

**APPENDIX B**  
**CITY OF WINNIPEG SPECIFICATIONS**



# APPROVED PRODUCTS FOR UNDERGROUND USE WITHIN THE CITY OF WINNIPEG



*Embrace the spirit • Vivez l'esprit*



## **LIST OF APPROVED PRODUCTS**

The City of Winnipeg is committed to ensuring that the citizens of Winnipeg are supplied with goods and materials which adhere to the highest national and international material standards as well as ensuring the maximum long-term value to the City's municipal water and wastewater infrastructure. In order to accomplish these goals the Water & Waste Department has developed and maintains a set of written product specifications. As such any product which is to be installed or used on any City municipal water and wastewater system must meet or exceed these specifications and be listed in the current edition of this document.

For detailed specifications relating to construction and installation please refer to The City of Winnipeg – Standard Construction Specifications for Underground Use.

### **Products Approval Process**

As a component of the Water & Waste Department, the Asset Management Branch is directly responsible for the review and approval of all municipal water and wastewater infrastructure products. In order to be incorporated into the Approved Products List applicants must submit all of the information and requirements listed in the [Guidelines for Product Approval](#) to the Asset Management Branch, Product Approvals Technologist. Once the Product Approvals Technologist has received the necessary information, the product and documentation will be reviewed to ensure compliance with the City's specifications. Following completion of this review, all information and recommendations will be submit to the Asset Management Engineer and then to the Underground Materials Review Committee for consideration.

### **Materials Testing**

If a product is submitted for approval which does not meet the present City of Winnipeg Specifications but does present a technological improvement it may require independent laboratory testing to ascertain its effectiveness. The duration and type of testing will be at the discretion of the Asset Management Branch.

### **Innovative Products**

In the spirit of ensuring the long-term value to the City's municipal water and wastewater infrastructure and encouraging innovation the City will consider granting Temporary Product Approval for products which do not meet our current specifications provided that the product present a technological improvement. In order to be considered for Temporary Product Approval status the City requires that a certified Professional Engineer (P.Eng) assume responsibility in ensuring that the product is thoroughly reviewed and that all information be provided to the Water & Waste Department, Asset Management Branch. Temporary Product Approval status will only be granted on a project by project basis and wide spread approval will not be granted until the product has been proven to provide a benefit to the City. The issuing of temporary approval as well as the duration and type of testing required will be at the sole discretion of the Water and Waste Department.





## **THE CITY OF WINNIPEG - VILLE DE WINNIPEG**

**WATER AND WASTE DEPARTMENT - SERVICE DES EAUX ET DES DÉCHETS**

**ENGINEERING DIVISION - DIVISION DE L'INGÉNIERIE**

### **Approval or Rejection**

Following the review by the Underground Materials Review Committee and provided no further information is requested, the Asset Management Engineer or his designate will review the decision of the committee and all associated materials. Subsequent to this review the City will notify the applicant in writing, outlining its findings and decision.

The City's decision is final however applications will be re-assessed if further information is provided or if the reason for rejection has been rectified. If at any time an approved product fails to perform as specified it will be removed from the Product Approvals List and only reinstated once corrective action has been taken which will meet the requirements and approval of the Water and Waste Department.

All inquires; questions and/or requests for product approval must be made to the Asset Management Branch.

City of Winnipeg, Water & Waste Department  
Engineering Division, Asset Management Branch  
110-1199 Pacific Avenue  
Winnipeg, Manitoba R3E 3S8  
Tel: (204) 986-7638  
Fax: (204) 986-3745





# **WATER PRODUCTS**

Winnipeg



FILE CODE: 4.1.1.10

PRODUCT TYPE: **AWWA C900 PVC WATER PIPE (150mm – 300mm)**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

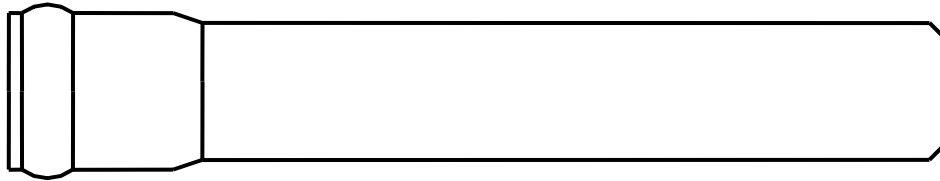
PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.10](#)

APPROVED PRODUCTS: [Ipex Inc.](#)

[Rehau Industries Inc.](#)

[Royal Pipe Systems](#)

[Northern Pipe Products Inc.](#)





FILE CODE: 4.1.1.10

PRODUCT TYPE: **AWWA C900 PVC WATER PIPE (150mm – 300mm)**

MANUFACTURER: Ipex Inc.

MODEL: Blue Brute

PRODUCT DESCRIPTION: AWWA C900, DR18, PVC Pressure Pipe in 150mm through 300mm CIOD.

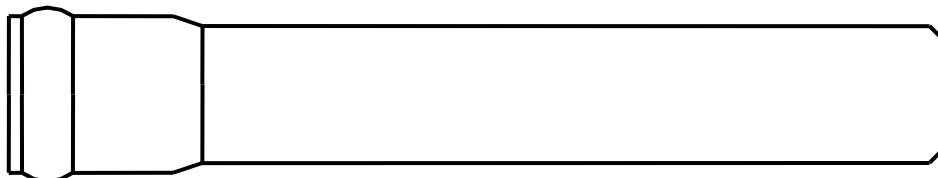
REQUIRED MARKINGS AND LOCATIONS: In stencil at no more than 5' intervals: Nominal diameter and OD base (ex: 6' CIOD), Blue Brute, PVC 1120, DR 18, CL 150, T600, NSF-PVC-cto-only SE, S907, FM, ULC (sticker), CSA B137.3, Production Code, Potable, PR 235, Made In Canada, MBT (or MBE).

INTERPRETATION: There are two types of production codes for this product, which can be interpreted as follows:

1. 1019E1C refers to the 1<sup>st</sup> day of the 01 month of 1991 at Edmonton, on the line (extruder) 1 shift C.
2. 1E2T2GH refers to the 1<sup>st</sup> day of January (months are alphabetical from E to R, skipping I and O, with E=January), 1992, at Toronto, on line (extruder) 2 shift GH.

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letters dated June 11, 1991, February 10, 1993 (name change from Scepter/Canron to Ipex).





FILE CODE: 4.1.1.10

PRODUCT TYPE: **AWWA C900 PVC WATER PIPE (150mm – 300mm)**

MANUFACTURER: Rehau Industries Inc.

MODEL: AquaLoc

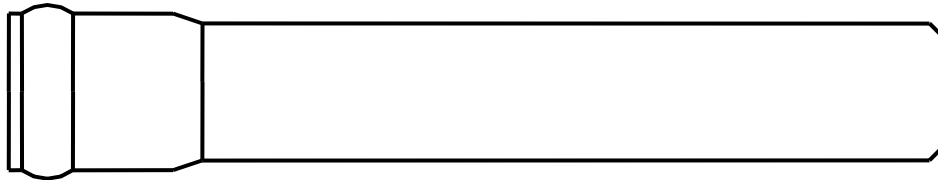
PRODUCT DESCRIPTION: AWWA C900, DR18, PVC Pressure Pipe in 150mm through 300mm CIOD.

REQUIRED MARKINGS AND LOCATIONS: Rehau, Nominal Diameter, DR/RD 18, PC 150, AWWA C900, CSA B137.3, NSF-61, Potable, Q 3624-250, TP600, Production Code, ULC (sticker).

INTERPRETATION: Production code 031192X2 refers to the 03 day of the 11 month of 1992, shift X2.

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letters dated June 25, 1991, March 11, 1992.





FILE CODE: 4.1.1.10

PRODUCT TYPE: **AWWA C900 PVC WATER PIPE (150mm – 300mm)**

MANUFACTURER: Royal Pipe Systems

MODEL: Royal Seal

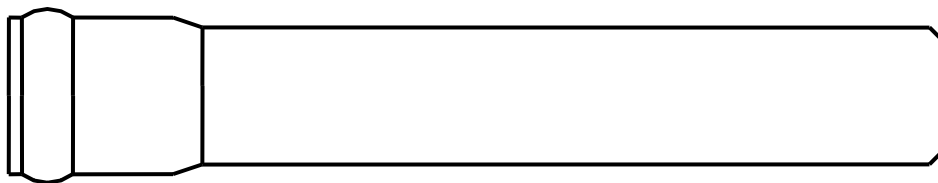
PRODUCT DESCRIPTION: AWWA C900, DR18, PVC Pressure Pipe in 150mm through 300mm CIOD.

REQUIRED MARKINGS AND LOCATIONS: Stenciled along the length of the pipe at no more than 5' intervals: Nominal Diameter, Crown Logo, Royal, DSLI Gasket, PVC 12454 B, AWWA C900, DR 18, PC 150 @ 23° C, T600 Psi, CSA 137.3, NSF-PVC-cto-only SE, FM Approved, ULC (sticker), Potable, BNQ (logo) 3624–250-0313, Production Code.

INTERPRETATION: Production code 2299115B refers to the 229 day of the year 1991, machine # 15 shift B.

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated November 15, 1991.





FILE CODE: 4.1.1.10

PRODUCT TYPE: **AWWA C900 PVC WATER PIPE (150mm – 300mm)**

MANUFACTURER: Northern Pipe Products Inc.

MODEL: N/ A

PRODUCT DESCRIPTION: AWWA C900, DR18, PVC Pressure Pipe in 150mm through 300mm CIOD.

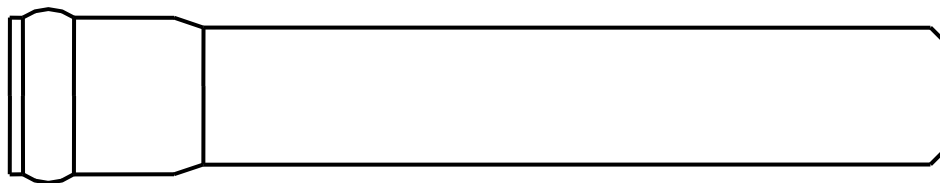
REQUIRED MARKINGS AND LOCATIONS: Stenciled along the length of the pipe at no more than 5' intervals: Northern, Size CIOD, DR18, PC 150 @ 73° F, T600, PVC 1120, AWWA C900, PW, UL Listed, 1AU1, PVC Pipe for Underground Watermains, B137 CSA, FM, NSF-61, Production Code.

INTERPRETATION: For interpretation of the production code:

Example: **110904R42NA** refers to; **11** = November, **09** = 9<sup>th</sup> day, **04** = 2004 and **R42NA** = material, extruder, shift, etc. (see file for explanation if needed)

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated January 21, 2003.





FILE CODE: 4.1.1.11

PRODUCT TYPE: **AWWA C905 LARGE DIAMETER PVC WATER PIPE (350mm – 500mm)**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

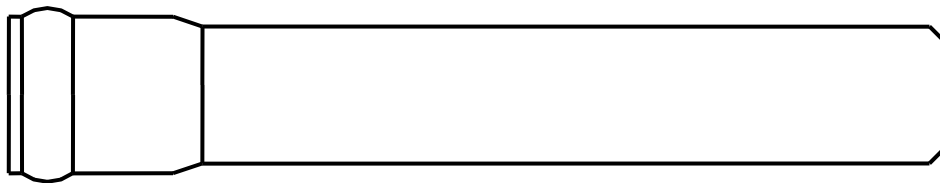
PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.11](#)

APPROVED PRODUCTS: [Ipex Inc.](#)

[Royal Pipe Systems](#)

[Northern Pipe Products Inc.](#)

[Rehau Industries Inc.](#)





FILE CODE: 4.1.1.11

PRODUCT TYPE: **AWWA C905 LARGE DIAMETER PVC WATER PIPE (350mm – 500mm)**

MANUFACTURER: Ipex Inc.

MODEL: Big Brute (formerly Centurion)

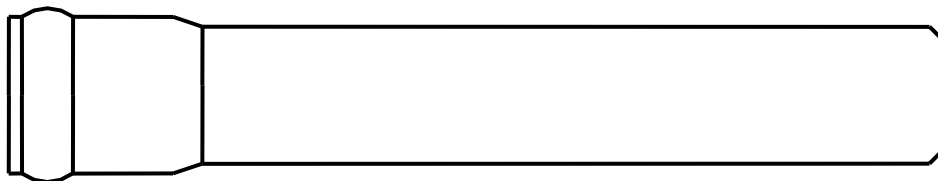
PRODUCT DESCRIPTION: AWWA C905, DR18, PVC Pressure Pipe in 350mm thru 500mm CIOD.

REQUIRED MARKINGS AND LOCATIONS: In stencil at no more than 5' intervals: Ipex, PVC 12454 B, CI, AWWA C905, PR235, DR 18, FM, NSF 14, CSA B137.3, Potable, T407, Production Code, ULC (sticker).

INTERPRETATION: Production code L931028 refers to L= Brossard Qb., 1993, 10 month, 28 day.

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated October 28, 1993.





FILE CODE: 4.1.1.11

PRODUCT TYPE: **AWWA C905 LARGE DIAMETER PVC WATER PIPE (350mm – 500mm)**

MANUFACTURER: Royal Pipe Systems

MODEL: Royal Seal

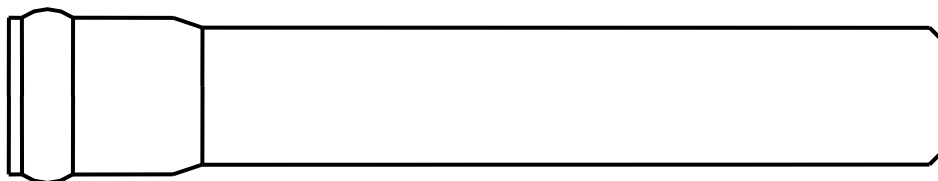
PRODUCT DESCRIPTION: AWWA C905, DR18, PVC Pressure Pipe in 350mm thru 500mm CIOD.

REQUIRED MARKINGS AND LOCATIONS: In stencil at no more than 5' intervals: 14", 350mm CI, Royal Crown, Royal Pipe Systems, DSLI Gasket, Eau, Potable, PVC 12454 B, AWWA C905, DR 18, PR 235 psi, 1620 kPa @ 23° C, T460 psi, CSA 137.3, NSF61, BNQ, NQ 3624-250 0313, FM, ULC, Made in/Fabrique au Canada, W-032 01 13 16.

INTERPRETATION: Production code indicates the day of the year (032), the year (01), the 13<sup>th</sup> hour (13), and extruder # 16 (16).

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated April 26, 2002.





FILE CODE: 4.1.1.11

PRODUCT TYPE: **AWWA C905 LARGE DIAMETER PVC WATER PIPE (350mm – 500mm)**

MANUFACTURER: Northern Pipe Products Inc.

MODEL: N/A

PRODUCT DESCRIPTION: AWWA C905, DR18, PVC Pressure Pipe in 350mm thru 500mm CIOD.

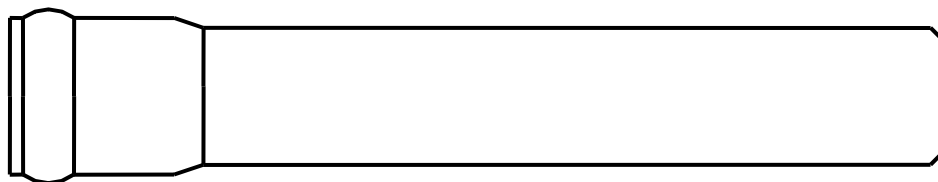
REQUIRED MARKINGS AND LOCATIONS: Stenciled along the length of the pipe at no more than 5' intervals: Northern, 14" CIOD, DR18, PC 235 @ 73°F, T470, PVC 1120, AWWA C905, PW, UL Listed, 1AU1, PVC Pipe for Underground Watermains, B137 CSA, FM, NSF-61, Production Code.

INTERPRETATION: For interpretation of the production code:

Example: **110904R42NA** refers to; **11** = November, **09** = 9<sup>th</sup> day, **04** = 2004 and **R42NA** = material, extruder, shift, etc. (see file for explanation if needed)

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated January 21, 2003.





FILE CODE: 4.1.1.11

PRODUCT TYPE: **AWWA C905 LARGE DIAMETER PVC WATER PIPE (350mm – 500mm)**

MANUFACTURER: Rehau Industries Inc.

MODEL: AquaLoc

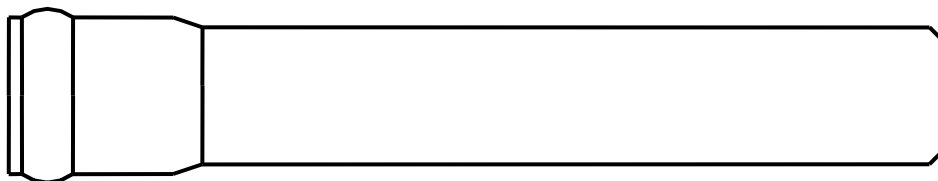
PRODUCT DESCRIPTION: AWWA C905, DR18, PVC Pressure Pipe in 350mm thru 500mm CIOD.

REQUIRED MARKINGS AND LOCATIONS: Stenciled along the length of the pipe at no more than 5' intervals: Rehau AquaLoc, 16" – 400mm CI, PVC 1120, DR/ RD18, PC 150, AWWA C905, (CSA Logo) B137.3, NSF 61 Logo, 340 NQ3624-250 (BNQ Logo) 465 NQ3660-950, TP600, ULC Logo, FM Warnock Hershey, Potable, Day, Month, Year, Shift, Operator Name, Extruder #, P Made in Canada.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated January 27, 2003.





FILE CODE: 4.1.1.60

PRODUCT TYPE: **AWWA C110 MAIN LINE IRON FITTINGS**

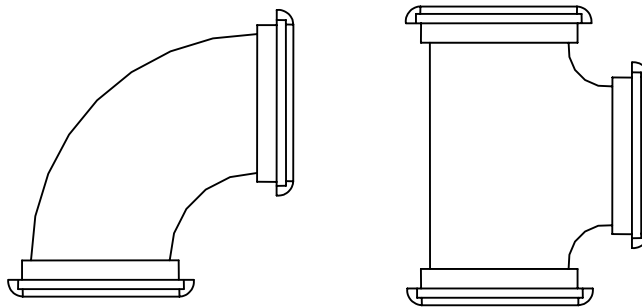
STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.60](#)

APPROVED PRODUCTS: [Sigma Corporation](#)

[Terminal City Iron Works \(ACS\) Inc.](#)





FILE CODE: 4.1.1.60

PRODUCT TYPE: **AWWA C110 MAIN LINE IRON FITTINGS**

MANUFACTURER: Sigma Corporation

MODEL: Tyton Joint

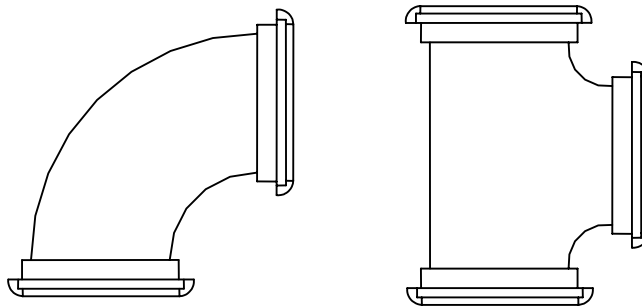
PRODUCT DESCRIPTION: AWWA C110 Gray and Ductile Iron Watermain Fittings, 150mm thru 500mm.

REQUIRED MARKINGS AND LOCATIONS: Gray Iron Fittings: Pressure Rating, Nominal Diameters of Openings, Manufacturer, Country Where Cast. Ductile Iron Fittings: Pressure Rating, Nominal Diameters of Openings, Manufacturer, Country Where Cast, "Ductile" or "DI"

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Shall be consistent with the requirements of the City of Winnipeg Standard Construction Specifications. PVC C900 injection moulded fittings are to be used preferentially if manufactured, see CoW Specification AT- 4.1.1.61.

NOTE: For complete product information, refer to the product approval letter dated July 20, 2004.





FILE CODE: 4.1.1.60

PRODUCT TYPE: **AWWA C110 MAIN LINE IRON FITTINGS**

MANUFACTURER: Terminal City Iron Works (ACS) Inc

MODEL: TC Tyton Fittings

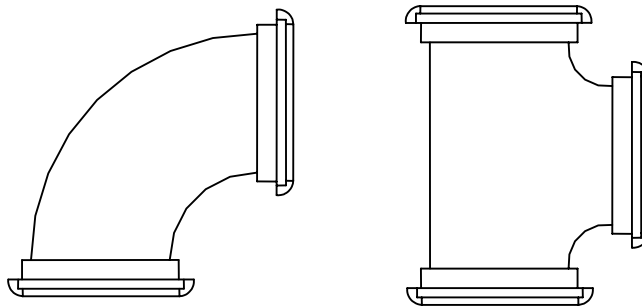
PRODUCT DESCRIPTION: AWWA C110 Gray and Ductile Iron Watermain Fittings, 150mm thru 500mm.

REQUIRED MARKINGS AND LOCATIONS: Gray Iron Fittings: Pressure Rating, Nominal Diameters of Openings, Manufacturer, Country Where Cast. Ductile Iron Fittings: Pressure Rating, Nominal Diameters of Openings, Manufacturer, Country Where Cast, "Ductile" or "DI"

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Shall be consistent with the requirements of the City of Winnipeg Standard Construction Specifications. PVC C900 injection moulded fittings are to be used preferentially if manufactured, see specification # 4.1.1.61.

NOTE: For complete product information, refer to the product approval letter dated March 13, 2008.





FILE CODE: 4.1.1.61

PRODUCT TYPE: **AWWA C907 - INJECTION MOULDED PVC FITTINGS AND COUPLINGS**

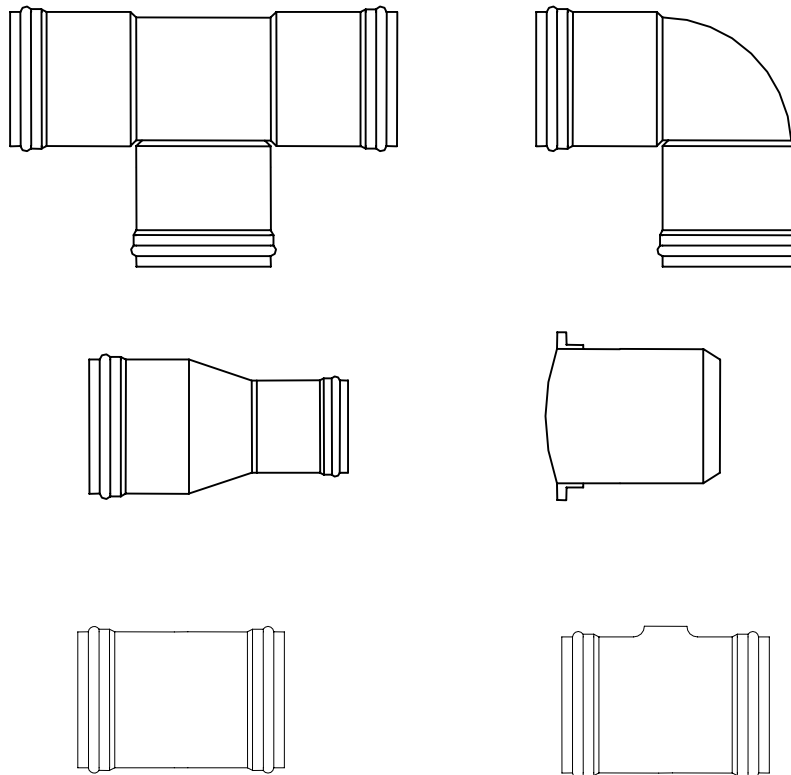
STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.61](#)

APPROVED PRODUCTS: [Ipex Inc.](#)

[Royal Pipe Systems](#)





FILE CODE: 4.1.1.61

PRODUCT TYPE: **AWWA C907 - INJECTION MOULDED PVC FITTINGS AND COUPLINGS**

MANUFACTURER: Ipex Inc.

MODEL: Blue Brute

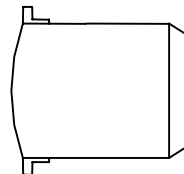
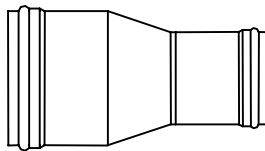
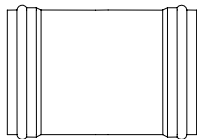
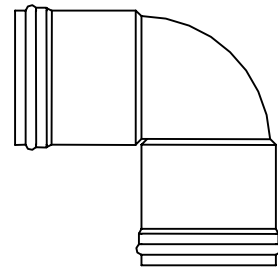
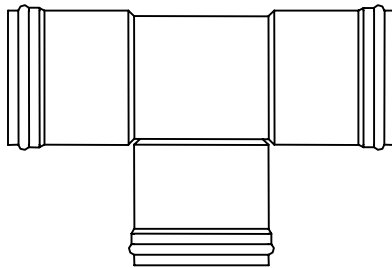
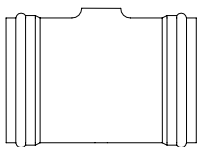
PRODUCT DESCRIPTION: PVC Injection Moulded Fittings in 150 & 200mm Tees and Bends, and 150mm – 300mm plugs, Stop and Repair Couplings in 150mm, 200mm, 250mm, and 300mm sizes, Tapped Couplings in 150mm and 200mm sizes.

Required Markings and Locations: Ipex, Nominal Diameter, Number of Degrees (bends only), Class 150, CIOD, PVC, Made in Canada, CSA B137.3, AWWA C907, FM, UL Listed 76S7, NSF61, Non-metallic PVC Fittings for Underground Watermains, Thrust Restraint Required, Bermondsey Road, Date, Production Code.

Interpretation: Production Code 234 refers to shift 2, injection mould 3, machine 4.

Installation Procedures: Apply supplied lubricant to the spigot end of the pipe. The spigot must be factory or field chamfered to the required 15°. Snug the spigot against the gasket to ensure concentric entry. Be sure to keep the bell free of bedding material. The correct insertion depth in fitting bells differs from that in pipe bells. Ignore the factory applied insertion mark on the pipe.

Note: For complete product information, refer to the product approval letters dated March 11, 1994 (Tees & Bends), March 11, 1994 (150mm to 300mm Stop & Repair Couplings), October 31, 1995, (150mm and 200mm Tapped Couplings), July 29, 1996 (250 & 300mm Plugs), January 30, 1996 (150 & 200mm Plugs).





FILE CODE: 4.1.1.61

PRODUCT TYPE: **AWWA C907 - INJECTION MOULDED PVC FITTINGS AND COUPLINGS**

MANUFACTURER: Royal Pipe Systems (Harco Fittings Inc.)

MODEL: Royal Seal

PRODUCT DESCRIPTION:

- Repair Coupling: 150 and 200;
- 90°, 45° 22 ½ ° and 11 ¼ ° Bends: 150 and 200;
- Tee: 150 x 150, 200 x 150, 200 x 200;
- Tapped Plug (threaded): 150 x 20, 150 x 25, 150 x 38, 150 x 50, 200 x 20, 200 x 25, 200 x 38, 200 x 50;
- Tapped Tee (threaded): 150 x 20, 150 x 25, 150 x 38, 150 x 50, 200 x 20, 200 x 25, 200 x 38, 200 x 50;
- Line Coupling: 150 and 200 ;
- Plug: 150 and 200;
- Reducer : 200 x 150;
- Caps: 150 and 200.

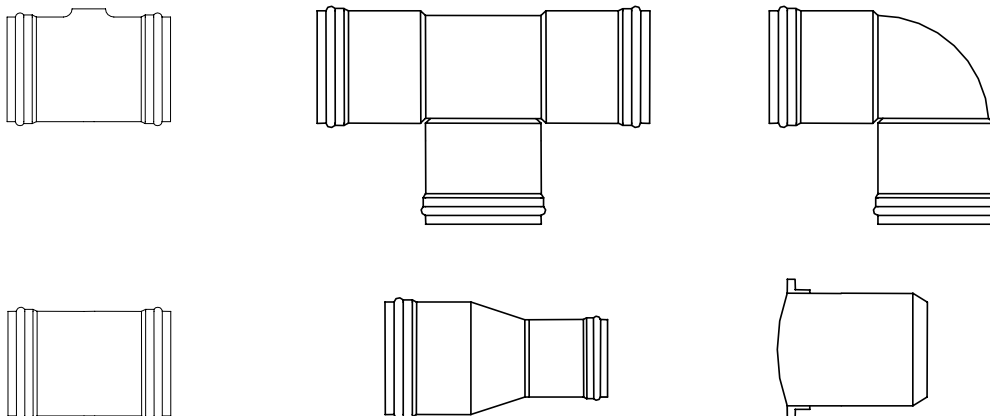
\*\*All sizes are in millimeters (mm)

Required Markings and Locations: HARCO, CL150, C.I. Size, PVC, ASTM 3139, Warnock Hersey Symbol, CSA B137.2, PC 150, PR 235 1620 Kpa, AWWA C907, NSF 61

Interpretation: n/a

Installation Procedures: As per manufacturer recommendations and City of Winnipeg Standard Construction Specification, CW-2110.

Note: For complete product information, refer to the product approval letter dated March 11, 2011.





FILE CODE: 4.1.1.63

PRODUCT TYPE: **MAIN LINE DUCTILE IRON WIDE RANGE COUPLINGS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110

APPROVED PRODUCT DRAWING REFERENCE: N/A

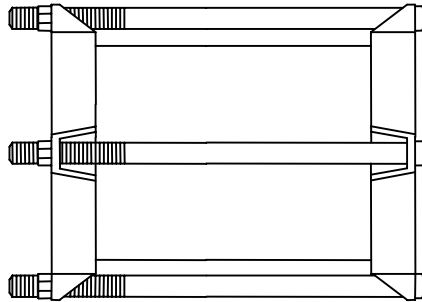
PRODUCT APPROVAL SPECIFICATION REFERENCE: **AT-4.1.1.63**

APPROVED PRODUCTS: **Romac Industries**

**The Ford Meter Box Company, Inc.**

**Smith-Blair Inc.**

**Mueller**





FILE CODE: 4.1.1.63

PRODUCT TYPE: **WIDE RANGE EPOXY COATED DUCTILE IRON COUPLINGS**

MANUFACTURER: Romac Industries

MODEL: XR501

PRODUCT DESCRIPTION: Epoxy Coated Wide Range Ductile Iron Couplings in Nominal Sizes 100mm thru 300mm

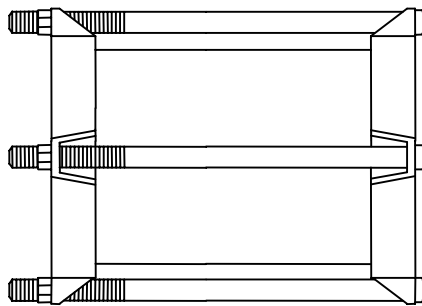
REQUIRED MARKINGS AND LOCATIONS: Gaskets: Manufacturer, Coupling O.D. Range, Coupling Model, Nominal Size. Body: Manufacturers Name, O.D Range, Nominal Size, Model. End Rings: Manufacturers Name, O.D Range.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Thoroughly clean approx. 6" of each pipe end to a bare smooth surface. Lubricate the pipe surface and gasket. Stab each pipe into the coupling. It may be necessary to loosen the nuts when assembling on larger O.D. pipes. **Disassembly of the coupling is not required.** For more detail refer to the manufacturers installation instructions supplied with each coupling.

NOTE: For complete product information, refer to the product approval letter dated July 12, 2004.

## WIDE RANGE EPOXY COATED COUPLING





FILE CODE: 4.1.1.63

PRODUCT TYPE: **WIDE RANGE EPOXY COATED DUCTILE IRON COUPLINGS**

MANUFACTURER: Ford Meter Box Co.

MODEL: FC2W-WIN

PRODUCT DESCRIPTION: Epoxy Coated Wide Range Ductile Iron Couplings in Nominal Sizes 100mm thru 300mm

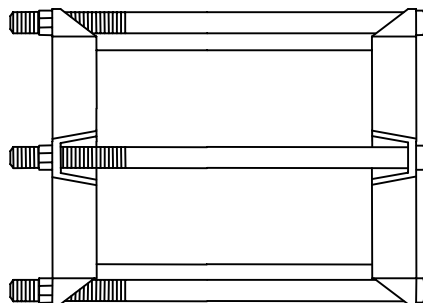
REQUIRED MARKINGS AND LOCATIONS: Gaskets: Manufacturer, Coupling O.D. Range, Coupling Model, Nominal Size. Body: Manufacturers Name, O.D Range, Nominal Size, Model. End Rings: Manufacturers Name, O.D Range.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Thoroughly clean approx. 5" of each pipe end to a bare smooth surface. Stab each pipe into the coupling. It may be necessary to loosen the nuts when assembling on larger O.D. pipes. **Disassembly of the coupling is not required.** Do not lubricate the pipe or gasket. For more detail refer to the manufacturers installation instructions supplied with each coupling.

NOTE: For complete product information, refer to the product approval letter dated July 21, 2004.

## WIDE RANGE EPOXY COATED COUPLING





FILE CODE: 4.1.1.63

PRODUCT TYPE: **WIDE RANGE EPOXY COATED DUCTILE IRON COUPLINGS**

MANUFACTURER: Smith-Blair Inc

MODEL: Quantum Model 462

PRODUCT DESCRIPTION: Epoxy Coated Wide Range Ductile Iron Couplings in Nominal Sizes 100mm thru 300mm

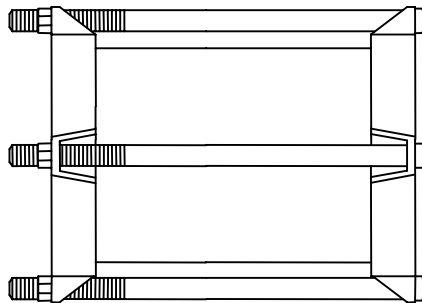
REQUIRED MARKINGS AND LOCATIONS: Gaskets: Manufacturer, Coupling O.D. Range, Coupling Model, Nominal Size. Body: Manufacturers Name, O.D Range, Nominal Size, Model. End Rings: Manufacturers Name, O.D Range.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Thoroughly clean working area of each pipe end to a bare smooth surface. Stab each pipe into the coupling. It may be necessary to loosen the nuts when assembling on larger O.D. pipes. **Disassembly of the coupling is not required.** Do not lubricate the pipe or gasket. For more detail refer to the manufacturers installation instructions supplied with each coupling.

NOTE: For complete product information, refer to the product approval letter dated August 12, 2005.

## WIDE RANGE EPOXY COATED COUPLING





FILE CODE: 4.1.1.63

PRODUCT TYPE: **WIDE RANGE EPOXY COATED DUCTILE IRON COUPLINGS**

MANUFACTURER: Mueller Canada

MODEL: Maxi-Range Coupling

PRODUCT DESCRIPTION: Rislan Nylon 11 Coated Wide Range Ductile Iron Couplings in Nominal Sizes 100mm thru 300mm

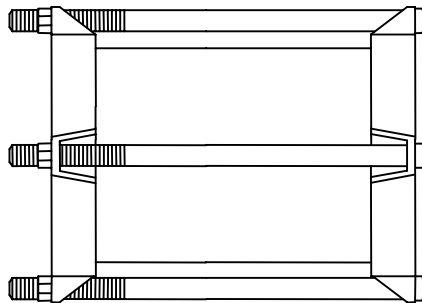
REQUIRED MARKINGS AND LOCATIONS: Gaskets: Manufacturer, Coupling O.D. Range, Body: Manufacturers Name, O.D Range, Nominal Size, Model. End Rings: Manufacturers Name, O.D Range.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Thoroughly clean working area of each pipe end to a bare smooth surface. Stab each pipe into the coupling. It may be necessary to loosen the nuts when assembling on larger O.D. pipes. **Disassembly of the coupling is not required.** Do not lubricate the pipe or gasket. For more detail refer to the manufacturers installation instructions supplied with each coupling.

NOTE: For complete product information, refer to the product approval letter dated January 1, 2011.

## WIDE RANGE EPOXY COATED COUPLING





FILE CODE: 4.1.1.64

PRODUCT TYPE: **FABRICATED PVC WATERMAIN FITTINGS (150mm to 300mm)**

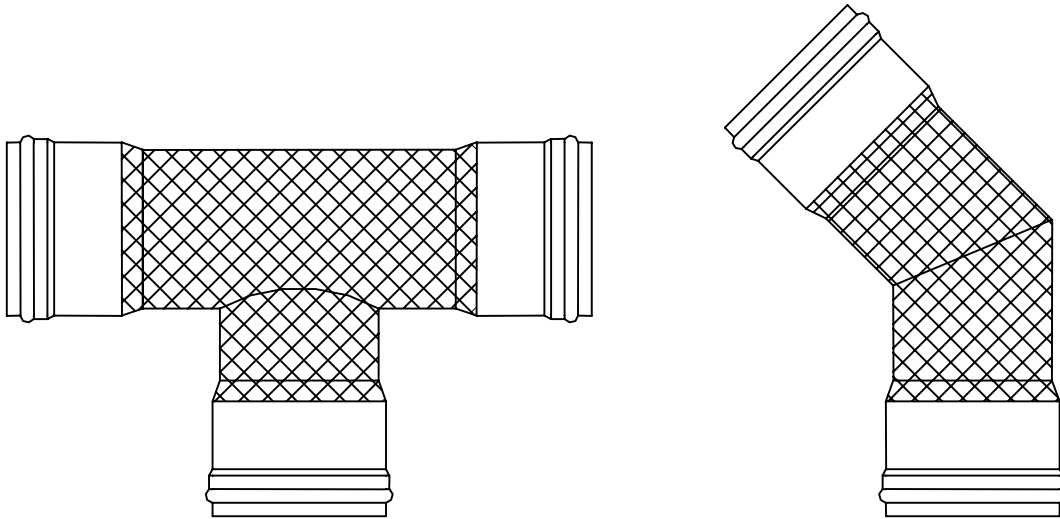
STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.64](#)

APPROVED PRODUCTS: [Ipex Inc.](#)

[Royal Pipe Systems](#)





FILE CODE: 4.1.1.64

PRODUCT TYPE: **FABRICATED PVC WATERMAIN FITTINGS (150mm to 300mm)**

MANUFACTURER: Ipex Inc.

MODEL: Blue Brute

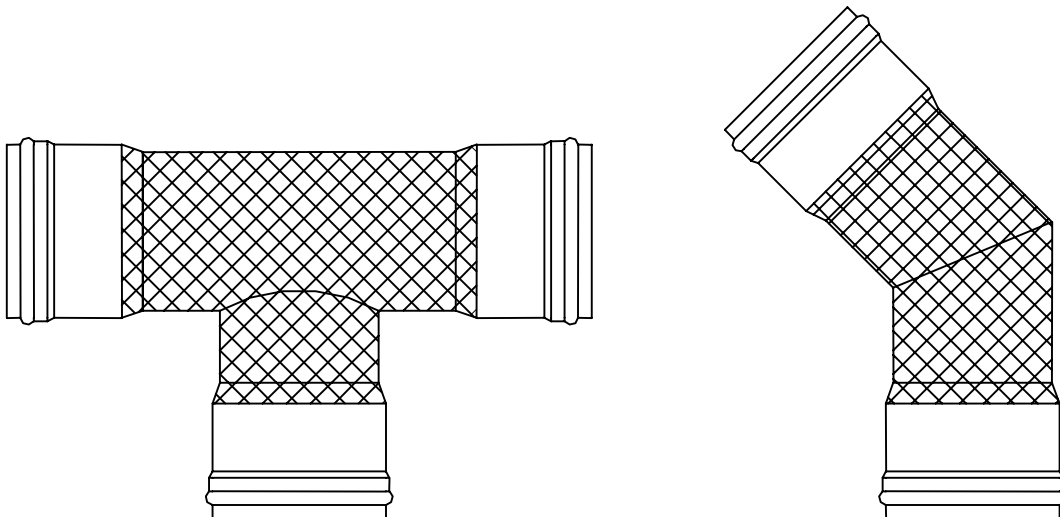
PRODUCT DESCRIPTION: AWWA C900, CSA B137.3, DR18, PVC Fabricated Fittings in 150mm and 300mm CIOD.

REQUIRED MARKINGS AND LOCATIONS: Part #, CSA Fabricated PVC Fittings, Nominal Size and Bend Angle (if required), Fitting Type, 235psi, CSA No B137.3, Date, Made in Canada.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 42 months after the date of manufacture. Refer to installation manual \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letters dated February 17, 2005 and February 21, 2006.





FILE CODE: 4.1.1.64

PRODUCT TYPE: **FABRICATED PVC WATERMAIN FITTINGS (150mm to 300mm)**

MANUFACTURER: Royal Pipe Systems

MODEL: Royal Seal

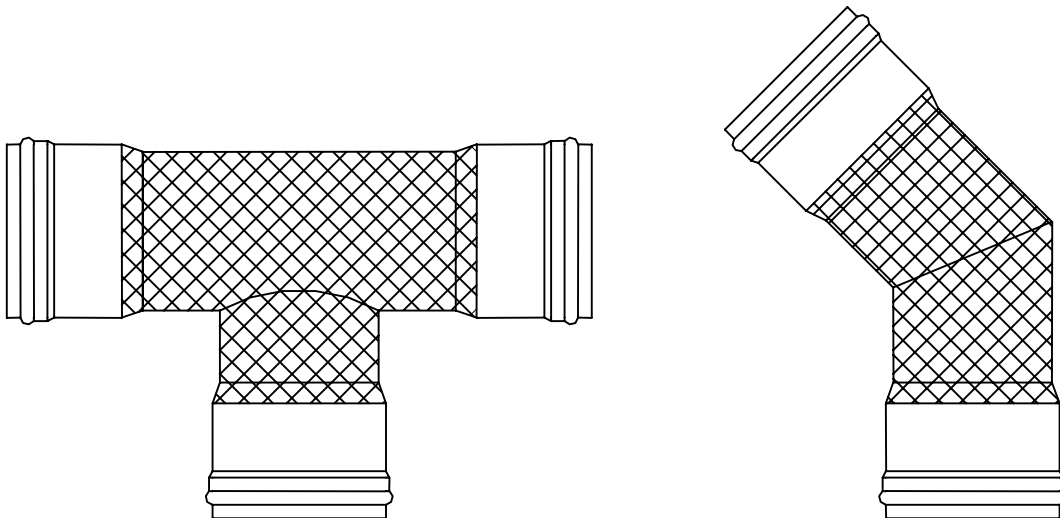
PRODUCT DESCRIPTION: AWWA C900, CSA B137.3, DR18, PVC Fabricated Fittings in 150mm and 300mm CIOD.

REQUIRED MARKINGS AND LOCATIONS: Part #, Manufacturer, Nominal Size and Bend Angle (if required), Fitting Type, 600psi, CSA No B137.3, Warnock Hersey, Date, Made in Canada.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 42 months after the date of manufacture. Refer to installation manual. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letters dated June 16, 2005 and February 21, 2006.





FILE CODE: 4.1.1.65

PRODUCT TYPE: **MAIN LINE IRON COUPLINGS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.65](#)

APPROVED PRODUCTS: [Romac Industries Ltd. \(501 and RC501\)](#)

[Robar Industries \(1506\)](#)

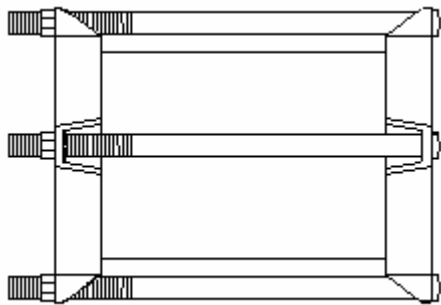
[Robar Industries \(1506R\)](#)

[Ford Meter Box Co. \(FC1 and FC2A\)](#)

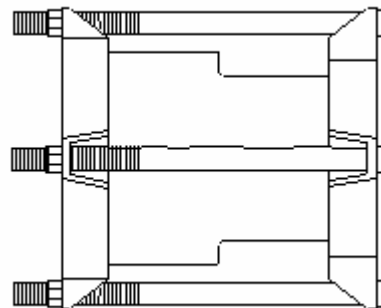
[Ford Meter Box Co. \(FRC\)](#)

[Smith Blair Inc \(Omni Models 441, R441, 442, 437 and 482\)](#)

### **STRAIGHT AND TRANSITION COUPLING**



### **REDUCING COUPLING**





PRODUCT TYPE: **MAIN LINE IRON COUPLINGS**

MANUFACTURER: Romac Industries Ltd.

MODEL: Straight and Transition – 501  
Reducing – RC501

PRODUCT DESCRIPTION: Straight and Transition Epoxy Coated Ductile Iron Coupling in Nominal Sizes 100mm x 100mm through 600mm x 600mm, and Reducing Couplings in Nominal Sizes 100mm through 600mm.

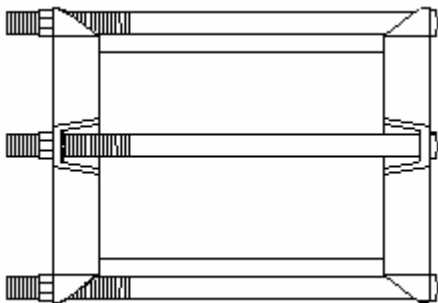
REQUIRED MARKINGS AND LOCATIONS: Gaskets is to be labeled as follows: Romac USA 501 SBR, Gasket Size Range, End Ring Color Code, Production Code, Year and Month of Manufacture. Bolt heads shall be marked with an “R” for Romac.

INTERPRETATION: N/A

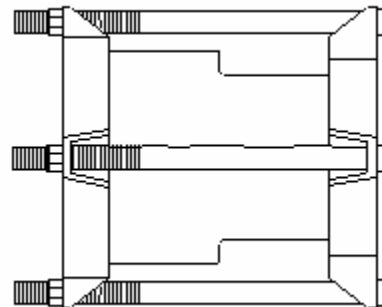
INSTALLATION PROCEDURES: Clean all pipe surfaces thoroughly. Place end ring(s) and gasket(s) on pipe ends. Place sleeve on one pipe end. Align pipe ends and assemble the coupling over the joint. Tighten the nuts to the manufacturers specifications. For more detail refer to the manufacturers installation instructions supplied with each coupling.

NOTE: For complete product information, refer to the product approval letter dated December 3, 1991 and January 1, 2007.

#### **STRAIGHT AND TRANSITION COUPLING**



#### **REDUCING COUPLING**





FILE CODE: 4.1.1.65

PRODUCT TYPE: **MAIN LINE IRON COUPLINGS**

MANUFACTURER: Robar Industries

MODEL: 1506

PRODUCT DESCRIPTION: Straight and Transition Epoxy Coated Ductile Iron Coupling in Nominal Sizes 100mm x 100mm through 600mm x 600mm.

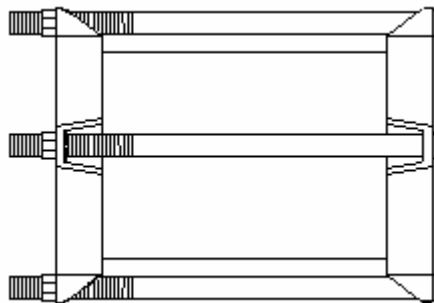
REQUIRED MARKINGS AND LOCATIONS: Gaskets are to be marked in yellow with production date code. Robar and nominal size shall be cast in tabs on the part line of all center sleeves. Bolt heads are to be marked PB.

INTERPRETATION: Production code 2002 refers to the year1992, day 002.

INSTALLATION PROCEDURES: Clean all pipe surfaces thoroughly. Place end ring(s) and gasket(s) on pipe ends. Place sleeve on one pipe end. Align pipe ends and assemble the coupling over the joint. Tighten the nuts to the manufacturers specifications. For more detail refer to the manufacturers installation instructions supplied with each coupling.

NOTE: For complete product information, refer to the product approval letter dated November 20, 2006.

### **STRAIGHT AND TRANSITION COUPLING**





FILE CODE: 4.1.1.65

PRODUCT TYPE: **MAIN LINE IRON COUPLINGS**

MANUFACTURER: Robar Industries

MODEL: 1506R

PRODUCT DESCRIPTION: Reducing Epoxy Coated Ductile Iron Coupling in Nominal Sizes 100mm through 600mm.

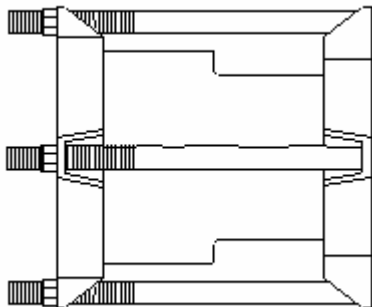
REQUIRED MARKINGS AND LOCATIONS: Gaskets are to be marked in yellow with production date code. Robar and nominal size shall be cast in tabs on the part line of all center sleeves. Bolt heads are to be marked PB.

INTERPRETATION: Production code 2002 refers to the year 2002, day 002.

INSTALLATION PROCEDURES: Clean all pipe surfaces thoroughly. Place end ring(s) and gasket(s) on pipe ends. Place sleeve on one pipe end. Align pipe ends and assemble the coupling over the joint. Tighten the nuts to the manufacturers specifications. For more detail refer to the manufacturers installation instructions supplied with each coupling.

NOTE: For complete product information, refer to the product approval letter dated November 20, 2006.

## REDUCING COUPLING





FILE CODE: 4.1.1.65

PRODUCT TYPE: **MAIN LINE IRON COUPLINGS**

MANUFACTURER: Ford Meter Box Co.

MODEL: Straight Coupling - FC1  
Transition Coupling - FC2A

PRODUCT DESCRIPTION: Straight and Transition Epoxy Coated Ductile Iron Couplings in Nominal Sizes 100mm x 100mm through 600mm x 600mm.

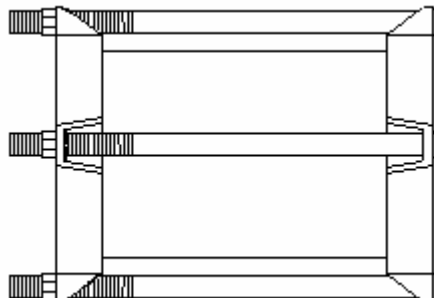
REQUIRED MARKINGS AND LOCATIONS: Gaskets shall be labeled as follows: Moulded: Ford Style No. FC1G or FC2AG, Gasket Size Range in Inches. Ink Stamped: month-day-year. End ring information to be cast into the face of each ring.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Clean all pipe surfaces thoroughly. Place end ring(s) and gasket(s) on pipe ends. Place sleeve on one pipe end. Align pipe ends and assemble the coupling over the joint. Tighten the nuts to the manufacturers specifications. For more detail refer to the manufacturers installation instructions supplied with each coupling.

NOTE: For complete product information, refer to the product approval letter dated January 20, 1992 and January 1, 2007.

### **STRAIGHT AND TRANSITION COUPLING**





FILE CODE: 4.1.1.65

PRODUCT TYPE: **MAIN LINE IRON COUPLINGS**

MANUFACTURER: Ford Meter Box Co.

MODEL: FRC

PRODUCT DESCRIPTION: Reducing Epoxy Coated Ductile Iron Couplings in Nominal Sizes 150mm x 100mm, 200mm x 150mm, 250mm x 200mm, and 300mm x 250mm.

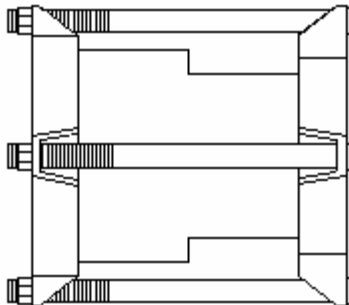
REQUIRED MARKINGS AND LOCATIONS: Gaskets shall be labeled as follows: Moulded: Ford, Gasket Size Range in Inches. Ink Stamped: month-day-year. End ring information shall be applied to the end ring in white paint.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Clean all pipe surfaces thoroughly. Place end ring(s) and gasket(s) on pipe ends. Place sleeve on one pipe end. Align pipe ends and assemble the coupling over the joint. Tighten the nuts to the manufacturers specifications. For more detail refer to the manufacturers installation instructions supplied with each coupling.

NOTE: For complete product information, refer to the product approval letter dated February 17, 1992 and January 1, 2007.

## REDUCING COUPLING





PRODUCT TYPE: **MAIN LINE IRON COUPLINGS**

MANUFACTURER: Smith Blair Inc

MODEL: Omni Models 441, R441, and 442

PRODUCT DESCRIPTION: Straight and transitional Epoxy Coated Ductile Iron Couplings in Nominal Sizes 150mm x 150mm to 400mm x 400mm Reducing Epoxy Coated Ductile Iron Couplings in Nominal Sizes 150mm x 100mm, and 200mm x 150mm.

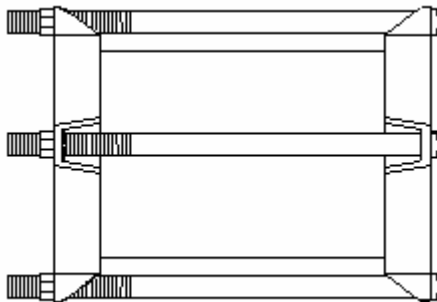
REQUIRED MARKINGS AND LOCATIONS: Gaskets shall be labeled as follows: Moulded: Smith Blair, Gasket Size Range in Inches, model number and year of manufacture. End ring information shall be stamped into the end ring.

INTERPRETATION: N/A

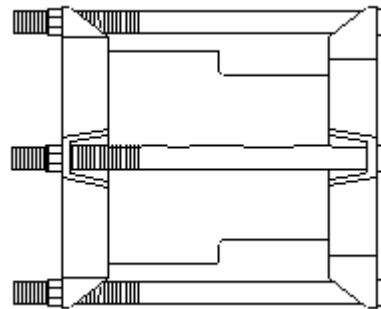
INSTALLATION PROCEDURES: Clean working area of pipe ends. Place coupling flanges on pipe ends. Clean gaskets and install with lubricant suitable for potable water systems. Beveled edge of gasket should face pipe ends. Center coupling over pipe ends while maintaining the recommended gap (see installation instructions). Slide gaskets against sleeve followed by flanges. Tighten the nuts to the manufacturer's specifications. For more detail refer to the manufacturers installation instructions supplied with each coupling.

NOTE: For complete product information, refer to the product approval letter dated November 23, 2005 and January 1, 2007.

**STRAIGHT AND TRANSITION  
COUPLING**



**REDUCING COUPLING**





FILE CODE: 4.1.1.69

PRODUCT TYPE: **STAINLESS STEEL REPAIR CLAMPS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.69](#)

APPROVED PRODUCTS: [Romac Industries Ltd.](#)

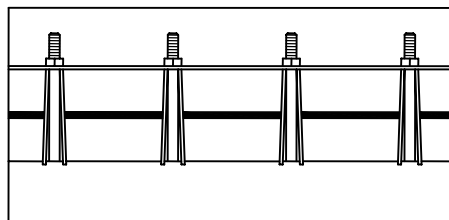
[Clow Canada](#)

[Robar Industries](#)

[Ford Meter Box Co.](#)

[Canada Pipeline Accessories \(1986\) Corp.](#)

[Kraus Industries Ltd.](#)





FILE CODE: 4.1.1.69

PRODUCT TYPE: **STAINLESS STEEL REPAIR CLAMP**

MANUFACTURER: Romac Industries Ltd.

MODEL: One Section - SS1  
Two Section - SS2  
Three Section - SS3

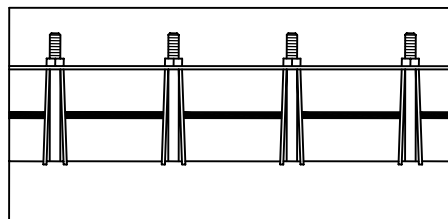
PRODUCT DESCRIPTION: Stainless Steel Repair Clamps.

REQUIRED MARKINGS AND LOCATIONS: Etched or stenciled on clamp: Make, Model, Range of Diameter, Size of Threaded Outlet (if app.), Direction of Rotation (if app.) ex: →, Production Year.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Scrape the pipe to remove as much dirt and corrosion as possible so that the surface is as smooth as possible. Ensure that the gasket is free of foreign matter and that nothing becomes lodged between the gasket and the pipe. Back off the nuts to the top of the bolts but do not remove. Lubricate the gasket. Place the clamp on the pipe so that the nuts are in the easiest tightening position. Slide the lift bar up the profile of the receiver lug until the lifter bar with the nuts snaps into place. Tighten the nuts evenly to the manufacturer's specification supplied with the product. For more details, refer to the instructions supplied with each clamp.

NOTE: For complete product information, refer to the product approval letter dated January 21, 1986.





FILE CODE: 4.1.1.69

PRODUCT TYPE: **STAINLESS STEEL REPAIR CLAMP**

MANUFACTURER: Clow Canada

MODEL: Concord D76R

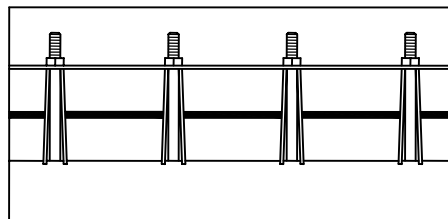
PRODUCT DESCRIPTION: One Section, Two Section, and Three Section Stainless Steel Repair Clamps.

REQUIRED MARKINGS AND LOCATIONS: Etched or stenciled on clamp: Make, Model, Range of Diameter, Size of Threaded Outlet (if app.), Direction of Rotation (if app.) ex: →, Production Year.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Scrape the pipe to remove as much dirt and corrosion as possible so that the surface is as smooth as possible. Ensure that the gasket is free of foreign matter and that nothing becomes lodged between the gasket and the pipe. Back off the nuts to the top of the bolts but do not remove. Lubricate the gasket. Place the clamp on the pipe so that the nuts are in the easiest tightening position. Slide the lift bar up the profile of the receiver lug until the lifter bar with the nuts snaps into place. Tighten the nuts evenly to the manufacturer's specification supplied with the product. For more details, refer to the instructions supplied with each clamp.

NOTE: For complete product information, refer to the product approval letters dated November 13, 1985, May 2, 1995 (name of manufacturer changed).





FILE CODE: 4.1.1.69

PRODUCT TYPE: **STAINLESS STEEL REPAIR CLAMP**

MANUFACTURER: Robar Industries Ltd.

MODEL: One Section - 5616  
Two Section - 5626  
Three Section - 5636

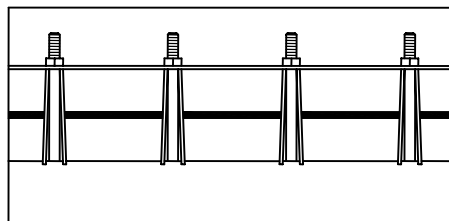
PRODUCT DESCRIPTION: Stainless Steel Repair Clamps.

REQUIRED MARKINGS AND LOCATIONS: Etched or stenciled on clamp: Make, Model, Range of Diameter, Size of Threaded Outlet (if app.), Direction of Rotation (if app.) ex: →, Production Year.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Scrape the pipe to remove as much dirt and corrosion as possible so that the surface is as smooth as possible. Ensure that the gasket is free of foreign matter and that nothing becomes lodged between the gasket and the pipe. Back off the nuts to the top of the bolts but do not remove. Lubricate the gasket. Place the clamp on the pipe so that the nuts are in the easiest tightening position. Slide the lift bar up the profile of the receiver lug until the lifter bar with the nuts snaps into place. Tighten the nuts evenly to the manufacturer's specification supplied with the product. For more details, refer to the instructions supplied with each clamp.

NOTE: For complete product information, refer to the product approval letter and attachments dated April 8, 1986.





FILE CODE: 4.1.1.69

PRODUCT TYPE: **STAINLESS STEEL REPAIR CLAMP**

MANUFACTURER: Ford Meter Box Co.

MODEL: One Section - FS1  
Two Section - FS2  
Three Section - FS3

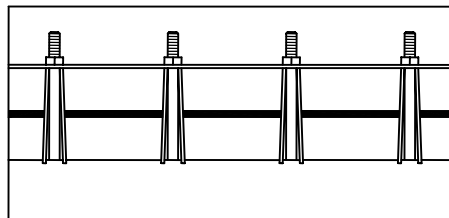
PRODUCT DESCRIPTION: Stainless Steel Repair Clamps.

REQUIRED MARKINGS AND LOCATIONS: Etched or stenciled on clamp: Make, Model, Range of Diameter, Size of Threaded Outlet (if app.), Direction of Rotation (if app.) ex:  $\rightarrow$ , Production Year.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Scrape the pipe to remove as much dirt and corrosion as possible so that the surface is as smooth as possible. Ensure that the gasket is free of foreign matter and that nothing becomes lodged between the gasket and the pipe. Back off the nuts to the top of the bolts but do not remove. Lubricate the gasket. Place the clamp on the pipe so that the nuts are in the easiest tightening position. Slide the lift bar up the profile of the receiver lug until the lifter bar with the nuts snaps into place. Tighten the nuts evenly to the manufacturer's specification supplied with the product. For more details, refer to the instructions supplied with each clamp.

NOTE: For complete product information, refer to the product approval letter dated January 17, 1994.





FILE CODE: 4.1.1.69

PRODUCT TYPE: **STAINLESS STEEL REPAIR CLAMP**

MANUFACTURER: Canada Pipeline Accessories (1986) Corp.

MODEL: One Section – CR-1  
Two Section – CR-2  
Three Section – CR-3

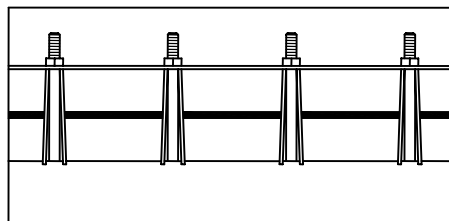
PRODUCT DESCRIPTION: Stainless Steel Repair Clamps.

REQUIRED MARKINGS AND LOCATIONS: Etched or stenciled on clamp: Make, Model, Range of Diameter, Size of Threaded Outlet (if app.), Direction of Rotation (if app.) ex:  $\rightarrow$ , Production Year.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Scrape the pipe to remove as much dirt and corrosion as possible so that the surface is as smooth as possible. Ensure that the gasket is free of foreign matter and that nothing becomes lodged between the gasket and the pipe. Back off the nuts to the top of the bolts but do not remove. Lubricate the gasket. Place the clamp on the pipe so that the nuts are in the easiest tightening position. Slide the lift bar up the profile of the receiver lug until the lifter bar with the nuts snaps into place. Tighten the nuts evenly to the manufacturer's specification supplied with the product. For more details, refer to the instructions supplied with each clamp.

NOTE: For complete product information, refer to the product approval letter and attachments dated August 2, 2005.





FILE CODE: 4.1.1.69

PRODUCT TYPE: **STAINLESS STEEL REPAIR CLAMP**

MANUFACTURER: Kraus Industries Ltd.

MODEL: EZ-Max Plus 4000 Series (with di-electric thermoset plastic rivets)

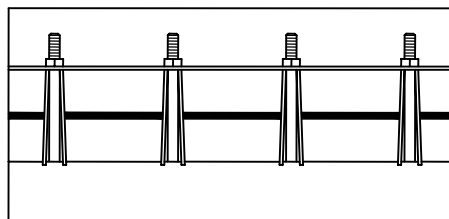
PRODUCT DESCRIPTION: Stainless Steel Repair Clamps.

REQUIRED MARKINGS AND LOCATIONS: Etched or stenciled on clamp: Make, Model, Range of Diameter, Size of Threaded Outlet (if app.), Direction of Rotation (if app.) ex:→, Production Year.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: **1.** Thoroughly de-scale and clean the outer pipe surface prior to wrapping the repair clamp around the pipe. The outer pipe surface should be free of dirt, corrosion and debris. **2.** If possible, place a reference mark on the pipe a measured distance from the break or leak to facilitate locating the clamp. **3.** With the bolts facing away from the installer, open the repair clamp by loosening the nuts, so they are flush with the tops of the bolts (removal of nuts is not required). Partially compress the lug assembly, pull upwards on the lug compression beam, and unlatch the lug assembly allowing the clamp to extend to a fully open position. **4.** Position the clamp around the pipe centered over or adjacent to the break or leak. **5.** Make sure that the tapered end of the gasket is on surface of the pipe, and is smoothly in place. It is recommended to use pipe lubricant on the gasket prior to wrapping the repair clamp around the damaged area of the pipe. This insures the gasket will slide easily on the pipe if installed next to the break or damaged area. **6.** Once the band is around the pipe, re-engage the compression beam over the lug assembly by pushing it forward until it clicks in place twice. Tighten the compression nuts, finger tight, making sure the lug centering pins are aligned. Completely rotate the clamp around the pipe in the direction of the nuts to insure a smooth gasket surface is achieved along the tapered end of the gasket. **7.** Place the nut, bolt and lug assembly in a position that allows for easy tightening of the bolts. Make sure that the reference mark on the pipe is measured to the middle of the clamp. **8.** Tighten all of the nuts, working from the center of the lug assembly towards the ends of the clamp. The leak should stop as the center nut or nuts become tight. **9.** Torque all nuts as directed on the product label to the recommended torque, and re-torque to check that the tightness is as even as possible. **10.** Torque Requirements as follows: (1.5 to 2.5 inch - 30ft.-lb., 3 to 6 inch - 50ft.-lb., 8 inch - 70ft.-lb., 10 to 12 inch - 100ft.-lb.) Note: Do not lubricate Nuts and Bolts.

NOTE: For complete product information, refer to the product approval letter and attachments dated November 7, 2008.





FILE CODE: 4.1.1.70

PRODUCT TYPE: **MAIN LINE TAPPING SLEEVES**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.70](#)

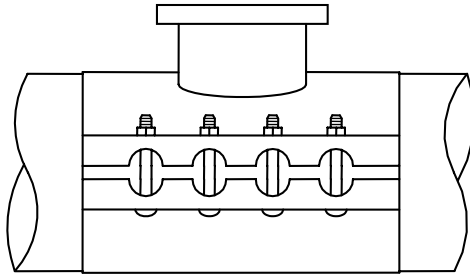
APPROVED PRODUCTS: [Romac Industries Ltd.](#)

[Robar Industries](#)

[Ford Meter Box Co.](#)

[Mueller Canada](#)

[Smith-Blair Inc.](#)





FILE CODE: 4.1.1.70

PRODUCT TYPE: **MAIN LINE TAPPING SLEEVES**

MANUFACTURER: Romac Industries Inc.

MODEL: SST

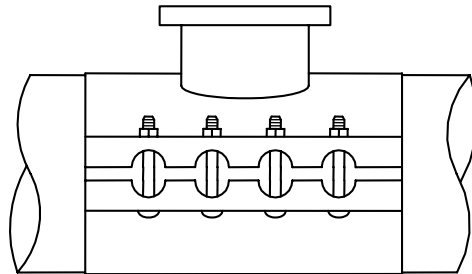
PRODUCT DESCRIPTION: Stainless Steel Tapping Sleeve with Stainless Steel Flange

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Scrape the pipe to remove as much dirt and corrosion as possible so that the surface is as smooth as possible. Ensure that the gasket is free of foreign matter and that nothing becomes lodged between the gasket and the pipe. Place the sleeve on the pipe. Tighten the nuts evenly on both sides. Do not over tighten.

NOTE: For complete product information, refer to the product approval letter dated January 29, 1985.





FILE CODE: 4.1.1.70

PRODUCT TYPE: **MAIN LINE TAPPING SLEEVES**

MANUFACTURER: Robar Industries

MODEL: 6606

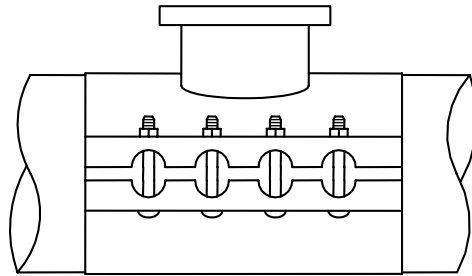
PRODUCT DESCRIPTION: Stainless Steel Tapping Sleeve with Stainless Steel Flange

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Scrape the pipe to remove as much dirt and corrosion as possible so that the surface is as smooth as possible. Ensure that the gasket is free of foreign matter and that nothing becomes lodged between the gasket and the pipe. Place the sleeve on the pipe. Tighten the nuts evenly on both sides. Do not over tighten.

NOTE: For complete product information, refer to the product approval letter dated March 14, 1997.





FILE CODE: 4.1.1.70

PRODUCT TYPE: **MAIN LINE TAPPING SLEEVES**

MANUFACTURER: Ford Meter Box Co.

MODEL: FAST

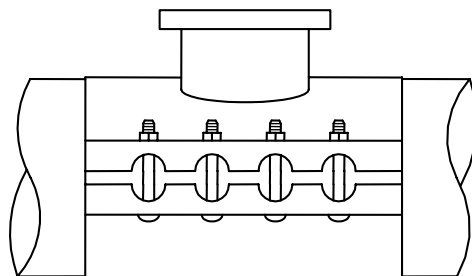
PRODUCT DESCRIPTION: Stainless Steel Tapping Sleeve with Stainless Steel Flange

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Scrape the pipe to remove as much dirt and corrosion as possible so that the surface is as smooth as possible. Ensure that the gasket is free of foreign matter and that nothing becomes lodged between the gasket and the pipe. Place the sleeve on the pipe. Tighten the nuts evenly on both sides. Do not over tighten.

NOTE: For complete product information, refer to the product approval letter dated April 18, 1997.





FILE CODE: 4.1.1.70

PRODUCT TYPE: **MAIN LINE TAPPING SLEEVES**

MANUFACTURER: Mueller Canada

MODEL: H304

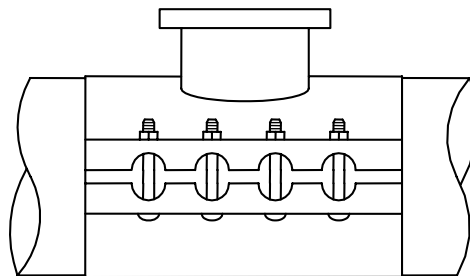
PRODUCT DESCRIPTION: Stainless Steel Tapping Sleeve with Stainless Steel Flange

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Scrape the pipe to remove as much dirt and corrosion as possible so that the surface is as smooth as possible. Ensure that the gasket is free of foreign matter and that nothing becomes lodged between the gasket and the pipe. Place the sleeve on the pipe. Tighten the nuts evenly on both sides. Do not over tighten.

NOTE: For complete product information, refer to the product approval letters dated April 26, 1982 (Canada Valve), January 17, 1996 (name changed to Mueller).





FILE CODE: 4.1.1.70

PRODUCT TYPE: **MAIN LINE TAPPING SLEEVES**

MANUFACTURER: Smith-Blair Inc.

MODEL: Model 663 (150mm, 200mm, 250mm & 300mm)

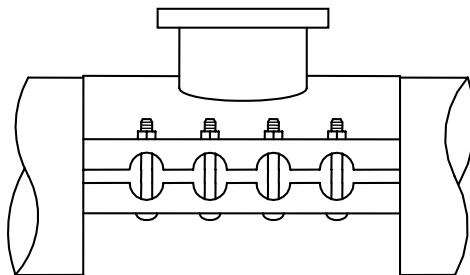
PRODUCT DESCRIPTION: Stainless Steel Tapping Sleeve with Stainless Steel Flange

REQUIRED MARKINGS AND LOCATIONS: Manufacturer's name; model; size of branch connection; production year.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Scrape the pipe to remove as much dirt and corrosion as possible so that the surface is as smooth as possible. Ensure that the gasket is free of foreign matter and that nothing becomes lodged between the gasket and the pipe. Lubricate Pipe and Gasket with soap solution. Antifreeze should be added in freezing weather. Place the sleeve on the pipe. Tighten the nuts evenly on both sides. Do not over tighten.

NOTE: For complete product information, refer to the product approval letter dated August 12, 2005.





FILE CODE: 4.1.1.71

PRODUCT TYPE: **MAIN LINE TAPPING VALVES**

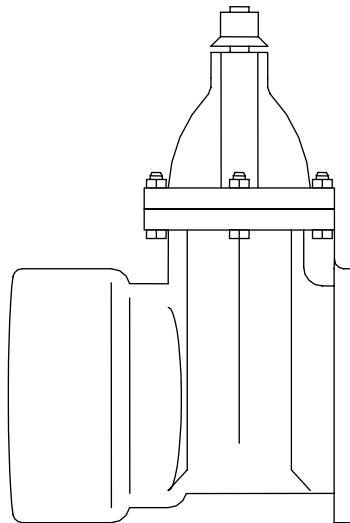
STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.71](#)

APPROVED PRODUCTS: [Clow Canada](#)

[Mueller Canada](#)





FILE CODE: 4.1.1.71

PRODUCT TYPE: **Main Line Tapping Valves**

MANUFACTURER: Clow Canada

MODEL: F-6115

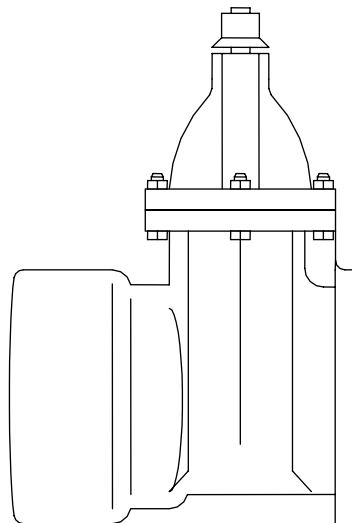
PRODUCT DESCRIPTION: Tapping Valve (Resilient Seated Gate Valve with flange x push on ends).

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Refer to S.C.S. CW 2110. Tapping valves are to be electrically isolated from tapping sleeves, to prevent sacrificial corrosion of the valve to the stainless steel tapping sleeve. Use an appropriate tapping valve isolating flange kit.

NOTE: For complete product information, refer to the product approval letter dated January 28 1997.





FILE CODE: 4.1.1.71

PRODUCT TYPE: **MAIN LINE TAPPING VALVES**

MANUFACTURER: Mueller Canada

MODEL: T-2360-43

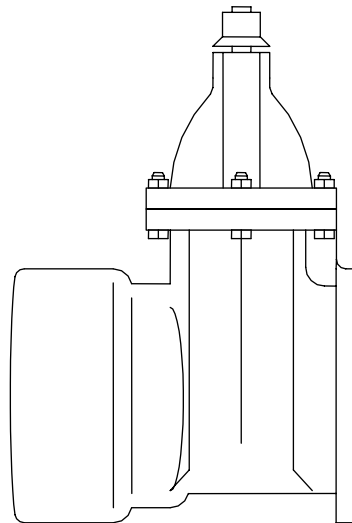
PRODUCT DESCRIPTION: Tapping Valve (Resilient Seated Gate Valve with flange x push on ends).

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Refer to S.C.S. CW 2110. Tapping valves are to be electrically isolated from tapping sleeves, to prevent sacrificial corrosion of the valve to the stainless steel tapping sleeve. Use an appropriate tapping valve isolating flange kit.

NOTE: For complete product information, refer to the product approval letter dated January 28 1997.





FILE CODE: 4.1.1.74

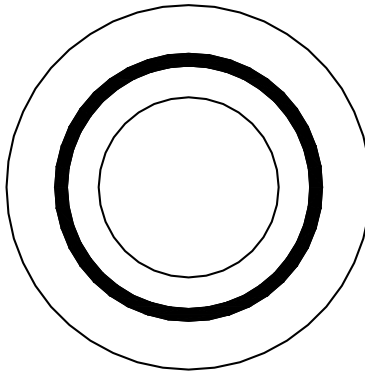
PRODUCT TYPE: **TAPPING VALVE FLANGE ISOLATING KIT**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: N/A

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.74](#)

APPROVED PRODUCTS: [Pikotec](#)





FILE CODE: 4.1.1.74

PRODUCT TYPE: **TAPPING VALVE ISOLATING FLANGE KITS**

MANUFACTURER: Pikotec

MODEL: PGE

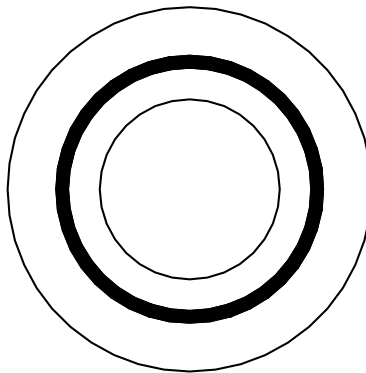
PRODUCT DESCRIPTION: Flange Isolation Kit.

REQUIRED MARKINGS AND LOCATIONS: Kit shall bear the manufacturer's name, Pikotec, Pipe and Flange Sizes in Inches and Millimeters, and year and month of production.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated February 16, 1996.





FILE CODE: 4.1.1.80

PRODUCT TYPE: **RESILIENT SEATED GATE VALVES**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

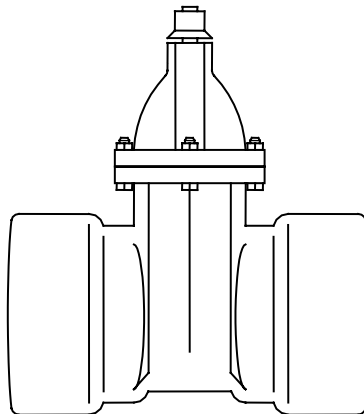
PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.80](#)

APPROVED PRODUCTS: [Clow Canada](#)

[American AVK Co.](#)

[Clow Valve Co.](#)

[Mueller Canada](#)





FILE CODE: 4.1.1.80

PRODUCT TYPE: **RESILIENT SEATED GATE VALVES**

MANUFACTURER: Clow Canada

MODEL: F-6112

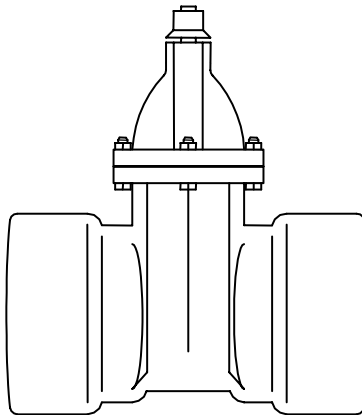
PRODUCT DESCRIPTION: Resilient Seated Gate Valve – 400mm only.

REQUIRED MARKINGS AND LOCATIONS: Clow, Year of Manufacture, Nominal Size, Rated Pressure, ULC (sticker).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Refer to S.C.S. CW 2110-R6

NOTE: For complete product information, refer to the product approval letter dated May 3, 2002.





FILE CODE: 4.1.1.80

PRODUCT TYPE: **RESILIENT SEATED GATE VALVES**

MANUFACTURER: American AVK Co.

MODEL: N/A

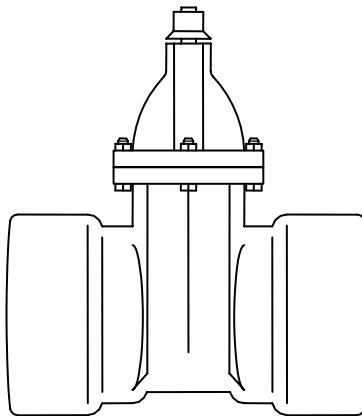
PRODUCT DESCRIPTION: Resilient Seated Gate Valves in 150mm thru 400mm.

REQUIRED MARKINGS AND LOCATIONS: AVK, Year of Manufacture, Fresno, California, Nominal Size, Rated Pressure, ULC (sticker).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Refer to S.C.S. CW 2110-R6

NOTE: For complete product information, refer to the product approval letters dated April 18, 1995 (150mm thru 300mm), February 2, 1996 (400mm).





FILE CODE: 4.1.1.80

PRODUCT TYPE: **RESILIENT SEATED GATE VALVES**

MANUFACTURER: Clow Valve Co.

MODEL: F-6112

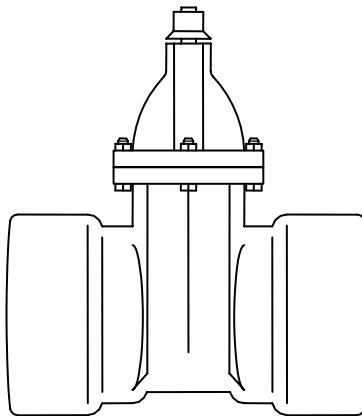
PRODUCT DESCRIPTION: Resilient Wedge Valve in 150mm thru 300mm Nominal Diameters.

REQUIRED MARKINGS AND LOCATIONS: Clow, Year of Manufacture, Nominal Size, Rated Pressure, ULC (sticker), UL (cast in valve body).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Refer to S.C.S. CW 2110-R6

NOTE: For complete product information, refer to the product approval letter dated June 22, 1992.





FILE CODE: 4.1.1.80

PRODUCT TYPE: **RESILIENT SEATED GATE VALVES**

MANUFACTURER: Mueller Canada

MODEL: A-2360-40

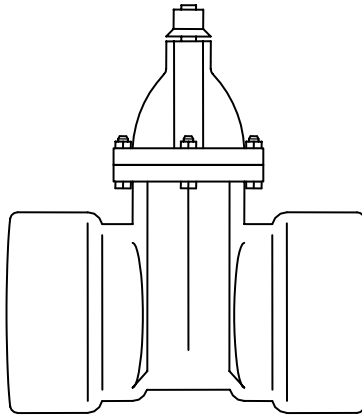
PRODUCT DESCRIPTION: Resilient Wedge Gate Valve in 150mm thru 300mm Nominal Diameters.

REQUIRED MARKINGS AND LOCATIONS: Mueller, Year of Manufacture, Nominal Size of Valve, Rated Pressure 200W.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Refer to S.C.S. CW 2110-R6

NOTE: For complete product information, refer to the product approval letter dated June 3, 1996.





FILE CODE: 4.1.1.81

PRODUCT TYPE: **VALVE BOXES, DR18 & PVC VALVE BOX BOTTOMS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: [AP-001](#)

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.81](#)

APPROVED PRODUCTS: [W.D. Valve Boxes Ltd.](#)

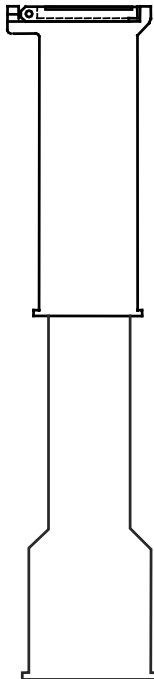
[Titan Foundry Ltd.](#)

[Northern Pipe Products](#)

[Ipex Inc.](#)

[Royal Pipe Systems](#)

[Rehau Industries](#)





FILE CODE: 4.1.1.81

PRODUCT TYPE: **VALVE BOXES, DR 18 & PVC VALVE BOX BOTTOM**

MANUFACTURER: W.D. Valve Boxes Ltd.

MODEL: Upper – WD46  
Cover – WD39

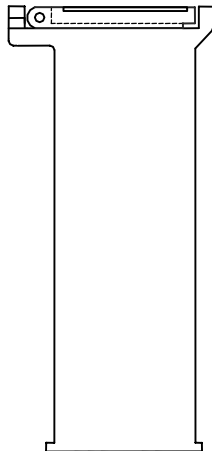
PRODUCT DESCRIPTION: Hinged Valve Box Upper Casing and Hinged Cover.

REQUIRED MARKINGS AND LOCATIONS: On the top surface of the upper rim, in recessed letters: WDVb, WD12, AIL. On the hinged cover, upper surface: WDVb, W or S. Underside: WD39, AIL.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated June 30, 1993.





FILE CODE: 4.1.1.81

PRODUCT TYPE: **VALVE BOXES, DR 18 & PVC VALVE BOX BOTTOM**

MANUFACTURER: Titan Foundry Ltd.

MODEL: N/A

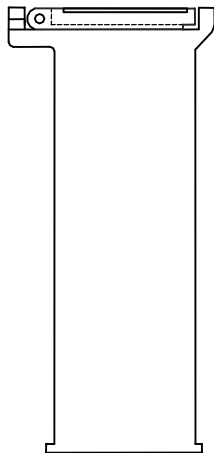
PRODUCT DESCRIPTION: Hinged Valve Box Upper Casing and Hinged Cover.

REQUIRED MARKINGS AND LOCATIONS: On the hinged cover, upper surface: Titan, W or S.  
Underside: VB4, Upper casing: Titan, VB4.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated April 13, 1993.





FILE CODE: 4.1.1.81

PRODUCT TYPE: **VALVE BOXES, DR 18 & PVC VALVE BOX BOTTOM**

MANUFACTURER: Northern Pipe Products

MODEL: N/A

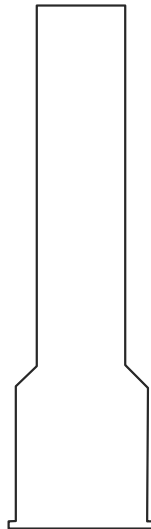
PRODUCT DESCRIPTION: C900 PVC Valve Box Bottom.

REQUIRED MARKINGS AND LOCATIONS: Pipe Specifications, Diameter, Production Code, CSA B137.3, Brand Name "Mueller Flow Control".

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated April 26, 2002.





FILE CODE: 4.1.1.81

PRODUCT TYPE: **VALVE BOXES, DR 18 & PVC VALVE BOX BOTTOM**

MANUFACTURER: Ipex Inc.

MODEL: N/A

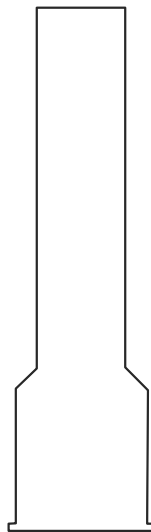
Product Description: PVC DR 18 C900 Valve Box Bottom and PVC Schedule 80 CSA B137.3 Valve Box Bottom.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated May 17, 1990 (Scepter), December 6, 1990 (Cannon), March 11, 1993 (name changed to Ipex).





FILE CODE: 4.1.1.81

PRODUCT TYPE: **VALVE BOXES, DR 18 & PVC VALVE BOX BOTTOM**

MANUFACTURER: Royal Pipe Systems

MODEL: N/A

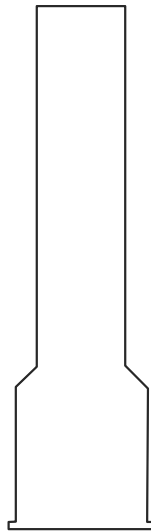
PRODUCT DESCRIPTION: PVC DR 18 AWWA C900 Valve Box Bottom.

REQUIRED MARKINGS AND LOCATIONS: In blue stencil: Nominal Diameter, Flex-Lox, PVC 1120, CI, AWWA P.C. 150, DR 18, FM, CSA B137.3, Potable, NSF-PVC-cto-only SE, 1620 @ 23° C, T600, AWWA C900, Production Code.

INTERPRETATION: Production code A11693 refers to shift A, 11<sup>th</sup> day of the 6<sup>th</sup> month, 1993.

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated May 7, 1992.





FILE CODE: 4.1.1.81

PRODUCT TYPE: **VALVE BOXES, DR 18 & PVC VALVE BOX BOTTOM**

MANUFACTURER: Rehau Industries

MODEL: N/A

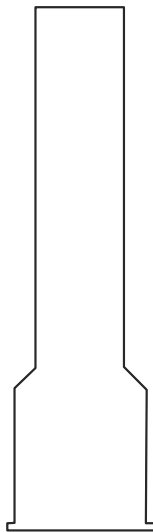
PRODUCT DESCRIPTION: PVC DR 18 AWWA C900 Valve Box Bottom.

REQUIRED MARKINGS AND LOCATIONS: Nominal Diameter, PVC 1120, P.C. 150, DR/RD 18, CSA B137.3, Potable, NSF61, BNQ 3624-250, TP600, AWWA C900, 1610FMWH, Production Code, Name of Fabricator.

INTERPRETATION: Production code 1293X4 refers to the 1<sup>st</sup> day of the 2<sup>nd</sup> month of 1993, shift X, extruder 4.

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated March 11, 1993, July 17, 1995 (addition of fabricator).





FILE CODE: 4.1.1.82

PRODUCT TYPE: **VALVE BOX UPPER CASING EXTENSION**

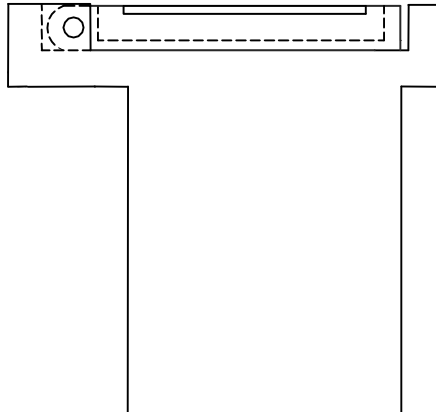
STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: [AP-016](#)

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.1.82](#)

APPROVED PRODUCTS: [W.D. Valve Boxes Ltd.](#)

[Titan Foundry Ltd.](#)





FILE CODE: 4.1.1.82

PRODUCT TYPE: **VALVE BOXES UPPER CASING EXTENSION**

MANUFACTURER: W.D. Valve Boxes Ltd.

MODEL: WD4

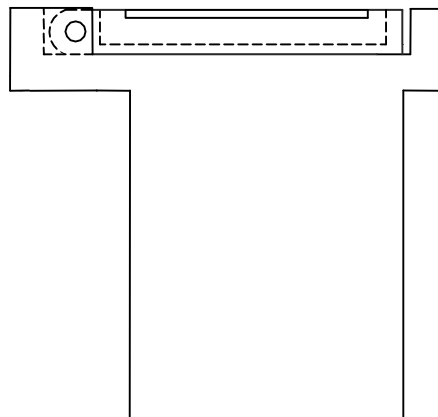
PRODUCT DESCRIPTION: Valve Box Extension

REQUIRED MARKINGS AND LOCATIONS: Recessed letters on the valve box extension.  
Upper rim: WDVb, WD4. Lower body: AIL. On the hinged cover, upper surface: WDVb, W or S. Underside: WD39, AIL.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated April 21, 1993.





FILE CODE: 4.1.1.82

PRODUCT TYPE: **VALVE BOXES UPPER CASING EXTENSION**

MANUFACTURER: Titan Foundry

MODEL: Type D/E

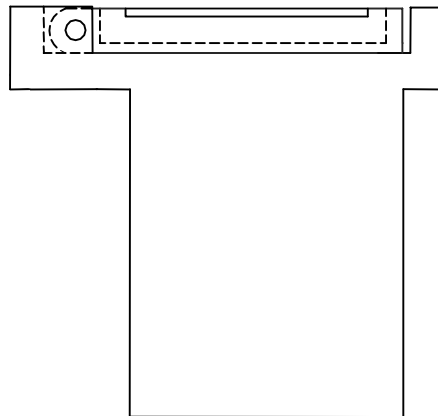
PRODUCT DESCRIPTION: Hinged Valve Box Extension Upper Casing and Hinged Cover.

REQUIRED MARKINGS AND LOCATIONS: Hinged Cover: Upper surface: Titan, W or S, Month, Year. Underside: N/A. Upper Casing: Titan, Size, Month, Year.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated September 8<sup>th</sup> 2006.





FILE CODE: 4.1.1.83

PRODUCT TYPE: **VALVE STEM EXTENSION**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

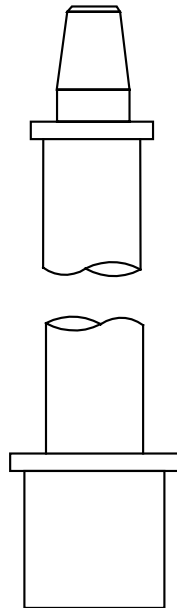
APPROVED PRODUCT DRAWING REFERENCE: [AP-002](#)

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS: [W.D. Valve Boxes Ltd.](#)

[F.N. New Enterprises](#)

[Titan Foundry Ltd.](#)





FILE CODE: 4.1.1.83

PRODUCT TYPE: **VALVE STEM EXTENSION**

MANUFACTURER: W.D. Valve Boxes Ltd.

MODEL: N/A

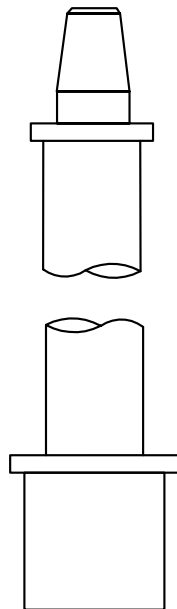
PRODUCT DESCRIPTION: Valve Stem Extension (38mm square operating nut, special order 50mm available).

REQUIRED MARKINGS AND LOCATIONS: "P" stamped on the operating nut, WDVb stenciled in white 38mm high letters on the stem. AIL (Ancast Industries Ltd.) stamped on the operating nut.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated January 10, 1990.





FILE CODE: 4.1.1.83

PRODUCT TYPE: **VALVE STEM EXTENSION**

MANUFACTURER: F.N. New Enterprises

MODEL: N/A

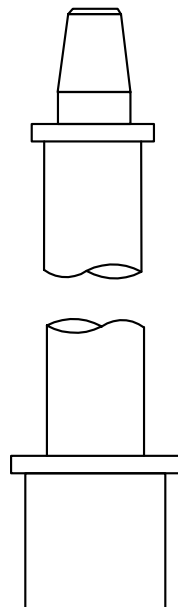
PRODUCT DESCRIPTION: Valve Stem Extension (38mm square operating nut).

REQUIRED MARKINGS AND LOCATIONS: 4 ellipses stamped around a 4mm hole on top of the operating nut and FN New Ent. stenciled in white 16mm high letters on the stem.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated July 3, 1990. Name changed from F.N. Precision Structures to F.N. NEW ENTERPRISES, April 15, 2003





FILE CODE: 4.1.1.83

PRODUCT TYPE: **VALVE STEM EXTENSION**

MANUFACTURER: Titan Foundry Ltd.

MODEL: N/A

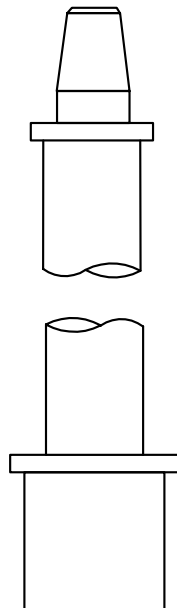
PRODUCT DESCRIPTION: Valve Stem Extension (38mm square operating nut).

REQUIRED MARKINGS AND LOCATIONS: T stamped or cast on the top of the operating nut and "TITAN" stenciled in 45mm high letters on the stem.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated August 11, 1992.





FILE CODE: 4.1.1.90

PRODUCT TYPE: **FIRE HYDRANTS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS: [Mueller Canada \(Century\)](#)

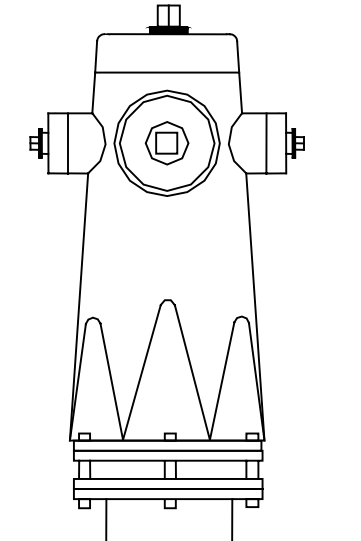
[Mueller Canada \(Centurion\)](#)

[Mueller Canada \(Darling\)](#)

[Mueller Canada \(Modern Centurion\)](#)

[Clow Canada \(McAvity\)](#)

[Clow Canada \(Concord\)](#)





FILE CODE: 4.1.1.90

PRODUCT TYPE: **Fire Hydrants**

MANUFACTURER: Mueller Canada

MODEL: Canada Valve – Century

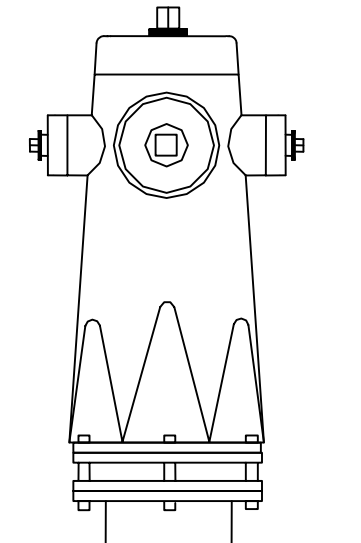
PRODUCT DESCRIPTION: Dry barrel compression shut-off, non-draining, 150mm push on joint bottom inlet

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Bury depth shall be such that the crown of the watermain is a minimum 8 ft. below the finished street centerline grade. Pumper nozzle shall face towards the street. Clean piping and hydrant base of any foreign matter before installation. For details refer to S.C.S CW 2110-R6, SD-006, and SD-007.

NOTE: For complete product information, refer to the product approval letter dated June 2, 1976.





FILE CODE: 4.1.1.90

PRODUCT TYPE: **FIRE HYDRANTS**

MANUFACTURER: Mueller Canada

MODEL: Centurion

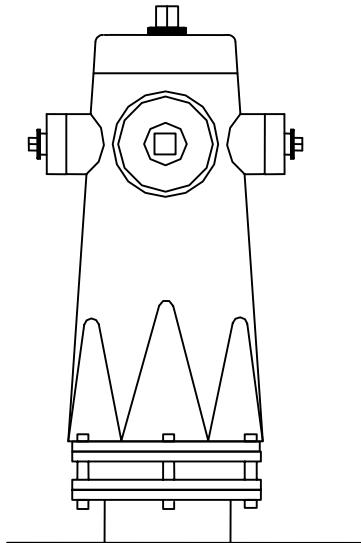
PRODUCT DESCRIPTION: Dry barrel compression shut-off, non-draining, 150mm push on joint bottom inlet

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Bury depth shall be such that the crown of the watermain is a minimum 8 ft. below the finished street centerline grade. Pumper nozzle shall face towards the street. Clean piping and hydrant base of any foreign matter before installation. For details refer to S.C.S CW 2110-R6, SD-006, and SD-007.

NOTE: For complete product information, refer to the product approval letter dated May 13, 1980.





FILE CODE: 4.1.1.90

PRODUCT TYPE: **FIRE HYDRANTS**

MANUFACTURER: Mueller Canada

MODEL: Canada Valve – Darling B-50-B-18  
Canada Valve – Darling B-50-B-24

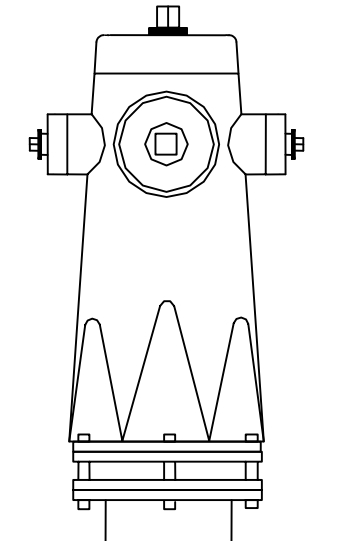
PRODUCT DESCRIPTION: Dry barrel compression shut-off, non-draining, 150mm push on joint bottom inlet

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Bury depth shall be such that the crown of the watermain is a minimum 8 ft. below the finished street centerline grade. Pumper nozzle shall face towards the street. Clean piping and hydrant base of any foreign matter before installation. For details refer to S.C.S CW 2110-R6, SD-006, and SD-007.

NOTE: For complete product information, refer to the product approval letters dated June 16, 1983, March 25, 1992, and April 18, 1997.





FILE CODE: 4.1.1.90

PRODUCT TYPE: **FIRE HYDRANTS**

MANUFACTURER: Mueller Canada

MODEL: Modern Centurion

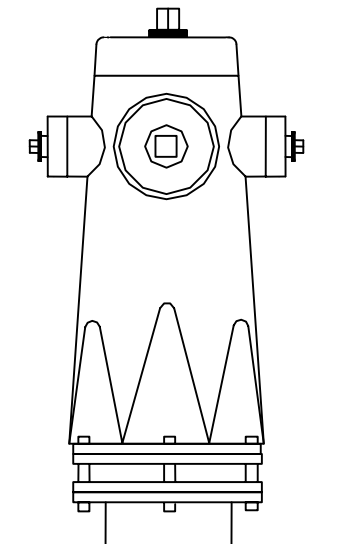
PRODUCT DESCRIPTION: Dry barrel compression shut-off, non-draining, 150mm push on joint bottom inlet

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Bury depth shall be such that the crown of the watermain is a minimum 8 ft. below the finished street centerline grade. Pumper nozzle shall face towards the street. Clean piping and hydrant base of any foreign matter before installation. For details refer to S.C.S CW 2110-R6, SD-006, and SD-007.

NOTE: For complete product information, refer to the product approval letter dated October 25, 1979.





FILE CODE: 4.1.1.90

PRODUCT TYPE: **FIRE HYDRANTS**

MANUFACTURER: Clow Canada

MODEL: McAvity – Brigadiere M67B

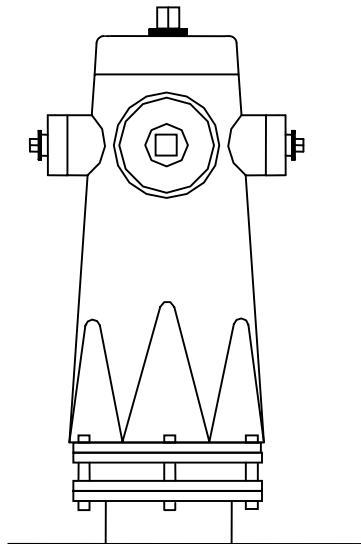
PRODUCT DESCRIPTION: Dry barrel compression shut-off, non-draining, 150mm push on joint bottom inlet

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Bury depth shall be such that the crown of the watermain is a minimum 8 ft. below the finished street centerline grade. Pumper nozzle shall face towards the street. Clean piping and hydrant base of any foreign matter before installation. For details refer to S.C.S CW 2110-R6, SD-006, and SD-007.

NOTE: For complete product information, refer to the product approval letter dated June 2, 1976 and August 1, 2006.





FILE CODE: 4.1.1.90

PRODUCT TYPE: **FIRE HYDRANTS**

MANUFACTURER: Clow Canada

MODEL: Concord – Premiere D67M

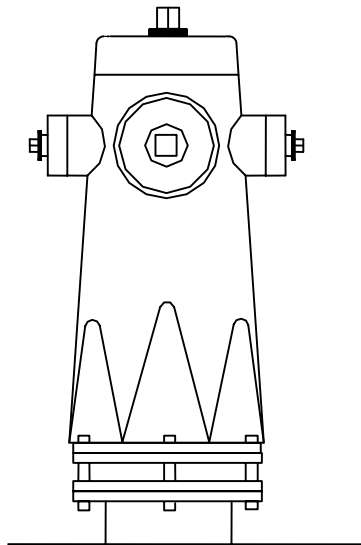
PRODUCT DESCRIPTION: Dry barrel compression shut-off, non-draining, 150mm push on joint bottom inlet

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Bury depth shall be such that the crown of the watermain is a minimum 8 ft. below the finished street centerline grade. Pumper nozzle shall face towards the street. Clean piping and hydrant base of any foreign matter before installation. For details refer to S.C.S CW 2110-R6, SD-006, and SD-007.

NOTE: For complete product information, refer to the product approval letter dated December 20, 1982.





FILE CODE: 4.1.1.91

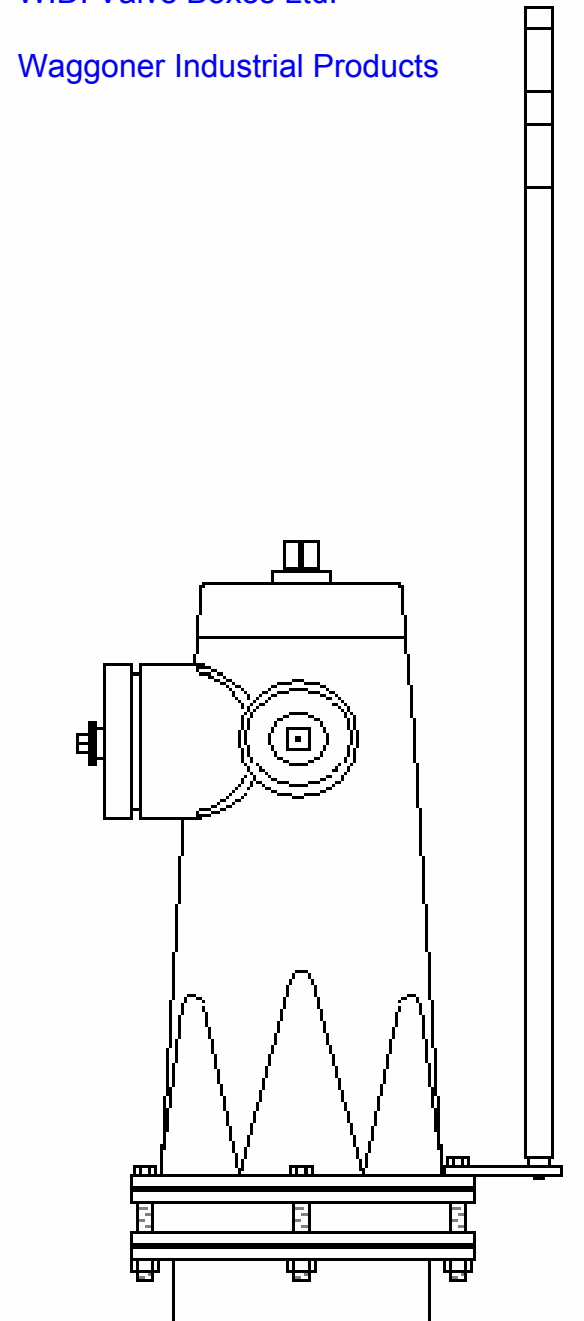
PRODUCT TYPE: **FIRE HYDRANT MARKERS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: N/A

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS:        [W.D. Valve Boxes Ltd.](#)  
   [Waggoner Industrial Products](#)





FILE CODE: 4.1.1.91

PRODUCT TYPE: **FIRE HYDRANT MARKER**

MANUFACTURER: W.D. Valve Boxes

MODEL: WD27

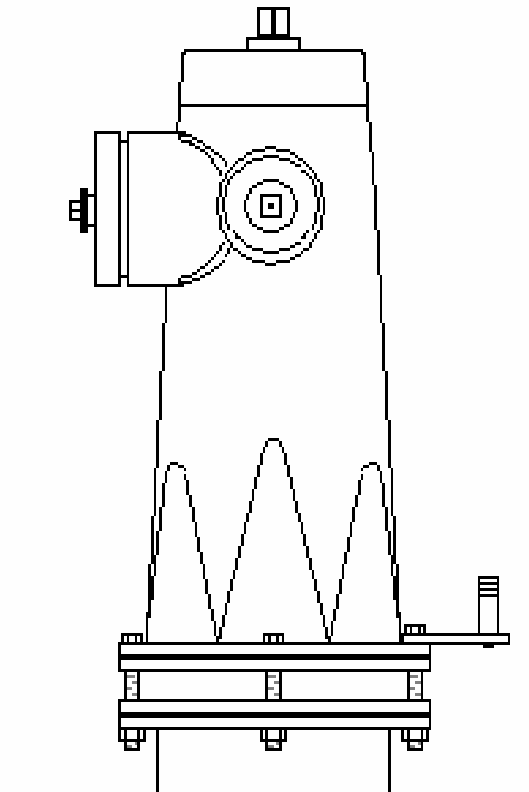
PRODUCT DESCRIPTION: Cast Iron Marker Base (Foot)

REQUIRED MARKINGS AND LOCATIONS: Casting Part No. WD27

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Remove bolt and nut from safety flange opposite hydrant pumper nozzle. Place marker base on the safety flange and align foot over flange hole at 90° to the hydrant body. Replace safety flange bolt and nut, secure as per hydrant manufacturer's instructions.

NOTE: For complete product information, refer to the product approval letter dated April 13, 2006.





FILE CODE: 4.1.1.91

PRODUCT TYPE: **FIRE HYDRANT MARKER**

MANUFACTURER: Waggoner Industrial Products

MODEL: WIPL001

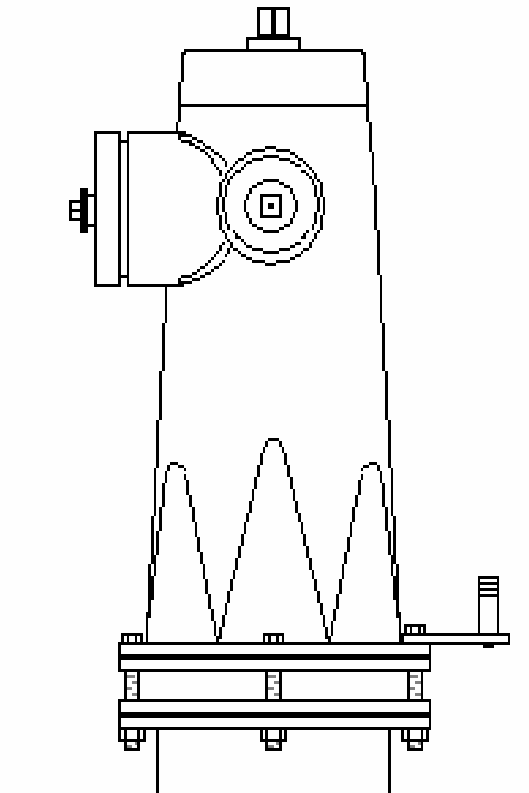
PRODUCT DESCRIPTION: Acrylic Enamel coated 2 Piece Steel Marker Base (Foot)

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Remove bolt and nut from safety flange opposite hydrant pumper nozzle. Place marker base on the safety flange and align foot over flange hole at 90° to the hydrant body. Replace safety flange bolt and nut, secure as per hydrant manufacturer's instructions.

NOTE: For complete product information, refer to the product approval letter dated April 11, 2008.





FILE CODE: 4.1.2.10

PRODUCT TYPE: **COPPER WATER CONNECTION PIPING**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

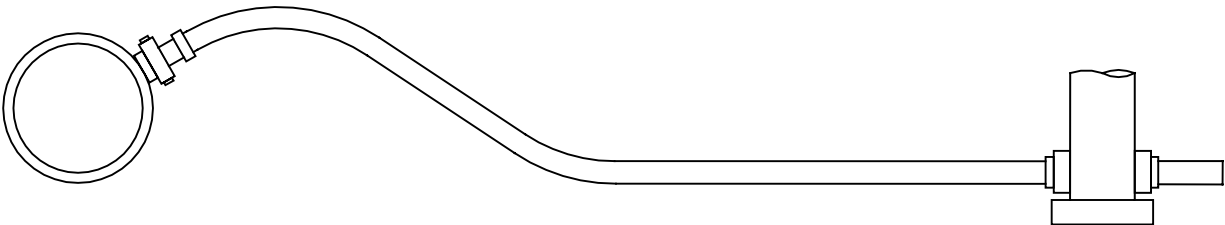
APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS: [Wolverine Division of UOP Ltd.](#)

[Cerro Copper Products](#)

[Halstead Metal Products](#)





FILE CODE: 4.1.2.10

PRODUCT TYPE: **COPPER WATER CONNECTION PIPING**

MANUFACTURER: Wolverine Division of UOP Ltd.

MODEL: N/A

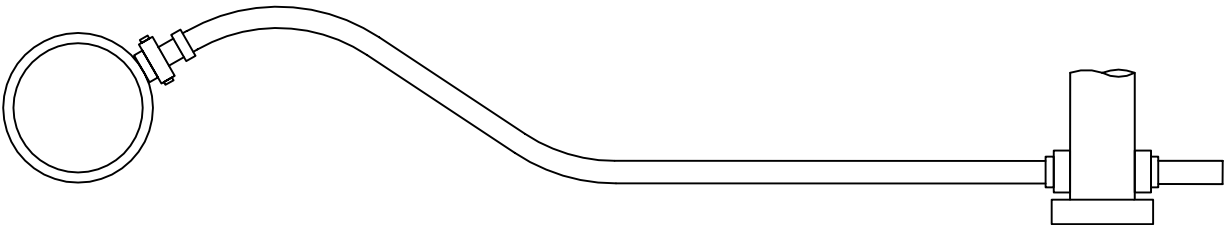
PRODUCT DESCRIPTION: Type K seamless water tube in 19mm, 25mm, 38mm, and 51mm.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated July 11, 1986.





FILE CODE: 4.1.2.10

PRODUCT TYPE: **COPPER WATER CONNECTION PIPING**

MANUFACTURER: Cerro Copper Products

MODEL: N/A

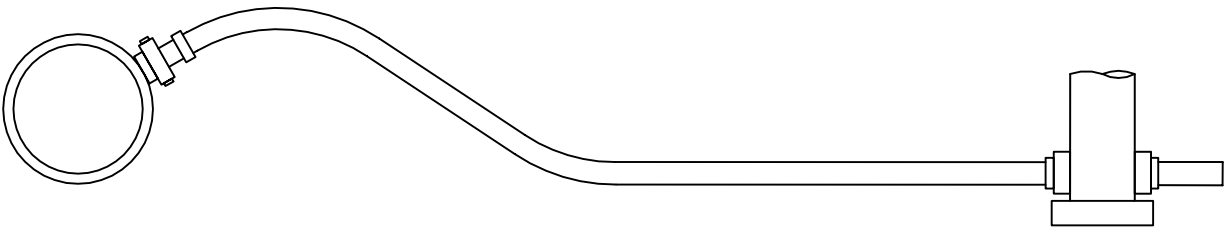
PRODUCT DESCRIPTION: Type K seamless water tube in 19mm, 25mm, 38mm, and 51mm.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated March 12, 1991.





FILE CODE: 4.1.2.10

PRODUCT TYPE: **COPPER WATER CONNECTION PIPING**

MANUFACTURER: Halstead Metal Products

MODEL: N/A

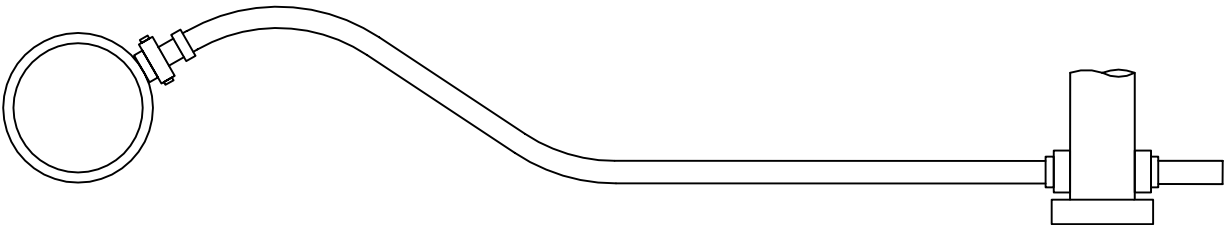
PRODUCT DESCRIPTION: Type K seamless water tube in 19mm, 25mm, 38mm, and 51mm.

REQUIRED MARKINGS AND LOCATIONS: In 300mm intervals: WH, Nominal Size, Type K, HMP, W, and Made in USA.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated June 22, 1994.





FILE CODE: 4.1.2.30

PRODUCT TYPE: **BRASS CONNECTION SADDLES**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

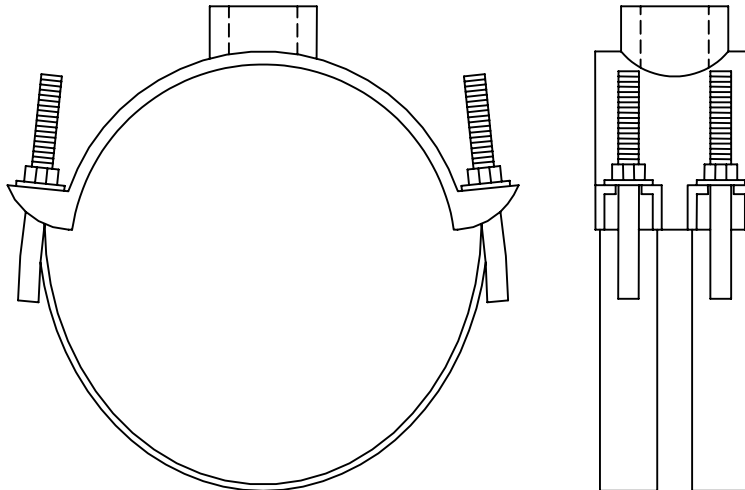
APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.2.30](#)

APPROVED PRODUCTS: [Mueller Canada](#)

[Ford Meter Box Co.](#)

[Romac Industries Ltd.](#) (Use only for connection to A/C pipe.)





FILE CODE: 4.1.2.30

PRODUCT TYPE: **BRASS CONNECTION SADDLE**

MANUFACTURER: Mueller Canada

MODEL: Saddle – H -13491 ( 150mm ), H -13492 ( 200m m), H -13493 ( 250mm),  
H -13494 ( 300 mm)  
Reducer Bushing – H -10036

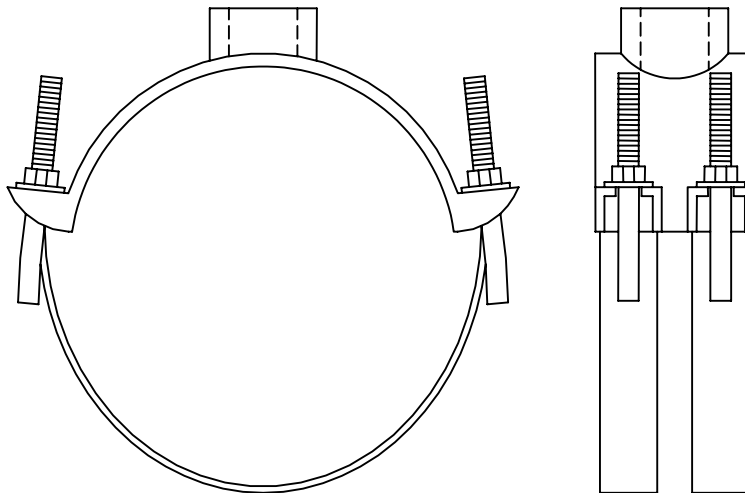
PRODUCT DESCRIPTION: 150mm – 300mm Brass Connection Saddles ( 51mm outlet) and  
51mm x 19mm to 51mm x 38mm Brass Reducer Bushings.

REQUIRED MARKINGS AND LOCATIONS: On the outside wall of each body strap component:  
Mueller. On the reducer bushing: H M.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Clean and smooth the pipe in the area where the saddle is to  
fit. Disassemble the saddle. Place the strap and saddle around the pipe. Tighten the screws  
alternately, maintaining equal gaps between the sections for uniform loading.

NOTE: For complete product information, refer to the product approval letter dated September  
29, 1993.





FILE CODE: 4.1.2.30

PRODUCT TYPE: **BRASS CONNECTION SADDLE**

MANUFACTURER: Ford Meter Box Co.

MODEL: Saddle - S90-607 ( 150mm), S90-807 ( 200mm), S90-1007 ( 250mm),  
S90-1207 ( 300mm)  
Reducer Bushing - BBAA

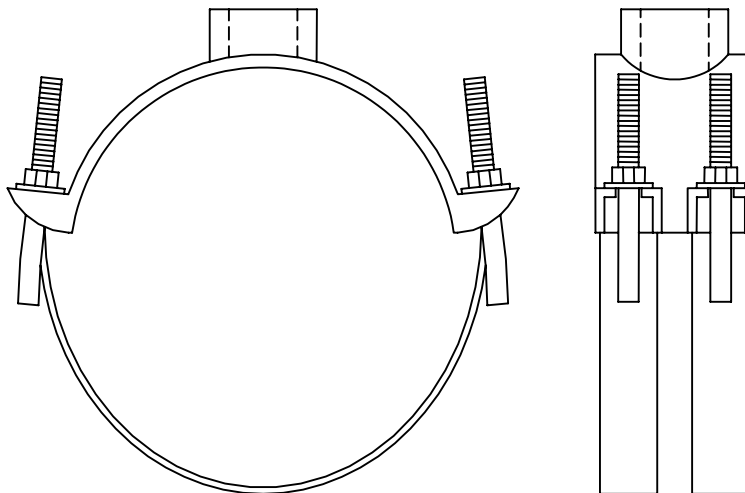
PRODUCT DESCRIPTION: 150mm – 300mm Brass Connection Saddles ( 51mm outlet) and  
51mm x 19mm to 51mm x 38mm Brass Reducer Bushings.

REQUIRED MARKINGS AND LOCATIONS: On the outside wall of each body strap component:  
Ford, Pattern #, Saddle Size. On the reducer bushing: Ford, Pattern #.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Clean and smooth the pipe in the area where the saddle is to  
fit. Disassemble the saddle. Place the strap and saddle around the pipe. Tighten the screws  
alternately, maintaining equal gaps between the sections for uniform loading.

NOTE: For complete product information, refer to the product approval letter dated September  
29, 1993.





FILE CODE: 4.1.2.30

PRODUCT TYPE: **BRASS CONNECTION SADDLE**

MANUFACTURER: Romac Industries Ltd.

MODEL: 202B

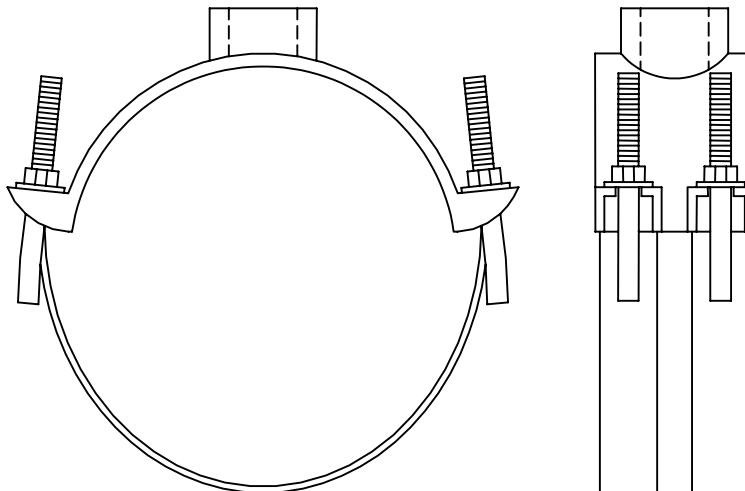
PRODUCT DESCRIPTION: 150mm – 300mm Double Bronze Strap Saddles with 19mm, 25mm, 38mm, and 51mm Taps. **USE ONLY FOR CONNECTION TO A/C PIPE.**

REQUIRED MARKINGS AND LOCATIONS: Romac and Size cast on body, Maximum Torque and Size stenciled on each brass strap.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Clean and smooth the pipe in the area where the saddle is to fit. Disassemble the saddle. Place the strap and saddle around the pipe. Tighten the screws alternately, maintaining equal gaps between the sections for uniform loading. **Note: Do not over torque as the brass straps will creep and loosen, leading to a leak.**

NOTE: For complete product information, refer to the product approval letter dated March 6, 1997.





FILE CODE: 4.1.2.31

PRODUCT TYPE: **BRASS CORPORATION STOP**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.2.31](#)

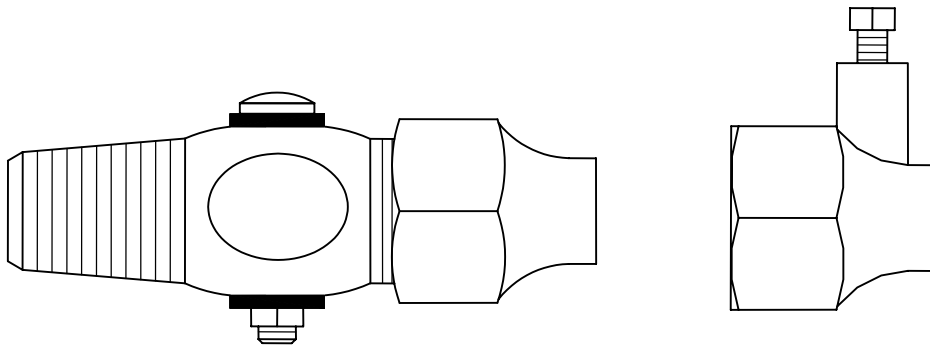
APPROVED PRODUCTS: [Mueller Canada](#)

[Ford Meter Box Co.](#)

[A.Y. McDonald Mfg. Co.](#)

[Cambridge Brass](#)

#### OPTIONAL THAW CONNECTION/ANODE CONNECTION





FILE CODE: 4.1.2.31

PRODUCT TYPE: **BRASS CORPORATION STOP**

MANUFACTURER: Mueller Canada

MODEL: A-220

PRODUCT DESCRIPTION: Copper Flare Outlet Corporation Stop in 19mm, 25mm, 38mm, and 51mm sizes. **Optional thaw connection/anode connection.**

REQUIRED MARKINGS AND LOCATIONS: Manufacturer's Name or Trademark and Nominal Size of the corporation stop on both the corporation body and the coupling nut.

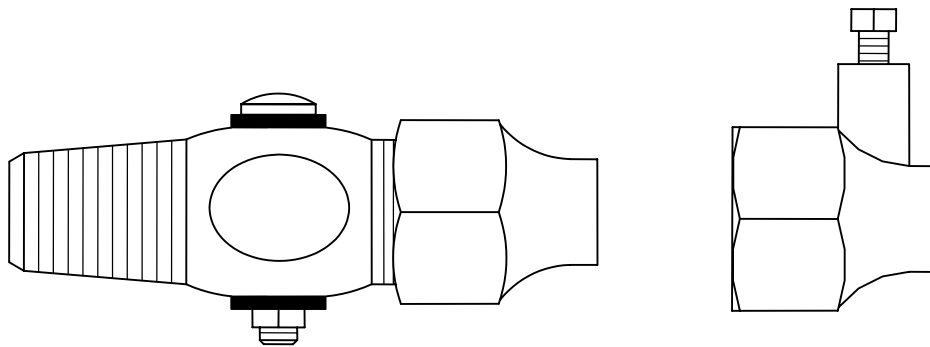
INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For use with flared copper tubing.

NOTE: For complete product information, refer to the product approval letters dated January 9, 1990 (19mm, 25mm, and 38mm), February 9, 1990.

### OPTIONAL THAW CONNECTION/ANODE CONNECTION





FILE CODE: 4.1.2.31

PRODUCT TYPE: **BRASS CORPORATION STOP**

MANUFACTURER: Ford Meter Box Co.

MODEL: F-600

PRODUCT DESCRIPTION: Copper Flare Outlet Corporation Stop in 19mm and 25mm sizes.  
**Optional thaw connection/anode connection.**

REQUIRED MARKINGS AND LOCATIONS: Manufacturer's Name or Trademark and Nominal Size of the corporation stop on both the corporation body and the coupling nut.

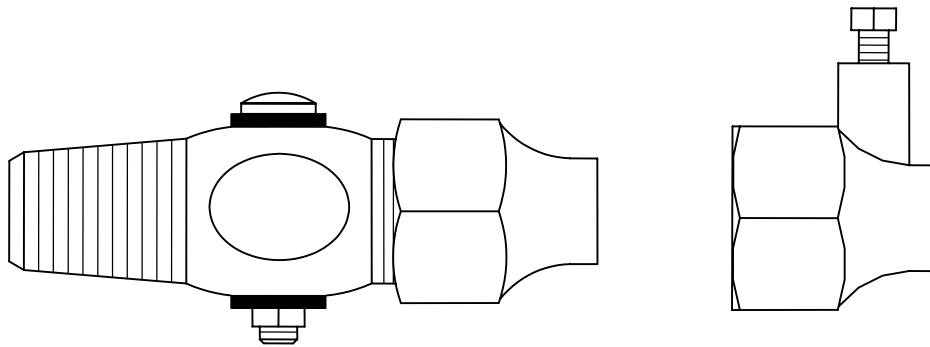
INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For use with flared copper tubing.

NOTE: For complete product information, refer to the product approval letters dated December 28, 1989 and March 11, 1997.

### **OPTIONAL THAW CONNECTION/ANODE CONNECTION**





FILE CODE: 4.1.2.31

PRODUCT TYPE: **BRASS CORPORATION STOP**

MANUFACTURER: A.Y. McDonald Mfg. Co.

MODEL: 4701WP

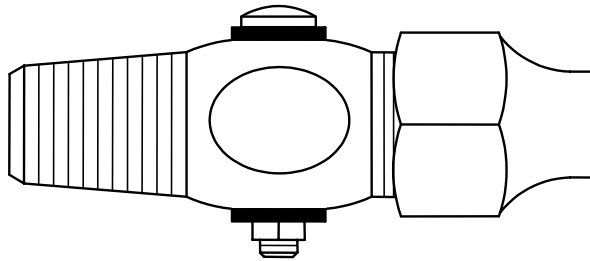
PRODUCT DESCRIPTION: Copper Flare Outlet Corporation Stop in 19mm, 25mm, 38mm, and 51mm sizes.

REQUIRED MARKINGS AND LOCATIONS: Manufacturer's Name or Trademark and Nominal Size of the corporation stop on both the corporation body and the coupling nut.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated February 16, 1990 (19mm and 25mm) and March 30, 1990 (38mm and 51mm).





FILE CODE: 4.1.2.31

PRODUCT TYPE: **BRASS CORPORATION STOP**

MANUFACTURER: Cambridge Brass

MODEL: 302

PRODUCT DESCRIPTION: Copper Flare Outlet Corporation Stop in 19mm, and 25mm sizes.  
**Optional thaw connection/anode connection.**

REQUIRED MARKINGS AND LOCATIONS: Manufacturer's Name or Trademark and Nominal Size of the corporation stop on both the corporation body and the coupling nut.

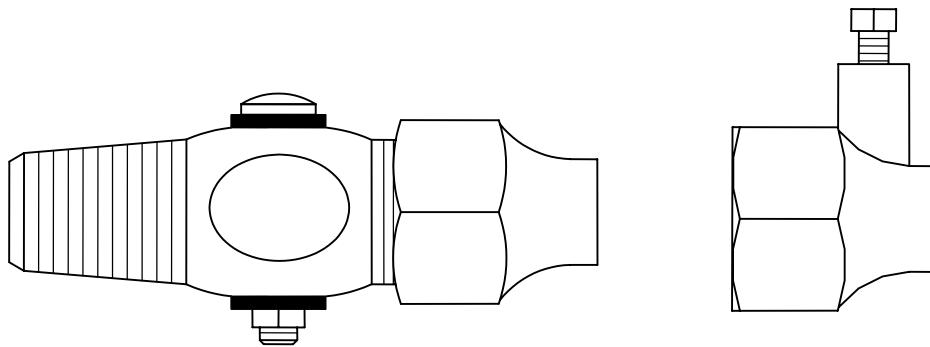
INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For use with flared copper tubing.

NOTE: For complete product information, refer to the product approval letters dated December 9, 2005.

### OPTIONAL THAW CONNECTION/ANODE CONNECTION





FILE CODE: 4.1.2.40

PRODUCT TYPE: **MINNEAPOLIS PATTERN CURB VALVE**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2210-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.2.40](#)

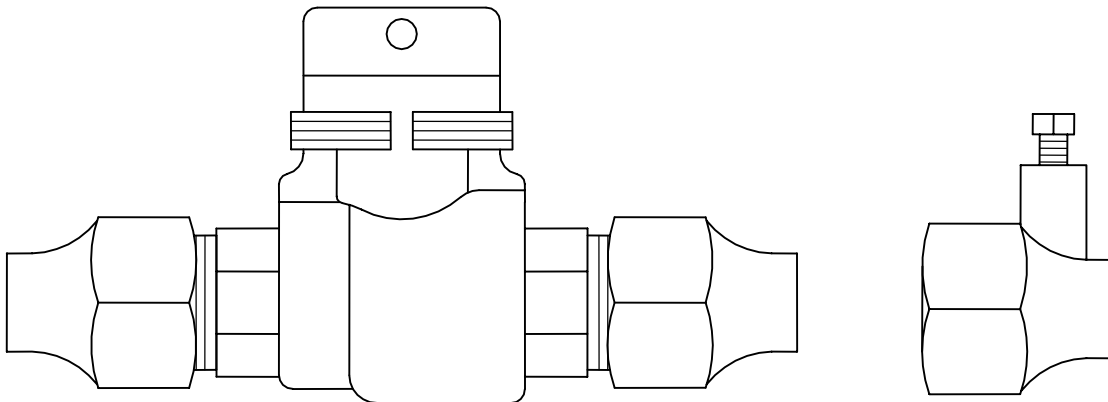
APPROVED PRODUCTS: [Mueller Canada](#)

[Ford Meter Box Co.](#)

[A.Y. McDonald Mfg. Co.](#)

[Cambridge Brass Inc.](#)

### OPTIONAL THAW CONNECTION/ANODE CONNECTION





FILE CODE: 4.1.2.40

PRODUCT TYPE: **MINNEAPOLIS PATTERN CURB VALVES**

MANUFACTURER: Mueller Canada

MODEL: B25154-W83

PRODUCT DESCRIPTION: Minneapolis Pattern Curb Valve in 19mm, 25mm, 38mm, and 51mm sizes. Top Curb Box Threads are: 38mm, 51mm, 76mm, and 87mm. **Optional thaw connection/anode connection.**

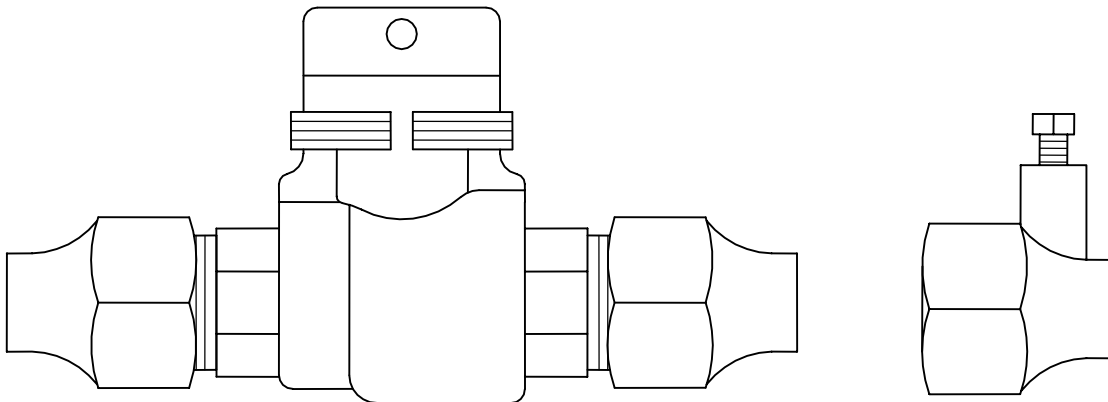
REQUIRED MARKINGS AND LOCATIONS: Manufacturer's Name or Trademark and Nominal Size of the ball curb valve on both the ball valve body and the coupling nuts.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated December 17, 1990, September 5, 1996 and January 10, 2006.

### OPTIONAL THAW CONNECTION/ANODE CONNECTION





FILE CODE: 4.1.2.40

PRODUCT TYPE: **MINNEAPOLIS PATTERN CURB VALVES**

MANUFACTURER: Ford Meter Box Co.

MODEL: B22-333M (19mm), B22-444M (25mm), B22-666M (38mm), B22-777M (51mm)

PRODUCT DESCRIPTION: Minneapolis Style Brass Curb Ball Valve in 19mm, 25mm, 38mm, and 51mm sizes. Top Curb Box Threads are: 38mm and 51mm. **Optional thaw connection/anode connection.**

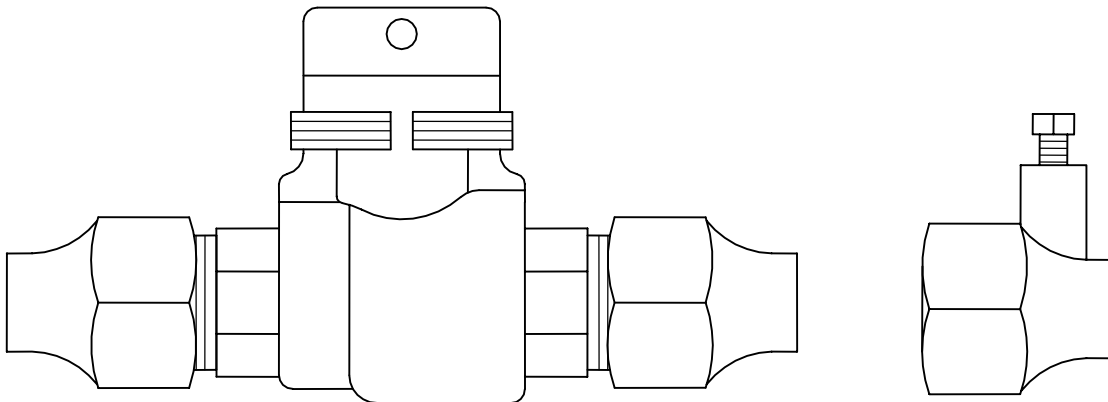
REQUIRED MARKINGS AND LOCATIONS: Manufacturer's Name or Trademark and Nominal Size of the ball curb valve on both the ball valve body and the coupling nuts.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated March 12, 1991, September 5, 1996, and March 11, 1997.

### OPTIONAL THAW CONNECTION/ANODE CONNECTION





FILE CODE: 4.1.2.40

PRODUCT TYPE: **MINNEAPOLIS PATTERN CURB VALVES**

MANUFACTURER: A.Y McDonald Mfg. Co.

MODEL: 6104

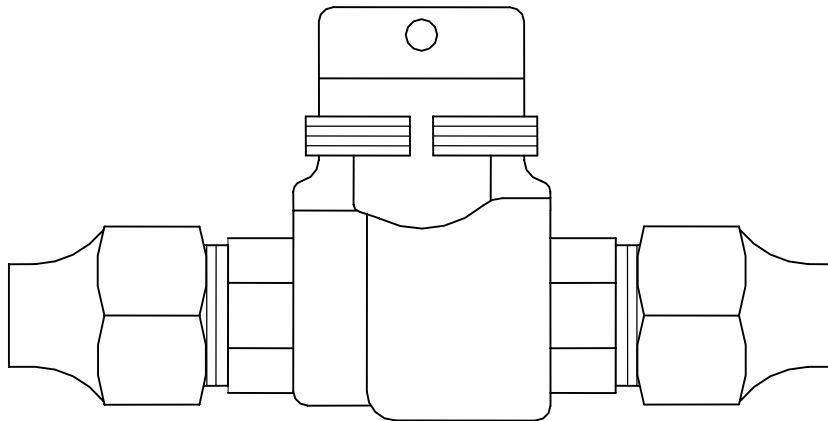
PRODUCT DESCRIPTION: Minneapolis Style Brass Curb Ball Valve in 19mm, 25mm, 38mm, and 51mm sizes. Top Curb Box Threads are: 38mm and 51mm.

REQUIRED MARKINGS AND LOCATIONS: Manufacturer's Name or Trademark and Nominal Size of the ball curb valve on both the ball valve body and the coupling nuts.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated May 2, 2002.





FILE CODE: 4.1.2.40

PRODUCT TYPE: **MINNEAPOLIS PATTERN CURB VALVES**

MANUFACTURER: Cambridge Brass Inc.

MODEL: 262

PRODUCT DESCRIPTION: Minneapolis Pattern Curb Valve in 19mm, 25mm, 38mm, and 51mm sizes. Top Curb Box Threads are: 38mm, 51mm, 76mm, and 87mm. **Optional thaw connection/anode connection.**

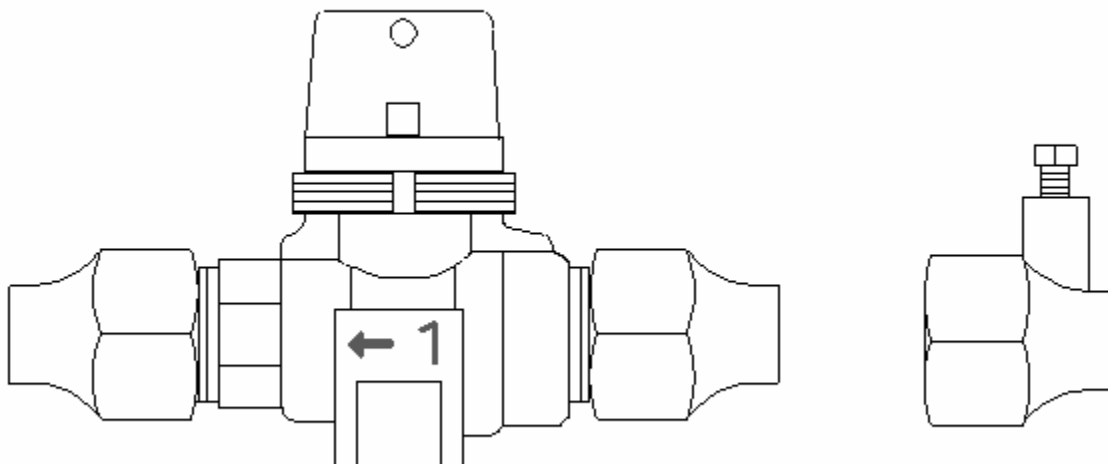
REQUIRED MARKINGS AND LOCATIONS: Manufacturer's Name or Trademark, Nominal Size of the ball curb valve and flow direction indicator on the ball valve body. Manufacturer's Name or Trademark on the coupling nuts.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated July 28, 2007

### OPTIONAL THAW CONNECTION/ANODE CONNECTION





FILE CODE: 4.1.2.41

PRODUCT TYPE: **AP-003 CURB VALVE BOX & EXTENSION, MINNEAPOLIS PATTERN CURB VALVE BOX**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110-R6

APPROVED PRODUCT DRAWING REFERENCE: [AP-003](#), [AP-013](#), [AP-014](#)

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.2.41](#)

APPROVED PRODUCTS: [Titan Foundry Ltd. \(Minneapolis Curb Box\)](#)

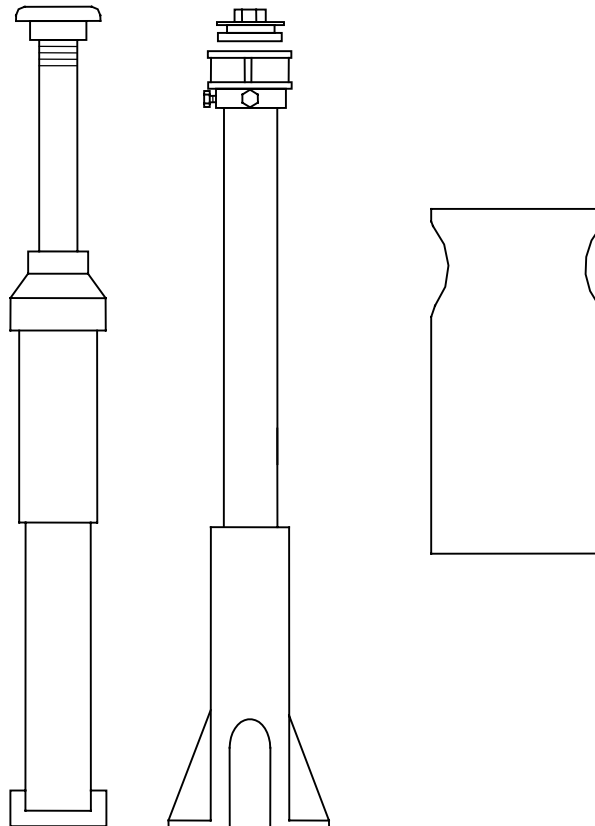
[Titan Foundry Ltd. \(Curb Box for Repair\)](#)

[Titan Foundry Ltd. \(Curb Box Extension\)](#)

[W.D. Valve Boxes Ltd. \(Minneapolis Curb Box\)](#)

[W.D. Valve Boxes Ltd. \(Curb Box for Repair\)](#)

[W.D. Valve Boxes Ltd. \(Curb Box Extension\)](#)





FILE CODE: 4.1.2.41

PRODUCT TYPE: **MINNEAPOLIS PATTERN CURB VALVE BOXES IN 19mm, 25mm, 38mm, AND 51mm**

MANUFACTURER: Titan Foundry Ltd.

MODEL: Minneapolis

PRODUCT DESCRIPTION: Minneapolis Style Curb Valve Box with 19mm, 25mm, 38mm, and 51mm Threads, Galvanized Steel Upper in 19mm and 25mm, and Cast Iron Upper in 38mm and 51mm.

REQUIRED MARKINGS AND LOCATIONS: Brass nut with letter T. Grey cast iron lid with markings: Winnipeg Water, Titan Edm.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated March 10, 1993 (19mm and 25mm) and May 14, 1993 (38mm and 51mm).





FILE CODE: 4.1.2.41

PRODUCT TYPE: **CURB VALVE BOXES IN 19mm AND 25mm**

MANUFACTURER: Titan Foundry Ltd.

MODEL: Non-Minneapolis

PRODUCT DESCRIPTION: Repair Curb Valve Box

REQUIRED MARKINGS AND LOCATIONS: N/A

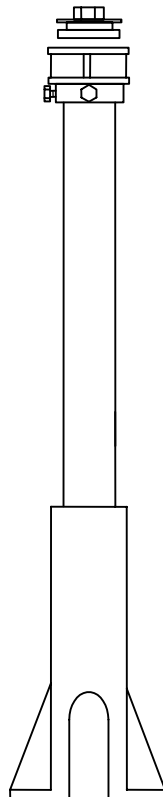
INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: Not for use with Minneapolis pattern curb valves.

NOTE: For complete product information, refer to the product approval letter dated March 14, 1997.

**THIS PRODUCT FOR REPAIRS AND WHEN A MINNEAPOLIS PATTERN CURB VALVE IS NOT PRESENT. NOT FOR USE IN NEW INSTALLATIONS.**





FILE CODE: 4.1.2.41

PRODUCT TYPE: **CURB VALVE BOX EXTENSION – “MILK BOTTLE”**

MANUFACTURER: W.D. Valve Boxes Ltd.

MODEL: WD9

PRODUCT DESCRIPTION: Service Barrel Extension with Brass Plug.

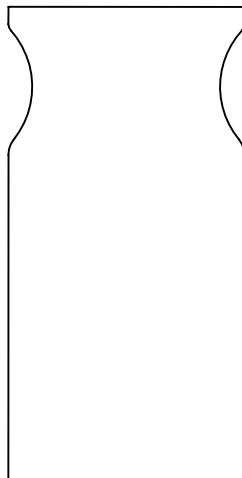
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: Not for use with Minneapolis pattern curb valves.

NOTE: For complete product information, refer to the product approval letter dated June 3, 1992.





FILE CODE: 4.1.2.41

PRODUCT TYPE: **MINNEAPOLIS PATTERN CURB VALVE BOXES IN 19mm, 25mm, 38mm, AND 51mm**

MANUFACTURER: W.D. Valve Boxes Ltd.

MODEL: VB36-20 (19mm), VB36-25 (25mm), VB36-38 (38mm), VB36-50 (51mm)

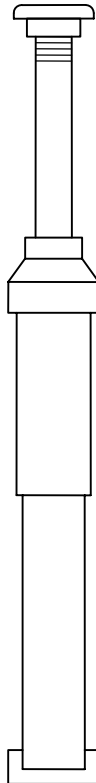
PRODUCT DESCRIPTION: Minneapolis Style Curb Valve Box with 19mm, 25mm, 38mm, and 51mm Threads, Galvanized Steel Upper in 19mm and 25mm, and Cast Iron Upper in 38mm and 51mm.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated January 15, 1993 and March 14, 2001.





FILE CODE: 4.1.2.41

PRODUCT TYPE: **CURB VALVE BOXES IN 19mm AND 25mm**

MANUFACTURER: W.D. Valve Boxes Ltd.

MODEL: WD27

PRODUCT DESCRIPTION: Repair Curb Valve Box

REQUIRED MARKINGS AND LOCATIONS: N/A

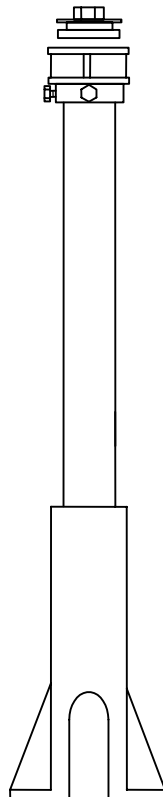
INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: Not for use with Minneapolis pattern curb valves.

NOTE: For complete product information, refer to the product approval letter dated March 15, 1982.

**THIS PRODUCT FOR REPAIRS AND WHEN A MINNEAPOLIS PATTERN CURB VALVE IS NOT PRESENT. NOT FOR USE IN NEW INSTALLATIONS.**





FILE CODE: 4.1.2.41

PRODUCT TYPE: **CURB VALVE BOX EXTENSION – “MILK BOTTLE”**

MANUFACTURER: Titan Foundry Ltd.

MODEL: Milk Bottle

PRODUCT DESCRIPTION: Curb Valve Box Extension with Brass Plug.

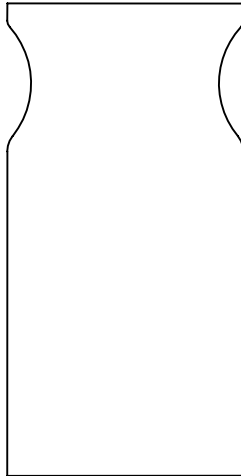
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: Not for use with Minneapolis pattern curb valves.

NOTE: For complete product information, refer to the product approval letter dated June 18, 1992.





FILE CODE: 4.1.3.20

PRODUCT TYPE: **GALVANIC ZINC ANODES**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2110

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.1.3.20](#)

APPROVED PRODUCTS: [Interprovincial Corrosion Control Co.](#)

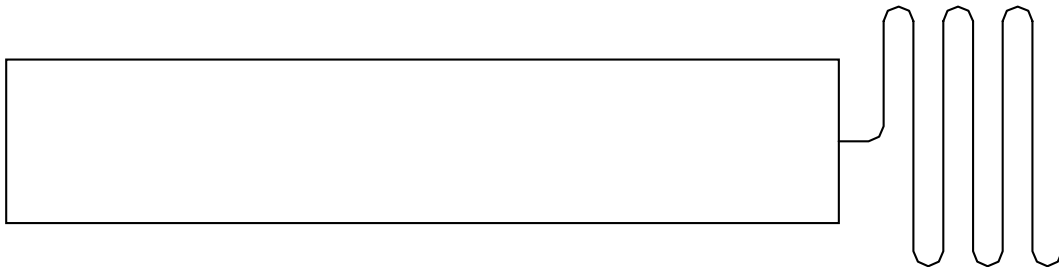
[Corpro Companies, Inc.](#)

[Canada Metal \(Eastern\) Ltd.](#)

[Corrosion Services Ltd](#)

[Exothermal Industries](#)

[Canada Metal \(Pacific\) Ltd.](#)





FILE CODE: 4.1.3.20

PRODUCT TYPE: **ANODES**

MANUFACTURER: Interprovincial Corrosion Control

MODEL: N/A

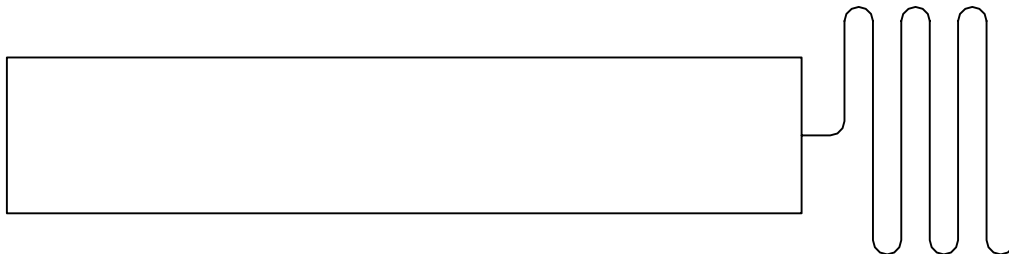
PRODUCT DESCRIPTION: 10.9 Kg. Galvanized Zinc Anode.

REQUIRED MARKINGS AND LOCATIONS: On cardboard tube: Interprovincial Corrosion Control, Address, Zinc Anode Type II I/A/W ASTM B418-88, 24 Lb., Date of Manufacture.

INTERPRETATION: Date of Manufacture: Month/Day/Year.

INSTALLATION PROCEDURES: Install the anode horizontally in the bottom of the trench parallel to the main at least 0.5m from the centerline of the pipe. Wrap the wire at least 1½ times around the pipe, ensuring enough slack to prevent strain during back filling. Prepare a 5x5 cm. area by grinding or filing. Remove sufficient length of insulation from the connecting wire and crimp on a silver sleeve. Insert the wire into the bottom of a 45g. crucible. Place a disk in the crucible and fill with weld material. Close the crucible and place on the prepared surface. Ignite. Wait 30 seconds before removing the crucible. Knock of any slag or rough edges.

NOTE: For complete product information, refer to the product approval letter dated January 19, 1995.





FILE CODE: 4.1.3.20

PRODUCT TYPE: **ANODES**

MANUFACTURER: Corrpro Canada Ltd.

MODEL: N/A

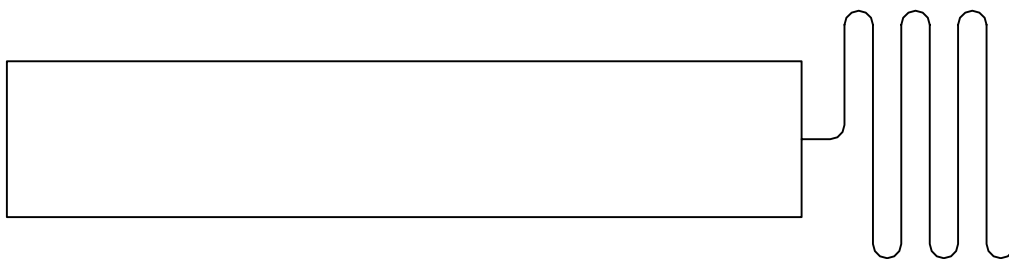
PRODUCT DESCRIPTION: 10.9 Kg. Galvanized Zinc Anode.

REQUIRED MARKINGS AND LOCATIONS: On cardboard tube: Corrpro Canada Ltd., Address, Zinc Anode Type II to ASTM B418-88, 24 Lb., Lot #.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Install the anode horizontally in the bottom of the trench parallel to the main at least 0.5m from the centerline of the pipe. Wrap the wire at least 1½ times around the pipe, ensuring enough slack to prevent strain during back filling. Prepare a 5x5 cm. area by grinding or filing. Remove sufficient length of insulation from the connecting wire and crimp on a silver sleeve. Insert the wire into the bottom of a 45g. crucible. Place a disk in the crucible and fill with weld material. Close the crucible and place on the prepared surface. Ignite. Wait 30 seconds before removing the crucible. Knock of any slag or rough edges.

NOTE: For complete product information, refer to the product approval letters dated February 11, 1991 and January 31, 1995 (name changed from United Corrosion Consultants Ltd. to Corrpro Canada Ltd.).





FILE CODE: 4.1.3.20

PRODUCT TYPE: **ANODES**

MANUFACTURER: The Canada Metal Co. Ltd.

MODEL: N/A

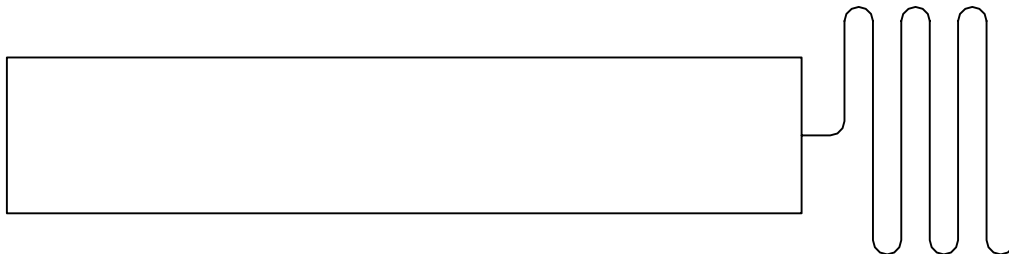
PRODUCT DESCRIPTION: 10.9 Kg. Galvanized Zinc Anode.

REQUIRED MARKINGS AND LOCATIONS: On cardboard tube: The Canada Metal Co. Ltd., Address, Zinc Anode Type II to ASTM B418-88, Zinc Weight, Lot #.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Install the anode horizontally in the bottom of the trench parallel to the main at least 0.5m from the centerline of the pipe. Wrap the wire at least 1½ times around the pipe, ensuring enough slack to prevent strain during back filling. Prepare a 5x5 cm. area by grinding or filing. Remove sufficient length of insulation from the connecting wire and crimp on a silver sleeve. Insert the wire into the bottom of a 45g. crucible. Place a disk in the crucible and fill with weld material. Close the crucible and place on the prepared surface. Ignite. Wait 30 seconds before removing the crucible. Knock of any slag or rough edges.

NOTE: For complete product information, refer to the product approval letter dated January 22, 1992.





FILE CODE: 4.1.3.20

PRODUCT TYPE: **ANODES**

MANUFACTURER: Corrosion Services Ltd.

MODEL: N/A

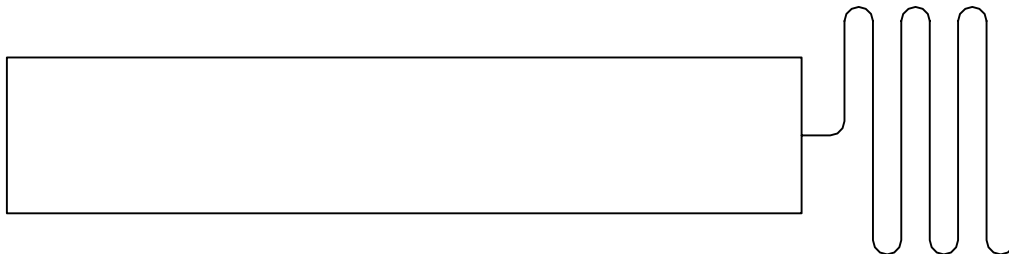
PRODUCT DESCRIPTION: 10.9 Kg. Galvanized Zinc Anode.

REQUIRED MARKINGS AND LOCATIONS: On cardboard tube: Zinc Anode, Z-24-48, Anode de Zinc, Date of Manufacture, Zinc Type II to ASTM B418-88, Lot #.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Install the anode horizontally in the bottom of the trench parallel to the main at least 0.5m from the centerline of the pipe. Wrap the wire at least 1½ times around the pipe, ensuring enough slack to prevent strain during back filling. Prepare a 5x5 cm. area by grinding or filing. Remove sufficient length of insulation from the connecting wire and crimp on a silver sleeve. Insert the wire into the bottom of a 45g. crucible. Place a disk in the crucible and fill with weld material. Close the crucible and place on the prepared surface. Ignite. Wait 30 seconds before removing the crucible. Knock of any slag or rough edges.

NOTE: For complete product information, refer to the product approval letter dated June 18, 1992.





FILE CODE: 4.1.3.20

PRODUCT TYPE: **ANODES**

MANUFACTURER: Exothermal Industries.

MODEL: N/A

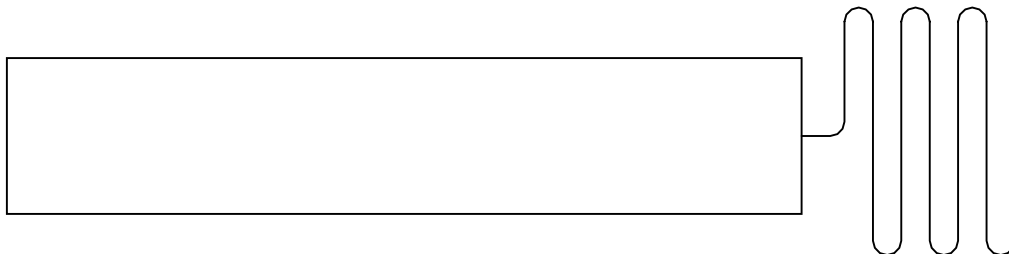
PRODUCT DESCRIPTION: 10.9 Kg. Galvanized Zinc Anode.

REQUIRED MARKINGS AND LOCATIONS: On cardboard tube: Exothermal Industries., Address, Zinc Anode Type II to ASTM B418-88, 10.9Kg (24 lbs), D/M/Y or Lot of Zinc Casting, D/M/Y or Lot of Anode Manufacture.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Install the anode horizontally in the bottom of the trench parallel to the main at least 0.5m from the centerline of the pipe. Wrap the wire at least 1½ times around the pipe, ensuring enough slack to prevent strain during back filling. Prepare a 5x5 cm. area by grinding or filing. Remove sufficient length of insulation from the connecting wire and crimp on a silver sleeve. Insert the wire into the bottom of a 45g. crucible. Place a disk in the crucible and fill with weld material. Close the crucible and place on the prepared surface. Ignite. Wait 30 seconds before removing the crucible. Knock of any slag or rough edges.

NOTE: For complete product information, refer to the product approval letter dated January 30, 2001. Name changed from Keylab Ind. to Exothermal Industries in January of 2002.





FILE CODE: 4.1.3.20

PRODUCT TYPE: **GALVANIC ZINC ANODES**

MANUFACTURER: The Canada Metal (Pacific) Ltd.

MODEL: N/A

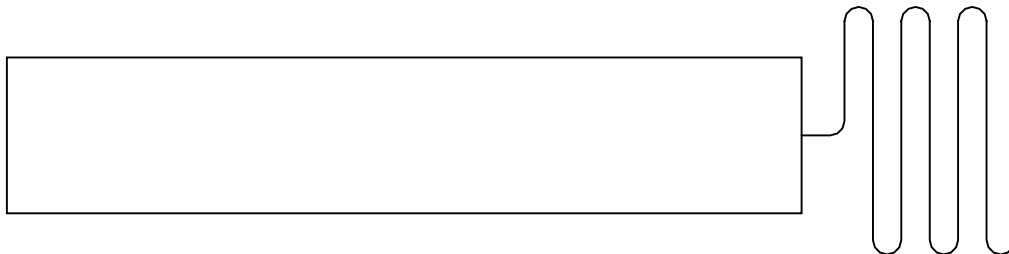
PRODUCT DESCRIPTION: 10.9 Kg. Galvanized Zinc Anode.

REQUIRED MARKINGS AND LOCATIONS: On cardboard tube: The Canada Metal (Pacific) Ltd., Address, Zinc Anode Type II to ASTM B418-88, Zinc Weight, Lot #.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Install the anode horizontally in the bottom of the trench parallel to the main at least 0.5m from the centerline of the pipe. Wrap the wire at least 1½ times around the pipe, ensuring enough slack to prevent strain during back filling. Prepare a 5x5 cm. area by grinding or filing. Remove sufficient length of insulation from the connecting wire and crimp on a silver sleeve. Insert the wire into the bottom of a 45g. crucible. Place a disk in the crucible and fill with weld material. Close the crucible and place on the prepared surface. Ignite. Wait 30 seconds before removing the crucible. Knock of any slag or rough edges.

NOTE: For complete product information, refer to the product approval letter dated February 1, 2011.





FILE CODE: 4.1.3.21

PRODUCT TYPE: **ELECTRICAL CABLE ATTACHMENT ACCESSORIES**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2210-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

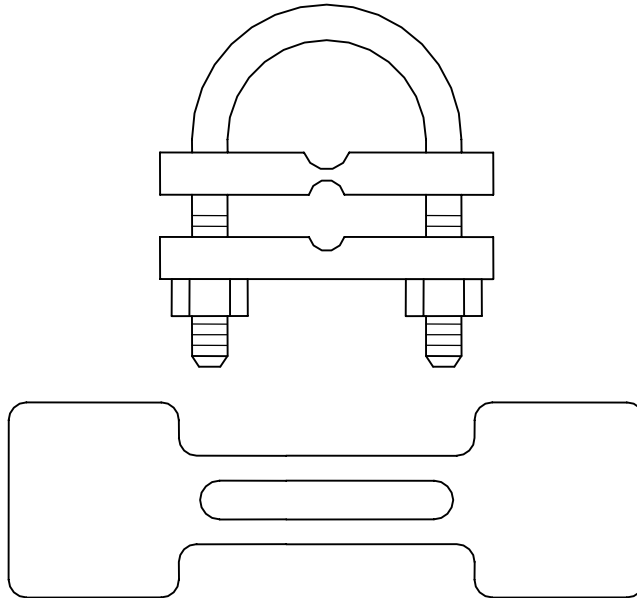
PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS: [Raychem Canada Ltd. \(Splice Applicators\)](#)

[Burndy Inc. \(Ground Clamps\)](#)

[Blackburn \(Ground Clamps\)](#)

[Deblo Ind. \(Ground Clamps\)](#)





FILE CODE: 4.1.3.21

PRODUCT TYPE: **ELECTRICAL CABLE ATTACHMENT ACCESSORIES**

MANUFACTURER: Blackburn

MODEL: N/A

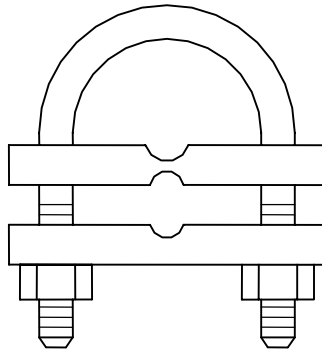
PRODUCT DESCRIPTION: U Bolt Ground Clamp.

REQUIRED MARKINGS AND LOCATIONS: CSA Marking

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated June 6, 1994.





FILE CODE: 4.1.3.21

PRODUCT TYPE: **ELECTRICAL CABLE ATTACHMENT ACCESSORIES**

MANUFACTURER: Raychem Canada Ltd.

MODEL: N/A

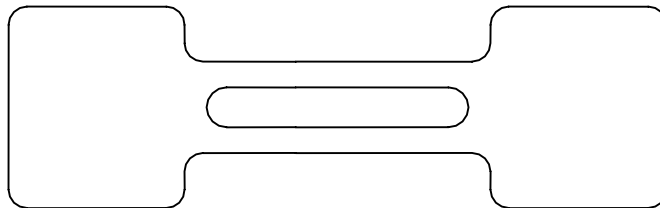
PRODUCT DESCRIPTION: Duraseal Heat Shrink Butt Applicators.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Strip wires. Insert into the crimp barrel. Crimp. Heat crimped splice until the tubing recovers and adhesive melts and flows.

NOTE: For complete product information, refer to the product approval letter dated February 6, 1991.





FILE CODE: 4.1.3.21

PRODUCT TYPE: **ELECTRICAL CABLE ATTACHMENT ACCESSORIES**

MANUFACTURER: Burndy Inc.

MODEL: N/A

PRODUCT DESCRIPTION: U-Bolt Ground Clamp.

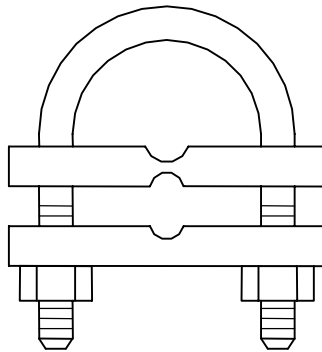
REQUIRED MARKINGS AND LOCATIONS: CSA Marking

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For connecting GAWG 7 strand copper wire to 19mm, 25mm, 38mm, and 51mm copper water tube.

NOTE: For complete product information, refer to the product approval letter dated February 6, 1991.





FILE CODE: 4.1.3.21

PRODUCT TYPE: **ELECTRICAL CABLE ATTACHMENT ACCESSORIES**

MANUFACTURER: Deblo Industries

MODEL: N/A

PRODUCT DESCRIPTION: Ground Clamp.

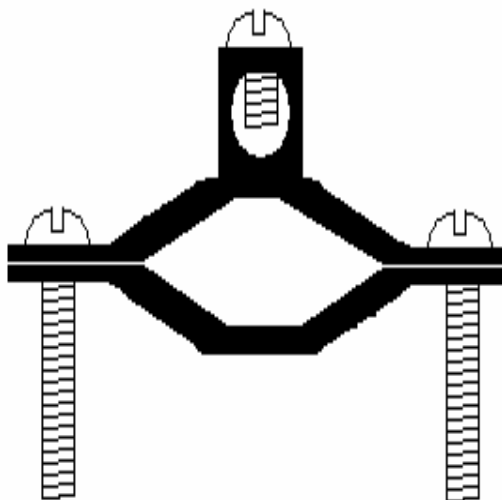
REQUIRED MARKINGS AND LOCATIONS: CSA Marking, UL Markings, Part Number, Size Range

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For connecting GAWG 7 strand copper wire to 19mm, 25mm, 38mm, and 51mm copper water tube.

NOTE: For complete product information, refer to the product approval letter dated March 10, 2008







# **SEWER PRODUCTS**

Winnipeg



FILE CODE: 4.2.1.10

PRODUCT TYPE: **MAIN LINE PVC SEWER PIPE**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.10](#)

APPROVED PRODUCTS: [Ipex Inc.](#)

[Rehau Industries Inc.](#)

[Royal Pipe Systems](#)

[Northern Pipe](#)





FILE CODE: 4.2.1.10

PRODUCT TYPE: **MAIN LINE PVC SEWER PIPE**

MANUFACTURER: Ipex Inc.

MODEL: Ring-Tite

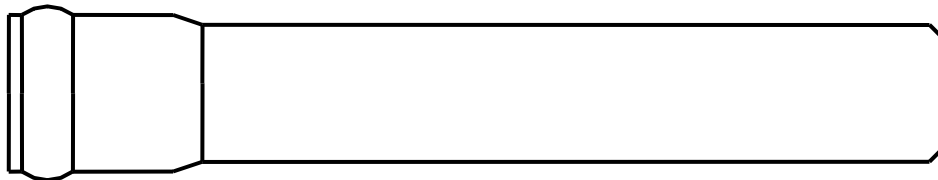
PRODUCT DESCRIPTION: SDR35 PVC Gravity Sewer Pipe in 250mm – 900mm.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer, Origin, CSA B182.2, Date of Manufacture. Pipe: Size (inches and millimeters), Manufacturer, Cell Classification (PVC 12364C, PVC 12454B), CSA B182.2, Minimum Pipe Stiffness (P.S. 46psi, 320kPa), ASTM D3034/F679, Date of Manufacture (year, month, day, hour), Location of Manufacture

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letters dated April 15, 1986 (Scepter and Canron approvals), February 10, 1993 (name changed to Ipex), December 23, 1996.





FILE CODE: 4.2.1.10

PRODUCT TYPE: **MAIN LINE PVC SEWER PIPE**

MANUFACTURER: Rehau Industries Inc.

MODEL: Duralok

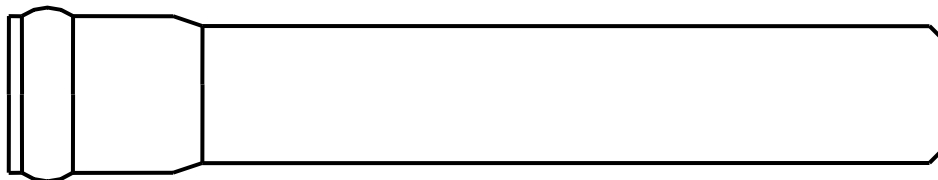
PRODUCT DESCRIPTION: SDR35 PVC Gravity Sewer Pipe in 250mm, 300mm, 375mm.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (Forshida), Origin (South Carolina), Size, Year, Quarter (stamped with pins). Pipe: Size (inches and millimeters), Manufacturer (Rehau), Date of Manufacture (day, month, year, shift, time), Location (P for Prescott Ontario), CSA B182.2, Minimum Pipe Stiffness (P.S. 46psi, 320kPa).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated August 28, 1996.





FILE CODE: 4.2.1.10

PRODUCT TYPE: **MAIN LINE PVC SEWER PIPE**

MANUFACTURER: Royal Pipe Systems

MODEL: Royal Seal

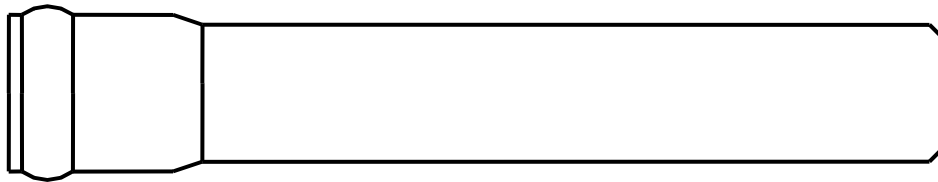
PRODUCT DESCRIPTION: SDR35 PVC Gravity Sewer Pipe in 250mm thru 675mm.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (S& B), Origin (Costa Rica), CSA B182.2, Date of Manufacture (year and quarter). Pipe Size (inches and millimeters), Manufacturer (Crown, Royal Seal), Date of Manufacture (day, month, year), CSA B182.2, Minimum Pipe Stiffness (P.S. 46psi, 320kPa), BNQ Number (NQ 3624-135-0309), ASTM 3034/F679 (dependant on size).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated August 8, 1995.





FILE CODE: 4.2.1.10

PRODUCT TYPE: **MAIN LINE PVC SEWER PIPE**

MANUFACTURER: Northern Pipe

MODEL: N/A

PRODUCT DESCRIPTION: SDR35 PVC Gravity Sewer Pipe in 250mm, 300mm and 375mm thru 675mm.

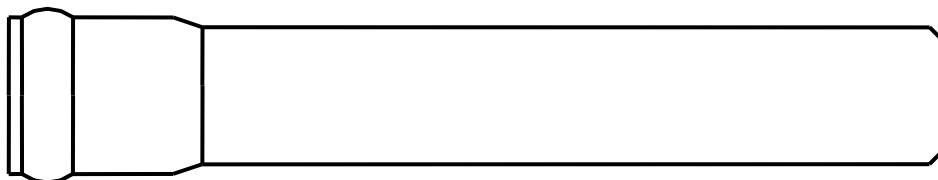
REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (S& B), Origin (Costa Rica), CSA B182.2, Date of Manufacture (year and quarter). Pipe: Size (inches and millimeters), Manufacturer, Cell Classification (PVC 12454B), CSA B182.2, Minimum Pipe Stiffness (P.S. 46psi, 320kPa), ASTM 3034/ F679 (dependant on size), Production Code

INTERPRETATION: For interpretation of the production code:

Example: **110904R42NA** refers to; **11** = November, **09** = 9<sup>th</sup> day, **04** = 2004 and **R42NA**= material, extruder, shift, etc. (see file for explanation if needed)

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

Note: For complete product information, refer to the product approval letter dated February 16, 1996.





FILE CODE: 4.2.1.11

PRODUCT TYPE: **MAIN LINE PVC CUL DE SAC SEWER PIPE**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

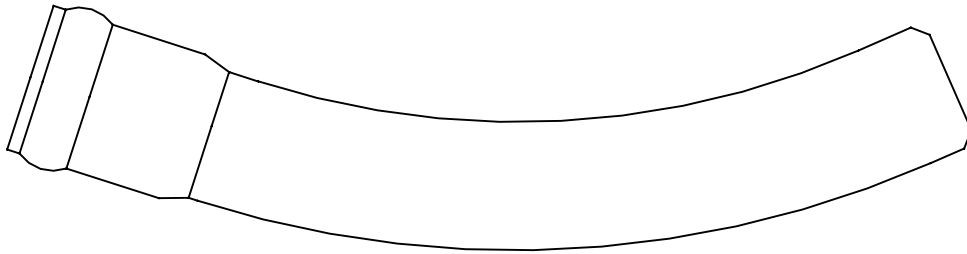
APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS: [Ipex Inc.](#)

[Royal Pipe Systems](#)

[GPK Products Inc.](#)





FILE CODE: 4.2.1.11

PRODUCT TYPE: **MAIN LINE PVC CUL DE SAC SEWER PIPE**

MANUFACTURER: Ipex Inc.

MODEL: Ring-Tite

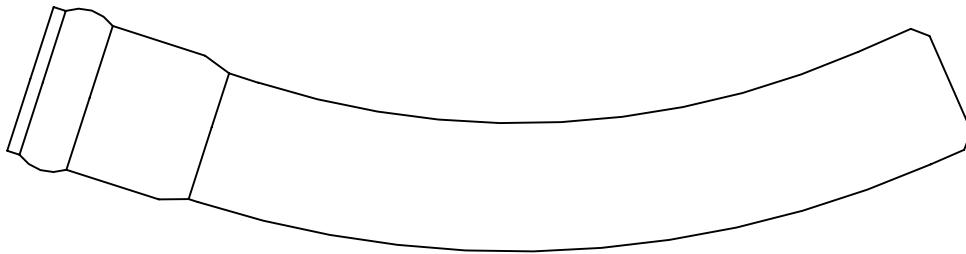
PRODUCT DESCRIPTION: SDR35 PVC Cul-De-Sac Sewer Pipe in 11  $1/4^\circ$  and 7  $1/2^\circ$  bends, 250mm only.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letters dated June 6, 1986 (Scepter), July 30, 1986 (Canron), February 10, 1993 (name changed to Ipex).





FILE CODE: 4.2.1.11

PRODUCT TYPE: **MAIN LINE PVC CUL DE SAC SEWER PIPE**

MANUFACTURER: Royal Pipe Systems

MODEL: Royal Seal

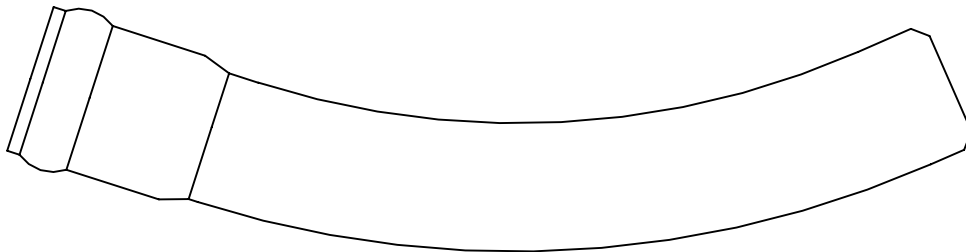
PRODUCT DESCRIPTION: SDR35 PVC Cul-De-Sac Sewer Pipe 11  $\frac{1}{4}^{\circ}$  and 7° bends, 250mm only.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated June 27, 1986, September 17, 1997.





FILE CODE: 4.2.1.11

PRODUCT TYPE: **MAIN LINE PVC CUL DE SAC SEWER PIPE**

MANUFACTURER: GPK Products Inc.

MODEL: N/A

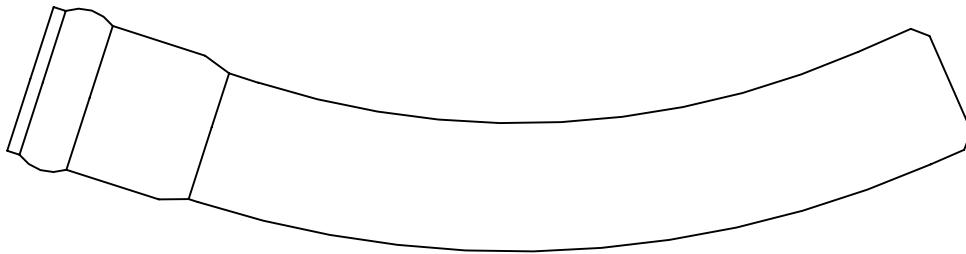
PRODUCT DESCRIPTION: SDR35 PVC Cul-De-Sac Sewer Pipe 7° bend, 250mm only, 5.6' laying length, 14m radius of curvature.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated June 11, 1986.





FILE CODE: 4.2.1.16

PRODUCT TYPE: PVC OPEN PROFILE RIBBED STORM SEWER PIPE

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: N/A

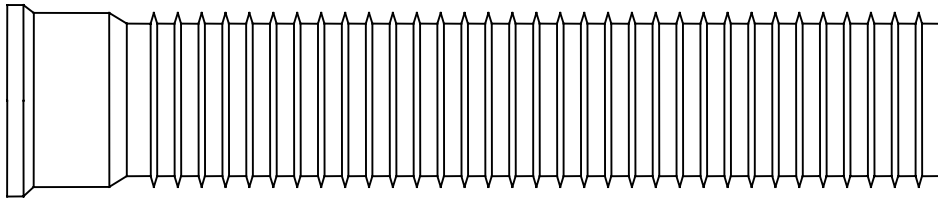
APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.16](#)

APPROVED PRODUCTS: [Ipex Inc.](#)

[Rehau Industries Inc.](#)

[Royal Pipe Systems](#)





FILE CODE: 4.2.1.16

PRODUCT TYPE: **PVC OPEN PROFILE RIBBED STORM SEWER PIPE**

MANUFACTURER: Ipex Inc.

MODEL: Ultra-Rib (200mm-600mm)  
Perma-Loc (675mm-900mm)

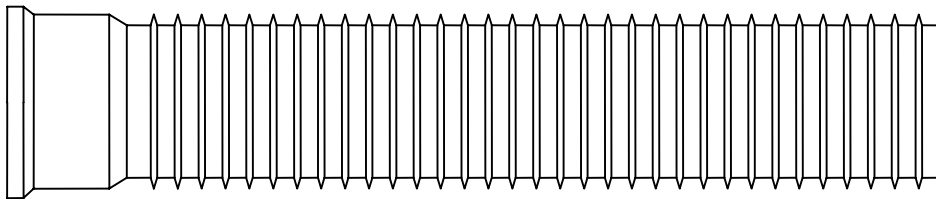
PRODUCT DESCRIPTION: Ribbed Storm Sewer Pipe

REQUIRED MARKINGS AND LOCATIONS: Ipex, CSA B182.4

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated October 11, 1996.





FILE CODE: 4.2.1.16

PRODUCT TYPE: **PVC OPEN PROFILE RIBBED STORM SEWER PIPE**

MANUFACTURER: Rehau Industries Inc.

MODEL: RauRib

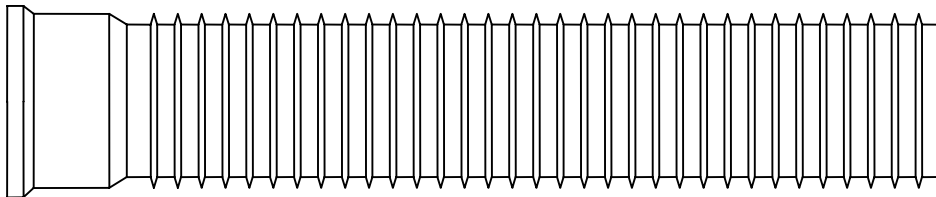
PRODUCT DESCRIPTION: Ribbed Storm Sewer Pipe in 200mm, 250mm, 300mm, 375mm, 450mm, and 600mm.

REQUIRED MARKINGS AND LOCATIONS: Rehau, Size (inches, mm), Raurib, PVC 12364B, Sewer/Egout, CSA B182.4, CL V, PS320Kpa/46psi, ASTM F794, NQ3624-135, (Warnock Hersey hammer symbol) 362, Made In/Fab... Canada, Date code, Plant, Extruder

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated December 12, 1996 and May 20, 2003 [8" (200mm), 10" (250mm) and 12" (300mm)]





FILE CODE: 4.2.1.16

PRODUCT TYPE: **PVC OPEN PROFILE RIBBED STORM SEWER PIPE**

MANUFACTURER: Royal Pipe Systems

MODEL: KorFlo

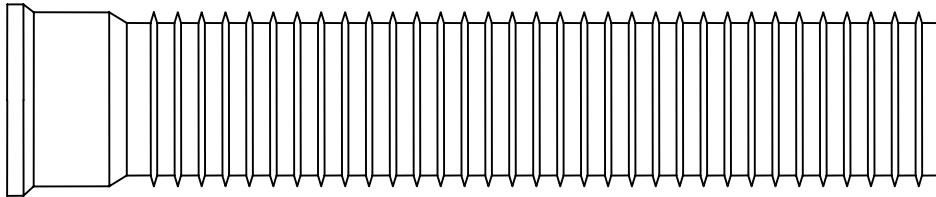
PRODUCT DESCRIPTION: PVC Open Profile Storm Sewer Pipe in 200mm to 600mm

REQUIRED MARKINGS AND LOCATIONS: Pipe Size, Royal Kor Flo, PVC 12454B, Sewer/Egout, (CSA Emblem) B182.4, PS 320 Kpa, (BNQ Emblem) NQ 3624-135 0309, ASTM F794, PS 46 psi, Made in Canada, Date Code

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated March 12, 2002.





FILE CODE: 4.2.1.40

PRODUCT TYPE: **MAIN LINE CONCRETE SEWER PIPE**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS: [Inland Pipe Ltd.](#)

[Lafarge Construction Materials Inc.](#)





FILE CODE: 4.2.1.40

PRODUCT TYPE: **MAIN LINE CONCRETE SEWER PIPE**

MANUFACTURER: Inland Pipe Ltd.

MODEL: Reinforced, Non-Reinforced, Jacking

PRODUCT DESCRIPTION: Concrete Sewer Pipe.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated August 2, 1977, December 10, 1996 (name changed from Hydropipe System Ltd to Inland Pipe Ltd.).





FILE CODE: 4.2.1.40

PRODUCT TYPE: **MAIN LINE CONCRETE SEWER PIPE**

MANUFACTURER: Lafarge Construction Materials Inc.

MODEL: Reinforced, Non-Reinforced, Jacking

PRODUCT DESCRIPTION: Concrete Sewer Pipe.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated April 7, 1981.





FILE CODE: 4.2.1.60

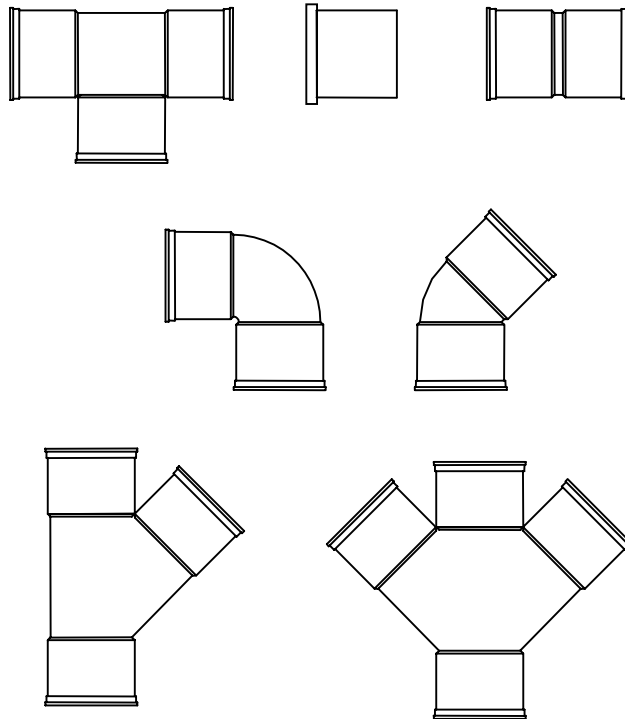
PRODUCT TYPE: **MAIN LINE INJECTION MOULDED PVC SEWER FITTINGS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.60](#)

APPROVED PRODUCTS:      [Ipex Inc.](#)  
  
                                 [Royal Pipe Systems](#)  
  
                                 [Galaxy Plastics Ltd.](#)





FILE CODE: 4.2.1.60

PRODUCT TYPE: **MAIN LINE INJECTION MOULDED PVC SEWER FITTINGS**

MANUFACTURER: Ipex Inc.

MODEL: Ring-Tite

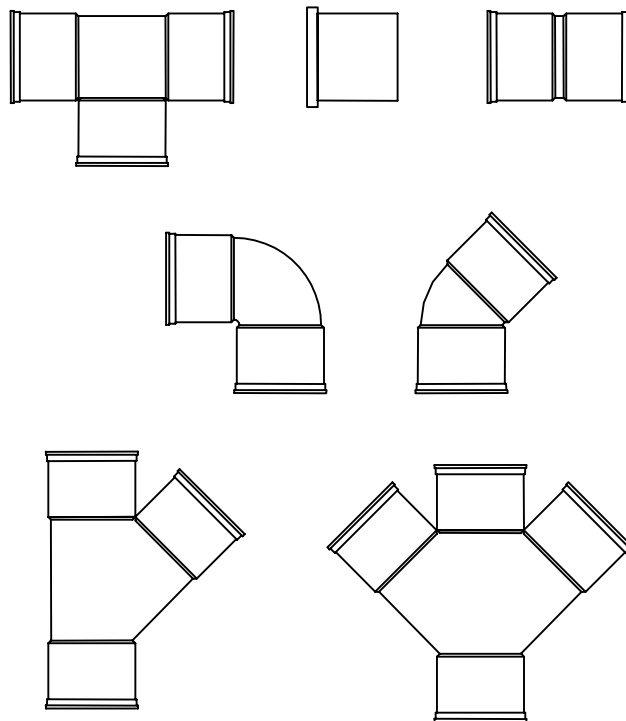
PRODUCT DESCRIPTION: Injection Moulded SDR 35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (Ipex), Origin (St. Jacques), CSA B182.2, Date of Manufacture (year and month). Fitting: Manufacturer (Ipex), Date of Manufacture (year and month), CSA B182.2, BNQ Number (BNQ 3624-135), ASTM D3034, PVC PSM, Five Digit Part Number (xxxxx), Size (in millimeters at each outlet).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated August 4, 1994.





FILE CODE: 4.2.1.60

PRODUCT TYPE: **MAIN LINE INJECTION MOULDED PVC SEWER FITTINGS**

MANUFACTURER: Royal Pipe Systems (Le-Ron Plastics, Plastic Trends and/or Fab-Tech)

MODEL: N/A

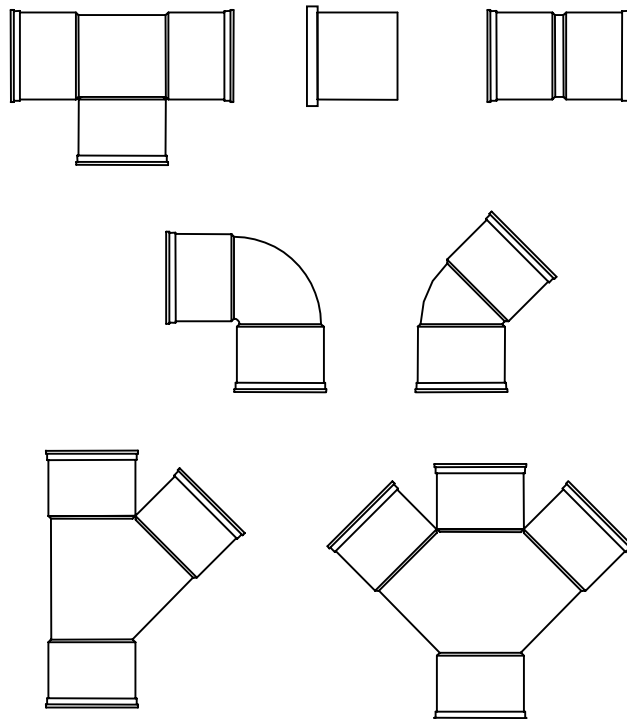
PRODUCT DESCRIPTION: Injection Moulded SDR35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer, Origin, CSA B182.2, Date of Manufacture (year and month). Fitting: Manufacturer, Date of Manufacture (year and month), CSA B182.2, BNQ Number (BNQ 3624-135), ASTM D3034, PVC PSM, Size (in inches).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated November 26, 1999, November 9, 2000.





FILE CODE: 4.2.1.60

PRODUCT TYPE: **MAIN LINE INJECTION MOULDED PVC SEWER FITTINGS**

MANUFACTURER: Galaxy Plastics Ltd.

MODEL: N/A

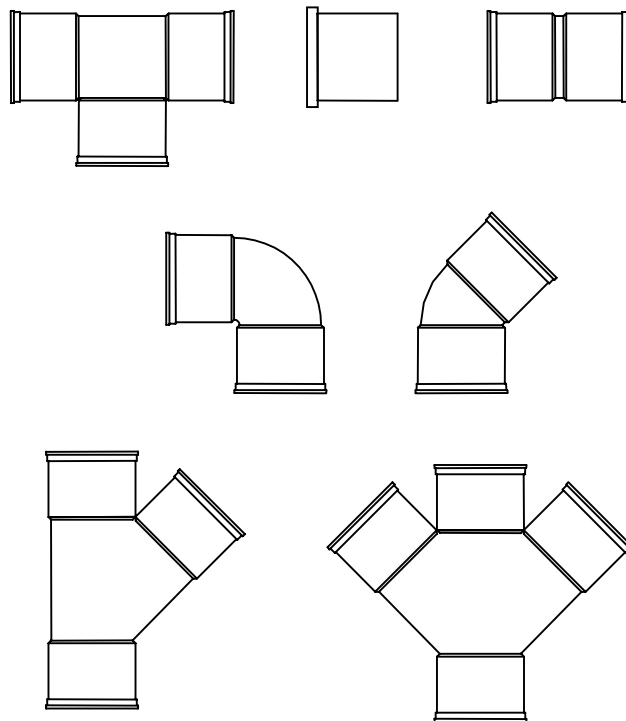
PRODUCT DESCRIPTION: Injection Moulded SDR 35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: RIEBER style SBR (BUNA-S). Fitting: Permanent marking consisting of the manufacturer's name and location, size, type, Standard Number (CAN/CSA-B181.1-M90, CAN/CSA-B181.2-M90, CAN/CSA-B182.1-M92) and the Warnock Hersey Certification Mark.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated March 13, 2008





FILE CODE: 4.2.1.61

PRODUCT TYPE: **MAIN LINE 450MM AND LARGER FABRICATED PVC SEWER FITTINGS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

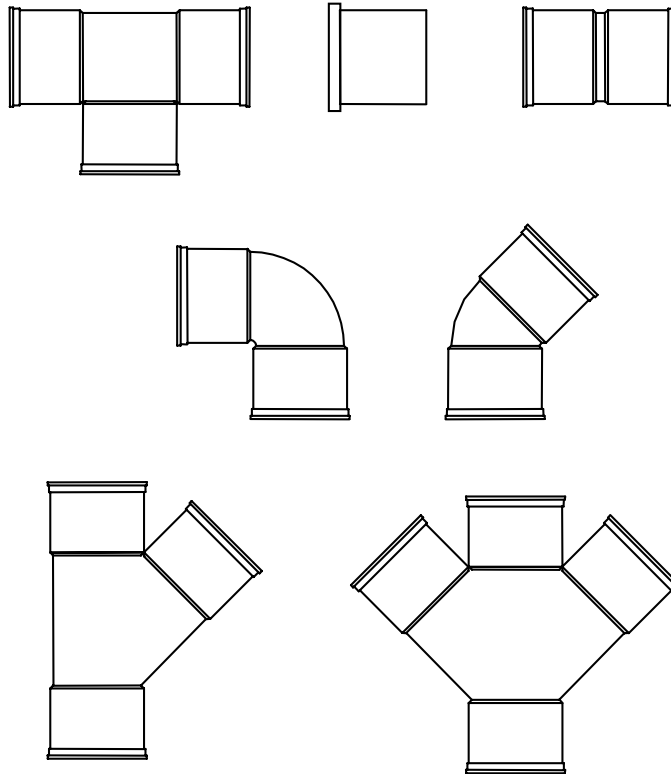
APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.61](#)

APPROVED PRODUCTS: [Ipex Inc.](#)

[Royal Pipe Systems](#)

[GPK Products Inc.](#)





FILE CODE: 4.2.1.61

PRODUCT TYPE: **MAIN LINE 450mm AND LARGER FABRICATED PVC SEWER FITTINGS**

MANUFACTURER: Ipex Inc.

MODEL: Ring-Tite

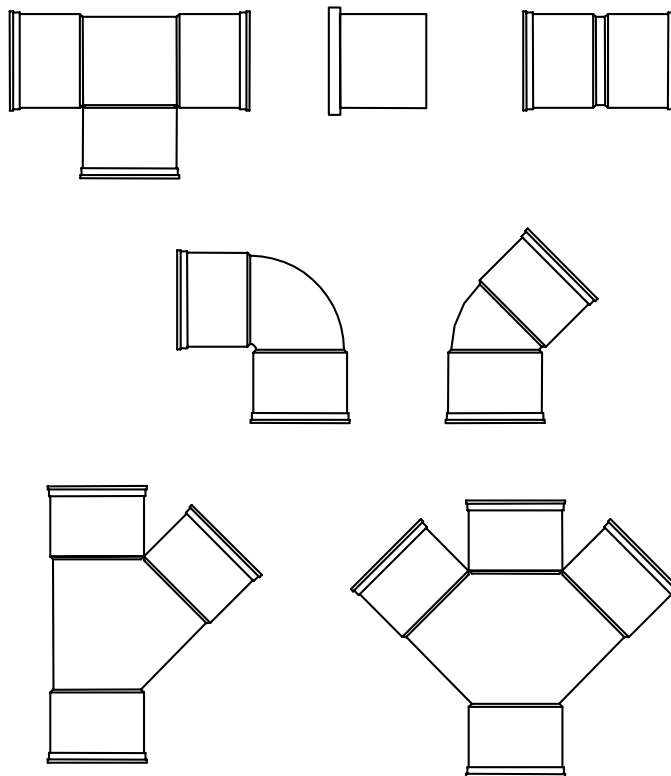
PRODUCT DESCRIPTION: Fabricated SDR 35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (Ipex), Origin (Made in Canada), Size (inches), Front (This Side Out), Hamilton Kent (HK), CSA B182.2, Date of Manufacture (year and month). Fitting: Manufacturer (Ipex, Scepter, Canron), Date of Manufacture (year and month), CSA B182.2, BNQ Number (BNQ 3624-135), ASTM D3034, PVC PSM, Five Digit Part Number (xxxxx), Size (in millimeters at each outlet).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated August 24, 1994.





FILE CODE: 4.2.1.61

PRODUCT TYPE: **MAIN LINE 450mm AND LARGER FABRICATED PVC SEWER FITTINGS**

MANUFACTURER: Royal Pipe Systems or Le-Ron Plastics Inc.

MODEL: N/A

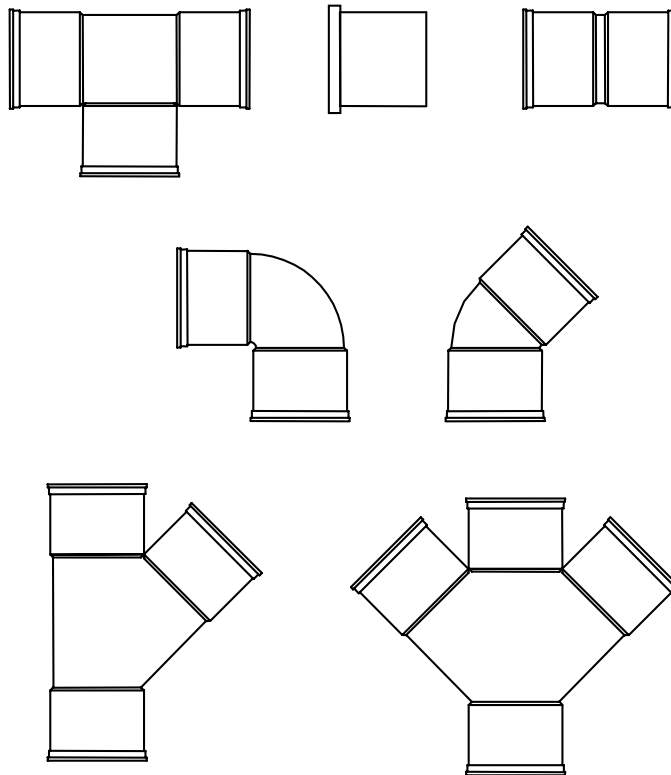
PRODUCT DESCRIPTION: Fabricated SDR35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (Le-Ron), Origin (Costa Rica), CSA B182.2, Date of Manufacture (year and month). Fitting: Manufacturer (Le-Ron), Date of Manufacture (year and month), CSA B182.2, ASTM D3034, PVC PSM, Size (in millimeters at each outlet).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated November 26, 1999.





FILE CODE: 4.2.1.61

PRODUCT TYPE: **MAIN LINE 450mm AND LARGER FABRICATED PVC SEWER FITTINGS**

MANUFACTURER: GPK Products Inc.

MODEL: N/A

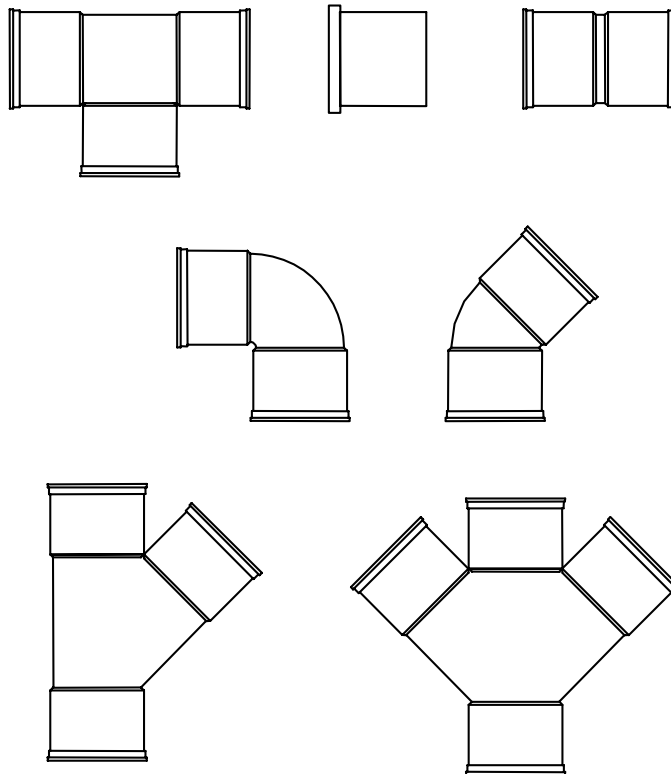
PRODUCT DESCRIPTION: Fabricated SDR 35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (GPK), Origin (Fargo ND.), CSA B182.2, Date of Manufacture (year and month). Fitting: Manufacturer (GPK Products Inc.), Date of Manufacture (year, month, and day), CSA B182.2, ASTM D3034, PVC PSM, Size (in millimeters at each outlet).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated June 26, 1995.





FILE CODE: 4.2.1.61A

**PRODUCT TYPE: 150mm LONG SWEEP ELBOWS AND 375mm FABRICATED PVC SEWER FITTINGS**

**STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6**

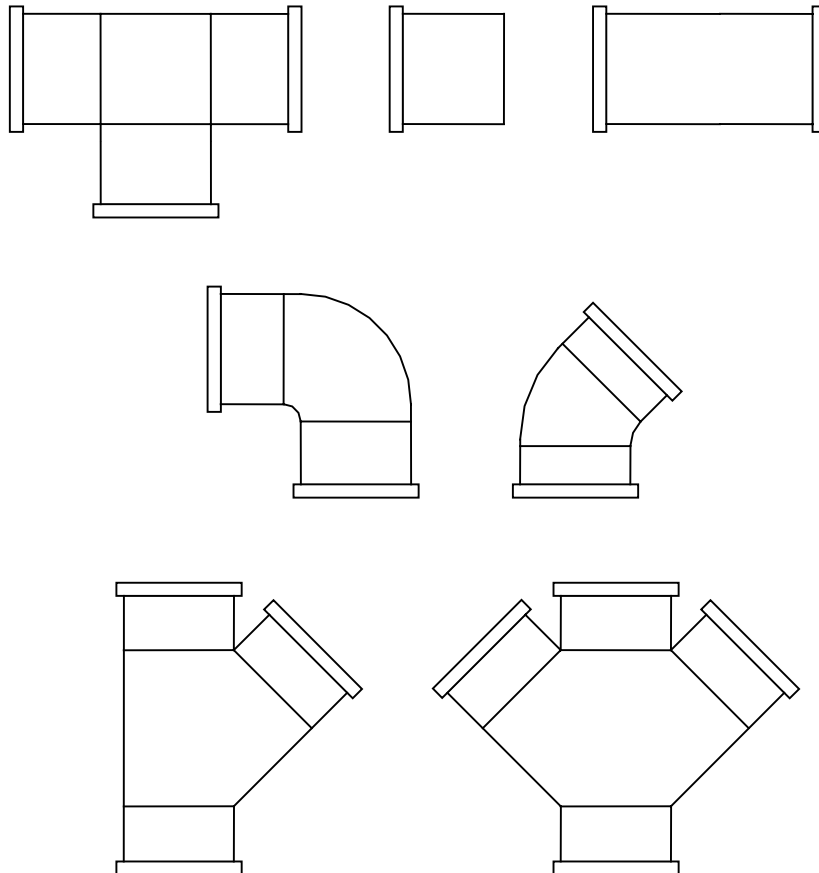
**APPROVED PRODUCT DRAWING REFERENCE: N/A**

**PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.61A](#)**

**APPROVED PRODUCTS: [Ipex Inc.](#)**

[Le-Ron Plastics](#)

[GPK Products Inc.](#)





FILE CODE: 4.2.1.61A

PRODUCT TYPE: **150mm LONG SWEEP ELBOWS AND 375mm FABRICATED PVC SEWER FITTINGS**

MANUFACTURER: Ipex Inc.

MODEL: Ring-Tite

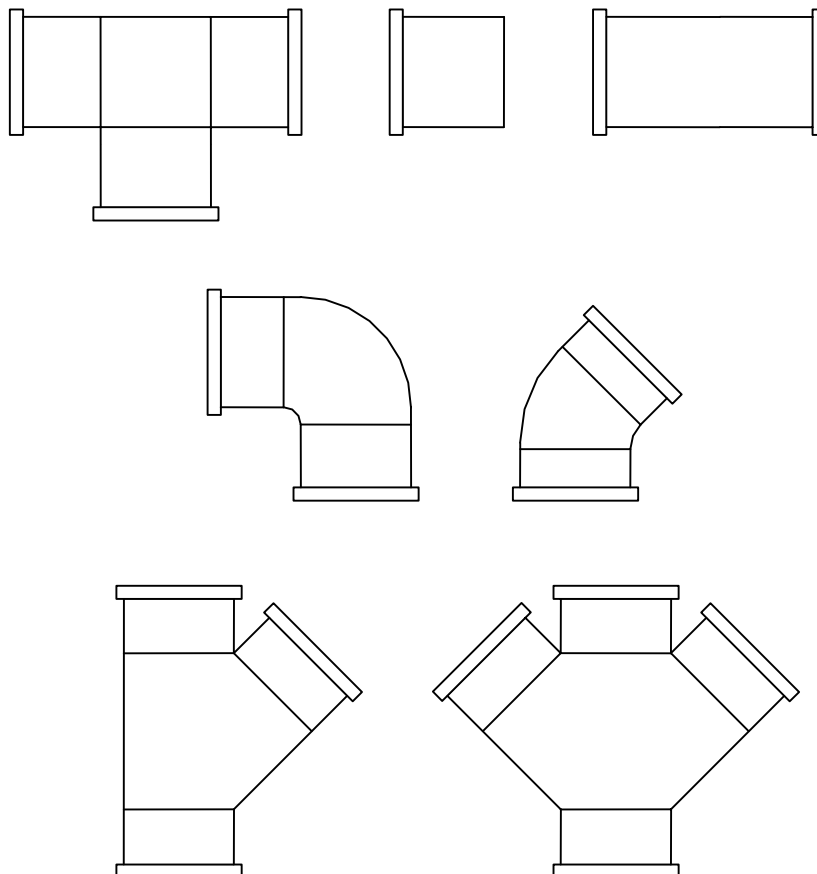
PRODUCT DESCRIPTION: Fabricated SDR 35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (Ipex), Origin (St. Jacques), CSA B182.2, Date of Manufacture (year and month). Fitting: Manufacturer (Ipex, or Canron), Date of Manufacture (year and month), CSA B182.2, BNQ Number (BNQ 3624-135), ASTM D3034, PVC PSM, Five Digit Part Number (xxxxx), Size (in millimeters at each outlet).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated August 24, 1994.





FILE CODE: 4.2.1.61A

PRODUCT TYPE: **150mm LONG SWEEP ELBOWS AND 375mm FABRICATED PVC SEWER FITTINGS**

MANUFACTURER: Le-Ron Plastics Inc.

MODEL: N/A

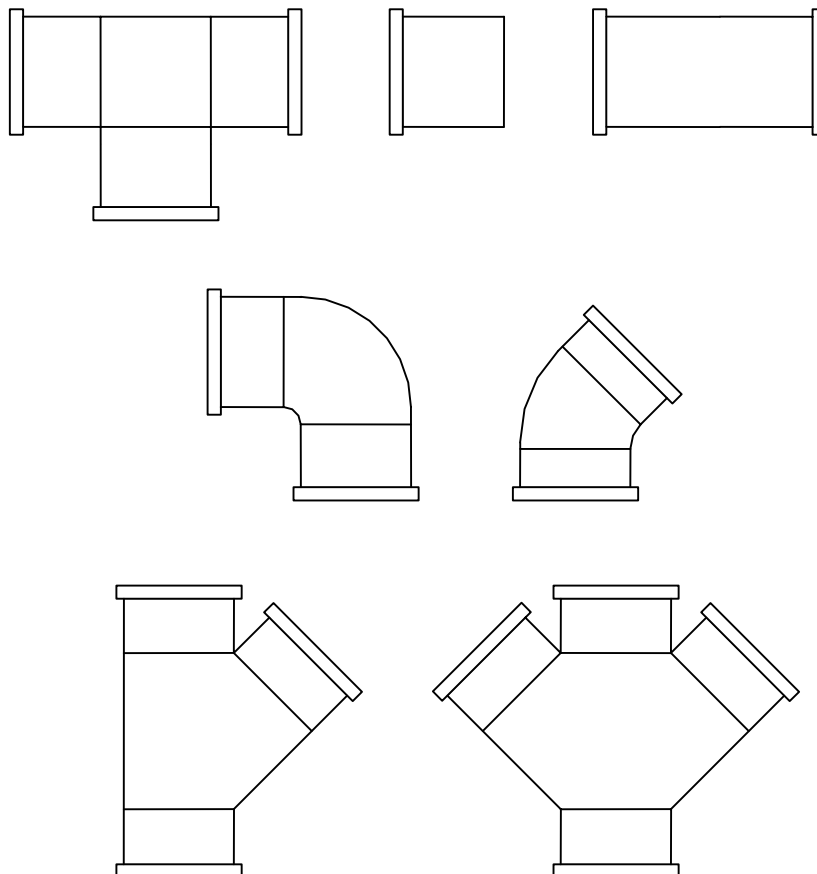
PRODUCT DESCRIPTION: Fabricated SDR35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (Le-Ron), Origin (Costa Rica), CSA B182.2, Date of Manufacture (year and month). Fitting: Manufacturer (Le-Ron), Date of Manufacture (year and month), CSA B182.2, ASTM D3034, PVC PSM, Size (in millimeters at each outlet).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated November 26, 1999.





FILE CODE: 4.2.1.61A

PRODUCT TYPE: **150mm LONG SWEEP ELBOWS AND 375mm FABRICATED PVC SEWER FITTINGS**

MANUFACTURER: GPK Products Inc.

MODEL: N/A

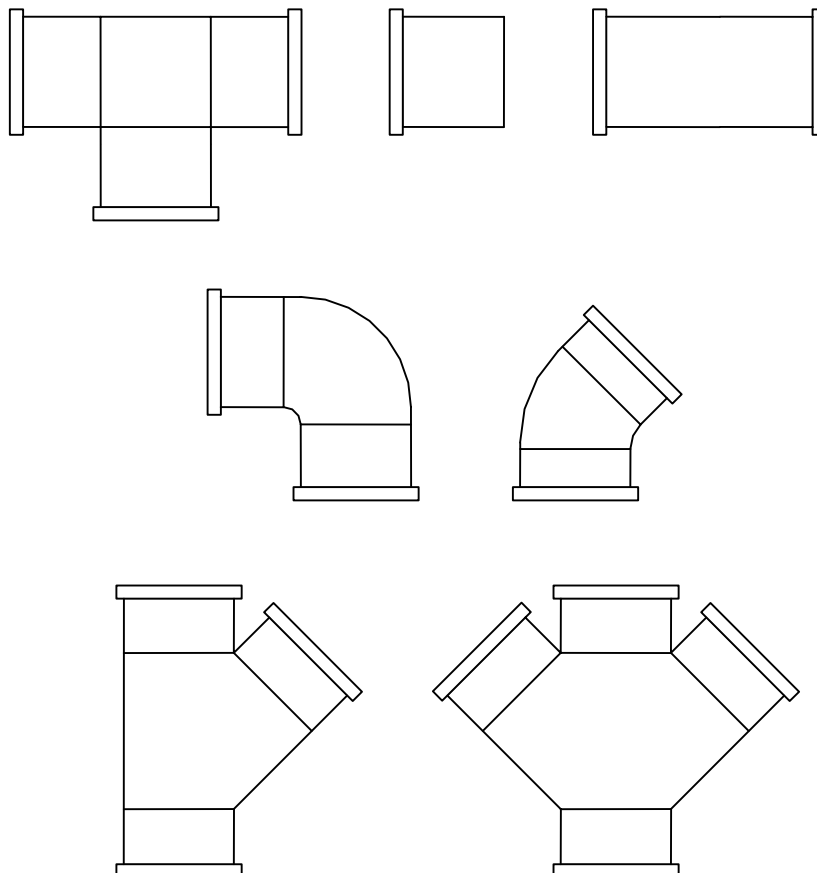
PRODUCT DESCRIPTION: Fabricated SDR 35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (GPK), Origin (Fargo ND.), CSA B182.2, Date of Manufacture (year, month). Fitting: Manufacturer (GPK Products Ltd.), Date of Manufacture (year, month, and day), CSA B182.2, ASTM D3034, PVC PSM, Size (in millimeters at each outlet).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated June 26, 1995.





FILE CODE: 4.2.1.66

PRODUCT TYPE: **MAIN LINE AND CONNECTION FLEXIBLE TRANSITION SEWER COUPLINGS**

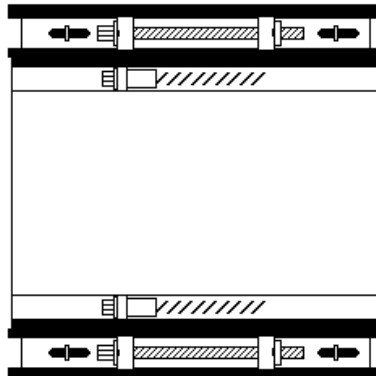
STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.66](#)

APPROVED PRODUCTS:

- [Mission Rubber Co.](#)
- [Dallas Specialty & Mfg Co.](#)
- [Fernco Connectors, Ltd.](#)





FILE CODE: 4.2.1.66

PRODUCT TYPE: **MAIN LINE AND CONNECTION FLEXIBLE TRANSITION SEWER COUPLINGS**

MANUFACTURER: Mission Rubber Co.

MODEL: Flex-Seal

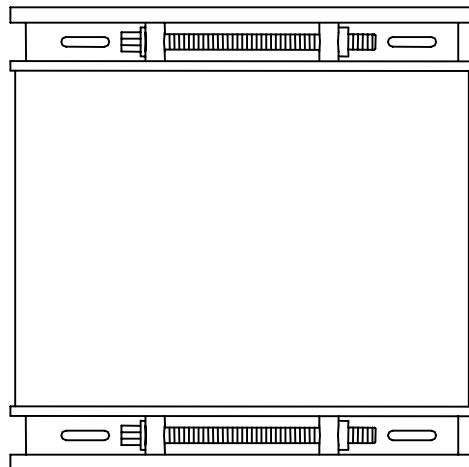
PRODUCT DESCRIPTION: Flexible Transition Sewer Couplings in 150mm thru 675mm, Multiple Combinations.

REQUIRED MARKINGS AND LOCATIONS: Mission B602, Nominal Size, Pipe Materials to be Joined, CSA, Made in USA. On the SS Straps and Shear Rings: Mission Clay Products, Mission, Yr/ Mnth, 316, Stainless Steel, CSA, Nominal Pipe Size, Whitter CA, USA.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated May 27, 1994.





FILE CODE: 4.2.1.66

PRODUCT TYPE: **MAIN LINE AND CONNECTION FLEXIBLE TRANSITION SEWER COUPLINGS**

MANUFACTURER: Dallas Specialty & Mfg Co.

MODEL: n/a

PRODUCT DESCRIPTION: Flexible Transition Sewer Couplings in 150mm thru 675mm, Multiple Combinations.

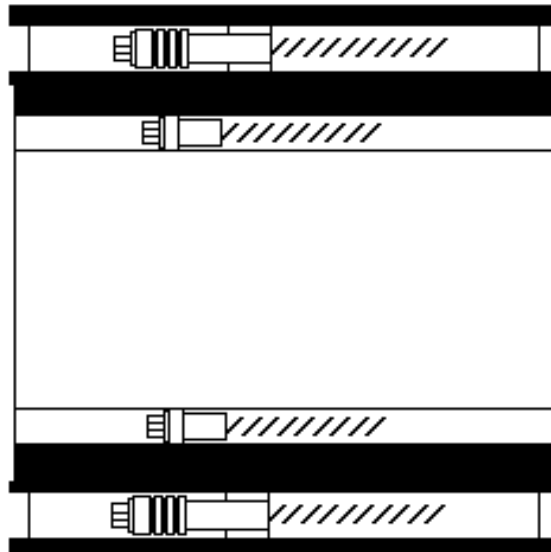
REQUIRED MARKINGS AND LOCATIONS: Manufacturers name or abbreviation, Country of origin, Product identification code, Stainless steel grade and identification, i.e. "STAINLESS STEEL" or "SS", CSA, IAPMO and/or Warnock Hersey certification logo, Strap or shear ring size, Shear ring shall display the nominal pipe size(s) and the pipe material(s) for which the coupling is designed. \*

*\*These markings need only appear on the shear ring if the shear ring partially or entirely obscures these same markings on the elastomer.*

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated November 17, 2008





FILE CODE: 4.2.1.66

PRODUCT TYPE: **MAIN LINE AND CONNECTION FLEXIBLE TRANSITION SEWER COUPLINGS**

MANUFACTURER: Fernco Connectors, Ltd.

MODEL: 5000 Series "RC" Couplings

PRODUCT DESCRIPTION: Flexible Transition Sewer Couplings in 150mm thru 675mm, Multiple Combinations.

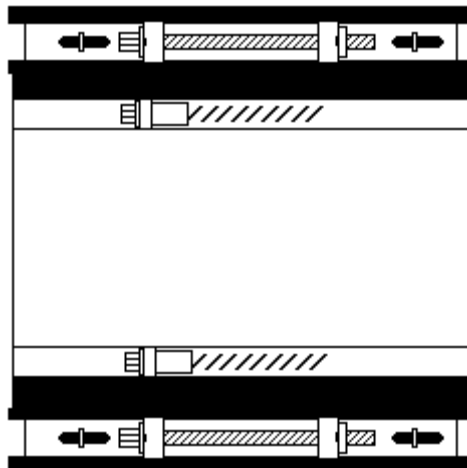
REQUIRED MARKINGS AND LOCATIONS: Manufacturers name or abbreviation, Country of origin, Product identification code, Stainless steel grade and identification, i.e. "STAINLESS STEEL" or "SS", CSA, IAPMO and/or Warnock Hersey certification logo, Strap or shear ring size, Shear ring shall display the nominal pipe size(s) and the pipe material(s) for which the coupling is designed. \*

*\*These markings need only appear on the shear ring if the shear ring partially or entirely obscures these same markings on the elastomer.*

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated February 1, 2011.





FILE CODE: 4.2.1.68

PRODUCT TYPE: **FITTINGS FOR OPEN PROFILE RIBBED STORM SEWER PIPE**

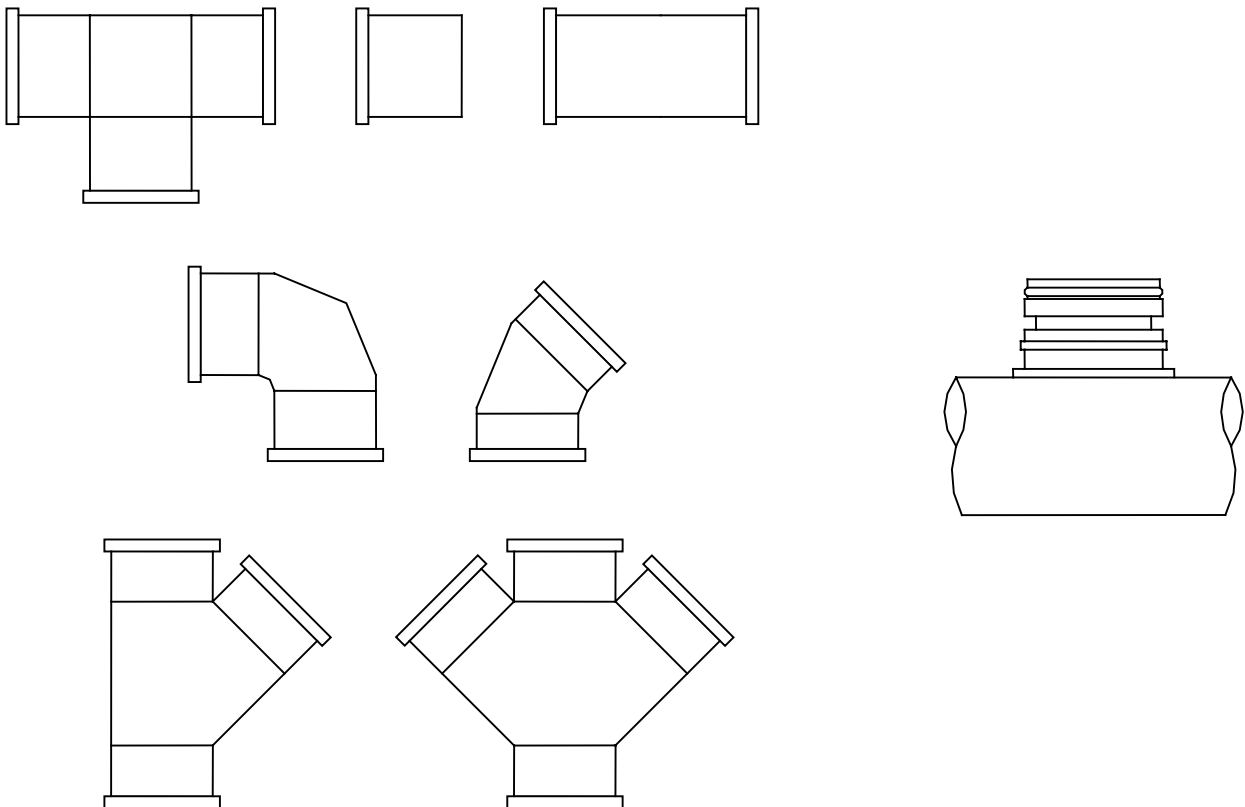
STANDARD CONSTRUCTION SPECIFICATION REFERENCE: N/A

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.16](#)

APPROVED PRODUCTS: [Ipex Inc. \(Multi-Fittings Inc.\)](#)

[Inserta Fittings Co.](#)





FILE CODE: 4.2.1.68

PRODUCT TYPE: **FITTINGS FOR OPEN PROFILE RIBBED STORM SEWER PIPE**

MANUFACTURER: Ipex Inc. (Multi-Fittings Inc.)

MODEL: Ultra-Rib

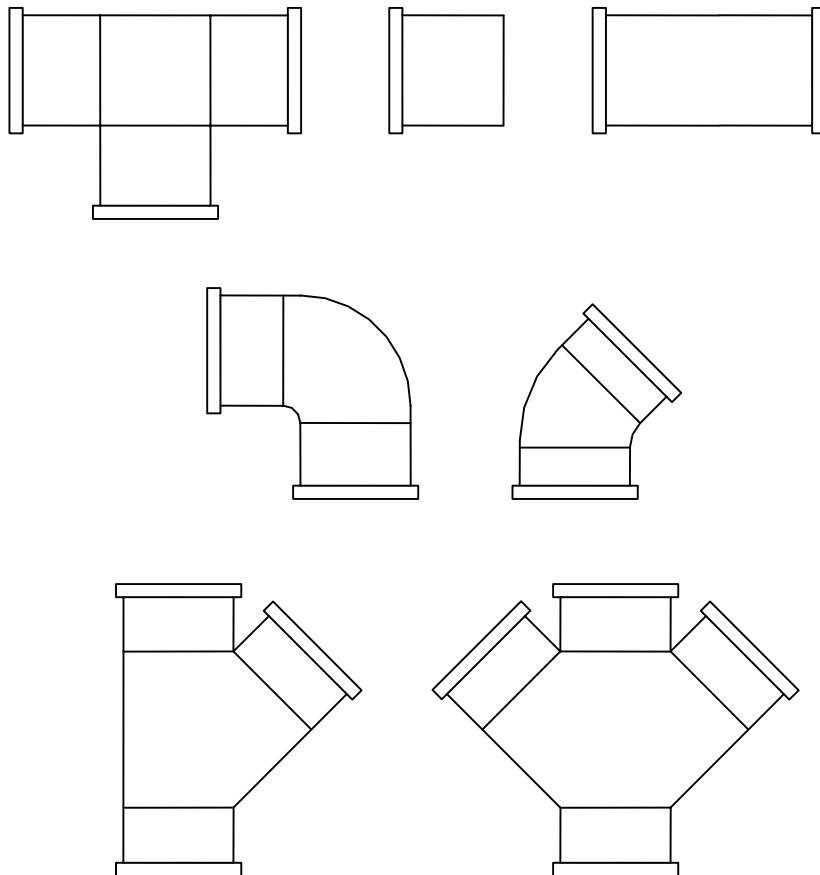
PRODUCT DESCRIPTION: Open Profile Pipe Fittings.

REQUIRED MARKINGS AND LOCATIONS: Multi, CSA B182.1 or CSA B182.2 for injection moulded fittings and CSA B182.4 for fabricated fittings.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated October 11, 1996.





FILE CODE: 4.2.1.68

PRODUCT TYPE: **FITTINGS FOR OPEN PROFILE RIBBED STORM SEWER PIPE**

MANUFACTURER: Inserta Fittings Co.

MODEL: N/A

PRODUCT DESCRIPTION: Open Profile Pipe Fitting.

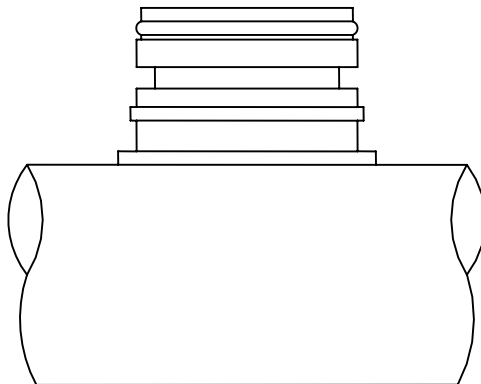
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: Approved for use with all types of sewer connection pipe (Ribbed, SDR35, and Concrete).

NOTE: For complete product information, refer to the product approval letter dated October 11, 1996. Name changed from Fowler Manufacturing to INSERTA FITTINGS CO., April 11, 2003.





FILE CODE: 4.2.1.70

PRODUCT TYPE: **MANHOLE PRE-CAST CONCRETE COMPONENTS**

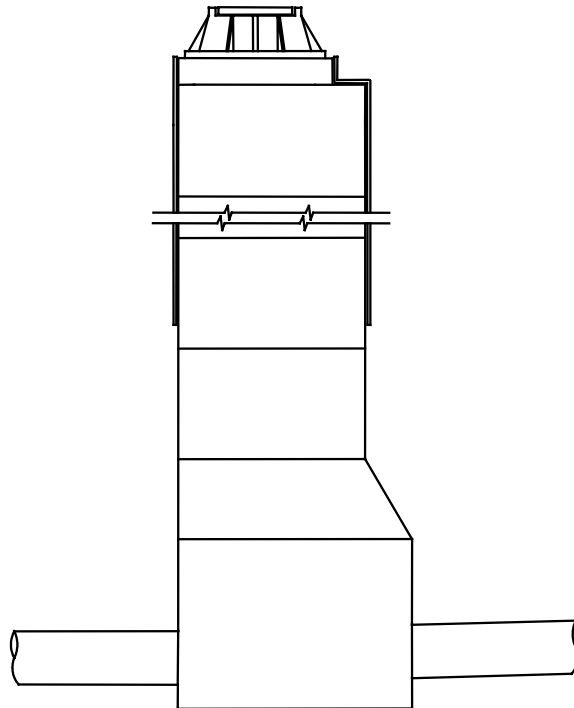
STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS: [Inland Pipe Ltd.](#)

[Lafarge Construction Materials](#)





FILE CODE: 4.2.1.70

PRODUCT TYPE: **MANHOLE PRE-CAST CONCRETE COMPONENTS**

MANUFACTURER: Inland Pipe Ltd.

MODEL: N/A

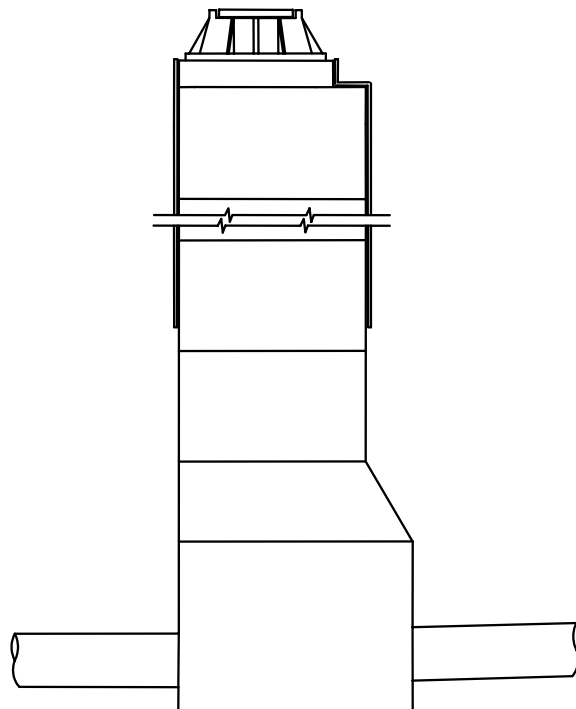
PRODUCT DESCRIPTION: All Pre-Cast Concrete Components Including Manhole Adusting Ring in 50mm, 75mm, 100mm, and 125mm Thickness, 750mm I.D.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated February 13, 1979, December 10, 1996 (name changed from Hydropipe Systems Ltd to Inland Pipe Ltd.).





FILE CODE: 4.2.1.70

PRODUCT TYPE: **MANHOLE PRE-CAST CONCRETE COMPONENTS**

MANUFACTURER: Lafarge Construction Materials Inc.

MODEL: N/A

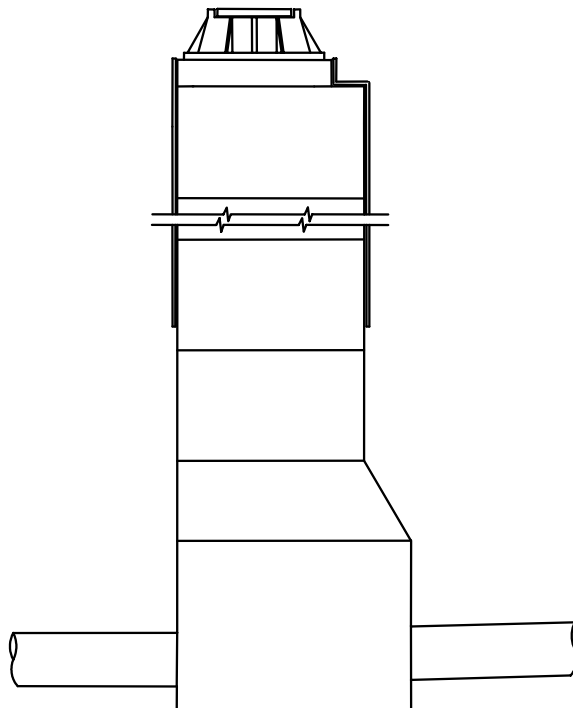
PRODUCT DESCRIPTION: All Pre-Cast Concrete Components Including Manhole Adjusting Ring in 50mm, 75mm, 100mm, and 125mm Thickness, 750mm I.D.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated August 14, 1995.





FILE CODE: 4.2.1.71

PRODUCT TYPE: **MANHOLE/CATCH BASIN JOINT GASKETS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

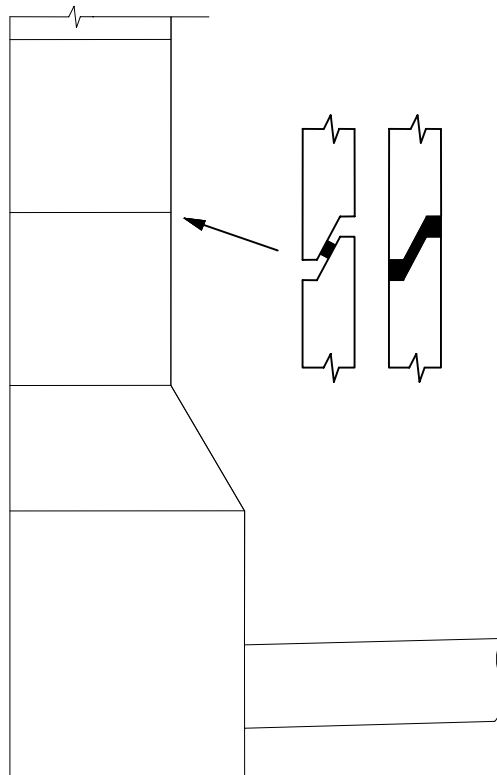
APPROVED PRODUCTS: [Inland Pipe Ltd.](#)

[Lafarge Construction Materials](#)

[ConSeal™ Inc.](#)

[Strata Tech, Inc.](#)

[Hamilton Kent](#)





FILE CODE: 4.2.1.71

PRODUCT TYPE: **MANHOLE/CATCH BASIN JOINT GASKETS**

MANUFACTURER: Inland Pipe Ltd.

MODEL: Kent Seal #2

PRODUCT DESCRIPTION: Joint Sealant

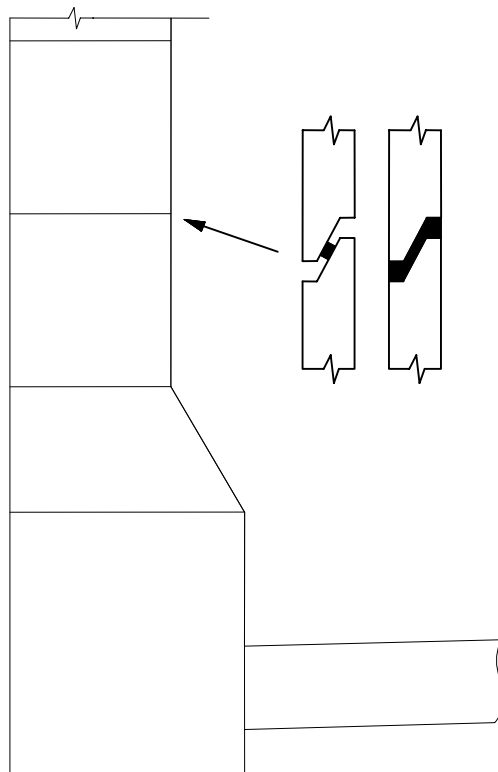
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Clean tongue surface of the pipe to be installed. Apply adhesive cement to the tongue and allow to dry. Press joint sealant to the tongue 25mm back from the leading edge. Apply until a continuous ring is formed around the circumference of the tongue. Cut off excess material and join by butt-welding. Couple structure.

NOTE: For manhole sections up to and including 1200mm in diameter, sealant diameter is to be 25mm. For larger manhole diameters sealant diameter is to be 37mm.

NOTE: For complete product information, refer to the product approval letters dated June 9, 1980, December 10, 1996 (name changed from Hydropipe Systems Ltd to Inland Pipe Ltd.).





FILE CODE: 4.2.1.71

PRODUCT TYPE: **MANHOLE/CATCH BASIN JOINT GASKETS**

MANUFACTURER: Lafarge Construction Materials Inc.

MODEL: Rub'r Nek

PRODUCT DESCRIPTION: Joint Sealant

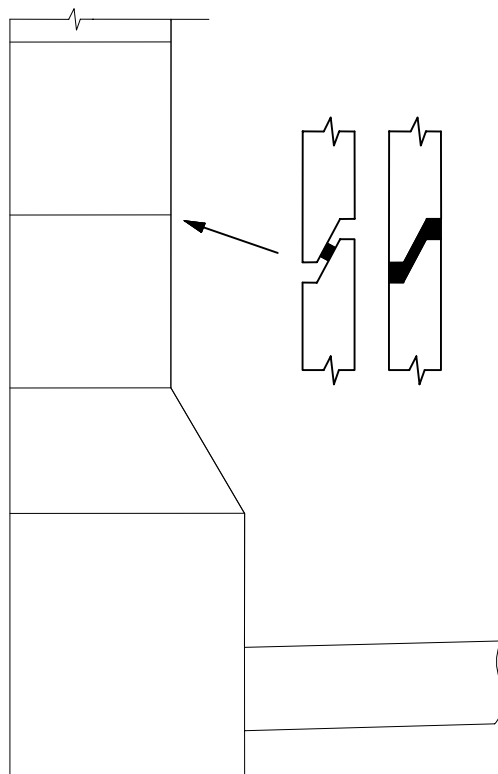
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Clean tongue surface of the pipe to be installed. Apply adhesive cement to the tongue and allow to dry. Press joint sealant to the tongue 25mm back from the leading edge. Apply until a continuous ring is formed around the circumference of the tongue. Cut off excess material and join by butt-welding. Couple structure.

NOTE: For use between pre-cast manhole sections.

NOTE: For complete product information, refer to the product approval letters dated August 14, 1995.





FILE CODE: 4.2.1.71

PRODUCT TYPE: **MANHOLE/CATCH BASIN JOINT GASKETS**

MANUFACTURER: Concrete Sealants Inc.

MODEL: ConSeal CS-102 & CS-231

PRODUCT DESCRIPTION: Joint Sealant

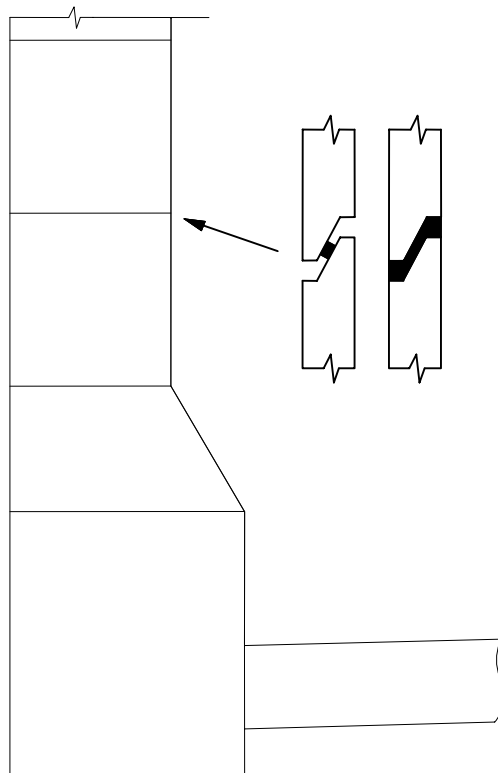
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Clean surface of the pipe to be installed. Apply joint sealant until a continuous ring is formed. Cut off excess material and butt at Joint. Couple structure.

NOTE: For use between pre-cast concrete manhole sections, concrete pipe, concrete vaults, and concrete box culverts.

NOTE: For complete product information, refer to the product approval letters dated January 1st, 2007





FILE CODE: 4.2.1.71

PRODUCT TYPE: **MANHOLE/CATCH BASIN JOINT GASKETS**

MANUFACTURER: Strata Tech Inc.

MODEL: ST-504 (Vari-Gel Injection Resin) & ST-591 (Activated Oakum)

PRODUCT DESCRIPTION: Joint Sealant

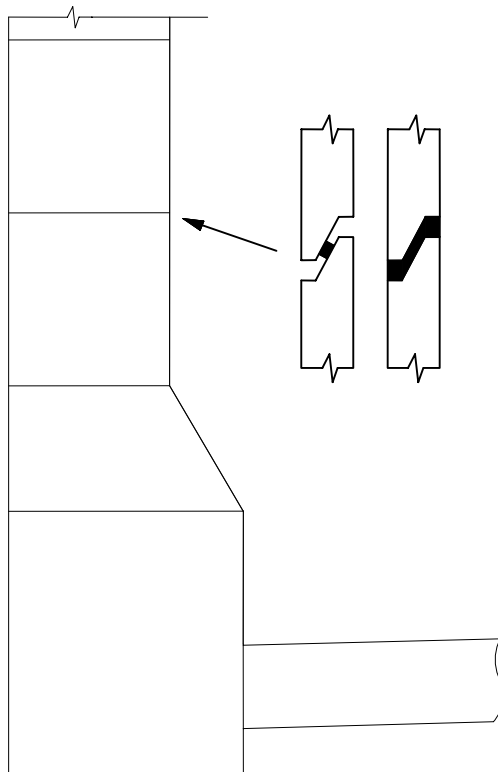
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Clean joint surfaces. Placed ST-591 in a container and saturated with ST-504. The saturated strand is then packed into the joint, where the resin reacts with water and expands. The packing can be done using gloved hands, wooden dowels, or other suitable tools. If the joint is not leaking, additional water can be sprayed on the placed strips to hydrate the Injection Resin. When the expansion reaction is complete, the foamed resin sets into a stiff rubber-like foam. Application usually stops about 1 inch below the gap surface to allow room for foam expansion without run over. Excess foam in the joint can be hand wiped as it expands to create a smooth seal surface.

NOTE: For use between pre-cast concrete manhole sections, concrete pipe, concrete vaults, and concrete box culverts.

NOTE: For complete product information, refer to the product approval letters dated January 1st, 2007.





FILE CODE: 4.2.1.71

PRODUCT TYPE: **MANHOLE/CATCH BASIN JOINT GASKETS**

MANUFACTURER: Hamilton Kent

MODEL: Tylox SuperSeal, Model 165

PRODUCT DESCRIPTION: Joint Gasket for 1200mm Manholes/Risers

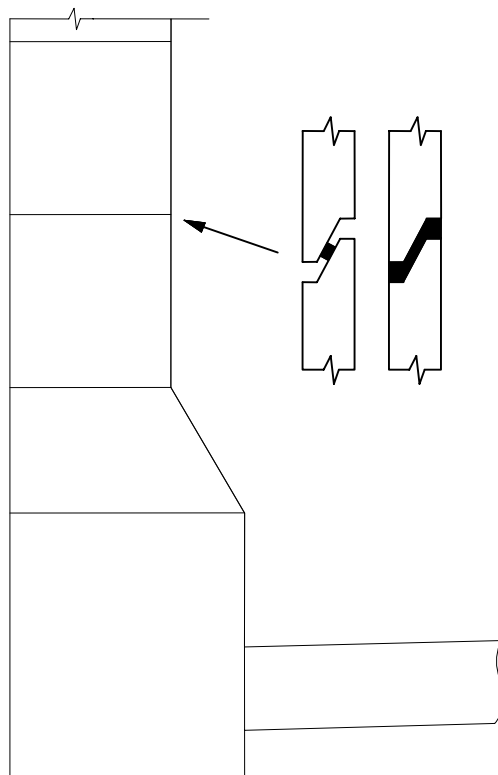
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Ensure bell, spigot and gasket are free from loose debris or foreign materials. Stretch the gasket around the spigot with the nose against the step and the tube laying flat against the spigot. Align the bell with the spigot and lower the MH section. Gravity will in most cases home the section but additional force may also be applied using suitable mechanical means. The homing process will cause the lubricated tube to “roll” over itself, above the compression section, allowing the riser to “Home”.

NOTE: For manhole/riser sections 1200mm in diameter only.

NOTE: For complete product information, refer to the product approval letters dated March 9 2007.





FILE CODE: 4.2.1.72

PRODUCT TYPE: **MANHOLE/CATCH BASIN RUNGS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

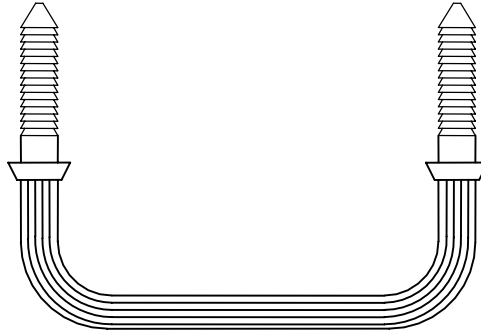
APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS: [MSU Mississauga Ltd.](#)

[Lafarge Construction Materials](#)

[Mecon Industries](#)





FILE CODE: 4.2.1.72

PRODUCT TYPE: **MANHOLE/CATCH BASIN RUNGS**

MANUFACTURER: MSU Mississauga Ltd.

MODEL: N/A

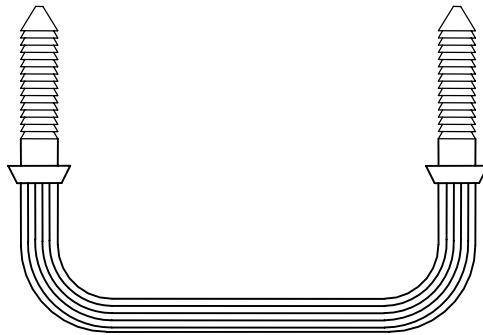
PRODUCT DESCRIPTION: Aluminum Manhole Rungs.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Drill holes and hammer in climbing steps.

NOTE: For complete product information, refer to the product approval letter dated October 3, 1979. Name changed from MSU Daymond Canada Ltd. to MSU MISSISSAUGA LTD. April 15, 2003.





FILE CODE: 4.2.1.72

PRODUCT TYPE: **MANHOLE/CATCH BASIN RUNGS**

MANUFACTURER: Lafarge Construction Materials Inc.

MODEL: N/A

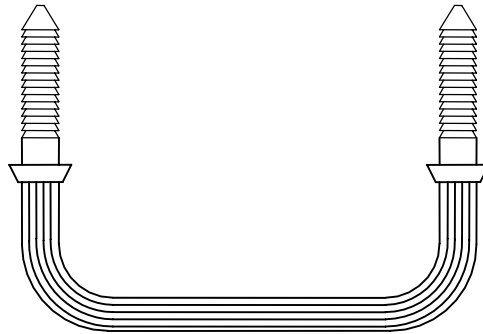
PRODUCT DESCRIPTION: Galvanized Steel and Aluminium Manhole Steps.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Drill holes and hammer in climbing steps.

NOTE: For complete product information, refer to the product approval letters dated April 7, 1981, August 14, 1995.





FILE CODE: 4.2.1.72

PRODUCT TYPE: **MANHOLE/CATCH BASIN RUNGS**

MANUFACTURER: Mecon Industries

MODEL: N/A

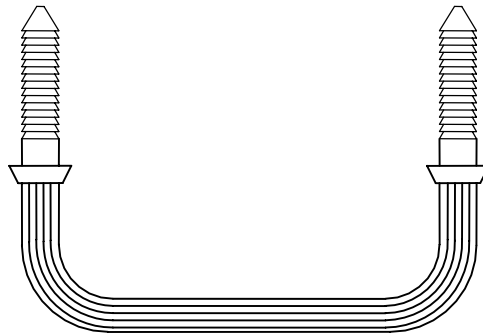
PRODUCT DESCRIPTION: Aluminum Manhole Rung.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Drill holes and hammer in climbing steps.

NOTE: For complete product information, refer to the product approval letter dated September 30, 1981.





FILE CODE: 4.2.1.73

PRODUCT TYPE: **MANHOLE FRAMES AND COVERS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: [AP-004 \(Frame\)](#), [AP-005 \(Solid Cover\)](#),  
[AP-006 \(Grated Cover\)](#)

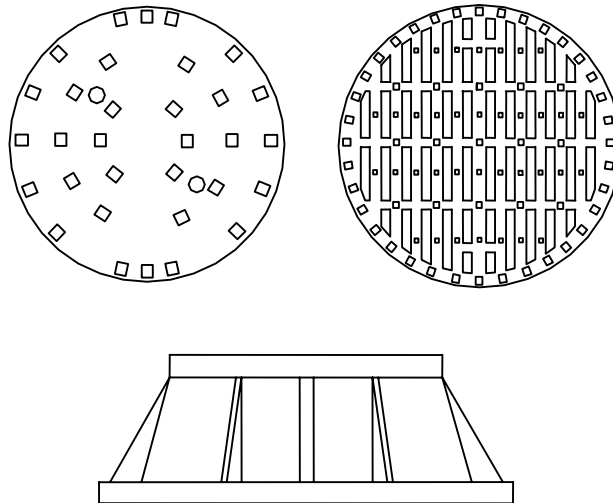
PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.73](#)

APPROVED PRODUCTS: [Blanchard Foundry](#)

[Titan Foundry Ltd.](#)

[W.D. Valve Boxes Ltd.](#)

[Sigma Corporation](#)





FILE CODE: 4.2.1.73

PRODUCT TYPE: **MANHOLE FRAMES AND COVERS**

MANUFACTURER: Blanchard Foundry

PRODUCT DESCRIPTION: Manhole Frame, Solid Cover, and Slotted Cover

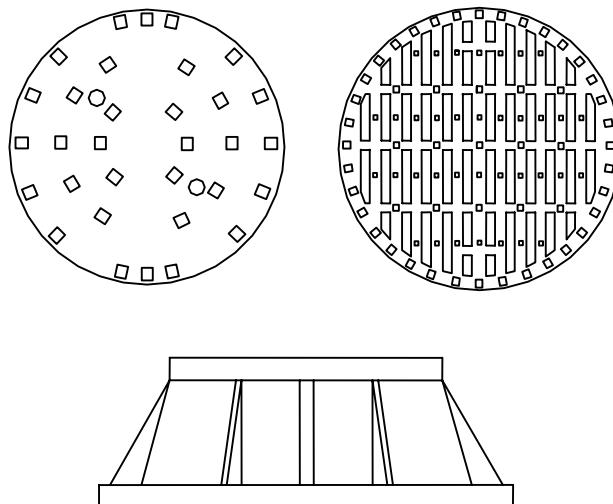
MODEL: Frame – 6042  
Solid Cover – 6042  
Slotted Cover – 6042S

REQUIRED MARKINGS AND LOCATIONS: Manhole frame on top of base flange: Blanchard, Pat #6042. On top of the solid cover: Blanchard, 6042. On top of the slotted cover: Blanchard, 6042S

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated May 27, 1992.





FILE CODE: 4.2.1.73

PRODUCT TYPE: **MANHOLE FRAMES AND COVERS**

MANUFACTURER: Titan Foundry

<u>MODEL:</u> Frame	TF-101-9
	TF-101-6
	TF-101-3
Solid Cover	TF-101-9
Slotted Cover	TF-101-9

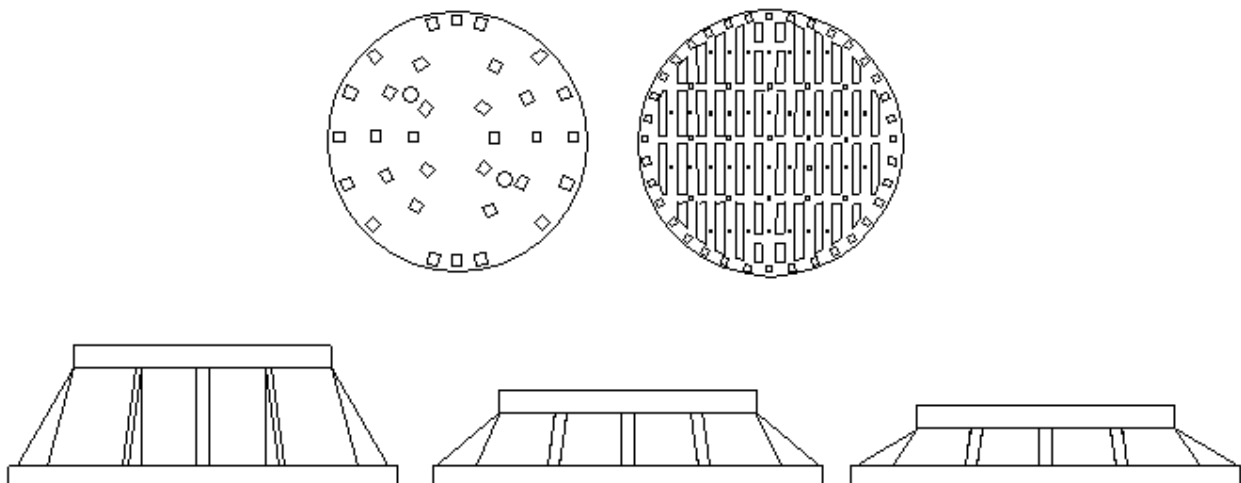
PRODUCT DESCRIPTION: Manhole Frame, Solid Cover, and Slotted Cover.

REQUIRED MARKINGS AND LOCATIONS: Manhole frame on top of base flange: Titan, TF101M, D/M/Y. On top of the solid cover: Titan, TF101M, D/M/Y. On top of the slotted cover: Titan, TF101M, D/M/Y.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated December 10, 1992 and November 7, 2008.





FILE CODE: 4.2.1.73

PRODUCT TYPE: **MANHOLE FRAMES AND COVERS**

MANUFACTURER: W.D. Valve Boxes Ltd.

MODEL: Frame – WD50F  
Solid Cover – WD50S  
Slotted Cover – WD50G

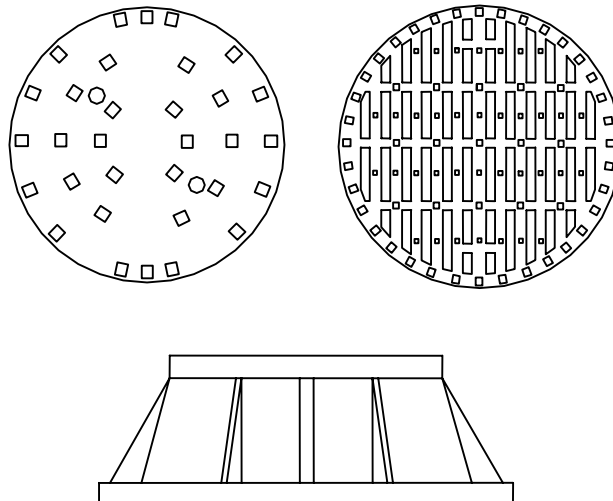
PRODUCT DESCRIPTION: Manhole Frame and Covers.

REQUIRED MARKINGS AND LOCATIONS: Manhole frame on top of the lid: WDVb, WD50F, STJ. On top of the solid cover: WDVb, WD50S, STJ. On top of the slotted cover: WDVb, WD50G, STJ.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated February 21, 1994.





FILE CODE: 4.2.1.73

PRODUCT TYPE: **MANHOLE FRAMES AND COVERS**

MANUFACTURER: Sigma Corporation

MODEL: Frame – MH - 2104  
Solid Cover – MH -2104  
Slotted Cover – MH -2104

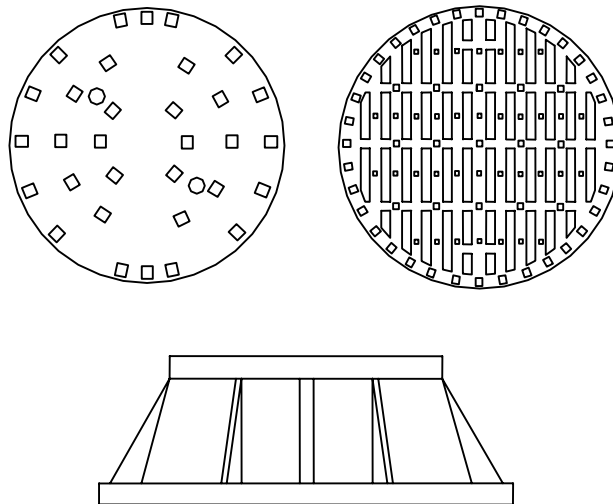
PRODUCT DESCRIPTION: Manhole Frame, Solid Cover, and Slotted Cover.

REQUIRED MARKINGS AND LOCATIONS: Manhole frame on top of base flange and underside: Name (Sigma), Model (MH -2104), Pattern # (eg. India P-1), Heat # (eg. MCF03I02-3). Solid cover on top: Name (Sigma), Model (MH -2104). Solid cover underside: Name (Sigma), Model (MH -2104), Pattern # (eg. India P-1), Heat # (eg. MCF03I02-3). Slotted cover on top: Name (Sigma), Model (MH -2104).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated April 8, 2003 and February 17, 2004.





FILE CODE: 4.2.1.75

PRODUCT TYPE: **MANHOLE FRAME LIFTER RINGS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

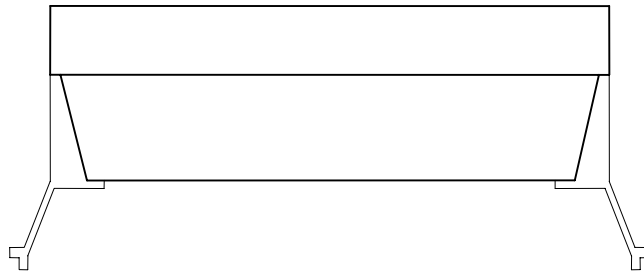
APPROVED PRODUCT DRAWING REFERENCE: [AP-007](#)

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.75](#)

APPROVED PRODUCTS: [Titan Foundry Ltd.](#)

[W.D. Valve Boxes Ltd.](#)

[Sigma Corporation](#)





FILE CODE: 4.2.1.75

PRODUCT TYPE: **MANHOLE LIFTER RINGS**

MANUFACTURER: Titan Foundry Ltd.

MODEL: TF-101

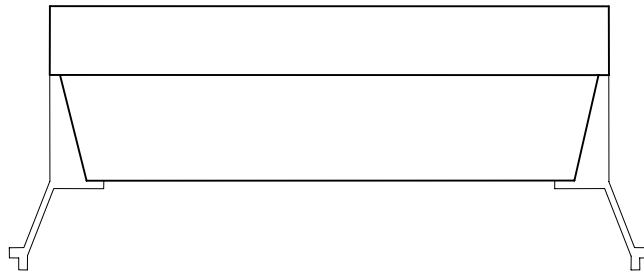
PRODUCT DESCRIPTION: 38mm, 51mm, 64mm, and 76mm Manhole Lifter Rings

REQUIRED MARKINGS AND LOCATIONS: On the upper rim of the upper ring: Titan, TF 101, Size, Y/ M/ D.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approvals letter dated April 5, 1993, May 31, 1993.





FILE CODE: 4.2.1.75

PRODUCT TYPE: **MANHOLE LIFTER RINGS**

MANUFACTURER: W.D. Valve Boxes Ltd.

MODEL: WD-5 (38mm), WD-6 (51mm), WD-7 (64mm), and WD-8 (76mm)

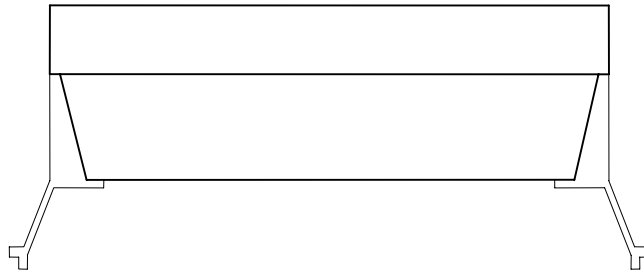
PRODUCT DESCRIPTION: 38mm, 51mm, 64mm, and 76mm Manhole Lifter Rings

REQUIRED MARKINGS AND LOCATIONS: WDVb, Pattern #, AIL.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated August 18, 1993.





FILE CODE: 4.2.1.75

PRODUCT TYPE: **MANHOLE LIFTER RINGS**

MANUFACTURER: Sigma Corporation

MODEL: MH210415  
MH210402  
MH210425  
MH210403

PRODUCT DESCRIPTION: 38mm, 51mm, 64mm, and 76mm Manhole Lifter Rings

REQUIRED MARKINGS AND LOCATIONS: On the upper rim of the upper ring: Sigma, Model No., Size, Date.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approvals letter dated November 7, 2008.





FILE CODE: 4.2.1.80

PRODUCT TYPE: **CATCH BASIN PRE-CAST CONCRETE COMPONENTS**

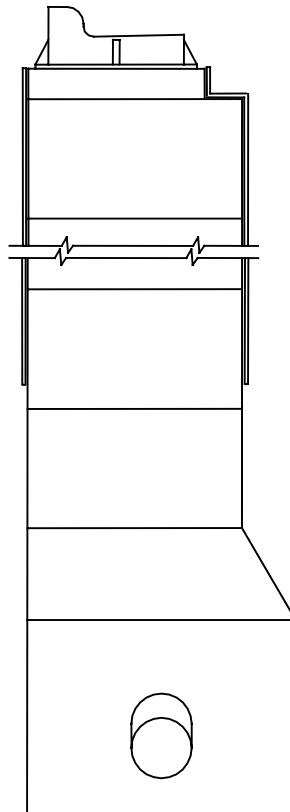
STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS: [Inland Pipe Ltd.](#)

[Lafarge Construction Materials Inc.](#)





FILE CODE: 4.2.1.80

PRODUCT TYPE: **CATCH BASIN PRE-CAST CONCRETE COMPONENTS**

MANUFACTURER: Inland Pipe Ltd.

MODEL: N/A

PRODUCT DESCRIPTION: All Pre-Cast Concrete Components Including Adjusting Ring in 50mm, 75mm, 100mm, and 125mm Thickness, 750mm I.D.

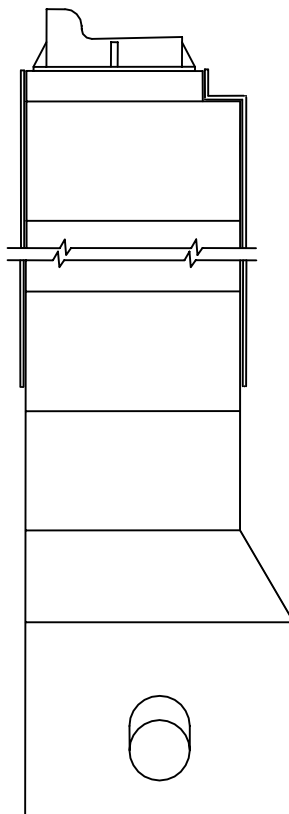
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For use below catch basin frame

NOTE: For complete product information, refer to the product approval letters dated February 13, 1979, December 10, 1996 (name changed from Hydropipe Systems Ltd to Inland Pipe Ltd.).





FILE CODE: 4.2.1.80

PRODUCT TYPE: **CATCH BASIN PRE-CAST CONCRETE COMPONENTS**

MANUFACTURER: Lafarge Construction Materials Inc.

MODEL: N/A

PRODUCT DESCRIPTION: All Pre-Cast Concrete Components Including Adjusting Ring in 50mm, 75mm, 100mm, and 125mm Thickness, 750mm I.D.

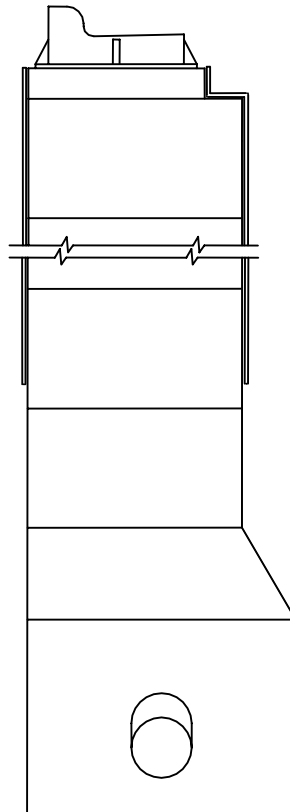
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For use below catch basin frame

NOTE: For complete product information, refer to the product approval letter dated April 7, 1981.





FILE CODE: 4.2.1.83B

PRODUCT TYPE: **BARRIER CURB AND GUTTER INLET FRAME, COVER, AND BOX**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6, CW 3205, CW 3210

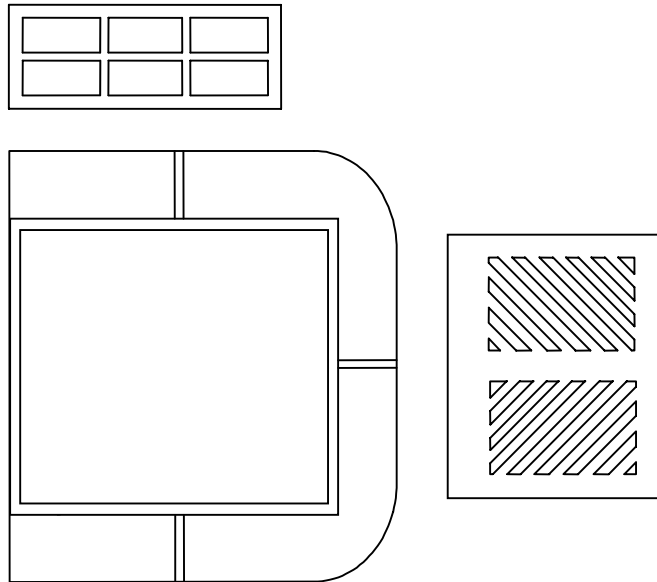
APPROVED PRODUCT DRAWING REFERENCE: [AP-008 \(FRAME & BOX\)](#), [AP-009 \(COVER\)](#), [AP-017 \(RISER COVER\)](#), [AP-018 \(RISER\)](#)

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.83B](#)

APPROVED PRODUCTS: [Titan Foundry Ltd.](#)

[W.D. Valve Boxes Ltd.](#)

[Sigma Corporation](#)





FILE CODE: 4.2.1.83B

PRODUCT TYPE: **BARRIER CURB AND GUTTER INLET FRAME, COVER, AND BOX**

MANUFACTURER: Titan Foundry

MODEL: Frame – TF-103-3  
Box – TF-103-3  
Grated Cover – TF-103-3  
Riser – TF-103R  
Riser Grated Cover – TF-103R

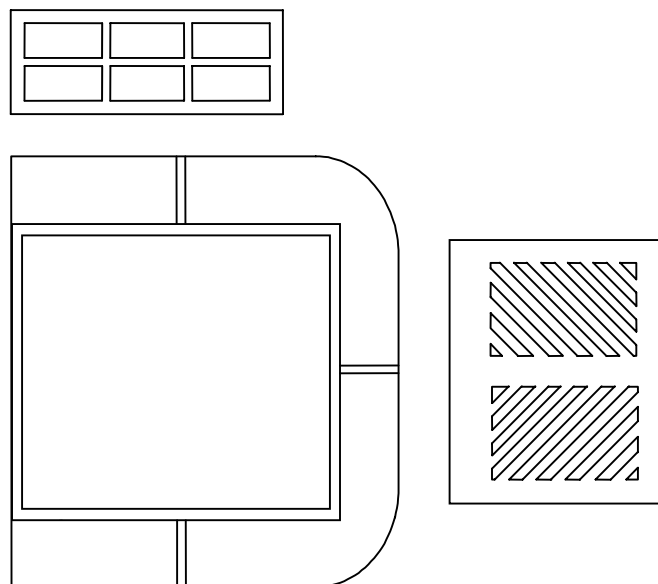
PRODUCT DESCRIPTION: Barrier Curb and Gutter Inlet Frame, Grated Cover, Box, Riser Ring and Grated Cover

REQUIRED MARKINGS AND LOCATIONS: Frame: Foundry Name or abbreviation (Titan), Pattern Code Number (TF-103). Cover – Frame: Foundry Name or abbreviation (Titan), Pattern Code Number (TF-103 or TF-103R), Casting Date (year, month, day). Box – Frame: Foundry Name or abbreviation (Titan), Pattern Code Number (TF-103). Riser Ring – Frame:

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated December 22, 1995 and June 16, 2006.





FILE CODE: 4.2.1.83B

PRODUCT TYPE: **BARRIER CURB AND GUTTER INLET FRAME, COVER, AND BOX**

MANUFACTURER: W.D. Valve Boxes Ltd.

MODEL: Frame – WD59  
Box – WD59CI  
Cover – WD59GI

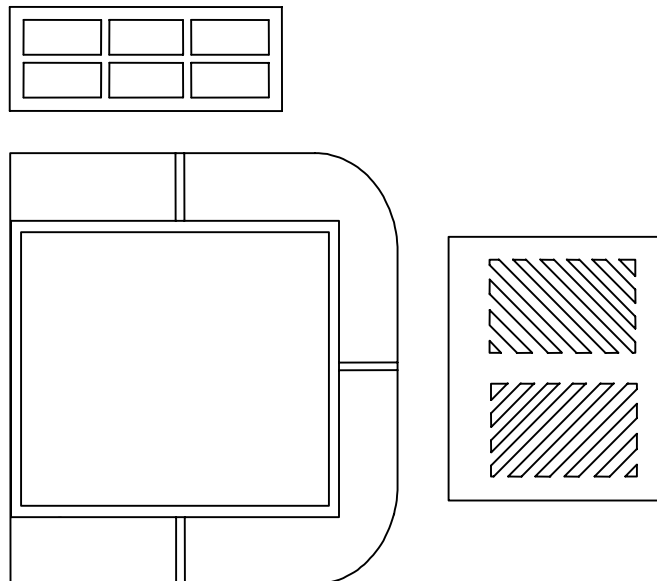
PRODUCT DESCRIPTION: Barrier Curb and Gutter Inlet Frame, Cover, and Box

REQUIRED MARKINGS AND LOCATIONS: Frame: Foundry Name or Abbreviation, Pattern Number or Code. Cover: Foundry Name or Abbreviation, Pattern Number or Code, Casting Date. Box: Foundry Name or Abbreviation, Pattern Number or Code

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated May 27, 2002.





FILE CODE: 4.2.1.83B

PRODUCT TYPE: **BARRIER CURB AND GUTTER INLET FRAME, COVER, AND BOX**

MANUFACTURER: Sigma Corporation

MODEL: Frame – FG-2108

Box – FG-2108

Cover – FG-2108

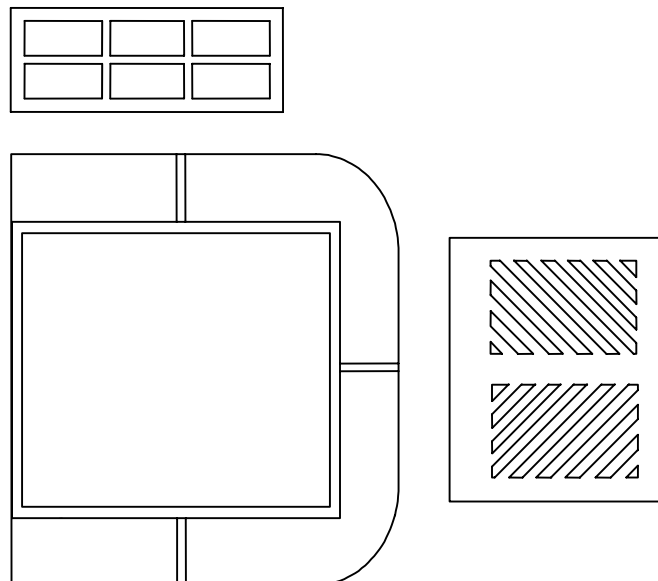
PRODUCT DESCRIPTION: Barrier Curb and Gutter Inlet Frame, Cover, and Box

REQUIRED MARKINGS AND LOCATIONS: Frame: Company Name or Abbreviation, Pattern Number or Code. Cover: Company Name or Abbreviation, Pattern Number or Code, Casting Date. Box: Company Name or Abbreviation, Pattern Number or Code.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated April 8, 2003 and May 10, 2004.





FILE CODE: 4.2.1.83M

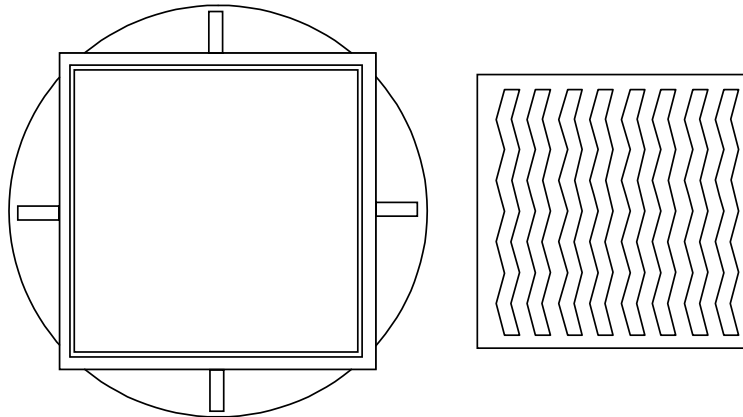
PRODUCT TYPE: **MOUNTABLE CURB AND GUTTER INLET FRAME AND COVER**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: [AP-011](#)

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.83M](#)

APPROVED PRODUCTS: [Titan Foundry](#)  
[W.D. Valve Boxes Ltd.](#)  
[Sigma Corporation](#)





FILE CODE: 4.2.1.83M

PRODUCT TYPE: **MOUNTABLE CURB AND GUTTER INLET FRAME AND COVER**

MANUFACTURER: Titan Foundry

MODEL: TF-102

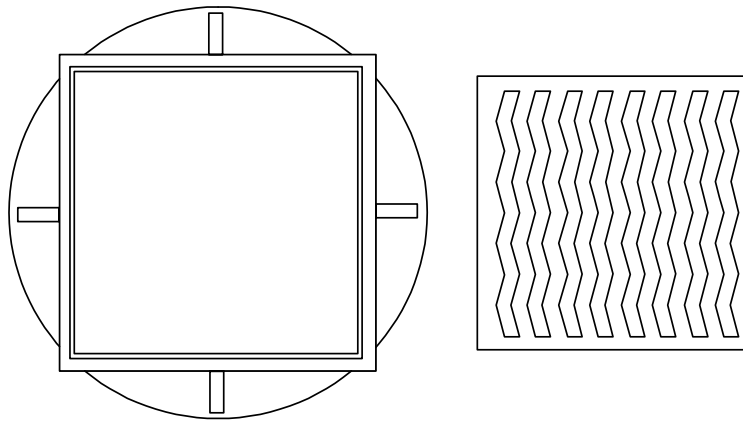
PRODUCT DESCRIPTION: Mountable Curb and Gutter Inlet.

REQUIRED MARKINGS AND LOCATIONS: Titan TF-102

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated September 15, 1976





FILE CODE: 4.2.1.83M

PRODUCT TYPE: **MOUNTABLE CURB AND GUTTER INLET FRAME AND COVER**

MANUFACTURER: W.D. Valve Boxes Ltd. (Dingzhou Dongfang Foundry Co. Ltd., China)

MODEL: WD55F (frame)  
WD55I (inlet grate)

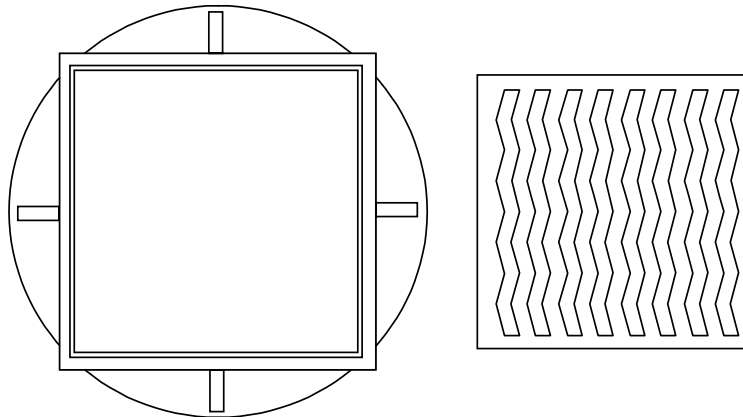
PRODUCT DESCRIPTION: Mountable Curb and Gutter Inlet.

REQUIRED MARKINGS AND LOCATIONS: Inlet grate: WD55I, WDVb, and DDF. Frame: WD55F

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the approval submission package dated February 17, 2006 and the product approval letter dated April 20, 2006





FILE CODE: 4.2.1.83M

PRODUCT TYPE: **MOUNTABLE CURB AND GUTTER INLET FRAME AND COVER**

MANUFACTURER: Sigma Corporation

MODEL: FG-21091 (cover), FG-21092 (frame)

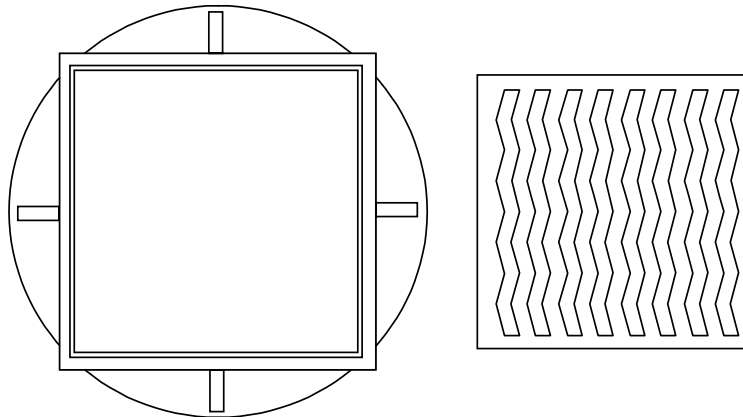
PRODUCT DESCRIPTION: Mountable Curb and Gutter Inlet.

REQUIRED MARKINGS AND LOCATIONS: Manufacture, Country of Origin, Date of Manufacture, Part Number

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated March 31, 2008





FILE CODE: 4.2.1.84

PRODUCT TYPE: **CATCH BASIN HOODS**

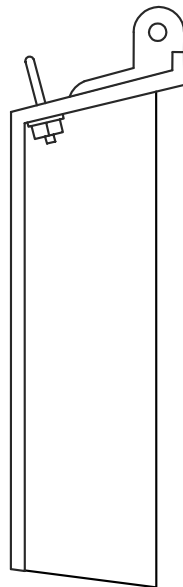
STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: [AP-012](#)

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS: [B & A Manufacturing Ltd.](#)

[State Industries Ltd.](#)





FILE CODE: 4.2.1.84

PRODUCT TYPE: **CATCH BASIN HOODS**

MANUFACTURER: B & A Manufacturing Ltd.

MODEL: BA112

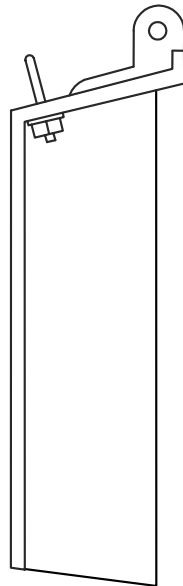
PRODUCT DESCRIPTION: Catch Basin Hood.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated December 20, 1993.





FILE CODE: 4.2.1.84

PRODUCT TYPE: **CATCH BASIN HOODS**

MANUFACTURER: State Industries Ltd.

MODEL: N/A

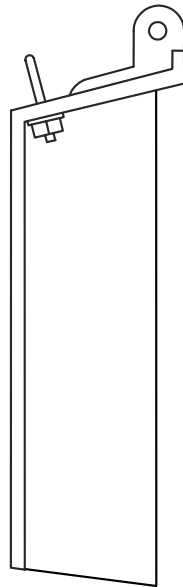
PRODUCT DESCRIPTION: Catch Basin Hood.

REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated January 14, 2004.





FILE CODE: 4.2.1.85

PRODUCT TYPE: **BOULEVARD INLET BOX SOLID COVERS**

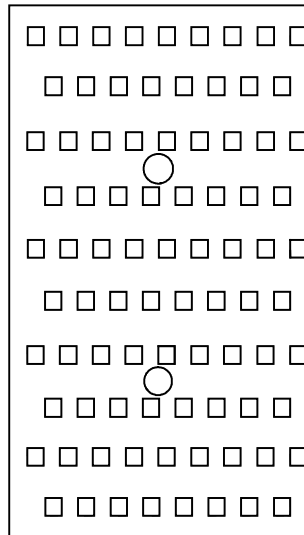
STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: [AP-015](#)

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.1.85](#)

APPROVED PRODUCTS: [W.D. Valve Boxes Ltd.](#)

[Titan Foundry Ltd.](#)





FILE CODE: 4.2.1.85

PRODUCT TYPE: **BOULEVARD INLET BOX SOLID COVERS**

MANUFACTURER: W.D. Valve Boxes Ltd.

MODEL: WD40

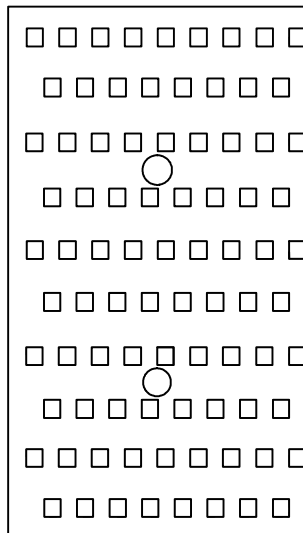
PRODUCT DESCRIPTION: Boulevard Inlet Box Solid Covers

REQUIRED MARKINGS AND LOCATIONS: Manufacturer's Name or Abbreviation (WDVB), Pattern Number (WD40), Foundry (AIL).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated January 14, 1994.





FILE CODE: 4.2.1.85

PRODUCT TYPE: **BOULEVARD INLET BOX SOLID COVERS**

MANUFACTURER: Titan Foundry

MODEL: TF-108

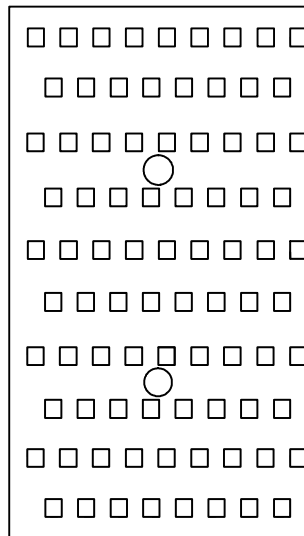
PRODUCT DESCRIPTION: Boulevard Inlet Box Solid Covers.

REQUIRED MARKINGS AND LOCATIONS: Manufacturer's Name or Abbreviation (Titan), Pattern Number (TF-108).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated April 13, 1993.





FILE CODE: 4.2.2.10

PRODUCT TYPE: **PVC SEWER CONNECTION PIPE**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

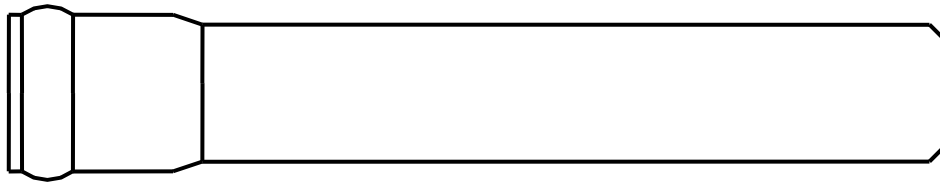
PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.2.10](#)

APPROVED PRODUCTS: [Ipex Inc.](#)

[Rehau Industries Inc.](#)

[Royal Pipe Systems](#)

[Northern Pipe](#)





FILE CODE: 4.2.2.10

PRODUCT TYPE: **PVC SEWER CONNECTION PIPE**

MANUFACTURER: Ipex Inc.

MODEL: Ring-Tite

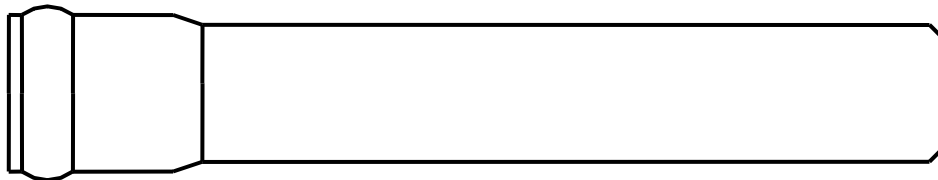
PRODUCT DESCRIPTION: SDR35 PVC Gravity Sewer Pipe in 150mm and 200mm.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer, Origin, CSA B182.2, Date of Manufacture. Pipe: Size (inches and millimeters), Manufacturer, Cell Classification (PVC 12364C, PVC 12454B), CSA B182.2, Minimum Pipe Stiffness (P.S. 46psi, 320kPa), ASTM D3034/F679, Date of Manufacture (year, month, day, hour), Location of Manufacture.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letters dated April 15, 1986 (Scepter and Canron approvals), February 10, 1993 (name changed to Ipex).





FILE CODE: 4.2.2.10

PRODUCT TYPE: **PVC SEWER CONNECTION PIPE**

MANUFACTURER: Rehau Industries Inc.

MODEL: Duralok

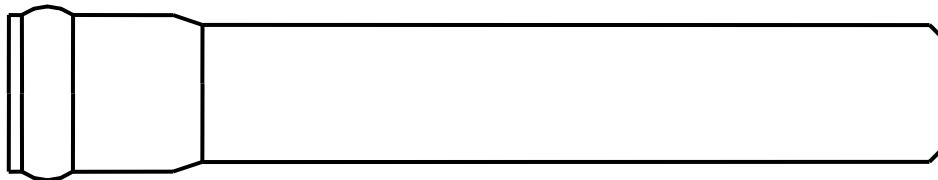
PRODUCT DESCRIPTION: SDR35 PVC Gravity Sewer Pipe in 150mm and 200mm.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (Forshida), Origin (South Carolina), CSA B182.2, Size, Year, Quarter (stamped with pins). Pipe: Size (inches and millimeters), Manufacturer (Rehau), Date of Manufacture (day, month, year, shift, time), Location (P for Prescott Ontario), CSA B182.2, Minimum Pipe Stiffness, SDR35 (320kPa).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated August 28, 1996.





FILE CODE: 4.2.2.10

PRODUCT TYPE: **PVC SEWER CONNECTION PIPE**

MANUFACTURER: Royal Pipe Systems

MODEL: Royal Seal

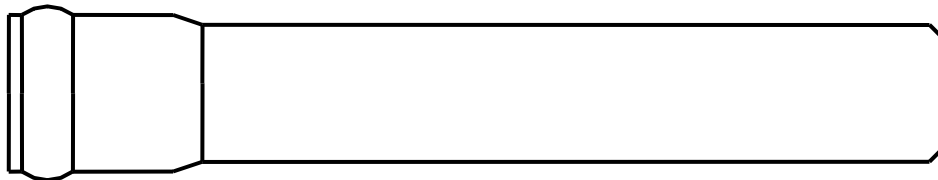
PRODUCT DESCRIPTION: SDR35 PVC Gravity Sewer Pipe in 150mm and 200mm

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (S& B), Origin (Costa Rica), CSA B182.2, Date of Manufacture (year and quarter). Pipe Size (inches and millimeters), Manufacturer (Crown, Royal Seal), Date of Manufacture (day, month, year), CSA B182.2, Minimum Pipe Stiffness (P.S. 46psi, 320kPa), BNQ Number (NQ 3624-135-0309), ASTM 3034.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated August 8, 1995.





FILE CODE: 4.2.2.10

PRODUCT TYPE: **PVC SEWER CONNECTION PIPE**

MANUFACTURER: Northern Pipe

MODEL: N/A

PRODUCT DESCRIPTION: SDR35 PVC Gravity Sewer Pipe in 150mm and 200mm.

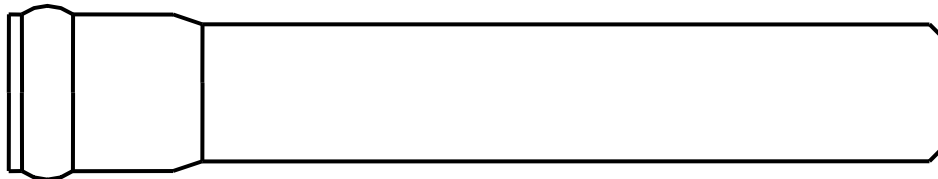
REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (S& B), Origin (Costa Rica), CSA B182.2, Date of Manufacture (year and quarter). Pipe: Size (inches and millimeters), Manufacturer, Cell Classification (PVC 12454B), CSA B182.2, Minimum Pipe Stiffness (P.S. 46psi, 320kPa), ASTM 3034/F679 (dependant on size), Production Code

INTERPRETATION: For interpretation of the production code:

Example: **110904R42NA** refers to; **11**= November, **09**= 9<sup>th</sup> day, **04**= 2004 and **R42NA**= material, extruder, shift, etc. (see file for explanation if needed)

INSTALLATION PROCEDURES: Product is to be installed no more than 30 months after the date of manufacture. Clean debris from the bell end of the pipe, and check to see that the gasket is well seated with no raised edges. Lubricate the spigot end with the supplied lubricant. Align the pipes within the maximum deflection angle and insert the pipe to the stop line on the spigot end. \* **DO NOT OVER INSERT** \*.

NOTE: For complete product information, refer to the product approval letter dated February 16, 1996.





FILE CODE: 4.2.2.30

PRODUCT TYPE: **PVC CONNECTION SADDLES**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2230-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.2.30](#)

APPROVED PRODUCTS: [Fernco Co.](#)

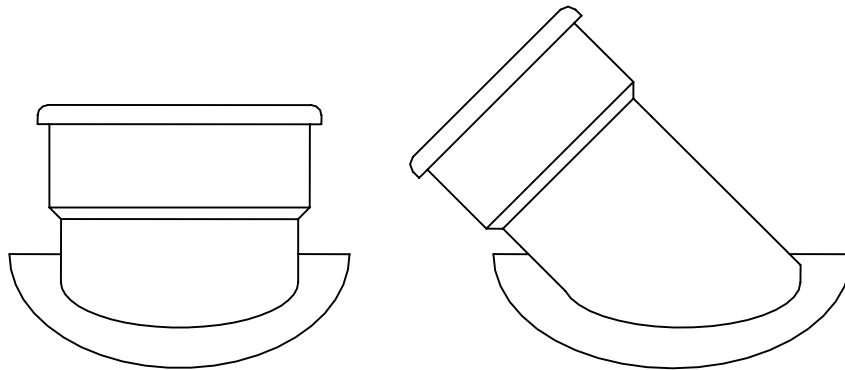
[CertainTeed](#)

[GPK Products Inc.](#)

[Rehau Industries Inc.](#)

[Ipex Inc.](#)

[Royal Pipe Systems \(PTI\)](#)





FILE CODE: 4.2.2.30

PRODUCT TYPE: **PVC CONNECTION SADDLES**

MANUFACTURER: Fernco Co.

MODEL: Predco

PRODUCT DESCRIPTION: Sewer Tap Saddle.

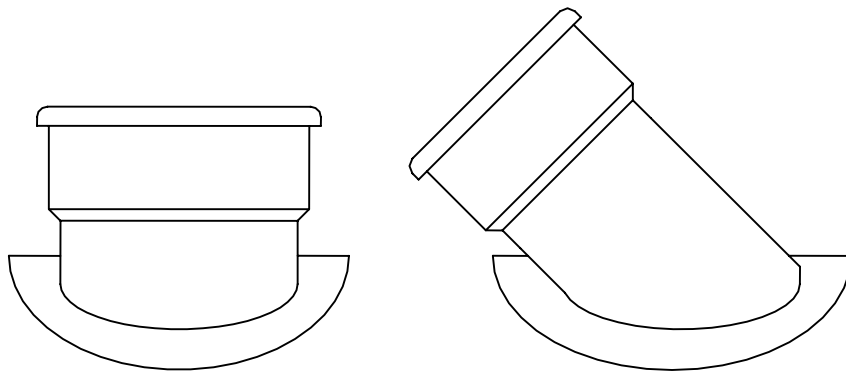
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: System requires the use of a hole saw and epoxy adhesive. Fastening can be achieved by using 316 stainless steel straps or minimum 6mm ( $\frac{1}{4}$ " ) 316 stainless steel bolts.

NOTE: For complete product information, refer to the product approval letter dated May 7, 1980.





FILE CODE: 4.2.2.30

PRODUCT TYPE: **PVC CONNECTION SADDLES**

MANUFACTURER: CertainTeed

MODEL: N/A

PRODUCT DESCRIPTION: PVC Saddle Tee and Wyes.

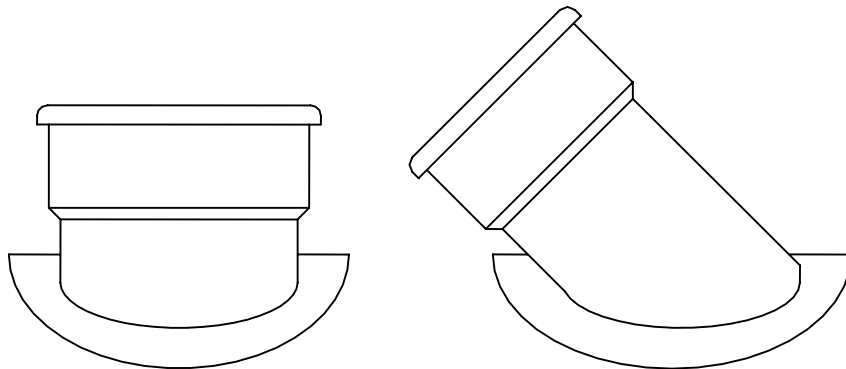
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: With rubber seal. For use on main line pipe only. Fastening can be achieved by using 316 stainless steel straps or minimum 6mm ( $\frac{1}{4}$ " ) 316 stainless steel bolts.

NOTE: For complete product information, refer to the product approval letter dated January 1, 1982.





FILE CODE: 4.2.2.30

PRODUCT TYPE: **PVC CONNECTION SADDLES**

MANUFACTURER: GPK Products Inc.

MODEL: N/A

PRODUCT DESCRIPTION: PVC Saddle Tee and Wyes.

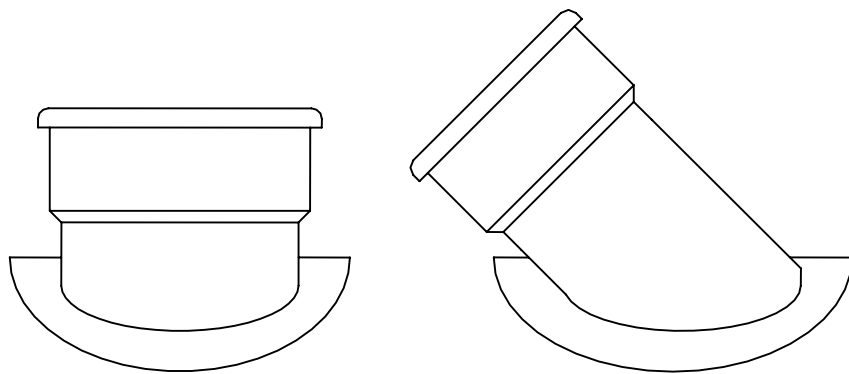
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: Solvent and adhesive to suit pipe. Fastening can be achieved by using 316 stainless steel straps or minimum 6mm ( $\frac{1}{4}$ " ) 316 stainless steel bolts.

NOTE: For complete product information, refer to the product approval letter dated April 20, 1982.





FILE CODE: 4.2.2.30

PRODUCT TYPE: **PVC CONNECTION SADDLES**

MANUFACTURER: Rehau Industries Inc.

MODEL: N/A

PRODUCT DESCRIPTION: PVC Sewer Strap on Saddle.

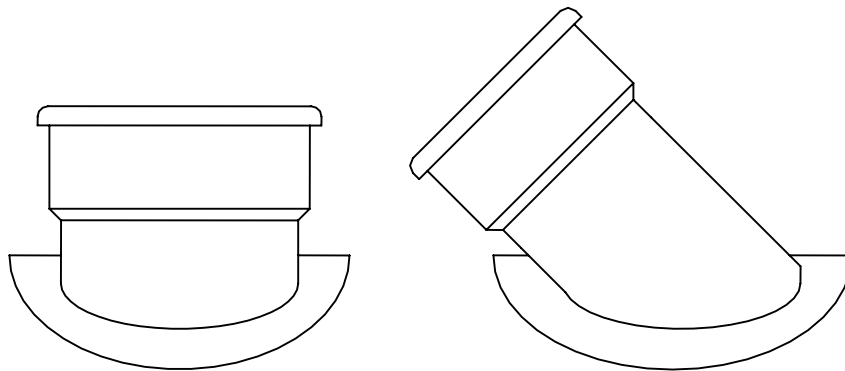
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For use on concrete main line pipe only. Fastening can be achieved by using 316 stainless steel straps or minimum 6mm ( $\frac{1}{4}$ " ) 316 stainless steel bolts.

NOTE: For complete product information, refer to the product approval letter dated October 18, 1982.





FILE CODE: 4.2.2.30

PRODUCT TYPE: **PVC CONNECTION SADDLES**

MANUFACTURER: Ipex Inc.

MODEL: N/A

PRODUCT DESCRIPTION: Sewer Strap on Saddle.

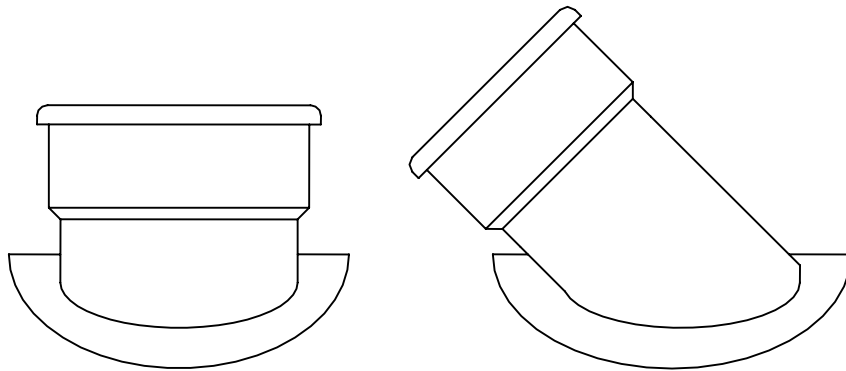
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: Fastening can be achieved by using 316 stainless steel straps or minimum 6mm ( $\frac{1}{4}$ " ) 316 stainless steel bolts.

NOTE: For complete product information, refer to the product approval letter dated March 11, 1993.





FILE CODE: 4.2.2.30

PRODUCT TYPE: **PVC CONNECTION SADDLES**

MANUFACTURER: Royal Pipe Systems (Plastic Trends)

MODEL: N/A

PRODUCT DESCRIPTION: PVC Gasketed SDR35 Sewer Saddle Tee.

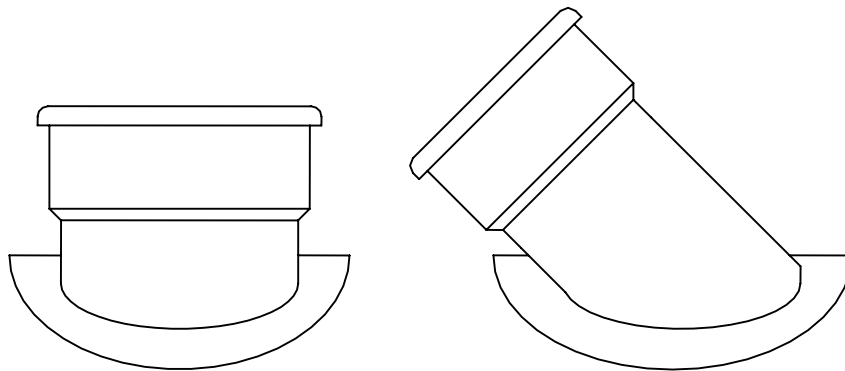
REQUIRED MARKINGS AND LOCATIONS: N/A

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For use on concrete main line pipe only. Fastening can be achieved by using 316 stainless steel straps or minimum 6mm ( $\frac{1}{4}$ " ) 316 stainless steel bolts.

NOTE: For complete product information, refer to the product approval letter dated March 6, 2008.





FILE CODE: 4.2.2.60

PRODUCT TYPE: **INJECTION MOULDED PVC SEWER CONNECTION FITTINGS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: CW 2130-R6

APPROVED PRODUCT DRAWING REFERENCE: N/A

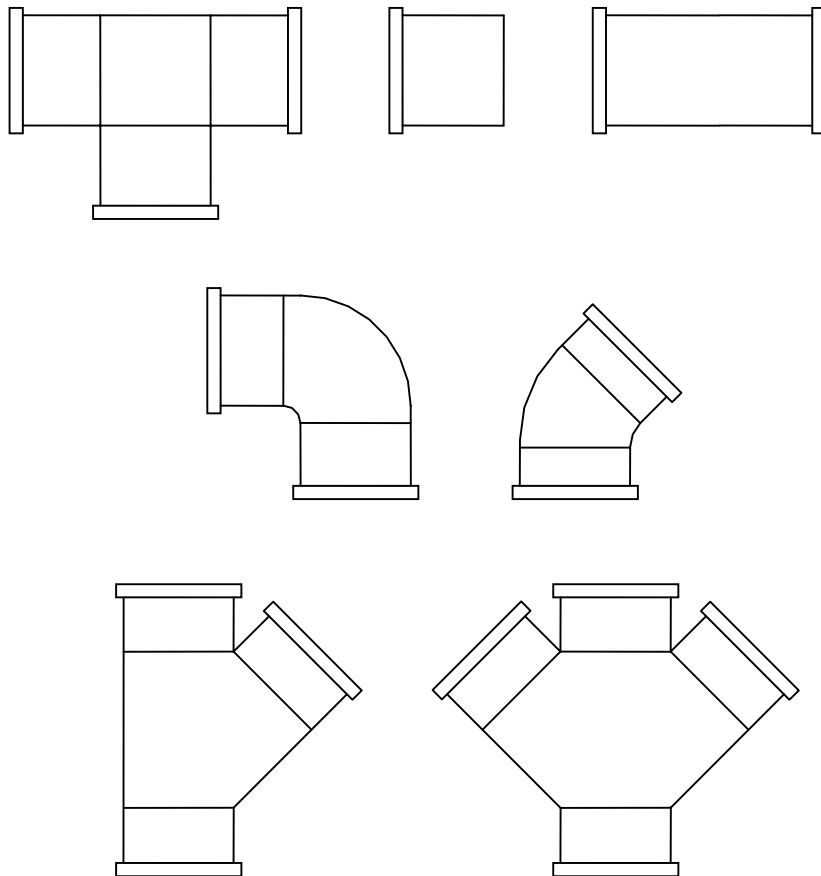
PRODUCT APPROVAL SPECIFICATION REFERENCE: [AT-4.2.2.60](#)

APPROVED PRODUCTS: [Royal Pipe Systems](#)

[GPK Products Ltd.](#)

[Ipex Inc.](#)

[Galaxy Plastics Ltd.](#)





FILE CODE: 4.2.1.60

PRODUCT TYPE: **INJECTION MOULDED PVC SEWER CONNECTION FITTINGS**

MANUFACTURER: Royal Pipe Systems (Plastic Trends, Le-Ron Plastics and/or Fab-Tech.)

MODEL: N/A

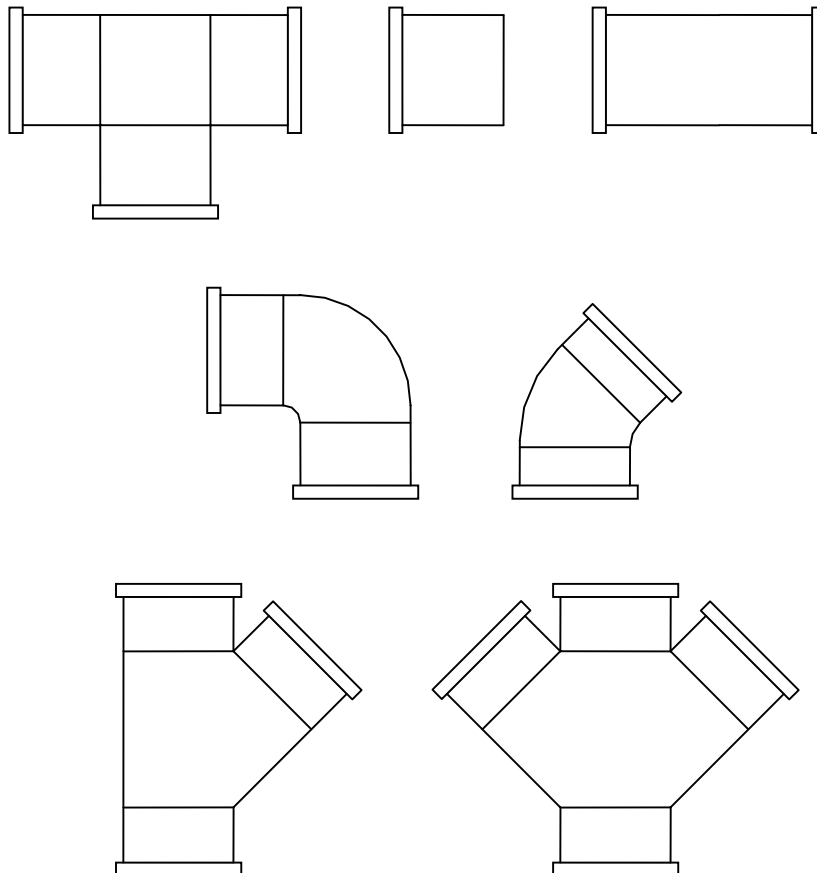
PRODUCT DESCRIPTION: Injection Moulded SDR35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer, Origin, CSA B182.2, Date of Manufacture (year and month). Fitting: Manufacturer, Date of Manufacture (year and month), CSA B182.2, BNQ Number (BNQ 3624-135), ASTM D3034, PVC PSM, Size (in inches).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letters dated November 26, 1999, November 9, 2000.





FILE CODE: 4.2.2.60

PRODUCT TYPE: **INJECTION MOULDED PVC SEWER CONNECTION FITTINGS**

MANUFACTURER: GPK Products Inc.

MODEL: N/A

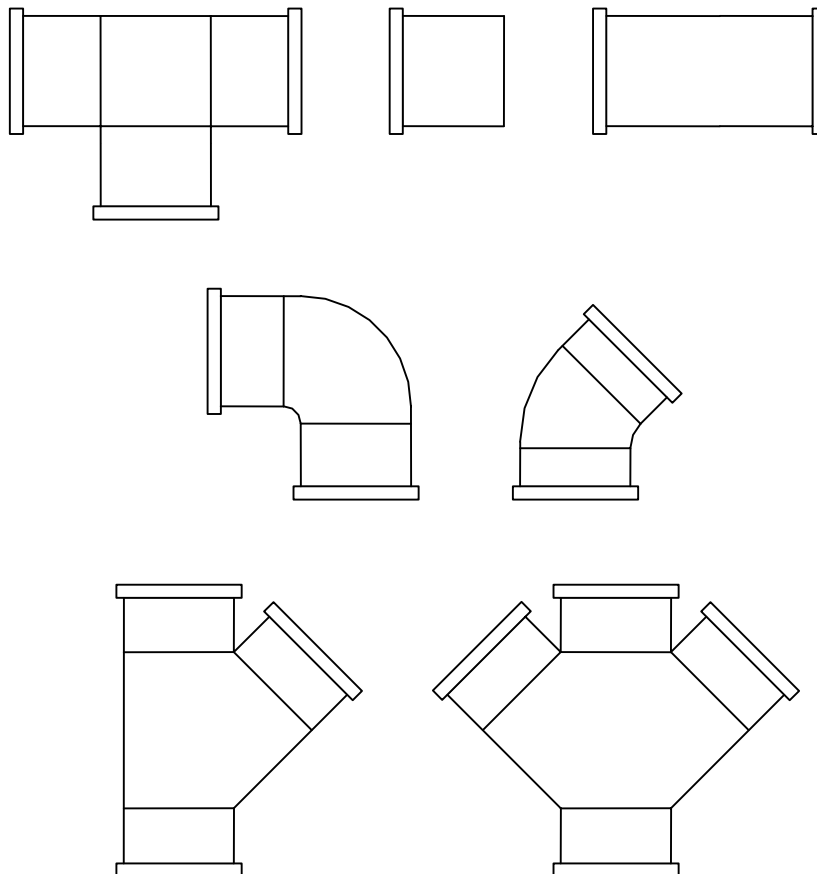
PRODUCT DESCRIPTION: Injection Moulded SDR 35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (GPK), Origin (Fargo ND.), CSA B182.2, Date of Manufacture (year and month). Fitting: Manufacturer (GPK Products Inc.), Date of Manufacture (year, month, and day), CSA B182.2, ASTM D3034, PVC PSM, Size (in millimeters at each outlet).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated June 26, 1995.





FILE CODE: 4.2.2.60

PRODUCT TYPE: **INJECTION MOULDED PVC SEWER CONNECTION FITTINGS**

MANUFACTURER: Ipex Inc.

MODEL: Ring-Tite

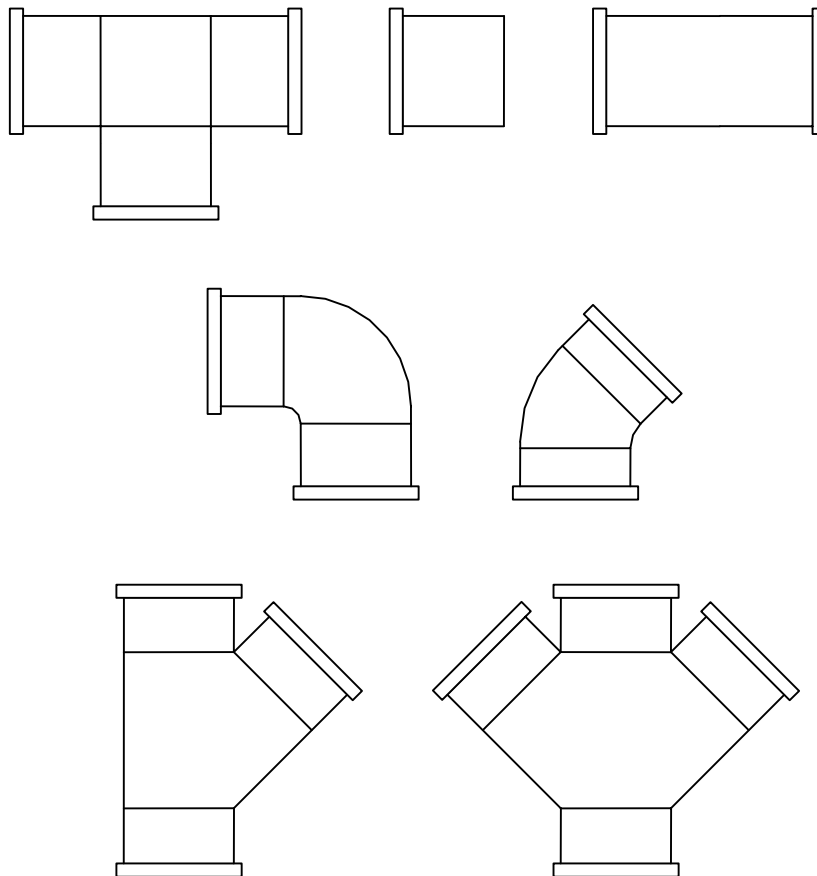
PRODUCT DESCRIPTION: Injection Moulded SDR 35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: Manufacturer (Ipex), Origin (St. Jacques), CSA B182.2, Date of Manufacture (year and month). Fitting: Manufacturer (Ipex), Date of Manufacture (year and month), CSA B182.2, BNQ Number (BNQ 3624-135), ASTM D3034, PVC PSM, Five Digit Part Number (xxxxx), Size (in millimeters at each outlet).

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated August 4, 1994.





FILE CODE: 4.2.2.60

PRODUCT TYPE: **INJECTION MOULDED PVC SEWER CONNECTION FITTINGS**

MANUFACTURER: Galaxy Plastics Ltd.

MODEL: N/A

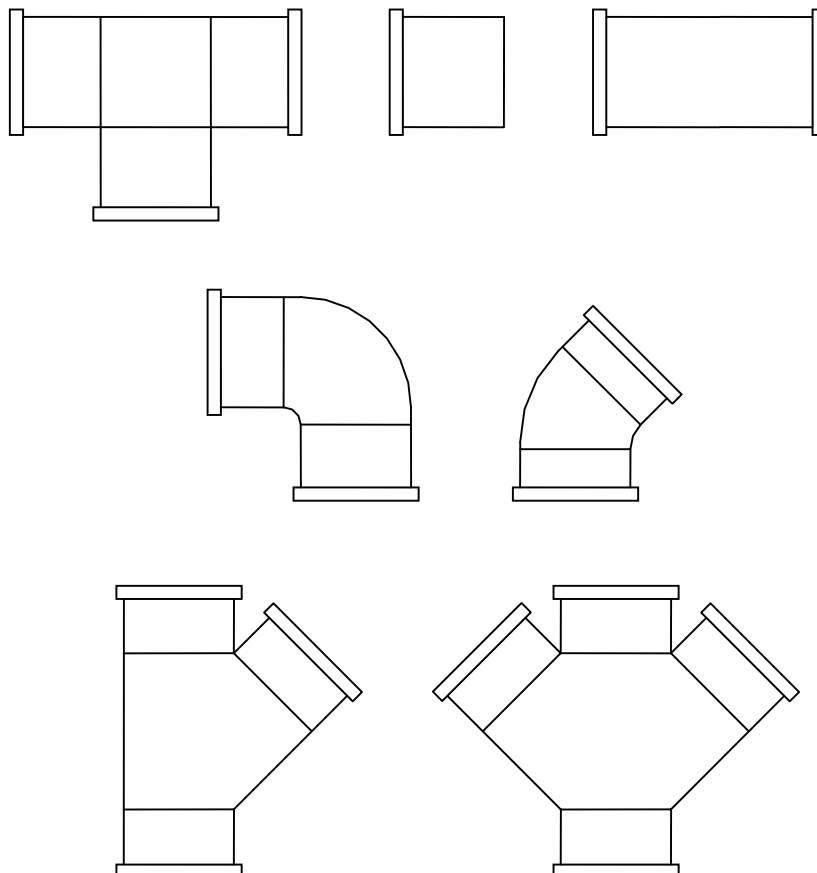
PRODUCT DESCRIPTION: Injection Moulded SDR 35 PVC Sewer Fittings.

REQUIRED MARKINGS AND LOCATIONS: Gasket: RIEBER style SBR (BUNA-S). Fitting: Permanent marking consisting of the manufacturer's name and location, size, type, Standard Number (CAN/CSA-B181.1-M90, CAN/CSA-B181.2-M90, CAN/CSA-B182.1-M92) and the Warnock Hersey Certification Mark.

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval application and affidavit letters dated December 8<sup>th</sup> 2006 and the product approval letter dated March 13, 2008.





FILE CODE: AT-4.2.0.0 MISC

PRODUCT TYPE: **MISILLANEOUS SEWER PRODUCTS**

STANDARD CONSTRUCTION SPECIFICATION REFERENCE: N/A

APPROVED PRODUCT DRAWING REFERENCE: N/A

PRODUCT APPROVAL SPECIFICATION REFERENCE: N/A

APPROVED PRODUCTS: [Titan Foundry](#)

[Highway Rubber & Safety Inc.](#)

[CCI Pipeline Systems](#)



FILE CODE: AT-4.2.0.0 MISC

PRODUCT TYPE: **MISILLANEOUS SEWER PRODUCTS**

MANUFACTURER: Titan Foundry

MODEL: Beehive Cover TF-101

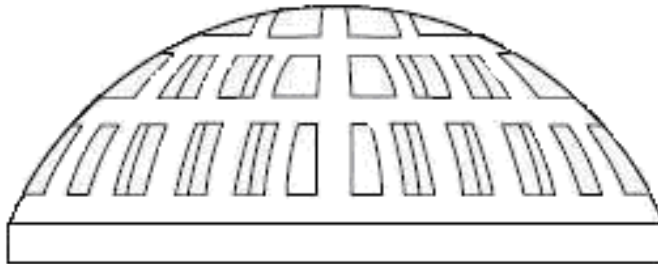
PRODUCT DESCRIPTION: Beehive Manhole Cover.

REQUIRED MARKINGS AND LOCATIONS: Manufacturer, Model, Date

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated November 7, 2008.





FILE CODE: AT-4.2.0.0 MISC

PRODUCT TYPE: **MISILLANEOUS SEWER PRODUCTS**

MANUFACTURER: Highway Rubber & Safety Inc.

MODEL: Flex-O-Ring

PRODUCT DESCRIPTION: Rubber Manhole Adjustment Ring.

REQUIRED MARKINGS AND LOCATIONS: Manufacturer, Model, Date

INTERPRETATION: N/A

INSTALLATION PROCEDURES: N/A

NOTE: For complete product information, refer to the product approval letter dated November 7, 2008.





PRODUCT TYPE: **MISILLANEOUS SEWER PRODUCTS**

MANUFACTURER: CCI Pipeline Systems

MODEL: WrapidSeal

PRODUCT DESCRIPTION: Heat activated adhesive manhole membrane

REQUIRED MARKINGS AND LOCATIONS: Manufacturer, Model, Date

INTERPRETATION: N/A

INSTALLATION PROCEDURES: **1.** Ensure all surfaces which the sleeve will be applied to are clean, dry and free of foreign objects and sharp edges. **2.** WrapidSeal should be sized to extend 3" - 4" above and below the upper and lower joints of the cone section, grade rings and frame. As a guide, make a series of marks around the manhole where the bottom of the sleeve will be. Determine the lay flat length of the sleeve by measuring the circumference of the manhole structure at the marks and add the overlap dimension, (6" min.). **3.** Using the torch, warm the surface to drive off any moisture. **4.** Apply WrapidSeal Primer to the application surfaces, (i.e. steel, concrete, fibreglass etc.) Wait until the primer is slightly tacky to touch before proceeding. This will take 5-15 minutes depending on temperature and humidity conditions. **5.** Roll up the cut sleeve ensuring that the release liner is still on the adhesive backing Caution: Do not allow exposed adhesive to fold over on itself. **6.** Remove ~6" of the release liner from the sleeve. Using the perimeter marks as a guide, begin wrapping the sleeve around the manhole while gradually removing the release liner. At the overlap, ensure that the top and bottom edges of the sleeve are uniformly aligned. **7.** Place the closure seal on a flat surface (adhesive side up) and apply gentle heat to activate the adhesive. Center the closure vertically over the overlap and apply a small amount of heat to the face of the closure. Using a gloved hand pat the closure down and, alternating with heat and pressure. Continue until the closure is fully bonded. **8.** Using a moderate to high flame, begin heating the sleeve from the bottom edge. Apply heat circumferentially around the structure. Continue heating upward as the sleeve shrinks. Use a gloved hand or roller to smooth wrinkles and push out all trapped air. **9.** After shrinking, WrapidSeal will be draped over the manhole frame gussets. Using a knife, cut the sleeve around the gussets. Apply gentle heat and press the sleeve onto the steel frame. Trim excess material protruding above the steel manhole frame and cover. **10.** Visually inspect the installed sleeve for the following: **a.** Sleeve is in full contact with the cone section and manhole frame. **b.** Adhesive flows beyond the sleeve edges. **c.** No cracks or holes in the sleeve backing. **11.** After shrinking is complete, allow the sleeve to cool prior to backfilling. Water quenching of the sleeve is acceptable to facilitate immediate backfilling. To prevent damage to the sleeve, use selected backfill material, (no sharp stones or large particles); otherwise an extruded polyethylene mesh or other suitable shield should be used.

NOTE: For complete product information, refer to the product approval letter dated November 7, 2008.





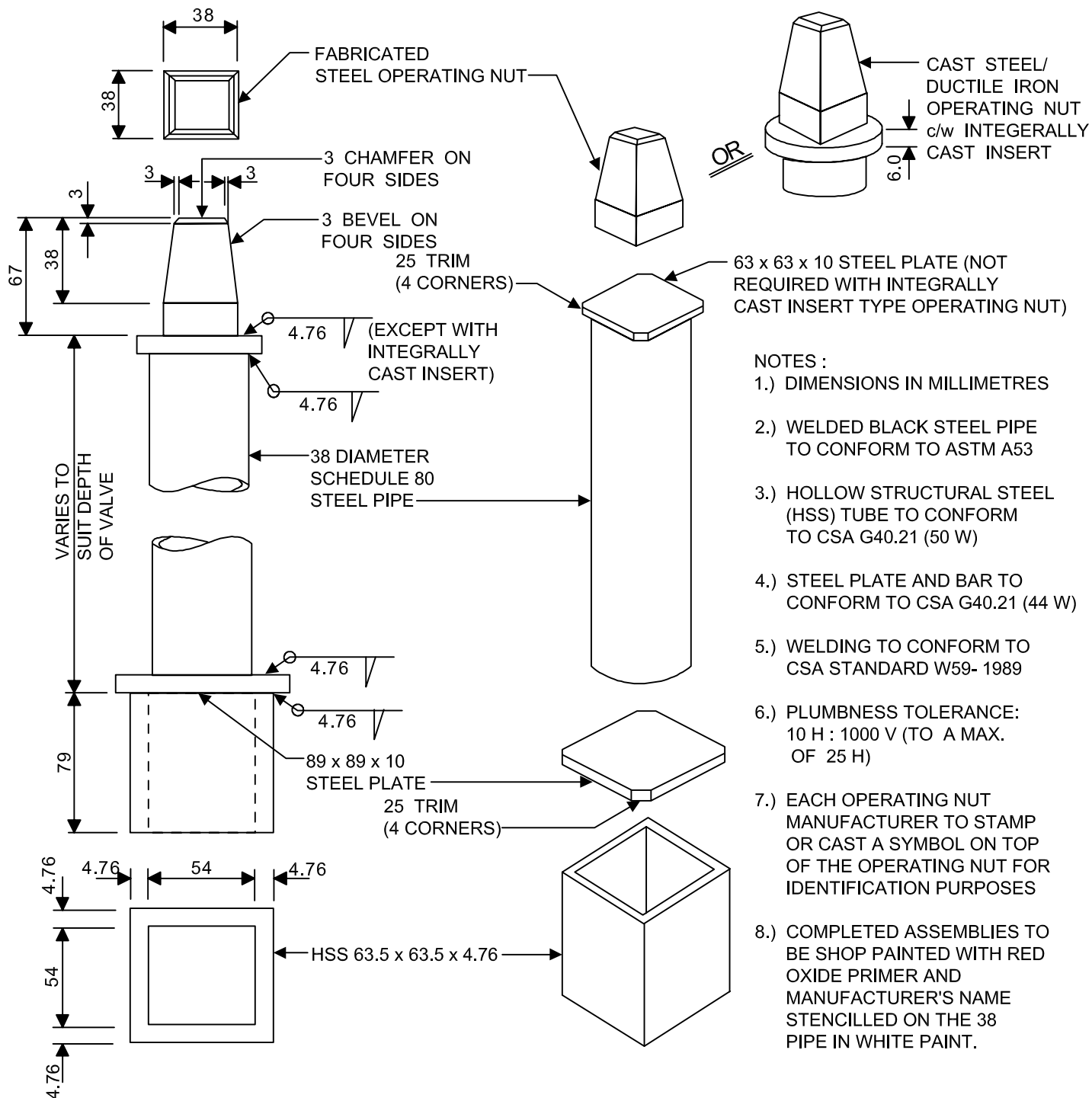
# **DETAIL DRAWINGS**

Winnipeg









DIMENSIONS IN MILLIMETRES

**The City Of Winnipeg**  
Water & Waste Department

Product Spec. Reference - N/A  
Construction Spec. Reference - CW2110

STEEL PIPE  
VALVE STEM EXTENSION

Designed By:  
RAS

Checked By:  
TW

Approved:

Drawn By:  
JMH

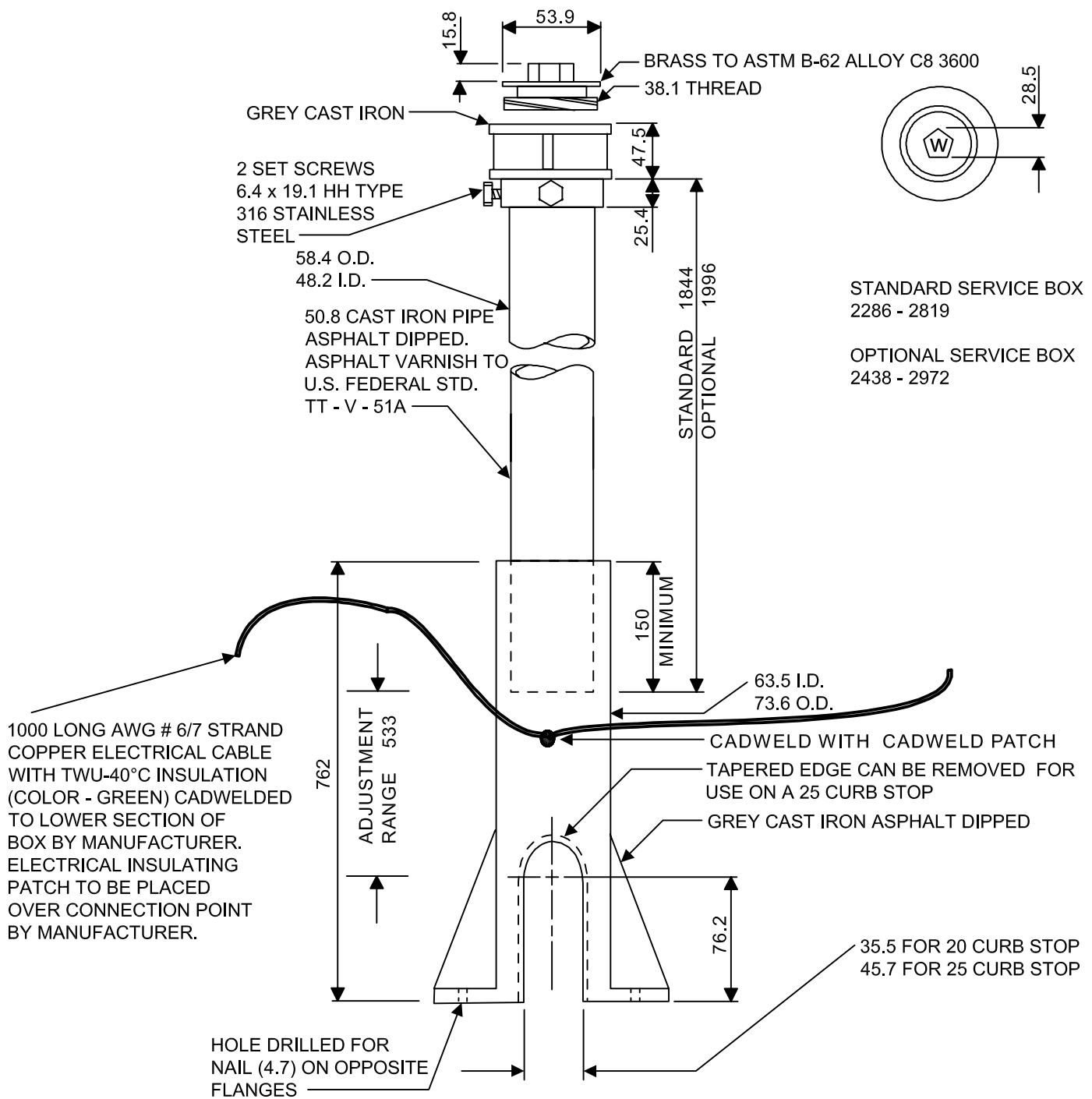
Date: 89-09  
Revised : 02-11

Scale:  
N.T.S.

Drawing No.

AP-002





APPROXIMATE WEIGHT 20.9 KILOGRAMS

DIMENSIONS IN MILLIMETRES

# The City Of Winnipeg

Water & Waste Department

Products Spec. Reference - AT-4.1.2.41

Construction Spec. Reference - CW2110

REPLACEMENT ADJUSTABLE  
CURB STOP BOX FOR NON  
MINNEAPOLIS STYLE 20  
MILLIMETRE AND 25 MILLIMETRE  
CURB STOPS

Designed By:  
PDW

Checked By:  
ECB

Approved:

Drawn By:  
JMH

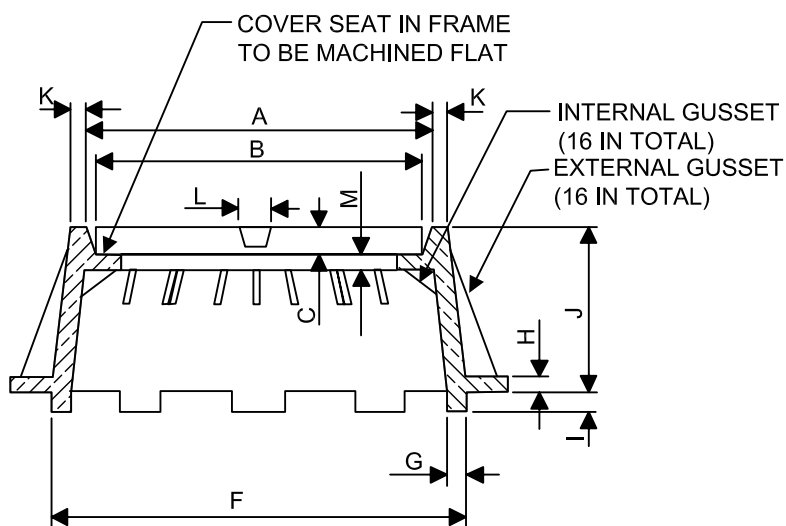
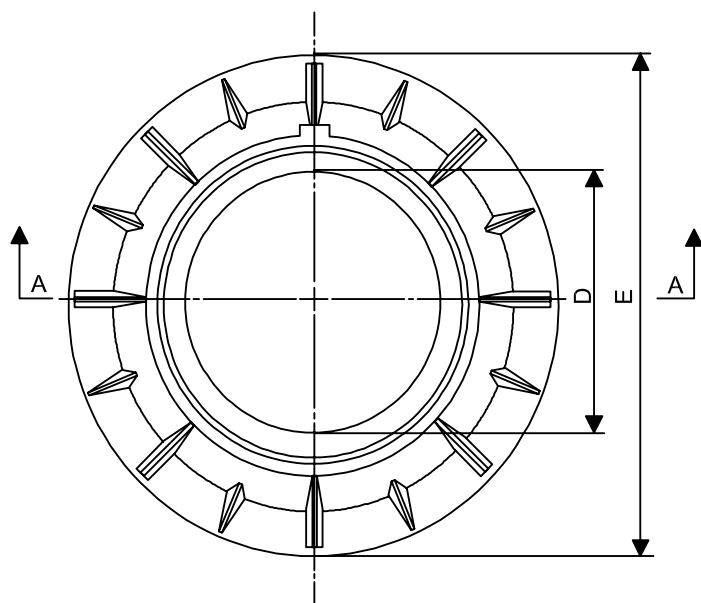
Date:  
97-02

Scale:  
N.T.S.

Drawing No.

AP-003





SECTION A - A

## DIMENSIONS

DIMENSIONS	VALUE	TOLERANCE
A	603	±2
B	590	±5
C	64	±1
D	521	±2
E	890	±10
F	757	±5
G	16	±4
H	19	±6
I	27	±3
J	227	±4
K	17	±4
L	38	±6
M	25	±3

DIMENSIONS IN MILLIMETRES

**The City Of Winnipeg**  
Water & Waste Department

Products Spec. Reference - AT-4.2.1.73  
Construction Spec. Reference - CW 2130

STANDARD FRAME  
FOR MANHOLE AND  
CATCH BASIN

Designed By:  
TEJK

Checked By:  
TEJK

Approved:

Drawn By:  
MDB

Date: 05-01-11  
Revision: 1

Scale:

N.T.S.

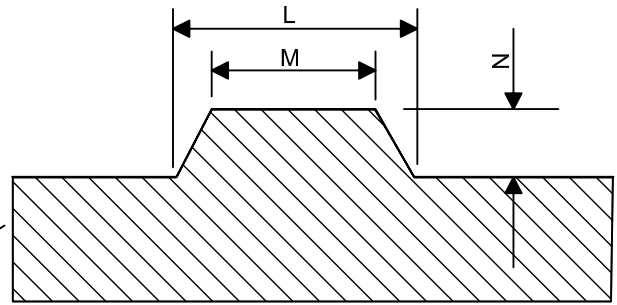
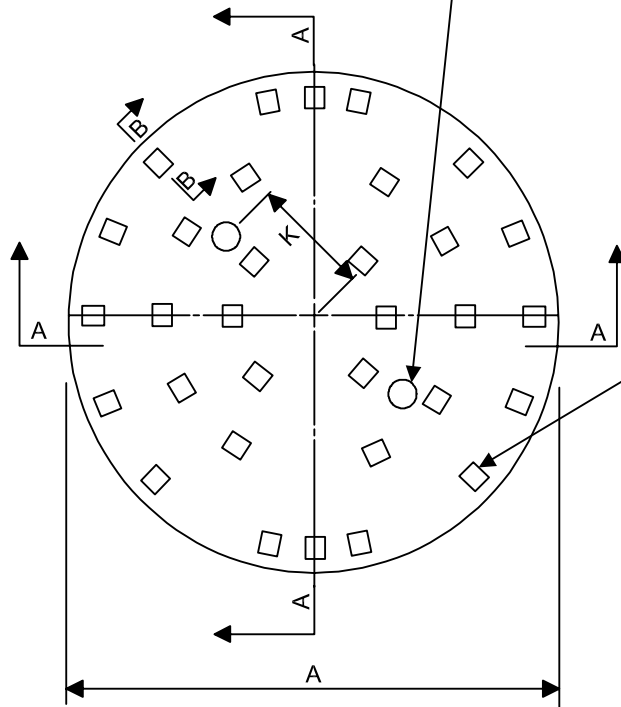
Drawing No.

AP-004



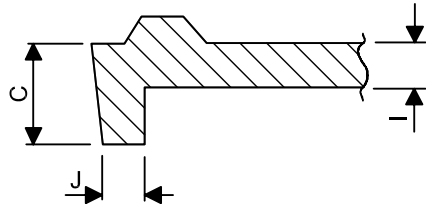
2 - 38 DIAMETER HOLES

NOTE:  
COVERS SHALL HAVE A MINIMUM OF 32 CHECKERS.  
LOCATIONS OF CHECKERS SHOWN ARE TO BE  
CONSIDERED APPROXIMATE

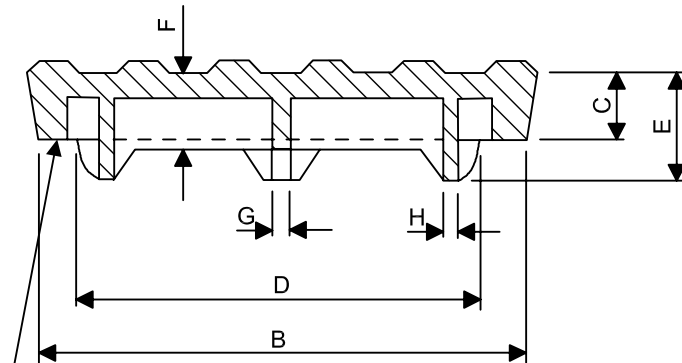


### DIMENSIONS

DIMENSIONS	VALUE	TOLERANCE
A	597	±2
B	575	±6
C	64	±1
D	506	±12
E	170	±30
F	125	±6
G	12	±6
H	12	±6
I	19	±2
J	23	±6
K	140	±6
L	25	±2
M	19	±2
N	4	±2



SECTION B - B



BOTTOM OF COVER RIM  
TO BE MACHINED FLAT

SECTION A - A

DIMENSIONS IN MILLIMETRES

# The City Of Winnipeg

## Water & Waste Department

Products Spec Reference - AT-4.2.1.73

Construction Spec Reference - CW 2130

STANDARD SOLID COVER  
FOR STANDARD FRAME

Designed By:  
TEJK

Checked By:  
TEJK

Approved:

Drawn By:  
MDB

Date: 05-01-11  
Revision: 1

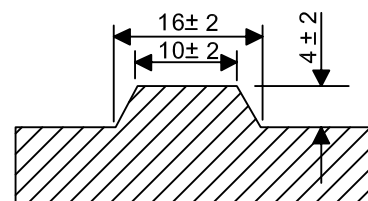
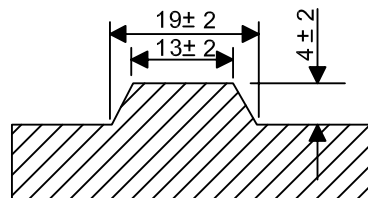
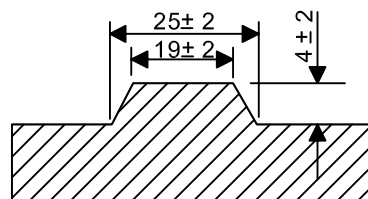
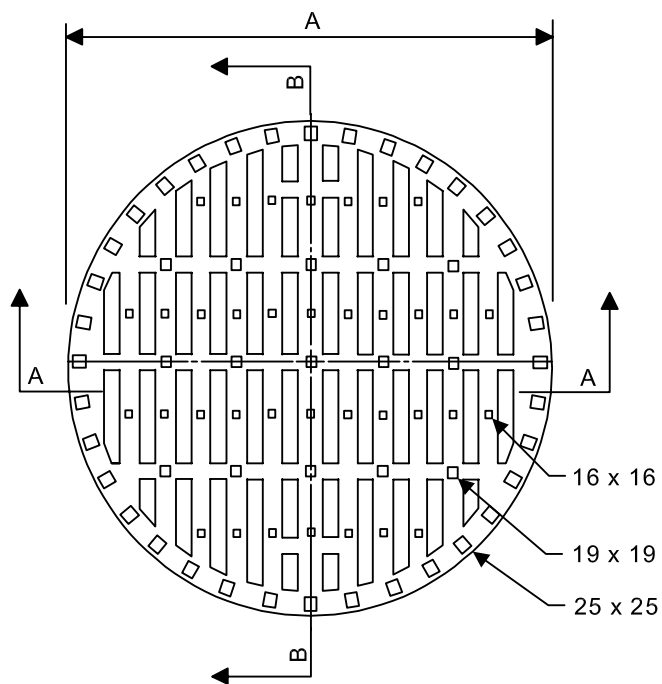
Scale:

N.T.S.

Drawing No.

AP-005





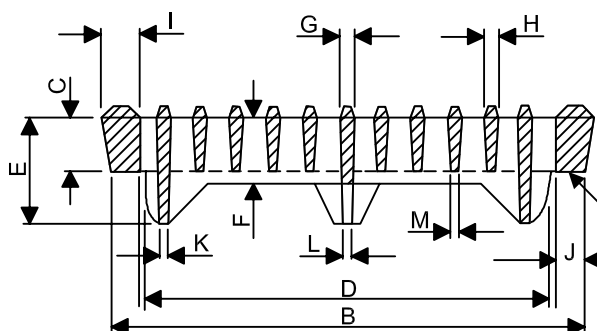
CHECKER DETAILS

### DIMENSIONS

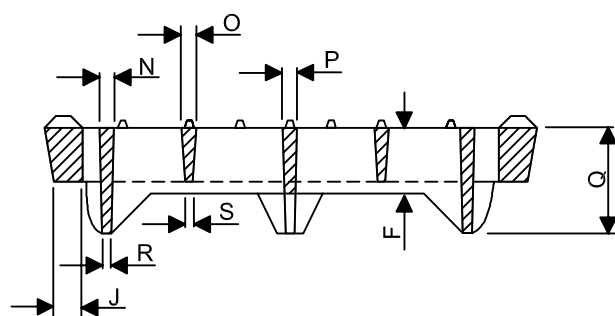
DIMENSIONS	VALUE	TOLERANCE
A	597	±2
B	575	±6
C	64	±1
D	506	±12
E	170	±30
F	125	±6
G	25	±6
H	19	±2
I	40	±4
J	23	±6
K	12	±6
L	12	±6
M	13	±4
N	25	±6
O	25	±6
P	25	±6
Q	170	±30
R	12	±6
S	13	±4

BOTTOM OF  
COVER RIM  
TO BE MACHINED  
FLAT

SECTION A - A



SECTION B - B



DIMENSIONS IN MILLIMETRES

**The City Of Winnipeg**

Water & Waste Department

Products Spec. Reference - AT-4.2.1.73

Construction Spec. Reference - CW 2130

STANDARD GRATED  
COVER FOR  
STANDARD FRAME

Designed By:  
TEJK

Checked By:  
TEJK

Approved:

Drawn By:  
MDB

Date: 05-01-11  
Revision: 1

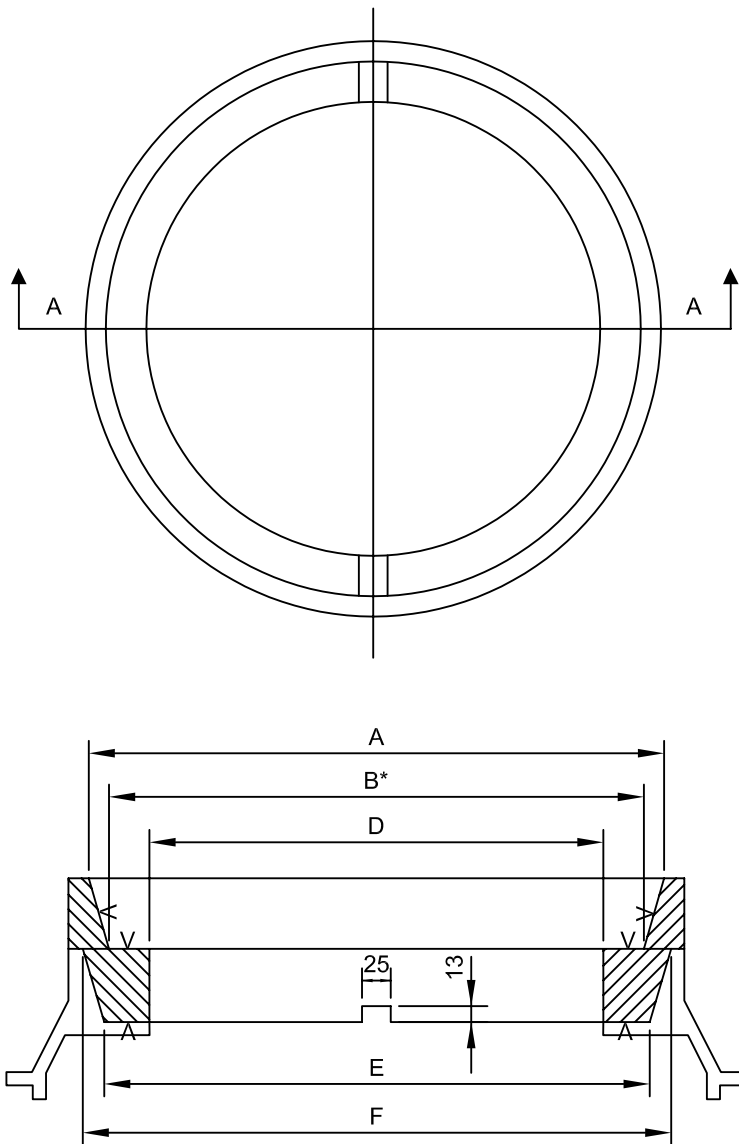
Scale:

N.T.S.

Drawing No.

AP-006





**SECTION A - A**

V = MACHINED SURFACES  
 \* = DIMENSION TO MACHINED SURFACES  
 TOLERANCES +/- 1mm  
 ALL TOLERANCES +/- 2mm UNLESS  
 SHOWN OTHERWISE

**DIMENSIONS**

DIMENSION	VALUE	TOLERANCE
A	603	
B*	584	±1
C	17	±4
D	521	±4
E	583	
F	597	

**The City Of Winnipeg**  
 Water & Waste Department

Products Spec. Reference - AT-4.2.1.75  
 Construction Spec. Reference - CW 2130  
 CW 3210

LIFTER RING FOR  
 STANDARD FRAME

Designed By:  
 TEJK

Checked By:  
 TEJK

Approved:

Drawn By:  
 EN

Date: 05-01-11  
 Revision: 1

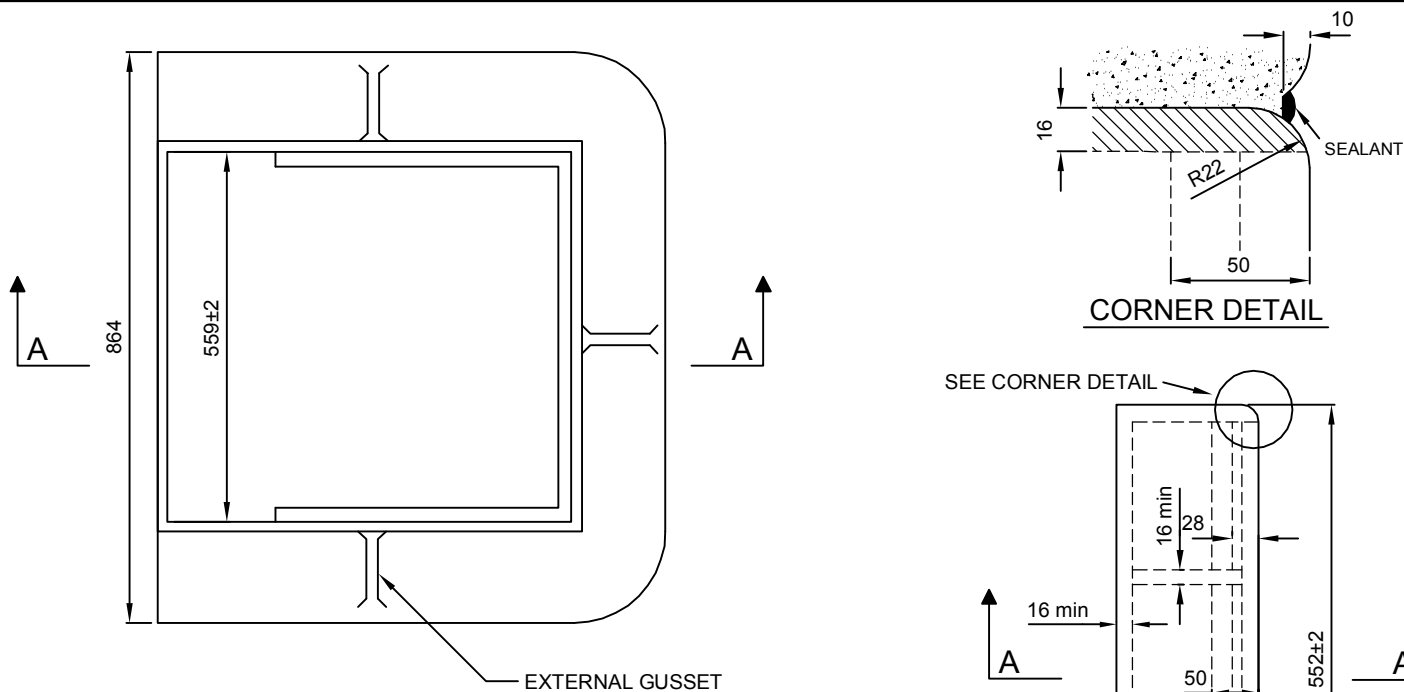
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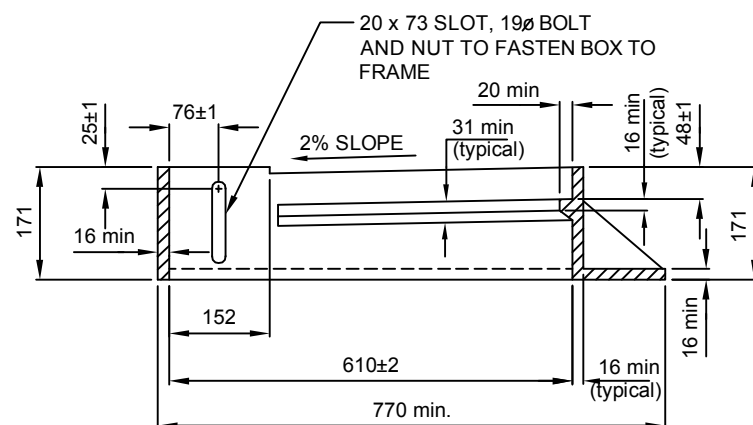
Drawing No.

AP-007



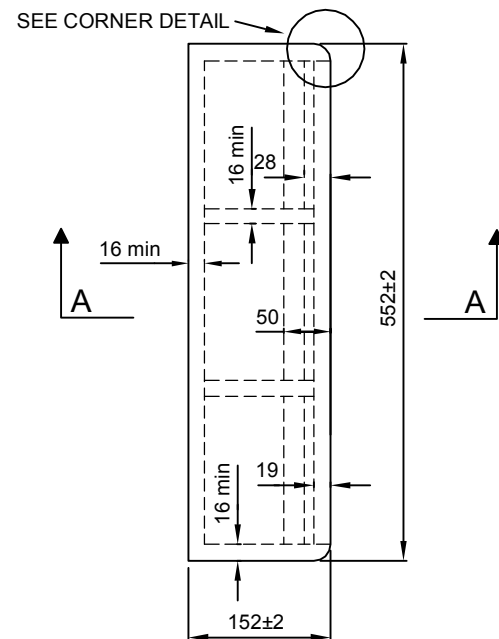


PLAN VIEW

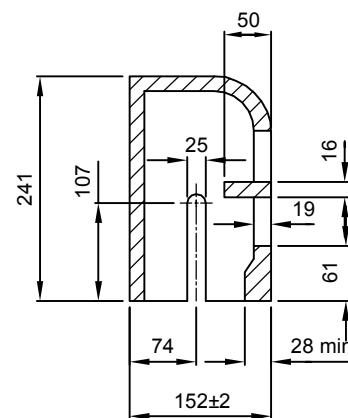


SECTION A - A

- NOTES:
- 1) ALL DIMENSIONS IN MILLIMETERS
  - 2) UNLESS OTHERWISE SPECIFIED DIMENSIONS SHALL HAVE A TOLERANCE OF ±2mm AND AN ADDITIONAL ±5mm PER METER OF DIMENSION



PLAN VIEW



SECTION A - A

**The City Of Winnipeg**

**Water & Waste Department**

Products Spec Reference - AT-4.2.1.83B

Construction Spec Reference - CW 2130  
CW 3210

**BARRIER CURB AND  
GUTTER INLET FRAME  
AND BOX**

**Designed By:**  
TEJK

**Checked By:**  
BAW

**Approved:**  
GKP

**Drawn By:**  
DB / WKT

**Drawing Date:**  
05-01-13

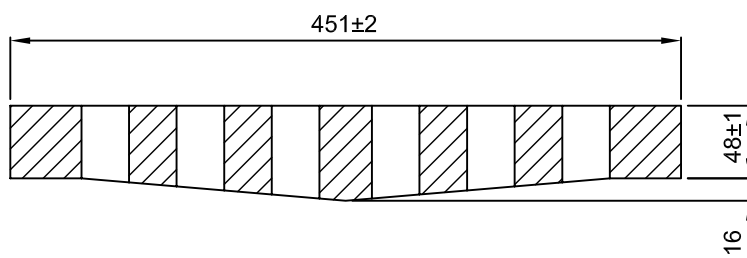
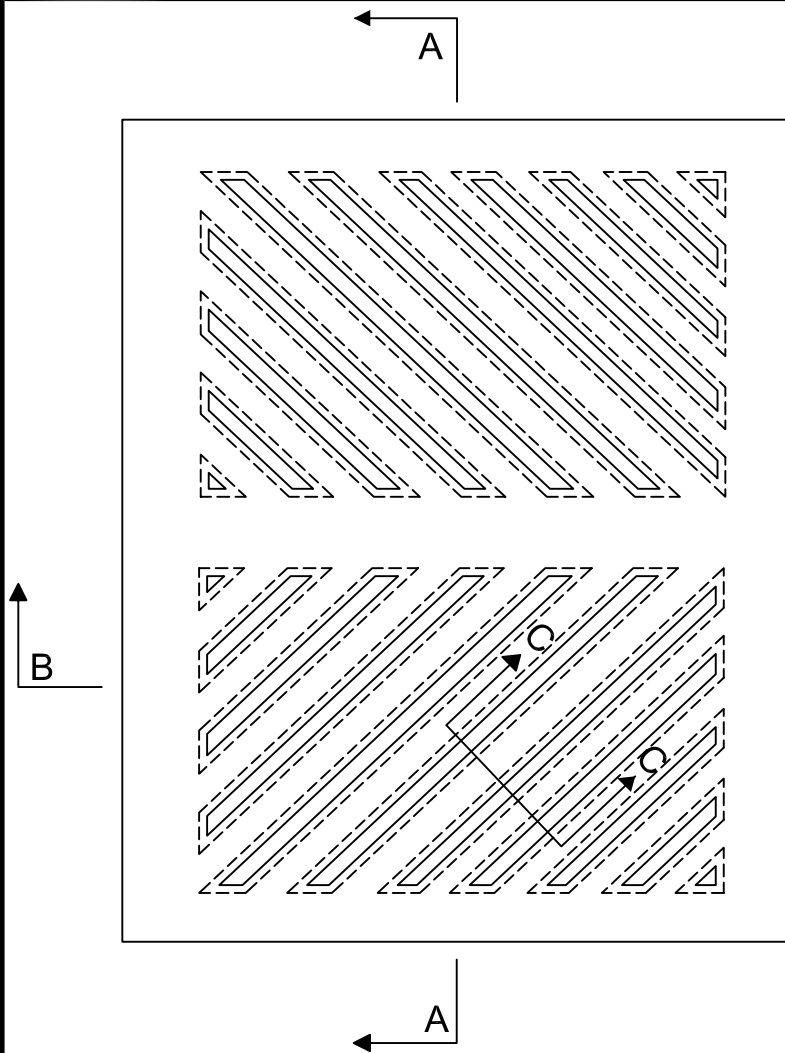
**Revision: 3**  
**Date: 05-12-01**

**Scale:**  
N.T.S.

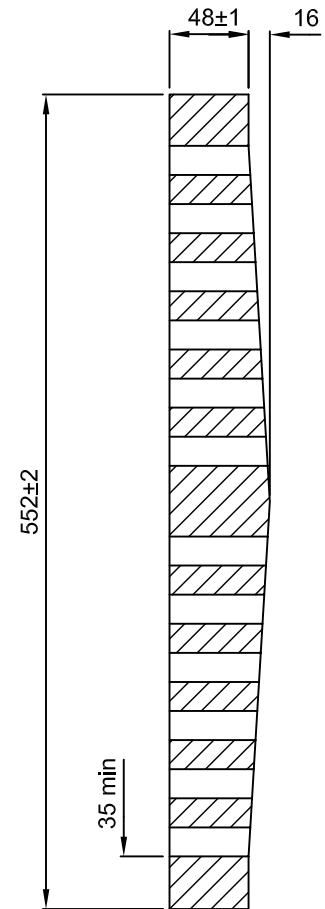
**Drawing No.**

**AP-008**

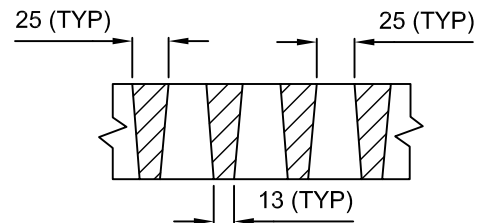




SECTION B - B



SECTION A - A



SECTION C - C

NOTES:

- 1) ALL DIMENSIONS IN MILLIMETERS
- 2) UNLESS OTHERWISE SPECIFIED DIMENSIONS SHALL HAVE A TOLERANCE OF  $\pm 2\text{mm}$  AND AN ADDITIONAL  $\pm 5\text{mm}$  PER METER OF DIMENSION

**The City Of Winnipeg**

**Water & Waste Department**

**Products Spec Reference - AT-4.2.1.83B**

**Construction Spec Reference - CW2130  
CW3205**

**BARRIER CURB AND  
GUTTER INLET COVER**

**Designed By:**  
**TEJK**

**Checked By:**  
**TEJK**

**Approved:**

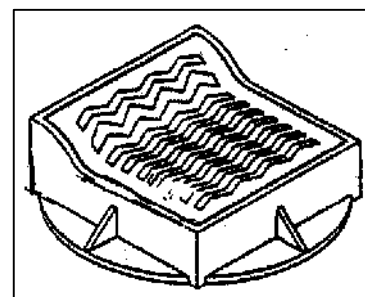
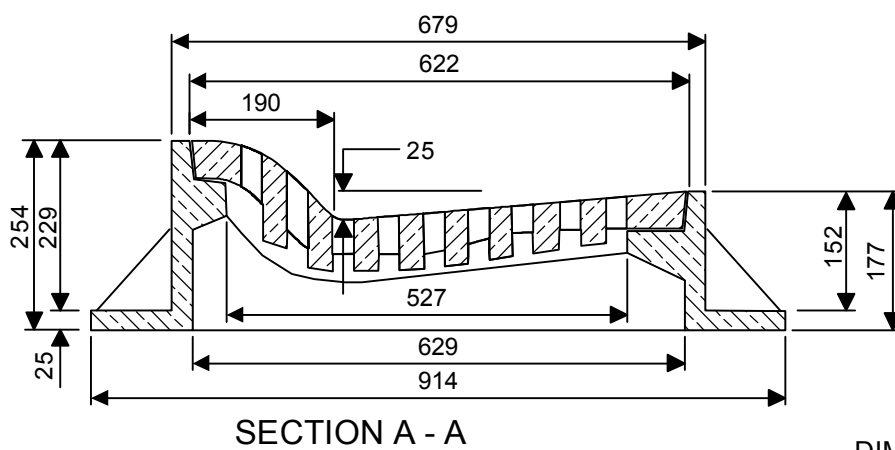
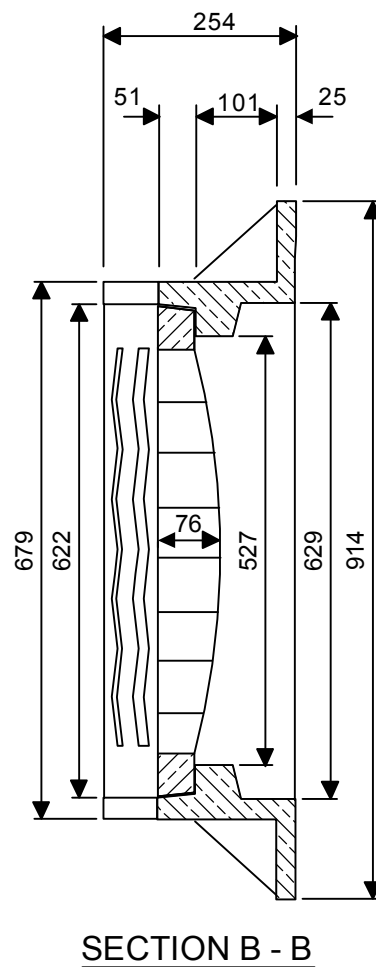
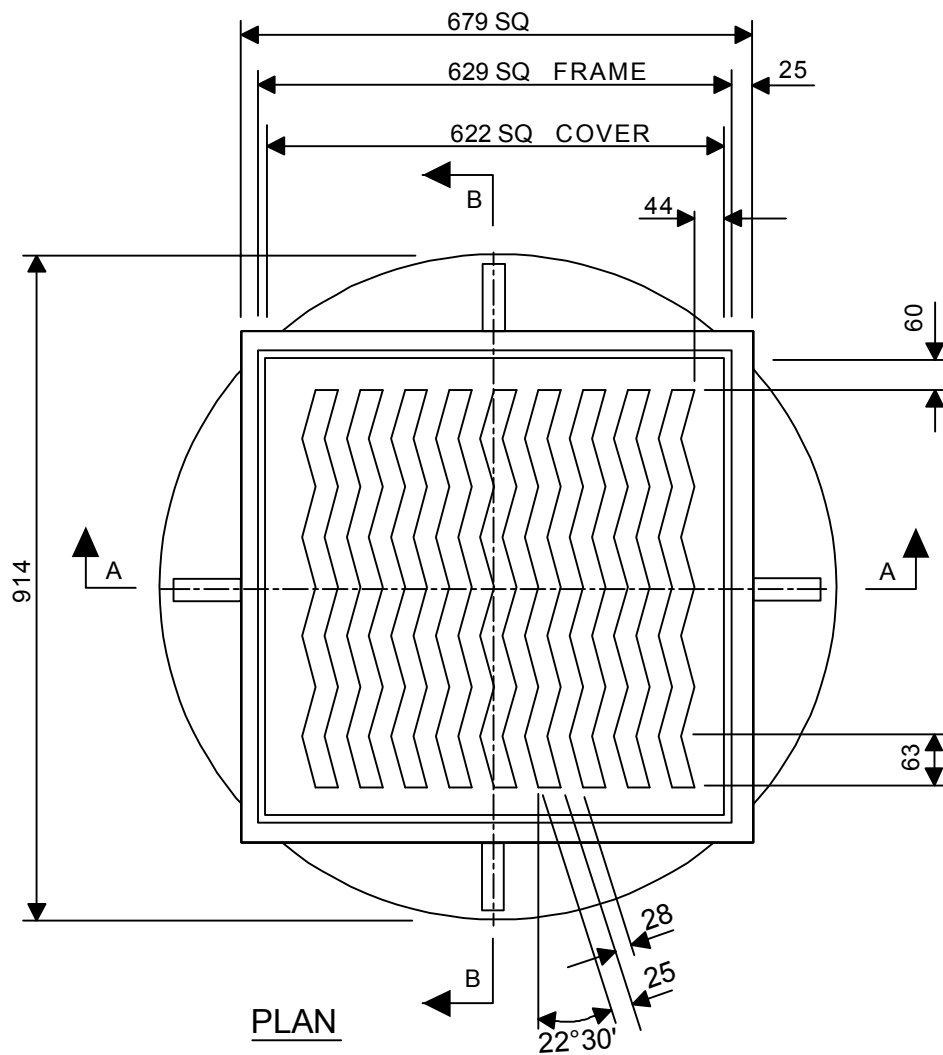
**Drawn By:**  
**REF**

**Date:**  
**JANUARY 1994**

**Scale:**  
**N.T.S.**

**Drawing No.**  
**AP-009**





THIS ISOMETRIC IS AN IMAGE ATTACHED TO THE CAD FILE - FILENAME : AP-011\_revision3.tif

DIMENSIONS IN MILLIMETRES



# THE CITY OF WINNIPEG

## WATER & WASTE DEPARTMENT

Products Spec. Reference - [AT-4.2.1.83M](#)  
Construction Spec. Reference - CW 2130  
CW 3210

**MOUNTABLE CURB AND  
GUTTER INLET**

Designed By:

Drawn By:

Scale:

Checked By:

Date:

Drawing No.

Approved:

06-01-03 Revision 3

AP-011

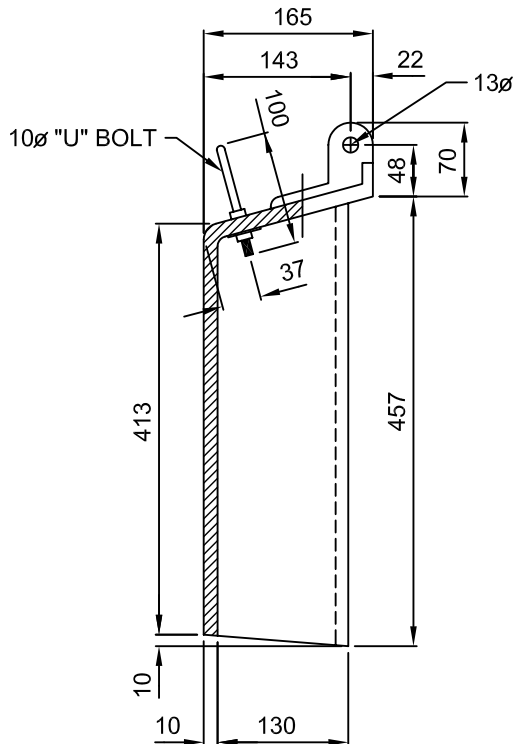
GKP

TLS

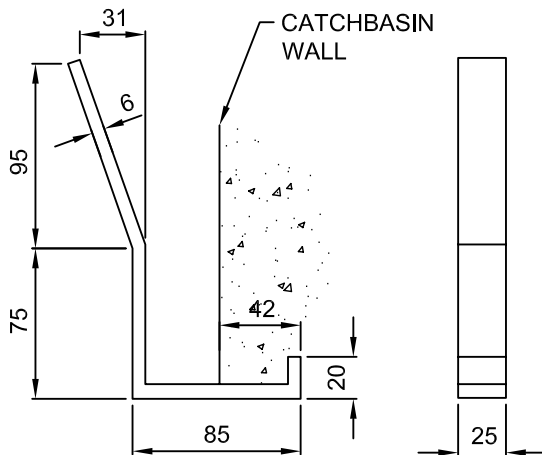
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BAW

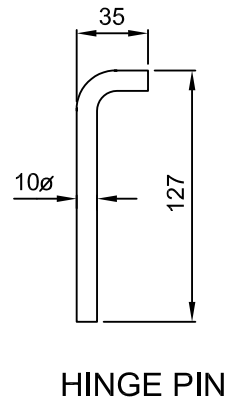
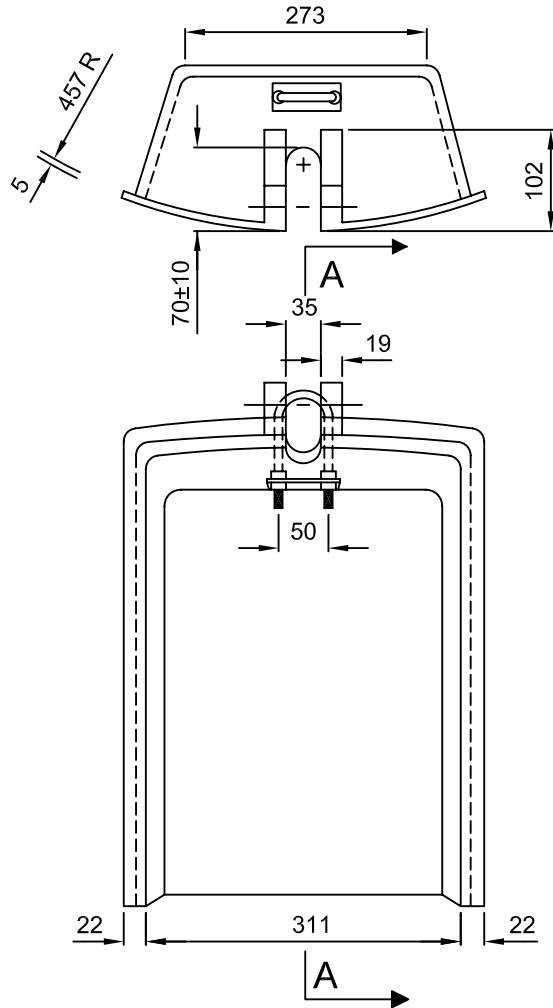




SECTION A - A



CATCH BASIN HOOK



**The City Of Winnipeg**  
Water & Waste Department

Products Spec Reference - N/A

Construction Spec Reference - CW 2130

CATCH BASIN HOOD

Designed By:  
JMH

Checked By:  
TEJK

Approved:

Drawn By:  
WKT

Date: 05-01-11  
Revision: 1

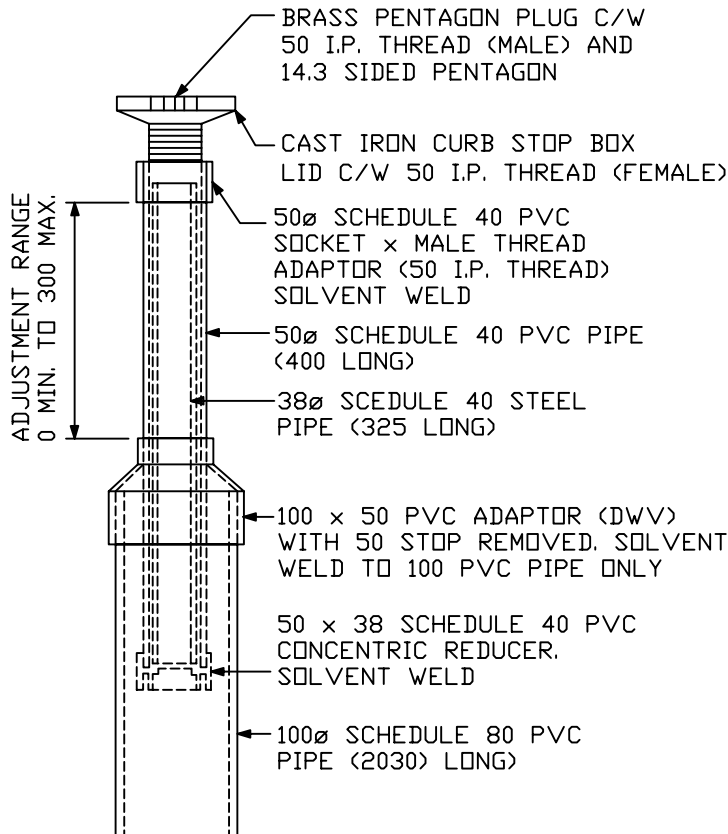
Scale:  
N.T.S.

Drawing No.

AP-012



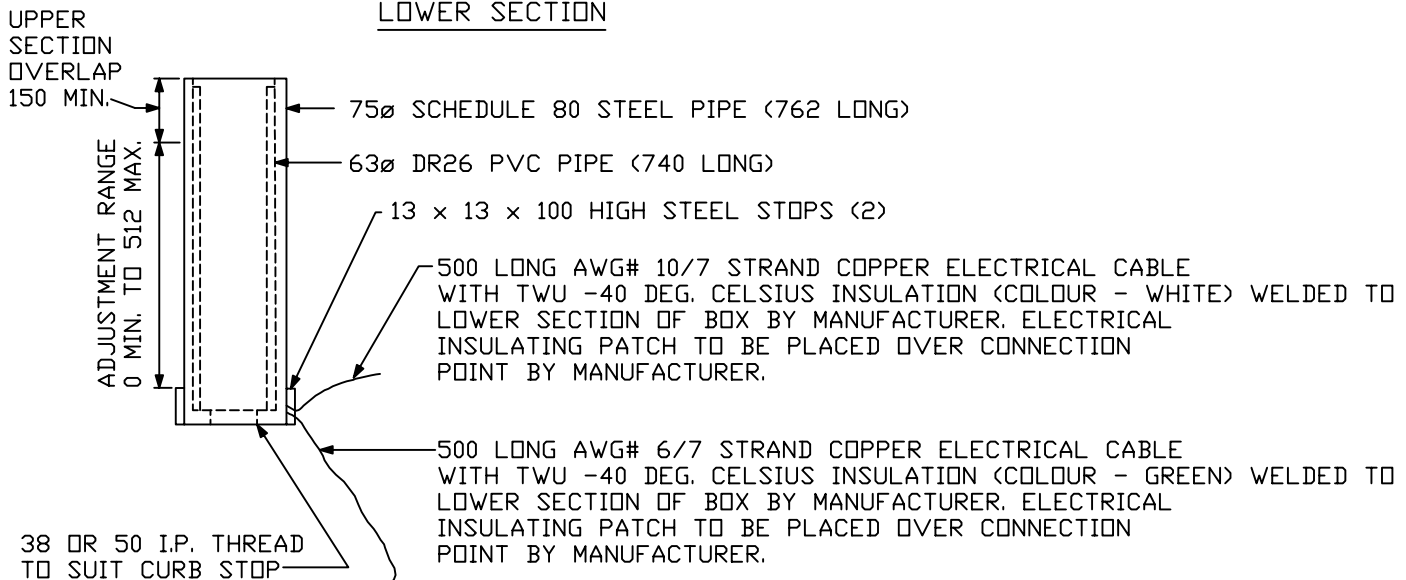
## UPPER SECTION



## NOTES

1. DIMENSIONS IN MILLIMETERS
2. STANDARD SERVICE BOX 2270-3082  
ADDITIONAL ADJUSTMENT RANGE CAN BE  
OBTAINED BY MODIFYING LENGTH OF 100Ø  
SCHEDULE 80 PVC PIPE
3. PVC SHALL CONFORM TO ASTM 1784-81  
TYPE 1 GRADE 1
4. STEEL SHALL CONFORM TO ASTM A53-88/  
A105-87/A108-87/A570-85. ALL  
WELDS SHALL BE CONTINUOUS WELDS  
AND SHALL CONFORM TO CSA STANDARD  
W59-1989
5. BRASS SHALL CONFORM TO ASTM B62-86  
ALLOY C83600
6. CAST IRON SHALL CONFORM TO ASTM  
A536 (65-45-12) OR A126-84 CLASS B
7. DUCTILE IRON OR GRAY CAST  
IRON MAY BE SUBSTITUTED FOR STEEL  
COMPONENTS
8. ELECTRICAL CABLE SHALL CONFORM  
TO CSA C22.2 No. 75-M1983

## LOWER SECTION



REDRAWN IN AUTOCAD 03-01

**The City Of Winnipeg**  
Water & Waste Department

Products Spec. Reference - AT-4.1.2.41

Construction Spec. Reference - CW2110

Designed By:  
TEJK

Drawn By:  
EN

Scale:

N.T.S.

Checked By:  
TEJK

Date:  
OCT. 1990

Drawing No.

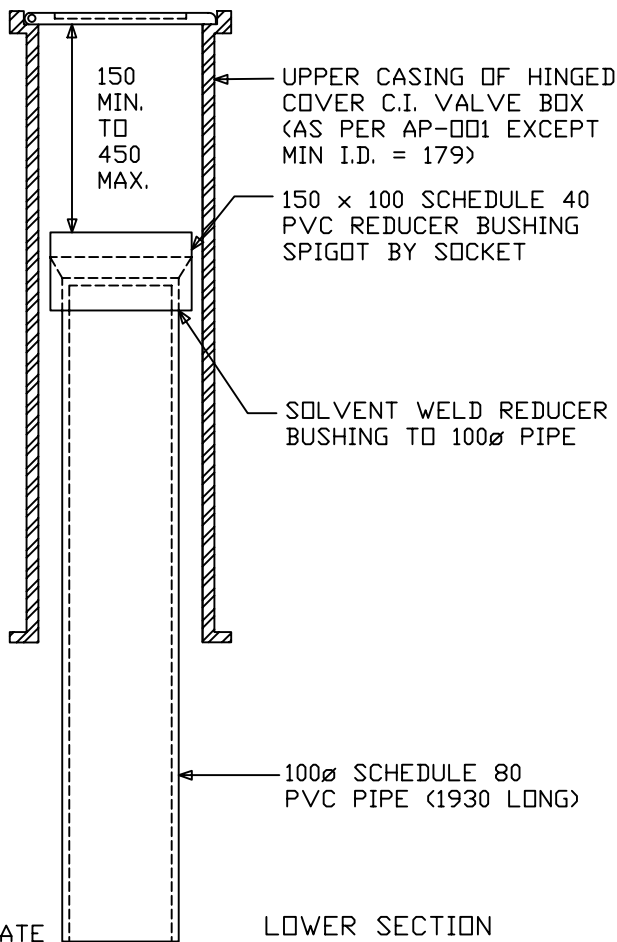
Approved:

AP-013

MINNEAPOLIS STYLE CURB STOP BOX  
FOR 20 MILLIMETER AND 25 MILLIMETER  
MINNEAPOLIS STYLE CURB STOPS



# UPPER AND INTERMEDIATE SECTIONS

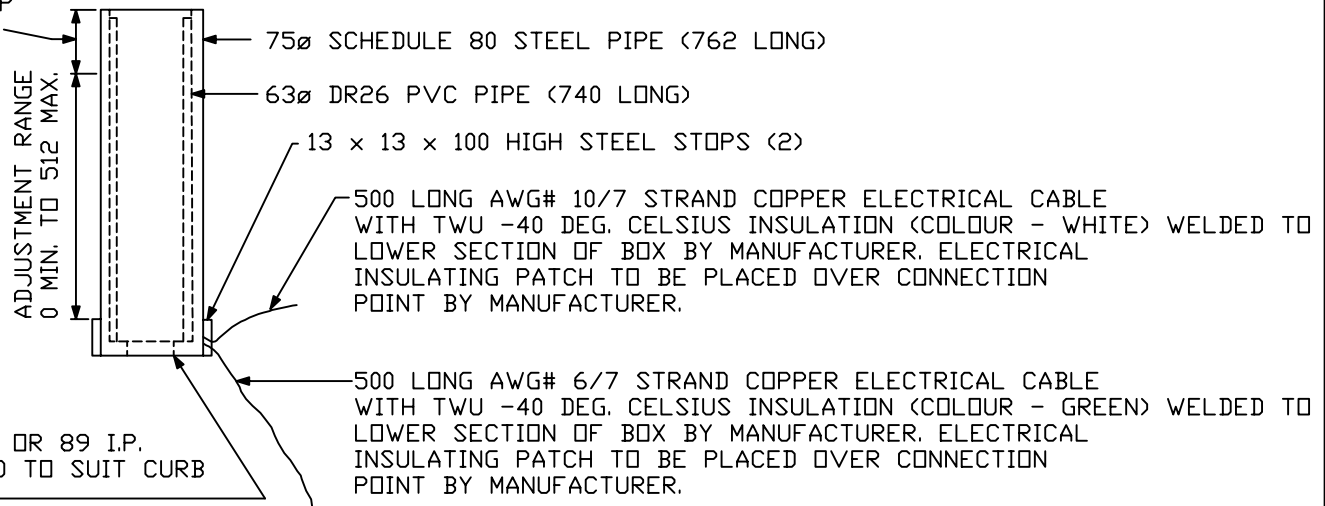


## NOTES

1. DIMENSIONS IN MILLIMETERS
2. STANDARD SERVICE BOX 2270-3082 ADDITIONAL ADJUSTMENT RANGE CAN BE OBTAINED BY MODIFYING LENGTH OF 100ø SCHEDULE 80 PVC PIPE
3. PVC SHALL CONFORM TO ASTM 1784-81 TYPE 1 GRADE 1
4. STEEL SHALL CONFORM TO ASTM A53-88/ A105-87/A108-87/A570-85. ALL WELDS SHALL BE CONTINUOUS WELDS AND SHALL CONFORM TO CSA STANDARD W59-1989
5. CAST IRON SHALL CONFORM TO ASTM A536 (65-45-12) OR A126-84 CLASS B
6. DUCTILE IRON OR GRAY CAST IRON MAY BE SUBSTITUTED FOR STEEL COMPONENTS
7. ELECTRICAL CABLE SHALL CONFORM TO CSA C22.2 No. 75-M1983

INTERMEDIATE SECTION OVERLAP 150 MIN.

## LOWER SECTION



REDRAWN IN AUTOCAD 03-01

**The City Of Winnipeg**  
Water & Waste Department

Products Spec. Reference - AT-4.1.2.41

Construction Spec. Reference - CW2110

Designed By:  
TEJK

Drawn By:  
EN

Scale:

N.T.S.

Checked By:  
TEJK

Date:  
OCT. 1990

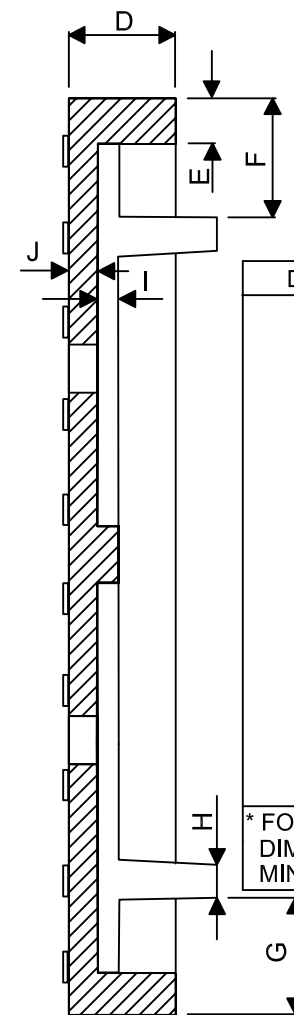
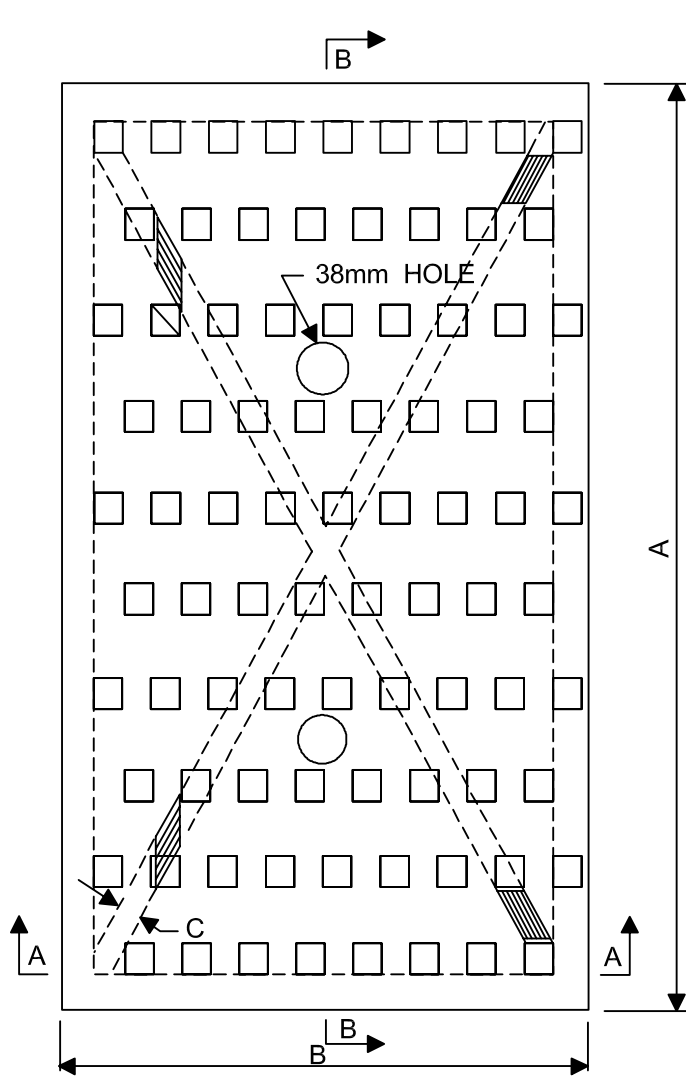
Drawing No.

Approved:

AP-014

MINNEAPOLIS STYLE CURB STOP BOX  
FOR 38 MILLIMETER AND 50 MILLIMETER  
MINNEAPOLIS STYLE CURB STOPS

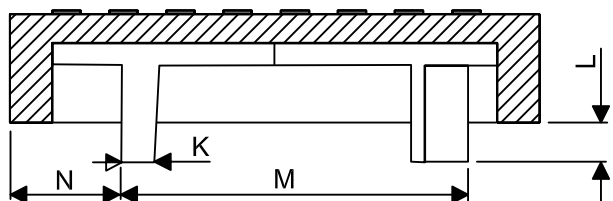




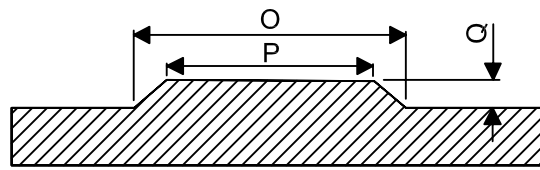
DIM.	VALUE	TOLERANCE
A	760	±5
B	455	±4
C	20	MINIMUM
D	75	±3
E	30	MINIMUM
F	85	±2
G	85	±2
H	23	MINIMUM
I	*18	MINIMUM
J	12	MINIMUM
K	23	MINIMUM
L	25	±2
M	318	±3
N	85	±2
O	26	±3
P	20	±3
Q	3	±2

\* FOR COVERS MADE OF GRAY IRON  
DIMENSION I SHALL BE 60mm  
MINIMUM

SECTION B-B



SECTION A-A



CHECKER DETAIL

NOTES:

- 1.) COVERS SHALL CONFORM TO THE CITY OF WINNIPEG PRODUCT STANDARD No. AT-4.2.1.85
- 2.) REFERENCE CITY OF WINNIPEG STANDARD CONSTRUCTION SPECIFICATIONS STANDARD DRAWING Nos. SD-221 AND SD-222
- 3.) DIMENSIONS ARE IN MILLIMETERS

**The City Of Winnipeg**  
Water & Waste Department

Products Spec. Reference - AT-4.2.1.85  
Construction Spec. Reference - CW 3210

CURB INLET BOX COVER

Designed By:  
TEJK

Checked By:  
TEJK

Approved:

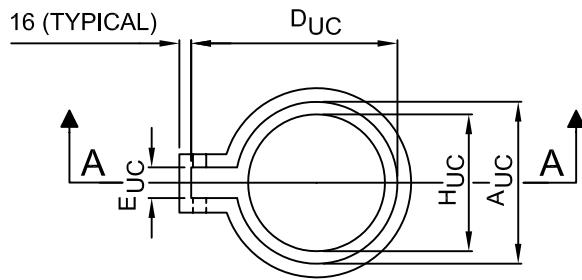
Drawn By:  
EN

Date: 05-01-12  
Revision: 1

Scale:  
N.T.S.

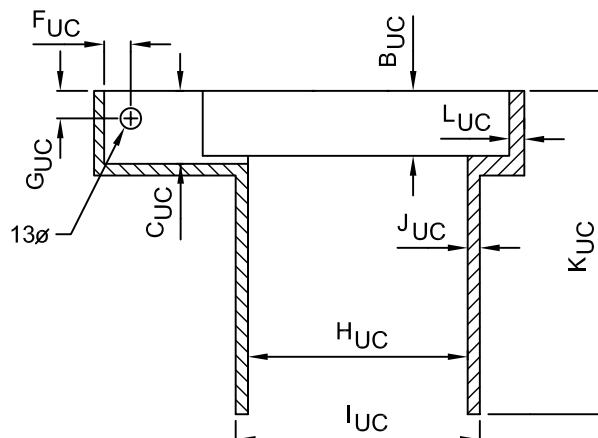
Drawing No.  
AP-015



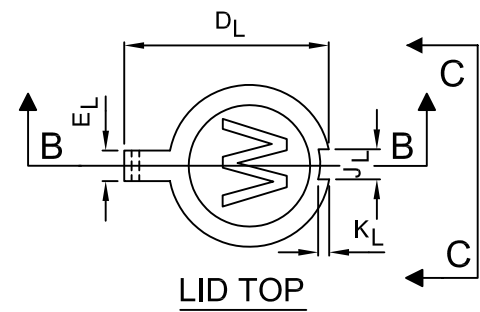


UPPER CASING

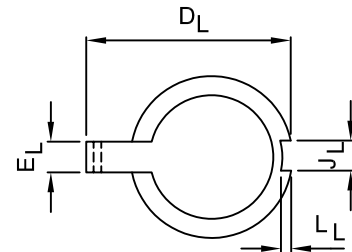
DIRECTION OF TRAFFIC



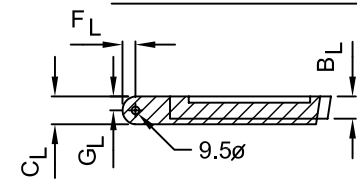
SECTION A - A



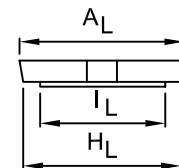
LID TOP



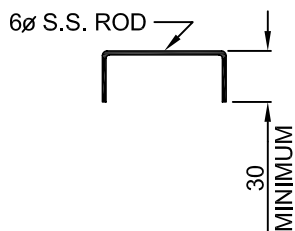
LID UNDERSIDE



SECTION B - B



SECTION C - C



HINGE PIN

UPPER CASING			LID		
DIMENSION	VALUE	TOLERANCE	DIMENSION	VALUE	TOLERANCE
AUC	200	±2	AL	195	±2
BUC	34	±1	BL	25	±2
CUC	44	±2	CL	32	±1
DUC	247	±2	DL	242	±2
EUC	38	±2	EL	32	±2
FUC	13ø 16	±1	FL	9.5ø 13	±1
GUC	13ø 16	±1	GL	9.5ø 16	±1
HUC	120	MINIMUM	HL	192	MINIMUM
IUC	146	MAXIMUM	IL	150	MINIMUM
JUC	6	MINIMUM	JL	38	±3
KUC	300	MINIMUM	KL	13	±3
LUC	16	MINIMUM	LL	19	MINIMUM

**The City Of Winnipeg**

Water & Waste Department

Products Spec Reference - AT-4.1.1.82  
Construction Spec Reference - CW2110

HINGED COVER  
VALVE BOX EXTENSION

Designed By:  
TEJK

Checked By:  
TEJK

Approved:

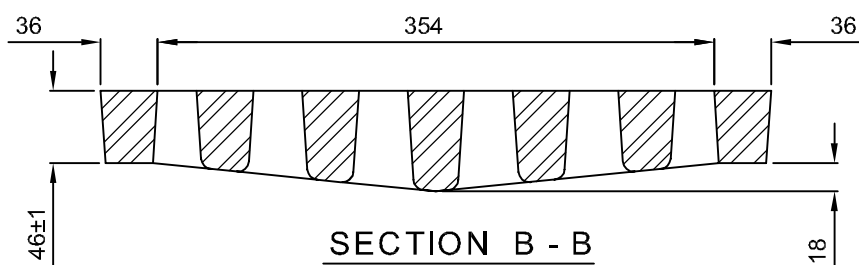
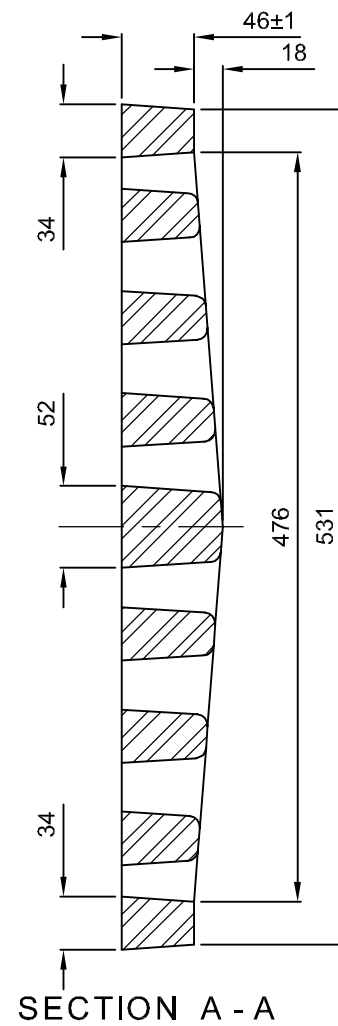
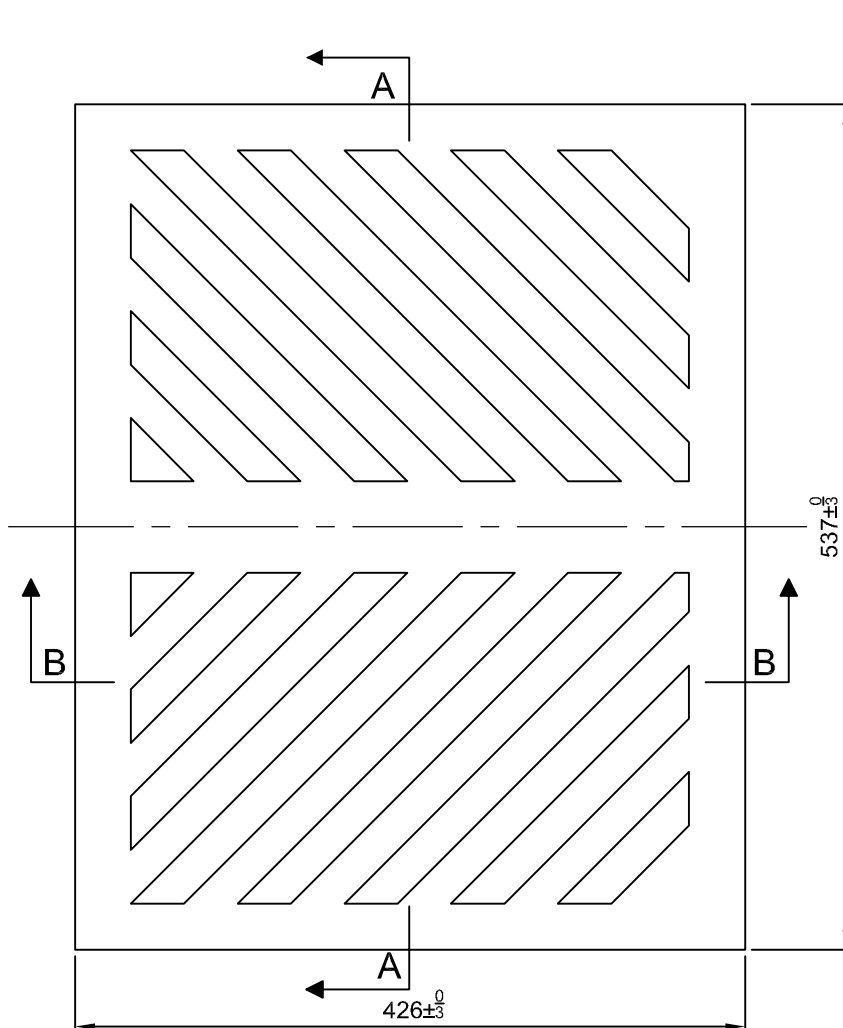
Drawn By:  
EN

Date:  
MARCH 1993

Scale:  
N.T.S.

Drawing No.  
AP-016





**NOTES:**

- 1) ALL DIMENSIONS IN MILLIMETERS
- 2) UNLESS OTHERWISE SPECIFIED DIMENSIONS SHALL HAVE A TOLERANCE OF  $\pm 2\text{mm}$  AND AN ADDITIONAL  $\pm 5\text{mm}$  PER METER OF DIMENSION

**The City Of Winnipeg**

**Water & Waste Department**

Products Spec Reference - AT-4.2.1.83B  
Construction Spec Reference - CW2130  
CW3205  
CW3210

BARRIER CURB AND  
GUTTER INLET 38 mm  
RISER COVER

Designed By:  
BAW

Checked By:  
BAW

Approved:  
GPK

Drawn By:  
PB

Drawing Date:  
2006/12/15

Revision:  
Date:

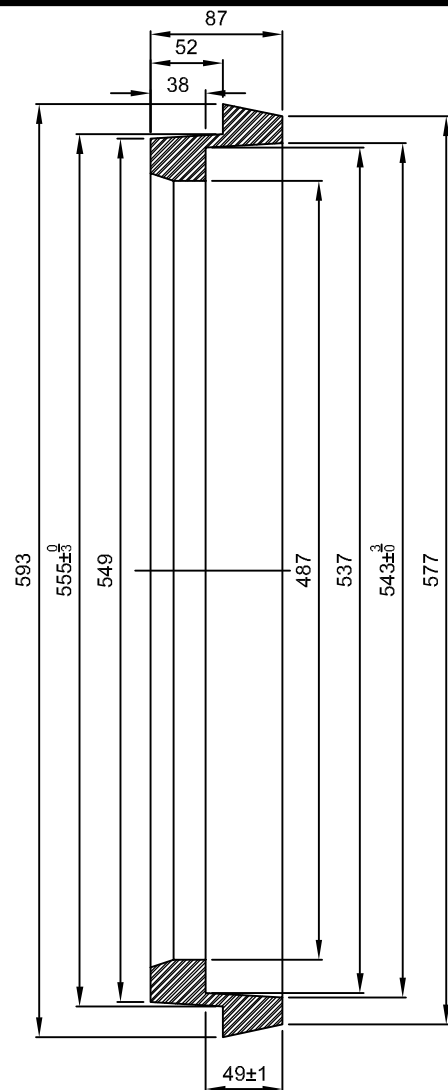
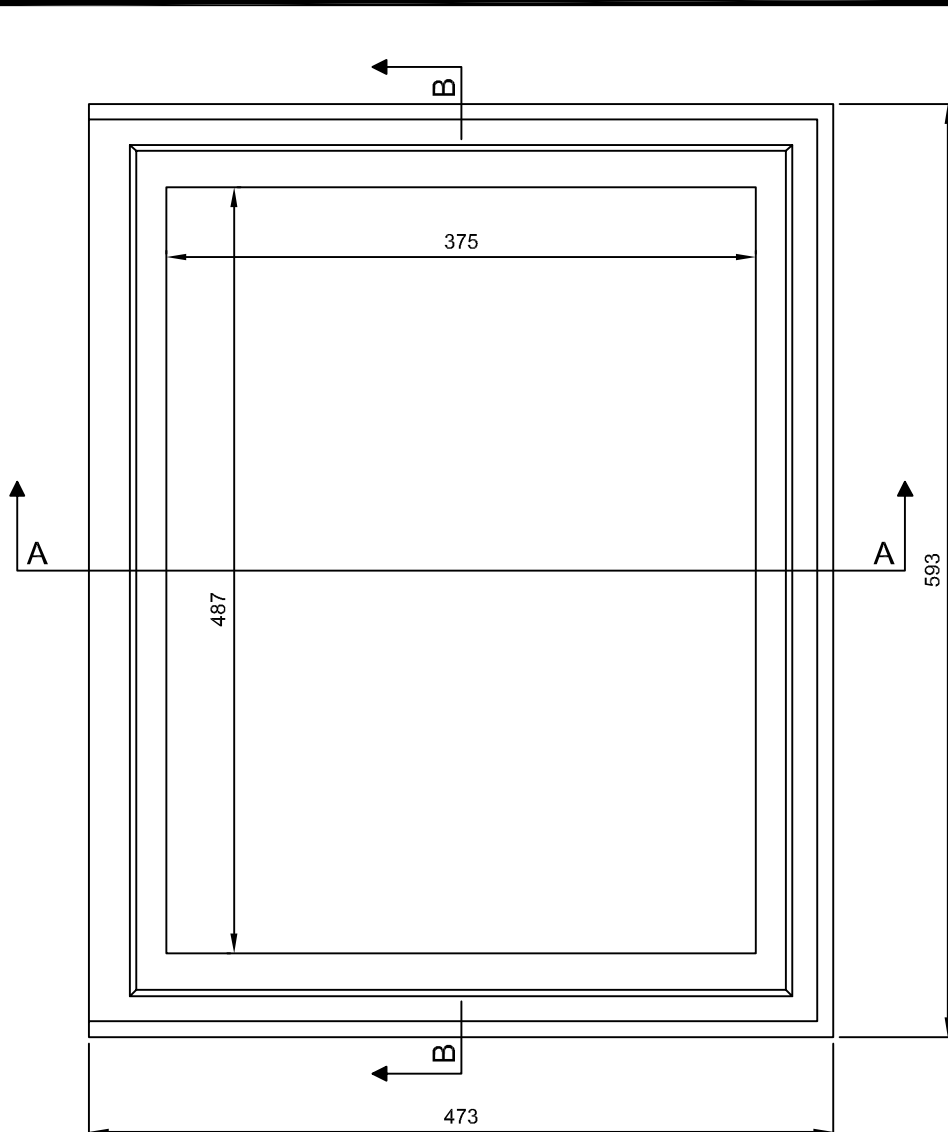
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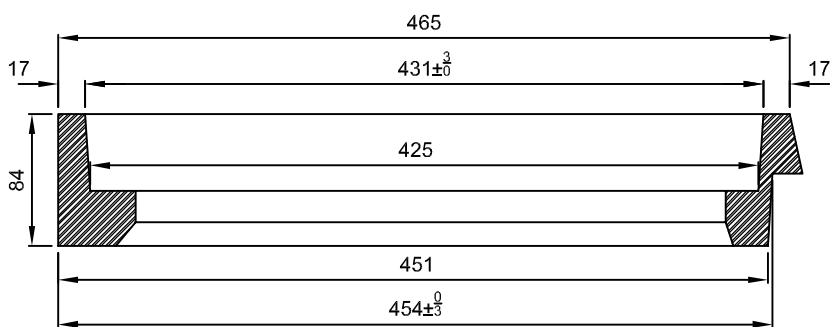
Drawing No.

AP-017





SECTION B - B



SECTION A - A

- NOTES:
- 1) ALL DIMENSIONS IN MILLIMETERS
  - 2) UNLESS OTHERWISE SPECIFIED DIMENSIONS SHALL HAVE A TOLERANCE OF  $\pm 2$ mm AND AN ADDITIONAL  $\pm 5$ mm PER METER OF DIMENSION

**The City Of Winnipeg**

**Water & Waste Department**

Products Spec Reference - AT-4.2.1.83B  
Construction Spec Reference - CW 2130  
CW 3210  
CW 3205

BARRIER CURB AND  
GUTTER INLET 38 mm  
RISER

Designed By:  
BAW

Checked By:  
BAW

Approved:  
GKP

Drawn By:  
PB

Drawing Date:  
2006/12/15

Revision:  
Date:

Scale:

N.T.S.

Drawing No.

AP-018





# **PRODUCT SPECIFICATIONS**

Winnipeg



**THE CITY OF WINNIPEG**  
**STANDARD FOR POLYVINYL CHLORIDE (PVC) WATERMAIN**  
**PIPING IN NOMINAL DIAMETERS 6 IN. THROUGH 12 IN.**  
**STANDARD NO. [AT-4.1.1.10](#)**

1990 05 09



## **1. SCOPE**

This standard shall apply to polyvinyl chloride (PVC) watermain piping in diameters 6" through 12" approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to PVC watermain piping purchased by the City.

## **2. PVC WATERMAIN PIPING**

### **2.1 General**

All materials shall conform to the requirements of AWWA C900-89 and the requirements of this standard for cast iron (CI) pipe size PVC watermain.

### **2.2 Dimension Ratio**

The dimension ratio (DR) of the pipe shall be 18.

### **2.3 Standard Lengths**

Standard laying lengths in the City of Winnipeg are 20 feet and 10 feet, plus or minus 1 inch.

### **2.4 Basic Materials**

Basic materials shall be in accordance with Section 2.1 of AWWA C900-89.

### **2.5 Pipe Requirements**

Pipe shall conform to the requirements of Section 2.2 of AWWA Standard C900-89. In addition to the standard laying length of 20 ft. plus or minus 1 in. noted in Section 2.2.4 of AWWA C900-89, the City also requires pipe having a standard laying length of 10 ft. plus or minus 1 in. (see Section 2.3 of this Standard).

### **2.6 Performance Requirements for Elastomeric Gasket Joints**

Bell-end pipe designed for making PVC joints using elastomeric gaskets shall conform to the requirements of Section 2.4 of AWWA C900-89.

### **2.7 Quality-Control Test Requirements**

#### **2.7.1** The manufacturer shall conduct all quality control testing as described in Sections 3.1.1, 3.1.2, 3.1.3, 3.1.4.1, 3.1.5, 3.1.6 and 3.1.7 of AWWA C900-89 for PVC pipe.



**2.7.2** Quality-control records shall be maintained for a period not less than two (2) years as described in Section 3.2 of AWWA C900-89.

**2.7.3** Hydrostatic proof testing shall be conducted on all pipes in accordance with Section 3.3.1 of AWWA C900-89.

**2.7.4** Any other quality control requirements of certification agencies denoted in Section 2.8.2 of this standard.

## **2.8 Marking Requirements**

**2.8.1** Required marking shall be provided in accordance with Sections 2.6.1 and 2.6.2 (including 2.6.2g) of AWWA C900-89.

**2.8.2** Additionally, the pipe shall bear certification seals or markings of the following agencies:

- i) NSF (National Sanitation Foundation) to Standard 14 for Plastics Piping System Components and related materials.
- ii) CSA (Canadian Standards Association) to Standard CAN3-B137.3-M86. Refer to Section 6.1 of CAN3-B137.3-M86 for marking requirements.
- iii) FM (Factory Mutual Research) to Approval Standard for Plastic Pipe and Fittings for Underground Fire Protection Service – Class No. 1610-June 1978. Refer to Section 3.1 of aforementioned standard for required markings.
- iv) UL (Underwriters' Laboratories) or ULC (Underwriters' Laboratories of Canada) for Polyvinyl Chloride Pipe and Fittings for Underground Fire Service Systems.

## **2.9 Packaging and Handling**

Pipe shall be packaged and handled to prevent damage due to crushing or piercing.

Pipe shall be installed within thirty (30) months of the date of manufacture.

The bell end of each pipe, which is furnished with an integral gasket, shall be protected with an approved opaque covering.

## **2.10 Installation Instructions**

The manufacturer shall furnish clear concise installation instructions.



## **2.11 Affidavit of Compliance**

The manufacturer shall provide an overall affidavit signed by an officer of the company that piping furnished for use in the City of Winnipeg complies with the requirements of this standard.

TEJK/lw



**THE CITY OF WINNIPEG**  
**STANDARD FOR POLYVINYL CHLORIDE (PVC) WATERMAIN**  
**PIPING IN NOMINAL DIAMETERS 14 IN. THROUGH 20 IN.**  
**STANDARD NO. [AT-4.1.1.11](#)**

1990 03 19



## **1. SCOPE**

This standard shall apply to polyvinyl chloride (PVC) watermain piping in diameters 14” through 20” approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to PVC watermain piping purchased by the City.

## **2. PVC WATERMAIN PIPING**

### **2.1 General**

All materials shall conform to the requirements of AWWA C905-88 and the requirements of this standard for cast iron (CI) pipe size PVC watermains.

### **2.2 Dimension Ratio**

The dimension ratio (DR) of the pipe shall be 18.

### **2.3 Standard Lengths**

Standard laying lengths in the City of Winnipeg are 20 feet and 10 feet, plus or minus 1 inch.

### **2.4 Marking Requirements**

1. Required marking as per sections 4.7.1 and 4.7.2 of AWWA C905-88 shall be provided.
2. In addition to the above the pipe shall bear certification seals or markings of the following agencies:
  - i) NSF (National Sanitation Foundation) to Standard 14 for Plastics Piping System Components and related materials.
  - ii) CSA (Canadian Standards Association) to Standard CAN3-B137.3-M86. Refer to Section 6.1 of CAN3-B137.3-M86 for marking requirements.
  - iii) FM (Factory Mutual Research) to Approval Standard for Plastic Pipe and Fittings for Underground Fire Protection Service – Class No. 1610-June 1978. Refer to Section 3.1 of aforementioned standard for required markings.



- iv) UL (Underwriters' Laboratories) or ULC (Underwriters' Laboratories of Canada) for Polyvinyl Chloride Pipe and Fittings for Underground Fire Service Systems.

## **2.5 Packaging and Handling**

Pipe shall be packaged and handled to prevent damage due to crushing or piercing.

Pipe shall be installed within thirty (30) months of the date of manufacture.

The bell end of each pipe, which is furnished with an integral gasket, shall be protected with an approved opaque covering.

## **2.6 Installation Instructions**

The manufacturer shall furnish clear concise installation instructions.

## **2.7 Affidavit of Compliance**

The manufacturer shall provide an overall affidavit signed by an officer of the company that piping furnished for use in the City of Winnipeg complies with the requirements of this standard.



**THE CITY OF WINNIPEG**

**STANDARD FOR GRAY AND DUCTILE IRON PIPE FITTINGS  
FOR USE WITH PVC WATERMAIN PIPING IN NOMINAL  
DIAMETERS 150MM (6") TO 500MM (20")**

**STANDARD NO. [AT-4.1.1.60](#)**

January 8, 2004



# **STANDARD FOR GRAY AND DUCTILE IRON PIPE FITTINGS FOR USE WITH PVC WATERMAIN PIPING IN NOMINAL DIAMETERS 150MM (6") TO 500MM (20")**

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## **1. SCOPE**

This standard shall apply to all main line gray and ductile iron fittings for use with PVC watermain piping in nominal diameters 150mm (6") to 500mm (20") approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements and or supplemental technical requirements to apply to gray and ductile iron fittings purchased by the City.

## **2. MAIN LINE GRAY OR DUCTILE IRON FITTINGS**

### **2.1 General**

Main line iron fittings provide either a division of flow (tees and crosses), an axial change in direction (bends), a reduction in pipe size (reducers), or a stoppage of flow (plugs and caps). Main line iron fittings approved for use in the City of Winnipeg shall conform to AWWA C110 and the requirements of this standard.

### **2.2 Material Requirements**

#### **2.2.1 Fitting Body**

Material for ductile iron fittings shall conform to ASTM A536, grade 70-50 - 05 as a minimum. Material for gray iron fittings shall conform to ASTM A48 class 30B as a minimum and ASTM A48 class 35B where specified in AWWA C110.

#### **2.2.2 Elastomeric Gaskets**

Elastomeric gasket material and material properties testing shall conform to the requirements of AWWA C111. The manufacturer shall provide complete descriptions of the material offered in accordance with the ASTM D2000 designation system.



## **2.3 Design Requirements**

### **2.3.1 Dimensions**

Gray and ductile iron fittings shall conform to the dimensional requirements of AWWA C110 for nominal sizes 150mm (6") to 500mm (20"). The dimensions cited shall have a tolerance conforming to AWWA C110.

### **2.3.2 Gasketed Push-On Joints**

Gray and ductile iron pipefittings shall incorporate gasketed push-on joints as defined in AWWA C111. The push-on joint dimensions shall conform to AWWA C111, and shall accommodate AWWA C900 or AWWA C905 CIOD PVC water pipe for all combinations of joint and gasket tolerances.

Gasketed push-on joints for gray or ductile iron fittings shall conform to the performance requirements of AWWA C111.

### **2.3.3 Lugs for Restraining Devices**

Each push-on joint shall have lugs molded on the outside of the bell, suitable for the installation of a joint restraint device. Joints shall have the number of lugs indicated in the chart below and be cast on the bell in accordance with Drawing No. FIT-1

<b>Nominal Size</b>	<b>Number of Lugs</b>
150 mm (6")	2
200 mm (8")	2
250 mm (10")	2
300 mm (12")	2
350 mm (14")	6
400 mm (16")	6
450 mm (18")	8
500 mm (20")	8

### **2.3.4 Pressure Rating**

Ductile iron fittings shall be rated for 350 psi (2413 kPa) working pressure.

Gray iron fittings shall be rated for 250 psi (1725 kPa) working pressure for 150mm (6") through 300mm (12") sizes.



Gray iron fittings shall be rated for 150 psi (1035 kPa) working pressure for 350mm (14") through 500mm (20") sizes.

### **2.3.5 Coatings and Linings**

The interior and exterior of each fitting shall receive a fusion-bonded epoxy coating meeting or exceeding the requirements of AWWA C116 or an equal approved by The City of Winnipeg.

Minimum dry film thickness for the fusion-bonded epoxy shall be determined by the method described in AWWA C116.

The coating shall conform to the requirements of ANSI/NSF Standard 61 entitled "Drinking Water System Components - Health Effects" as certified by NSF International, Underwriters Laboratories Inc., Underwriters' Laboratories of Canada, or other third party certification acceptable to the City of Winnipeg.

## **2.4 Marking Requirements**

Each gray and ductile iron pipe fitting shall bear markings in accordance with AWWA C110.

Each gasket shall bear markings in accordance with AWWA C111.

## **2.5 Workmanship**

### **2.5.1 Fitting Body**

Gray and ductile iron pipe fittings shall be homogenous throughout, and be free from any visible cracks, voids, inclusions, blisters, or other imperfections that may impair serviceability.

The joint surfaces shall be free of any injurious defects that may cause leakage. The fittings shall be as uniform as commercially practical in all physical properties.

### **2.5.2 Elastomeric Gaskets**

All gaskets shall be homogenous and free from porosity, blisters, pitting or other imperfections that may affect serviceability, in any cross section.



## **2.6 Packaging and Handling**

Gray or ductile iron pipe fittings shall be packaged so as to prevent damage during shipping and handling.

Gaskets for gray or ductile iron pipe fittings shall be packaged separately in opaque containers and stored indoors.

## **2.7 Quality Assurance**

### **2.7.1 Quality Assurance in Production**

Manufacturers of gray or ductile iron pipe fittings for the City of Winnipeg must maintain a quality control program that meets or exceeds the most current issue of ISO 9001 or CSA Standard CAN3-Z299.3. Consequently, a quality control manual shall be submitted to the City of Winnipeg for review prior to issue of product approval as referred to in section 3. In addition to the requirements of CSA Standard CAN3-Z299.3, the manual shall include a "Corrective Action" policy section for cases of non-conformance (Corrective Action shall be addressed in ISO 9001). Corrective action shall include:

- (i) A review and analysis of detected non-conformance and a subsequent corrective action to prevent reoccurrence;
- (ii) Initiate a corrective action when notified by the customer (City of Winnipeg) of the potential or actual non-conformance;
- (iii) Prompt implementation of corrective actions that they are effective, and follow up to ensure continued effectiveness;
- (iv) A regular report to appropriate levels of management to the causes of non-conformance and corrective action taken.

### **2.7.2 Affidavit of Compliance**

The manufacturer shall provide an overall affidavit of compliance, signed by a signing officer of the company, stating that all gray and ductile iron pipe fittings and gaskets comply with the requirements of the City of Winnipeg Standard No. AT-4.1.1.60 dated January 8, 2004.

## **3. CITY OF WINNIPEG APPROVAL**

The manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing gray or ductile iron pipe fittings for use in the City of Winnipeg. Where a party other than the foundry owns the patterns, the party owning the pattern **and** the foundry



shall jointly apply for written approval from the City of Winnipeg prior to furnishing gray and ductile iron pipe fittings for use in the City of Winnipeg.

#### **4. REFERENCES**

ASTM A48

*Standard Specifications for Gray Iron Castings*

ASTM A536

*Standard Specification for Ductile Iron Castings*

AWWA C110

*Ductile Iron and Gray Iron Fittings, 3 In. Through 48 In. (75mm Through 1200mm) For Water and Other Liquids*

AWWA C111

*Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings*

AWWA C116

*Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service*

AWWA C900

*Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100mm Through 300mm), for Water Distribution*

AWWA C905

*Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 in. Through 48 in. (350mm Through 1200mm) for Water Transmission and Distribution.*

ASTM D2000

*Standard Classification System for Rubber Products in Automotive Applications*

CSA Z299.3

*Quality Assurance Program – Category 3*

ISO 9001

*Quality Management Systems Requirements*

NSF Standard Number 61

*Drinking Water System Components – Health Effects*



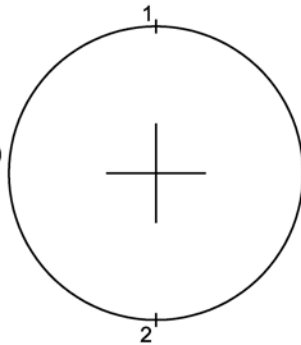
*The City of Winnipeg Standard for Polyvinyl Chloride (PVC) Watermain Piping in Nominal Diameter 6" Through 12", Standard No. AT-4.1.1.10 (1990 05 09)*

*The City of Winnipeg Standard for Polyvinyl Chloride (PVC) Watermain Piping in Nominal Diameter 14" Through 20", Standard No. AT-4.1.1.11 (1990 03 19)*

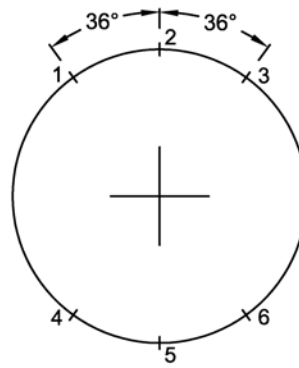
Geoffrey Patton, P.Eng.  
Water Distribution Planning Engineer



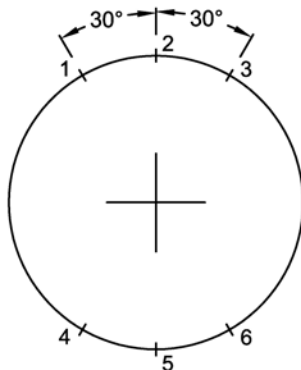
150mm (6"), 200mm (8"),  
250mm (10") & 300mm (12")  
FITTINGS  
2 LUGS



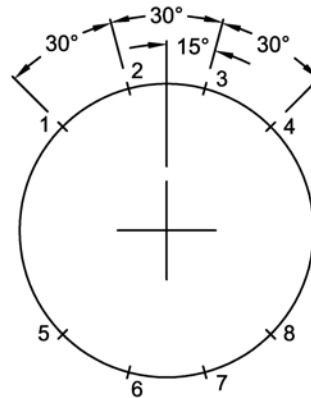
350mm (14") FITTINGS  
6 LUGS



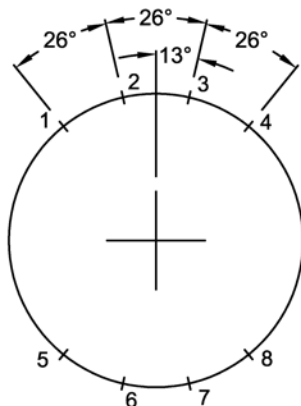
400mm (16") FITTINGS  
6 LUGS



450mm (18") FITTINGS  
8 LUGS



500mm (20") FITTINGS  
8 LUGS



NOTE: LUGS ARE TO BE ALONG THE HORIZONTAL PLANE WHEN THE FITTING IS IN SERVICE

NOTE: ALL ANGULAR DIMENSIONS ARE TO THE CENTER LINE OF THE LUGS

# The City Of Winnipeg

## Water & Waste Department

NUMBER OF LUGS  
REQUIRED FOR CI & DI  
WATERMAIN FITTINGS

Designed By:

Drawn By:

DB

Scale:

N.T.S.

Checked By:

Date:

December 2003

Drawing No.

Approved:

FIT-1



**The City of Winnipeg**

**Standard for  
Injection Moulded Polyvinyl Chloride (PVC)  
Tees, Bends, Plugs, and Reducers for use  
with DR18 PVC Watermain Piping  
in Nominal Diameters 150mm (6") and Larger.**

**Standard No. [AT-4.1.1.61](#)**



## **1. SCOPE**

This standard shall apply to all injection moulded polyvinyl chloride (PVC) tees, bends, plugs, and reducers for use with DR18 PVC watermain piping in 150mm (6") and larger nominal diameters approved for use in the City of Winnipeg. (As City policy, injection moulded PVC watermain fittings shall be used by the City in preference to cast iron fittings when they are available.)

This specification shall apply to technical requirements only. The City may impose contractual requirements and/or supplemental technical requirements to apply to PVC fittings purchased by the City.

## **2. REQUIREMENTS**

### **2.1 General**

This standard shall apply to polyvinyl chloride (PVC) fittings for DR18 PVC watermain piping in diameters 150mm (6") and larger and shall conform to the requirements of AWWA C907 and the requirements of this specification.

All materials shall conform to the requirements of AWWA C907 and CSA B137.2.

All PVC fittings for watermain pipe shall be blue in colour.

## **3. MATERIAL**

All material used in the manufacture of PVC fittings shall conform to the requirements of AWWA C907 and NSF/ANSI 61.

### **3.1 PVC**

Basic fitting materials shall be made from virgin resin and meets the physical and chemical properties as defined in ASTM D1784 in accordance with AWWA C907.

Clean reworked PVC materials may be used provided the materials are from the same manufacturer and comply with the requirements of ASTM D1784 in accordance with AWWA C907.



### **3.2 Gaskets and Lubricants**

All gaskets and lubricants intended for use with PVC fittings shall be made from approved materials in accordance to AWWA C907 and shall not adversely affect water quality.

Material for elastomeric gaskets shall conform to the requirements of AWWA C907, ASTM F477 and CSA B137.2. The manufacturer shall provide complete descriptions of the material offered in accordance with the ASTM D2000 designation system.

All Gaskets shall be factory installed in the bell ends of the fittings in accordance to AWWA C907.

All PVC water fittings must be assembled with a non-toxic, water soluble lubricant approved by the National Sanitation Foundation (NSF).

## **4. DESIGN**

PVC fittings and elastomeric gaskets shall conform to the dimensional requirements of AWWA C907 (for the tee, the 22.5°, the 45°, and the 90° bends only.)

### **4.1 Elastomeric Gasket**

All PVC fittings supplied for use within the City of Winnipeg shall be supplied with factory installed elastomeric gaskets and shall meet the requirements of ASTM F477 as specified in AWWA C907.

### **4.2 Performance Requirements for Elastomeric Gasket Joints**

Bell-end fittings designed for making PVC joints using elastomeric gaskets shall meet the performance requirements specified in ASTM D3139 in accordance with the requirements of AWWA C907.

## **5. MARKING**

### **5.1 Fittings Markings**

All PVC fittings supplied for use within the City of Winnipeg shall bear markings in accordance with AWWA C907. All PVC fittings shall be marked with the following identifications:



- nominal size including branch sizes
- deflection angle of bends
- DR18
- Manufacturers' name or trademark
- Manufacturer's production code shall include the day, month, year, shift, plant and extruder of manufacturer.
- AWWA C907
- CSA standard number
- Certification agency trademark/seal

In addition to the above, each PVC tee and bend shall bear the certification seals or markings of the following certification agencies:

1. NSF International (National Sanitation Foundation) - NSF/ANSI 61 – Drinking Water System Components - Health Effects;
2. CSA (Canadian Standards Association) – CSA B137.2 - PVC Injection-Moulded Gasketed Fittings for Pressure Applications;
3. UL (Underwriters' Laboratories) or ULC (Underwriters' Laboratories of Canada) - UL 1285 – Pipe and Couplings, Polyvinyl Chloride (PVC) for Underground Fire Service Systems.

Required marking for PVC fittings supplied to the City of Winnipeg shall be applied so as not to adversely affect the quality of the fitting in accordance with AWWA C907.

## **5.2 Gasket Markings**

Gaskets shall be marked with at least the following

- date code
- manufacturer name
- nominal diameter

## **6. WORKMANSHIP AND FINISH**

PVC tees and bends shall be homogeneous throughout and shall be free from visible cracks, voids, inclusions and other injurious defects. The sealing surfaces of integral bell sockets shall be free of nicks, scratches, and other imperfections that may cause joint leakage. The plane face of the bell shall be at right angles to the centre-line of the flow. The fittings shall be as uniform as commercially practical in colour, density, opacity, and other physical properties. Rework material may be used, providing the fittings produced meet the requirements of this standard.



## **6.1 Quality-Control Tests**

The manufacturer shall conduct all quality-control testing as described in AWWA C907. In addition, the manufacturer shall conduct quality-control testing as required by the third-party certification agents denoted below, including, but not limited to the following:

1. NSF/ANSI 61, Drinking Water System Components – Health Effects
2. CSA B137, Thermoplastic Pressure Piping Compendium
3. UL 1285, Pipe and Couplings, Polyvinyl Chloride (PVC) for Underground Fire Service Systems.

## **6.2 Quality-Control Records**

Quality-control records shall be maintained in accordance with AWWA C907, and the requirements of the third-party certification agents denoted above.

## **6.3 Performance Requirements for Elastomeric Gasketed Joints**

Joints for PVC fittings shall incorporate elastomeric gaskets, and shall conform to the requirements of AWWA C907.

## **7. PACKAGING**

PVC fittings shall be packaged and handled so as to prevent damage due to crushing and/or piercing. Each bell end of each PVC fitting shall be furnished with an integral gasket. The manufacturer and any distributors shall store PVC fittings in sealed containers while outdoors or inside an approved storage facility. PVC fittings shall be installed within forty-two (42) months of the date of manufacture.

## **8. INSTALLATION INSTRUCTIONS**

Clear, concise installation instructions shall be furnished by the manufacturer. In particular, the manufacturer shall furnish recommended procedures for cast in place concrete thrust blocking and joint restraining devices, if permitted.



## **9. QUALITY ASSURANCE**

A copy of the listing agreements between the manufacturer and each of the third party certification agencies shall be submitted to the City together with the product approval application.

The manufacturer shall provide an overall affidavit of compliance, signed by a signing officer of the company, stating that PVC fittings for use with DR18 PVC watermain piping furnished for use in the City of Winnipeg comply with the requirements of the City of Winnipeg Standard No. AT-4.1.1.61

Distributors of PVC fittings shall provide a joint affidavit of compliance to both the manufacturer and the City of Winnipeg, signed by a signing officer of the company, stating that all PVC fittings intended for use with any DR18 PVC watermain piping shall be stored in accordance with this standard. It is noted that this requirement applies to all PVC fittings, not only to those intended for use in the City of Winnipeg. The manufacturer shall be responsible for ensuring that their product is stored in accordance with this standard as a condition of their approval.

## **10. CITY OF WINNIPEG**

Notwithstanding Section 9 of this standard, the manufacturer shall apply for and be in receipt of written approval from the City of Winnipeg prior to furnishing Polyvinyl Chloride (PVC) fittings for use with DR 18 PVC watermain piping for use in the City of Winnipeg. Where patterns are owned by a party other than the manufacturer, the party owning the pattern and the manufacturer shall jointly apply for written approval from the City of Winnipeg prior to furnishing Polyvinyl Chloride (PVC) fittings for use in the City of Winnipeg.

## **11. REFERENCES**

AWWA C907  
*Polyvinyl Chloride (PVC) Pressure Fittings for Water - 4 in. Through 8 in.  
(100mm Through 200mm)*

NSF/ANSI 61  
*Drinking Water System Components - Health Effects*

CSA B137 SERIES  
*Thermoplastic pressure piping compendium (B137.0 to B137.12)*

UL 1285  
*Pipe and Couplings, Polyvinyl Chloride (PVC) for Underground Fire Service*



## 10. CITY OF WINNIPEG

Notwithstanding Section 9 of this standard, the manufacturer shall apply for and be in receipt of written approval from the City of Winnipeg prior to furnishing Polyvinyl Chloride (PVC) fittings for use with DR 18 PVC watermain piping for use in the City of Winnipeg. Where patterns are owned by a party other than the manufacturer, the party owning the pattern and the manufacturer shall jointly apply for written approval from the City of Winnipeg prior to furnishing Polyvinyl Chloride (PVC) fittings for use in the City of Winnipeg.

## 11. REFERENCES

AWWA C907

*Polyvinyl Chloride (PVC) Pressure Fittings for Water - 4 in. Through 12 in. (100mm Through 300mm)*

ANSI/NSF Standard 61

*Drinking Water System Components - Health Effects for Fittings and Gaskets*

CSA CAN3-B137.0-M86

*Definitions, General Requirements, and Methods of Testing for Thermoplastic Pressure Piping*

CSA CAN3 B137.2-02

*PVC Sewer Pipe and Fittings (PSM Type)*

CSA CAN3 B137.3-M90

*Rigid Poly (Vinyl Chloride) (PVC) Pipe for Pressure Applications*

FM Class No. 1610 - June 1978

*Plastic Pipe and Fittings for Underground Fire Protection Service*

FM Class No. 1612 - April 1999

*Polyvinyl Chloride (PVC) Pipe and Fittings for Underground Fire Protection Service*

UL Standard 1285

*Pipe and Couplings, Polyvinyl Chloride (PVC) for Underground Fire Service*

ULC Subject C107B

*Test Requirements - Polyvinyl Chloride Pipe and Fittings for Underground Fire Service*



**THE CITY OF WINNIPEG**

**STANDARD FOR EPOXY COATED WIDE RANGE  
DUCTILE IRON COUPLINGS NOMINAL PIPE  
SIZE 4" (100mm) THROUGH 12" (300mm)**

**STANDARD NO. [AT-4.1.1.63](#)**

March 25, 2004



## **1. SCOPE**

This standard shall apply to epoxy coated wide range ductile iron pipe couplings approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to coupling purchased by the City.

## **2. DESIGN**

### **2.1 General**

Epoxy coated ductile pipe couplings approved for use in the City of Winnipeg shall conform to the requirements of AWWA C219 and this standard. The coupling shall generally be comprised of a ductile iron sleeve, two ductile iron end rings, two rubber wedge gaskets, a rubber-insulating boot, stainless steel bolts, and stainless steel nuts. Ductile iron components shall be epoxy coated unless otherwise noted or approved. Couplings shall be suitable to join various watermain pipes differing in material of manufacture with the same nominal pipe diameter.

### **2.2 Design Requirements**

The wide range coupling shall provide a range encompassing steel pipe size outside diameter (OD) through Class 200 asbestos cement pipe, rough barrel outside diameter (OD) for the same nominal pipe diameter.

Couplings shall hold pressure without visible leakage at a watermain test pressure of 150 pounds per square inch via compression of elastomeric gaskets.

Couplings shall accommodate up to four degrees (4°) of pipe misalignment, regardless of pipe material.

Couplings shall not require special equipment or tools for installation.

All end rings shall be designed to restrain bolt heads from turning during tightening of nuts.

### **2.3 Material Requirements**

#### **2.3.1 Sleeve and End Rings**

The sleeve and end rings shall be made of ductile iron conforming to the requirements of ASTM A536, grade 65-45-12, as a minimum.

#### **2.3.2 Gaskets and Insulating Boot**

Gaskets and insulating boots shall be made of moulded or vulcanized SBR rubber



conforming to the requirements of ANSI/AWWA C111/A21.11 as a minimum. The manufacturer shall provide complete descriptions of the material offered in accordance with the ASTM D2000 designation system.

### **2.3.3 Bolts and Nuts**

Bolts shall be made of alloy 304 stainless steel condition CW or SH conforming to the requirements of ASTM F593.

Bolts shall be 5/8" National Coarse Roll Thread (NC) track head.

Thread lubricant or anti-seize coating for threaded fasteners shall be a dry molybdenum disulfide based or polytetrafluoroethylene based compound.

Nuts shall be made of alloy 304 stainless steel condition CW or SH conforming to the requirements of ASTM F594.

### **2.3.4 Minimum sleeve length and bolt assemblies**

Nominal Size (mm)	Minimum Sleeve Length (mm)	Minimum Number of Bolts
100	175	4
150	175	4
200	175	4
250	200	6
300	200	6

### **2.3.5 Washers**

Stainless steel nuts shall be isolated from metallic contact with the end ring through the use of di-electric isolation washers. Washers shall be made from thermoset plastic and shall have both high resistance to dynamic and static wear and have very low creep characteristics. A stainless steel washer shall be used between the nut and plastic washer to protect the plastic washer from being damaged during tightening.

### **2.3.6 Epoxy Powder**

The epoxy powder for coating shall conform to the material requirements outlined in ANSI/AWWA C213.

## **2.4 Coatings**

The sleeve and end rings shall be epoxy coated in the manner outlined and to the requirements of ANSI/AWWA C213.

All exposed ductile iron parts shall be free of burrs and sharp edges prior to application of epoxy coating.



## **2.5 Marking Requirement**

### **2.5.1 Sleeve and End Rings**

The sleeve shall be marked on the outside wall discernable after installation according to AWWA C219 including the following requirements:

- Manufacturer's name and model number or type
- Coupling nominal size
- Pipe outside diameter range

Each end ring shall be marked on the outside face perpendicular to the pipe after installation. Each end ring shall be marked so as to provide at least the following information:

- Manufacturer's name
- O.D. range

Allowable methods of marking the previously mentioned components are as follows:

- cast or moulded raised or indented symbols
- low stress stamped symbols
- stencilling ink, paint or dye provided that said marking compound is water-resistant and free of corrosive agents.
- water-resistant, non-biodegradable and non-corrosive sticker

### **2.5.2 Gaskets**

Gaskets shall be marked according to the requirements of ANSI/AWWA C111/A21.11.

### **2.5.3 Bolts**

Bolts shall be marked according to the requirements of ASTM F593.

## **2.6 Packaging**

Each coupling assembly shall be individually packed in a corrugated cardboard container. Components shall be packaged such that coatings are not damaged. Corrugated cardboard containers shall be enclosed on all sides and shall be designed and constructed to allow unsupported stacking to a height of 1.5 metres.

Each container shall be clearly marked to provide at least the following information:

- Manufacturer's name
- Nominal size
- O.D. range
- Manufacturer's product code number.



## **2.7 Affidavit of Compliance**

A signing officer of the manufacturing company shall furnish an affidavit of compliance stating that epoxy coated wide range cast iron couplings furnished for use in the City of Winnipeg shall comply with the requirements of the City of Winnipeg Standard No. AT-4.1.1.63 dated March 25, 2004.

## **3. CITY OF WINNIPEG**

The manufacturer shall apply for and be in receipt of, written approval from the City of Winnipeg prior to furnishing epoxy coated wide range cast iron pipe couplings for use in the City of Winnipeg.

## **4. REFERENCES**

ASTM A536  
*Standard Specification for Ductile Iron Castings*

ASTM D2000  
*Standard Classification System for Rubber Products in Automotive Applications*

ASTM F593  
*Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs*

ASTM F594  
*Standard Specification for Stainless Steel Nuts*

AWWA C111  
*Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings*

AWWA C213  
*Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines*

AWWA C219  
*Bolted, Sleeve-Type Couplings for Plain-End Pipe*

Geoffrey Patton, P.Eng.  
March 25, 2004



**The City of Winnipeg**

**Standard for  
Fabricated PVC Fittings  
in Nominal Diameters  
150mm (6") TO 300mm (12")  
for use with  
PVC Watermain Pipe**

**Standard No. [AT-4.1.1.64](#)**



## **1 SCOPE**

This standard shall apply to all fabricated polyvinyl chloride (PVC) fittings for use with DR18 PVC watermain piping in 150mm (6") to 300mm (12") diameters approved for use in the City of Winnipeg.

Fabricated PVC fittings shall only be used in the absence or unavailability of an approved injection molded PVC fitting, see City of Winnipeg Specification AT 4.1.1.61.

This specification shall apply to technical requirements only. The City of Winnipeg may impose contractual requirements and/or supplemental technical requirements to apply to fabricated PVC fittings purchased by the City of Winnipeg.

## **2. REQUIREMENTS**

### **2.1 General**

Fabricated PVC fittings for use with DR18 watermain piping shall conform to the requirements of AWWA C900, CSA B137.3, and this specification.

Fabricated PVC fittings shall have a dimension ratio of 18 (DR18) with cast iron pipe equivalent outside diameters (CIOD).

Bends will only be approved in standard deflection angles (11.25 , 22.5 , 45 , and 90 ).

## **3. MATERIAL**

### **3.1 PVC**

Basic pipe materials shall be made from virgin resin and meets the physical and chemical properties as defined in ASTM D1784 in accordance with AWWA C900.

Clean reworked PVC materials may be used provided the materials are from the same manufacturer and comply with the requirements of ASTM D1784 in accordance with AWWA C900.

Fabricated fittings shall only be manufactured using segments of currently approved City of Winnipeg AWWA C900 DR18 PVC pipe.



### **3.2 Elastomeric Gaskets**

Material for elastomeric gaskets shall conform to the requirements of AWWA C900 and CSA B137.3. The manufacturer shall provide complete descriptions of the material offered in accordance with the ASTM D2000 designation system.

### **3.3 Overwrap Reinforcement**

Fabricated fittings shall be overwrapped with fiberglass-reinforced-polyester and conform to the requirements of AWWA C900 and CSA B137.3. There shall be no overwrap reinforcement on the bells of the fittings, to facilitate and provide no hindrance in the use of mechanical joint restraint. If bends are one continuous piece of pipe, manufactured by bending the pipe (11.25 , 22.5 and 45 ), overwrapping shall not be required.

### **3.4 Resin**

Resin shall be commercial grade unsaturated polyester resin and be compatible with the fiberglass reinforcing.

## **4. DESIGN**

### **4.1 Dimension Ratio**

The minimum wall thickness of any point along the pipe shall conform to the dimension ratio (DR) of 18 as specified in AWWA C900.

### **4.2 Fitting Dimensions**

All fitting dimensions and tolerances shall conform to the requirements outlined in AWWA C900 and CSA B137.3.

### **4.2 Pressure Ratings**

The pressure rating of all fabricated fittings shall be the same as the pipe used in the fabrication of the fittings, and meet the requirements of AWWA C900 and CSA B137.3.

### **4.3 Performance Requirements for Elastomeric Gasket Joints**

Bell-end pipe designed for making PVC joints using elastomeric gaskets shall meet the performance requirements specified in ASTM D3139 in accordance with the requirements of AWWA C900.



## **5. MARKING**

### **5.1 Fittings Markings**

All PVC pipe supplied for use within the City of Winnipeg shall bear markings in accordance with AWWA C900. All fabricated fittings shall be marked with the following identifications:

- nominal size including branch sizes
- deflection angle of bends
- DR18
- Manufacturers' name or trademark
- AWWA C900
- CSA standard number
- Certification agency trademark/seal

Additionally, the fittings shall bear certification seals or markings of the following agencies:

1. NSF (National Sanitation Foundation) to Standard 14 for Plastics Piping System Components and related materials.
2. CSA (Canadian Standards Association) to Standard CAN3- B137.3-M86. Refer to Section 6.1 of CAN3-B137.3-M86 for marking requirements.
3. FM (Factory Mutual Research) to Approval Standard for Plastic Pipe and Fittings for Underground Fire Protection Service – Class No. 1610-June 1978. Refer to Section 3.1 of aforementioned standard for required markings.
4. FM (Factory Mutual Research) to Approval Standard for Polyvinyl Chloride (PVC) Pipe and Fittings for Underground Fire Protection Service – Class No. 1612-April 1999. Refer to Section 3.4 of aforementioned standard for required markings.
5. UL (Underwriters' Laboratories) or ULC (Underwriters' Laboratories of Canada) for Polyvinyl Chloride Pipe and Fittings for Underground Fire Service Systems.

Required marking for PVC fabricated fittings supplied to the City of Winnipeg shall be applied so as not to adversely affect the quality of the pipe in accordance with AWWA C900.



## **5.2 Gasket Markings**

Gaskets shall be marked with at least the following

- date code
- manufacturer name
- nominal diameter

## **6. WORKMANSHIP AND FINISH**

### **6.1 Fitting Body**

Pipe segments used in the fabrication of the fittings and the bonds between them shall be free from voids, inclusions, cracks, and other defects. Fittings shall be as uniform as commercially possible in colour, density, opacity, and other physically possible. The joining surfaces of bells and spigots shall be free from imperfections that may cause joint leaks.

### **6.2 Elastomeric Gaskets**

All Gaskets shall be homogeneous and free from porosity, blisters, pitting, or other imperfections that may affect serviceability, in any cross section.

### **6.3 Quality Control Requirements**

The manufacturer shall conduct all quality control tests and meet all qualification test requirements as outlined in CSA B137.3.

### **6.4 Third-Party Certification Requirements**

All fabricated fittings must be certified by a Standard Council of Canada accredited certification agency to CSA B137.3

## **7. PACKAGING**

Fittings shall be packaged and handled to prevent damage due to crushing and/or piercing.

Fittings shall be stored indoors or enclosed by an opaque cover at the site of manufacture and strictly indoors by distributors. Fittings shall be installed within 42 months of date of manufacture.

All approved manufacturers shall have local representation within the City of Winnipeg.



## **8. INSTALLATION INSTRUCTIONS**

The manufacturer shall provide clear concise installation instructions for fabricated PVC fittings.

Fabricated PVC pipe fittings shall be installed within thirty (30) months of the date of manufacture

## **9. QUALITY ASSURANCE**

The manufacturer shall provide an overall affidavit signed by a signing officer of the company stating that fabricated PVC fittings for use with PVC pipe, furnished for use in the City of Winnipeg comply with the requirements of the City of Winnipeg Standard No. AT-4.1.1.64.

## **10. CITY OF WINNIPEG**

Notwithstanding Section 9 of this standard, the manufacturer shall apply for and be in receipt of written approval from the City of Winnipeg prior to furnishing fabricated Polyvinyl Chloride (PVC) pipe fittings for use in the City of Winnipeg. Where patterns are owned by a party other than the manufacturer, the party owning the pattern and the manufacturer shall jointly apply for written approval from the City of Winnipeg prior to furnishing fabricated Polyvinyl Chloride (PVC) pipe fittings for use in the City of Winnipeg.

## **11. REFERENCES**

AWWA C900

*Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 12 in. (100mm through 300mm) for Water Distribution*

CSA B137.3

*Rigid Polyvinyl Chloride Pipe (PVC) for Pressure Applications*

FM (Factory Mutual Research)

*Standard for Plastic Pipe and Fittings for Underground Fire Protection Service – Class No. 1610-June 1978.*

FM (Factory Mutual Research)

*Standard for Polyvinyl Chloride (PVC) Pipe and Fittings for Underground Fire Protection Service – Class No. 1612-April 1999.*

UL (Underwriters' Laboratories) or ULC (Underwriters' Laboratories of Canada)  
*Polyvinyl Chloride Pipe and Fittings for Underground Fire Service Systems.*



**The City of Winnipeg**

**Standard for  
Epoxy Coated Cast Iron  
Couplings in Nominal Pipe Sizes  
100mm (4") and Over**

**Standard No. [AT-4.1.1.65](#)**



## **1. SCOPE**

This standard shall apply to epoxy coated cast iron pipe couplings approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to coupling purchased by the City.

## **2. REQUIREMENTS**

### **2.1 General**

Epoxy coated cast pipe couplings approved for use in the City of Winnipeg shall conform to the requirements of this standard. The coupling shall generally be comprised of a ductile iron sleeve, two ductile iron end rings, two rubber wedge gaskets, a rubber insulating boot, steel bolts, steel nuts, steel washers and thermoset plastic washers. Ductile iron and steel components shall be epoxy coated unless otherwise noted or approved. Couplings shall be suitable to join various watermain pipes differing in material of manufacture and outside diameters.

## **3. MATERIALS**

### **3.1 Sleeves**

The sleeve shall be made of ductile iron conforming to the requirements of ASTM A536, grade 65-45-12, as a minimum.

### **3.2 End Rings**

The end rings shall be made of ductile iron conforming to the requirements of ASTM A536, grade 65-45-12, as a minimum.

### **3.3 Gaskets and Insulating Boot**

Gaskets and insulating boots shall be made of moulded or vulcanized SBR rubber conforming to the requirements of ANSI/AWWA C219 as a minimum. The manufacturer shall provide complete descriptions of the material offered in accordance with the ASTM D2000 designation system.



### 3.4 Bolts and Nuts

Bolts shall be made of alloy 304 stainless steel conditions CW or SH conforming to the requirements of ASTM F593.

Bolts shall be 5/8" National Coarse Roll Thread (NC) track head.

Thread lubricant or anti-seize coating for threaded fasteners shall be a dry molybdenum disulfide based or polytetrafluoroethylene based compound.

Nuts shall be made of alloy 304 stainless steel conditions CW or SH conforming to the requirements of ASTM F594.

### 3.4 Minimum Sleeve Length and Bolt Assemblies

Nominal Size (inches)	Nominal Size (mm)	Minimum Sleeve Length (mm)	Minimum Number of Bolts
4	100	125	4
6	150	125	4
8	200	125	4
10	250	150	6
12	300	150	6
14	350	150	6
16	400	150	6

### 3.5 Washers

Stainless steel nuts shall be isolated from metallic contact with the end ring through the use of di-electric isolation washers. Washers shall be made from thermoset plastic and shall have both high resistance to dynamic and static wear and have very low creep characteristics. A stainless steel washer shall be used between the nut and plastic washer to protect the plastic washer from being damaged during tightening.

### 3.6 Epoxy Powder Coating

The epoxy powder for coating shall conform to the material requirements outlined in Section 2 of ANSI/AWWA C213.

The sleeve, and end rings shall be epoxy coated in the manner outlined and to the requirements of ANSI/AWWA C213. The coating shall have a minimum volume resistivity of  $1.3 \times 10^{15}$  ohm.cm when tested at 73°F as outlined in ASTM D257.

All exposed metal parts shall be free of burrs and sharp edges prior to application of epoxy coating.



Epoxy coatings shall have a coating thickness of 15 mils plus or minus 5 mils (0.35 mm to 0.5 mm as determined by the testing method outlined in ASTM B 499).

#### **4. DESIGN**

Couplings shall hold pressure without visible leakage at a watermain test pressure of 150 pounds per square inch via compression of elastomeric gaskets.

Couplings shall accommodate up to four degrees (4°) of pipe misalignment, as defined in figure 2, regardless of pipe material.

Couplings shall not require special equipment or tools for installation.

All end rings shall be designed to restrain bolt heads from turning during tightening of nuts.

#### **5. MARKINGS**

##### **5.1 Sleeve and End Rings**

The sleeve shall be marked on the outside wall discernable after installation. The sleeve shall be marked so as to provide at least the following information:

- Manufacturer's name
- Nominal size

Each end ring shall be marked on the outside face perpendicular to the pipe after installation. Each end ring shall be marked so as to provide at least the following information:

- Manufacturer's name
- O.D. range

Allowable methods of marking the aforementioned components are as follows:

- cast or moulded raised or indented symbols
- low stress stamped symbols
- stencilling ink, paint or dye provided that said marking compound is water-resistant and free of corrosive agents.
- Nominal size and O.D. range may be identified by means of a colour code system where the sleeve colour represents the nominal size and the end ring colour represents the O.D. range.



## **5.2 Gaskets**

Gaskets shall be marked according to the requirements of ANSI/AWWA C219.

## **5.3 Bolts**

The head end of each bolt shall bear a recognized abbreviation or symbol representing the bolt manufacturer.

## **6. WORKMANSHIP AND FINISH**

All exposed ductile iron parts shall be free of burrs and sharp edges prior to application of epoxy coating.

The epoxy coated cast pipe couplings approved for use in the City of Winnipeg shall be smooth throughout and shall be free from visible cracks, voids, inclusions and other injurious defects. Any coupling found with removal of the epoxy coating whether intentional or accidental shall not be used and should be returned to the manufacturer for recoating.

## **7. PACKAGING**

Each coupling assembly shall be individually packed in a corrugated cardboard container. Components shall be packaged such that coatings are not damaged. Corrugated cardboard containers shall be enclosed on all sides and shall be designed and constructed to allow unsupported stacking to a height of 1.5 metres.

Each container shall be clearly marked to provide at least the following information:

- Manufacturer's name
- Nominal size
- O.D. range
- Manufacturer's product code number.

## **8. INSTALLATION INSTRUCTIONS**

The manufacturer shall provide clear concise installation instructions for the epoxy coated cast pipe couplings approved for use in the City of Winnipeg.



## **9. QUALITY ASSURANCE**

A signing officer of the manufacturing company shall furnish an affidavit of compliance stating that epoxy coated cast iron couplings furnished for use in the City of Winnipeg shall comply with the requirements of the City of Winnipeg Standard No. AT-4.1.1.65.

## **10. CITY OF WINNIPEG**

Notwithstanding Section 9 of this standard, the manufacturer shall apply for and be in receipt of, written approval from the City of Winnipeg prior to furnishing epoxy coated cast iron pipe couplings for use in the City of Winnipeg. Where patterns are owned by a party other than the manufacturer, the party owning the pattern and the manufacturer shall jointly apply for written approval from the City of Winnipeg prior to furnishing epoxy coated cast iron couplings for use in the City of Winnipeg.

## **11. REFERENCES**

ASTM A536

*Standard Specification for Ductile Iron Castings*

ASTM A593

*Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs*

ASTM A594

*Standard Specification for Stainless Steel Nuts*

ASTM B418

*Standard Specification for Cast and Wrought Galvanic Zinc Anodes*

ASTM D257

*Standard Test Methods for DC Resistance or Conductance of Insulating Materials*

ASTM D2000

*Standard Classification System for Rubber Products in Automotive Applications*

AWWA C219

*Bolted, Sleeve-Type Couplings for Plain-End Pipe*



AWWA C213

*Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines*

SAE J2655

*Fastener Part Standard-Washers and Lock Washers (Inch Dimensioned)*



**THE CITY OF WINNIPEG**  
**STANDARD FOR**  
**STAINLESS STEEL REPAIR CLAMPS**  
**STANDARD NO. AT- 4.1.1.69**

May 20, 1992

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## **1. SCOPE**

This Standard shall apply to stainless steel repair clamps approved for use in the City of Winnipeg.

This Standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to clamps purchased by the City.

## **2. STAINLESS STEEL REPAIR CLAMPS**

### **2.1 General**

Stainless steel repair clamps shall be designed and constructed to suit the City's intended use and shall meet the minimum requirements specified herein.

### **2.2 Usage**

Clamps will be installed on watermains transporting potable water.

Clamps will be used to repair holes, longitudinal splits and circumferential cracks in watermains.

### **2.3 Design Requirements (See Figure 1)**

Clamps shall hold pressure without visible leakage at a watermain test pressure of 150 pounds per square inch.

Joints between sections of shell shall be designed to allow engaging and disengaging without complete removal of nuts from studs.

Studs shall be secured to sidebars.

Gaskets shall be of the overlapping taper type and shall be secured to the shell. Gaskets shall not be spliced or assembled from component pieces except that a bevel joint may be made where the gasket is secured to the shell for no less than 2 inches to either side of the joint.

Gasket armor shall be provided at each joint between sections of shell. Gasket armor shall be inset and secured to the gasket so as to provide a smooth, flush surface.

The clamp shall be designed so as not to create electrical continuity between the clamp and the watermain.

The clamp shall be designed so as not to require special equipment or tools for installation.



### 3. Materials (See Figure 1)

#### 3.1 Data & Samples

Before or after approval for use in the City of Winnipeg the manufacturer may be required to submit:

- a) a complete statement of origin, composition, manufacturer and supplier of any materials to be supplied;
- b) samples of any said materials, which samples may be subjected to the tests provided for in this Standard.

#### 3.2 Metal Parts

Shells, sidebars, lifter bars, lugs and gasket armor shall be fabricated from stainless steel conforming to ASTM A167- Type A167 - Type 304 or Type 304L, or approved equal.

Minimum material thickness shall be as follows:

- a) shells - 0.035 inch
- b) side bars - 0.120 inch
- c) lift bars - 0.060 inch
- d) lugs - 0.125 inch
- e) gasket armor - 0.050 inch

Threaded fasteners shall be fabricated from stainless steel conforming to ASTM A493 - Type 304, or approved equal.

#### 3.3 Gaskets

Gasket material shall be selected by the manufacturer to suit the design of the clamp and the purpose for which it is intended.

The following information shall be noted:

- a) ambient air temperature during installation may vary from -40°C to + 40°C;
- b) temperature in the installed position after burial may vary from 0°C to + 10°C.

The manufacturer shall provide complete descriptions of the material offered in accordance with ASTM D2000 designation system.



### 3.4 Thread Coating

Thread lubricant or anti-seize coating for threaded fasteners shall be a dry molybdenum disulfide based or polytetrafluorethylene based compound.

## 4. **FABRICATION**

### 4.1 Threaded Fasteners

Studs shall be fabricated in accordance with ASTM F593 - Group 1, Alloy Type 304, Condition CW or SH, or approved equal.

Nuts shall be fabricated in accordance with ASTM F594 - Group 1, Alloy Type 304, Condition CW or SH, or approved equal.

Studs shall be welded to the sidebars.

Stud threads or nut threads shall be coated with an anti-seize compound subsequent to cleaning and descaling of the welded subassembly.

### 4.2 Threaded Outlets

Threaded outlets shall be provided, when specified, by welding female half-coupling to the shell of the clamp.

Half-couplings shall be fabricated in accordance with ASTM A182-F304, or approved equal and shall be internally threaded in accordance with AWWA C800 Fig. 1 (commonly referred to as a corporation cock or CC thread).

### 4.3 Bending

No metal part shall be bent with a bend radius less than the thickness of metal.

### 4.4 Welding

All welds shall be by the tungsten-arc inert gas (TIG) or metal-arc inert gas (MIG) methods.

Where filler metal is used, it shall be selected to result in a weld with corrosion resistance at least equal to Type 304 stainless steel. Fluxes or filler wire coatings containing halogens shall not be used.

### 4.5 Finish

All exposed metal parts shall be free of burrs and sharp edges.

### 4.6 Cleaning



All metal parts shall be free of contaminants and coatings such as those used to facilitate cold forming operations.

Subsequent to fabrication, all welded subassemblies and individual parts shall be cleaned and descaled as recommended by ASTM A 380 to remove all surface contaminants.

#### 4.7 Coatings

Subsequent to cleaning and descaling, no coatings, lubricants labels or stickers shall be applied to any metal parts except as otherwise specified.

### **5. PACKAGING**

#### 5.1 Markings

Each clamp shall be clearly marked on the shell with the following information:

- a) make;
- b) model;
- c) range of pipe diameter;
- d) size of threaded outlet (if applicable);
- e) direction of rotation (if applicable);
- f) production year.

No stickers of any sort shall be affixed to any metal part. The following methods of marking will be allowed:

- a) etching, provided that the resultant etched surface is free of contaminants;
- b) stencilling ink, paint or dye provided that said marking compound is water resistant and free of corrosive agents.

#### 5.2 Packaging

Each clamp shall be individually packaged, along with a copy of installation instructions, in a corrugated cardboard container. The clamp shall be in an assembled state.

Each container shall be clearly marked with the following information:

- a) make;
- b) model;
- c) range of pipe diameter;
- d) length;
- e) size of tapped outlet (if applicable).

#### 5.3 Installation Instructions



Each clamp shall be supplied with a copy of installation instructions specific to the clamp. Generalized instructions listing differing installation procedures for differing models will not be accepted.

The instructions shall clearly indicate:

- a) make;
- b) model;
- c) installation procedure in sequential order;
- d) recommended torque (minimum and maximum) and tightening sequence for threaded fasteners;
- e) cautions and warnings (if applicable).

Where bilingual instructions are provided both sets of instructions shall be identical in meaning and content.

Subsequent to approval for use in the City of Winnipeg, no changes to the instructions shall be made without the written approval of the Engineer.

The manufacturer shall not give verbal or informal instructions, which modify or contradict the written instructions, to City personnel.



**THE CITY OF WINNIPEG**  
**SPECIFICATION FOR**  
**STAINLESS STEEL TAPPING SLEEVES**  
**SPECIFICATION NO. [AT- 4.1.1.70](#)**

February 26, 1997



## 1. **SCOPE**

This Specification shall apply to stainless steel tapping sleeves approved for use in the City of Winnipeg.

This Specification shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to tapping sleeves purchased by the City.

## 2. **STAINLESS STEEL TAPPING SLEEVES**

### 2.1 **General**

Stainless steel tapping sleeves shall be designed and constructed to suit the City's intended use and shall meet the minimum requirements specified herein.

### 2.2 **Usage**

Tapping sleeves will be installed on water mains transporting potable water and tapping sleeves will be used with tapping valves to permit connection to an existing main without interruption of service.

### 2.3 **Design Requirements**

Tapping sleeves shall hold pressure without visible leakage at a water main test pressure of 150 pounds per square inch.

Studs shall be secured to sidebars.

Gaskets shall be of the overlapping taper type and shall be secured to the shell. Gaskets shall not be spliced or assembled from component pieces except that a bevel joint may be made where the gasket is secured to the shell for no less than 2 inches to either side of the joint.

Gasket armour shall be provided at each joint between sections of shell. Gasket armour shall be inset and secured to the gasket so as to provide a smooth, flush surface.

A branch connection with integral flat-faced flange shall be provided whose port is perpendicular to and centered on the axis of the water mains

A 3/4" test plug for pressure testing shall be provided.

The tapping sleeve shall be designed so as not to create electrical continuity between the tapping sleeve and the water main.

The tapping sleeve shall be designed so as not to create electrical continuity between the flange and the tapping valve when an isolating flange kit is used.



The tapping sleeve shall be designed so as not to require special equipment or tools for installation.

### 3. Materials

#### 3.1 Data & Samples

Before or after approval for use in the City of Winnipeg the manufacturer may be required to submit:

- a) a complete statement of origin, composition, manufacturer and supplier of any materials to be supplied;
- b) samples of any said materials, which samples may be subjected to the tests provided for in this Specification.

#### 3.2 Metal Parts

Upper shell, lower shell, sidebars, lifter bars, lugs, branch connection, flange and gasket armour shall be fabricated from 18-8 stainless steel conforming to ASTM A167-Type 304 or Type 304L, or approved equal.

Minimum material thickness shall be as follows:

- a) upper shells -0.100 inch
- b) lower shells -0.062 inch
- c) side bars -0.120 inch
- d) lift bars -0.075 inch
- e) lugs -0.125 inch
- f) gasket armour -0.050 inch
- g) branch connection -0.100 inch
- h) flange -0.688 inch (6", 8" & 10" branch - as per AWWA C207)  
-0.812 inch (12" branch -as per AWWA C207)

Threaded fasteners shall be fabricated from stainless steel conforming to ASTM A493 - Type 304, or approved equal.

#### 3.3 Gaskets

Gasket material shall be selected by the manufacturer to suit the design of the tapping sleeve and the purpose for which it is intended.

The following information shall be noted:

- a) ambient air temperature during installation may vary from -40EC to + 40E C;



b) temperature in the installed position after burial may vary from 0EC to + 10E C.

The manufacturer shall provide complete descriptions of the material offered in accordance with ASTM D2000 designation system.

### 3.4 Thread Coating

Thread lubricant of anti-seize coating for threaded fasteners shall be a dry molybdenum disulphide based or polytetrafluoroethylene based compound.

## 4. **FABRICATION**

### 4.1 Threaded Fasteners

Studs shall be fabricated in accordance with ASTM F593 - Group 1, Alloy Type 304, Condition CW or SH, or approved equal.

Nuts shall be fabricated in accordance with ASTM F594 - Group 1, Alloy Type 304, Condition CW or SH, or approved equal.

Studs shall be welded to the sidebars.

Stud threads or nut threads shall be coated with an anti-seize compound subsequent to cleaning and descaling of the welded subassembly.

### 4.2 Branch Connections

Branch connections covered by this specification are nominal sizes 6", 8", 10" and 12".

The minimum inside diameter of the branch connection shall be at least 1/4 inch larger than the nominal pipe size of the branch connection as specified with MSS SP section 6.5a.

The branch will have an integral flat-faced flange, optionally without the alignment groove, or the concentric Aphonograph finish≡ on the flange. The flange boltholes shall be compatible with tapping valves.

The flange shall conform in dimensions and drilling to AWWA C207.

### 4.3 Bending

No metal part shall be bent with a bend radius less than the thickness of metal.

### 4.4 Welding



All welds shall be by the tungsten-arc inert gas (TIG) or metal-arc inert gas (MIG) methods.

Where filler metal is used, it shall be selected to result in a weld with corrosion resistance at least equal to Type 304 stainless steel. Fluxes or filler wire coatings containing halogens shall not be used. All welds shall be passivated.

#### 4.5 Finish

All exposed metal parts shall be free of burrs and sharp edges.

#### 4.6 Cleaning

All metal parts shall be free of contaminants and coatings such as those used to facilitate cold forming operations.

Subsequent to fabrication, all welded subassemblies and individual parts shall be cleaned and descaled as recommended by ASTM A 380 to remove all surface contaminants

#### 4.7 Coatings

Subsequent to cleaning and descaling, no coatings, lubricants labels or stickers shall be applied to any metal parts except as otherwise specified.

### **5. PACKAGING**

#### 5.1 Markings

Each tapping sleeve shall be clearly marked on the shell with the following information:

- a) manufacturer's name;
- b) model;
- c) size of branch connection;
- d) production year

No stickers of any sort shall be affixed to any metal part. The following methods of marking will be allowed:

- a) etching, provided that the resultant etched surface is free of contaminants;
- b) stencilling ink, paint or dye provided that said marking compound is water resistant and free of corrosive agents.

#### 5.2 Packaging

Each tapping sleeve shall be individually packaged, along with a copy of installation



instructions, in a corrugated cardboard container. The tapping sleeve shall be assembled.

Each container shall be clearly marked with the following information:

- a) manufacturer's name;
- b) model;
- c) range of pipe diameter;
- d) size of branch connection

### 5.3 Installation Instructions

Each tapping sleeve shall be supplied with a copy of installation instructions specific to the tapping sleeve. The instructions shall clearly indicate:

- a) manufacturer's name;
- b) model;
- c) installation procedure in sequential order;
- d) recommended torque (minimum and maximum) and tightening sequence for threaded fasteners;
- e) cautions and warnings (if applicable).

Where bilingual instructions are provided both sets of instructions shall be identical in meaning and content.

Subsequent to approval for use in the City of Winnipeg, no changes to the instructions shall be made without the written approval of the Engineer.

E.C. Burgener, P. Eng.  
Materials and Service Standards Engineer  
City of Winnipeg Water and Waste Department

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**THE CITY OF WINNIPEG SPECIFICATION  
FOR RESILIENT-SEATED TAPPING VALVES WITH NON-RISING  
STEMS IN NOMINAL SIZES 6", 8", 10", AND 12"  
SPECIFICATION NO. [AT-4.1.1.71](#)**

February 25, 1997



## **1. SCOPE**

This specification shall apply to resilient seated tapping valves (RSTV) with non-rising stems approved for use in the City of Winnipeg's water distribution system. This specification shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to RSTV's purchased by the City of Winnipeg.

## **2. RESILIENT SEATED TAPPING VALVES**

### **2.1 General**

RSTV's with non-rising stems shall conform to the requirements, both performance and material, of AWWA C509-94 except where more stringent requirements are specified herein.

### **2.2 Sizes**

RSTV's covered by this specification are nominal size 6", 8", 10", 12" and 16" in accordance with AWWA C509-94 Section 1.1.1. This specification further covers RSTV's of nominal size of 14".

### **2.3 Valve Pressure Rating**

The design working water pressure shall be 200 psig for 6" through 12" sizes and 150 psig for 16" size in accordance with AWWA C509-94 Section 1.1.2. The design working water pressure shall be 150 psig for 14" sizes in accordance with UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 4.1.

## **2.4 MATERIALS**

### **2.4.1 Gray Iron Components**

Gray iron castings shall conform to the requirements of ASTM, A126 Class B in accordance with AWWA C509-94 Section 2.2.1.

### **2.4.2 Ductile Iron Components**

Ductile cast iron shall conform to the requirements of ASTM A 536 in accordance with AWWA C509-94 Section 2.2.2.

### **2.4.3 Cast Carbon Steel Components**

Carbon steel castings or fasteners shall not be permitted. This supersedes AWWA C509-94 Section 2.2.3.



#### **2.4.4 Stainless Steel Components**

Unless noted otherwise stainless steel materials shall conform to the requirements of ASTM F593 Alloy Group 2 Condition A and ASTM F594 Alloy Group 2 Condition A (Stainless Steel Alloy Number 316). Fasteners shall be marked either raised or depressed with the alloy number "316" to identify the material in accordance with supplementary requirement S8 of the aforementioned standards. This supersedes AWWA C509-94 Section 2.2.3. Stainless steel valve stems will be considered as an alternate to brass for 14" and 16" valves.

#### **2.4.5 Brass Components**

Valve stems made from brass shall meet or exceeding requirements of Grade E in Table 1 of AWWA C509-94. Acceptable copper alloys include C66100, C69400, C99400 and C99500. This supersedes AWWA C509-94 Section 2.2.4.2, and 4.2.

Valve stem nuts made from brass shall meet or exceed requirements of Grade A, D or E in Table 1 of AWWA C509-94. Acceptable copper alloys include C66100, C69400, C836600, C99400 and C99500. This supersedes AWWA C509-94, Sections 2.2.4.2, and 4.2.

#### **2.4.6 Valve Body Gaskets**

Valve body seals may be either flat gaskets or O-rings. Gasket material shall conform to the requirements of AWWA C509-94 Section 2.2.5. O-ring material shall conform to the requirements of AWWA C509-94 Section 2.2.6.

#### **2.4.7. Valve Stem O-Rings**

Valve stem O-rings shall be made from vulcanized natural-rubber or synthetic-rubber meeting or exceeding the requirements of ASTM D-2000 and shall have properties meeting or exceeding requirements of UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 16.

#### **2.4.8 Anti-Friction Washers**

Anti-friction washers at thrust bearings shall be made of thermoplastic material and have physical properties suitable for the application.

#### **2.4.9 Resilient Seats**

Resilient seats shall be made from vulcanized natural-rubber or synthetic rubber meeting or exceeding the requirements of both:

- .1 AWWA C509-94 Section 2.2.8 through 2.2.8.6.
- .2 UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 16. The rubber compound shall conform to the requirements of ANSI.NSF Standard 61



entitled "Drinking Water Additives - Health Effects" as certified by NSF International, Underwriters Laboratories Inc., Underwriters Laboratories of Canada, or other third party certification agency acceptable to The City of Winnipeg.

#### **2.4.10 Corrosion Resistant Epoxy Coating for Internal Surfaces**

Internal surfaces of valve iron body components shall receive an internal corrosion resistant epoxy coating meeting or exceeding the requirements of:

- .1 AWWA C509-94 Sections 2.2.7.
- .2 AWWA C550-90 all sections except Section 5.1

Notes: The internal coating shall conform to the requirements of ANSI/NSF Standard 61 entitled "Drinking Water Additives Health Effects" as certified by NSF International, Underwriters Laboratories Inc., Underwriters Laboratories of Canada, or other third party certification agency acceptable to the City of Winnipeg.

Minimum dry film thickness for liquid epoxy and for fusion-bonded epoxy shall be 10 mils. (Reference AWWA C550-90 Section 4.2.2)

#### **2.4.11 Corrosion Resistant Epoxy Coating for External Surfaces**

External surfaces of valve iron body components shall receive an external coating of the same material as used for the internal coating. External coatings shall conform to the requirements of section 2.4.10.

#### **2.4.12 Di-electric Isolation Washers**

It is the preference of the City that the external stainless steel fasteners receive an epoxy coating after valve iron body components assembly in accordance with Section 2.4.11. In the event that the manufacturing process is incompatible with this, uncoated stainless steel fasteners shall be isolated from metallic contact with the iron body components through the use of di-electric isolation washers. Washers shall be made from natural rubber, synthetic rubber or thermoset plastic and shall have both high resistance to dynamic and static wear and have very low creep characteristics.

#### **2.4.13 Valve End Gaskets**

Valve end gaskets for push-on joints shall conform to the requirements of AWWA C111/A21.11-90.



## **2.5 DESIGN**

### **2.5.1 Resistance to Stress**

The input torque values contained in AWWA C509-94 are superseded by the torque values contained in UL Standard 262 Seventh Edition (May 27, 1994 Revision) Table 23.1 namely: 6": 325 foot-pounds; 8": 450 foot-pounds; 10": 640 foot-pounds; 12": 760 foot-pounds; and 14": 900 foot-pounds. Furthermore, internal valve parts shall be capable of withstanding input torque values as contained in UL Standard 262 Seventh Edition (May 27, 1994 Revision) Table 23.2 namely: 6": 487.5 foot pounds; 8": 675 foot-pounds; 10": 960 foot-pounds; 12": 1140 foot-pounds; and 14": 1350 foot-pounds. Values for 16" valves shall be extrapolated from Table 23.1 and Table 23.2 in UL Standard 262 Seventh Edition (May 27, 1994 Revision).

### **2.5.2. Basis of Structural Design**

The requirements of AWWA C509-94 section 3.1 apply except the input torque values shall be as per Section 2.5.1 of this specification.

### **2.5.3 Size of Waterway**

The requirements of AWWA C509-94 Section 3.2 apply, except that 1/4" extra bore size is required to accommodate the tapping machine cutter.

### **2.5.4 Shell Wall Thickness**

The minimum gray iron or ductile iron wall thickness and the maximum relative area of minimum wall thickness for valve bodies and bonnets shall be in accordance with AWWA C509-94 Section 4.3.1.

### **2.5.5 External Fasteners**

All external fasteners shall have hexagonal heads or shapes and shall be made from 316 stainless steel conforming to the requirements of ASTM F593 and ASTM F594 for Alloy Group 2 Condition A (supersedes AWWA C509-94 Section 4.4). Should stainless steel fasteners not be epoxy coated after valve iron body components assembly in accordance with Section 2.4.12 di-electric isolation washers would be provided to isolate stainless steel bearing surfaces from gray iron or ductile iron components.

### **2.5.6 Internal Fasteners**

Where fasteners are used to attach the rubber seat ring to the valve disc the fasteners shall be made from 304 stainless steel or 316 stainless steel conforming to the requirements of ASTM F593 and ASTM F594 for alloy Group 1 (304) or Alloy Group 2 (316).



### **2.5.7 Valve Ends**

Valve end connections shall be flat flange by push-on joint type suitable for use with CIOD PVC water main pipe (supersedes AWWA C509-94 Section 4.5).

Each push on valve end shall have a factory inspected and installed elastomeric gasket. Elastomeric gaskets shall be in accordance with Section 2.4.13.

Each push on valve end shall be furnished with (2) 15/16" minimum diameter closed lugholes for tie-rodding purposes.

### **2.5.8 Guides**

Should guides be necessary they shall conform to AWWA C509-94 Section 4.6 and UL Standard 262, Seventh Edition (May 27, 1994 Revision) Section 5.4.

### **2.5.9 Stems and Stem Nuts**

Stems and stem nuts shall be made from copper alloys in accordance with Section 2.4.5. Stem collars shall be made integral with stems in accordance with AWWA C 509-94 Section 4.7.1. The threads of stems and stem nuts (disc bushings) shall be of the ACME type conforming to the requirements of AWWA C509-94 Sections 4.7.1 and 4.7.3. At least one (1) anti-friction washer (thrust collar) shall be provided in the thrust bearing (stem collar) region. Anti-friction washers shall be in accordance with Section 2.4.8. The minimum stem diameters and minimum number of turns of stem to open shall be in accordance with AWWA C509-94 Table 4. (The values for 14" valves shall be interpolated from this table) The stem shall, when the valve is closed, enter the stem nut a distance equal to at least 1 1/4 times the outside diameter of the stem in accordance with UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 8.5. The stem shall be attached to the wrench nut by means such as a square tapered end or pinning the nut to the stem in accordance with UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 8.7.

### **2.5.10 Stem Seals**

Stem sealing shall be accomplished using O-rings. O-rings shall be in accordance with AWWA C509-94 Section 4.8.2 and 4.8.2.1 and UL Standard 262 Seventh Edition (May 27, 1994 Revision) Sections 13.1.

### **2.5.11 Wrench Nuts/Operating Nuts**

Wrench nuts/Operating nuts shall be made from grey iron, ductile iron, or brass. The grey iron shall conform to Section 2.4.1, the ductile iron to Section 2.4.2 and the brass to Section 2.4.5. Wrench nuts/Operating nuts shall be made in accordance with AWWA C509-94 Sections 4.11, 4.11.1, 4.11.2 and 4.11.4. Nuts shall be secured to the valve stem in accordance with UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 11.1. Opening direction shall be colour-coded in accordance with AWWA Standard C509-94 Section 4.11.5. The City of Winnipeg uses valves having



either counter clockwise or clockwise opening directions.

### **2.5.12 Valve Gates, Wedges or Discs**

Valve gates, wedges or discs shall be made from gray or ductile iron conforming to Sections 2.4.1 or 2.4.2 or from brass conforming to Section 2.4.5. Where ductile iron is used it shall receive a coating in accordance with Section 2.4.11 or it shall be totally encapsulated in resilient seat material.

Resilient valve seats shall be applied to the gate, wedge or disc and shall seat against smooth internal areas of the valve body. Where resilient seal rings are mechanically fastened to gates, wedges or discs the fasteners shall be in accordance with Section 2.5.6. Resilient seat material shall be a rubber material in accordance with Section 2.4.9. The resilient seat material shall meet or exceed performance requirements specified in AWWA C509-94 Section 4.16 and UL Standard 262 Seventh Edition (May 27, 1994 Revision) Sections 16,18 and 19.

### **2.5.13 Indicator Post Flanges**

Valves shall not be provided with indicator post flanges. This supersedes UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 12.

## **2.6 QUALITY-CONTROL TEST REQUIREMENTS**

### **2.6.1 Hydrostatic Leakage Testing**

Each resilient-seated gate valve shall exhibit no leakage when hydrostatically tested at the factory in accordance with UL Standard 262 Seventh Edition (May 27,1994 Revision) Sections 21.1, 21.2, 21.3 and 25.2 namely:

1. Resilient-Seat Leakage Test: 2 times rated working pressure with valve in closed position for a minimum duration of one minute with hydrostatic pressure applied between one end and the closed gate and then between the opposite end and the closed gate. The valve closing torque value shall not exceed the maximum value contained in Table 21.1 for the valve size being tested, namely: 110 foot-pounds for 6", 150 foot-pounds for 8"; 185 foot-pounds for 10", 225 foot-pounds for 12"and 14" and 275 foot-pounds for 16".
2. Shell or Body Leakage Test: Following the resilient-seat leakage test the body shall be tested at 2 times rated working pressure for a minimum duration of 15 seconds with the valve in the open position. There shall be no leakage through the body or permanent distortion.



### **3. MARKING REQUIREMENTS**

#### **3.1 AWWA Marking Requirements**

Each valve shall be marked in accordance with AWWA C509-94 Section 7.1 namely:

- .1 Manufacturer's name or trademark
- .2 Year of manufacture
- .3 Nominal size of valve
- .4 Rated Pressure (working Pressure).

Markings shall be cast on the body or bonnet of each valve.

#### **3.2 Underwriters Laboratories (UL) Marking Requirements**

In addition to the marking requirements identified in Section 3.1 the following additional marking requirements apply in accordance with UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 26, namely:

- .1 Distinctive model number, catalogue designation, or the equivalent.
- .2 If a manufacturer produces valves at more than one factory, each valve shall have a distinctive marking to identify it as the product of a particular factory.
- .3 Markings shall be in the form of cast letters at least 2" high and raised at least 0.03 inch from the body or bonnet. The manufacturer may, subject to the approval of the third party certification agency, provide some of the required marking information stamped into a stainless steel tag affixed to the valve.
- .4 Each, valve shall have UL or ULC label affixed/markings in accordance with UL or ULC listing agreement. UL certification shall be on the basis of UL standard 262 Seventh Edition (May 27, 1994 Revision) "Standard for Gate Valves for Fire Protection Service UL 262 Seventh Edition". ULC certification shall be on the basis of ULC's standard "ULC/ORD-C262-1992, Gate Valves for Fire Protection Service".

Note: Notwithstanding provisions contained in their own standards both UL and ULC have informed the City of Winnipeg that they are prepared to certify products having features described in sections 2.5.11 and 2.5.3 of this specification, namely: clockwise opening valves and no indicator post flanges.



#### **4. PACKAGING & HANDLING**

##### **4.1 AWWA Requirements**

Valves shall be prepared for shipment in accordance with AWWA C509-94 Section 7.2 and AWWA C550-90 Section 7.

##### **4.2 City of Winnipeg Requirements**

Valves shall be packaged in such a manner that normal shipping and handling practices will not cause damage to the coating on the valve.

Valves shall be shipped with the valve in the closed position. Each valve shall be furnished with opaque weather resistant covers attached to the valve ends using the tie-rod holes. Valve end covers shall have a diameter approximately equal to the outside diameter of the valve end. The cover material shall be acceptable to the City of Winnipeg.

#### **5. CITY OF WINNIPEG APPROVAL**

The manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing resilient seated tapping valves for use in the City of Winnipeg. In addition to normal product information the manufacturer shall provide a copy of the UL listing agreement and an affidavit of compliance signed by two company signing officers stating that resilient seated tapping valves furnished for use in the City of Winnipeg comply with the requirements of the City of Winnipeg Specification No. AT4.1.1.71.

E. Burgener, P.Eng.  
Material and Service Standards Engineer



**THE CITY OF WINNIPEG**  
**SPECIFICATION FOR**  
**ISOLATING FLANGE KITS**  
**SPECIFICATION NO. [AT- 4.1.1.74](#)**

APRIL 3, 1997



## 1. **SCOPE**

This Specification shall apply to isolating flange kits approved for use in the City of Winnipeg.

This Specification shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to isolating flange kits purchased by the City.

## 2. **ISOLATING FLANGE KITS**

### 2.1 **General**

Isolating flange kits shall be designed and constructed to suit the City's intended use and shall meet the minimum requirements specified herein.

### 2.2 **Usage**

A flange isolation gasket will be installed between the flange end of a tapping sleeve and the flange end of a tapping valve.

The purpose of the flange isolation kit is to provide absolute flange sealing and electrical isolation.

### 2.3 **Design Requirements**

Isolating flange kits shall be designed to fit flat-faced flanges. The industry definition of "flat-faced flange" includes the "phonograph grooves" used to grip the traditional compression gasket.

Isolating flange kits shall be designed to conform in dimensions and drilling to AWWA C110-93.

Isolating flanges that use "O" rings shall position the "O" rings so as to fit an industry standard tapping sleeve, as follows:

<u>Pipe Size</u>	<u>Gasket OD</u>	<u>Gasket ID</u>	<u>OD 1<sup>st</sup> "O" Ring</u>	<u>OD 2<sup>nd</sup> "O" Ring</u>
12"	19"	12"	13.9"	14.7"
10"	16"	10"	11.9"	12.7"
8"	13.5"	8"	9.6"	10.3"
6"	11"	6"	7.6"	8.2"
4"	9"	4"	5.4"	5.9"



### 3. Materials

#### 3.1 Data & Samples

Before or after approval for use in the City of Winnipeg the manufacturer may be required to submit:

- a) a complete statement of origin, composition, manufacturer and supplier of any materials to be supplied;
- b) samples of any said materials, which samples may be subjected to the tests provided for in this Specification.

#### 3.2 Composition

The gaskets shall be type "E" G-10 or G-11, 3mm thick, epoxy glass.

The gasket shall come complete with homogeneous (jointless) nitrile O-rings or seal rings imbedded on opposite sides of the gasket.

The bolt sleeves shall be spirally wound mylar material.

The washers shall be G-10 or G-11 epoxy glass backed with stainless steel type 316 washers.

#### 3.3 Bolt Sleeves

The bolt sleeve sizes shall be as follows:

<u>Gasket Size</u>	<u>Sleeve Length</u>
6"	56mm
8"	56mm
10"	60mm
12"	60mm

### 4. PACKAGING

#### 4.1 Markings

Each gasket shall be clearly marked with the branch connection size, in millimetres and inches.



#### 4.2 Packaging

Each isolating flange kit shall be individually packaged, along with a copy of installation instructions, in a corrugated cardboard container.

Each container shall be clearly marked with the following information:

- a) manufacturer's name and location,
- b) size of branch connection,
- c) year and month of manufacture
- d) model (if applicable)

#### 4.3 Installation Instructions

Each isolating flange kit shall be supplied with a copy of installation instructions specific to the kit.

The instructions shall clearly indicate:

- a) manufacturer
- b) model (if applicable)
- c) installation procedure in sequential order;
- d) cautions and warnings

Where bilingual instructions are provided both sets of instructions shall be identical in meaning and content.

E.C. Burgener, Pen.  
Materials and Service Standards Engineer

Attached: Table 10.14 - AWWA C110-93

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**THE CITY OF WINNIPEG**  
**SPECIFICATION FOR**  
**RESILIENT-SEATED GATE VALVES WITH NON-RISING STEMS**  
**IN NOMINAL SIZES 6", 8", 10", 12", 14" AND 16"**  
**FOR BURIED SERVICE**  
**SPECIFICATION NO. [AT-4.1.1.80](#)**

February 25, 1997



## **1. SCOPE**

This specification shall apply to resilient seated gate valves (RSGV) with non-rising stems approved for use in the City of Winnipeg's water distribution system. This specification shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to RSGV's purchased by the City of Winnipeg.

## **2. RESILIENT-SEATED GATE VALVES**

### **2.1 General**

RSGV's with non-rising stems shall conform to the requirements, both performance and material, of AWWA C509-94 except where more stringent requirements are specified herein.

### **2.2 Sizes**

RSGV's covered by this specification are nominal size 6", 8", 10", 12" and 16" in accordance with AWWA C509-94 Section 1.1.1. This specification further covers RSGV's of nominal size of 14".

### **2.3 Valve Pressure Rating**

The design working water pressure shall be 200 psig for 6" through 12" sizes and 150 psig for 16" size in accordance with AWWA C509-94 Section 1.1.2. The design working water pressure shall be 150 psig for 14" sizes in accordance with UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 4.1.

## **2.4 MATERIALS**

### **2.4.1 Gray Iron Components**

Gray iron castings shall conform to the requirements of ASTM, A126 Class B in accordance with AWWA C509-94 Section 2.2.1.

### **2.4.2 Ductile Iron Components**

Ductile cast iron shall conform to the requirements of ASTM A 536 in accordance with AWWA C509-94 Section 2.2.2.

### **2.4.3 Cast Carbon Steel Components**

Carbon steel castings or fasteners shall not be permitted. This supersedes AWWA C509-94 Section 2.2.3.



#### **2.4.4 Stainless Steel Components**

Unless noted otherwise stainless steel materials shall conform to the requirements of ASTM F593 Alloy Group 2 Condition A and ASTM F594 Alloy Group 2 Condition A (Stainless Steel Alloy Number 316). Fasteners shall be marked either raised or depressed with the alloy number "316" to identify the material in accordance with supplementary requirement S8 of the aforementioned standards. This supersedes AWWA C509-94 Section 2.2.3. Stainless steel valve stems will be considered as an alternate to brass for 14" and 16" valves.

#### **2.4.5 Brass Components**

Valve stems made from brass shall meet or exceeding requirements of Grade E in Table 1 of AWWA C509-94. Acceptable copper alloys include C66100, C69400, C99400 and C99500. This supersedes AWWA C509-94 Section 2.2.4.2, and 4.2.

Valve stem nuts made from brass shall meet or exceeding requirements of Grade A, D or E in Table 1 of AWWA C509-94. Acceptable copper alloys include C66100, C69400, C836600, C99400 and C99500. This supersedes AWWA C509-94 Sections 2.2.4.2, and 4.2.

#### **2.4.6 Valve Body Gaskets**

Valve body seals may be either flat gaskets or O-rings. Gasket material shall conform to the requirements of AWWA C509-94 Section 2.2.5. O-ring material shall conform to the requirements of AWWA C509-94 Section 2.2.6.

#### **2.4.7. Valve Stem O-Rings**

Valve stem O-rings shall be made from vulcanized natural-rubber or synthetic-rubber meeting or exceeding the requirements of ASTM D-2000 and shall have properties meeting or exceeding requirements of UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 16.

#### **2.4.8 Anti-Friction Washers**

Anti-friction washers at thrust bearings shall be made of thermoplastic material and have physical properties suitable for the application.

#### **2.4.9 Resilient Seats**

Resilient seats shall be made from vulcanized natural-rubber or synthetic rubber meeting or exceeding the requirements of both:

- .1 AWWA C509-94 Section 2.2.8 through 2.2.8.6.
- .2 UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 16. The



rubber compound shall conform to the requirements of ANSI.NSF Standard 61 entitled "Drinking Water Additives - Health Effects" as certified by NSF International, Underwriters Laboratories Inc., Underwriters Laboratories of Canada, or other third party certification agency acceptable to The City of Winnipeg.

#### **2.4.10 Corrosion Resistant Epoxy Coating for Internal Surfaces**

Internal surfaces of valve iron body components shall receive an internal corrosion resistant epoxy coating meeting or exceeding the requirements of:

- .1 AWWA C509-94 Sections 2.2.7.
- .2 AWWA C550-90 all sections except Section 5.1

Notes: The internal coating shall conform to the requirements of ANSI/NSF Standard 61 entitled "Drinking Water Additives Health Effects" as certified by NSF International, Underwriters Laboratories Inc., Underwriters Laboratories of Canada, or other third party certification agency acceptable to the City of Winnipeg.

Minimum dry film thickness for liquid epoxy and for fusion-bonded epoxy shall be 10 mils. (Reference AWWA C550-90 Section 4.2.2)

#### **2.4.11 Corrosion Resistant Epoxy Coating for External Surfaces**

External surfaces of valve iron body components shall receive an external coating of the same material as used for the internal coating. External coatings shall conform to the requirements of section 2.4.10.

#### **2.4.12 Di-electric Isolation Washers**

It is the preference of the City that the external stainless steel fasteners receive an epoxy coating after valve iron body components assembly in accordance with Section 2.4.11. In the event that the manufacturing process is incompatible with this, uncoated stainless steel fasteners shall be isolated from metallic contact with the iron body components through the use of di-electric isolation washers. Washers shall be made from natural rubber, synthetic rubber or thermoset plastic and shall have both high resistance to dynamic and static wear and have very low creep characteristics.

#### **2.4.13 Valve End Gaskets**

Valve end gaskets for push-on joints shall conform to the requirements of AWWA C111/A21.11-90.



## **2.5 DESIGN**

### **2.5.1 Resistance to Stress**

The input torque values contained in AWWA C509-94 are superseded by the torque values contained in UL Standard 262 Seventh Edition (May 27, 1994 Revision) Table 23.1 namely: 6": 325 foot-pounds; 8": 450 foot-pounds; 10": 640 foot-pounds; 12": 760 foot-pounds; and 14": 900 foot-pounds. Furthermore, internal valve parts shall be capable of withstanding input torque values as contained in UL Standard 262 Seventh Edition (May 27, 1994 Revision) Table 23.2 namely: 6": 487.5 foot pounds; 8": 675 foot-pounds; 10": 960 foot-pounds; 12": 1140 foot-pounds; and 14": 1350 foot-pounds. Values for 16" valves shall be extrapolated from Table 23.1 and Table 23.2 in UL Standard 262 Seventh Edition (May 27, 1994 Revision).

### **2.5.2. Basis of Structural Design**

The requirements of AWWA C509-94 section 3.1 apply except the input torque values shall be as per Section 2.5.1 of this specification.

### **2.5.3 Size of Waterway**

The requirements of AWWA C509-94 Section 3.2 apply. This requirement supersedes the "Exception" contained in UL standard 262 Seventh Edition, (May 27, 1994 Revision) Section 5.1.

### **2.5.4 Shell Wall Thickness**

The minimum gray iron or ductile iron wall thickness and the maximum relative area of minimum wall thickness for valve bodies and bonnets shall be in accordance with AWWA C509-94 Section 4.3.1.

### **2.5.5 External Fasteners**

All external fasteners shall have hexagonal heads or shapes and shall be made from 316 stainless steel conforming to the requirements of ASTM F593 and ASTM F594 for Alloy Group 2 Condition A (supersedes AWWA C509-94 Section 4.4). Should stainless steel fasteners not be epoxy coated after valve iron body components assembly in accordance with Section 2.4.12 di-electric isolation washers will be provided to isolate stainless steel bearing surfaces from gray iron or ductile iron components.

### **2.5.6 Internal Fasteners**

Where fasteners are used to attach the rubber seat ring to the valve disc the fasteners shall be made from 304 stainless steel or 316 stainless steel conforming to the requirements of ASTM F593 and ASTM F594 for alloy Group 1(304) or Alloy Group 2 (316).



### **2.5.7 Valve Ends**

Valve end connections shall be of the push-on joint type suitable for use with CIOD PVC water main pipe (supersedes AWWA C509-94 Section 4.5).

Each valve end shall have a factory inspected and installed elastomeric gasket. Elastomeric gaskets shall be in accordance with Section 2.4.13.

Each valve end shall be furnished with (2) 15/16" minimum diameter closed lugholes for tie-rodding purposes.

### **2.5.8 Guides**

Should guides be necessary they shall conform to AWWA C509-94 Section 4.6 and UL Standard 262, Seventh Edition (May 27, 1994 Revision) Section 5.4.

### **2.5.9 Stems and Stem Nuts**

Stems and stem nuts shall be made from copper alloys in accordance with Section 2.4.5.

Stem collars shall be made integral with stems in accordance with AWWA C 509-94 Section 4.7.1. The threads of stems and stem nuts (disc bushings) shall be of the ACME type conforming to the requirements of AWWA C509-94 Sections 4.7.1 and 4.7.3. At least one (1) anti-friction washer (thrust collar) shall be provided in the thrust bearing (stem collar) region. Anti-friction washers shall be in accordance with Section 2.4.8. The minimum stem diameters and minimum number of turns of stem to open shall be in accordance with AWWA C509-94 Table 4. (The values for 14" valves shall be interpolated from this table) The stem shall, when the valve is closed, enter the stem nut a distance equal to at least 1 1/4 times the outside diameter of the stem in accordance with UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 8.5. The stem shall be attached to the wrench nut by means such as a square tapered end or pinning the nut to the stem in accordance with UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 8.7.

### **2.5.10 Stem Seals**

Stem sealing shall be accomplished using O-rings. O-rings shall be in accordance with AWWA C509-94 Section 4.8.2 and 4.8.2.1 and UL Standard 262 Seventh Edition (May 27, 1994 Revision) Sections 13.1.

### **2.5.11 Wrench Nuts/Operating Nuts**

Wrench nuts/Operating nuts shall be made from grey iron, ductile iron, or brass. The grey iron shall conform to Section 2.4.1, the ductile iron to Section 2.4.2 and the brass to Section 2.4.5. Wrench nuts/Operating nuts shall be made in accordance with AWWA C509-94 Sections 4.11, 4.11.1, 4.11.2 and 4.11.4. Nuts shall be secured to the valve stem in accordance with UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 11.1. Opening direction shall be colour-coded in accordance with



AWWA Standard C509-94 Section 4.11.5. The City of Winnipeg uses valves having either counter clockwise or clockwise opening directions.

### **2.5.12 Valve Gates, Wedges or Discs**

Valve gates, wedges or discs shall be made from gray or ductile iron conforming to Sections 2.4.1 or 2.4.2 or from brass conforming to Section 2.4.5. Where ductile iron is used it shall receive a coating in accordance with Section 2.4.11 or it shall be totally encapsulated in resilient seat material.

Resilient valve seats shall be applied to the gate, wedge or disc and shall seat against smooth internal areas of the valve body. Where resilient seal rings are mechanically fastened to gates, wedges or discs the fasteners shall be in accordance with Section 2.5.6. Resilient seat material shall be a rubber material in accordance with Section 2.4.9. The resilient seat material shall meet or exceed performance requirements specified in AWWA C509-94 Section 4.16 and UL Standard 262 Seventh Edition (May 27, 1994 Revision) Sections 16,18 and 19.

### **2.5.13 Indicator Post Flanges**

Valves shall not be provided with indicator post flanges. This supersedes UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 12.

## **2.6 QUALITY-CONTROL TEST REQUIREMENTS**

### **2.6.1 Hydrostatic Leakage Testing**

Each resilient-seated gate valve shall exhibit no leakage when hydrostatically tested at the factory in accordance with UL Standard 262 Seventh Edition (May 27,1994 Revision) Sections 21.1, 21.2, 21.3 and 25.2 namely:

1. Resilient-Seat Leakage Test: 2 times rated working pressure with valve in closed position for a minimum duration of one minute with hydrostatic pressure applied between one end and the closed gate and then between the opposite end and the closed gate. The valve closing torque value shall not exceed the maximum value contained in Table 21.1 for the valve size being tested, namely: 110 foot-pounds for 6", 150 foot-pounds for 8"; 185 foot-pounds for 10", 225 foot-pounds for 12"and 14" and 275 foot-pounds for 16".
2. Shell or Body Leakage Test: Following the resilient-seat leakage test the body shall be tested at 2 times rated working pressure for a minimum duration of 15 seconds with the valve in the open position. There shall be no leakage through the body or permanent distortion.



### **3. MARKING REQUIREMENTS**

#### **3.1 AWWA Marking Requirements**

Each valve shall be marked in accordance with AWWA C509-94 Section 7.1 namely:

- .1 Manufacturer's name or trademark
- .2 Year of manufacture
- .3 Nominal size of valve
- .4 Rated Pressure (working Pressure).

Markings shall be cast on the body or bonnet of each valve.

#### **3.2 Underwriters Laboratories (UL) Marking Requirements**

In addition to the marking requirements identified in Section 3.1 the following additional marking requirements apply in accordance with UL Standard 262 Seventh Edition (May 27, 1994 Revision) Section 26, namely:

- .1 Distinctive model number, catalogue designation, or the equivalent.
- .2 If a manufacturer produces valves at more than one factory, each valve shall have a distinctive marking to identify it as the product of a particular factory.
- .3 Markings shall be in the form of cast letters at least 2" high and raised at least 0.03 inch from the body or bonnet. The manufacturer may, subject to the approval of the third party certification agency, provide some of the required marking information stamped into a stainless steel tag affixed to the valve.
- .4 Each, valve shall have UL or ULC label affixed/marketing in accordance with UL or ULC listing agreement. UL certification shall be on the basis of UL standard 262 Seventh Edition (May 27, 1994 Revision) "Standard for Gate Valves for Fire Protection Service UL 262 Seventh Edition". ULC certification shall be on the basis of ULC's standard "ULC/ORD-C262-1992, Gate Valves for Fire Protection Service".

Note: Notwithstanding provisions contained in their own standards both UL and ULC have informed the City of Winnipeg that they are prepared to certify products having features described in sections 2.5.11 and 2.5.3 of this standard, namely: clockwise opening valves and no indicator post flanges.



#### **4. PACKAGING & HANDLING**

##### **4.1 AWWA Requirements**

Valves shall be prepared for shipment in accordance with AWWA C509-94 Section 7.2 and AWWA C550-90 Section 7.

##### **4.2 City of Winnipeg Requirements**

Valves shall be packaged in such a manner that normal shipping and handling practices will not cause damage to the coating on the valve.

Valves shall be shipped with the valve in the closed position. Each valve shall be furnished with opaque weather resistant covers attached to the valve ends using the tie-rod holes. Valve end covers shall have a diameter approximately equal to the outside diameter of the valve end. The cover material shall be acceptable to the City of Winnipeg.

#### **5. CITY OF WINNIPEG APPROVAL**

The manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing resilient-seated gate valves for use in the City of Winnipeg. In addition to normal product information the manufacturer shall provide a copy of the UL listing agreement and an affidavit of compliance signed by two company signing officers stating that resilient-seated gate valves furnished for use in the City of Winnipeg comply with the requirements of the City of Winnipeg Specification No. AT4.1.1.80.

E. Burgener, P.Eng.  
Material and Service Standards Engineer



**THE CITY OF WINNIPEG**  
**STANDARD FOR GRAY OR DUCTILE IRON**  
**VALVE BOX UPPER CASINGS**  
**STANDARD NO. [AT-4.1.1.81](#)**

1992 05 08



## **1. SCOPE**

This standard shall apply to gray or ductile iron valve box upper casings approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements to apply to valve box upper casings purchased by the City of Winnipeg.

## **2. VALVE BOX UPPER CASINGS**

### **2.1 General**

Valve boxes provide access for operation of underground valves on mainline water and sewer piping. The hinged lid of the valve box upper casing reduces debris entry while providing access. Valve box upper casings telescope on the outside of the valve box lower casings thereby enabling adjustable valve box lengths.

Valve box upper casings approved for use in the City of Winnipeg shall conform to the requirements of this standard. A valve box upper casing shall generally be comprised of a gray or ductile iron hinged lid, a stainless steel hinge pin, and a gray or ductile iron upper casing.

### **2.2 Hinged Lid**

The hinged lid shall be made of either gray iron conforming to ASTM A48, class 30B, as a minimum or ductile iron conforming to the requirements of ASTM A536, grade 65-45-12, as a minimum. See Approved Products Drawing No. AP-001 for dimensions of the hinged lid.

The hinged lid shall be marked so as to provide at least the following information:

- Foundry name or a recognized abbreviation representing such.
- Pattern number or code identifying the component to the applicable pattern drawing.
- A raised letter “W” cast on the top of the hinged lid to represent a water valve. Lids shall also be available with an “S” for use on sewer valves. Letter shall be minimum 50 mm in height.

### **2.3 Hinge Pin**

The hinge pin apparatus shall consist of a 6 mm diameter stainless steel rod as shown on Approved Products Drawing No. AP-001.



## **2.4 Upper Casing**

The upper casing shall be made of either gray iron conforming to ASTM A48, class 30B, as a minimum, ductile iron conforming to ASTM A536, grade 65-45-12, as a minimum or steel conforming to ASTM A53-88 / A105-87 / A108-87 / A570-85, as a minimum. The upper casing can be cast either integrally or in two pieces with the upper section, which supports the lid, welded to the upper casing. See Approved Products Drawing No. AP-001 for dimensions of the upper casing. Where the upper casing is comprised of two pieces and the lower piece (barrel) is AWWA C151 ductile iron pipe, the top socket shall be ductile iron to ASTM A536, grade 65-45-12 and the pipe barrel shall be ductile iron 60-42-10 in accordance with AWWA C151. The ductile iron pipe shall be 8" class 50 ductile iron pipe, as a minimum. Where the upper casing is comprised of two pieces and the barrel is steel pipe, the top socket shall be ductile iron to ASTM A536, grade 65-45-12 and the pipe barrel shall be 8" schedule 20 steel pipe, as a minimum. All welds shall be continuous welds and shall conform to CSA Standard W59-1989.

Markings shall be located on the inside of the upper casing within 50 mm of the top of the upper casing, thereby enabling product identification after installation. The upper casing shall be marked so as to provide at least the following information.

- Foundry's name or a recognized abbreviation representing such.
- Pattern number or code identifying the component to the applicable pattern drawing.

## **2.5 Tolerances**

Unless otherwise specified, the dimensions on Approved Products Drawing No. AP-001 shall have a tolerance of  $\pm 2$  mm and an additional  $\pm 5$  mm per metre of dimension. Notwithstanding, hinged lids shall be interchangeable with upper casings.

The upper casings shall have a straightness tolerance of 5 mm horizontal to 1000 mm vertical.

## **2.6 Seating Surface**

The lid shall seat without rocking. If necessary, seating surfaces shall be machined.



## **2.7 Side Play**

Side play is defined as the maximum clearance between any two adjacent vertical surfaces in the same horizontal plane. Hinged lid side play within the upper casings shall not exceed 8 mm.

## **2.8 Workmanship and Finish**

Castings shall be of even grain and free of cracks, voids, blisters, and other imperfections that may impair serviceability.

## **2.9 Quality Control**

Foundries that manufacture valve box uppers, or parts thereof for the City of Winnipeg, must implement or maintain a quality control program that meets or exceeds CSA Standard Z299.3. Consequently, a quality control manual, as outlined in the above standard, shall be submitted to the City of Winnipeg for review prior to issuance of product approval as referred to in Section 3. In addition, the manual shall include a “Corrective Action” policy section for cases of non-conformance or test failure. Corrective action shall include:

- (i) A review and analysis of detected non-conformance and a subsequent corrective action to prevent recurrence.
- (ii) Initiation of corrective action when notified by the customer (City of Winnipeg) of the potential or actual non-conformance.
- (iii) Prompt implementation of corrective actions, ensuring that they are effective, and follow-up to ensure continued effectiveness.
- (iv) A regular report to appropriate levels of management of the causes of non-conformance and the corrective action taken.

## **2.10 Quality Assurance**

The foundry’s quality control manager shall provide a written affidavit of compliance stating that the valve box uppers, or parts thereof, furnished for use in the City of Winnipeg, comply with the requirements of the City of Winnipeg Standard No. AT-4.1.1.81. Where gray or ductile iron castings are subsequently assembled by another party both the foundry and the fabricator shall provide affidavits for work under their control.

## **3. CITY OF WINNIPEG APPROVAL**

The manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing gray or ductile iron valve box upper casings



for use in the City of Winnipeg. Where a party other than the foundry owns the patterns, both the party owning the pattern and the foundry shall jointly apply for written approval prior to furnishing gray or ductile iron valve box upper casings for use in the City of Winnipeg.

T.E.J. Kjartanson, P.Eng.  
Standards Engineer

TEJK/TSJ/pr



**THE CITY OF WINNIPEG**  
**STANDARD FOR GRAY OR DUCTILE IRON**  
**VALVE BOX EXTENSIONS**  
**STANDARD NO. [AT-4.1.1.82](#)**

August 18, 1992

Revised April 1, 1993



## **1. SCOPE**

This standard shall apply to gray or ductile iron valve box extensions approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements to apply to valve box extensions purchased by the City of Winnipeg.

## **2. VALVE BOX EXTENSIONS**

### **2.1 General**

Valve box extensions approved for use in the City of Winnipeg shall conform to the requirements of this standard. A valve box extension shall generally be comprised of a gray or ductile iron hinged lid, a stainless steel hinge pin, and a gray or ductile iron upper casing.

### **2.2 Hinged Lid**

The hinged lid shall be made of either gray iron conforming to ASTM A48, class 30B, as a minimum or ductile iron conforming to the requirements of ASTM A536, grade 65-45-12, as a minimum. See Approved Products Drawing No. AP-016 for dimensions of the hinged lid.

### **2.3 Hinge Pin**

The hinge pin apparatus shall consist of a 6 mm diameter stainless steel rod as shown on Approved Products Drawing No. AP-016.

### **2.4 Valve Box Extension**

The valve box extension shall be made of either gray iron conforming to ASTM A48, class 30B, as a minimum, ductile iron conforming to ASTM A536, grade 65-45-12, as a minimum or steel conforming to ASTM A53-88 / A105-87 / A108-87 / A570-85, as a minimum. See Approved Products Drawing No. AP-016 for dimensions of the valve box extension. Where the components are welded, all welds shall be continuous welds and shall conform to CSA Standard W59-1989.

### **2.5 Tolerances**

Unless otherwise specified, the dimensions on Approved Products Drawing No. AP-014 shall have a tolerance of  $\pm 2$  mm and an additional  $\pm 5$  mm per metre of dimension. Notwithstanding, hinged lids shall be interchangeable with valve box extensions.

The valve box extension shall have a straightness tolerance of 5 mm horizontal to 1000 mm vertical.



## **2.6 Seating Surface**

The lid shall seat without rocking. If necessary, seating surfaces shall be machined.

## **2.7 Marking Requirements**

### **2.7.1 Hinged Lid**

The hinged lid shall be marked so as to provide at least the following information:

- Foundry name or a recognized abbreviation representing such.
- Pattern number or code identifying the component to the applicable pattern drawing.
- A raised letter “W” cast on the top of the hinged lid to represent a water valve. Lids shall also be available with an “S” for use on sewer valves. Letter shall be minimum 50 mm in height.

### **2.7.2 Valve Box Extension**

Markings shall be located on the inside of the valve box extension within 50 mm of the top of the valve box extension, thereby enabling product identification after installation. The valve box extension shall be marked so as to provide at least the following information:

- Foundry name or a recognized abbreviation representing such.
- Pattern number or code identifying the component to the applicable pattern drawing.

## **2.8 Side Play**

Side play is defined as the maximum clearance between any two adjacent vertical surfaces in the same horizontal plane. Hinged lid side play within the upper casings shall not exceed 8 mm.

## **2.9 Workmanship and Finish**

Castings shall be of even grain and free of cracks, voids, blisters, and other imperfections that may impair serviceability.



## **2.10 Quality Control**

Foundries that manufacture valve box extensions, or parts thereof, for the City of Winnipeg, must implement or maintain a quality control program that meets or exceeds CSA Standard Z299.3. Consequently, a quality control manual, as outlined in the above standard, shall be submitted to the City of Winnipeg for review prior to issuance of product approval as referred to in Section 3. In addition, the manual shall include a “Corrective Action” policy section for cases of non-conformance.

Corrective action shall include:

- (i) A review and analysis of detected non-conformance and a subsequent corrective action to prevent recurrence.
- (ii) Initiation of corrective action when notified by the customer (City of Winnipeg) of the potential or actual non-conformance.
- (iii) Prompt implementation of corrective actions, ensuring that they are effective, and follow-up to ensure continued effectiveness.
- (iv) A regular report to appropriate levels of management of the causes of non-conformance and the corrective action taken.

## **2.11 Quality Assurance**

The foundry’s quality control manager shall provide a written affidavit of compliance stating that the valve box extensions, or parts thereof, furnished for use in the City of Winnipeg, comply with the requirements of the City of Winnipeg Standard No. AT-4.1.1.82 dated April 1, 1993. Where gray or ductile iron castings are subsequently assembled by another party, both the foundry and the fabricator shall provide affidavits for work under their control.

## **3. CITY OF WINNIPEG APPROVAL**

The manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing gray or ductile iron valve box extensions for use in the City of Winnipeg. Where a party other than the foundry owns the patterns, both the party owning the pattern and the foundry shall jointly apply for written approval prior to furnishing gray or ductile iron valve box extensions for use in the City of Winnipeg.

T.E.J. Kjartanson, P.Eng.  
Standards Engineer

TEJK/TSJ/MNS/pr/rgb/jb



**THE CITY OF WINNIPEG**

**STANDARD FOR BRASS CONNECTION SADDLES AND  
CORPORATION VALVE REDUCER BUSHINGS FOR CONNECTION  
OF CORPORATION VALVES TO PVC WATERMAINS**

**STANDARD No. [AT-4.1.2.30](#)**

**May 17, 1993**



## 1. SCOPE

This standard shall apply to brass connection saddles and reducer bushings approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to brass connection saddles and reducer bushings purchased by the City.

## 2. BRASS CONNECTION SADDLES AND REDUCER BUSHINGS

### 2.1 GENERAL

Brass connection saddles and reducer bushings approved for use in the City of Winnipeg shall conform to the requirements of this standard.

The connection saddle provides structural support to the corporation valve tapping into the polyvinyl chloride (PVC) watermain. The connection saddle shall generally be comprised of a brass body with a threaded corporation valve outlet and rubber gasket, and a solid brass strap in two or three sections connected by two (2) brass bolts per junction, with brass nuts and brass washers optional.

The reducer bushing provides a diameter reduction of the service connection from a nominal 50mm (2") connection saddle outlet to a nominal 19mm ( $\frac{3}{4}$ "), 25mm (1") or 38mm ( $1\frac{1}{2}$ ") corporation valve.

### 2.2 MATERIAL REQUIREMENTS

#### 2.2.1 *Brass Connection Saddles*

##### 2.2.1.1 Body

The body shall be made of Copper Alloy UNS No. C83600 (Waterworks Bronze, 85-5-5-5) conforming to the requirements of ASTM B62-90, or other approved copper alloy meeting or exceeding this copper content and these performance requirements.

##### 2.2.1.2 Bolts, Nuts and Washers

Bolts and nuts shall be made of Copper Alloy No. C65100 (Silicon Bronze). Bolts shall conform to the requirements of ASTM F468-90, as a minimum. Nuts, if used, shall conform to the requirements of ASTM F467-90, as a minimum. Washers, if used, shall be made of Copper Alloy No. C65100 (Silicon Bronze).

##### 2.2.1.3 Gasket

Elastomeric gaskets shall be made of an oil and gas resistant compound such as nitrile rubber, or other material specifically approved by the City of Winnipeg. The manufacturer shall provide complete descriptions of the material offered in accordance with the ASTM D2000-90 designation system.



### **2.2.2 Brass Reducer Bushings**

Reducer bushings shall be made of Copper Alloy UNS No. C83600 (Waterworks Bronze, 85-5-5) conforming to the requirements of ASTM B62-90, or other approved copper alloy meeting or exceeding this copper content and these performance requirements.

## **2.3 DESIGN REQUIREMENTS**

Connection saddles and reducer bushings shall generally assemble as shown in Figures 1 and 2. Connection saddles and reducer bushings shall be designed so as to provide a drip-tight connection when used to connect corporation valves to the PVC main. Connection saddles and reducer bushings shall not require special tools or equipment for installation.

### **2.3.1 Brass Connection Saddles**

#### **2.3.1.1 Size**

Connection saddles shall be suitable for use on Cast Iron Outside Diameter (CIOD) PVC pipe of nominal sizes 150mm and larger, approved for use in the City of Winnipeg (City of Winnipeg Standard No.'s At-4.1.1.10 dated May 9, 1990 and AT-4.1.1.11 dated March 19, 1990).

#### **2.3.1.2 Pressure Rating**

Connection saddles shall be designed for satisfactory use with water up to a temperature of 38 degrees Celsius (100°F) and a pressure of 1035 kiloPascals (150 psig).

#### **2.3.1.3 Body**

The body of the connection saddle shall be manufactured so as to conform to the outside configuration of the PVC watermain.

The outer wall of the body where the corporation valve outlet is located shall be manufactured so as to facilitate bracing with a crescent wrench.

##### **2.3.1.3.1 Outlet**

The outlet shall be threaded to receive either a 50mm (2") nominal size corporation valve, or a 50mm x 38mm (2" x 12"), 50mm x 25mm (2" x 1") or 50mm x 19mm (2" x 3/4") nominal size brass reducer bushing, and thus have corresponding internal threads conforming to the dimensions given for the 50mm (2") nominal size AWWA corporation valve external threads in Table 6 of AWWA Standard C800-89.

##### **2.3.1.3.2 Gasket Housing**

A groove shall be either cast or machined under the base of the threaded inlet to house the gasket, thus preventing gasket slippage and resisting cold flow and distortion.



#### **2.3.1.4 Strap**

The connection saddle strap shall consist of two (2) sections for use with 150mm (6") and 200mm (8") nominal CIOD PVC pipe, or three (3) sections for use with 250mm (10") and larger nominal CIOD PVC pipe. The width of each strap section shall not be less than 63mm (2½") at any point. The thickness of each strap section shall not be less than 4mm at any point.

The body section of the strap shall be capable of connecting with the other strap section(s) around the pipe to facilitate installation. All strap sections shall be solid with an exception being made if the fastening design requires access spaces.

Each strap section joint shall be fastened with two (2) bolts, and optional nuts and washers. Where nuts are used, strap sections shall be designed to prevent bolts from turning during tightening of nuts, or vice-versa.

#### **2.3.1.5 Gasket**

The integral gasket shall be confined to the groove in accordance with section 2.3.1.3.2 of this standard and cemented in place to prevent gasket slip during and after installation. The integral gasket shall provide a pressure tight seal against the PVC watermain. The manufacturer shall provide complete descriptions of the gasket seating design.

### **2.3.2 Brass Reducer Bushings**

The exposed surface of the reducer bushing shall be manufactured so as to facilitate installation with a standard size of wrench.

#### **2.3.2.1 Size**

Reducer bushings shall be suitable for threading into the 50mm (2") nominal size threaded outlet of the body of the connection saddle, and shall be able to receive corporation valves of the nominal 19mm (¾"), 25mm (1"), or 38mm (1½") size.

#### **2.3.2.2 Pressure Rating**

Reducer bushings shall be designed for satisfactory use with water up to a temperature of 38 degrees Celsius (100°F) and a pressure of 1035 kiloPascals (150 psig).

#### **2.3.2.3 Threading**

Reducer bushings shall be threaded into the outlet of the connection saddle, and thus shall have corresponding external threads conforming to the dimensions given for the 50mm (2") nominal size AWWA corporation valve external threads in Table 6 of AWWA Standard C800-89.

Reducer bushings shall be threaded to receive a 38mm (1½"), 25mm (1"), or 19mm (¾") nominal size corporation valve and thus have corresponding internal threads conforming to the dimensions given for the 38mm (1½"), 25mm (1") or 19mm (¾") nominal size AWWA corporation valve external threads in Table 6 of AWWA Standard C800-89.

## **2.4 MARKING REQUIREMENTS**

### **2.4.1 Brass Connection Saddles**



Each body and strap component of all connection saddles shall be marked on the outside wall so as to provide at least the following information:

- manufacturer's name or a recognized abbreviation of such;
- pattern or part number;
- saddle size and/or AWWA C900 or C905 nominal pipe size.

All markings, including any additional markings on the inside wall of the body or strap components, shall be recessed so as not to impair the serviceability of the saddle.

#### **2.4.2 Brass Reducer Bushings**

Each reducer bushing shall be marked on an exposed surface so as to provide at least the following information:

- manufacturer's name or a recognized abbreviation of such;
- pattern or part number (optional);
- bushing size (optional).

The pattern or part number and the bushing size shall be clearly marked on individual packages. All bushing markings, including any additional markings not on an exposed surface, shall be recessed so as not to impair the serviceability of the reducer bushing.

### **2.5 WORKMANSHIP AND FINISH**

Connection saddles and reducer bushings shall be free of sharp edges, metal chips and filings. Castings shall be of even grain and free of cracks, voids, blisters, and other imperfections that may impair serviceability.

### **2.6 PACKAGING**

Connection saddles and reducer bushings shall be complete and ready for installation when shipped. A plastic coating, or other means acceptable to the City shall protect all exposed metal threads, during shipping and handling.

### **2.7 INSTALLATION INSTRUCTIONS**

The manufacturer shall furnish clear, concise installation instructions for connection saddles and reducer bushings.

### **2.8 QUALITY ASSURANCE**

A signing officer of the manufacturing company shall furnish an affidavit of compliance stating that brass connection saddles and/or reducer bushings furnished for use in the City of Winnipeg shall comply with the requirements of the City of Winnipeg Standard AT-4.1.2.30 dated May 17, 1993.



### 3. CITY OF WINNIPEG APPROVAL

Notwithstanding section 2.8 of this standard, the manufacturer shall apply for and be in receipt of written approval from the City of Winnipeg prior to furnishing brass connection saddles and/or reducer bushings for use in the City of Winnipeg. Where patterns are owned by a party other than the manufacturer, the party owning the pattern and the manufacturer shall jointly apply for written approval from the City of Winnipeg prior to furnishing brass connection saddles and/or reducer bushings for use in the City of Winnipeg.

### 4. REFERENCES

ASTM B 62-90

*Composition of Bronze or Ounce Metal Castings*

ASTM F 467-90

*Nonferrous Nuts for General Use*

ASTM F 468-90

*Nonferrous Bolts, Hex Cap Screws, and Studs for General Use*

ASTM D 2000-90

*Standard Classification System for Rubber Products in Automotive Applications*

AWWA C800-89

*Underground Service Line Valves and Fittings*

AWWA C900a-92

*Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution*

AWWA C905-88

*Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 in. Through 36 in.*

City of Winnipeg Standard No. AT-4.1.1.10

*Polyvinyl Chloride (PVC) Watermain Piping in Nominal Diameters 6 in. Through 12 in.*

City of Winnipeg Standard No. AT-4.1.1.11

*Polyvinyl Chloride (PVC) Watermain Piping in Nominal Diameters 14 in. Through 20 in.*

T.E.J. Kjartanson, P.Eng.  
Standards Engineer

MNS: TEJK: jm: jb

May 17, 1993



**THE CITY OF WINNIPEG**  
**STANDARD FOR BRASS CORPORATION STOPS**  
**STANDARD NO. [AT-4.1.2.31](#)**

1989 11 21



## **1. SCOPE**

This standard shall apply to brass corporation stops approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements to apply to brass corporation stops purchased by the City of Winnipeg.

## **2. BRASS CORPORATION STOPS**

### **2.1 General**

This standard applies to  $\frac{3}{4}$ ", 1", 1½" and 2" nominal size brass corporation stops to be used with Type K copper tubing water connection pipe. All corporation stops shall be suitable for insertion into water mains under pressure.

### **2.2 Pressure Rating**

Corporation stops shall be designed for satisfactory use with water up to a temperature of 100 degrees Fahrenheit and a pressure of 150 pounds per square inch.

### **2.3 Materials of Manufacture**

Brass castings, nuts and washers shall comply with AWWA Standard C800-84 Section 2.1, namely Copper Alloy No. C83600 in accordance with the requirements of ASTM B62 or B584 nominally containing 85 percent copper and 5 percent each tin, lead and zinc.

### **2.4 Dimensions**

The corporation stop shall be of one-piece body construction and the dimensions shall be suitable for direct tapping installation using standard tapping machines. The minimum inside diameter and the overall body dimensions for the nominal sizes given in 2.1 shall be in accordance with Tables 1 and 2 respectively in AWWA Standard C800-84.

### **2.5 Valve Type**

Corporation stops shall be of the tapered plug valve type with integrally cast operating heads suitable for operation using two smooth jawed wrenches ("Crescent wrenches"). The plug shall be cast from the same material as the body (See Section 2.3). The plug and corporation stop body shall be individually fitted and precision machined to obtain a mated fit. Machining tolerances shall be such



that a drip tight shut off at an operating pressure of 150 psi is obtained using a grease lubricant only.

## **2.6 Inlet End**

The inlet side of the corporation stop shall have standard AWWA corporation stop inlet threads conforming to the dimensions given in Table 3 and the standards of AWWA Standard C800-84.

## **2.7 Outlet End**

The outlet side of the corporation stop shall have external threads and a “bull nose” end for use with flared Type K copper tubing. The outlet end shall conform to Table 4, Figure 2 and the standards of AWWA Standard C800-84 for a flared outlet end.

## **2.8 Outlet End Coupling Nut**

The outlet end coupling nut shall be suitable for use with flared Type K copper tubing and shall conform to Table 5, Figure 3 and the standards of AWWA Standard C800-84 for flared outlet and coupling nuts. The length of the straight smooth barrel of the coupling nut as measured from the smooth barrel end of the nut to the beginning of the flaring curve shall be equal to or greater than the nominal size of the connection pipe.

## **2.9 Factory Testing**

The manufacturer shall factory test each corporation stop. Testing shall be conducted using air under water. The valves shall be tested in the open position to verify the shell and in the closed position to verify the seal. In the closed position the sealing test shall be conducted twice, initial closed position and then following 180 degrees rotation of the plug. Air pressure during testing shall be a minimum of 85 psig. Test duration shall be a minimum of 15 seconds. No leaks are permitted. Testing methods other than air under water shall be subject to the City’s approval. The manufacturer shall provide an overall affidavit signed by an officer of the company that the corporation stops furnished comply with applicable provisions of this section.

## **2.10 Marking**

The manufacturer’s name or trademark and the nominal size of the corporation stop shall appear on the body of the corporation stop and on the coupling nut.



### **2.11 Packaging**

A plastic coating or other means acceptable to the City shall protect all exposed threads during shipping and handling.

### **2.12 Installation Instructions**

The manufacturer shall furnish clear, concise installation instruction.



**The City of Winnipeg**

**Standard for  
Minneapolis Style  
Brass Curb Ball Valves**

**Standard No. [AT-4.1.2.40](#)**

**2007 07 01**



## **1. SCOPE**

This standard shall apply to “Minneapolis Style” brass curb ball valves approved for use in the City of Winnipeg.

It is noted that AWWA Standard C800 entitled “AWWA Standard for Underground Service Line Valves and Fittings” has been used as a reference document in the preparation of this standard to describe certain minimum product requirements. As this City of Winnipeg standard describes requirements which are over and above those contained in AWWA C800, in the event of any inconsistency between any clause of this standard and anything contained in AWWA C800, this standard shall prevail.

It is further noted that this standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to Minneapolis style brass curb ball valves purchased by the City of Winnipeg.

## **2. REQUIREMENTS**

### **2.1 General**

This standard applies to 19 mm, 25 mm, 38 mm and 50 mm nominal size Minneapolis style brass curb ball valves to be used with Type K seamless copper water tube conforming to ASTM B88. All Minneapolis style brass curb ball valves supplied for use within the City of Winnipeg shall be of the “non-draining” type of design.

All Minneapolis style brass curb ball valves supplied for use within the City of Winnipeg shall conform to the requirements of and be certified in accordance with NSF 61 standards.

### **2.2 Pressure Rating**

All Minneapolis style brass curb ball valves supplied for use within the City of Winnipeg shall be designed for satisfactory use with potable water up to a temperature of 38° C (100° F) and a pressure of 1050 kPa (150 psi).



### **3. MATERIALS**

#### **3.1 Body**

All copper based alloy components exposed to the water shall be made from ASTM B62, ASTM B584, Alloy C83600, 85-5-5-5 cast brass. Copper based alloy components not exposed to the water shall be made from ASTM B62, ASTM B584, Alloy 83600, 85-5-5-5 brass or other copper alloy containing not less than 85% copper specifically approved for use by the City of Winnipeg. This is to include but not limited to the body pieces, ball, stem, cap, fasteners, pins, restrainers, and all other copper based alloy components.

#### **3.2 Seats**

The seats that seal against the ball shall be made of Buna N nitrile rubber suitable for water service with a compression set of less than 40% as determined by ASTM D395, method B, for 22 hours at 100° C (212°F).

#### **3.3 Ball**

The ball shall be coated on the external spherical surface with a PTFE coating such as Teflon fluorocarbon suitable for potable water.

#### **3.4 O Rings**

The operating stem O-rings shall be made from Buna N rubber or EPDM rubber compound. The operating stem shall be equipped with two separate and independent O-ring grooves, each with its own O-ring to provide a true, independent, double O-ring seal on the operating stem.

#### **3.5 Alternate Materials**

Any alternate material that does not meet the present standard but does present a technological improvement will be considered dependent upon independent laboratory and/or field testing to ascertain its effectiveness. The duration and type of testing will be at the discretion of the City of Winnipeg.



## **4. DESIGN**

### **4.1 Body**

The upper most part of the valve body shall be threaded (Minneapolis style) with nominal IPT for threaded attachment of the curb valve box. The threaded connection between valve body parts shall be locked and sealed by an anaerobic thread locking and sealing compound.

### **4.2 Ball Valve**

The ball valve shall provide a full round port flow path that passes completely through the valve with a minimum inside diameter of the nominal size of the curb valve. The port shall be unobstructed.

### **4.3 Stem**

The valve-operating stem shall be of “blow-out proof” stem design. The valve-operating stem shall have a two O-ring top seal. This seal shall prevent ground water and contaminants from entering the valve body and act as a pressure seal when the valve is in the open position.

### **4.4 Operating Head**

The head of the valve operating mechanism shall be parallel to the flow way of the valve when the valve is in the open position and perpendicular to the flow-way of the valve when the valve is closed.

The head shall be rectangular in shape with the following approximate dimensions:

<b>Ball Curb Valve Nominal Size</b>	<b>Operating Head Dimensions</b>		
	<b>Thickness</b>	<b>Height</b>	<b>Width</b>
19 mm	9.525mm	15.875mm	31.750mm
25 mm	9.525mm	15.875mm	31.750mm
38 mm	12.700mm	19.050mm	50.800mm
50 mm	12.700mm	19.050mm	50.800mm

The Minneapolis style curb valve shall have a 90° (¼ turn) operation from the full open to the full closed position. Stops shall be provided at the full open and full closed positions.



#### **4.5 Inlet and Outlet End**

The end connections of the Minneapolis style ball curb valve shall have external threads and “bullnose” ends for use with flared Type K copper tubing. The end connections shall conform to AWWA Standard C800 as shown in Figure 5 and dimensioned in Table 4.

#### **4.6 Coupling Nuts**

The Minneapolis style ball curb valve shall be provided with coupling nuts for use with flared copper water service tube in accordance with AWWA Standard C800 as shown in Figure 3 and dimensioned in Table 5.

#### **4.7 Electrical Resistance**

The Minneapolis style ball curb valve shall have a maximum electrical resistance of 0.005 ohms at any position of the ball valve. An open circuit at any position will not be accepted. The conductivity shall be measured across the valve by attaching copper water tube to each end connection and taking electrical measurements via the copper tube adjacent to each end connection.

#### **4.8 TORQUE REQUIREMENTS**

##### **4.8.1 Operating Torque Values**

The Minneapolis style ball curb valve shall be capable of operation at the following maximum torque values for the nominal valve size noted.

<b>Ball Curb Valve Nominal Size</b>	<b>Maximum Starting Torque</b>	<b>Maximum Running Torque</b>
19 mm	6.779 N·m	3.390 N·m
25 mm	13.558 N·m	6.779 N·m
38 mm	27.116 N·m	13.558 N·m
50 mm	40.675 N·m	20.337 N·m

*\* 1 N·m is equal to 0.737562 lbf ft*



#### **4.8.2 Minimum Yield Torque Values of 90° Operation Stops**

The 90° operation stops referenced in Section 3.4 shall not yield below the torque values for the curb valve sizes indicated. Furthermore, the stem shall not over-ride the stops at or below these torque values.

<b>Ball Curb Valve Nominal Size</b>	<b>Minimum Yield Torque</b>
19 mm	135.582 N·m
25 mm	169.478 N·m
38 mm	203.373 N·m
50 mm	237.269 N·m

#### **4.8.3 Minimum Yield Torque Values of Ball Valve-To-Stem Connection**

There shall be no yielding of the valve stem or ball valve at the valve-to-stem connection at the minimum torque values for the nominal ball curb valve sizes indicated.

<b>Ball Curb Valve Nominal Size</b>	<b>Ball Valve-To-Stem Connection Minimum Torque Value</b>
19 mm	61.012 N·m
25 mm	101.686 N·m
38 mm	135.582 N·m
50 mm	169.477 N·m

#### **4.9 FACTORY TESTING**

Each Minneapolis style ball curb valve shall be tested at the factory to verify drip tight sealing under the following conditions:

1. Open position (shell test) – 1050 kPa minimum
2. Closed position (high pressure seal test) – 1050 kPa minimum
3. Closed position (low pressure seal test) –70 kPa maximum

Testing shall be conducted using air under water or an electronic air pressure decay method. Test duration shall be a minimum of 18 seconds. No leaks are permitted. Other testing methods shall be subject to the City's approval.



## **5. MARKING**

The Manufacturer's name or trademark and the nominal size of the Minneapolis style ball curb valve shall appear on the body of the ball curb valve and on the coupling nuts.

## **6. WORKMANSHIP AND FINISH**

Minneapolis style brass curb ball valves shall be free of sharp edges, metal chips and filings. Castings shall be of even grain and free of cracks, voids, blisters, and other imperfections that may impair serviceability.

## **7. PACKAGING**

The exposed Minneapolis style threads shall be protected by a plastic covering or other means acceptable to the City of Winnipeg during shipping and handling.

## **8. INSTALLATION INSTRUCTIONS**

Clear, concise installation instructions shall be furnished by the manufacturer.

## **9. QUALITY ASSURANCE**

The manufacturer shall provide an overall written affidavit of compliance signed by a signing officer of the company stating that the Minneapolis style brass curb ball valves, or parts thereof, furnished for use in the City of Winnipeg, comply with the requirements of the City of Winnipeg Standard No. AT-4.1.2.40. Where the Minneapolis style brass curb ball valves are subsequently assembled by another party both the parties shall provide affidavits for work under their control.



## 10. CITY OF WINNIPEG

Notwithstanding Section 9 of this standard, the manufacturer shall apply for and be in receipt of written approval from the City of Winnipeg prior to furnishing Minneapolis style brass curb ball valves for use in the City of Winnipeg. Where patterns are owned by a party other than the manufacturer, the party owning the pattern and the manufacturer shall jointly apply for written approval from the City of Winnipeg prior to furnishing Minneapolis style brass curb ball valves for use in the City of Winnipeg.

## 11. REFERENCES

ASTM B62

*Composition of Bronze or Ounce Metal Castings*

ASTM B88

*Standard specification for seamless copper water tube*

ASTM B584

*Standard specification for copper alloy sand castings for general applications*

ASTM D395

*Standard test methods for rubber property - compression set*

ASTM D2000

*Standard Classification System for Rubber Products in Automotive Applications*

AWWA C800

*Underground Service Line Valves and Fittings*

NSF/ANSI 61

*Drinking Water System Components - Health Effects*



**THE CITY OF WINNIPEG**

**SPECIFICATION FOR CURB VALVE STOP BOXES, MINNEAPOLIS STYLES:**

**NOMINAL SIZES 20mm, 25mm, 38mm, AND 50mm (3/4", 1", 1½", 2")**

**AND STYLE AP-003:**

**NOMINAL SIZES 20mm AND 25mm (3/4" AND 1")**

**SPECIFICATION [AT-4.1.2.41](#)**

February 3, 1997



## **1. SCOPE**

- 1.1 This specification shall apply to Curb Valve Stop Boxes approved for use in The City of Winnipeg's water distribution system. This specification shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to curb stop boxes purchased by the City of Winnipeg.
- 1.2 Curb Valve Stop Boxes shall conform to the requirements, both performance and material, as specified herein, unless otherwise approved as an equal.
- 1.3 Curb Valve Stop Boxes covered by this specification are nominal size 20mm to 50mm(3/4" to 2")

## **2. DESIGN**

- 2.1 Materials are as specified in drawings AP-003, AP-013, and AP-014, contained herein. Anode Wire type RWU90 is an acceptable alternate to TWU wire.
- 2.2 All Curb Stop Boxes shall be factory fitted with anode lead wires to facilitate the field attachment of anodes, as specified in attached drawings.

## **3. MARKING REQUIREMENTS**

Each valve shall be marked as follows:

- a) Manufacturer's name or trademark
- b) Nominal size
- c) Size of Curb Valve threads, if applicable.

## **4. PACKAGING**

Curb Valve Boxes shall be prepared for shipment by taping, wrapping or otherwise restraining the parts from being separated.

## **5. CITY OF WINNIPEG APPROVAL**

The manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing Curb Valve Stop Boxes for use in the City of Winnipeg.

E. Burgener, P.Eng.  
Material and Service Standards Engineer



**The City of Winnipeg**

**Standard for  
Curb Stop  
Service Boxes  
In Nominal Sizes  
20mm, 25mm, 38mm, and 50mm  
(3/4", 1", 1 1/2" and 2")**

**Standard No. AT-4.1.2.42**



## **1. SCOPE**

This standard shall apply to all curb stop valve boxes approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to all service boxes purchased by the City of Winnipeg.

## **2. REQUIREMENTS**

### **2.1. General**

All service boxes shall be designed to accommodate curb stop valves in nominal size 20mm through to 50mm (3/4" to 2"). All service boxes shall conform to the requirements, both performance and material, as specified herein, unless otherwise approved by the City of Winnipeg as an equal.

## **3. MATERIALS**

### **3.1. Cap**

The City of Winnipeg Standard curb stop service box cap shall be constructed of cast ductile iron, ASTM A536 grade 65-45-12 or gray iron ASTM A48 grade 30B with a threaded brass pentagon plug as per detail drawing AP-019.

### **3.2. Upper**

The upper section of the City of Winnipeg Standard curb stop curb stop service box shall be constructed of a 31.75mm, Schedule 40 Type 304 stainless steel pipe as per detail drawing AP-019.

### **3.3. Lower**

The lower section of the City of Winnipeg Standard curb stop curb stop service box shall be constructed of a 25.40mm, Schedule 40 Type 304 stainless steel pipe as per detail drawing AP-019.



### **3.4. Bolts and Set Screws**

All bolts and set screws supplied with the City of Winnipeg Standard curb stop service box shall be made of alloy 304 stainless steel condition CW or SH conforming to the requirements of ASTM F593.

### **3.5. Boot and Base**

The City of Winnipeg Standard curb stop service box boot and base shall be constructed of either;

- An injection molding grade ABS (Acrylonitrile Butadiene Styrene) or other approved thermosetting polymer or,
- An epoxy coated ductile iron, ASTM A536 grade 65-45-12 or gray iron, ASTM A48 grade 30B.

### **3.6. Spindle**

The City of Winnipeg Standard curb stop service box shall include a 12.70mm type 304 stainless steel spindle as per detail drawing AP-019. The pin to attach the spindle to the brass curb ball valve shall also be of type 304 stainless steel.

### **3.7. Locator Magnet and Sleeve**

The City of Winnipeg Standard curb stop service box shall include a 50mm ceramic or equivalent, magnetic locator with a minimum pull of 111 N (25 lbs).

The locator magnet sleeve shall be manufactured of DOM Structural Round Steel Tube or equivalent and shall be epoxy coated.

### **3.8. Epoxy Coating**

All components specified as requiring an epoxy coating shall receive a corrosion resistant epoxy coating meeting or exceeding the requirements of AWWA C213.

The Minimum dry film thickness for liquid epoxy and for fusion-bonded epoxy shall be 10 mils.

### **3.9. Alternate Materials**

Any alternate material that does not meet the present standard but does present a technological improvement will be considered dependent upon independent laboratory and/or field testing to ascertain its effectiveness. The duration and type of testing will be at the discretion of the City of Winnipeg.



## **4. DESIGN**

### **4.1. Cap**

The City of Winnipeg Standard curb stop service box shall be designed as per detail drawing AP-019.

### **4.2. Upper**

The upper section of the City of Winnipeg Standard curb stop service box shall be designed as per detail drawing AP-019.

### **4.3. Lower**

The lower section of the City of Winnipeg Standard curb stop service box shall be designed as per detail drawing AP-019.

### **4.4. Bolts and Set Screws**

All bolts and set screws used on the City of Winnipeg Standard curb stop service box shall be manufactured as per ASTM F593 and detail drawing AP-019.

Bolts and set screws shall be 3/8" National Coarse Roll Thread (NC) track head.

### **4.5. Boot and Base**

The City of Winnipeg Standard service box boot and base shall be designed to accommodate both Minneapolis and non-Minneapolis pattern brass curb ball valves specified in the City of Winnipeg Standard, AT-4.1.2.40 in nominal sizes of 20mm, 25mm, 38mm and 50mm.

### **4.6. Spindle**

The City of Winnipeg Standard curb stop service box shall be designed as per detail drawing AP-019. The spindle shall be designed so the spindle remains centred within both the upper and lower sections of the service box at all times.

### **4.7. Locator Magnet and Sleeve**

The City of Winnipeg Standard curb stop service box shall include a locator magnet and sleeve as per detail drawing AP-019. The locator magnet and sleeve shall be located immediately below the service box cap.



## **5. MARKING**

The Manufacturer's name or trademark and the nominal size(s) of the curb stop valve(s) shall appear on the boot of the service box.

## **6. WORKMANSHIP AND FINISH**

All curb stop service box components shall be free of sharp edges, metal chips and filings. Castings and moldings shall be of even grain and free of cracks, voids, blisters, and other imperfections that may impair serviceability or pose a hazard to the installed or general public.

All exposed cast or ductile iron parts shall be free of burrs and sharp edges prior to application of the epoxy coating.

## **7. PACKAGING**

All curb stop service boxes shall be shipped complete and shall be packaged in such a manner that normal shipping and handling practices will not cause damage to the curb stop service box or its components.

## **8. INSTALLATION INSTRUCTIONS**

The manufacturer shall provide clear concise installation instructions for all curb stop service boxes approved for use in the City of Winnipeg.

## **9. QUALITY ASSURANCE**

The manufacturer shall provide an overall written affidavit of compliance signed by a signing officer of the company stating that the curb stop valve boxes, or parts thereof, furnished for use in the City of Winnipeg, comply with the requirements of the City of Winnipeg Standard No. AT-4.1.2.42. Where the curb stop valve boxes are subsequently assembled by another party both the parties shall provide affidavits for the work under their control.



## **10. CITY OF WINNIPEG**

Notwithstanding Section 9 of this standard, the manufacturer shall apply for and be in receipt of written approval from the City of Winnipeg prior to furnishing curb stop service boxes for use in the City of Winnipeg. Where patterns are owned by a party other than the manufacturer, the party owning the pattern and the manufacturer shall jointly apply for written approval from the City of Winnipeg prior to furnishing curb stop service boxes for use in the City of Winnipeg.

## **11. REFERENCES**

ASTM A48

*Standard Specification for Gray Iron Castings*

ASTM A536

*Standard Specification for Ductile Iron Castings*

ASTM F593

*Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs*

AWWA C213

*Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines*



THE CITY OF WINNIPEG  
SPECIFICATION FOR GALVANIC ZINC ANODES  
SPECIFICATION NO. [AT-4.1.3.20](#)

October 23, 1997



## 1. Scope

This specification shall apply to galvanic zinc anodes approved for use in the City of Winnipeg.

This specification shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to galvanic zinc anodes purchased by the City.

## 2. Galvanic Zinc Anodes

### 2.1 General

Galvanic zinc anodes approved for use in the City of Winnipeg shall conform to the requirements of this specification. A galvanic zinc anode shall be generally comprised of an insulated electrical copper lead wire, Type II Zinc casting, a cardboard tube, and low resistivity backfill. References to the weight of the zinc anode shall be understood to mean the weight of the zinc in the packaged anode.

### 2.2 Insulated Electrical Copper Lead Wire

The anode lead wire shall be at least 3.0 metres (length extending beyond zinc casting) of No. 10 American Wire Gauge (AWG) standard (7 strand) copper wire with white TWU minus 40EC insulation conforming to CAS Spec. C22.2 No. 75 or, #8 RWU 90 strand copper cable with blue insulation.

### 2.3 Zinc

Galvanic zinc anodes shall be made of zinc conforming to ASTM B 418-88 Type II. The zinc shall have the following composition:

Aluminium	0.005% maximum
Cadmium	0.003% maximum
Iron	0.004% maximum
Lead	0.003% maximum
Copper	0.002% maximum
Zinc	Reminder

An independent testing laboratory shall determine zinc composition and test results verifying compliance to this City of Winnipeg specification shall be provided. Sampling and methods of zinc anode chemical analysis shall be in accordance with ASTM B 418-88.

The zinc shall be cast directly around a minimum 3.17mm (0.125 inch) diameter galvanized steel core. The lead wire shall be connected to the steel core with silver



solder and the connection shall be insulated by filling the recess and any voids in the lead wire connection with an electrical potting compound.

#### 2.4 Cardboard Tube

The galvanic zinc anode shall be packaged in a rugged water permeable cardboard tube having a minimum wall thickness of 2.3 mm. The diameter and length of the cardboard tube shall suit the dimensions of the zinc casting plus backfill material cover requirements of minimum 25 mm between any surface of the zinc and the cardboard tube (including tube ends). The cardboard tubes shall be provided with plastic caps at both ends and devices to hold the anode in the centre of the tube. The cardboard tubes used to package anodes shall have sufficient strength to permit normal shipping and handling without failure.

#### 2.5 Low Resistivity Backfill

Galvanic zinc anodes shall be packaged in a low resistivity (45 ohmcm maximum) gypsum/bentonite backfill with the following nominal composition:

Ground Hydrated Gypsum	75-77%
Powdered Wyoming Bentonite	15-20%
Anhydrous Sodium Sulphate	5-8%

The backfill shall have a grain size so that 100% is capable of passing through a #20 mesh screen and a #100 mesh screen will retain 50%.

The backfill shall be firmly packaged around the anode by means of adequate vibration. Backfill material shall be of sufficient quantity to cover all zinc anode surfaces to a minimum thickness of 25mm.

#### 2.6 Anode Size

The standard zinc anode weights for the City of Winnipeg shall be 10.9 Kg and 42 Kg. The length of this size of anode shall be approximately 1.2 m for the 10 Kg unit, and 0.71 m for the 42 Kg unit. (Lengths +/- 10 cm)

#### 2.7 Marking Requirements

All anodes shall be labelled or marked providing, as a minimum, the following information:

- Manufacturer's name



- Location of manufacture
  - Type of anode (Zinc: Type II to ASTM B418-88)
  - Zinc Weight
- 
- Date of manufacture, lot number or some other specific casting identification information.

### **3. City of Winnipeg Approval**

Notwithstanding Section 2.8 of this specification the manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing zinc anodes for use in the City of Winnipeg.

ECB/lm  
October 23, 1997



**The City of Winnipeg**

**Standard For**

**Extruded Polyvinyl Chloride (PVC) Mainline Sewer Pipe**

**in Diameters 250 mm (10") Through 675mm (27")**

**Standard No. [AT-4.2.1.10](#)**

**August 9, 1996**



## **1. SCOPE**

This standard shall apply to all solid wall extruded polyvinyl chloride (PVC) mainline sewer pipe in diameters 250 mm (10") through 675mm (27") approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City of Winnipeg may impose contractual requirements and supplemental technical requirements to apply to extruded PVC sewer pipe purchased by the City.

## **2. EXTRUDED PVC MAINLINE SEWER PIPE**

### **2.1 GENERAL**

Extruded PVC mainline solid wall sewer pipe approved for use in the City of Winnipeg shall have a maximum dimension ratio (SDR) of 35, and conform to the requirements of this standard.

### **2.2 MATERIAL REQUIREMENTS**

#### **2.2.1 PVC Sewer Pipe**

All materials used for extruded PVC sewer pipe shall be in accordance with sections 4.1.1, 4.1.3 and 4.2 of CSA Standard No. B182.2-M90 (referred to hereinafter as CAN/CSA B182.2-M90). However, pipe shall be extruded from a PVC compound having a cell classification of 12454-C or 12364-C as defined by ASTM Standard D1784. Different cell classifications may be used provided that all properties are equal to or superior to those of the specified compounds.

#### **2.2.2 Elastomeric Gaskets**

Elastomeric gaskets shall be manufactured from material that complies with the physical requirements specified in;

-section 6.2.1 of CAN/CSA-B.182.2-M90.

-sections 6.2, 6.3 and 7.8 of the ASTM standard F 477-90 and related ASTM testing.

Gasket material shall be designated in accordance to ASTM Standard D 2000, and the date of manufacture of gaskets shall not precede the date of pipe manufacture by more than 6 months unless a written warranty, verifying a longer gasket shelf life, is provided by the gasket manufacturer.

## **2.3 DIMENSIONAL REQUIREMENTS**

### **2.3.1 Pipe Dimensions**

The pipe diameter and out of roundness tolerance shall comply with section 5.2.1 and 5.2.3 (respectively) of CAN/CSA-B182.2-M90. The minimum wall thickness of all fittings shall be Standard Dimension Ratio (SDR) 35 as defined in section 5.2.2 of CAN/CSA-B182.2-M90. Pipe stiffness shall comply with section 5.5 of CAN/CSA-B182.2-M90 or as alternate, section 8.8 of ASTM D3034 up to and including 375mm (15") and section 6.6 of ASTM F679 for sizes 450mm (18") through 675mm (27") diameter.



### **2.3.2 Joint Design**

The joints of extruded PVC sewer pipe shall generally be designed in accordance with CAN/CSA B182.2-M90 section 5.3.

#### **2.3.2.1 Socket Dimensions**

Socket dimensions of all extruded PVC sewer pipe shall be in accordance with section 5.3.2.1 of CAN/CSA B182.2-M90. In addition, joints shall have dimensions that will accommodate pipes having the average outside diameters detailed in Table 1 of CAN/CSA Standard B182.2-M90.

#### **2.3.2.2 Elastomeric Gasket Dimensions**

Elastomeric gasket dimensions shall conform to section 6.2.1.1 of CAN/CSA B182.2-M90.

## **2.4 MARKING REQUIREMENTS**

### **2.4.1 Extruded PVC Sewer Pipe**

Extruded PVC sewer pipe shall be marked on the exterior in accordance with CAN/CSA B182.2-M90 sections 11.1.1 and 11.1.2. In addition, extruded PVC sewer pipe shall include the following markings:

- i) The manufacturer's production code, including plant, year, month, day and extruder of manufacturer.

### **2.4.2 Elastomeric Gaskets**

Elastomeric gaskets shall be marked in accordance with ASTM F 477 section 11.1, and shall include at least the following markings\* :

- i) Date code (year and quarter);
- ii) Name of manufacturer;
- iii) Nominal size.

\* - If the gasket is an integral part of the pipe - i.e. non-removable as a result of the extruding process - then these markings need not appear on the gasket. However, this information must then clearly appear on the pipe.

## **2.5 QUALITY CONTROL REQUIREMENTS**

The manufacturer shall conduct all quality control testing for the extruded PVC sewer pipe in diameters 250mm (10") through 375mm (15") as described in sections 9, 10.1, 10.2, 10.7, 10.8, and 10.9 of CAN/CSA-B182.2-M90. Further, extruded PVC sewer pipe in diameters 450mm (18") through 675mm (27") shall be quality control tested as described in sections 9.1, 9.3, 10.1, 10.2, 10.7, 10.8 and 10.9 of CAN/CSA-B182.2-M90.



## **2.6 PACKAGING AND HANDLING**

Extruded PVC sewer pipe shall be packaged and handled to prevent damage due to crushing and/or piercing.

Extruded PVC sewer pipe shall be installed within twenty four (24) months of the date of manufacture.

## **2.7 INSTALLATION INSTRUCTIONS**

Clear concise installation instructions for extruded PVC sewer pipe shall be furnished by the manufacturer.

## **2.8 WORKMANSHIP**

All PVC sewer pipe shall be extruded PVC, with factory installed elastomeric gaskets.

### **2.8.1 Pipe Body**

The pipe body shall be homogenous throughout and free from visible cracks, voids, foreign inclusions or other injurious defects. pipe shall be as uniform as commercially practical in colour, density, opacity and other physical properties. Rework material may be used, providing the pipe produced meets the requirements of this standard.

### **2.8.2 Elastomeric Gaskets**

All gaskets shall be homogeneous and free from porosity, blisters, pitting or other imperfections that may affect serviceability, in any cross section.

## **2.9 QUALITY ASSURANCE**

The manufacturer shall provide an overall affidavit signed by a signing officer of the company stating that extruded solid wall PVC sewer pipe, furnished for use in the City of Winnipeg complies with the requirements of the City of Winnipeg Standard No. AT-4.2.1.10 dated August 9, 1996.

## **3. CITY OF WINNIPEG APPROVAL**

Notwithstanding Section 2.9 of this Standard, the manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing extruded solid wall PVC sewer pipe for use in the City of Winnipeg.

## **4. REFERENCES**

ASTM D1784  
ASTM D2000  
ASTM D3034  
ASTM D3212-86  
ASTM F 477-90



ASTM F679-89  
ASTM F913-87

CAN/CSA B182-M90  
*PVC Sewer Pipe and Fittings (PSM Type)*

E.C. Burgener, P.Eng.  
Materials and Service Standards Engineer

KPT

August 9, 1996



**The City of Winnipeg**

**Specification For**

**Open Profile (Ribbed) PVC Storm Sewer Pipe and Fittings**

**Circumferential in Diameters 200mm (8") through 600mm (24")**

**and**

**Spiral in Diameters 675mm (27") Through 1200mm (48")**

**Specification No. [AT-4.2.1.16](#)**

Specification No. [AT-4.2.1.68](#)

**September 30, 1996**



## **1. SCOPE:**

This specification shall apply to all open profile polyvinyl chloride (PVC) storm sewer pipe in diameters 200 mm (8") through 1200mm (48") approved for use in the City of Winnipeg.

This specification shall apply to technical requirements only. The City of Winnipeg may impose contractual requirements and supplemental technical requirements to apply to extruded PVC sewer pipe purchased by the City.

## **2. REQUIREMENTS:**

### **2.1 GENERAL**

Circumferential open profile PVC storm sewer pipe approved for use in the City of Winnipeg shall be used for diameter 200mm (8") to 600mm (24"), (the largest sizes currently available) and spiral open profile PVC storm sewer pipe shall be used for all larger sizes, if circumferential wall pipe is not available. Both circumferential wall and spiral wall ribbed storm sewer pipe shall conform to the requirements of this specification.

### **2.2 APPLICABLE STANDARDS AND REQUIREMENTS:**

Open Profile pipe acceptable to the City of Winnipeg shall meet the requirements of CAN/CSA-B182.4 - 92 and shall meet the requirements of ASTM F794 A Standard Specification for PVC Ribbed Gravity Sanitary Pipe and Fittings Based on a Controlled Inside Diameter.

The date of manufacture of gaskets shall not precede the date of pipe manufacture by more than 12 months unless the gasket manufacturer provides a written warranty, verifying a longer gasket shelf life.

Pipe stiffness shall be 320 N/m/mm (kPa) and comply with section 5.4.1 of CSA B182.4 92.

The fittings of PVC storm sewer pipe shall generally be designed in accordance with CSA B182.1 or CSA B182.2 for injection moulded fittings, and CSA B182.4 for Fabricated fittings.

Pipe shall be colour coded green.

Extruded PVC sewer pipe shall be marked in accordance with CAN/CSA B182.4. In addition, pipe shall include the manufacturer's production code, including plant, year, month, day and extruder of manufacturer.

Elastomeric gaskets shall be marked with at least the following markings:

- i) Year of manufacture
- ii) Name of manufacturer;
- iii) Nominal size.

All gaskets shall be homogeneous and free from porosity, blisters, pitting or other imperfections that may affect serviceability, in any cross section.

Pipe shall be packaged and handled to prevent damage due to crushing and/or piercing.



Pipe, fittings and gaskets shall be installed within thirty (30) months of the date of manufacture, unless stored indoors or under cover to protect the product against direct sunshine (UV) degradation.

The manufacturer shall furnish clear concise installation instructions.

The pipe body shall be homogenous throughout and free from visible cracks, voids, foreign inclusions or other injurious defects. The pipe shall be as uniform as commercially practical in colour, density, opacity and other physical properties.

### **3.0 QUALITY ASSURANCE**

The manufacturer shall provide an overall affidavit signed by a signing officer of the company stating that open profile wall PVC pipe, furnished for use in the City of Winnipeg complies with the requirements of the City of Winnipeg Specification No. AT-4.2.1.16 dated September 13, 1996.

### **4.0 CITY OF WINNIPEG APPROVAL**

Each manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing open profile PVC pipe for use in the City of Winnipeg.

E.C. Burgener, P.Eng.  
Materials and Service Standards Engineer

September 30, 1996



**THE CITY OF WINNIPEG**

**SPECIFICATION FOR**

**INJECTION MOULDED PVC TEES, WYES AND BENDS**  
**FOR USE WITH 250MM AND LARGER MAINLINE PVC SEWER PIPE**  
**SPECIFICATION NO. [AT-4.2.1.60](#)**

**December 20, 1996**



## **1. SCOPE**

This specification shall apply to all injection moulded polyvinyl chloride (PVC) sewer tees, wyes and bends for 250mm diameter and larger main line PVC sewer pipe approved for use in the City of Winnipeg.

This specification shall apply to technical requirements only. The City of Winnipeg may impose contractual requirements and supplemental technical requirements to apply to injection moulded PVC sewer fittings purchased by the City.

## **2. INJECTION MOULDED PVC FITTINGS FOR MAIN LINE PVC SEWER PIPE**

### **2.1 GENERAL**

All injection moulded PVC sewer fittings shall incorporate elastomeric gasketed joints. Glued in gaskets are preferred.

### **2.2 MATERIAL REQUIREMENTS**

#### ***2.2.1 PVC Mainline Sewer Fittings***

All materials used for injection moulded PVC fittings shall be in accordance with sections 4.1.2, 4.1.3 and 4.2 of CSA Standard No. B182.2-M90 (referred to hereinafter as CAN/CSA B182.2-M90). However, fittings shall be injection moulded from a PVC compound having a cell classification of 12454-C or 13343-C according to ASTM Standard D1784. Different cell classifications may be used provided that all properties are equal to or superior to those of the specified compounds.

#### ***2.2.2 Elastomeric Gaskets***

Elastomeric gaskets shall be manufactured from material that complies with the physical requirements specified in;

- section 6.2.1 of CAN/CSA-B.182.2-M90.
- sections 6.2, 6.3 and 7.8 of the ASTM standard F 477-90 and related ASTM testing.

Gasket material shall be designated in accordance to ASTM Standard D 2000, and the date of manufacture of gaskets shall not precede the date of fitting manufacture by more than 6 months unless the gasket manufacturer provides a written warranty, verifying a longer gasket shelf life.

### **2.3 DIMENSIONAL REQUIREMENTS**

#### ***2.3.1 Fitting Body Dimensions***

The fitting laying lengths shall comply with section 5.4.2 of CAN/CSA-B182.2-M90. The minimum wall thickness of all fittings shall be Standard Dimension Ratio (SDR) 35 as defined in section 5.4.1.1 of CAN/CSA-B182.2-M90.

#### ***2.3.2 Joint Design***



The joints of injection moulded PVC sewer fittings shall generally be designed in accordance with CAN/CSA B182.2-M90 section 6.2.2.

#### **2.3.2.1 Socket Dimensions**

Socket dimensions of all fittings shall be in accordance with section 5.3.2.1 of CAN/CSA B182.2-M90. In addition, joints shall have dimensions that will accommodate pipes having the average outside diameters detailed in Table 1 of CAN/CSA Standard B182.2-M90.

#### **2.3.2.2 Elastomeric Gasket Dimensions**

Elastomeric gasket dimensions shall conform to section 6.2.1.1 of CAN/CSA B182.2-M90.

### **2.4 MARKING REQUIREMENTS**

#### **2.4.1 Injection Moulded PVC Main Line Sewer Pipe Fittings**

Bodies of fittings shall be marked on the exterior in accordance with CAN/CSA B182.2-M90 section 11.2.1. In addition, moulded fittings shall include the following markings:

- i) The nominal size of each socket;
- ii) The manufacturer's production code, including plant, year and month.

#### **2.4.2 Elastomeric Gaskets**

Elastomeric gaskets shall be marked in accordance with ASTM F913-87 section 12.1, or section 11.1 of ASTM F 477 (where applicable), and shall include at least the following markings:

- i) Date code (year and quarter);
- ii) Name of manufacturer;
- iii) Nominal size.

### **2.5 QUALITY CONTROL REQUIREMENTS**

The manufacturer shall conduct all quality control testing for the fittings as described in sections 7, 10.1, 10.2, 10.4, and 10.5 of CAN/CSA-182.2-M90.

### **2.6 PACKAGING AND HANDLING**

Fittings shall be packaged, handled and stored to prevent damage due to crushing, piercing or ultra violet exposure.

Fittings shall be installed within twenty four (24) months of the date of manufacture.

### **2.7 INSTALLATION INSTRUCTIONS**

Clear concise installation instructions for injection moulded PVC fittings for use on mainline PVC sewer pipe shall be furnished by the manufacturer.



## **2.8 WORKMANSHIP**

All PVC sewer fittings shall be one piece, injection moulded PVC, with factory installed elastomeric gaskets.

### **2.8.1 *Fitting Body***

The fitting bodies shall be homogenous throughout and free from visible cracks, voids, foreign inclusions or other injurious defects. Fittings shall be as uniform as commercially practical in colour, density, opacity and other physical properties. Rework material may be used, providing the fittings produced meet the requirements of this specification.

### **2.8.2 *Elastomeric Gaskets***

All gaskets shall be homogeneous and free from porosity, blisters, pitting or other imperfections that may affect serviceability, in any cross section.

## **2.9 QUALITY ASSURANCE**

The manufacturer shall provide an overall affidavit signed by a signing officer of the company stating that injection moulded PVC fittings for use with mainline PVC sewer pipe, furnished for use in the City of Winnipeg complies with the requirements of the City of Winnipeg Specification No. AT-4.2.1.60 dated December 20, 1996.

## **3. CITY OF WINNIPEG APPROVAL**

The manufacturer shall apply for, and be in receipt of, a written product approval from the City of Winnipeg prior to furnishing injection moulded PVC fittings for use with mainline PVC sewer pipe for use in the City of Winnipeg.

E.C. Burgener, P.Eng.  
Material and Service Standards Engineer

December 20, 1996



**The City of Winnipeg**

**Standard For  
Fabricated PVC Tees, Wyes And Bends In Nominal Diameters 450mm  
(18") And Larger For Use With Mainline PVC Sewer Pipe  
Standard No. [AT-4.2.1.61](#)**

**May 9, 1994**



## **1.SCOPE**

This standard shall apply to all fabricated polyvinyl chloride (PVC) sewer tees, wyes and bends for 450mm diameter and larger main line PVC sewer pipe approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City of Winnipeg may impose contractual requirements and supplemental technical requirements to apply to fabricated PVC sewer fittings purchased by the City.

## **2. FABRICATED PVC FITTINGS FOR MAIN LINE PVC SEWER PIPE**

### **2.1 GENERAL**

Fabricated PVC sewer fittings approved for use in the City of Winnipeg shall conform to the requirements of this standard. All fabricated PVC sewer fittings shall incorporate elastomeric gasketed joints.

PVC mainline sewer fittings provide either a change of direction (bend) or combination of flow (tees and wyes) in a PVC sewer main (450mm and larger).

### **2.2 MATERIAL REQUIREMENTS**

#### ***2.2.1 PVC Mainline Sewer Fittings***

All materials used for fabricated PVC fittings shall be in accordance with sections 4.1.1, 4.1.3 and 4.2 of CSA Standard No. B182.2-M90 (referred to hereinafter as CAN/CSA B182.2-M90). However, fittings shall be fabricated from PVC pipe having a cell classification of 12454-C or 12364-C according to ASTM Standard D1784. Different cell classifications may be used provided that all properties are equal to or superior to those of the specified compounds.

#### ***2.2.2 Elastomeric Gaskets***

Elastomeric gaskets shall be manufactured from material that complies with the physical requirements specified in;

- section 6.2.1 of CAN/CSA-B.182.2-M90.
- sections 6.2, 6.3 and 7.8 of the ASTM standard F 477-90 and related ASTM testing.

Gasket material shall be designated in accordance to ASTM Standard D 2000, and the date of manufacture of gaskets shall not precede the date of fitting manufacture by more than 6 months unless the gasket manufacturer provides a written warranty, verifying a longer gasket shelf life.

### **2.3 DIMENSIONAL REQUIREMENTS**

#### ***2.3.1 Fitting Body Dimensions***

The fitting dimensions (laying lengths only) shall comply with section 5.4.2 of CAN/CSA-B182.2-M90. The minimum wall thickness of all fittings shall be Standard Dimension Ratio (SDR) 35 as defined in section 5.4.1.2 of CAN/CSA-B182.2-M90.

#### ***2.3.2 Joint Design***



The joints of fabricated PVC sewer fittings shall generally be designed in accordance with CAN/CSA B182.2-M90 sections 6.2.2 and 6.2.3.

#### **2.3.2.1 *Socket Dimensions***

Socket dimensions of all fittings shall be in accordance with section 5.3.2.1 of CAN/CSA B182.2-M90. In addition, joints shall have dimensions that will accommodate pipes having the average outside diameters detailed in Table 1 of CAN/CSA Standard B182.2-M90.

#### **2.3.2.2 *Elastomeric Gasket Dimensions***

Elastomeric gasket dimensions shall conform to section 6.2.1.1 of CAN/CSA B182.2-M90.

### **2.4 MARKING REQUIREMENTS**

#### **2.4.1 *Fabricated PVC Main Line Sewer Pipe Fittings***

Bodies of fittings shall be marked on the exterior in accordance with CAN/CSA B182.2-M90 section 11.2.2. In addition, fabricated fittings shall include the following markings:

- i) The nominal size of each socket;
- ii) The manufacturer's production code, including day, month, year, shift, plant, and extruder of manufacture. In accordance with section 11.3 of ASTM F679-86

#### **2.4.2 *Elastomeric Gaskets***

Elastomeric gaskets shall be marked in accordance with ASTM F913-87 section 12.1, or section 11.1 of ASTM F 477 (where applicable), and shall include at least the following markings:

- i) Date code; (month and year)
- ii) Name of manufacturer;
- iii) Nominal size.

### **2.5 QUALITY CONTROL REQUIREMENTS**

The manufacturer shall conduct all quality control testing for the fittings as described in sections 8, 9, 10.1, 10.2, 10.3, 10.4, 10.6.1, 10.8 and 10.9 of CAN/CSA-182.2-M90.

### **2.6 PACKAGING AND HANDLING**

Fittings shall be packaged and handled to prevent damage due to crushing and/or piercing.

Fittings shall be installed within twenty four (24) months of the date of manufacture.

### **2.7 INSTALLATION INSTRUCTIONS**

Clear concise installation instructions for fabricated PVC fittings for use on mainline PVC sewer pipe shall be furnished by the manufacturer.

### **2.8 WORKMANSHIP**

All fabricated PVC sewer fittings shall have factory installed elastomeric gaskets.

#### **2.8.1 *Fitting Body***



The fitting bodies shall be homogenous throughout and free from visible cracks, voids, foreign inclusions or other injurious defects. Fittings shall be as uniform as commercially practical in colour, density, opacity and other physical properties. Rework material may be used, providing the fittings produced meet the requirements of (though not limited to) section 2.2.1 of this standard.

### **2.8.2 Elastomeric Gaskets**

All gaskets shall be homogeneous and free from porosity, blisters, pitting or other imperfections that may affect serviceability, in any cross section.

## **2.9 QUALITY ASSURANCE**

The manufacturer shall provide an overall affidavit signed by a signing officer of the company stating that fabricated PVC fittings for use with mainline PVC sewer pipe, furnished for use in the City of Winnipeg comply with the requirements of the City of Winnipeg Standard No. AT-4.2.1.61 dated May 9, 1994.

## **3. CITY OF WINNIPEG APPROVAL**

Notwithstanding Section 2.9 of this Standard, the manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing fabricated PVC fittings for use with mainline PVC sewer pipe for use in the City of Winnipeg.

## **4. REFERENCES**

ASTM D1784  
ASTM D2000  
ASTM D3212-86  
ASTM F477-90  
ASTM F679-89  
ASTM F913-87

CAN/CSA B182-M90  
*PVC Sewer Pipe and Fittings (PSM Type)*

R.M. Girling, P.Eng.  
Engineer of Design and Construction

RMG:JMH:TSJ

May 9, 1994



**The City of Winnipeg**

**Standard For**

**Fabricated PVC Long Sweep Elbows in Nominal Diameter 150mm (6") For Use  
With Connection PVC Sewer Pipe**

**and**

**Fabricated PVC Tees, Wyes And Bends In Nominal Diameters 375mm (15") For  
Use With Mainline PVC Sewer Pipe**

**Standard No. [AT-4.2.1.61A](#)**

**May 9, 1994**



## 1. SCOPE

This standard shall apply to all fabricated polyvinyl chloride (PVC) sewer long sweep elbows for 150mm (6") diameter connection PVC pipe and tees, wyes and bends for 375mm (15") diameter main line PVC sewer pipe approved for use in the City of Winnipeg. Further, be it noted that, those PVC sewer fittings not covered by Standards AT-4.2.1.60, AT-4.2.2.60 and AT-4.2.1.61 shall conform to the requirements of this standard.

This standard shall apply to technical requirements only. The City of Winnipeg may impose contractual requirements and supplemental technical requirements to apply to fabricated PVC sewer fittings purchased by the City.

## 2. FABRICATED PVC FITTINGS FOR MAIN LINE PVC SEWER PIPE

### 2.1 GENERAL

Fabricated PVC sewer fittings approved for use in the City of Winnipeg shall conform to the requirements of this standard. All fabricated PVC sewer fittings shall incorporate elastomeric gasketed joints.

PVC mainline sewer fittings provide either a change of direction (bend) or combination of flow (tees and wyes) in a PVC sewer main (375mm).

### 2.2 MATERIAL REQUIREMENTS

#### 2.2.1 *PVC Mainline Sewer Fittings*

All materials used for fabricated PVC fittings shall be in accordance with sections 4.1.1, 4.1.3 and 4.2 of CSA Standard No. B182.2-M90 (referred to hereinafter as CAN/CSA B182.2-M90). However, fittings shall be fabricated from PVC pipe having a cell classification of 12454-C or 12364-C according to ASTM Standard D1784. Different cell classifications may be used provided that all properties are equal to or superior to those of the specified compounds.

#### 2.2.2 *Elastomeric Gaskets*

Elastomeric gaskets shall be manufactured from material that complies with the physical requirements specified in;

- section 6.2.1 of CAN/CSA-B.182.2-M90.
- sections 6.2, 6.3 and 7.8 of the ASTM standard F 477-90 and related ASTM testing.

Gasket material shall be designated in accordance to ASTM Standard D 2000, and the date of manufacture of gaskets shall not precede the date of fitting manufacture by more than 6 months unless the gasket manufacturer provides a written warranty, verifying a longer gasket shelf life.

## 2.3 DIMENSIONAL REQUIREMENTS



### **2.3.1 Fitting Body Dimensions**

The fitting dimensions (laying lengths only) shall comply with section 5.4.2 of CAN/CSA-B182.2-M90. The minimum wall thickness of all fittings shall be Standard Dimension Ratio (SDR) 35 as defined in section 5.4.1.2 of CAN/CSA-B182.2-M90.

### **2.3.2 Joint Design**

The joints of fabricated PVC sewer fittings shall generally be designed in accordance with CAN/CSA B182.2-M90 sections 6.2.2 and 6.2.3.

#### **2.3.2.1 Socket Dimensions**

Socket dimensions of all fittings shall be in accordance with section 5.3.2.1 of CAN/CSA B182.2-M90. In addition, joints shall have dimensions that will accommodate pipes having the average outside diameters detailed in Table 1 of CAN/CSA Standard B182.2-M90.

#### **2.3.2.2 Elastomeric Gasket Dimensions**

Elastomeric gasket dimensions shall conform to section 6.2.1.1 of CAN/CSA B182.2-M90.

## **2.4 MARKING REQUIREMENTS**

### **2.4.1 Fabricated PVC Main Line Sewer Pipe Fittings**

Bodies of fittings shall be marked on the exterior in accordance with CAN/CSA B182.2-M90 section 11.2.2. In addition, fabricated fittings shall include the following markings:

- i) The nominal size of each socket;
- ii) The manufacturer's production code, including plant, year and month

### **2.4.2 Elastomeric Gaskets**

Elastomeric gaskets shall be marked in accordance with ASTM F913-87 section 12.1, or section 11.1 of ASTM F 477 (where applicable), and shall include at least the following markings:

- i) Date code; (month and year)
- ii) Name of manufacturer;
- iii) Nominal size.

## **2.5 QUALITY CONTROL REQUIREMENTS**

The manufacturer shall conduct all quality control testing for the fittings as described in sections 8, 9, 10.1, 10.2, 10.3, 10.4, 10.6.1, 10.8 and 10.9 of CAN/CSA-182.2-M90.

## **2.6 PACKAGING AND HANDLING**

Fittings shall be packaged and handled to prevent damage due to crushing and/or piercing.



Fittings shall be installed within twenty four (24) months of the date of manufacture.

## **2.7 INSTALLATION INSTRUCTIONS**

Clear concise installation instructions for fabricated PVC fittings for use on mainline PVC sewer pipe shall be furnished by the manufacturer.

## **2.8 WORKMANSHIP**

All fabricated PVC sewer fittings shall have factory installed elastomeric gaskets.

### **2.8.1 *Fitting Body***

The fitting bodies shall be homogenous throughout and free from visible cracks, voids, foreign inclusions or other injurious defects. Fittings shall be as uniform as commercially practical in colour, density, opacity and other physical properties. Rework material may be used, providing the fittings produced meet the requirements of (though not limited to) section 2.2.1 of this standard.

### **2.8.2 *Elastomeric Gaskets***

All gaskets shall be homogeneous and free from porosity, blisters, pitting or other imperfections that may affect serviceability, in any cross section.

## **2.9 QUALITY ASSURANCE**

The manufacturer shall provide an overall affidavit signed by a signing officer of the company stating that fabricated PVC fittings for use with mainline PVC sewer pipe, furnished for use in the City of Winnipeg comply with the requirements of the City of Winnipeg Standard No. AT-4.2.1.61A dated May 9, 1994.

## **3. CITY OF WINNIPEG APPROVAL**

Notwithstanding Section 2.9 of this Standard, the manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing fabricated PVC fittings for use with mainline PVC sewer pipe for use in the City of Winnipeg.

## **4. REFERENCES**

ASTM D1784  
ASTM D2000  
ASTM D3212-86



ASTM F477-90

ASTM F679-89

ASTM F913-87

CAN/CSA B182-M90

*PVC Sewer Pipe and Fittings (PSM Type)*

R.M. Girling P. Eng.

Engineer of Design and Construction

RMG:JMH:TSJ

May 9, 1994



**The City of Winnipeg**

**Standard For**  
**Flexible Transition Couplings**  
**For Use With Mainline & Connection Sewer Pipe**  
**Standard No. [AT-4.2.1.66](#)**

**11/17/2008**



## **1. SCOPE**

This Standard shall apply to all flexible transition couplings, suitable for non-pressure applications in underground mainline and connection (150mm and larger) wastewater and stormwater sewer pipes approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City of Winnipeg may impose contractual requirements and supplemental technical requirements to apply to flexible transition couplings purchased by the City.

## **2. REQUIREMENTS**

### **2.1. General**

Flexible transition couplings for mainline and connection sewer pipe approved for use in the City of Winnipeg shall conform to the requirements of this standard.

Flexible sewer couplings shall be used to axially join non-pressure mainline and connection sewer pipes and/or fittings. However, flexible transition couplings shall not be used to join PVC pipe to PVC pipe.

## **3. MATERIALS**

### **3.1. Elastomer**

Material for the elastomeric sealing components of flexible transition couplings shall conform to the requirements of CAN/CSA B602-99 section 4.1. The elastomeric material shall be compatible with the pipe materials to which it is to be in contact.

### **3.2. Stainless Steel**

All stainless steel components shall be of type 304 stainless steel or better, containing not less than 16 % chromium and not less than 8 % nickel. This supersedes CAN/CSA-B602-99, section 4.2. Straps and shear rings shall contain a minimum of welds and shall be subject to City of Winnipeg approval. The stainless steel components shall not have contact with any dissimilar metal.



## 4. DESIGN

### 4.1. Design Requirements

Flexible transition couplings shall be comprised of an elastomeric sealing component and stainless steel tension components (straps, bolts and shear rings) or alternate strap material acceptable to the City of Winnipeg.

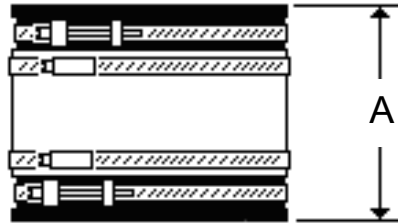


Figure 1

#### 4.1.1. Elastomer

The dimensions for all flexible transition couplings approved for use in the City of Winnipeg shall be compatible with the outer diameter dimensions and tolerances of the specific material(s) and size(s) of the pipes and/or fittings to which it is designed to be joined.

The couplings shall be designed in such a way that an abrupt face or vertical surface that could potentially impede flow is not created within the pipe or fitting, and that the external diameter of the coupling does not vary. Additionally the couplings shall conform to the following design tolerance requirements;

<u>Nominal Coupling Size</u>	<u>Minimum Wall Thickness</u>	<u>Minimum Width*</u>
150 mm x 150 mm	9.5 mm	125 mm
200 mm x 200 mm	9.5 mm	150 mm
250 mm x 250 mm	9.5 mm	150 mm
300 mm x 300 mm	9.5 mm	150 mm
Over 300 mm	10.3 mm	150 mm

\* - See dimension "A" in Figure 1

Figure 2



Strap and shear ring grooves shall be kept to a minimum depth. In all cases the minimum wall thickness under the strap and shear ring grooves shall be the minimum thickness indicated in section 4.1.1 of this standard.

#### **4.1.2. Stainless Steel**

Straps and shear rings shall be provided for all flexible transition couplings 150mm and larger and have a minimum thickness of 0.280 mm and be capable of withstanding a minimum of 6.78 Nm torque. All threaded components shall be right hand National Course Roll Thread.

Thread coating, thread lubricant or anti-seize coating for threaded components shall be a dry molybdenum disulphide or polytetrafluoroethylene (PTFE) based compound or alternate thread coating acceptable to the City of Winnipeg.

### **5. MARKINGS**

#### **5.1. Marking Requirements**

The components of flexible transition couplings shall bear markings in general accordance with Standard No. CAN/CSA B602-99, section 6. Specifically, markings shall be as follows:

##### **5.1.1. Elastomer**

- Manufacturer's name or abbreviation;
- Country of origin;
- Product identification code;
- Nominal pipe size(s) and pipe material(s) for which the coupling is designed;
- CSA, IAPMO and/or Warnock Hersey certification logo.

##### **5.1.2. Stainless Steel Straps and Shear Rings**

- Manufacturers name or abbreviation;
- Country of origin;
- Product identification code;
- Stainless steel grade and identification, i.e. "STAINLESS STEEL" or "SS";
- CSA, IAPMO and/or Warnock Hersey certification logo;
- Strap or shear ring size;
- Shear ring shall display the nominal pipe size(s) and the pipe material(s) for which the coupling is designed. \*

\* *These markings need only appear on the shear ring if the shear ring partially or entirely obscures these same markings on the elastomer.*



## **5.2. Labelling Requirements**

No adhesive labels or stickers of any sort shall be affixed to any metal part. The following methods of marking will be allowed:

- Stamping;
- Etching;
- Stencilling.

Any one of these methods is acceptable provided that the finished surface is free from contaminants and that the chosen marking compound is indelible and free of corrosive agents.

## **6. WORKMANSHIP AND FINISH**

### **6.1. Elastomer**

All elastomeric component(s) shall be free from pitting, cracks, air marks, porosity, or any other imperfections, which could impair serviceability.

### **6.2. Stainless Steel**

All stainless steel components shall be parts shall be free of burrs and sharp edges and be of uniform quality consistent with good manufacturing and inspection practices and shall have no imperfections that could adversely affect performance.

## **7. PACKAGING**

### **7.1. Packaging and Handling**

Flexible transition couplings shall be packaged and handled in such a way as to prevent damage due to piercing, tearing or crushing.

All flexible transition couplings shall be stored indoors. This requirement shall not be limited to couplings intended for use in the City of Winnipeg. Manufacturers and distributors shall store all flexible sewer couplings in sealed containers while outdoors or in an approved indoor storage facility.



Each container shall be clearly marked to provide at least the following information:

- Manufacturer's name
- Nominal pipe size(s)
- Pipe material(s)
- Manufacturer's product code number.

## **8. INSTALLATION INSTRUCTIONS**

The manufacturer shall provide clear concise installation instructions for the flexible transition couplings approved for use in the City of Winnipeg. The installation instructions furnished by the manufacturer shall also include recommended tools, minimum and maximum recommended torque for stainless steel tension components and special considerations for cold weather installations.

## **9. QUALITY ASSURANCE**

### **9.1. Quality Assurance**

A signing officer of the manufacturing company shall furnish an affidavit of compliance stating that flexible transition couplings furnished for use in the City of Winnipeg shall comply with the requirements of the City of Winnipeg Standard No. AT-4.2.1.66.

### **9.2. Quality Control Requirements**

Manufacturers of flexible transition couplings shall be in possession of either CSA or Warnock Hersey certification of their product to Standard CAN/CSA B602-99, and as such, shall undergo the performance tests outlined in section 5 of CAN/CSA B602-99.

## **10. CITY OF WINNIPEG**

Notwithstanding Section 9 of this standard, the manufacturer shall apply for and be in receipt of, written approval from the City of Winnipeg prior to furnishing flexible transition couplings for use in the City of Winnipeg. Where patterns are owned by a party other than the manufacturer, the party owning the pattern and the manufacturer shall jointly apply for written approval from the City of Winnipeg prior to furnishing flexible transition couplings for use in the City of Winnipeg.



## 11. REFERENCES

ASTM A 167

*Specification for Stainless and Heat-Resistant Chromium Nickel Steel Plate, Sheet and Strip*

ASTM A 480M

*General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip*

ASTM C 425

*Compression Joints for Vitrified Clay Pipe and Fittings*

ASTM C 1173

*Flexible Transition Couplings for Underground Piping Systems*

CAN/CSA B70-M91

*Cast Iron Soil Pipe, Fittings and Means of Joining*

CAN/CSA B602-99

*Mechanical Couplings for Drain, Waste, and Vent Pipe and Sewer Pipe*

IAPMO/UPC

*Uniform Plumbing Code*



**THE CITY OF WINNIPEG**  
**STANDARD FOR MANHOLE FRAMES AND COVERS**  
**STANDARD NO. [AT-4.2.1.73](#)**

1991 09 30



## **1. SCOPE**

This standard shall apply to manhole frames and covers approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to manhole frames and covers purchased by the City of Winnipeg.

## **2. MANHOLE FRAMES AND COVERS**

### **2.1 General**

Manhole frames and covers approved for use in the City of Winnipeg shall conform to the requirements of this standard.

### **2.2 Materials**

Manhole frames and covers shall be made of either gray cast iron conforming to the requirements of ASTM A48, Class 30B as a minimum or ductile iron conforming to the requirements of ASTM A536, grade 65-45-12, as a minimum.

### **2.3 Manhole Frames**

Dimensions of manhole frames shall be in accordance with City of Winnipeg Approved Products Drawing No. AP-004.

### **2.4 Manhole Covers**

Dimensions of manhole covers shall be in accordance with City of Winnipeg Approved Products Drawing Nos. AP-005 and AP-006.

### **2.5 Tolerances**

Unless otherwise specified, the dimensions of all castings shall have a tolerance of  $\pm 2$  mm and an additional  $\pm 5$  mm per metre of dimension. Notwithstanding the above tolerances, all frames and covers of the same nominal size shall assemble interchangeably.

### **2.6 Seating Surfaces**

All seating surfaces of covers and frames shall be machined to the degree that the cover shall seat in the frame without rocking with the cover oriented in any direction.



## **2.7 Side Play**

Side play is defined as the maximum clearance between any two adjacent vertical surfaces in the same horizontal plane. Cover side play within the frame at the top surface of the manhole frame shall not exceed 10 mm.

## **2.8 Marking Requirements**

Each manhole cover shall be marked on the top so as to provide at least the following information:

- Foundry name or a recognized abbreviation representing such.
- Pattern number or code identifying the cover to the applicable pattern drawing.

Each manhole frame shall be marked on the underside of the cover support flange and on the top of the base flange so as to provide at least the following information:

- Foundry name or a recognized abbreviation representing such.
- Pattern number or code identifying the cover to the applicable pattern drawing.

## **2.9 Workmanship and Finish**

Castings shall be of even grain and free of cracks, voids, blisters, and other imperfections that may impair serviceability.

## **2.10 Quality Control**

Foundries that manufacture manhole frames and covers for the City of Winnipeg must implement or maintain a quality control program that meets or exceeds CSA Standard Z299.3. Consequently, a quality control manual, as outlined in the above standard, shall be submitted to the City of Winnipeg for review prior to issuance of product approval as referred to in Section 3. In addition to the requirements of CSA Standard Z299.3, the manual shall include a "Corrective Action" policy section for cases of non-conformance test failure.

Corrective action shall include:

- (i) A review and analysis of detected non-conformance and a subsequent corrective action to prevent reoccurrence.



- (ii) Initiate a corrective action when notified by the customer (City of Winnipeg) of the potential or actual non-conformance.
- (iii) Prompt implementation of corrective actions, ensuring that they are effective, and follow up to ensure continued effectiveness.
- (iv) A regular report to appropriate levels of management to the causes of non-conformance and the corrective action taken.

## **2.11 Quality Assurance**

The foundry's quality control manager shall provide an affidavit of compliance stating that the manhole frames and covers furnished for use in the City of Winnipeg comply with the requirements of the City of Winnipeg Standard No. AT-4.2.1.73.

## **3. CITY OF WINNIPEG APPROVAL**

The foundry shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing manhole frames and covers for use in the City of Winnipeg. Where patterns are owned by a party other than the foundry the party owning the pattern **and** the foundry shall jointly apply for written approval from the City of Winnipeg prior to furnishing manhole frames and covers for use in the City of Winnipeg.

T.E.J. Kjartanson, P.Eng.  
Standards Engineer

TEJK:TSJ:pr

1991 09 30



**THE CITY OF WINNIPEG**  
**SPECIFICATION FOR MANHOLE FRAME LIFTER RINGS**  
**SPECIFICATION NO. [AT-4.2.1.75](#)**

**February 25, 1997**



## **1. SCOPE**

**This specification shall apply to manhole frame lifter rings approved for use in the City of Winnipeg. This specification shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to manhole frame lifter rings purchased by the City of Winnipeg.**

## **2. MANHOLE FRAME LIFTER RINGS**

### **2.1 GENERAL**

**Manhole frame lifter rings approved for use in the City of Winnipeg shall conform to the requirements of this specification.**

### **2.2 MATERIALS**

**Manhole frame lifter rings shall be made of either grey iron conforming to the requirements of ASTM A48, Class 30B as a minimum or ductile iron conforming to the requirements of ASTM A536, grade 65-45-12, as a minimum.**

### **2.3 DIMENSIONS**

**Dimensions of manhole frame lifter rings shall be in accordance with City of Winnipeg Approved Products Drawing No. AP-007.**

### **2.4 TOLERANCES**

**Unless otherwise specified, the dimensions of all castings shall have a tolerance of  $\pm 2\text{mm}$ . The dimensions to machined surfaces shall have a tolerance of  $\pm 1\text{mm}$ .**

### **2.5 SEATING SURFACES**

**All seating surfaces of manhole frame lifter rings shall be machined to the degree that the lift rings will assemble with manhole frames and covers (as detailed in City of Winnipeg Specification No. AT-4.2.1.73 dated September 30, 1991) without rocking of the cover or lifter ring, regardless of the orientation of the cover or lifter ring.**



## **2.6 MARKING REQUIREMENTS**

Each manhole frame lifter ring shall be marked on the top of the upper ring or on the inside vertical face of the lower ring so as to provide the following information:

- Foundry name or a recognized abbreviation representing such.
- Pattern number or code identifying the lifter ring to the applicable pattern drawing.

## **2.7 WORKMANSHIP AND FINISH**

Castings shall be of even grain and free of cracks, voids, blisters, and other imperfections that may impair serviceability.

## **2.8 QUALITY CONTROL**

Foundries that manufacture manhole frame lifter rings for the City of Winnipeg must implement or maintain a quality control program that meets or exceeds CSA Standard Z 299.3. Consequently, a quality control manual, as outlined in the above standard, shall be submitted to the City of Winnipeg for review prior to issuance of product approval as referred to in Section 3. In addition to the requirements of CSA Standard Z 299.3 the manual shall include a "Corrective Action" policy section for cases of non-conformance or test failure.

Corrective action shall include:

- (I) A review and analysis of detected non-conformance and a subsequent corrective action to prevent reoccurrence.
- (ii) Initiate a corrective action when notified by the customer (City of Winnipeg) of the potential or actual non-conformance.
- (iii) Prompt implementation of corrective actions, ensuring that they are effective, and follow up to ensure continued effectiveness.
- (iv) A regular report to appropriate levels of management to the causes of non-conformance and the corrective action taken.



## **2.10 QUALITY ASSURANCE**

**The foundry's quality control manager shall provide an affidavit of compliance stating that the manhole frame lifter rings furnished for use in the City of Winnipeg comply with the requirements of the City of Winnipeg Specification No. AT-4.2.1.75.**

## **3. CITY OF WINNIPEG APPROVAL**

**The foundry shall apply for, and be in receipt of, written approval from the city of Winnipeg prior to furnishing manhole frame lifter rings for use in the City of Winnipeg. Where patterns are owned by a party other than the foundry both the party owning the pattern and the foundry shall jointly apply for written approval from the City of Winnipeg prior to furnishing manhole frame lifter rings for use in the City of Winnipeg.**

**E.C. Burgener, P.Eng.  
Standards Engineer**

**ECB/lm**



**THE CITY OF WINNIPEG**

**STANDARD FOR**

**GREY OR DUCTILE IRON**

**BARRIER CURB AND GUTTER INLET FRAMES, COVERS AND BOXES**

**STANDARD NO. [AT-4.2.1.83B](#)**

**February 10, 1994**



## **1. SCOPE**

This standard shall apply to grey and ductile iron barrier curb and gutter inlet products approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to curb and gutter inlet products purchased by the City of Winnipeg.

## **2. BARRIER CURB AND GUTTER INLET FRAMES, COVERS AND BOXES**

### **2.1 GENERAL**

Barrier curb and gutter inlet products approved for use in the City of Winnipeg shall conform to the requirements of this standard. Grey and ductile iron barrier curb and gutter inlet products generally include frames, covers and boxes.

### **2.2 MATERIAL REQUIREMENTS**

Barrier curb and gutter inlet products shall be made of either grey cast iron conforming to the requirements of ASTM A48, Class 30B as a minimum, or ductile iron conforming to the requirements of ASTM A536, grade 65-45-12 as a minimum.

### **2.3 DIMENSIONAL REQUIREMENTS**

#### **2.3.1 Barrier Curb and Gutter Inlet Frames**

Dimensions of barrier curb and gutter inlet frames shall be in accordance with City of Winnipeg Approved Products Drawing No. AP-008.

#### **2.3.2 Barrier Curb and Gutter Inlet Covers**

Dimensions of barrier curb and gutter inlet covers shall be in accordance with City of Winnipeg Approved Products Drawing No. AP-009.

#### **2.3.3 Barrier Curb and Gutter Inlet Boxes**

Dimensions of barrier curb and gutter inlet boxes shall be in accordance with City of Winnipeg Approved Products Drawing No. AP-010.

#### **2.3.4 Tolerances**

Unless otherwise specified, the dimensions of all castings shall have a tolerance of  $\pm 2\text{mm}$  and an additional  $\pm 5\text{mm}$  per metre of dimension. Notwithstanding the above tolerances, all barrier curb and gutter inlet frames, covers and boxes shall assemble interchangeably.

#### **2.3.5 Seating surfaces**



All seating surfaces of covers and frames shall, if necessary, be machined to the degree that the cover shall seat in the frame without rocking.

## **2.4 MARKING REQUIREMENTS**

### **2.4.1 Barrier Curb & Gutter Frames**

Each barrier curb and gutter inlet frame shall be marked on the inside wall below the cover seat, discernable after installation. The frame shall be marked so as to provide at least the following information:

- Foundry name or a recognized abbreviation representing such;
- Pattern number or code identifying the frame to the applicable pattern drawing.

### **2.4.2 Barrier Curb & Gutter Covers**

Each barrier curb and gutter inlet cover shall be marked on the top so as to provide at least the following information.

- Foundry name or a recognized abbreviation representing such;
- Pattern number or code identifying the cover to the applicable pattern drawing;
- Casting date.

### **2.4.3 Barrier Curb & Gutter Boxes**

Each barrier curb and gutter inlet box shall be marked on an inside wall, discernable after installation. The box shall be marked so as to provide at least the following information:

- Foundry name or a recognized abbreviation representing such;
- Pattern number or code identifying the box to the applicable pattern drawing.

## **2.5 WORKMANSHIP AND FINISH**

Castings shall be of even grain and free of cracks, voids, blisters, and other imperfections that may impair serviceability.

## **2.6 QUALITY CONTROL**

Foundries that manufacture barrier curb and gutter inlet frames, covers and boxes for the City of Winnipeg must implement or maintain a quality control program that meets or exceeds CSA standard CAN3-Z299.3. Consequently, a quality control manual, as outlined in the above standard, shall be submitted to the City of Winnipeg for review prior to issue of product approval as referred to in section 3. In addition to the requirements of CSA standard CAN3-Z299.3, the manual shall include a "Corrective Action" policy section for cases of non-conformance.

Corrective action shall include:

- (i) A review and analysis of detected non-conformance and a subsequent corrective action to prevent reoccurrence;



- (ii) Initiate a corrective action when notified by the customer (City of Winnipeg) of the potential or actual non-conformance;
- (iii) Prompt implementation of corrective actions ensuring that they are effective, and follow up to ensure continued effectiveness;
- (iv) A regular report to appropriate levels of management to the causes of non-conformance and the corrective action taken.

## **2.7 QUALITY ASSURANCE**

The foundry's Quality Control Manager shall provide a written affidavit of compliance stating that barrier curb and gutter inlet frames, covers and boxes or parts thereof, furnished for use in the City of Winnipeg, comply with the requirements of the City of Winnipeg Standard No. AT-4.2.1.83B dated February 10, 1994.

## **3. CITY OF WINNIPEG APPROVAL**

Notwithstanding section 2.7, the foundry shall apply for and be in receipt of, written approval from the City of Winnipeg prior to furnishing barrier curb and gutter inlet products for use in the City of Winnipeg. Where patterns are owned by a party other than the foundry the party owning the pattern and the foundry shall jointly apply for written approval from the City of Winnipeg prior to furnishing barrier curb and gutter inlet products for use of the City of Winnipeg.

## **4. REFERENCES**

CSA CAN3-Z299.3  
Quality Assurance Program - Category 3

ASTM A48

ASTM A536

City of Winnipeg Approved Products Drawing No. AP-008, AP-009, AP-010.

R. M. Girling, P.Eng.  
Engineer of Design and Construction

RMG:TEJK:TSJ:MNS

February 10, 1994



**THE CITY OF WINNIPEG**

**STANDARD FOR**  
**GREY OR DUCTILE IRON**  
**MOUNTABLE CURB AND GUTTER INLET FRAMES AND COVERS**

**STANDARD NO. [AT-4.2.1.83M](#)**

**May 16, 1995**



## **1. SCOPE**

This standard shall apply to grey and ductile iron mountable curb and gutter inlet products approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to curb and gutter inlet products purchased by the City of Winnipeg.

## **2. MOUNTABLE CURB AND GUTTER INLET FRAMES AND COVERS**

### **2.1 GENERAL**

Mountable curb and gutter inlet products approved for use in the City of Winnipeg shall conform to the requirements of this standard. Grey and ductile iron mountable curb and gutter inlet products generally include frames and covers.

### **2.2 MATERIAL REQUIREMENTS**

Mountable curb and gutter inlet products shall be made of either grey cast iron conforming to the requirements of ASTM A48, Class 30B as a minimum, or ductile iron conforming to the requirements of ASTM A536, grade 65-45-12 as a minimum.

### **2.3 DIMENSIONAL REQUIREMENTS**

#### **2.3.1 Mountable Curb and Gutter Inlet Frames**

Dimensions of mountable curb and gutter inlet frames shall be in accordance with City of Winnipeg Approved Products Drawing No. AP-011.

#### **2.3.2 Mountable Curb and Gutter Inlet Covers**

Dimensions of mountable curb and gutter inlet covers shall be in accordance with City of Winnipeg Approved Products Drawing No. AP-011.

#### **2.3.3 Tolerances**

Unless otherwise specified, the dimensions of all castings shall have a tolerance of  $\pm 2\text{mm}$  and an additional  $\pm 5\text{mm}$  per metre of length. Notwithstanding the above tolerances, all mountable curb and gutter inlet frames and covers shall assemble interchangeably.

#### **2.3.4 Seating surfaces**

All seating surfaces of covers and frames shall, if necessary, be machined to the degree that the cover shall seat in the frame without rocking.



## **2.4 MARKING REQUIREMENTS**

### **2.4.1 Mountable Curb & Gutter Frames**

Each mountable curb and gutter inlet frame shall be marked on the inside wall below the cover seat, discernable after installation. The frame shall be marked so as to provide at least the following information:

- Foundry name or a recognized abbreviation representing such;
- Pattern number or code identifying the frame to the applicable pattern drawing.

### **2.4.2 Mountable Curb & Gutter Covers**

Each mountable curb and gutter inlet cover shall be marked on the top so as to provide at least the following information.

- Foundry name or a recognized abbreviation representing such;
- Pattern number or code identifying the cover to the applicable pattern drawing;
- Casting date.

## **2.5 WORKMANSHIP AND FINISH**

Castings shall be of even grain and free of cracks, voids, blisters, and other imperfections that may impair serviceability.

## **2.6 QUALITY CONTROL**

Foundries that manufacture mountable curb and gutter inlet frames and covers for the City of Winnipeg must implement or maintain a quality control program that meets or exceeds CSA standard CAN3-Z299.3. Consequently, a quality control manual, as outlined in the above standard, shall be submitted to the City of Winnipeg for review prior to issue of product approval as referred to in section 3. In addition to the requirements of CSA standard CAN3-Z299.3, the manual shall include a "Corrective Action" policy section for cases of non-conformance.

Corrective action shall include:

- (i) A review and analysis of detected non-conformance and a subsequent corrective action to prevent reoccurrence;
- (ii) Initiate a corrective action when notified by the customer (City of Winnipeg) of the potential or actual non-conformance;
- (iii) Prompt implementation of corrective actions ensuring that they are effective, and follow up to ensure continued effectiveness;
- (iv) A regular report to appropriate levels of management to the causes of non-conformance and the corrective action taken.



## **2.7 QUALITY ASSURANCE**

The foundry's Quality Control Manager shall provide a written affidavit of compliance stating that mountable curb and gutter inlet frames and covers or parts thereof, furnished for use in the City of Winnipeg, comply with the requirements of the City of Winnipeg Standard No. AT-4.2.1.83M dated May 16, 1995.

## **3. CITY OF WINNIPEG APPROVAL**

Notwithstanding section 2.7, the foundry shall apply for and be in receipt of, written approval from the City of Winnipeg prior to furnishing mountable curb and gutter inlet products for use in the City of Winnipeg. Where patterns are owned by a party other than the foundry the party owning the pattern and the foundry shall jointly apply for written approval from the City of Winnipeg prior to furnishing mountable curb and gutter inlet products for use of the City of Winnipeg.

## **4. REFERENCES**

CSA CAN3-Z299.3  
Quality Assurance Program - Category 3

ASTM A48

ASTM A536

City of Winnipeg Approved Products Drawing No. AP-011.

R. M. Girling, P.Eng.  
Engineer of Design and Construction

RMG:TEJK:TSJ:MNS

May 16, 1995



**THE CITY OF WINNIPEG**  
**STANDARD FOR BOULEVARD INLET BOX SOLID COVERS**  
**STANDARD NO. [AT-4.2.1.85](#)**

1992 08 18



## **1. SCOPE**

This standard shall apply to boulevard inlet box solid covers approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City may impose contractual requirements and supplemental technical requirements to apply to boulevard inlet box solid covers purchased by the City of Winnipeg.

## **2. DESIGN REQUIREMENTS**

### **2.1 General**

Boulevard inlet box solid covers approved for use in the City of Winnipeg shall conform to the requirements of this standard.

### **2.2 Materials**

Boulevard inlet box solid covers shall be made of either gray cast iron conforming to the requirements of ASTM A48, Class 30B as a minimum or ductile iron conforming to the requirements of ASTM A536, grade 65-45-12, as a minimum.

### **2.3 Boulevard Inlet Box Solid Covers**

Dimensions of boulevard inlet box solid covers shall be in accordance with City of Winnipeg Approved Products Drawing No. AP-015.

### **2.4 Tolerances**

Unless otherwise specified, the dimensions of all castings shall have a tolerance of  $\pm 2$  mm and an additional  $\pm 5$  mm per metre of dimension.

### **2.5 Marking Requirements**

Each boulevard inlet box solid cover shall be marked on the top and/or bottom so as to provide at least the following information:

- Foundry name or a recognized abbreviation representing such.
- Pattern number or code identifying the cover to the applicable pattern drawing.

### **2.6 Workmanship and Finish**

Castings shall be of even grain and free of cracks, voids, blisters, and other imperfections that may impair serviceability.



## **2.7 Quality Control**

Foundries that manufacture boulevard inlet box solid covers for the City of Winnipeg must implement or maintain a quality control program that meets or exceeds CSA Standard Z299.3. Consequently, a quality control manual, as outlined in the above standard, shall be submitted to the City of Winnipeg for review prior to issuance of product approval as referred to in Section 3. In addition to the requirements of CSA Standard Z299.3, the manual shall include a “Corrective Action” policy section for cases of non-conformance test failure.

- (i) Review and analysis of detected non-conformance and a subsequent corrective action to prevent reoccurrence.
- (ii) Initiate a corrective action when notified by the customer (City of Winnipeg) of the potential or actual non-conformance.
- (iii) Prompt implementation of corrective actions, ensuring that they are effective, and follow up to ensure continued effectiveness.
- (iv) A regular report to appropriate levels of management to the causes of non-conformance and the corrective action taken.

## **2.8 Quality Assurance**

The foundry’s quality control manager shall provide an affidavit of compliance stating that the boulevard inlet box solid covers furnished for use in the City of Winnipeg comply with the requirements of the City of Winnipeg Standard No. AT-4.2.1.85.

## **3. CITY OF WINNIPEG APPROVAL**

The foundry shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing boulevard inlet box solid covers for use in the City of Winnipeg. Where patterns are owned by a party other than the foundry the party owning the pattern and the foundry shall jointly apply for written approval from the City of Winnipeg prior to furnishing boulevard inlet box solid covers for use in the City of Winnipeg.

T.E.J. Kjartanson, P.Eng.  
Standards Engineer

TEJK:TSJ:pr



**The City of Winnipeg**

**Standard For**

**Extruded Polyvinyl Chloride (PVC) Connection Sewer Pipe**

**in Diameters 150 mm (6") and 200mm (8")**

**Standard No. [AT-4.2.2.10](#)**

**August 9, 1996**



## **1. SCOPE**

This standard shall apply to all solid wall extruded polyvinyl chloride (PVC) connection sewer pipe in diameters 150 mm (6") and 200mm (8") approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City of Winnipeg may impose contractual requirements and supplemental technical requirements to apply to extruded PVC sewer pipe purchased by the City.

## **2. EXTRUDED PVC CONNECTION SEWER PIPE**

### **2.1 GENERAL**

Extruded PVC connection solid wall sewer pipe approved for use in the City of Winnipeg shall have a maximum dimension ratio (SDR) of 35, and conform to the requirements of this standard.

### **2.2 MATERIAL REQUIREMENTS**

#### **2.2.1 PVC Sewer Pipe**

All materials used for extruded PVC sewer pipe shall be in accordance with sections 4.1.1, 4.1.3 and 4.2 of CSA Standard No. B182.2-M90 (referred to hereinafter as CAN/CSA B182.2-M90). However, pipe shall be extruded from a PVC compound having a cell classification of 12454-C or 12364-C as defined by ASTM Standard D1784. Different cell classifications may be used provided that all properties are equal to or superior to those of the specified compounds.

#### **2.2.2 Elastomeric Gaskets**

Elastomeric gaskets shall be manufactured from material that complies with the physical requirements specified in;

-section 6.2.1 of CAN/CSA-B.182.2-M90.

-sections 6.2, 6.3 and 7.8 of the ASTM standard F 477-90 and related ASTM testing.

Gasket material shall be designated in accordance to ASTM Standard D 2000, and the date of manufacture of gaskets shall not precede the date of pipe manufacture by more than 6 months unless the gasket manufacturer provides a written warranty, verifying a longer gasket shelf life.

### **2.3 DIMENSIONAL REQUIREMENTS**

#### **2.3.1 Pipe Dimensions**

The pipe diameter and out of roundness tolerance shall comply with section 5.2.1 and 5.2.3 (respectively) of CAN/CSA-B182.2-M90. The minimum wall thickness of all fittings shall be Standard Dimension Ratio (SDR) 35 as defined in section 5.2.2 of CAN/CSA-B182.2-M90.

#### **2.3.2 Joint Design**



The joints of extruded PVC sewer pipe shall generally be designed in accordance with CAN/CSA B182.2-M90 section 5.3.

#### **2.3.2.1 Socket Dimensions**

Socket dimensions of all extruded PVC sewer pipe shall be in accordance with section 5.3.2.1 of CAN/CSA B182.2-M90. In addition, joints shall have dimensions that will accommodate pipes having the average outside diameters detailed in Table 1 of CAN/CSA Standard B182.2-M90.

#### **2.3.2.2 Elastomeric Gasket Dimensions**

Elastomeric gasket dimensions shall conform to section 6.2.1.1 of CAN/CSA B182.2-M90.

### **2.4 MARKING REQUIREMENTS**

#### **2.4.1 Extruded PVC Sewer Pipe**

Extruded PVC sewer pipe shall be marked on the exterior in accordance with CAN/CSA B182.2-M90 sections 11.1.1 and 11.1.2. In addition, extruded PVC sewer pipe shall include the following markings:

- i) The manufacturer's production code, including plant, year, month, day and extruder of manufacturer.

#### **2.4.2 Elastomeric Gaskets**

Elastomeric gaskets shall be marked in accordance with ASTM F 477 section 11.1, and shall include at least the following markings\*:

- i) Date code (year and quarter);
- ii) Name of manufacturer;
- iii) Nominal size.

\* - If the gasket is an integral part of the pipe - i.e. non-removable as a result of the extruding process - then these markings need not appear on the gasket. However, this information must then clearly appear on the pipe.

### **2.5 QUALITY CONTROL REQUIREMENTS**

The manufacturer shall conduct all quality control testing for the extruded PVC sewer pipe as described in sections 5.5, 9, 10.1, 10.2, 10.7, 10.8, and 10.9 of CAN/CSA-182.2-M90.

### **2.6 PACKAGING AND HANDLING**

Extruded PVC sewer pipe shall be packaged and handled to prevent damage due to crushing and/or piercing.

Extruded PVC sewer pipe shall be installed within twenty four (24) months of the date of manufacture.



## **2.7 INSTALLATION INSTRUCTIONS**

The manufacturer shall furnish clear concise installation instructions for extruded PVC sewer pipe.

## **2.8 WORKMANSHIP**

All PVC sewer pipe shall be extruded PVC, with factory installed elastomeric gaskets.

### **2.8.1 Pipe Body**

The pipe body shall be homogenous throughout and free from visible cracks, voids, foreign inclusions or other injurious defects. pipe shall be as uniform as commercially practical in colour, density, opacity and other physical properties. Rework material may be used, providing the pipe produced meets the requirements of this standard.

### **2.8.2 Elastomeric Gaskets**

All gaskets shall be homogeneous and free from porosity, blisters, pitting or other imperfections that may affect serviceability, in any cross section.

## **2.9 QUALITY ASSURANCE**

The manufacturer shall provide an overall affidavit signed by a signing officer of the company stating that extruded solid wall PVC sewer pipe, furnished for use in the City of Winnipeg complies with the requirements of the City of Winnipeg Standard No. AT-4.2.2.10 dated November 9, 1994.

## **3. CITY OF WINNIPEG APPROVAL**

Notwithstanding Section 2.9 of this Standard, the manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing extruded PVC sewer pipe for use in the City of Winnipeg.

## **4. REFERENCES**

ASTM D1784  
ASTM D2000  
ASTM D3034  
ASTM D3212-86  
ASTM F 477-90  
ASTM F679-89  
ASTM F913-87

CAN/CSA B182-M90  
*PVC Sewer Pipe and Fittings (PSM Type)*



E.C. Burgener, P.Eng.  
Materials and Service Standards Engineer

August 9, 1996



**The City of Winnipeg**  
**Specification For**  
**PVC Storm Sewer and Sewer Connection Saddles**

**Specification No. [AT-4.2.2.30](#)**

**October 11, 1996**



## **1. SCOPE:**

This specification shall apply to all Connection Saddles used to connect connection (small diameter) PVC storm sewer pipe or sewer pipe to mainline pipe (large diameter PVC, Concrete, clay tile, etc.)

This specification shall apply to technical requirements only. The City of Winnipeg may impose contractual requirements and supplemental technical requirements to apply to PVC connection saddles purchased by the City.

## **2. REQUIREMENTS:**

### **2.1 GENERAL**

PVC Connection Saddles are used to make permanent watertight connections between connecting storm sewer and sewer pipes and mainline pipes. The Saddles must endure the shear loading of back-fill operations, some long term settling stresses, and in the City of Winnipeg, a very corrosive set of soil conditions. PVC Connection Saddles are assembled in difficult circumstances, in outdoor conditions, with rain, freezing temperatures, dirt, and confined spaces. PVC Connection Saddles that are approved for use in the City of Winnipeg shall have a demonstrated history of use under similar conditions, and shall conform to the requirements of this specification.

### **2.2 APPLICABLE STANDARDS AND REQUIREMENTS:**

PVC Connection saddles shall conform to the dimensional requirements of CAN/CSA-B182.4 - 92 and/or ASTM F794 A Standard Specification for PVC Ribbed Gravity Sanitary Pipe and Fittings Based on a Controlled Inside Diameter, and CAN/CSA-B.182.2-M90 and/or ASTM D3034 for SDR 35 - PVC Mainline Sewer Pipe.

Manufacturers shall provide the specifications for all materials used in the manufacture of PVC Connection saddles, the material capabilities, such as resistance to chemicals, soils, etc., and test results compiled by third party testing agencies.

The date of manufacture of gaskets shall not precede the date of fitting manufacture by more than 12 months unless the gasket manufacturer provides a written warranty, verifying a longer gasket shelf life.

PVC Connection Saddles shall include the manufacturer's production code, including plant, year, month, and day of manufacture.

All gaskets, pipe, and other materials shall be homogeneous and free from porosity, blisters, pitting or other imperfections that may affect serviceability, in any cross section.

PVC Connection Saddles shall be installed within thirty (30) months of the date of manufacture, unless stored indoors or under cover to protect the product against direct sunshine (UV) degradation.

The manufacturer shall furnish clear concise installation instructions.

## **3.0 QUALITY ASSURANCE**



The manufacturer shall provide an overall affidavit signed by a signing officer of the company stating that the PVC Connection Saddles furnished for use in the City of Winnipeg complies with the requirements of the City of Winnipeg Specification No. AT-4.2.2.30 dated October 11, 1996.

#### **4.0 CITY OF WINNIPEG APPROVAL**

Each manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing open profile PVC pipe for use in the City of Winnipeg.

E.C. Burgener, P.Eng.  
Materials and Service Standards Engineer

October 11, 1996



**THE CITY OF WINNIPEG**

**STANDARD FOR**

**INJECTION MOULDED PVC BENDS AND REDUCER BUSHINGS**  
**FOR USE WITH 150MM AND 200MM PVC SEWER CONNECTION PIPE**  
**STANDARD No. [AT-4.2.2.60](#)**

**May 9, 1994**



## **1. SCOPE**

This standard shall apply to injection moulded polyvinyl chloride (PVC) typical bends for PVC sewer connection pipe in diameters of 150mm and 200mm, approved for use in the City of Winnipeg.

This standard shall apply to technical requirements only. The City of Winnipeg may impose contractual requirements and supplemental technical requirements to apply to injection moulded PVC sewer fittings purchased by the City.

## **2. INJECTION MOULDED PVC FITTINGS FOR PVC SEWER CONNECTION PIPE**

### **2.1 GENERAL**

Injection moulded PVC sewer fittings approved for use in the City of Winnipeg shall conform to the requirements of this standard. All moulded PVC sewer fittings shall incorporate elastomeric gasketed joints.

Injection moulded PVC sewer connection pipe fittings provide either a change of direction (bends) or a diameter reduction (reducer bushings) in PVC sewer connection lines 150mm and 200mm.

### **2.2 MATERIAL REQUIREMENTS**

#### ***2.2.1 Injection Moulded PVC Sewer Connection Pipe Fittings***

All material used for injection moulded PVC fittings shall be in accordance with sections 4.1.2, 4.1.3 and 4.2 of CSA Standard No. B182.2-M90. However, fittings shall be injection moulded from a PVC compound having a cell classification of 12454-C or 13343-C according to ASTM Standard D1784. Different cell classifications may be used provided that all properties are equal to or superior to those of the specified compounds.

#### ***2.2.2 Elastomeric Gaskets***

Elastomeric gaskets shall be manufactured from material that complies with the physical requirements specified in;

- section 6.2.1 of CAN/CSA -B 182.2-M90.

- sections 6.2, 6.3 and 7.8 of the ASTM standard F 477-90 and related ASTM testing.

Gasket material shall be designated in accordance with ASTM Standard D 2000, and the date of manufacture of all gaskets shall not precede the date of pipe manufacture by more than six (6) months unless written the gasket manufacturer provides warranty of a longer shelf life.

### **2.3 DIMENSIONAL REQUIREMENTS**

#### ***2.3.1 Fitting Body Dimensions***

The dimensions of 150mm (6") and 200mm (8") nominal size injection moulded fittings shall comply with section 5.4.2 of CSA Standard No. B182.2-M90. The minimum wall thickness of all fittings shall be Standard Dimension Ratio (SDR) 35 as defined in section 5.4.1.1 of CSA Standard No. B182.2-M90.

#### ***2.3.2 Elastomeric Gasket Seal Joint Dimensions***



Dimensions of elastomeric gasket seal joints shall be in accordance with Sections 5.3.2.1 and 6.2.1.1 of CSA Standard No. B182.2-M90 for 150mm (6") and 200mm (8") nominal size fittings, respectively. In addition, 150mm and 200mm nominal size joints shall have dimensions such as will accommodate pipes having the average outside diameters detailed in Table 1 of CSA Standard No. B182.2-M90.

## **2.4 MARKING REQUIREMENTS**

### **2.4.1 Injection Moulded PVC Sewer Connection Pipe Fittings**

- a) Fittings of the nominal 150mm and 200mm diameter shall be marked on the exterior in accordance with CSA Standard No. B182.2, section 11.2.1. In addition, injection moulded fittings shall bear the following markings:
  - i) The nominal size of each socket;
  - ii) The manufacturer's production code, including plant, year and month.

### **2.4.2 Elastomeric Gaskets**

Elastomeric gaskets shall be marked in accordance with ASTM F913-87 section 12.1, or section 11.1 of ASTM F 477 (where applicable), and shall include at least the following markings\*:

- i) Date code (month and year);
- ii) Name of manufacturer;
- iii) Nominal size.

\* - If the gasket is an integral part of the fitting - i.e. non-removable as a result of the injection moulding process. - then these markings need not appear on the gasket. However, this information must then clearly (legibly, and without confusion to other "fitting" information) appear on the fitting.

## **2.5 QUALITY CONTROL REQUIREMENTS**

The manufacturer shall conduct the quality control testing described in sections 7, 9, 10.1, 10.2, 10.4, 10.8 and 10.9 of CSA Standard No. 182.2-M90 for the 150mm and 200mm nominal diameter fittings.

## **2.6 PACKAGING AND HANDLING**

Fittings shall be packaged and handled to prevent damage due to crushing and/or piercing.

Fittings shall be installed within twenty-four (24) months of the date of manufacture.

## **2.7 INSTALLATION INSTRUCTIONS**

Clear, concise installation instructions for PVC fittings for use on PVC sewer connection pipe shall be furnished by the manufacturer, and shall be in accordance with the installation requirements detailed in the City of Winnipeg standard construction specification.

## **2.8 WORKMANSHIP**

All PVC sewer connection pipe fittings shall be one piece, injection moulded PVC, with factory installed elastomeric gaskets.



### **2.8.1 Fitting Body**

The fitting bodies shall be homogeneous throughout and free from visible cracks, voids, foreign inclusions or other injurious defects. Fittings shall be as uniform as commercially practical in colour, density, opacity and other physical properties. Rework material may be used, providing the fittings produced meet the requirements of this standard.

### **2.8.2 Elastomeric Gaskets**

All gaskets shall be homogeneous and free from porosity, blisters, pitting or other imperfections that may affect serviceability, in any cross section.

## **2.9 QUALITY ASSURANCE**

The manufacturer shall provide an overall affidavit signed by a signing officer of the company stating that injection moulded PVC fittings for use on PVC sewer connection pipe furnished for use in the City of Winnipeg comply with the requirements of the City of Winnipeg Standard No. AT-4.2.2.60 dated May 9, 1994.

## **3. CITY OF WINNIPEG APPROVAL**

Notwithstanding section 2.9 of this Standard, the manufacturer shall apply for, and be in receipt of, written approval from the City of Winnipeg prior to furnishing moulded PVC sewer fittings for use in the City of Winnipeg.

## **4. REFERENCES**

ASTM D1784  
ASTM D2000  
ASTM D3212-86  
ASTM F 477-90  
ASTM F679-89  
ASTM F913-87

CAN/CSA B182-M90  
*PVC Sewer Pipe and Fittings (PSM Type)*

R.M. Girling, P.Eng.  
Engineer of Design and Construction

RMG:MNS:JMH:

May 9, 1994





# **APPLICATION DOCUMENTS**

Winnipeg





## THE CITY OF WINNIPEG - VILLE DE WINNIPEG

WATER AND WASTE DEPARTMENT - SERVICE DES EAUX ET DES DÉCHETS

ENGINEERING DIVISION - DIVISION DE L'INGÉNIERIE

### GUIDELINES FOR PRODUCT APPROVAL

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In order to obtain Approved Product Status of any given product for use in the City of Winnipeg, the applicant must supply at least the following to the Asset Management Branch:

- A completed Product Approval Application Form
- A completed Affidavit of Compliance signed by a Company Signing Officer
- Applicable third party certification, or a recognized quality assurance system including a corrective action plan.
- Literature about the product including installation instructions
- Shop drawings
- A product sample

Submission of the above noted items will not necessarily assure that Approval for use in the City of Winnipeg will be granted.

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110-1199 Pacific Avenue • 1199, avenue Pacific, porte 110 • Winnipeg • Manitoba R3E 3S8

tel/tél. (204) 986-7638 • fax/télec. (204) 986-3745 • [www.winnipeg.ca](http://www.winnipeg.ca)

<http://www.winnipeg.ca/matmgmt/Spec/Default.stm>





## THE CITY OF WINNIPEG - VILLE DE WINNIPEG

WATER AND WASTE DEPARTMENT - SERVICE DES EAUX ET DES DÉCHETS

ENGINEERING DIVISION - DIVISION DE L'INGÉNIERIE

### PRODUCT APPROVAL APPLICATION FORM

#### General Information and Instructions

1. Information submitted on this form will enable the City of Winnipeg - Water & Waste Department to assess the product identified.
2. This form must be completed in full in order to be considered for product approval. A completed application shall consist of the following:
  - A completed Product Approval Application Form,
  - A completed Affidavit of Compliance signed by a Company Signing Officer,
  - Applicable third party certification or a recognized quality assurance system including a corrective action plan,
  - Literature about the product including installation and maintenance instructions,
  - Shop drawings,
  - Product sample(s)\*.
3. The Application, including all relevant information must be sent to:

City of Winnipeg, Water & Waste Department  
Engineering Division, Asset Management Branch  
110-1199 Pacific Avenue  
Winnipeg, Manitoba, Canada, R3E 3S8  
Attn: Blair Will CD CET

<b>1. City of Winnipeg**</b>	
City Specification	
City Specification Number	City Specification Date

<b>2. Company Profile</b>				
Name		<b>Type of Business</b>  <input type="checkbox"/> Manufacturer  <input type="checkbox"/> Supplier  <input type="checkbox"/> Representative  <input type="checkbox"/> Other (Specify)		
Address				City/Town
Province/State	Postal/Zip Code			Country
Contact Person				Telephone Number
Title		Fax Number		
Email		Company Web Site		
Signature		Date		

\* Please contact the City of Winnipeg representative at (204) 986-7638 prior to supplying / shipping product samples.

\*\* The City of Winnipeg Standard Construction Specifications for Underground Works can be found at <http://www.winnipeg.ca/matmgt/Spec/Default.stm>





## THE CITY OF WINNIPEG - VILLE DE WINNIPEG

WATER AND WASTE DEPARTMENT - SERVICE DES EAUX ET DES DÉCHETS

ENGINEERING DIVISION - DIVISION DE L'INGÉNIERIE

### 3. Product Description (Attach product literature, detailed specifications and technical data)

Product Name		Model No.	<b>Product Category</b> <input type="checkbox"/> Water Systems <input type="checkbox"/> Wastewater Systems <input type="checkbox"/> Stormwater system <input type="checkbox"/> Specialty Equipment
Manufacturer Name	Location of Plant/Foundry		
Year Introduced	Number of Years Available	<b>Samples Available For (Check All Applicable)</b> <input type="checkbox"/> Viewing <input type="checkbox"/> Demonstration <input type="checkbox"/> Testing	
Product Description			

### 4. Product Application/Function and Special Features:

End Use Function
Features
Special Features

### 5. Current Approvals

Municipality	Contact Person	Phone Number
1.		
2.		
3.		

### 6. Compliance With Industry Standards (Must attach Proof of Certification)

Standard	Section No.	Standard	Section No.	Standard	Section No.
<input type="checkbox"/> AWWA		<input type="checkbox"/> ASTM		<input type="checkbox"/> AASHTO	
<input type="checkbox"/> OCPA		<input type="checkbox"/> WH		<input type="checkbox"/> IAPMO	
<input type="checkbox"/> NSF		<input type="checkbox"/> FM		<input type="checkbox"/> Other	
<input type="checkbox"/> CSA		<input type="checkbox"/> UL		<input type="checkbox"/> Other	

### 7. Temporary Product Approval Application (If applicable)

Project Title	Project File No.	Developer
Project Location	Engineering Consultant	Consultant Address
Project Description		





Vendor Name:	Vendor Location (City):	Contact Person:	Phone Number:
1.			
2.			
3.			
4.			
5.			

1.
2.
3.

<input type="checkbox"/> Full Approved	Date	<input type="checkbox"/> Temporary Approval	Date
<input type="checkbox"/> Granted	<input type="checkbox"/> Denied	<input type="checkbox"/> Granted	<input type="checkbox"/> Denied

[illegible]





**THE CITY OF WINNIPEG - VILLE DE WINNIPEG**  
**WATER AND WASTE DEPARTMENT - SERVICE DES EAUX ET DES DÉCHETS**  
ENGINEERING DIVISION - DIVISION DE L'INGÉNIERIE

**AFFIDAVIT OF COMPLIANCE**

I, \_\_\_\_\_ of \_\_\_\_\_  
(Company Signing Officer) (Company Name)

do hereby make oath and certify that \_\_\_\_\_  
(Company Name)

is carrying on business as a manufacturer of \_\_\_\_\_  
(Product Name)

\_\_\_\_\_ in the City/Town of \_\_\_\_\_  
(City/Town, Province/State)

and that \_\_\_\_\_ furnished for use in the City  
(Product)

of Winnipeg shall comply with the requirements contained in the City of Winnipeg  
specification for \_\_\_\_\_, specification number  
(Product)

\_\_\_\_\_ dated \_\_\_\_\_ .  
(City of Winnipeg Specification Number) (City of Winnipeg Specification Date)

Signed \_\_\_\_\_, at \_\_\_\_\_  
(Month/Day/Year) (City/Town, Province/State)

\_\_\_\_\_  
(Signature of Signing Officer of Company)

\_\_\_\_\_  
(Signature of Witness)

\_\_\_\_\_  
(Printed Name and Title)

\_\_\_\_\_  
(Printed Name)

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# **UPDATE INFORMATION**

Winnipeg



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**REVISION INFORMATION**  
**DIVISION 3 – APPROVED PRODUCTS**  
**STANDARD CONSTRUCTION SPECIFICATIONS**

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**Pre-2003 REVISION SUMMARY**

**1997**

**Water Approved**

- 4.1.1.70 – Ford Meter Box Co. (April 18, 1997)

**Sewer Approved**

- 4.2.1.11 – Royal Flex Loc Pipe Ltd. (September 17, 1997)
- 4.2.1.84 – D. Martens Manufacturing Co. Ltd. (July 14, 1997)

**1999**

**Water Revoked**

- 4.1.1.60 – Terminal City Ironworks Ltd. (November 26, 1999)

**Sewer Approved**

- 4.2.1.60 – Le-Ron Plastics Inc. (November 26, 1999)
- 4.2.1.61 – Le-Ron Plastics Inc. (November 26, 1999)
- 4.2.1.61A – Le-Ron Plastics Inc. (November 26, 1999)
- 4.2.2.60 – Le-Ron Plastics Inc. (November 26, 1999)

**2000**

**Sewer Approved**

- 4.2.1.60 – Le-Ron Plastics Inc. (November 9, 2000)
- 4.2.2.60 – Le-Ron Plastics Inc. (November 9, 2000)

**2001**

**Water Approved**

- 4.1.2.41 – W.D. Valve Boxes Ltd. (March 14, 2001)
- 4.1.3.20 – Keylab Inc. (January 30, 2001)

**2002**

**Water Approved**

- 4.1.1.11 – Royal Pipe Systems (April 26, 2002)
- 4.1.1.80 – Clow Canada (May 3, 2002)
- 4.1.1.81 – Northern Pipe Products Inc. (April 26, 2002)
- 4.1.2.40 – A.Y. McDonald Mfg. Co. (May 2, 2002)

**Sewer Approved**

- 4.2.1.16 – Royal Pipe Systems (March 12, 2002)
- 4.2.1.83B – W.D. Valve Boxes Ltd. (May 27, 2002)



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**REVISION INFORMATION**  
**DIVISION 3 – APPROVED PRODUCTS**  
**STANDARD CONSTRUCTION SPECIFICATIONS**

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**2003 REVISION SUMMARY**

An **APPLICATION DOCUMENTS** section was been added to the web page.

**Water - Approved**

- 4.1.1.10 – Northern Pipe Products Inc. (January 21, 2003)
- 4.1.1.11 – Northern Pipe Products Inc. (January 21, 2003)
- 4.1.1.11 – Rehau Incorporated (January 27, 2003)
- 4.1.1.60 – Sigma Corporation – 150mm through 300mm (July 8, 2003)

**Water - Revoked**

- 4.1.1.60 – Clow Canada (April 1, 2003)
- 4.1.1.83 – Winnipeg Fabricators Ltd. (April 14, 2003)
- 4.1.1.83 – Dormar Construction (April 14, 2003)

**Water - Name Change**

- 4.1.1.83 – F.N. Precision Structures Ltd. changed to **F.N. NEW ENTERPRISES** (April 16, 2003)

**Sewer - Approved**

- 4.2.1.16 – Rehau Industries Inc. – 200mm through 300mm (May 20, 2003)
- 4.2.1.83M – Titan Foundry (May 12, 2003)

**Sewer - Revoked**

- 4.2.1.83M – Norwood Foundry (May 9, 2003)
- 4.2.1.84 – D. Martens Manufacturing (April 15, 2003)

**Sewer - Information and Name Change**

- 4.2.1.16 – Loc Pipe changed to **HANSON PIPE & PRODUCTS CANADA INC.** (May 21, 2003)
- 4.2.1.16 – Hanson Pipe & Products – added 250mm & 300mm and deleted 450mm (May 21, 2003)
- 4.2.1.68 – Fowler Manufacturing changed to **INSERTA FITTINGS CO.** (April 11, 2003)
- 4.2.1.72 – MSU Daymond Canada Ltd. changed to **MSU MISSISSAUGA LTD.** (April 15, 2003)
- 4.2.1.82 – MSU Daymond Canada Ltd. changed to **MSU MISSISSAUGA LTD.** (April 15, 2003)



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**REVISION INFORMATION**  
**DIVISION 3 – APPROVED PRODUCTS**  
**STANDARD CONSTRUCTION SPECIFICATIONS**

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**2004 REVISION SUMMARY**

**Application Document Information**

- Revised
  - Guidelines for Product Approval Form
  - Product Approval Application Form
  - Affidavit of Compliance Form
- Deleted
  - Draft Affidavit of Compliance form

**Standard - Revised**

- 4.1.1.60 – Standard For Gray and Ductile Iron Pipe Fittings For Use With PVC Watermain Piping In Nominal Diameters 150mm To 500mm – dated January 8, 2004
- 4.1.1.63 – Standard For Epoxy Coated Wide Range Ductile Iron Couplings Nominal Pipe Sizes 100mm Through 300mm – dated March 25, 2004

**Water - Approved**

- 4.1.1.60 – Sigma Corporation (July 20, 2004) – Approved to revised standard
- 4.1.1.63 – Romac Industries (July 12, 2004) – Approved to new standard
- 4.1.1.63 – Ford Meter Box Co. (July 21, 2004) – Approved to new standard

**Water - Revoked**

- 4.1.1.60 – Sigma Corporation (July 1, 2004)
- 4.1.1.60 – Norwood Foundry (July 1, 2004)
- 4.1.1.70 – Clow Canada (September 3, 2004)

**Water – Information Changed**

- 4.1.1.10 – Northern Pipe Products Inc. – Added date/production code interpretation chart
- 4.4.1.11 – Northern Pipe Products Inc. – Added date/production code interpretation chart

**Sewer - Approved**

- 4.2.1.73 – Sigma Corporation (February 17, 2004)
- 4.2.1.83B – Sigma Corporation (April 8, 2003 and May 10, 2004)
- 4.2.1.84 – State Industries Inc. (January 14, 2004)



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**REVISION INFORMATION**  
**DIVISION 3 – APPROVED PRODUCTS**  
**STANDARD CONSTRUCTION SPECIFICATIONS**

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**2005 REVISION SUMMARY**

A “**MODEL**” description was been added to the manufacturers product pages, identifying all approved models for each product.

**Standard - Approved**

- 4.1.1.64 – Standard For Fabricated PVC Fittings In Nominal Diameters 250mm and 300mm For Use With PVC Watermain Pipe – dated February 15, 2005

**Water- Approved**

- 4.1.2.31 – Cambridge Brass (December 9 2005)
- 4.1.1.63 – Smith-Blair Inc.(August 12, 2005)
- 4.1.1.64 – Ipex Inc (February 17, 2005)
- 4.1.1.64 – Royal Pipe Systems (June 16, 2005)
- 4.1.1.65 – Smith-Blair Inc.(November 23, 2005)
- 4.1.1.69 – Canada Pipeline Accessories (1986) Corp.(August 2, 2005)
- 4.1.1.70 – Smith-Blair Inc.(August 12, 2005)

**Water – Information Change**

- 4.1.1.10 – Northern Pipe has changed the production code in the print line
- 4.1.1.11 – Northern Pipe has changed the production code in the print line
- 4.1.3.20 – Removed zinc end cap reference from this section.

**Sewer – Information Change**

- 4.2.1.10 – Northern Pipe has changed the production code in the print line
- 4.2.2.10 – Northern Pipe has changed the production code in the print line
- 4.2.1.71 – Consolidated 4.2.1.81 – Catch Basin Joint Gasket into this section and changed “Product Type” to Manhole/Catch Basin Joint Gasket
- 4.2.1.72 – Consolidated 4.2.1.82 – Catch Basin Rungs into this section and changed “Product Type” to Manhole/Catch Basin Rungs.
- 4.2.1.81 – Catch Basin Joint Gasket Removed this section
- 4.2.1.82 – Catch Basin Rungs Removed this section
- 4.2.1.83B – Removed the reference to AP-010 under the “Approved Product Drawing Reference” on the manufacturers listing page.

**Drawings**

- AP-001 - Revised Title – Standard Valve Box
- AP-004 - Revised Title – Standard Frame for Manhole and Catch Basin
- AP-008 – Barrier Curb and Gutter Detail Drawing (August 15, 2005)
- AP-011 – Mountable Curb and Gutter Inlet Detail Drawing (August 15, 2005)



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**REVISION INFORMATION**  
**DIVISION 3 – APPROVED PRODUCTS**  
**STANDARD CONSTRUCTION SPECIFICATIONS**

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**2006 REVISION SUMMARY**

**Standard - Approved**

- 4.1.1.64 – Fabricated PVC Fittings (150mm – 300mm)

**Water - Approved**

- 4.1.2.40 – Mueller Canada (Model B25154-W83) (January 13, 2006)
- 4.1.2.40 – Cambridge Brass (Model 262) (September 12, 2006)
- 4.1.1.64 – Ipex (February 21, 2006)
- 4.1.1.64 – Royal Pipe Systems (February 21, 2006)
- 4.1.1.82 – Titan Foundry Ltd. (September 8, 2006)
- 4.1.1.90 – Clow (McAvity) (September 8, 2006)
- 4.1.1.91 – WD Valve Boxes Ltd. (April 13, 2006)

**Sewer - Approved**

- 4.2.1.83M – WD Valve Boxes Ltd. (April 20, 2006)
- 4.2.1.83M – Titan Foundry Ltd. (September 8, 2006)

**Sewer – Revoked**

- 4.2.1.83B – Norwood Foundry (September 12, 2006)



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**REVISION INFORMATION**  
**DIVISION 3 – APPROVED PRODUCTS**  
**STANDARD CONSTRUCTION SPECIFICATIONS**

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**2007 REVISION SUMMARY**

**Standard – Approved**

- 4.1.1.65 – Epoxy Coated Cast Iron Couplings in Nominal Pipe Sizes 100mm and Over. (January 1, 2007)

**Standard – Rescinded**

- 4.1.1.65 – Epoxy Coated Cast Iron Couplings Nominal Pipe Size 4" and Over. (March 28, 1996)

**Water – Approved**

- 4.1.1.65 – Romac Industries Ltd. – 501 and RC501 (January 1, 2007).
- 4.1.1.65 – Robar Industries – 1507 (November 20, 2006).
- 4.1.1.65 – Robar Industries – 1507R (November 20, 2006).
- 4.1.1.65 – Ford Meter Box Co. – FC1 and FC2A (January 1, 2007)
- 4.1.1.65 – Ford Meter Box Co. – FRC (January 1, 2007)
- 4.1.1.65 – Smith Blair Inc. – Omni Models 441, R441, 442, 437 and 482 (January 1, 2007)

**Water – Revoked**

- 4.1.3.20 – Corritherm Inc. – (March 21, 2007)
- 4.1.3.20 – Colony Viking Services Ltd. – (March 21, 2007)
- 4.1.2.40 – Mueller Canada Model No. H15154 – (January 13, 2007)

**Water – Name Change**

- 4.1.3.20 – Duratron Systems Ltd. – amalgamated under Canada Metals Co.
- 4.1.3.20 – Keylab Inc. – name changed to Exothermal Ind.

**Sewer – Approved**

- 4.2.1.71 – Hamilton Kent - Tylox SuperSeal, Model 165, 1200mm only (March 9, 2007)



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**REVISION INFORMATION**  
**DIVISION 3 – APPROVED PRODUCTS**  
**STANDARD CONSTRUCTION SPECIFICATIONS**

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**2008 REVISION SUMMARY**

**Application Document Information**

- Revised – [Product Approval Application Form](#)

**Standard – Revised**

- 4.2.1.66 – [Main Line and Connection Flexible Sewer Couplings](#)

**Water – Approved**

- 4.1.1.60 – [Terminal City Iron Works \(ACS\) Inc.](#)
- 4.1.1.69 – [Kraus Industries Ltd.](#)
- 4.1.1.91 – [Waggoner Industrial Products Ltd.](#)
- 4.1.3.21 – [Deblo Industries](#)

**Sewer – Approved**

- 4.2.1.60 – [Galaxy Plastics](#)
- 4.2.1.66 – [Dallas Specialty & Mfg Co.](#)
- 4.2.1.73 – [Titan Foundry](#)
- 4.2.1.75 – [Sigma Corporation](#)
- 4.2.1.83M – [Sigma Corporation](#)
- 4.2.2.30 – [Royal Pipe Systems \(Plastic Trends\)](#)
- 4.2.2.60 – [Galaxy Plastics](#)
- 4.2.0.0 Misc – [Titan Foundry](#)
- 4.2.0.0 Misc – [Highway Rubber & Safety Inc.](#)
- 4.2.0.0 Misc – [CCI Pipeline Systems](#)



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March 11, 2011

**REVISION INFORMATION**  
**DIVISION 3 – APPROVED PRODUCTS**  
**STANDARD CONSTRUCTION SPECIFICATIONS**

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**REVISION SUMMARY**

**Standards – New and/or Revised**

- 4.1.1.61 – [AWWA C907 - Injection Moulded PVC Fittings & Couplings](#)

**Water – Approved**

- 4.1.1.61 – [Royal Pipe Systems](#)
- 4.1.1.63 – [Mueller Canada](#)
- 4.1.3.20 – [Canada Metal \(Pacific\) Ltd.](#)

**Sewer – Approved**

- 4.2.1.66 – [Fernco Inc.](#)



**CW 3615 – RIPRAP****TABLE OF CONTENTS**

1.	GENERAL CONDITIONS .....	1
3.	DESCRIPTION.....	1
5.	MATERIALS.....	1
	5.1 General .....	1
	<b>5.2 Rock.....</b>	<b>1</b>
	5.3 Random Stone Riprap .....	1
	5.4 Grout .....	1
	5.5 Sand Bags .....	1
	5.6 Sacked Concrete .....	2
	5.7 Flexible Joint Sealant.....	2
	5.8 Expansion Joint Material.....	2
9.	CONSTRUCTION METHODS .....	2
	9.1 Preparation of Existing Ground.....	2
	9.2 Random Stone Riprap .....	2
	9.3 Grouted Stone Riprap .....	2
	9.4 Sacked Concrete Riprap.....	3
12.	METHOD OF MEASUREMENT .....	3
	12.1 Random Stone Riprap .....	3
	12.2 Grouted Stone Riprap.....	3
	12.3 Sacked Concrete Riprap .....	3
13.	BASIS OF PAYMENT .....	4
	13.1 Random Stone Riprap .....	4
	13.2 Grouted Stone Riprap.....	4
	13.3 Sacked Concrete Riprap .....	4



**CW 3615 - RIPRAP****1. GENERAL CONDITIONS**

The General Conditions and Standard Provisions attached hereto shall apply to and be a part of this Specification.

**3. DESCRIPTION**

This Specification shall cover the operations relating to the supply and placement of approved riprap and other works relating to the placing of riprap.

The work to be done by the Contractor under this Specification shall include the supply of all materials, and the furnishing of all superintendence, overhead, labour, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

**5. MATERIALS****5.1 General**

The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

**5.2 Rock**

Rock for riprap shall consist of hard, dense, durable rock. The rock shall be quarried rock or fieldstone, dense and durable, and resistant to the action of frost and water and suitable in all other respect for the purpose intended. Stone rip-rap shall be free of sod, roots, organic material and debris prior to placement. Individual pieces of stone shall be free of defects such as seams or cracks prior to placement. Where stipulated, rock is to be of the same type as that existing in place. In other installations, the stones shall range in size from 100 mm to 350 mm in diameter with at least seventy-five (75%) percent ranging from 200 mm to 300 mm in diameter. The Contract Administrator shall approve the rock for riprap prior to placing.

Quarried rock shall have a maximum Los Angeles Abrasion Loss of 32% when tested in accordance with ASTM C535 and a maximum Magnesium Sulphate Soundness Loss of 13% when tested in accordance with ASTM C88.

**5.3 Random Stone Riprap**

Random stone riprap shall be placed over a non-woven geotextile fabric which shall conform to requirements of CW 3130.

**5.4 Grout**

Concrete grout shall be 15 MPa compressive strength at 28 days, with sand aggregate of a consistency to ensure total penetration to fill all voids in the riprap.

**5.5 Sand Bags**

Sand bags shall be of 225 g jute 300 mm x 600 mm with salvage top and tie string attached to the side approximately 100 mm from the top.



**5.6     Sacked Concrete**

Concrete for sacked concrete riprap shall consist of a mixture of 20 kg of normal Portland cement to 50 kg of aggregate. Aggregate shall be well graded and have a maximum aggregate size of 40 mm.

**5.7     Flexible Joint Sealant**

Flexible joint sealant shall be guaranteed non-staining, grey polyurethane, as approved by the Contract Administrator and applied in strict accordance with the manufacturer's instructions.

**5.8     Expansion Joint Material**

Expansion joint material shall be rot-proof and of the preformed, non-extruding, resilient type made with a bituminous fibre and shall conform to the requirements of ASTM Standard D1751, Specification for Preformed Expansion Joint fillers for Concrete Paving and Structural Construction.

**9.       CONSTRUCTION METHODS****9.1     Preparation of Existing Ground**

The bed for riprap shall be shaped and trimmed to the lines as shown on the Drawings or as staked in the field by the Contract Administrator, prior to placing of any riprap. No riprap shall be placed until the bed has been inspected and approved by the Contract Administrator.

**9.2     Random Stone Riprap**

Place a layer of geotextile fabric under the riprap. Anchor the geotextile fabric on the upstream and downstream end of the rock filled trenches as shown on the Drawings.

Place the rock riprap carefully on the geotextile fabric so that it does not tear. Place the rock in such a manner that the larger stones are uniformly distributed and smaller rocks serve to fill the spaces between the larger rocks. Sufficient hand work shall be done to procure a neat and uniform surface with the thickness as shown on the Drawings.

**9.3     Grouted Stone Riprap**

Placing of the stone riprap shall be in accordance with Section 9.2 of this Specification.

The concrete sand grout shall then be vibrated or rodded to ensure that the voids between the stones are filled, resulting in total penetration and worked such that the top surfaces of the exposed stones are not covered by grout. The finished surface shall present an even, closed surface, with at least fifty (50%) percent of the rocks on the surface projecting approximately 25 mm to 100 mm above the specified thickness. The grout layer shall be a minimum of 300 mm in thickness or greater as shown on the Drawings.

The outside perimeter of the riprap shall be constructed using a vertical formed edge equal to the depth of the grout layer.

After initial set of the grout, the portion of the rocks projecting above the grout layer shall be thoroughly cleaned of all grout by sandblasting, to the satisfaction of the Contract Administrator. Following sand-blasting, all loose material shall be removed from the site.

Expansion joints shall be constructed where the riprap is placed against any structure, or where directed by the Contract Administrator. A 13 mm thick fibre joint filler shall be installed in expansion



joints. The fibre joint shall extend from the base of the grout layer up to 13 mm below the grout surface. A bond breaker, as approved by the Contract Administrator, shall be placed along the bottom of the 13 mm deep by 13 mm wide notch, and the top shall be filled with flexible joint sealant in accordance with the manufacturer's recommended procedures, as approved by the Contract Administrator.

The Contractor shall be responsible for removal, off site, of all surplus excavated material.

#### **9.4 Sacked Concrete Riprap**

Sacked concrete riprap shall consist of jute bags filled with a dry concrete mix watered after placement.

The concrete mixture shall be mixed in a batch mixer until the aggregate is uniformly coated with cement.

The bags shall then be filled two thirds full with the dry mix and securely tied.

The filled bags shall be hand placed with close broken joints, firmly bedded into the slopes and securely butted against adjacent bags. The riprap shall have a minimum thickness of 150 mm and shall not vary more than 75 mm at any point. The bags shall be thoroughly compacted as construction progresses and the finished surface shall present an even, closed surface.

The dry mix bags shall be thoroughly wetted down with water after laying is complete.

### **12. METHOD OF MEASUREMENT**

#### **12.1 Random Stone Riprap**

Random stone riprap will be measured on a volume basis. The volume to be paid for shall be the number of cubic metres installed in accordance with this Specification and accepted by the Contract Administrator, based on the surface area multiplied by the specified thickness.

This work shall include all necessary trimming and excavation and the removal off site, of the excess excavated material, unless otherwise specified in the Specifications for the Work.

#### **12.2 Grouted Stone Riprap**

Grouted stone riprap will be measured on a volume basis. The volume to be paid for shall be the number of cubic metres installed in accordance with this Specification and accepted by the Contract Administrator, based on the surface area multiplied by the specified thickness.

This work shall include all necessary trimming and excavation and the removal off site, of the excess excavated material, unless otherwise specified in the Specifications for the Work.

#### **12.3 Sacked Concrete Riprap**

Sacked concrete riprap will be measured on a volume basis. The volume to be paid for shall be the number of cubic metres installed in accordance with this Specification and accepted by the Contract Administrator, based on the surface area multiplied by the specified thickness.

This work shall include all necessary trimming and excavation and the removal off site, of the excess excavated material, unless otherwise specified in the Specifications for the Work.



**13. BASIS OF PAYMENT****13.1 Random Stone Riprap**

Random stone riprap will be paid for at the Contract Unit Price per cubic metre for "Random Stone Riprap", measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

**13.2 Grouted Stone Riprap**

Grouted stone riprap will be paid for at the Contract Unit Price per cubic metre for "Grouted Stone Riprap", measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

**13.3 Sacked Concrete Riprap**

Sacked concrete riprap will be paid for at the Contract Unit Price per cubic metre for "Sacked Concrete Riprap", measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.



**CW 2030 - EXCAVATION BEDDING AND BACKFILL****TABLE OF CONTENTS**

1.	DESCRIPTION.....	1
1.1	General .....	1
1.2	Definitions .....	1
1.3	Referenced Standard Construction Specifications .....	1
1.4	Referenced Standard Details.....	1
2.	MATERIALS.....	2
2.1	Bedding and Backfill .....	2
2.2	Cement-Stabilized Fill .....	3
2.3	Flowable Cement-Stabilized Fill .....	3
2.4	Concrete Bedding .....	3
2.5	Material Testing Methods.....	3
3.	CONSTRUCTION METHODS .....	3
3.1	Site Drainage and Excavation Dewatering .....	3
3.2	Pavement Removal.....	4
3.3	Excavation .....	4
3.4	Solid Rock and Concrete Excavation .....	4
3.5	Shoring.....	5
3.6	Disposal of Unsuitable or Surplus Excavated Material .....	5
3.7	Foundation, Bedding and Backfill .....	5
3.8	Classes of Backfill.....	6
3.9	Jetting, Flooding and Tamping of Backfill .....	7
3.10	Excavation and Backfill Where New Pipes Cross Existing Pipes .....	7
3.11	Excavation and Backfill of Parallel Pipes .....	8
3.12	Filling Underground Voids With Cement Stabilized Fill .....	8
3.13	Restoration .....	8
4.	MEASUREMENT AND PAYMENT .....	8
4.1	Site Drainage and Excavation Dewatering .....	8
4.2	Excavation .....	8
4.3	Excavation of Unsuitable Material .....	9
4.4	Solid Rock and Concrete Excavation .....	9
4.5	Backfill Material to Replace Rock and Unsuitable Material .....	9
4.6	Shoring.....	9
4.7	Shoring Left in Place.....	10
4.8	Foundation, Bedding and Backfill .....	10
4.9	Jetting, Flooding and Tamping of Backfill .....	10
4.10	Filling Underground Voids With Cement Stabilized Fill .....	10
4.11	Backfill for Parallel Pipes.....	10



## **CW 2030 - EXCAVATION BEDDING AND BACKFILL**

### **1. DESCRIPTION**

#### **1.1 General**

- .1 This specification covers excavation, trenching, disposal of excess or unsuitable excavated material, shoring, foundations, bedding, backfilling and compaction required for the installation of Underground Works.

#### **1.2 Definitions**

- .1 Excavation will include trenches and shafts.
- .2 Shaft means a vertical or inclined opening excavated below ground level.
- .3 Trench means an excavation having a depth which exceeds its width measured at the bottom.
- .4 Shoring will include, bracing, sheeting, planking, circular steel sleeves and trench cages.
- .5 Solid rock and concrete excavation is defined as boulders, rock, concrete rubble and foundations greater than 0.5 cubic metres in volume as well as bedrock, consolidated glacial till or hardpan and buried concrete pavements that requires blasting, drilling, splitting or breaking with additional equipment before being removed from excavations using normal mechanical excavation equipment.
- .6 Frozen material will not be considered rock excavation.
- .7 Trenchless installation methods are methods of installing pipe inside a hole that has been made between shafts by coring, boring, horizontal directional drilling, jacking, tunnelling and extraction of an existing pipe or similar methods with minimal excavation and surface disruption.

#### **1.3 Referenced Standard Construction Specifications**

- .1 CW 1120 - Existing Services, Utilities and Structures
- .2 CW 1130 – Site Requirements
- .3 CW 2160 – Concrete Underground Structures and Works
- .4 CW 3230 - Full-Depth Patching of Existing Slabs and Joints
- .5 CW 3235 - Renewal of Existing Miscellaneous Concrete Slabs
- .6 CW 3240 - Renewal of Existing Curbs

#### **1.4 Referenced Standard Details**

- .1 SD-001 – Standard Pipe Bedding Classes
- .2 SD-002 – Standard Trench and Excavation Backfill Classes
- .3 SD-003 - Jetting Nozzle Insertion Locations



**2. MATERIALS****2.1 Bedding and Backfill**

- .1 Type 1 material is to consist of well graded pit-run material conforming to the grading requirements of Table CW 2030.1
- .2 Type 2 and Type 3 material is to consist of sound, hard, crushed rock or crushed gravel free from organic or soft material that would disintegrate through decay or weathering, well graded throughout conforming to the grading requirements of Table CW 2030.1. Type 2 material is to have a 100% crush content and be well graded throughout.
- .3 Material passing the 315 micrometre sieve is to have a liquid limit not greater than 25 and a plasticity index not greater than 6.
- .4 Sand is to be clean and free running conforming to the grading requirements of Table CW 2030.1. Use dry sand when freezing conditions occur.
- .5 Type 1, Type 2 and Type 3 material is to have a loss of not more than 35% when subjected to abrasion testing in accordance with Grading B of ASTM C131.

**TABLE CW 2030.1 - GRADING REQUIREMENTS FOR IMPORTED BACKFILL**

Canadian Metric Sieve Size	Percent of Total Dry Weight Passing Each Sieve			
	Type 1 Material	Type 2 Material	Type 3 Material	Sand
75 000	90% - 100%			
28 000	80% - 100%		100%	
20 000		100%		
10 000				100%
5 000	40% - 80%	40% - 70%	0% - 5%	90% - 100%
2 500		25% - 60%		
630				25% - 60%
315	10% - 35%	8% - 25%		
80	5% - 30%	6% - 17%		0% - 3%



- .6 Imported clay material is to be low to medium plastic clays with liquid limit <50 or mixtures of clay and sand suitable for compaction and is to be free of silt, rock, concrete rubble and organic materials. Material is to be approved by the Contract Administrator before placing in excavations.

**2.2 Cement-Stabilized Fill**

- .1 Cement-stabilized fill to be in accordance with Table CW 2160.1 of CW 2160.

**2.3 Flowable Cement-Stabilized Fill**

- .1 Flowable cement-stabilized fill is to be in accordance with Table CW 2160.1 of CW 2160.

**2.4 Concrete Bedding**

- .1 Concrete bedding to be in accordance with Table CW 2160.1 of CW2160.

**2.5 Material Testing Methods**

- .1 Imported bedding and backfill material will be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract Administrator. Notify the Contract Administrator at least 7 days before construction starts of sites where imported backfill material will be obtained. Provide material samples for testing at no cost to the Contract Administrator. Replace imported backfill materials that do not conform in whole or in part to this specification.
- .2 Standard Proctor Density for materials used for bedding and backfill will be determined in accordance with ASTM D698. Field density of materials will be calculated as a percentage of Standard Proctor Density.
- .3 Field density of unexcavated and compacted backfill materials will be verified by field density tests in accordance with ASTM Standard D2922.
- .4 Frequency and number of tests will be determined by the Contract Administrator.
- .5 Fill holes made by the removal of testing samples from compacted backfill and unexcavated material promptly with appropriate material and compact to match adjacent compacted material.

**3. CONSTRUCTION METHODS**

**3.1 Site Drainage and Excavation Dewatering**

- .1 Keep excavations free of water while work is in progress.
- .2 Maintain existing site drainage around excavations.
- .3 Protect open excavations from flooding and damage due to rainfall and surface run-off.
- .4 Do not direct drainage water from ground surface or excavations into existing sewer system without written approval of the Contract Administrator.



**3.2 Pavement Removal**

- .1 Remove existing pavement in accordance with specifications CW 3230, CW 3235 and CW 3240.

**3.3 Excavation**

- .1 Perform excavation in accordance with Province of Manitoba “W210 The Workplace Safety and Health Act” and “Guidelines for Excavation Work”.
- .2 Excavate to the lines, grades, elevations and dimensions shown on the Drawings and set in the field by the Contract Administrator.
- .3 Excavate the additional depth required for bedding and foundation material in accordance with SD-001 and the Drawings.
- .4 Ensure the bottom of the excavation is smooth, free from depressions, lumps and protruding objects.
- .5 Maximum trench width from the underside of the pipe bedding and foundation to 600 millimetres above the top of the pipe to be the greater of 1200 millimetres or the outside diameter of the pipe plus 750 millimetres.
- .6 Where the maximum trench width is exceeded due to unstable soil conditions or over-excavation, the Contract Administrator will review the external loading condition on the pipe to determine if the class of bedding and pipe type or strength specified needs to be upgraded.
- .7 Remove unsuitable soil from bottom of excavation as directed by the Contract Administrator.
- .8 Fill over-excavation to required elevation with Type 1, Type 2 or Type 3 material as directed by the Contract Administrator and compact to at least 95% of Standard Proctor Density.

**3.4 Solid Rock and Concrete Excavation**

- .1 Over-excavate solid rock and concrete an additional 150 millimetres below the underside of the required bedding for full width of trenches and 300 millimetres beyond largest outside dimension of manholes, catch basins and structures unless otherwise indicated in the Drawings, and Specifications or directed by the Contract Administrator.
- .2 Where blasting is required, retain a certified blaster who is qualified to handle and use explosives to supervise preparations, precautions and perform rock blasting operations. Carry out rock blasting in accordance with local regulations, Province of Manitoba Workplace, Health and Safety Act W210 and Federal Explosives Act.
- .3 Fill over-excavation to underside of required bedding with Type 2 or Type 3 material as directed by the Contract Administrator compacted to at least 95% of Standard Proctor Density.



**3.5     Shoring**

- .1    Provide shoring in accordance with Province of Manitoba “W210 The Workplace Safety and Health Act” and “Guidelines for Excavation Work”.
- .2    Use suitable type of shoring for soil conditions.
- .3    Provide shoring design stamped, signed and dated by a Professional Engineer experienced in shoring design and licensed to practice in Province of Manitoba when required in the Specifications.
- .4    Install shoring in a manner to support sides of excavation and prevent ground movement that may damage pipes and structures being constructed and cause damage to existing adjacent pavements, buildings and other structures.
- .5    Use type or method of shoring that will not disturb the compacted foundation and bedding when being removed.
- .6    Arrange with the Professional Engineer who designed the shoring system to inspect the shoring system during construction and certify, in writing to the Contract Administrator, that construction is in conformance with the approved design.
- .7    Leave the shoring system in place until such time as the Professional Engineer who designed the shoring system has provided written approval to remove. Provide a copy of the written approval to the Contract Administrator before removal.
- .8    Remove shoring from excavations as backfilling proceeds unless otherwise indicated in the Specifications or directed by the Contract Administrator to leave shoring permanently in place. Cut-off shoring permanently left in place 1.2 metres below grade unless otherwise indicated in the Specifications or directed by the Contract Administrator.
- .9    Repair pavements, boulevards, pipes, utilities and structures as directed by the Contract Administrator that are damaged or disturbed by shoring failure or when removing shoring.

**3.6     Disposal of Unsuitable or Surplus Excavated Material**

- .1    Dispose of unsuitable and surplus excavated material in accordance with Specification CW 1130.

**3.7     Foundation, Bedding and Backfill**

- .1    Remove boulders, rocks or concrete larger than 50 millimetres in size, ice, snow, frozen material, organic material, or debris from bottom of excavation before placing foundation or bedding material.
- .2    Provide a foundation consisting of Type 3 material over the entire bottom of shafts made for trenchless installation in accordance with SD-001. Compact to a density of at least 95% of Standard Proctor Density. Foundations will not be required in shafts for watermain unless directed otherwise by the Contract Administrator.



- .3 Place bedding material in excavations and under pipe haunches in accordance with SD-001. Compact to a density of at least 95% of Standard Proctor Density.
- .4 Type 2 and Type 3 material can be substituted for sand where sand is specified for the bedding and initial backfill material.
- .5 Place specified initial backfill around and over the pipe to the height shown on SD-001 and compact to a density of at least 95% of Standard Proctor Density using methods and equipment that will not damage the pipe.
- .6 Backfill the remainder of the excavation as follows with specified class of backfill in accordance with Section 3.8 of this specification and SD-002.
  - .1 Trenches and excavations located within existing paved areas and areas proposed to be paved: Class 1, Class 2 or Class 3 Backfill as indicated on the Drawings and Specifications or as directed by the Contract Administrator.
  - .2 Trenches and excavations within 1 metre of a paved area: Class 3 Backfill.
  - .3 Trenches and excavations located within a boulevard or grassed area: Class 4 or Class 5 Backfill as indicated on the Drawings and Specifications or as directed by the Contract Administrator.
- .7 Ensure adequate cover is provided over the pipe to protect it from being damaged by backfill placed and equipment used for compaction.
- .8 Repair pavements, boulevards, pipes, utilities and structures as directed by the Contract Administrator that are damaged or disturbed by settlement of backfill in trenches and excavations.

### **3.8 Classes of Backfill**

- .1 Class 1 Backfill
  - .1 Backfill the excavation with Type 1 material compacted in accordance with Clause 3.8.2 or 3.8.3 of this specification to within 1 metre of the underside of pavement. Fill the remainder of the excavation with cement-stabilized fill to the required depth below finished pavement in accordance with the Drawings and Specifications or as directed by the Contract Administrator.
- .2 Class 2 Backfill
  - .1 Backfill the excavation with Type 1 material in maximum 300 millimetre thick layers to the grade required for backfill in accordance with the Drawings and Specifications or as directed by the Contract Administrator. Compact each layer with a vibratory compactor to at least 95% of Standard Proctor Density. Obtain approval from the Contract Administrator before proceeding with next layer.



.3 Class 3 Backfill

- .1 Backfill the excavation with Type 1 material to grade required for backfill in accordance with the Drawings and Specifications or as directed by the Contract Administrator. Compact backfill material by jetting, flooding and tamping in accordance with Section 3.9 of this specification.

.4 Class 4 Backfill

- .1 Backfill the excavation with suitable excavated material in maximum 600 millimetre thick layers to the grade required for backfill in accordance with the Drawings and Specifications or as directed by the Contract Administrator. Compact each layer by mechanical means to a density equivalent to that of the surrounding unexcavated material. Obtain approval from the Contract Administrator before proceeding with next layer.

.5 Class 5 Backfill

- .1 Backfill the excavation with suitable excavated material to the grade required for backfill in accordance with the Drawings and Specifications or as directed by the Contract Administrator. Compact backfill material by jetting, flooding and tamping in accordance with Section 3.9 of this specification.

**3.9 Jetting, Flooding and Tamping of Backfill**

- .1 Make arrangements for water supply source in accordance with Specification CW 1120.
- .2 Use a minimum 25 millimetre diameter rigid pipe of suitable length for jetting excavations.
- .3 Insert the jetting pipe into the backfill to within 1 metre of the top of the pipe allowing the water jetting action to determine the rate at which the jetting pipe is worked through the backfill.
- .4 Locate jetting insertions in accordance with SD-003.
- .5 Continue jetting until water rises above top surface of backfill and begins to pond.
- .6 Tamp backfill with a backhoe mounted vibratory plate compactor once surface water has sufficiently dried.
- .7 Place and compact additional specified backfill material to maintain top surface of backfill at required elevation.

**3.10 Excavation and Backfill Where New Pipes Cross Existing Pipes**

- .1 New pipes being installed in a trench cross above an existing pipe trench.
  - .1 Excavate to 600 millimetres below bottom of new pipe or to top of existing pipe whichever is lesser for a length along the existing pipe of 1500 millimetres or the existing pipe diameter plus 600 millimetres which ever is greater.
  - .2 Backfill to the underside of the bedding required for new pipe with Class 2 Backfill unless



indicated otherwise in the Drawings and Specifications or directed by the Contract Administrator.

- .2 New pipes being installed in a trench cross below an existing pipe trench.
  - .1 Support or remove and replace a section of the existing pipe to allow installation of new pipe.
  - .2 Backfill the excavation for the new pipe with Class 2 Backfill to the underside of bedding required for existing pipe unless indicated otherwise in the Drawings and Specifications.
- .3 Bed the new pipe and backfill the remainder of the excavation in accordance with Clause 3.7.6 of this specification unless indicated otherwise in the Drawings and Specifications or directed by the Contract Administrator.

### **3.11 Excavation and Backfill of Parallel Pipes**

- .1 Support and protect the higher pipe as required where excavation of the lower pipe will disturb the ground under the higher pipe.
- .2 Backfill the lower pipe excavation to the invert of the higher pipe with Class 2 Backfill unless indicated otherwise in the Drawings and Specifications or directed by the Contract Administrator.
- .3 Bed the new pipe and backfill the remainder of the excavation in accordance with Clause 3.7.6 of this specification unless indicated otherwise in the Drawings and Specifications or directed by the Contract Administrator.

### **3.12 Filling Underground Voids With Cement Stabilized Fill**

- .1 Fill underground voids as indicated in the Drawings and Specifications or directed by the Contract Administrator with cement-stabilized fill. Obtain approval from the Contract Administrator to make additional excavations to accommodate the placement of cement-stabilized fill.

### **3.13 Restoration**

- .1 Restore surfaces in accordance with the Drawings and Specifications, applicable By-Laws if the work being done under a Permit or as directed by the Contract Administrator.

## **4. MEASUREMENT AND PAYMENT**

### **4.1 Site Drainage and Excavation Dewatering**

- .1 Site drainage and excavation dewatering will be included with construction of the underground works.

### **4.2 Excavation**

- .1 Excavation and disposal of surplus excavated material will be included with construction of the underground Works.



- .2 Upgrading of bedding, pipe type and strength as directed by the Contract Administrator due to over excavation beyond the specified limits will be at own expense.

#### **4.3 Excavation of Unsuitable Material**

- .1 Excavation and disposal of unsuitable material will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Excavation of Unsuitable Material". Volume to be paid for will be the total number of cubic metres of unsuitable material excavated and disposed of in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Excavated material will be measured by cross sections in its original position and the volume computed using the method of Average End Areas.
- .3 Upgrading of bedding, pipe type and strength as directed by the Contract Administrator due to unsuitable soil conditions will be paid for as an authorized Change in Work.

#### **4.4 Solid Rock and Concrete Excavation**

- .1 Excavation and disposal of solid rock and concrete will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Solid Rock and Concrete Removal". Volume to be paid for will be the total number of cubic metres of solid rock and concrete excavated and disposed of in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Solid rock and concrete removal will be measured by cross sections in its original position and the volume computed using the method of Average End Areas.
- .3 Over excavation of solid rock and concrete beyond the specified limits will be at own expense.

#### **4.5 Backfill Material to Replace Rock and Unsuitable Material**

- .1 Backfill material required to replace rock and unsuitable material will be measured on a volume basis for each type of backfill and paid for at the Contract Unit Price per cubic metre for "Backfill Material". Volume to be paid for will be the total number of cubic metres of Backfill supplied, placed and compacted in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Backfill material will be measured by cross sections in its compacted position and the volume computed using the method of Average End Areas.
- .3 Backfill material required for over excavation beyond specified limits will be at own expense.

#### **4.6 Shoring**

- .1 Supply, installation and removal of shoring will be included with construction of the underground work.
- .2 Repair of damage to existing pavements and structures adjacent to the excavation caused by careless installation and removal of shoring will be at own expense.



- .3 Replacement and re-compaction of bedding disturbed by removal of shoring will be at own expense.

#### **4.7 Shoring Left in Place**

- .1 Shoring specified or directed to be left in place will be measured on an area basis and paid for at the Contract Unit Price for “Shoring Left in Place”. Area to be paid for will be total number of square metres of shoring installed and left in place in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Measurement will be made by multiplying the height of the shoring left in place by the perimeter of the excavation.

#### **4.8 Foundation, Bedding and Backfill**

- .1 Supply and installation of foundation, bedding and backfill for pipe and other structures will be included with construction of the underground works.
- .2 Where granular or cement-stabilized backfill material is directed by the Contract Administrator to be used in place of the specified backfill material it will be measured on a volume basis for each type of backfill and paid for at the Contract Unit Price per cubic metre for “Granular Backfill Material” and “Cement-Stabilized Backfill Material”. Volume to be paid for will be the total number of cubic metres of Backfill supplied, placed and compacted in place in accordance with this specification, accepted and measured by the Contract Administrator.
- .3 The unit price provided for granular or cement-stabilized backfill material used in place of the specified backfill will be the incremental cost of the material above and beyond the cost of the volume of the specified backfill being replaced.
- .4 Repair of damage to pavements, boulevards, pipes, utilities and structures resulting from settlement of excavations will be at own expense.

#### **4.9 Jetting, Flooding and Tamping of Backfill**

- .1 Jetting, flooding and tamping of backfill will be included with construction of the underground works.

#### **4.10 Filling Underground Voids With Cement Stabilized Fill**

- .1 Filling underground voids with cement-stabilized fill will be measured on a volume basis and paid for at the Contract Unit Price for “Filling Underground Voids With Cement-Stabilized Fill”. Volume to be paid for will be the total number of cubic metres of cement stabilized fill supplied and placed in accordance with this specifications, accepted and measured by the Contract Administrator.
- .2 Measurement for cement stabilized fill will be made by calculating the volume of the void being filled.

#### **4.11 Backfill for Parallel Pipes**

- .1 Backfill for parallel pipes will be measured on a length basis and paid for at the Contract Unit Price for “Backfill for Parallel Pipes”. Length to be paid for will be the total number of linear



metres of backfill supplied and placed in accordance with this specification, accepted and measured by the Contract Administrator.

- .2 Measurement of backfill for parallel pipes will be made horizontally at grade along the centreline of the trench of the lower pipe.



**CW 2130 - GRAVITY SEWERS****TABLE OF CONTENTS**

1.	DESCRIPTION.....	1
1.1	General .....	1
1.2	Definitions .....	1
1.3	Referenced Standard Construction Specifications .....	1
1.4	Referenced Standard Details.....	1
1.5	Referenced Approved Product Drawings .....	2
2.	MATERIALS.....	2
2.1	Approved Products .....	2
2.2	Sewer and Sewer Service Pipe .....	2
2.3	Drainage Inlet Connection Pipe .....	3
2.4	Sewer and Sewer Service Fittings and Connection Saddles.....	3
2.5	Sewer Pipe Gaskets .....	3
2.6	Flexible Transition Pipe Couplings .....	3
2.7	Manholes, Catch Basins and Catch Pits.....	3
2.8	Fasteners.....	4
2.9	Cast-in-Place Concrete, Grout, Mortar and Cement-Stabilized Fill .....	4
2.10	Cement Patching Compound .....	4
2.11	Bedding and Backfill.....	4
3.	CONSTRUCTION METHODS .....	4
3.1	Excavation .....	4
3.2	Foundation and Bedding.....	4
3.3	Installation in a Trench.....	4
3.4	Installation Using Trenchless Methods .....	5
3.5	Fitting Installation .....	5
3.6	Line and Grade .....	6
3.7	Backfill.....	6
3.8	Manhole, Catch Basin and Catch Pit Installation .....	6
3.9	New Manhole Installation on Existing Sewer.....	7
3.10	Sewer Service Installation .....	7
3.11	Drainage Connection Pipe Installation .....	8
3.12	Sewer Repairs.....	8
3.13	Existing Manhole and Catch Basin Repairs .....	8
3.14	Removal and Replacement of Existing Manholes, Catch Basins and Catch Pits 9	
3.15	Connecting New Sewers and Catch Basin Leads to Existing Manholes, Catch Basins and Catch Pits.....	9
3.16	Connecting New Sewer or Sewer Service to Existing Sewer .....	10
3.17	Connecting to Existing Sewer and Sewer Service Stubs.....	11
3.18	Connecting Existing Sewer Service to New Sewer .....	11
3.19	Plugging and Abandoning Existing Sewers and Sewer Services .....	12
3.20	Abandoning, Relocation and Removal of Existing Manholes, Catch Basins, Catch Pits and Drainage Inlets .....	12
3.21	Maintaining Flow in Existing Sewers .....	13
3.22	Deflection Testing of SDR 35 PVC Sewers.....	13
3.23	Reinforced Concrete Pipe Three Edge Bearing Test.....	13
3.24	Sewer Cleaning .....	14
3.25	Video Inspection.....	14
3.26	Restoration .....	14
4.	MEASUREMENT AND PAYMENT .....	14
4.1	Sewer Installation.....	14



4.2	Fitting Installation .....	15
4.3	Manholes .....	15
4.4	Catch Basins and Catch Pits .....	16
4.5	Sewer Service Installation .....	16
4.6	Drainage Connection Pipe Installation.....	16
4.7	Sewer Service Risers .....	16
4.8	Sewer Repairs .....	17
4.9	Existing Manhole and Catch Basin Repairs.....	17
4.10	Connecting New Sewers and Sewer Services to Existing Manholes, Catch Basins and Catch Pits.....	19
4.11	Connecting New Sewer or Sewer Service to Existing Sewer .....	19
4.12	Connecting to Existing Sewer or Sewer Service Stubs.....	20
4.13	Connecting Existing Sewer Service to New Sewer .....	20
4.14	Plugging and Abandoning Existing Sewers and Sewer Services .....	20
4.15	Abandoning, Relocation and Removal of Existing Manholes, Catch Basins, Catch Pits and Drainage Inlets .....	21
4.16	Maintaining Existing Sewer Flow.....	21
4.17	Sewer Cleaning .....	21
4.18	Video Inspection.....	21
4.19	Deflection Testing of SDR 35 PVC Sewers.....	21
4.20	Concrete Pipe Three Edge Bearing Test .....	21
4.21	Pavement Restoration.....	22
4.22	Boulevard Restoration.....	22



**CW 2130 - GRAVITY SEWERS****1. DESCRIPTION****1.1 General**

- .1 This specification covers supply and installation of combined sewers, interceptor sewers, land drainage sewers, storm relief sewers, wastewater sewers, sewer services, sewer repairs, catch basins, manholes and connections to existing catch basins, manholes and sewers including fittings, appurtenances and related work.

**1.2 Definitions**

- .1 Fittings include tees, wyes, bends, reducers, couplings and plugs.
- .2 Appurtenances include, flexible rubber compression joint sealers, bushings, catch basin hoods, hooks and pins, fasteners and miscellaneous components required for completion of the Work.
- .3 Where used in this specification "sewer services" will include sewer connections as defined in the City of Winnipeg By-Law No. 7070 as well as catch basin leads, roof drains and utility manhole drains.
- .4 Sewer service risers consist of that portion of the sewer service from the outside top of the sewer pipe to the top of the sewer service pipe at the 45 degree elbow as shown on SD-014 and SD-015.
- .5 Trenchless installation methods are methods of installing pipe inside a hole that has been made between shafts by coring, boring, horizontal directional drilling, jacking, tunnelling and extraction of an existing pipe or similar methods with minimal excavation and surface disruption.

**1.3 Referenced Standard Construction Specifications**

- .1 CW 2030 - Excavation, Bedding and Backfill
- .2 CW 2140 – Sewer And Manhole Cleaning
- .3 CW 2145 – Sewer and Manhole Inspections
- .4 CW 2160 - Concrete Underground Structures and Works
- .5 CW 3110 - Sub-Grade, Sub-base and Base Course Construction
- .6 CW 3150 – Gravel Surfacing
- .7 CW 3210 – Adjustment of Pavement and Boulevard Structures
- .8 CW 3230 -Full-Depth Patching of Existing Slabs and Joints
- .9 CW 3235 - Renewal of Existing Miscellaneous Concrete Slabs
- .10 CW 3240 - Renewal of Existing Curbs
- .11 CW 3310 – Portland Cement Concrete Pavement Works
- .12 CW 3410 - Asphalt Concrete Pavement Works
- .13 CW 3510 - Sodding
- .14 CW 3520 - Seeding

**1.4 Referenced Standard Details**

- .1 SD-001 - Standard Pipe Bedding Classes
- .2 SD-002 - Standard Trench and Excavation Backfill Classes
- .3 SD-009 – Sewer or Sewer Service Connection to Existing 1050 Diameter and Larger Sewer
- .4 SD-010 - Standard Pre-cast Concrete Manhole (For up to 525 Millimetre Pipe)
- .5 SD-011 - Standard Pre-cast Concrete Pipe Manhole (For 600 to 1500 Diameter Pipe)



- .6 SD-014 - Sewer Service With Alternative "A" Riser
- .7 SD-015 - Sewer Service With Alternate "B" Riser
- .8 SD-020 – Nine Arm Mandrel and Proving Ring for 5.25% Deflection Testing of SDR 35 PVC Pipe
- .9 SD-021 – Sewer Service Abandonment Beneath Pavement
- .10 SD-022A – Sewer Repair Up to 3.0 Metres Long
- .11 SD-022B – Sewer Repair Longer Than 3.0 Metres
- .12 SD-023 - Curb and Gutter Inlet With Catch Pit
- .13 SD-024 - Catch Basin With Curb and Gutter Inlet
- .14 SD-025 - Standard Catch Basin
- .15 SD-220B – Manhole Isolation Detail in Existing Pavements
- .16 SD-220C – Curb and Gutter Inlet Isolation Detail

## 1.5 **Referenced Approved Product Drawings**

- .1 AP-004 - Standard Frame for Manhole and Catch Basin
- .2 AP-005 - Standard Solid Cover for Standard Frame
- .3 AP-006 - Standard Grated Cover for Standard Frame
- .4 AP-007 – Lifter Ring for Standard Frame
- .5 AP-008 – Barrier Curb and Gutter Inlet Frame and Box
- .6 AP-009 – Barrier Curb and Gutter Inlet Cover
- .7 AP-011 – Mountable Curb and Gutter Inlet
- .8 AP-012 - Catch Basin Hood

## 2. **MATERIALS**

### 2.1 **Approved Products**

- .1 Use only those products listed as Approved Products for Underground Use in the City of Winnipeg found on the City of Winnipeg, Materials Management web site at: <http://www.winnipeg.ca/matmgt/spec/>

### 2.2 **Sewer and Sewer Service Pipe**

- .1 Mainline and sewer connection pipe to be in accordance with AT 4.2.1.10 and AT 4.2.2.10 of the Approved Products for Underground Use in the City of Winnipeg.
- .2 Mainline cul-de-sac sewer pipe to be in accordance with AT 4.2.1.11.
- .3 Open profile ribbed storm sewer pipe in accordance with AT 4.2.1.16 of the Approved Products for Underground Use in the City of Winnipeg.
- .4 250 to 600 millimetre non-reinforced concrete bell and spigot pipe in accordance with CAN/CSA A257.1 and ASTM C14, Class 3.
- .5 300 millimetre and larger reinforced concrete bell and spigot pipe in accordance with CAN/CSA A257.2 and ASTM C76.
- .6 Reinforced concrete bell and spigot straight wall pipe used for jacking in accordance with CAN/CSA A257.2 and ASTM C76. Outside of bell ends to be fitted with a 14 gauge steel band with a width of 1.5 times the length of the bell end groove.



**2.3 Drainage Inlet Connection Pipe**

- .1 250 millimetre diameter gasketed bell and spigot PVC pipe in accordance with CAN/CSA B182.2 and ASTM D 3034, SDR 35.
- .2 250 millimetre non-reinforced concrete bell and spigot pipe in accordance with CAN/CSA A257.1 and ASTM C14, Class 3.

**2.4 Sewer and Sewer Service Fittings and Connection Saddles**

- .1 150 millimetre and larger gasketed push-on style PVC injection moulded fittings in accordance with AT 4.2.1.60 of the Approved Products for Underground Use in the City of Winnipeg.
- .2 450 millimetre and larger gasketed push-on style PVC fabricated fittings in accordance with AT 4.2.1.61 of the Approved Products for Underground Use in the City of Winnipeg.
- .3 250 millimetre and larger gasketed bell and spigot concrete pipe fittings in accordance with CAN/CSA A257 Series and ASTM C 14 and C 76.

**2.5 Sewer Pipe Gaskets**

- .1 PVC pipe gaskets, flexible rubber in accordance with ASTM F477
- .2 Concrete pipe gaskets, flexible rubber in accordance with ASTM C443.
- .3 Where required, elastomeric compounds for oil and gas resistant gaskets to be rated as "excellent".

**2.6 Flexible Transition Pipe Couplings**

- .1 Flexible transition sewer couplings to be in accordance with AT 4.2.1.66 of the Approved Products for Underground Use in the City of Winnipeg.

**2.7 Manholes, Catch Basins and Catch Pits**

- .1 Pre-cast concrete sections as indicated on SD-010, SD-011, SD-023, SD-024 and SD-025: to CSA A257.4 and ASTM Standard C 76 Class II and C 478 (circular sections)
- .2 Cast iron frames and covers to be in accordance with AP-004, AP-005, AP-006, AP-007, AP-008, AP-009, AP-010 and AP-011 in accordance with AT 4.2.1.73, AT 4.2.1.75, AT 4.2.1.83B, and AT 4.2.1.83M of the Approved Products for Underground Use in the City of Winnipeg.
- .3 Ladder rungs to be in accordance with AT 4.2.1.72 of the Approved Products for Underground Use in the City of Winnipeg.
- .4 Pre-cast concrete adjusting rings in accordance with CAN/CSA A257.4 and ASTM C478.
- .5 Concrete brick in accordance with CAN3-A165 Series.
- .6 Catch basin hood to be in accordance with AP-012 and AT 4.2.1.84 of the Approved Products for Underground Use in the City of Winnipeg.
- .7 Manhole and catchbasin joint gaskets to be in accordance with AT 4.2.1.71 of the Approved Products for Underground Use in the City of Winnipeg.



- .8 Core and seat boot type flexible rubber connection for PVC pipe in accordance with material requirements of ASTM C923.

## **2.8 Fasteners**

- .1 Fasteners, tie rods, clamps, straps, bands, nuts and bolts to be stainless steel in accordance with ASTM A320, ANSI Type 316 marked as such with raised or indented numerals.

## **2.9 Cast-in-Place Concrete, Grout, Mortar and Cement-Stabilized Fill**

- .1 Cast-in-place concrete, grout, mortar and cement stabilized fill in accordance with CW 2160.

## **2.10 Cement Patching Compound**

- .1 Cement patching compound to be fast hardening, high strength non-shrink mixture suitable for use on vertical surfaces.

## **2.11 Bedding and Backfill**

- .1 Bedding and backfill in accordance with CW 2030.

# **3. CONSTRUCTION METHODS**

## **3.1 Excavation**

- .1 Remove existing concrete pavement slabs, miscellaneous concrete slabs, curbs and asphalt pavement in accordance with CW 3110, CW3230, CW 3235, CW 3240 and CW 3410.
- .2 Excavate in accordance with CW 2030. Excavate and prepare trench a sufficient distance in ahead to not to interfere with installation of the pipe.

## **3.2 Foundation and Bedding**

- .1 Place and compact foundation material, where required and bedding material in bottom of trench or excavation in accordance with CW 2030 and SD-001 to grade and elevation shown on the Drawings. Level across full width of trench or excavation and leave ready for pipe installation.

## **3.3 Installation in a Trench**

- .1 Install same material, class and type of pipe between adjacent manholes.
- .2 Assemble pipe in accordance with manufacturer's instructions so when complete sewer will have a smooth and uniform invert. Lay pipe with bell upgrade. Use longest pipe size manufactured where practicable to reduce total number of joints on sewer.
- .3 Place pipe on compacted bedding ensuring uniform support under bell and pipe body throughout its full length. Work and compact bedding material under sides of pipe to provide proper haunching.
- .4 Protect exposed pipe ends with an approved stopper to prevent excess amounts of water, earth and debris from entering pipe as work proceeds.
- .5 Install pipe to the line and grade shown on the Drawings or as determined by the Contract Administrator on-site in accordance with the limits in Section 3.6 of this specification.



- .6 Pipe joint deflections to be within the manufacturer's recommendations.
- .7 Remove construction debris and materials from sewers before performing video inspection.

### **3.4 Installation Using Trenchless Methods**

- .1 Install sewers using trenchless methods where alignment is under or crosses existing and proposed pavements, existing boulevards, trees, utility poles, structures and at other locations in accordance with the Drawings and Specifications or as directed by the Contract Administrator.
- .2 Install same material, class and type of pipe between adjacent manholes.
- .3 Excavate shafts and provide shoring in accordance with CW 2030.
- .4 Provide the locations and sizes of shafts to the Contract Administrator for review before excavating.
- .5 Completely remove existing pipe for on-line sewer renewals.
- .6 Join pipe sections together in shafts before inserting into installation hole. Pull or push entire length of pipe into installation hole from end of last pipe with bells facing away from pulling or pushing direction. Installation methods where tension is applied to a pipe section will not be permitted.
- .7 Ensure the force applied to the section of pipe being pulled or pushed into the installation hole does not result in spigots being inserted into the bell beyond the manufacturer's recommended insertion depth.
- .8 Pull back the entire length of pipe already in the installation hole if a length of pipe is to be withdrawn from the installation hole.
- .9 Install pipe to the line and grade shown on the Drawings or as determined by the Contract Administrator on-site in accordance with the limits in Section 3.6 of this specification.
- .10 Keep pipe joint deflections within the manufacturer's recommendations.
- .11 Remove construction debris and materials from sewers before performing video inspection.
- .12 Repair damage to underground and surface structures due to surface subsidence and soil heaving caused by trenchless installation methods.
- .13 Where field conditions are such that sewers cannot be installed using trenchless methods install sewers in a trench using the type of backfill specified in CW 2030 for the installation location after receiving written approval from the Contract Administrator.

### **3.5 Fitting Installation**

- .1 Install fittings of same material, type and class as sewer, sewer service or catch pit pipe.
- .2 Install watertight plug in the end of sewers where shown on the Drawings to allow for a future connection.
- .3 Excavate, bed and install fittings as specified for sewers and sewer services.



**3.6 Line and Grade**

- .1 Allowable variance from specified line to be +/- 100 millimetres. Allowable variance from specified grade to be 25 millimetres above grade and 50 millimetres below grade at any one location. Allowable ponding in pipe due to combined variance above and below grade not to exceed 50 millimetres.
- .2 Correct alignment and grade exceeding the allowable variance in a manner acceptable to the Contract Administrator.

**3.7 Backfill**

- .1 Place and compact initial backfill above the pipe in accordance with CW 2030 and SD-001.
- .2 Backfill the remainder of the trench or excavation in accordance with CW 2030 and SD-002.

**3.8 Manhole, Catch Basin and Catch Pit Installation**

- .1 Level bedding to ensure manhole base, catch basin and catch pit is uniformly supported and the floor is level.
- .2 Construct manholes, catch basins and catch pits in accordance with SD-010, SD-010D, SD-011, SD-023, SD-024 and SD-025 and as shown on the Drawings. Install manhole, drop pipe, catch basin and catch pit sections plumb and level. Variance from line and grade to be in accordance with Section 3.6 of this specification.
- .3 Install approved gasket or joint sealer between pre-cast concrete sections including 750 millimetre diameter riser adjusting rings and between frame and pre-cast concrete riser as construction progresses. Alternately install grout between frame and pre-cast concrete risers as approved and directed by Contract Administrator. Ensure grout completely fills space between frame and riser to make joint watertight and finish flush with inside surface of risers.
- .4 Connect sewers to manhole bases, catch basins and catch pits at invert elevations shown on the Drawings and grout in place to make a watertight connection. Coat outside of PVC pipe end for a length equal to the manhole, catch basin and catch pit wall thickness plus 150 millimetres with an approved cementing agent to which sand has been added and allow mixture to harden before grouting in place. Alternatively PVC pipe may be connected using an approved pre-treated, gasketed PVC insert or an approved interference fit flexible rubber boot or gasket inserted into a hole cored in the manhole base, catch basin or catch pit wall.
- .5 Bench and channel manhole floor with mortar or concrete in accordance with SD-010 and SD-011 and as shown on the Drawings. Curve flow channels smoothly and provide smooth transition between inlet and outlet pipes.
- .6 Grout and plug lifting holes, joints and frame with mortar to make watertight. Remove excess mortar from inside surface of manhole.
- .7 Compact backfill between manholes, catch basins or catch pits and the sides of the trench or excavation in accordance with CW 2030.



**3.9     New Manhole Installation on Existing Sewer**

- .1 Where a new manhole is to be installed by removing a length of the existing sewer pipe install the manhole in accordance with Section 3.8 of this specification and the following requirements.
  - .1 Cut fully through the existing sewer pipe leaving neat, square ends and remove the required length or remove existing sewer pipe at a joint within the excavation.
  - .2 Excavate the required depth below the existing sewer for granular foundation and bedding.
  - .3 Install required length of new sewer, connect to existing sewer with approved coupling, adapter or bushing and connect to new manhole.
  - .4 Remove construction debris and materials from manholes and sewers when the Work is complete.
- .2 Where a new manhole is to be installed overtop the existing sewer without removing a length of pipe install the manhole in accordance with Section 3.8 of this specification and the following requirements.
  - .1 Excavate the required depth below the existing sewer for the cast-in-place concrete manhole floor. Fully support the existing sewer during excavation.
  - .2 Set the saddle or arch type open manhole base over the existing sewer in a manner to not damage the existing sewer.
  - .3 Place concrete in the bottom of the excavation and embed the manhole base to required elevation. Plumb and level the manhole base as required.
  - .4 Cut out and remove top portion of existing sewer as required in a manner that will not damage the remaining sewer pipe.
  - .5 Grout around the sewer pipe and manhole wall opening with mortar to make a watertight joint.
  - .6 Place mortar or concrete between the existing sewer pipe and the inside of new manhole wall and form smooth flow channel and benching.
  - .7 Remove construction debris and materials from manholes and sewers when the Work is complete.

**3.10     Sewer Service Installation**

1. Install sewer services as specified for sewers in accordance with Section 3.3 and 3.4 of this specification.
- .2 Variance from specified line not to exceed +/- 100 millimetres. Variance from specified grade not to exceed +/- 25 millimetres.
- .3 Connect sewer services to sewers at locations where preformed fittings have been provided. Use an approved adapter, coupling or bushing if required to make a watertight connection. Connect sewer services in accordance with Section 3.16 of this specification if preformed fittings do not exist on the sewer.



- .4 Install a sewer service riser pipe in accordance with SD-014 and SD-015 where the connection to the sewer is deeper than 4.25 metres. Terminate sewer service riser 3.35 to 4.25 metres below finished grade.
- .5 Use 45 degree or less bends only on sewer services.
- .6 Install a watertight removable plug in the end of the sewer service to allow for a future connection.

### **3.11 Drainage Connection Pipe Installation**

- 1. Install drainage connection pipe between inlet box or catch pit and catch basin in accordance with Section 3.3 and 3.4 of this specification at locations shown on the drawings or as directed by the Contract Administrator.
- .2 Variance from specified line not to exceed +/- 100 millimetres. Variance from specified grade not to exceed +/- 25 millimetres.
- .3 Connect drainage connecting pipe to existing catch basins in accordance with Section 3.8 of this specification.

### **3.12 Sewer Repairs**

- .1 Perform video inspection of sewer to be repaired using video equipment in accordance with CW 2145 and review with Contract Administrator to confirm repair limits. Coding of the video inspection is not required.
- .2 Install required length of new sewer pipe in accordance with SD-022A or SD-022B, Section 3.3 or 3.4 of this specification and to the following requirements.
  - .1 Excavate, expose and remove sewer pipe to be repaired. Cut fully through existing sewer pipe at limits of repair leaving neat square ends or remove existing sewer pipe at a joint location within excavation.
  - .2 Install required length of sewer pipe of the type and class in accordance with the Specifications and Drawings.
  - .3 Connect new sewer pipe to existing sewer pipe using an approved flexible transition coupling, adapter or bushing to make a watertight connection.
  - .4 Connect new sewer pipe to existing manhole in accordance with Section 3.8.4 of this specification.
- .3 Remove construction debris and materials from sewers when the Work is complete.

### **3.13 Existing Manhole and Catch Basin Repairs**

- .1 Saw cut and remove existing pavement in accordance with SD-220B and SD-220C where frames, covers, reducers and risers are required to be replaced.
- .2 Prevent construction materials and debris from entering the sewer.
- .3 Remove existing pre-cast concrete, cast-in-place concrete or brick reducer and riser sections to depth shown on the Drawings or as directed by the Contract Administrator without damaging



remaining risers. Level top of remaining riser section as necessary with mortar or concrete to accept and make a watertight joint with new pre-cast concrete flat top reducer or riser section. Add or remove excess mortar or concrete from joint as necessary to make new flat top reducer and riser section level and plumb and finish joint flush with inside surface of wall.

- .4 Install pre-cast concrete riser sections, flat top reducer, frame and cover in accordance with Section 3.8 of this specification.
- .5 Make final adjustment of frames in accordance with Section 3.2 of CW 3210.
- .6 Remove loose and unsound material from inside surface of wall area to be repaired. Clean and prepare repair area as required and apply approved concrete patching compound in accordance with manufacturer's instructions. Finish surface smooth and form to shape of wall.
- .7 Remove loose and flaking mortar from brickwork and clean repair area as required. Remove and replace cracked and broken bricks as necessary. Apply mortar to replacement brick before fitting into place. Work mortar completely into joints ensuring all gaps are filled. Remove excess mortar and shape joint to match existing.
- .8 Cut existing rungs and steps to be replaced flush with inside wall surface. Install approved rungs on alignment indicated on contract drawings and as directed by the Contract Administrator at 300 millimetres vertically on centre.
- .9 Cut existing catch basin hood wall hook to be replaced flush with inside wall surface. Attach approved wall hook directly above existing wall hook with adequately sized stainless steel anchor bolt. Replace broken or missing hinge pin with approved hinge pin.
- .10 Remove construction debris and materials from bottom of manholes, catch basins and sewers when the Work is complete.

### **3.14 Removal and Replacement of Existing Manholes, Catch Basins and Catch Pits**

- .1 Remove and replace existing manholes, catch basins and catch pits where indicated on the Drawings and Specifications as excavation progresses. Install replacement manholes, catch basins and catch pits in accordance with SD-010, SD-010D, SD-011, SD-023, SD-024 and SD-025, Section 3.8 of this specification and the following requirements
  - .1 Cut fully through existing sewer pipe or catch basin lead pipe leaving neat, square ends before removing the existing catch basin, catch pit or manhole base. Alternately, remove existing sewer pipe or catch basin lead pipe at a joint location within the excavation.
  - .2 Install new sewer pipe or catch basin lead pipe of specified size and type from new manhole, catch basin or catch pit to existing sewer pipe or catch basin lead pipe.
  - .3 Connect to existing sewer pipe or catch basin lead pipe with approved coupling, adapter or bushing to make a watertight connection.
- .2 Remove construction debris and materials from manholes, catch basins, catch pits and sewers when the Work is complete.

### **3.15 Connecting New Sewers and Catch Basin Leads to Existing Manholes, Catch Basins and Catch Pits**

- .1 Connect new sewers and catch basin leads to existing manholes, catch basins and catch pits at locations and elevations shown on the Drawings.



- .2 Excavate required depth and make neat hole in manhole, catch basin or catch pit wall a maximum of 25 millimetres larger than outside diameter of the sewer or catch basin lead pipe.
- .3 Connect sewers, catch basin leads and drainage connection pipes in accordance with Section 3.8 of this specification.
- .4 Connect catch basin leads to existing manholes at a depth of 2.4 to 4.0 metres below finished grade and from 600 millimetres to 900 millimetres above the manhole floor where the manhole floor is between 3.0 and 4.0 metres below finished grade
- .5 Install approved catch basin hood in accordance with AP-012, SD-024 and SD-025. Reuse existing catch basin hood if not damaged and approved by Contract Administrator.
- .6 Cut existing catch basin lead pipe flush with catch basin or catch pit wall and plug opening with mortar or concrete to make watertight.
- .7 Re-bench and re-channel manhole floor as required with mortar or concrete in accordance with SD-010 and SD-011. Curve flow channels for perpendicular connections smoothly into main flow channel.
- .8 Remove construction debris and materials from existing manholes, catch basins, catch pits and sewers.

### **3.16 Connecting New Sewer or Sewer Service to Existing Sewer**

- .1 Connect to existing sewer fittings where provided with approved coupling, adapter or bushing to make a watertight connection.
- .2 Connect to existing vitrified clay pipe sewers where no fitting is provided by removing the required length of sewer pipe and installing an approved tee, required lengths of new sewer pipe and flexible couplings, bushing or adapters in accordance with Section 3.12 of this specification.
  - .1 Where approved by the Contract Administrator a connection can be made to 300 millimetre and larger vitrified clay sewers with an approved PVC saddle in accordance with clause 3.16.3.2 of this specification.
- .3 Connect to other types of existing sewers where no fitting is provided using one of the following methods.
  - .1 Remove a section of existing sewer pipe and install an approved tee. or
  - .2 Make a neat circular hole in the existing sewer the same size as the sewer or sewer service to be connected and install an approved PVC saddle in accordance with the manufacturer's instructions using stainless steel straps or 6 millimetre diameter stainless steel bolts.
    - .1 Maximum connection to an existing sewer using a PVC saddle to be two sizes smaller than the sewer pipe.
    - .2 Install fastening bolts with head on the inside of the sewer pipe. Use washers if hole has chipped during drilling. Do not over tighten bolts to cause stress or damage to existing sewer pipe.
    - .3 Limit excavation beneath existing sewer to only what is required to install saddle straps. Fill excavation beneath existing sewer with grout or cement stabilized fill.



- .3 Make a neat circular hole in the existing sewer a maximum of 25 millimetres larger than sewer or sewer service pipe to be connected. Insert a short piece of sewer or service pipe into the hole with the bell end resting on the outside of the existing sewer pipe. Grout around and between the sewer or service pipe bell and the existing sewer pipe wall with mortar in accordance with SD-009 or construct a concrete collar in accordance with the Drawings to make a watertight connection.
- .4 Make holes in existing sewer pipes using the following methods.
  - .1 Non-reinforced monolithic concrete sewer and pre-cast reinforced concrete pipe 900 millimetres in diameter and larger: by concrete coring.
  - .2 Pipes less than 900 millimetres in diameter: by concrete coring or drilling a series of 12 millimetre diameter holes with a masonry drill bit around the circumference of the hole and carefully tapping out the coupon.
    - .1 Drill holes at 15 millimetres on centre for sewer pipes 375 millimetre diameter and smaller and at 25 millimetres on centre for sewer pipes up to and including 900 millimetre diameter.
  - .3 PVC pipe: by coring or cutting with hole saw or other tool capable of cutting a circular opening.
- .5 Ensure the new sewer or service pipe does not protrude more than 19 millimetres into the existing sewer.
- .6 Remove all construction debris and materials from the existing sewer when the Work is complete.
- .7 Perform a video inspection of the existing sewer after completion of backfilling and compaction using the video equipment indicated in CW 2145 from the nearest manhole to a minimum of 2 metres past the new connection. Provide the DVD of the inspection to the Contract Administrator for review. The video inspection is to clearly show the distance from the manhole to the connection and the connection. Coding of the video inspection will not be required.
- .8 Submit video inspections of existing sewers equal to or smaller than 450 millimetres in size for a new service connection done under a Service Permit within 90 Calendar days of the completion of the new service connection. Video inspection of existing sewers larger than 450 millimetres in size are not required for a new sewer service connection made under a Service Permit.

### **3.17 Connecting to Existing Sewer and Sewer Service Stubs**

- .1 Remove the existing plug and connect the new sewer or sewer service pipe to the existing sewer pipe with an approved coupling, adapter or bushing to make a watertight connection.

### **3.18 Connecting Existing Sewer Service to New Sewer**

- .1 Locate existing sewer service by dye tracing, electronic tracing, video inspection or other methods approved by the Contract Administrator.
- .2 Excavate and connect to the existing sewer service pipe at the location shown on the Drawings or within the limits of excavation for on-line sewer renewals unless otherwise directed by the Contract Administrator.
- .3 Cut fully through the existing sewer service pipe leaving a neat square end or remove existing



sewer service pipe at a joint location within the excavation.

- .4 Connect the new sewer service pipe to the existing sewer service pipe or joint using an approved flexible transition coupling, adaptor or bushing to make a watertight connection.
- .5 Install fittings, riser pipe, required length of new sewer service pipe and connect to the tee on the new sewer in accordance with Section 3.10 of this specification.

### **3.19 Plugging and Abandoning Existing Sewers and Sewer Services**

- .1 Abandon existing sewers and sewer services smaller than 300 millimetres in diameter by completely plugging each end at a manhole or where cut off with mortar or concrete a minimum of 300 millimetres thick.
- .2 Abandon existing sewers and sewer services 300 millimetres in diameter and larger by plugging one end with mortar or concrete and completely filling the sewer or sewer service with cement-stabilized flowable fill. Confirm all active sewer services have been disconnected from sewer being abandoned and have been reconnected to new sewer before filling the sewer.
- .3 Abandon sewer services under pavement by installing a plug within 1.0 metre of the sewer and filling with flowable cement-stabilized fill in accordance with SD-021 except where the existing sewer itself will be abandoned with flowable cement-stabilized fill.
- .4 Perform a video inspection of the existing sewer using the equipment indicated in CW 2145 from the nearest manhole to a minimum of 2 metres past the abandoned sewer service and provide the DVD to the Contract Administrator for review. The video inspection is to clearly show the distance from the manhole to the abandoned sewer service. Cleaning of the sewer and coding of the video inspection will not be required.
- .5 Video inspection of existing sewers is not required after plugging and abandoning existing sewer services under a Service Permit.

### **3.20 Abandoning, Relocation and Removal of Existing Manholes, Catch Basins, Catch Pits and Drainage Inlets**

- .1 Abandon existing manholes, catch basins and catch pits by removing the frame and cover, flat top reducers and riser sections to a minimum of 1.2 metres below existing or proposed finished grade.
- .2 Abandon existing drainage inlets and inlet box by removing the inlet frame and inlet box cover and completely demolishing the concrete inlet box.
- .3 Relocate existing manholes, catch basins and catch pits by completely removing the structure from the existing location and installing at the location shown on the Drawings.
- .4 Remove existing manholes, catch basins and catch pits by completely removing the entire structure from the ground.
- .5 Plug sewers and sewer services and drainage inlet pipe connected to abandoned or removed manholes, catch basins, catch pits and drainage inlet boxes in accordance with Section 3.19 of this specification. Backfill the remainder of the manhole, catch basin or excavation with compacted Class of Backfill indicated on the Drawings and Specifications in accordance CW 2030.
- .6 Load and deliver salvaged frames and covers as directed by the Contract Administrator to the



Water and Waste Department, Water Services Division Yard located at 552 Plinguet Street.  
Unload salvaged material as directed by City personnel.

### 3.21 **Maintaining Flow in Existing Sewers**

- .1 Maintain flow in existing sewers and sewer services during renewal, repair and any other time construction activities may impede or interrupt flow by methods such as diversion through the excavation, redirecting flow or providing by-pass pumping.
- .2 Provide details of methods for maintaining flow in existing sewers to the Contract Administrator for review prior to beginning the Work.
- .3 Flow control by temporary sewer isolation and by-pass pumping to be in accordance with Section 3.13 of CW 2140.
- .4 Provide approved traffic ramps for by-pass pumping discharge hoses where crossing roadways and traffic lanes and locate where directed and approved by the Contract Administrator.

### 3.22 **Deflection Testing of SDR 35 PVC Sewers**

- .1 Perform deflection testing of SDR 35 PVC pipe in the presence of the Contract Administrator by pulling a cylindrical shaped mandrel constructed with 9 evenly spaced arms generally conforming to SD-020 through the sewer after installation of sewer services and no sooner than 24 hours after compaction of backfill.
- .2 Position the mandrel a minimum of 4 metres in front of the camera if deflection testing is performed with video inspection.
- .3 Allowable deflection to be no greater than 0.15 times the pipe SDR as indicated in Table CW 2130.1. Deflection is expressed as a percent of the base inside diameter of the sewer pipe as defined in the ASTM standard to which the pipe is manufactured.
- .4 Mandrel diameter will be checked with a go/no-go proving ring having an inside diameter equal to 2 times the specified Mandrel arm radius. Mandrels passing through the proving ring will not be allowed for deflection testing.
- .5 Sewer pipe that does not allow the mandrel to pass will be considered to have failed deflection testing and is to be replaced or re-bedded as directed by the Contract Administrator.

**Table CW 2130.1 Mandrel and Proving Ring Dimensions for SDR 35 PVC Pipe**

Nominal Pipe Size (millimetres)	Mandrel Arm Radius (millimetres)	Mandrel Contact Length (millimetres)	Proving Ring Inside Diameter (millimetres)
250	115.70	200	231.40
300	137.46	250	274.92
375	168.17	300	336.34
450	205.41	350	410.82
525	242.03	450	484.12
600	272.03	500	544.06

### 3.23 **Reinforced Concrete Pipe Three Edge Bearing Test**

- .1 The Contract Administrator will randomly select one pipe of each size and class from the pipe supplied for the sewer installation for a three-edge bearing testing in accordance with ASTM C 497. Deliver selected pipe to supplier and perform testing to ultimate failure in presence of



Contract Administrator.

### **3.24 Sewer Cleaning**

- .1 Clean sewers in accordance with CW 2140 if required before performing video inspection except for Clause 3.5.7.1, Sections 3.6, 3.7, 3.8 and Clause 3.9.6 and their associated payment clauses which do not apply to new sewer installations.

### **3.25 Video Inspection**

- .1 Perform video inspection of sewers in accordance with CW 2145 except for Sections 3.18, 3.19, 3.21 and 3.22 and their associated payment clauses which do not apply to sewer repairs and new sewer installations.
- .2 Perform video inspection of catch basin leads longer than 15 metres in length or that extend from a sewer or manhole to a catch basin at a rear lot line, in a public lane, in a park area or in a parking lot.

### **3.26 Restoration**

- .1 Replace concrete pavement slabs, miscellaneous concrete slabs, curbs and asphalt pavement or overlays in accordance with CW3230, CW 3235, CW 3240 and CW 3410 as indicated in the Specifications and as directed by the Contract Administrator. Use “early opening” concrete in accordance with the CW 3310 as indicated in the Specifications and as directed by the Contract Administrator.
- .2 Restore boulevards and grassed areas by sodding or seeding using imported topsoil in accordance with CW 3510 and CW 3520 as indicated in the Specifications and as directed by the Contract Administrator.
- .3 Restore gravel surfaces in accordance with CW 3150 as indicated in the Specifications and as directed by the Contract Administrator.

## **4. MEASUREMENT AND PAYMENT**

### **4.1 Sewer Installation**

- .1 Sewer installation will be measured for payment on a length basis for each size, type of pipe material, method of installation, type of bedding, type of backfill and depth and paid for at the Contract Unit Price per metre for the Items of Work listed below. Length to be paid for will be total number of linear metres supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

#### **Items of Work:**

Combined Sewers  
Interceptor Sewers  
Land Drainage Sewers  
Storm Relief Sewers  
Wastewater Sewers

- .2 Measurement for length of sewer installed in a trench will be made horizontally at grade above the centreline of pipe through fittings from centre to centre of manholes.



- .3 Measurement for length of sewer installed using trenchless methods will be made horizontally at grade above the centreline of pipe through shafts from centre to centre of manholes.
- .4 Measurement for length of sewer installed using trenchless methods between sewers installed in a trench will be made horizontally at grade above the centreline of pipe from face to face of the trench excavation.
- .5 Sewers specified to be installed using trenchless methods but were installed in a trench due to field conditions will be paid for at the Contract Unit Price per metre for trenchless installation.
- .6 Depth classification for sewers installed in a trench will be from 0 to 4 metres then in 1.0 metre increments. No further subdivision will be made for depth. Depth will be the average depth between adjacent manholes measured from existing or proposed final grade to the lowest sewer invert. No depth classification will be made for sewers installed by trenchless methods.
- .7 Connecting new sewers to new manholes will be included in sewer installation.
- .8 Repair of damage to underground and surface structures due to surface subsidence and soil heaving caused by trenchless installation methods will be at own expense.
- .9 Correction of alignment and grade exceeding the allowable variance will be at own expense.
- .10 Replacement or re-bedding of sewers that do not allow the mandrel to pass will be at own expense.

#### **4.2 Fitting Installation**

- .1 Supply and installation of sewer fittings and couplings will be included in sewer installation.

#### **4.3 Manholes**

- .1 Manhole installation including frames, covers, rungs, risers, base and other accessories and appurtenances will be measured for payment on a vertical length basis for each manhole type and base size and paid for at the Contract Unit Price per vertical metre for the Items of Work listed below. Length to be paid for will be the total number of vertical metres of manhole supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

##### **Items of Work:**

Manhole  
Manhole With Internal Drop Pipe  
New Manhole on Existing Sewer  
Remove and Replace Existing Manhole

- .2 Measurement of manholes will be from the lowest sewer invert to the top of the finished rim elevation.
- .3 Pipe, couplings and connections to existing sewer required to install a new manhole on an existing sewer will be included in manhole installation.
- .4 Removal of existing manhole will be included with installation of new manhole.
- .5 Internal pipe, fittings, couplings, anchors, spacers and fasteners will be included with installation of new manhole with internal drop pipe.



**4.4 Catch Basins and Catch Pits**

- .1 Catch basin and catch pit installation including hoods, fittings, frame and cover and other accessories and appurtenances will be measured for payment on a unit basis for each type and paid for at the Contract Unit Price for the Items of Work listed below. Number of units to be paid for will be the total number of catch basins and catch pits supplied, installed and removed where required in accordance with this specification, accepted and measured by the Contract Administrator.

**Items of Work:**

Catch Basin  
Catch Pit  
Remove and Replace Existing Catch Basin  
Remove and Replace Existing Catch Pit

- .2 Reconnection of up to 1.0 metre of catch basin lead measured from the outside of the catch basin, including lead pipe and couplings will be included in catch basin and catch pit installation.

**4.5 Sewer Service Installation**

- .1 Sewer service installation will be measured for payment on a length basis for each size, type of backfill and method of installation and paid for at the Contract Unit Price per metre for "Sewer Services". Length to be paid for will be the total number of linear metres of sewer service supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Measurement for length of sewer service installed in a trench will be made horizontally at grade, above the centreline of the sewer service through fittings from sewer centreline to termination point of sewer service.
- .3 Measurement for length of sewer service installed using trenchless methods will be made horizontally at grade above the centreline of the sewer service through shafts from sewer centreline to termination point of the sewer service.
- .4 Fittings for sewer services will be included in sewer service installation.
- .5 Connection to saddle, tee or wye provided on sewer will be included in sewer service installation.

**4.6 Drainage Connection Pipe Installation**

- .1 Drainage connection pipe installation will be measured for payment on a length basis and paid for at the Contract Unit Price per metre for "Drainage Connection Pipe". Length to be paid for will be the total number of linear metres of drainage connection pipe supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Measurement for length of drainage connection pipe installed in a trench will be made horizontally at grade, above the centreline of the drainage connection pipe through fittings from the centreline of the inlet box or catch pit to the centreline of the catch basin.
- .3 Fittings for drainage connection pipe will be included in drainage connection pipe installation.

**4.7 Sewer Service Risers**

- .1 Sewer service riser installation will be measured for payment on a vertical length basis for each



type and size and paid for at the Contract Unit Price per metre for "Sewer Service Risers". Length to be paid for will be the total number of vertical metres of sewer service risers supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

- .2 Measurement for vertical length of sewer service risers will be from the top of the sewer to the top of the sewer service pipe in accordance with SD-014 and SD-015.
- .3 Fittings for sewer service risers will be included in sewer service riser installation.

#### **4.8 Sewer Repairs**

- .1 Sewer repairs made by replacing up to 3.0 continuous metres in length will be measured for payment on a unit basis for each size and type of backfill and paid for at the Contract Unit Price for "Sewer Repair – Up to 3.0 Metres Long". Number of units to be paid for will be the total number of sewer repairs up to 3.0 metres long supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Sewer repairs made by replacing additional pipe continuous to the first 3.0 metres of pipe will be measured for payment on a length basis for each size and type of backfill and paid for at the Contract Unit Price for "Sewer Repair – In Addition to First 3.0 metres". Length to be paid for will be the total number of linear metres of sewer repair additional to the first 3.0 metre repair supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- .3 Measurement will be made horizontally at grade above the centreline of pipe through fittings from connection to connection to existing sewer.
- .4 Supply and installation of couplings and connections to existing sewer pipe will be included in sewer repairs.
- .5 Repairs completed beyond limits confirmed with Contract Administrator will not be measured for payment.
- .6 Video inspection required to confirm limits of sewer repair will be included in sewer repairs.

#### **4.9 Existing Manhole and Catch Basin Repairs**

- .1 Replacing existing manhole and catch basin frames and covers will be measured for payment on a unit basis for each type and paid for at the Contract Unit Price for the Items of Work listed below. Number of units to be paid for will be the total number of manhole and catch basin frames and covers supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

##### **Replacing Standard Frames and Covers**

- i) AP-004 - Standard Frame for Manhole and Catch Basin
  - ii) AP-005 - Standard Solid Cover for Standard Frame
  - iii) AP-006 - Standard Grated Cover for Standard Frame
  - iv) AP-008 – Barrier Curb and Gutter Inlet Frame and Box
  - v) AP-009 – Barrier Curb and Gutter Inlet Cover
  - vi) AP-011 – Mountable Curb and Gutter Inlet
- .2 Installing new or replacing existing flat top reducers will be measured for payment on a unit basis for each size and paid for at the Contract Unit Price for "Installing New Flat Top Reducer" or "Replacing Existing Flat Top Reducer". Amount to be paid for will be the total number of flat top



reducers supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.



- .3 Replacing existing manhole risers will be measured for payment on a vertical metre basis for each size and paid for at the Contract Unit Price for the Items of Work listed below. Length to be paid for will be the total number of vertical metres of risers supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

**Replacing Existing Risers**

- i) Pre-cast concrete risers
  - ii) Brick risers
  - iii) Cast-in-place concrete
- .4 Patching the interior of existing manholes will be measured for payment on a vertical metre basis and paid for at the Contract Unit Price for "Patching Existing Manholes". Length to be paid for will be the total number of vertical metres patched in accordance with this specification, accepted and measured by the Contract Administrator.
- .5 Re-pointing and replacing existing manhole brickwork will be measured for payment on a vertical metre basis and paid for at the Contract Unit Price for "Re-pointing Brickwork". Length to be paid for will be the total number of vertical metres of brickwork re-pointed in accordance with this specification, accepted and measured by the Contract Administrator.
- .6 Replacing existing manhole rungs will be measured for payment on a unit basis and paid for at Contract Unit Price for "Replacing Existing Manhole or Catch Basin Rungs". Number of units to be paid for will be total number of manhole rungs supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- .7 Replacing existing catch basin hood, pin or wall hook will be measured for payment on a unit basis and paid for at Contract Unit Price for "Replacing Existing Catch Basin Hoods, Pins or Wall Hooks". Number of units to be paid for will be total number of catch basin hoods, pins or wall hooks supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

**4.10 Connecting New Sewers and Sewer Services to Existing Manholes, Catch Basins and Catch Pits**

- .1 Connecting new sewers and sewer services to existing manholes, catch basins and catch pits will be measured for payment on a unit basis for each size and type of connection and paid for at the Contract Unit Price for the Items of Work listed below. Number of units to be paid for will be the total number of connections supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

**Items of Work**

Connecting to Existing Manhole  
Connecting to Existing Catch Basin  
Connecting to Existing Catch Pit  
Connecting to Existing Inlet Box

**4.11 Connecting New Sewer or Sewer Service to Existing Sewer**

- .1 Connecting new sewers and sewer services to existing sewers where no stub or fitting exists will be measured for payment on a unit basis for each size and type of new sewer or sewer service and each size and type of existing sewer and paid for at the Contract Unit Price for "Connecting to Existing Sewer". Number of units to be paid for will be total number of connections supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.



- .2 Supply and installation of sewer pipe, couplings, tees and saddles will be included with the sewer connection.

#### **4.12 Connecting to Existing Sewer or Sewer Service Stubs**

- .1 Connecting to existing sewer or sewer service stubs will be included with the sewer or sewer service installation.

#### **4.13 Connecting Existing Sewer Service to New Sewer**

- .1 Connecting existing sewer services to new sewers will be measured for payment on a unit basis for each size and paid for at the Contract Unit Price for "Connecting Existing Sewer Service to New Sewer". Number of units to be paid for will be the total number of connections supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Supply and installation of fittings will be included in the sewer service connection.
- .3 Supply and installation of sewer service risers will be measured and paid for in accordance with Section 4.7.
- .4 Supply and installation of sewer service pipe will be measured and paid for in accordance with Section 4.5.
- .5 Supply and installation of up to 1.0 metre of new sewer service pipe measured horizontally at grade above the centreline of the sewer service pipe from the outside of the new sewer main will be included with the connection of existing sewer services to a new sewer renewed on-line.

#### **4.14 Plugging and Abandoning Existing Sewers and Sewer Services**

- .1 Cutting off and plugging existing sewers and sewer services smaller than 300 millimetres in diameter will be measured for payment on a unit basis for each size and paid for at the Contract Unit Price for "Plugging Existing Sewers and Sewer Services Smaller Than 300 Millimetres". Number of units to be paid for will be the total number of sewers and sewer services plugged in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Abandoning existing sewers larger than 300 millimetres in diameter with cement-stabilized flowable fill will be measured for payment on a volume basis and paid for at the Contract Unit Price for "Abandoning Existing Sewers With Cement-Stabilized Flowable Fill". Volume to be paid for will be the total number of cubic metres of sewer abandoned in accordance with this specification, accepted and measured by the Contract Administrator.
- .3 Volume of cement-stabilized flowable fill used will be calculated based on the inside diameter and length of the sewer abandoned.
- .4 Abandoning existing sewer services under pavement with flowable fill will be measured for payment on a unit basis for each size and paid for at Contract Unit Price for "Abandoning Existing Sewer Services Under Pavement". Number of units to be paid for will be the total number of sewer services abandoned in accordance with this specification, accepted and measured by the Contract Administrator.



**4.15 Abandoning, Relocation and Removal of Existing Manholes, Catch Basins, Catch Pits and Drainage Inlets**

- .1 Abandoning of existing manholes, catch basins and catch pits will be measured for payment on a unit basis and paid for at the Contract Unit Price for “Abandoning Existing Manholes, Catch Basins and Catch Pits”. Number of units to be paid for will be the total number of manholes, catch basins and catch pits abandoned in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Abandoning of existing drainage inlets and inlet boxes will be measured for payment on a unit basis and paid for at the Contract Unit Price for “Abandoning Existing Drainage Inlets”, Number of units to be paid for will be the total number of drainage inlets abandoned in accordance with this specification, accepted and measured by the Contract Administrator.
- .3 Removal of existing manholes, catch basins and catch pits that will not be replaced at the same location will be measured for payment on a unit basis and paid for at the Contract Unit Price for “Removal of Existing Manholes, Catch Basins or Catch Pits”. Number of units to be paid for will be the total number of manholes, catch basins and catch pits removed in accordance with this specification, accepted and measured by the Contract Administrator.
- .4 Removal of existing manholes, catch basins, catch pits and curb inlets that will be replaced by a new manhole, catch basin or catch pit at the same location will be included with manhole, catch basin or catch pit installation.
- .5 Relocation of existing manholes, catch basins and catch pits will be measured for payment on a unit basis for each size and type and paid for at Contract Unit Price for “Relocation of Existing Manholes, Catch Basins and Catch Pits”. Number of units to be paid for will be the total number of manholes, catch basins and catch pits relocated in accordance with this specification, accepted and measured by the Contract Administrator.

**4.16 Maintaining Existing Sewer Flow**

- .1 Maintaining existing sewer flow and will be included with type of sewer work being done.

**4.17 Sewer Cleaning**

- .1 Cleaning of new sewers will be included with sewer installation.

**4.18 Video Inspection**

- .1 Video inspection will be measured and paid for in accordance with CW 2145 except Section 4.6 and 4.7 will not apply to new sewer installations.

**4.19 Deflection Testing of SDR 35 PVC Sewers**

- .1 Deflection testing of SDR 35 PVC sewers will be included with sewer installation.

**4.20 Concrete Pipe Three Edge Bearing Test**

- .1 Concrete pipe three edge bearing test will be measured for payment on a unit basis for each size and type of pipe and paid for at the Contract Unit Price for “Concrete Pipe Three-Edge Bearing Test”. Number of units to be paid for will be the total number of pipes tested in accordance with this specification, accepted and measured by the Contract Administrator.



**4.21 Pavement Restoration**

- .1 Renewal of existing concrete pavement slabs will be measured on a surface area basis per square metre in accordance with CW 3230. No separate measurement or payment will be made for Drilled Dowels or Tie Bars, the cost for which shall be included in the prices bid for the renewal of the concrete pavement.
- .2 Removal and replacement of existing miscellaneous concrete slabs, curbs and asphalt pavement or overlays will be measured for payment in accordance with CW 3235, CW 3240 and CW 3410.

**4.22 Boulevard Restoration**

- .1 Restoration of boulevards and grassed areas disturbed by construction activities will be included with the sewer work being done.
- .2 Restoration of boulevard and grassed areas beyond the limits of construction as directed by the Contract Administrator will be measured for payment in accordance with CW 3510 and CW 3520.



**CW 3110 – SUB-GRADE, SUB-BASE AND BASE COURSE CONSTRUCTION****TABLE OF CONTENTS**

1.	DESCRIPTION.....	1
1.1	General .....	1
1.2	Definitions .....	1
1.3	Referenced Standard Construction Specifications .....	1
2.	MATERIALS.....	1
2.1	Sub-Base Materials.....	1
2.2	Base Course Materials .....	3
2.3	Asphalt Cuttings for Base Course Material .....	3
2.4	Lime or Portland Cement.....	4
2.5	Imported Fill Material .....	4
2.6	Quality Assurance Testing.....	4
3.	CONSTRUCTION METHODS .....	4
3.1	Pavement Removal .....	4
3.2	Excavation .....	5
3.3	Preparation of Sub-grade and Placement of Sub-Base Material.....	5
3.4	Placement of Sub-Base Material With Geotextile Fabric.....	6
3.5	Placement of Crushed Sub-base Material with Geotextile Fabric and Geogrid For Unstable Sub-grades.....	6
3.6	Placement of Base Course Material .....	7
3.7	Placement of Imported Fill .....	8
3.8	Grading of Boulevards .....	8
3.9	Grading of Ditches .....	8
3.10	Quality of Sub-grade, Sub-base and Base Course Layers .....	9
3.11	Removal of Existing Concrete Bases .....	9
4.	MEASUREMENT AND PAYMENT .....	9
4.1	Pavement Removal .....	9
4.2	Stripping and Stockpiling Topsoil.....	10
4.3	Excavation .....	10
4.4	Sub-grade Compaction .....	10
4.5	Sub-base Material.....	10
4.6	Base Course Material .....	11
4.7	Leveling Course .....	12
4.8	Grading of Boulevards .....	12
4.9	Ditch Grading .....	12
4.10	Boulevard Excavation .....	12
4.11	Ditch Excavation .....	12
4.12	Removal of Existing Concrete Bases .....	13
4.13	Imported Fill Material .....	13
4.14	Lime or Portland Cement.....	13



**CW 3110 - SUB-GRADE, SUB-BASE AND BASE COURSE CONSTRUCTION****1. DESCRIPTION****1.1 General**

- .1 This specification covers pavement removal, excavation, preparation of sub-grade, supply and placement of sub-base and base course materials, ditch grading and boulevard grading for pavements, slab renewals, curbs, miscellaneous concrete slabs, sidewalks and other related works.

**1.2 Definitions**

- .1 Sub-grade – the natural in-situ material.
- .2 Sub-base – where required, the layer of material provided between the sub-grade and the base course.
- .3 Base course – the layer of base course material, greater than 50mm in depth, immediately underlying the pavement wearing surface.
- .4 Leveling course – a non-structural layer of base course material, up to 50mm in depth, placed immediately underlying the pavement wearing surface.
- .5 Crushed Aggregate – Crushed aggregate from glacial till pits.
- .6 Crushed Limestone - Crushed limestone from a limestone quarry.
- .7 Crushed Granite – Crushed granite from a granite quarry.
- .8 **Crushed Recycled Concrete – Crushed Portland Cement Concrete that has been crushed into pieces that are a group of aggregate particles cemented together which may or may not include the host (dominant) particle.**
- .10 **Deleterious Material - soft material that would decay or disintegrate from weathering, porcelain, vegetation, organic material, wood, glass, plastic, metal, reinforcing steel, building rubble, brick, shale, and friable particles.**
- .11 **Friable - the condition of being friable, describes the ability of a solid substance to be reduced to smaller pieces with little effort, especially by rubbing.**

**1.3 Referenced Standard Construction Specifications**

- .1 CW 1130 – Work Site Requirements.
- .2 CW 3130 – Supply and Installation of Geotextile Fabrics.
- .3 CW 3450 – Planing of Pavement.

**2. MATERIALS****2.1 Sub-Base Materials**

- .1 Sub-base material of the type(s) shown on the Drawings or indicated in the Specifications will be supplied in accordance with the following requirements:
  - .1 Suitable site sub-base material will be of a type approved by the Contract Administrator.



- .2 Clay borrow sub-base material will be of a type approved by the Contract Administrator.
- .3 Crushed sub-base material will be crushed aggregate, crushed granite, crushed limestone or crushed concrete pavement.
- .4 Crushed sub-base material will be well-graded and conform to the following grading requirements:

**TABLE CW 3110.1 - Crushed Sub-Base Material Grading Requirements**

CANADIAN METRIC SIEVE SIZE	PERCENT OF TOTAL DRY WEIGHT PASSING EACH SIEVE		
	50 mm MAX.	100mm	150 mm
200 000			100%
150 000			90% - 100%
100 000		97% - 100%	65% - 85%
50 000	100%		
25 000		30% - 50%	0% - 40%
5 000	25% - 60%		
80	4% - 15%	8% max.	

The content composition of crushed concrete pavement shall be based on weight as follows :

- minimum of 85% Crushed Recycled Concrete
- maximum of 15% of recycled asphaltic concrete
- maximum of 3% clay
- maximum of 1% deleterious material

150 and 100 millimetre crushed sub-base material when subjected to the abrasion test will have a loss of not more than 40% when tested in accordance with grading 1 of ASTM C535, Test for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

50 millimetre crushed sub-base material when subjected to the abrasion test will have a loss of not more than 40% when tested in accordance with grading A of ASTM C131, Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.



**2.2 Base Course Materials**

- .1 Base course material will be approved by the Contract Administrator.
- .2 Base course material will consist of sound, hard, crushed rock, crushed gravel, or crushed concrete.
- .3 Crushed rock and crushed gravel will be free from organic or soft material that would disintegrate through decay or weathering.
- .4 Base course material will consist of sound durable particles produced by crushing, screening and grading of recovered materials, free from soft material that would decay or disintegrate from weathering.
- .5 Crushed concrete base course material is limited to a maximum of two percent of the total dry weight of deleterious material.
- .6 The base course material will be well graded and conform to the following grading requirements:

**TABLE CW 3110.2 – Base Course Material Grading Requirements**

CANADIAN METRIC SIEVE SIZE	PERCENT OF TOTAL DRY WEIGHT PASSING EACH SIEVE		
	Granular	Crushed Concrete	Crushed Limestone
25 000	100%		
20 000	80% - 100%	100%	100%
5 000	40% - 70%	40% - 70%	40% - 70%
2 500	25% - 55%	25% - 60%	25% - 60%
315	13% - 30%	8% - 25%	8% - 25%
80	5% - 15%	6% - 17%	6% - 17%

Base course material when subjected to the abrasion test will have a loss of not more than 35% when tested in accordance with grading B of ASTM C131, Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

Test base course material using an Atterberg Limits Test in accordance with ASTM D4318. The material passing the 315 sieve will have a liquid limit not greater than 25 and a plasticity index not greater than 6.

Where base course is being placed under an asphaltic concrete pavement, the aggregate retained on a No. 5 000 sieve will contain not less than 35% crushed aggregate as determined by actual particle count. Crushed aggregate will be considered as that aggregate having at least one fractured face.

**2.3 Asphalt Cuttings for Base Course Material**

- .1 Asphalt cuttings produced from planing of asphalt pavements or overlays in accordance with CW 3450 may be used as a base course material where indicated in the Specifications or as approved by the Contract Administrator.
- .2 Asphalt cuttings will be well graded and have a maximum particle size of 40 millimetres.



**2.4 Lime or Portland Cement**

- .1 Use either Lime or Type 10 normal Portland Cement for drying the sub-grade.
- .2 Supply Lime in accordance with CSA A82.43.
- .3 Supply Portland Cement in accordance with CSA A5.

**2.5 Imported Fill Material**

- .1 Imported fill material will consist of low to medium plastic clays or mixtures of sand and clay, uniform in texture.
- .2 The fill material shall be free of wood, vegetation, concrete rubble or stones larger than 25 millimetres in diameter.

**2.6 Quality Assurance Testing**

- .1 The Contract Administrator shall ensure that a minimum of one sample shall be tested for gradation and LA abrasion for sub-base and base course materials prior to starting construction for every contract. The materials shall be sampled from stockpiles designated to be used for the contract and shall be tested in accordance with this Specification.
- .2 The materials shall be sampled from stockpiles designated to be used for the contract and shall be tested in accordance with this Specification.
- .3 If one test fails to meet the requirements of this Specification, the material shall be re-tested. If the material fails a second test, the Contract Administrator shall designate a new source for supply of the material.
- .4 Testing in addition to the requirements of this Specification shall be as directed by the Contract Administrator.
- .5 Copies of all test results shall be sent to the Research and Standards Engineer for the Public Works Department and to the Contract Administrator prior to the supply and placement of the material.

**3. CONSTRUCTION METHODS****3.1 Pavement Removal**



- .1 Remove existing concrete pavement, including curbs and asphalt overlays at locations as shown on the Drawings or as directed by the Contract Administrator. Remove all pavements to a combined thickness of 300 millimetres, unless otherwise indicated in the Specifications.
- .2 Remove existing asphalt pavement including asphalt curbs at locations as shown on the Drawings or as directed by the Contract Administrator. Remove pavement to a maximum thickness of 150 millimetres, unless otherwise indicated in the Specifications.
- .3 Saw-cut the existing pavement full-depth along the limits designated for removal.
- .4 Utilize backhoe type equipment unless approved otherwise by the Contract Administrator.
- .5 Dispose of material in accordance with Section 3.4 of CW 1130.

### **3.2 Excavation**

- .1 Excavate in-situ material to the depth to accommodate the pavement structure as shown on the Drawings or as directed by the Contract Administrator.
- .2 Stockpile suitable in-situ material and suitable site sub-base material at locations on site as directed by the Contract Administrator.
- .3 Dispose of surplus suitable site material and unsuitable material such as frost heaving clays, silts, rocks and rubble in accordance with Section 3.4 of CW 1130.
- .4 Strip and stockpile topsoil from the site in a manner which will prevent contamination of topsoil with underlying soil materials. Stockpile the stripped topsoil at locations on site for later use.
- .5 The limits of excavation will be taken as a vertical plane 450 millimetres beyond the limits of the proposed pavement except when slip form paving equipment is specified for placement of the concrete pavement, the limits of excavation will be increased to a vertical plane 750 millimetres beyond the limits of the proposed pavement.
- .6 During excavation, the Contractor will be advised by the Contract Administrator as to which areas have an unsuitable sub-grade. Extend the excavation either to the lower limit of the unsuitable material or to a depth as directed by the Contract Administrator.
- .7 Remove wooden poles, concrete bases, or tree stumps encountered under pavements to the top of subgrade or 1 metre below the bottom of the pavement surface, whichever depth is greater.
- .8 Backfill and compact over-excavated areas with sub-base material approved by the Contract Administrator.
- .9 Excavate additional material beyond the boulevard grading and ditch grading limits as directed by the Contract Administrator.

### **3.3 Preparation of Sub-grade and Placement of Sub-Base Material**

- .1 Compact the sub-grade after the bottom of the excavation has been approved by the Contract Administrator.
- .2 Compact areas of suitable sub-grade material, the full width of the excavation, to a minimum of 95% Standard Proctor Density.
- .3 Sub-base material shall not be placed over frozen subsoil.



- .4 Place and compact suitable site sub-base material before placing any new sub-base material, as directed by the Contract Administrator.
- .5 Place and compact crushed sub-base material with or without geogrid as directed by the Contract Administrator in accordance with CW 3135.
- .6 Place and compact sub-base materials in layers to a depth of 3 times the maximum aggregate size or as directed by the Contract Administrator. Compact to a minimum of 100% Standard Proctor Density, for the full width of the excavation, and each layer must be levelled and approved by the Contract Administrator before the succeeding layer may be placed.
- .7 Layering, mixing or blending of crushed concrete with crushed aggregate or crushed limestone sub-base materials is not allowed.
- .8 Recompact or replace any layer, which has been rejected as directed by the Contract Administrator.
- .9 When excess water has been applied, either by sprinkling operations or by precipitation, to cause local or continuous pondage, soil compaction will not be permitted until sufficient soil drying has occurred, creating a condition lending itself favourably to compacting operations. Exercise necessary precautions to protect compacted areas against excess wetting from any natural or artificial sources of water application.
- .10 Should excess moisture from continuous or heavy precipitation threaten to unduly delay the completion of the Contract. Apply in writing to the Contract Administrator requesting permission to use Lime or Portland Cement to dry out the clay sub-grade or sub-base material at specific location(s).

### **3.4 Placement of Sub-Base Material With Geotextile Fabric**

- .1 Install separation or separation/reinforcement geotextile fabric in accordance with CW 3130.
- .2 For stable sub-grades, place and compact sub-base material to a minimum depth of 150 millimetres.
- .3 For unstable sub-grades, place and compact sub-base material to a minimum depth of 300 millimetres or greater thickness as directed by the Contract Administrator.
- .4 Place sub-base material by end-dumping methods and level with front-end loader type of equipment as approved by the Contract Administrator to avoid damage to the geotextile fabric and minimize sub-grade failures.
- .5 Layering, mixing or blending of crushed concrete with crushed aggregate or crushed limestone sub-base materials is not allowed.
- .6 Avoid sudden stops or sharp turns by construction equipment during placement of sub-base materials.
- .7 Construction traffic will not be allowed to travel on the placed sub-base material until approved by the Contract Administrator.

### **3.5 Placement of Crushed Sub-base Material with Geotextile Fabric and Geogrid For Unstable Sub-grades**



- .1 Prepare the subgrade in accordance with Section 3.3 of this Specification.
- .2 Supply and install separation (non-woven) geotextile fabric over the subgrade in accordance with CW 3130.
- .3 Supply and install geogrid over the separation (non-woven) fabric in accordance with CW 3135.
- .4 Supply crushed sub-base material in accordance with Section 2.1 of CW 3110.
- .5 Compacted sub-base sections using size and depth as directed by the Contract Administrator or as shown on the Drawings. For residential pavements, optimum performance of approved geogrid may be achieved using 300-450mm in thickness of 100mm crushed subbase material.
- .6 Place crushed sub-base material by end dumping down the centre of the excavation. The sub-base shall be pushed forward and levelled using a track type dozer where possible, to build a thickened section to support the hauling operations and avoid damage to the subgrade, geotextile fabric or geogrid. This procedure shall continue until all sub-base material has been placed down the centre of the excavation.
- .7 Spread the crushed sub-base material to facilitate final grades utilizing a track type dozer.
- .8 Initial compaction of the crushed sub-base material shall consist of two complete passes utilizing vibratory type equipment capable of compacting the material. Each pass shall be over lapped by half the width of the roller. All additional compaction shall be completed utilizing static type equipment. No trucks, rubber tire loaders or graders will be allowed to travel on the sub-base material until the Contract Administrator has approved the compaction of the sub-base.

### **3.6 Placement of Base Course Material**

- .1 Place and compact base course material to a minimum 75 millimetres thickness for pavement and approaches to a minimum of 100% Standard Proctor Density for the full width of the excavation unless otherwise shown on the Drawings or as directed by the Contract Administrator.
- .2 Level the compacted base course to the finished base course elevation.
- .3 Maintain the finished base course until the pavement is placed.
- .4 Spread base course material uniformly to avoid segregation, free of pockets of fine and coarse material.
- .5 Place and compact leveling course to a maximum thickness of 50 millimetres for sidewalks, renewal of existing curbs and miscellaneous concrete slabs, to 95% Standard Proctor Density.
- .6 Place and compact base course material immediately beneath pavement and forms to provide firm support.



**3.7 Placement of Imported Fill**

- .1 Place fill materials to satisfy the grading requirements of boulevard and ditches.
- .2 Supply material in accordance with Section 2.5 of this specification.
- .3 Compact to a minimum of 90% Standard Proctor Density.
- .4 Imported fill shall be free of frozen lumps and shall be placed and compacted in an unfrozen state. Imported fill shall not be placed over frozen subsoil.

**3.8 Grading of Boulevards**

- .1 Grading of the boulevards and medians to receive sod will be understood to mean the required excavation or backfilling to a depth up to 150 millimetres so that the boulevards and medians, after compaction, are at a uniform depth of 100 millimetres below finished boulevard grade, as shown on the Drawings.
- .2 Remove all debris, stones and concrete rubble from the boulevards and medians before commencing grading.
- .3 Grade the boulevards and medians to receive sod, unless otherwise shown on the Drawings or as directed by the Contractor Administrator.
- .3 Remove all debris, stones and concrete rubble from the boulevards and medians before commencing grading.
- .4 Excavate to a depth of up to 150 millimetres to meet the final grade 100 millimetres below finished boulevard grade.
- .5 Place and compact suitable backfill material as approved by the Contract Administrator to a depth of up to 150 millimetres to meet the final grade 100 millimetres below finished boulevard grade.
- .6 Supply backfill material in accordance with Section 2.5 of this specification.
- .7 Compact backfill materials to a minimum of 90% Standard Proctor Density.

**3.9 Grading of Ditches**

- .1 Grading of ditches will be understood to mean the required excavation or backfilling to a depth up to 300 millimetres so that the ditches, after compaction are at finished grade where no sodding is required or at a uniform depth of 100 millimetres below finished grade where sodding is required.
- .2 Grade ditches as shown on the Drawings or as directed by the Contract Administrator.
- .3 Excavate to a depth of up to 300 millimetres to meet the final ditch grade requirements.
- .4 Place and compact suitable backfill material as approved by the Contract Administrator to a depth of up to 300 millimetres to meet the final ditch grade requirements.
- .5 Supply backfill material in accordance with Section 2.5 of this specification.
- .6 Compact backfill materials to a minimum of 90% Standard Proctor Density.



**3.10 Quality of Sub-grade, Sub-base and Base Course Layers**

- .1 Determine the Standard Proctor Density for the sub-grade, sub-base and base course materials at the optimum moisture content in accordance with ASTM Standard D698. The field density of each sub-grade, sub-base and base course layers will be a percentage of the applicable Standard Proctor Density, in Sections 3.3, 3.4, 3.5 and 3.6 of this specification.
- .2 Utilize quality control tests to determine the acceptability of the sub-grade, sub-base and base course layers, as placed and compacted before the succeeding layer may be applied.
- .3 Verify the field density of the compacted layers by Field Density Tests in accordance with ASTM Standard D1556, Test for Density of Soil in Place by the Sand-Cone Method, or ASTM Standard D2922, Test of Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- .4 The frequency and number of tests will be as directed by the Contract Administrator.
- .5 Fill promptly, holes made by the removal of samples from the layers with appropriate material and thoroughly compact so as to conform in every way with the adjoining material.

**3.11 Removal of Existing Concrete Bases**

- .1 Remove existing concrete bases as shown on the Drawings or as directed by the Contract Administrator.
- .2 Remove to a depth of 1.0 metre below finished grade.
- .3 Dispose of material in accordance with Section 3.4 of CW 1130.
- .4 Backfill holes remaining with base course material and compact to the satisfaction of the Contract Administrator.

**4. MEASUREMENT AND PAYMENT****4.1 Pavement Removal**

- .1 Pavement removal will be measured on an area basis and paid for at the Contract Unit Price per square meter for the "Items of Work" listed here below. The area to be paid for will be the total number of square metres of existing pavement removed in accordance with this specification, accepted and measured by the Contract Administrator.

**Items of Work:****Pavement Removal**

- i.) Concrete Pavement
  - ii.) Asphalt Pavement
- .2 Disposal of material will be included in the payment for the "Items of Works" listed for pavement removal.
  - .3 Curb and asphalt overlay will be included in the payment for the Item of Work if both are removed in one operation with the pavement.



- .4 Payment for pavement over 300mm in thickness will be paid in ratio to the thickness over 300mm.

#### **4.2 Stripping and Stockpiling Topsoil**

- .1 Stripping and stockpiling topsoil will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Stripping and Stockpiling Topsoil". The volume to be paid for will be the total number of cubic metres of existing topsoil stripped and stockpiled in accordance with this specification, accepted and measured by the Contract Administrator.

#### **4.3 Excavation**

- .1 Excavation will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Excavation". The volume to be paid for will be the total number of cubic metres excavated in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 The volume of excavation will be measured by cross-sections in its original position and computed by the method of Average End Areas.
- .3 Only material excavated within the limits of excavation will be included in the payment for "Excavation".
- .4 Disposal of material, removal of miscellaneous trees, shrub and concrete bases unless otherwise indicated in the Specifications, will be included in payment for "Excavation".
- .5 Excavation of solid bedrock, glacial till, boulders, loose rock, concrete rubble and foundations which are located within the limits of excavation and which require the use of additional or unconventional excavation equipment will be measured and paid for in addition to the unit price for excavation.

#### **4.4 Sub-grade Compaction**

- .1 Sub-grade compaction will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Sub-Grade Compaction". The area to be paid for will be the total number of square metres of sub-grade compacted in accordance with this specification, accepted and measured by the Contract Administrator.

#### **4.5 Sub-base Material**

##### **.1 Suitable Site Sub-base Material**

- .1 The reloading, hauling, placing and compaction of suitable site sub-base material will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Placing Suitable Site Sub-base Material". The volume to be paid for will be the total number of cubic metres of suitable site sub-base material placed in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 The volume of suitable sub-base material will be measured by cross-sections and computed by the method of Average End Areas.
- .3 Only material placed within the limits of excavation will be included in the payment for "Placing Suitable Site Sub-base Material".
- .4 No measurement or payment will be made for materials rejected by the Contract Administrator.



**.2 Clay Borrow Sub-base Material**

- .1 The supplying, placing and compaction of clay borrow sub-base material will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for “Supplying and Placing Clay Borrow Sub-base Material”. The volume to be paid for will be the total number of cubic metres of material compacted in place in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 The volume of clay borrow sub-base material will be measured by cross-sections and computed by the method of Average End Areas.
- .3 Only material placed within the limits of excavation will be included in the payment for “Supplying and Placing Clay Borrow Sub-base Material”.
- .4 No measurement or payment will be made for materials rejected by the Contract Administrator.

**.3 Crushed Sub-base Material**

- .1 The supplying, placing and compaction of crushed sub-base material will be measured on a weight basis and paid for at the Contract Unit Price per tonne for the “Items of Work” listed here below. The weight to be paid for will be the total number of tonnes of crushed sub-base material supplied and placed in accordance with this specification, accepted and measured by the Contract Administrator.

**Items of Work:****Crushed Sub-Base Material**

- i.) 50 mm\*
- ii.) 100mm\*
- iii.) 150 mm\*

\*Limestone, Granular or Crushed Concrete Material may be specified.

- .2 The weight to be paid for will be the total number of tonnes of crushed sub-base material as measured on a certified weigh scale.
- .3 Only material placed within the limits of excavation will be included in the payment for the “Items of Work” listed for crushed sub-base material.
- .4 No measurement or payment will be made for materials rejected by the Contract Administrator.

**4.6 Base Course Material**

- .1 The supplying, placing and compaction of base course material will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for the “Supplying and Placing Base Course Material\*”. The volume to be paid for will be the total number of cubic metres of base course material supplied and placed in accordance with this specification, accepted and measured by the Contract Administrator.

\* Limestone, Granular or Crushed Concrete Material may be specified.



- .2 The placing and compaction of asphalt cuttings will be measured on a volume basis and paid for at the Contract Unit price per cubic metre for "Asphalt Cuttings Base Course Material". The volume to be paid for will be the total number of cubic metres of asphalt cuttings placed in accordance with this specification, accepted and measured by the Contract Administrator.
- .3 The volume of base course material will be measured by cross-sections and computed by the method of Average End Areas.
- .4 Only material placed within the limits of excavation will be included in payment for "Supplying and Placing Base Course Material" or "Asphalt Cuttings Base Course Material".
- .5 No measurement or payment will be made for materials rejected by the Contract Administrator.

#### **4.7 Leveling Course**

- .1 No payment will be made for leveling course.

#### **4.8 Grading of Boulevards**

- .1 The grading of boulevards will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Grading of Boulevards". The area to be paid for will be the total number of square metres of boulevards graded in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Additional excavation over 150 millimetres in depth required to complete boulevard grading will be paid for as "Boulevard Excavation".
- .3 Additional placement of backfill material over 150 millimetres in depth required to complete boulevard grading will be paid as "Imported Fill Material".

#### **4.9 Ditch Grading**

- .1 Ditch grading will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Ditch Grading". The area to be paid for will be the total number of square metres of ditch graded in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Additional excavation over 300 millimetres in depth required to complete the ditch grading will be paid for as "Ditch Excavation".
- .3 Additional placement of backfill material over 300 millimetres in depth required to complete the ditch grading will be paid as "Imported Fill Material".

#### **4.10 Boulevard Excavation**

- .1 Boulevard excavation will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Boulevard Excavation". The volume to be paid for will be the total number of cubic metres of boulevard excavated in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 The volume of excavation will be as measured by cross-sections in its original position and computed by the method of Average End Areas.

#### **4.11 Ditch Excavation**



- .1 Ditch excavation will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Ditch Excavation". The volume to be paid for will be the total number of cubic metres of ditches excavated in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 The volume of excavation will be as measured by cross-sections in its original position and computed by the method of Average End Areas.

#### **4.12 Removal of Existing Concrete Bases**

- .1 Removal of existing concrete bases will be measured on a unit basis and paid for at the Contract Unit Price per unit for the "Items of Work" listed here below. The number of units to be paid for will be the total number of existing concrete bases removed in accordance with this specification, accepted and measured by the Contract Administrator.

##### **Items of Work:**

##### **Removal of Existing Concrete Bases**

- i.) 600 mm Diameter or Less
  - ii.) Greater than 600 mm Diameter
- .2 No measurement or payment will be made for concrete bases removed for parking metres and precast concrete bases for traffic signs.

#### **4.13 Imported Fill Material**

- .1 Imported material fill will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Imported Fill Material". The volume to be paid for will be the total number of cubic metres of imported fill material supplied and placed in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 The volume of imported fill material will be computed from cross-sections by the method of Average End Areas.

#### **4.14 Lime or Portland Cement**

- .1 Lime for drying the sub-grade will be measured on a weight basis and paid for at the Contract Unit Price per tonne for "Supplying and Placing Lime". The weight to be paid for will be the total number of tonnes of Lime supplied and placed in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Portland Cement for drying the sub-grade will be measured on a weight basis and paid for at the Contract Unit Price per tonne for "Supplying and Placing Portland Cement". The weight to be paid for will be the total number of tonnes of Portland Cement supplied and placed in accordance with this specification, accepted and measured by the Contract Administrator.
- .3 The weight to be paid for will be the total number of tonnes of Lime or Portland Cement as measured on a certified weigh scale.



**CW 3130 – SUPPLY AND INSTALLATION OF GEOTEXTILE FABRICS****TABLE OF CONTENTS**

1.	DESCRIPTION.....	1
	1.1 General .....	1
	1.2 Definitions .....	1
	1.3 Referenced Standard Construction Specifications .....	1
2.	MATERIALS.....	1
	2.1 Approved Products .....	1
	2.2 Material Identification .....	1
	2.3 Storage and Handling .....	1
	2.4 Mill Certificate and Marv Data.....	1
	2.5 Separation Geotextile Fabric .....	2
	2.6 Separation/Reinforcement Geotextile Fabric.....	2
3.	CONSTRUCTION METHODS .....	3
	3.1 General .....	3
	3.2 Separation or Separation/Reinforcement Geotextile Fabric .....	3
4.	MEASUREMENT AND PAYMENT .....	4
	4.1 Separation Geotextile Fabric .....	4
	4.2 Separation/Reinforcement Geotextile Fabric.....	4



**CW 3130 – SUPPLY AND INSTALLATION OF GEOTEXTILE FABRICS****1. DESCRIPTION****1.1 General**

- .1 This specification covers the supply and installation of Separation (non – woven) and Separation/Reinforcement (woven) Geotextile Fabrics relating to Surface Works construction.

**1.2 Definitions**

- .1 Separation Geotextile Fabric – a non-woven geotextile fabric used to separate the sub-base from the sub-grade in a pavement structure.
- .2 Separation/Reinforcement Geotextile Fabric – a woven geotextile fabric used to separate the sub-base from the sub-grade and provide limited reinforcement in a pavement structure.

**1.3 Referenced Standard Construction Specifications**

- .1 CW 3110 – Sub-Grade, Sub-Base and Base Course Construction.
- .2 CW 3135 – Supply and Installation of Geogrid.
- .3 Approved Products for Surface Works.

**2. MATERIALS****2.1 Approved Products**

- .1 Use only those materials listed as Approved Products for Surface Works. The Approved Products are available in Adobe Acrobat (.pdf) format at the City of Winnipeg, Corporate Finance, Material Management Internet site at: <http://www.winnipeg.ca/matmgt/info.stm>

**2.2 Material Identification**

- .1 Geotextile fabric is to be labelled in accordance with ASTM D4873, and must clearly show the manufacturer's product style number and unique roll number.

**2.3 Storage and Handling**

- .1 Protect geotextile fabric at all times from contamination of dirt, dust any other deleterious materials.
- .2 Protective coating is to remain on the geotextile fabric until installation.
- .3 Store and handle in accordance with manufacturer's and/or supplier's recommendations.
- .4 Protect geotextile fabric from exposure to ultraviolet light during storage.

**2.4 Mill Certificate and Marv Data**

- .1 Provide Mill Certificate and the MARV (Minimum Average Roll Value) Data upon request by the Contract Administrator.



**2.5 Separation Geotextile Fabric**

- .1 Separation Fabric will be non-woven and meet or exceed the following requirements:

**TABLE CW 3130.1 – Separation Fabric Requirements**

Physical Property	Standard	Test Method
Grab Tensile Strength	900 N – minimum	ASTM D4632
CBR Puncture	2200 N - minimum	ASTM D 6241
Trapezoid Tear	350 N - minimum	ASTM D4533
Apparent Opening Size	0.18mm – maximum	ASTM D4751
Permittivity	1.4 sec <sup>-1</sup> – minimum	ASTM D4491
Flow Rate	4000 l/min/m <sup>2</sup> – minimum	ASTM D4491
U.V. Resistance	70% per 500 hrs - minimum	ASTM D4355

- .2 When CBR Puncture and Trapezoid Tear material property values are not available from the manufacturer, the following material property values for Puncture Strength\* and Mullen Burst\*\* must be met as alternatives to CBR Puncture and Trapezoid Tear in Table CW 3130.1.

*Puncture Strength	575 N – minimum	ASTM D4833
**Mullen Burst	2000 kPa – minimum	ASTM D3786

- .3 All physical property requirements are MARV (Minimum Average Roll Values) determined in accordance with ASTM 4759.

**2.6 Separation/Reinforcement Geotextile Fabric**

- .1 Separation/reinforcement geotextile fabric will be woven fabric and meet or exceed the following requirements:

**TABLE CW 3130.2 – Separation/Reinforcement Geotextile Fabric Requirements**

Physical Property	Requirements	Test Method
Grab Tensile Strength	1400 N – minimum	ASTM D4632
CBR Puncture	4000 N - minimum	ASTM D 6241
Trapezoid Tear	500 N – minimum	ASTM D4533
Apparent Opening Size	0.43 mm – maximum	ASTM D4751
Permittivity	0.05 sec <sup>-1</sup> – minimum	ASTM D4491
U.V. Resistance	70% per 500 hrs - minimum	ASTM D4355

- .2 When CBR Puncture material property values are not available from the manufacturer, the following material property values for Puncture Strength\* and Mullen Burst\*\* must be met as alternatives to CBR Puncture in Table CW 3130.2.

*Puncture Strength	530 N – minimum	ASTM D4833
**Mullen Burst	3500 KPa - minimum	ASTM D 3786

- .3 All physical property requirements are MARV (Minimum Average Roll Values) determined in accordance with ASTM 4759.



### 3. CONSTRUCTION METHODS

#### 3.1 General

- .1 Where the sub-grade is unstable as determined by the Contract Administrator, place separation (non-woven) geotextile fabric and geogrid over the sub-grade in accordance with CW 3135.
- .2 Where the sub-grade is stable as determined by the Contractor Administrator, place separation (non-woven) geotextile fabric without geogrid over the sub-grade.
- .3 Separation/Reinforcement (Woven) Geotextile Fabric may be used as directed by the Contract Administrator in place of Separation Geotextile Fabric over stable sub-grade.

#### 3.2 Separation or Separation/Reinforcement Geotextile Fabric

- .1 Commence installation of geotextile fabric after material has been approved by the Contract Administrator and the preparation of the sub-grade has been completed in accordance with CW 3110.
- .2 Install geotextile fabric to the complete limits of the roadway sub-grade including intersections and turning lanes or as directed by the Contract Administrator.
- .3 Unroll geotextile fabric as smooth as possible on the prepared sub-grade in the direction of the construction traffic.
- .4 Install geotextile fabric in the longest continuous practical length, free from tension, stress, wrinkles and creases.
- .5 Cut or fold geotextile fabric to conform to curves.
- .6 Install geotextile fabric in accordance with this specification and procedures recommended by the manufacturer.
- .7 Overlap joints a minimum of 600 millimetres.
- .8 Install pins or place piles of sub-base material as required to hold geotextile fabric in place.
- .9 Place a minimum of 150mm of sub-base over the geotextile fabric before driving construction vehicles over the geotextile fabric.
- .10 Remove and replace geotextile fabric that is improperly installed or damaged as directed by the Contract Administrator.



**4. MEASUREMENT AND PAYMENT****4.1 Separation Geotextile Fabric**

- .1 Supply and installation of separation geotextile fabric will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Separation Geotextile Fabric". The area to be paid for will be the total number of square metres of separation geotextile fabric, supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Only material placed within the designated sub-grade limits will be included in the payment for "Separation Geotextile Fabric".
- .3 No measurement or payment will be made for geotextile fabric removed and replaced due to improper installation or damaged materials.
- .4 No measurement or payment will be made for 600mm overlap described in this Specification.

**4.2 Separation/Reinforcement Geotextile Fabric**

- .1 Supply and installation of separation/reinforcement geotextile fabric will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Separation/Reinforcement Geotextile Fabric". The area to be paid for will be the total number of square metres of separation/reinforcement geotextile fabric, supplied and installed in accordance with specification, accepted and measured by the Contract Administrator.
- .2 Only material placed within the designated sub-grade limits will be included in the payment for "Separation/Reinforcement Geotextile Fabric".
- .3 No measurement or payment will be made for geotextile fabric removed and replaced due to improper installation or damaged materials.
- .4 No measurement or payment will be made for the 600 mm overlap described in this Specification.



**CW 3170 – EARTHWORK AND GRADING****TABLE OF CONTENTS**

1.	GENERAL CONDITIONS.....	1
3.	DESCRIPTION.....	1
5.	MATERIALS.....	1
	5.1 General .....	1
	5.2 Handling and Storage of Materials.....	1
	5.3 Testing and Approval .....	1
	5.4 Fill Material.....	1
	5.5 Sub-base Material.....	2
8.	EQUIPMENT .....	2
9.	CONSTRUCTION METHODS .....	2
	9.1 Clearing and Grubbing.....	2
	9.2 Excavation .....	2
	9.3 Removal of Existing Pavement.....	3
	9.4 Disposal of Material .....	3
	9.5 Preparation of Existing Ground Surface .....	3
	9.6 Embankment.....	4
	9.7 Compaction.....	4
	9.8 Finishing and Maintaining .....	4
	9.9 Boulevard Grading .....	4
10.	QUALITY CONTROL .....	4
	10.1 Inspection .....	4
	10.2 Access .....	5
	10.3 Materials .....	5
	10.4 Quality of Sub-grade and Embankment Materials .....	5
	10.5 Corrective Action .....	5
12.	METHOD OF MEASUREMENT.....	5
	12.1 Excavation .....	5
	12.2 Fill Material .....	6
	12.3 Preparation of Existing Ground Surface .....	6
13.	BASIS OF PAYMENT .....	6
	13.1 Topsoil Excavation.....	6
	13.2 Common Excavation.....	6
	13.3 Fill Material .....	7
	13.4 Preparation of Existing Ground Surface .....	7



**CW 3170 - EARTHWORK AND GRADING****1. GENERAL CONDITIONS**

The General Conditions and Standard Provisions attached hereto shall apply to and be a part of this Specification.

**3. DESCRIPTION**

This Specification shall cover all phases of removal and/or placement of all materials necessary for the construction and preparation of embankments, slopes, drainage works, and approaches.

The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

**5. MATERIALS****5.1 General**

The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

**5.2 Handling and Storage of Materials**

All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

**5.3 Testing and Approval**

All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Testing Laboratory designated by the Contract Administrator. There shall be no charge to the City for any materials taken by the Contract Administrator for testing purposes.

The Contract Administrator shall approve all materials at least ten (10) days before any construction is undertaken. If, in the opinion of the Contract Administrator, such materials, in whole or in part, do not conform to the Specification detailed herein or are found to be defective in manufacture or have become damaged in transit, storage or handling operations, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

**5.4 Fill Material**

Fill material for embankment construction shall be obtained from site excavation, from borrow sites as specified in the Specifications for the Work or shall be imported material, of a type approved by the Contract Administrator.

Approved clay fill material shall consist of low to medium plastic clays or of mixtures of sand and clay, uniform in texture and suitable for compaction.



**5.5     Sub-base Material**

Sub-base material shall conform to Section 5.4 of Specification CW 3110.

**8.       EQUIPMENT**

All equipment shall be of a size and type as required to complete the work in reasonable time as approved by the Contract Administrator, and shall be kept in good working order.

**9.       CONSTRUCTION METHODS****9.1     Clearing and Grubbing**

No earthwork and grading shall commence until clearing and grubbing operations have been completed in accordance with Specification CW 3010 and the Drawings, and have been approved by the Contract Administrator.

**9.2     Excavation**

Excavation shall consist of topsoil excavation, common excavation and borrow excavation, which shall be understood to mean the following:

**a)   Topsoil Excavation**

The excavation of surface soil, organic growth, or other material designated by the Contract Administrator as overburden, the stockpiling of topsoil for re-use on site, and the satisfactory disposal of unsuitable material such as brush, grass, weeds and all other organic growth and any surface topsoil, unless otherwise specified herein or in the Specifications for the Work.

**b)   Common Excavation**

The excavation of all material encountered within the limits of grading following topsoil excavation, the on-site placement or the stockpiling of suitable site material, and the satisfactory disposal of unsuitable site material such as frost heaving clays, silts, rock, rubble, rubbish and any surplus suitable site material, unless otherwise specified herein or in the Specifications for the Work.

**c)   Borrow Excavation**

The excavation and placing of excavated material, obtained from designated borrow locations. The widening of roadway cuts and ditches will not be considered as borrow.

The excavation procedure shall be subject to the approval of the Contract Administrator. Excavation shall continue in as nearly a continuous manner as possible. Excavation at multiple locations at the same time shall be subject to the approval of the Contract Administrator.

The Contractor shall conduct his excavation procedure in such a manner as to enable the Contract Administrator to inspect the separation of materials and determine which materials are to be disposed of and which materials are to be used.

The Contractor shall excavate as required to reach sub-grade levels of pavement and landscaping, and rough grade levels for areas to be graded only.

During the course of common excavation, the Contractor will be advised by the Contract



Administrator as to which areas have an unsuitable sub-grade. In the areas of unsuitable sub-grade, whether in a homogeneous mass or in isolated pockets, the excavation shall be extended either to the lower limit of the unsuitable material or to a depth of one metre below the elevation of the bottom of base course for a Portland cement concrete pavement, or to a depth of 600 mm below the elevation of the bottom of sub-base for an asphaltic concrete pavement, whichever is lesser, unless otherwise specified on the Drawings or in the Specifications for the Work. Additional excavation of unsuitable material may be required as specified by the Contract Administrator.

In areas of excavation of unsuitable material, the side of the excavation may be sloped into the excavation provided that the sides remain at least 150 mm outside of the limits of the proposed pavement at the bottom of the excavation. The longitudinal slope shall not be steeper than 1:1.

Excavation of solid bedrock, glacial till, boulders, loose rock, concrete rubble and foundations which are located within the limits of excavation and which require the use of additional or unconventional excavation equipment shall be measured and paid for in addition to the unit prices for excavation.

### **9.3 Removal of Existing Pavement**

Removal of existing pavement shall conform to the requirements of Specification CW 3110.

### **9.4 Disposal of Material**

Disposal of material shall be understood to mean the removal of a material from the site, hauling of the material along a route approved by the Contract Administrator, and the unloading and grading of the material in a manner satisfactory to the Contract Administrator at a legal disposal site.

If a disposal site is not otherwise indicated in the Specifications for the Work, the Contractor shall locate a legal disposal site and identify a haul route to be approved by the Contract Administrator.

Any material dropped or spilled on any streets during the hauling operation shall be promptly cleaned up by and at the expense of the Contractor, to the satisfaction of the Contract Administrator.

### **9.5 Preparation of Existing Ground Surface**

Before any embankment is placed on original ground having a smooth firm surface, the existing ground shall be scarified or ploughed so as to permit bonding with the new material.

Where the existing ground surface is sloped sufficiently to affect the bond between the old and new materials the original ground on which the embankment is to be placed shall be ploughed deeply or stepped before embankment construction is commenced, as directed by the Contract Administrator.

When embankment is being placed on an existing roadbed, the side slopes of the existing roadbed shall have vegetation removed and then be scarified or ploughed, as directed by the Contract Administrator, to ensure adequate bonding between the new embankment and the existing material.

Following the excavation and disposal of unsuitable material and the preparation of the side slopes, as described above, the surface of the existing roadbed shall be scarified to a depth of 150 mm, and compacted to the proper density, at the optimum moisture content.

Where existing roadbeds are being widened and existing embankments extended, the existing slopes shall be denuded of all vegetation and either stepped or ploughed so as to form a medium of contact with the new embankment. Vertical cuts for the full depths of embankment shall not be permitted.



**9.6     Embankment**

Embankment construction shall be understood to mean the placing of suitable earth fill to obtain the required lines, grades and cross-sections shown on the drawings.

Materials shall be deposited and spread in uniform layers of specified thickness, for the full width of the embankment. Each layer shall be shaped to line and cross-section and thoroughly compacted before the succeeding layer is placed.

Where embankment is being placed on side fill or sloping sections, the lower portion shall be constructed as above, until a full width surface of the specified cross-section is obtained. The embankment shall be completed thereafter with full width layers.

Flood protection embankment fill materials shall be clay fill material as specified in Clause 5.4.

**9.7     Compaction**

All material placed in embankments shall be spread and bladed smooth in successive layers not exceeding 150 mm in compacted thickness to the full width of the cross-section, unless otherwise directed by the Contract Administrator.

Each layer, including the existing sub-grade, shall be compacted to a minimum of ninety-five (95%) percent of Standard Proctor Density. The material shall be compacted at the optimum moisture content, or up to two (2%) percent higher than optimum, as directed by the Contract Administrator.

Where the grade line is in cut, the sub-grade shall be excavated to a minimum depth of 500 mm below the sub-grade line, or as directed by the Contract Administrator. The sub-grade shall then be reconstructed in layers as specified and compacted to ninety-five (95%) percent of Standard Proctor Density.

Where the moisture content of the embankment material is too high, the material shall be thoroughly worked until the optimum moisture content is achieved.

Where the moisture content of the embankment material is too low, the material shall be thoroughly disced and broken down, water added as required and the material thoroughly worked to mix the water throughout the material, prior to commencing compaction operations.

**9.8     Finishing and Maintaining**

The Contractor shall, as soon as practicable, bring the excavations and embankments to the correct widths, lines and grades as shown on the Drawings.

All surfaces shall be maintained to the specified grade and cross-section and to the specified density until the project or that portion of the project is accepted.

**9.9     Boulevard Grading**

Boulevard grading shall be done and paid for in accordance with Specification CW 3110.

**10.     QUALITY CONTROL****10.1     Inspection**

All workmanship and all materials furnished and supplied under this Specification are subject to close



and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Contract Administrator reserves the right to reject any materials or works that are not in accordance with the requirements of this Specification.

## **10.2 Access**

The Contract Administrator shall be afforded full access for the inspection and control testing of materials, both at the site of work and at any plant or borrow pit used for the supply of the materials, to determine whether the material is being supplied in accordance with this Specification.

## **10.3 Materials**

All materials supplied under this Specification shall be subject to testing and approval by the Contract Administrator in accordance with Section 5.3 of this Specification.

## **10.4 Quality of Sub-grade and Embankment Materials**

The Standard Proctor Density for the sub-grade and embankment materials shall be determined at the optimum moisture content in accordance with ASTM Standard D698. The field density of each layer shall be a percentage of the Standard Proctor Density, as specified in Section 9.7 of this Specification.

Quality control tests will be used to determine the acceptability of each layer, as placed and compacted by the Contractor, before the succeeding layer may be applied.

The field density of the compacted layers shall be verified by Field Density Tests in accordance with ASTM Standard D1556, Test for Density of Soil in Place by the Sand-Cone Method, or ASTM Standard D2922, Test of Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

The frequency and number of tests to be made shall be as determined by the Contract Administrator.

Holes made by the removal of samples from the layers shall be promptly filled by the Contractor with appropriate material and thoroughly compacted so as to conform in every way with the adjoining compacted material.

## **10.5 Corrective Action**

The Contractor shall, at his own expense, correct such work or replace such materials found to be defective under this Specification in an approved manner to the satisfaction of the Contract Administrator.

## **12. METHOD OF MEASUREMENT**

### **12.1 Excavation**

Excavation will be measured on a volume basis. The volume to be paid for shall be the total number of cubic metres that are excavated in accordance with this Specification acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator. No payment will be made for material removed outside of the limits of excavation.

The volume of the various types of excavation shall be as measured in its original position, and as determined by the method of Average End Areas.



**12.2 Fill Material****a) Suitable Site Material**

Suitable site material will be measured on a volume basis. The volume to be paid for shall be the total number of cubic metres compacted in place in accordance with this Specification acceptable to the Contract Administrator, as computed from cross-sections taken by the Contract Administrator using the method of Average End Areas. No payment will be made for material placed outside of the limits of placement as directed by the Contract Administrator.

**b) Clay Borrow Material**

Clay borrow material will be measured on a volume basis. The volume to be paid for shall be the total number of cubic metres compacted in place in accordance with this Specification acceptable to the Contract Administrator, as computed from cross-sections taken by the Contract Administrator using the method of Average End Areas. No payment will be made for material placed outside of the limits of placement as directed by the Contract Administrator.

**c) Imported Material**

Imported material will be measured on a volume basis. The volume to be paid for shall be the total number of cubic metres compacted in place in accordance with this Specification acceptable to the Contract Administrator, as computed from cross-sections taken by the Contract Administrator using the method of Average End Areas. No payment will be made for material placed outside of the limits of placement as directed by the Contract Administrator.

**12.3 Preparation of Existing Ground Surface**

Preparation of the existing ground surface will be measured on an area basis. The area to be paid for shall be the total number of square metres that are prepared in accordance with this Specification acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

**13. BASIS OF PAYMENT****13.1 Topsoil Excavation**

Topsoil excavation will be paid for at the Contract Unit Price per cubic metre for "Topsoil Excavation", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the work included in this Specification.

**13.2 Common Excavation**

Common excavation will be paid for at the Contract Unit Price per cubic metre for the "Items of Work" listed here below, measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the work included in this Specification.

**Items of Work:**

- i. Common Excavation – Suitable Site Material
- ii. Common Excavation – Unsuitable Site Material



**13.3 Fill Material****a) Suitable Site Material**

The loading, hauling, placing and compaction of suitable site sub-base material will be paid for at the Contract Unit Price per cubic metre for "Placing Suitable Site Material", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the work included in this Specification.

**b) Clay Borrow Material**

The supplying, placing and compaction of clay borrow sub-base material will be paid for at the Contract Unit Price per cubic metre for "Supplying and Placing Clay Borrow Material", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the work included in this Specification.

**c) Imported Material**

The supplying, placing and compaction of imported material will be paid for at the Contract Unit Price per cubic metre for "Supplying and Placing Imported Material", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the work included in this Specification.

**13.4 Preparation of Existing Ground Surface**

Preparation of the existing ground surface will be paid for at the Contract Unit Price per square metre for "Preparation of Existing Ground Surface", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the work included in this Specification.



**CW 3410 – ASPHALTIC CONCRETE PAVEMENT WORKS****TABLE OF CONTENTS**

1.	GENERAL CONDITIONS	1
3.	DESCRIPTION	1
5.	MATERIALS	1
	5.1 General	1
	5.2 Handling and Storage of Materials	1
	5.3 Testing and Approval	1
	5.4 Asphaltic Concrete Constituent Materials	1
	5.4.1 Aggregates.....	1
	5.4.2 Asphalt Cement .....	2
	5.4.3 Mineral Filler .....	3
	5.5 Incidental Materials	6
	5.5.1 Prime Coat.....	6
	5.5.2 Tack Coat .....	6
	5.5.3 Miscellaneous Materials.....	6
	5.5.4 Reclaimed Asphalt Pavement.....	6
	5.5.5 Recycled Asphalt Shingles .....	6
6.	DESIGN REQUIREMENTS FOR ASPHALTIC CONCRETE PAVING MIX	6
	6.1 Mix Design Statement	6
	6.2 Aggregate Gradation Requirements	7
	6.3 Allowable Deviation from Job Mix Formula	7
	6.3.1 Aggregate Gradation.....	7
	6.3.2 Asphalt Cement Content.....	7
	6.4 Physical Requirements	7
	6.5 Method of Testing	7
	6.6 Reclaimed Asphalt Pavement Content	8
	6.7 Recycled Asphalt Shingles	8
7.	SUPPLY OF ASPHALTIC CONCRETE PAVING MIX	8
	7.1 Mixing Plant	8
	7.2 Batch Mix and Continuous Mix Plant Operations	9
	7.2.1 Aggregate Storage.....	9
	7.2.2 Preparation of Asphalt Cement.....	9
	7.2.3 Preparation of Mineral Aggregate.....	9
	7.2.4 Preparation of Asphaltic Concrete Paving Mix .....	9
	7.2.5 Mixing Plant Inspection .....	9
	7.3 Drum Mix Plant Operations	9
	7.4 Transportation of Asphaltic Concrete Paving Mix	11
8.	EQUIPMENT	11
9.	CONSTRUCTION METHODS	11
	9.1 Base Preparation	11
	9.1.1 Preparation of Base for Asphaltic Concrete Pavement .....	11
	9.1.2 Preparation of Existing Pavement for Asphaltic Concrete Overlay.....	11
	9.2 Placing Asphaltic Concrete Paving Mixture	12
	9.3 Main Line Paving, Tie-Ins and Approaches	13
	9.3.1 Main Line Paving .....	13
	9.3.2 Tie-Ins and Approaches .....	13
	9.4 Asphalt Patching	13
	9.5 Joints	14
	9.5.1 Location of Joints .....	14
	9.5.2 Preparation of Joints .....	15
	9.5.3 Construction of Joints .....	15
	9.6 Compaction of Asphaltic Concrete Paving Mixture	15
	9.6.1 Static Rolling .....	16



9.6.2	Vibratory Rolling.....	16
9.6.3	Compaction of Areas Inaccessible to Rollers .....	17
9.7	Requirements After Final Rolling	17
9.8	Opening to Traffic	17
10.	QUALITY CONTROL	17
10.1	Inspection	17
10.2	Access	17
10.3	Materials	17
10.4	Quality of Asphaltic Concrete Paving Mixture	17
10.5	Quality of Asphaltic Concrete Pavement	18
10.6	Quality Assurance	19
10.7	Corrective Action	19
12.	METHOD OF MEASUREMENT	19
12.1	Construction of Asphaltic Concrete Pavement	20
12.2	Construction of Asphaltic Concrete Overlay	20
12.3	Construction of Asphaltic Concrete Base Course	20
12.4	Construction of Asphalt Patches	20
13.	BASIS OF PAYMENT	20
13.1	Construction of Asphaltic Concrete Pavement	20
13.2	Construction of Asphaltic Concrete Overlay	20
13.3	Construction of Asphaltic Concrete Base Course	21
13.4	Construction of Asphalt Patches	21



**CW 3410 - ASPHALTIC CONCRETE PAVEMENT WORKS****1. GENERAL CONDITIONS**

The General Conditions and Standard Provisions attached hereto shall apply to and be a part of this Specification.

**3. DESCRIPTION**

This Specification shall cover the preparation of hot-mixed, hot-laid, asphaltic concrete paving mix for, and all placing operations relating to, the construction of asphaltic concrete base courses, pavements, overlays and other related pavement works.

The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

**5. MATERIALS****5.1 General**

The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

**5.2 Handling and Storage of Materials**

All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

**5.3 Testing and Approval**

All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Testing Laboratory designated by the Contract Administrator. There shall be no charge to the City for any materials taken by the Contract Administrator for testing purposes.

The Contract Administrator shall approve all materials before any construction is undertaken. If, in the opinion of the Contract Administrator, such materials, in whole or in part, do not conform to the Specification detailed herein or are found to be defective in manufacture or have become damaged in transit, storage or handling operations, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

**5.4 Asphaltic Concrete Constituent Materials****5.4.1 Aggregates**

The Contractor shall furnish in writing to the Contract Administrator the location of the sources where aggregate will be obtained in order that same may be inspected and tentatively approved by the Contract Administrator. Changes in the source of aggregate supply during the course of the Contract will not be permitted without notification in writing to and the express approval of the Contract Administrator.



**(a) Fine Aggregate**

Fine aggregate shall consist of sand having clean, hard, strong, durable, uncoated grains free from injurious amounts of dust, soft or flaking particles, shale, alkali, organic matter, loam or other deleterious substances.

**(b) Coarse Aggregate**

Coarse aggregate shall consist of natural gravel, crushed stone or other approved materials of similar characteristics having clean, hard, strong, durable, uncoated particles free from injurious amounts of soft, friable, thin, elongated or laminated pieces, alkali, organic or other deleterious matter.

Crushed stone shall consist of angular, cubical fragments of aggregate of uniform quality throughout. It shall be produced from rock formations or from boulders and stones and shall be from sources of approved nature and origin. Coarse aggregate will not be accepted from rock formations or from boulders and stones containing intrusions or stratifications of an undesirable nature or from source showing signs of disintegration from the elements or other causes.

Coarse aggregate shall conform to the following additional requirements:

- (i)** Soundness - Coarse aggregate when subjected to five cycles of the soundness test shall have a weighted loss of not more than twelve (12%) percent when sodium sulphate is used or not more than eighteen (18%) percent when magnesium sulphate is used, or have in the opinion of the Contract Administrator a satisfactory soundness record. The method of testing shall be in accordance with ASTM Standard C88, Test for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
- (ii)** Abrasion - Coarse aggregate when subjected to the abrasion test shall have a loss of **not more than thirty-five (35%) percent** by weight, of any hand picked portion of a sample containing a minimum of one and a half (1.5%) percent by weight of the original sample. The method of testing shall be in accordance with ASTM Standard C131, Test for Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine.
- (iii)** Crushed Aggregate - Aggregate retained on a No. 5 000 sieve shall contain not less than the percent of crushed aggregate as determined by actual particle count and as shown in Table 1 CW 3410.R5.1.

**5.4.2 Asphalt Cement**

The asphalt cement shall be prepared by the refining of petroleum, it shall be uniform in character and shall not foam when heated to 175°C.

150 - 200(A) Grade asphalt cement shall conform to the requirements specified in the following table:



Test Characteristics	A.S.T.M. TEST Methods	150-200 (A)															
Kinematic Viscosity, 135°C, mm <sup>2</sup> /s	D2171	The viscosity and penetration values must fall within the area bounded by A to B to C to D to A, plotted as straight lines on a full logarithmic plot (log-log) as shown on Fig. CW 3410.1-R5, with the co-ordinates of the points as follows:  <table><tr><td><u>Point</u></td><td><u>Abs. Visc.</u></td><td><u>Pen.</u></td></tr><tr><td>A</td><td>360</td><td>150</td></tr><tr><td>B</td><td>255</td><td>150</td></tr><tr><td>C</td><td>205</td><td>200</td></tr><tr><td>D</td><td>285</td><td>200</td></tr></table>	<u>Point</u>	<u>Abs. Visc.</u>	<u>Pen.</u>	A	360	150	B	255	150	C	205	200	D	285	200
<u>Point</u>	<u>Abs. Visc.</u>		<u>Pen.</u>														
A	360		150														
B	255		150														
C	205		200														
D	285	200															
Penetration, 25°C, 100 g, 5 s in dmm	D5																
Flash Point, Cleveland Open Cup, min. °C.	D92	205															
Solubility in Trichloroethylene, min. %	D2042	99.5															
Tests on Residue from Thin-Film Oven Test:	D1754																
Ratio of Absolute Viscosity of Residue from Thin-Film Oven Test to Original Absolute Viscosity, max.	D2171	4.0															
Ductility, 25°C, 5 cm/min., min., cm	D113	100															
15.56°C, 5 cm/min., min., cm		--															

#### 5.4.3 Mineral Filler

Mineral filler, when required, shall consist of finely divided mineral matter such as rock dust, slag dust, hydrated lime, hydraulic cement, fly ash, loess or other suitable mineral matter, and shall conform to the requirements of ASTM Standard D242, Standard Specification for Mineral Filler for Bituminous Paving Mixtures.



FIGURE CW 3410.1-R5

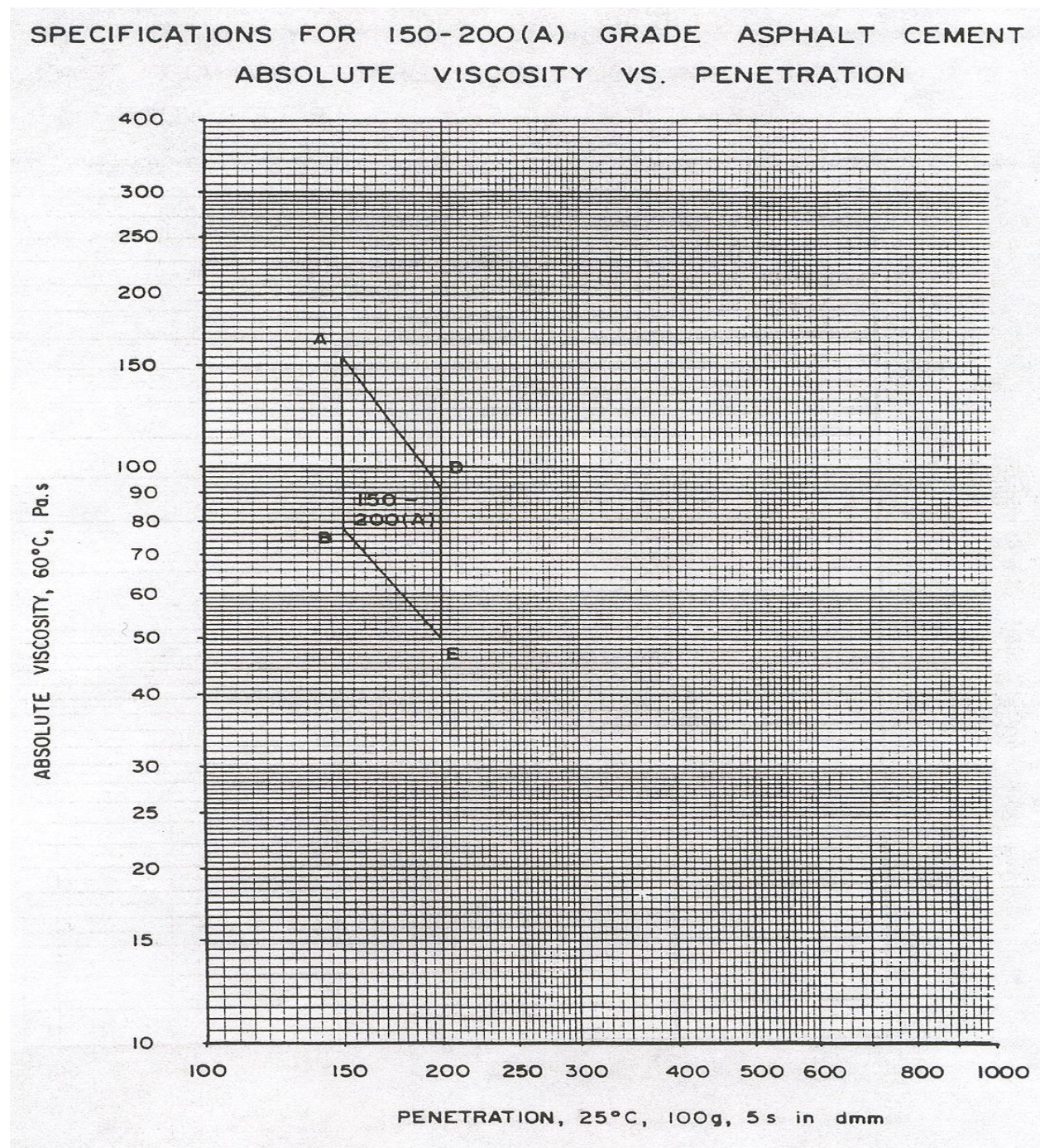
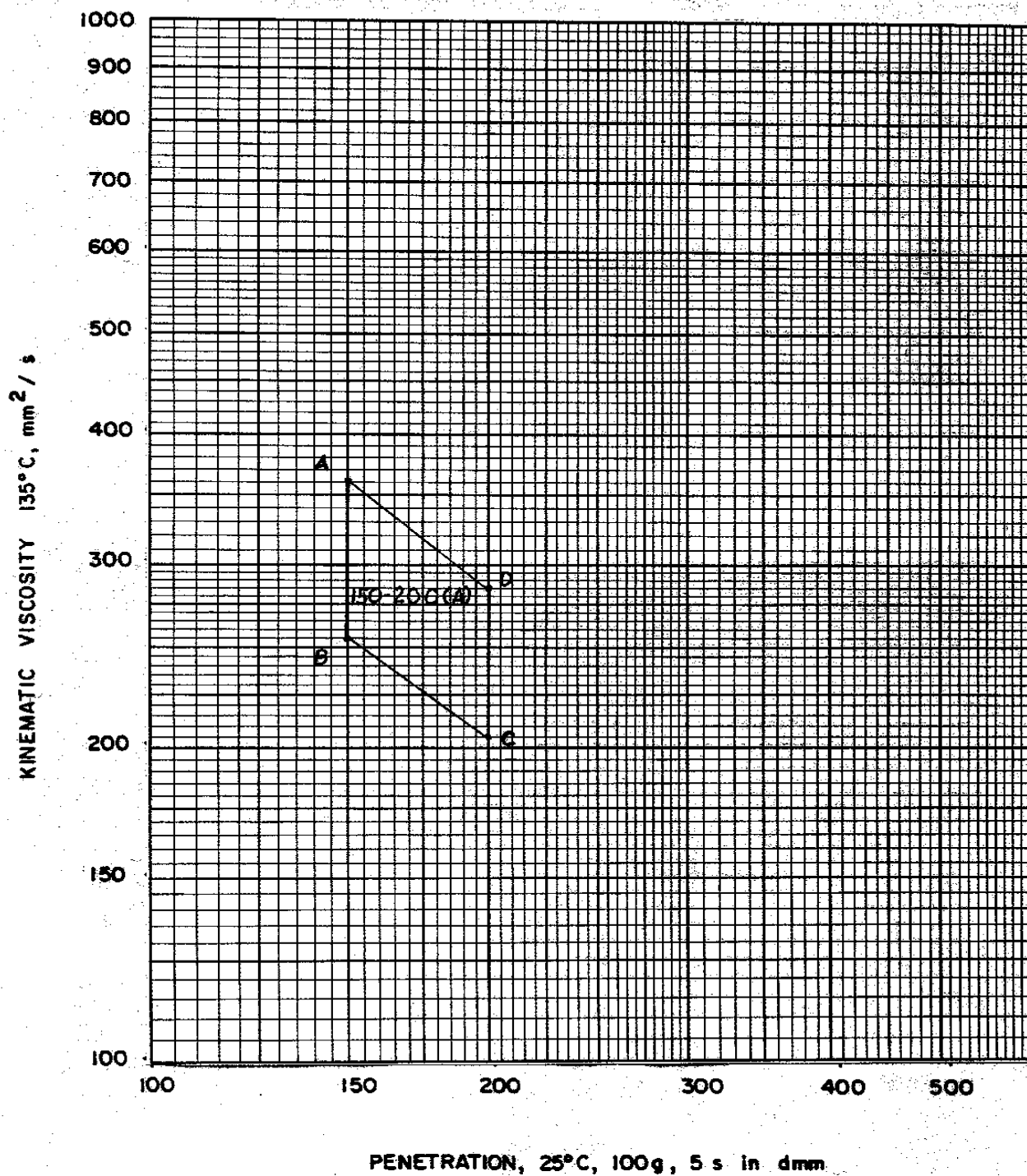




FIGURE CW 3410.2-R5

SPECIFICATIONS FOR 150-200(A) GRADE ASPHALT CEMENT  
KINEMATIC VISCOSITY VS. PENETRATION





**5.5 Incidental Materials****5.5.1 Prime Coat**

Prime coat shall consist of either an emulsified or cutback asphalt. Selection shall be based upon existing field conditions and shall be subject to the approval of the Contract Administrator. Method of application shall conform to manufacturer's recommendations.

**5.5.2 Tack Coat**

Tack coat shall consist of either an emulsified or cutback asphalt. Selection shall be based upon existing field conditions and shall be subject to the approval of the Contract Administrator. Method of application shall conform to manufacturer's recommendations.

**5.5.3 Miscellaneous Materials**

Miscellaneous materials shall be of the type specified on the Drawings or approved by the Contract Administrator.

**5.5.4 Reclaimed Asphalt Pavement**

Reclaimed asphalt pavement (RAP) shall be processed hot mix asphaltic concrete material recovered from planing or full depth removal.

The reclaimed asphalt pavement material shall consist of sound durable particles produced by crushing and screening.

**5.5.5 Recycled Asphalt Shingles**

Blending of recycled asphalt shingles (RAS) material shall be during production of the asphalt and the mix produced shall consist of a uniform blend of all materials.

**6. DESIGN REQUIREMENTS FOR ASPHALTIC CONCRETE PAVING MIX****6.1 Mix Design Statement**

For each type of asphaltic paving mix to be used, the Contractor shall provide the Contract Administrator with a Mix Design Statement certifying the constituent materials and mix proportions that will be used in the asphaltic concrete paving mix. The Contractor shall also supply reasonable evidence to the Contract Administrator that the mix proportions selected will produce asphaltic concrete conforming to the requirements specified in Sections 6.2, 6.3 and 6.4 of this Specification.

One (1) week prior to the start of paving the Contractor shall provide the Contract Administrator with the results of three (3) separate sets of Marshall Tests to show that the requirements of the mix design statement have been met. Where a correction of the mix design statement is necessary to reflect actual production, the Contractor will submit to the Contract Administrator a minimum of five (5) separate sets of Marshall test results for approval of the corrected mix design statement. This mix design statement, or revised mix design statement, as necessary, will be called the Job Mix Formula.

Should a change occur in the Job Mix Formula during the course of the work, the Contractor shall re-submit to the Contract Administrator a minimum of five (5) separate sets of Marshall test results to support approval of the revision.



Should a lengthy break occur in the paving operation, the Contract Administrator may request that the Contractor submit the results of three (3) recent, separate sets of Marshall test results as evidence that the Job Mix Formula is being achieved.

No changes in the Job Mix Formula will be permitted without following the above procedure.

## 6.2 Aggregate Gradation Requirements

For each type of paving mixture, the mineral constituents shall be combined in such proportions so as to fall within the Gradation Limits shown in Table 1 - CW 3410-R5.1, unless the Contractor can conclusively show to the Contract Administrator that he can meet the physical requirements specified in Section 6.4 only by deviating from these gradation limits.

## 6.3 Allowable Deviation from Job Mix Formula

### 6.3.1 Aggregate Gradation

The aggregate gradation of the asphaltic concrete supplied by the Contractor shall not deviate from that of the Job Mix Formula by more than the Allowable Deviations shown hereafter and shall fall within the gradation limits shown in Clause 2.04 Table 1 - CW 3410-R5.1.

MAXIMUM ALLOWABLE DEVIATION FROM JOB MIX FORMULA	
CANADIAN METRIC SIEVE SIZE	PERCENT OF TOTAL DRY WEIGHT PASSING EACH SIEVE
10 000	± 5%
5 000	± 5%
2 500	± 4%
1 250	± 4%
630	± 4%
315	± 4%
160	± 2%
80	± 2%

### 6.3.2 Asphalt Cement Content

The asphalt cement content of the asphaltic concrete supplied by the Contractor shall not deviate from that of the Job Mix Formula by more than  $\pm 0.4\%$ , provided that the asphalt cement content requirements are maintained in accordance with Table 2 - CW 3410-R5.2 of this Specification.

## 6.4 Physical Requirements

For each type of paving mixture, the asphaltic concrete paving mix shall conform to the physical requirements shown in Table 2 - CW 3410-R5.2.

## 6.5 Method of Testing



The aggregate gradation and physical properties of asphaltic concrete paving mix shall be determined in accordance with the requirements of Sections 10.4 and 10.5 of this Specification.

#### **6.6 Reclaimed Asphalt Pavement Content**

Reclaimed asphalt pavement (RAP) material may be incorporated to a maximum of 10% by mass of total mix into the Type 1A mix design for asphalt pavements and overlays.

Blending of the reclaimed asphalt pavement material shall be during production and the mix produced shall consist of a uniform blend of all materials.

A mix design statement in accordance with section 6.1 shall be submitted to the Contract Administrator for approval.

All physical requirements and combined aggregate gradation limits shall meet the requirements of Table 1 – CW 3410-R5.1 and Table 2 – CW 3410-R5.2.

#### **6.7 Recycled Asphalt Shingles**

RAS material shall consist of sound durable particles produced from recovered organic asphalt shingles, asphalt caps and asphalt rolled roofing. Fiberglass shingles are not allowed.

Recycled asphalt shingles (RAS) material shall be incorporated to a maximum 3% by weight of the total mix into Type 1A mix design asphalt.

RAS particles shall be a maximum size of 10mm and otherwise shall meet the grading limits in Table 3410-R5.1 and physical requirements in Table 3410-R5.2.

RAS shall be free of chemical contaminants. Deleterious substances shall be a maximum of 3% of RAS by weight. Deleterious substances include fiberglass shingles, metal, glass, rubber, nails, soil, brick, tars and asbestos.

A mix design statement in accordance with section 6.1 shall be submitted to the Contract Administrator for approval.

### **7. SUPPLY OF ASPHALTIC CONCRETE PAVING MIX**

#### **7.1 Mixing Plant**

The asphaltic concrete paving mix shall be supplied from an approved mixing plant. The mixing plant shall be a batch mix plant, a continuous mix plant or a drum mix plant, conforming to the requirements of ASTM Standard D995, Specifications for Requirements for Mix Plants for Hot-Mixed, Hot-Laid, Bituminous Paving Mixtures.



Table 1  
CW 3410-R5.1

COMBINED AGGREGATE GRADATION LIMITS				
Percent of Total Dry Weight Passing Each Sieve				
Canadian Metric Sieve Size	Type 1A (Surface Course) %	Type I (Surface Course) %	Type II (Surface Course) %	Type III (Base Course) %
40 000	99% to 100%  --  70% to 88%  55% to 70%  40% to 60%  25% to 50%  15% to 40%  5% to 28%  4% to 11%  3% to 7%  60% min. (2 fractured faces)	100%	100%  90% to 95%  74% to 80%  55% to 64%  35% to 46%  22% to 30%  --  8% to 11%  --  --	100%  90% to 100%  60% to 90%  56% to 80%  --  29% to 59%  20% to 50%  --  15% to 30%  5% to 17%  --  1% to 7%  60% min. (2 fractured faces)
25 000				
16 000				
12 500				
10 000				
5 000				
2 500				
1 250				
630				
315				
160				
80				
Crush Count: (Clause 5.4.1 (b) (iii))		50% min. (1 fractured face)		

Table 2  
CW 3410-R5.2

				PHYSICAL REQUIREMENTS
	Type 1A (Surface Course) %	Type I (Surface Course) %	Type II (Surface Course) %	Type III (Base Course) %
Asphalt Cement, % total sample weight	5.0% to 6.0%	5.0% to 6.0%	5.0% to 7.0%	4.0% to 5.5%
Voids in Mineral Aggregate, VMA	14.0% min.	14.5% min.	16.0% min.	12.0% min.
Air Voids	3.0% to 5.0%	2.5% to 5.0%	2.5% to 5.0%	2.5% to 5.0%
Marshall Stability, kN at 60°C	7 min.	5 min.	4 min.	5 min.
Flow Index, units of 250 µm	6.0 to 16.0	6.0 to 16.0	6.0 to 16.0	6.0 to 16.0



**7.2 Batch Mix and Continuous Mix Plant Operations****7.2.1 Aggregate Storage**

The different sizes of aggregate used shall be kept separate and adequate provision shall be made to keep them from becoming mixed or otherwise contaminated.

**7.2.2 Preparation of Asphalt Cement**

The asphalt cement shall be heated at the paving plant to a temperature of 135°C to 160°C before mixing with the aggregates. The temperature of the asphalt cement and aggregates immediately prior to mixing shall be approximately that of the completed batch. In no case shall the temperature of the asphalt and aggregates differ by more than 15°C when placed in the pug mill. The penetration of the asphalt cement shall be maintained within the limits of penetration specified.

**7.2.3 Preparation of Mineral Aggregate**

The coarse and fine aggregate shall be fed by feeders to the cold elevators in their proper proportions and at a rate to permit correct and uniform temperature control of the heating and drying operation. The aggregates shall be dried and delivered to the mixer at a temperature between 135°C and 160°C. The temperature between these limits shall be regulated according to the penetration grade of the asphalt, temperature of the atmosphere and workability of the mixture, but shall be as low as possible consistent with proper mixing and laying. Immediately after heating, the aggregates shall be screened into bins with separation on such coarse sieves as the number of bins permits. All aggregates in the bins that contain sufficient moisture to cause foaming in the mixture shall be removed and replaced in their respective stockpiles.

**7.2.4 Preparation of Asphaltic Concrete Paving Mix**

Each size of hot aggregate and the asphalt cement shall be measured separately and accurately to the proportions in which they are to be mixed. When the mixture is prepared in a twin pug mixer, the volume of mineral aggregate and asphalt cement shall not be so great as to extend above the tips of the mixer blades when these blades are in a vertical position. For batch mixing, the aggregates shall be mixed dry for a period of not less than 15 seconds, after which the asphalt cement shall be added and the mixing continued for a period of at least 30 seconds or longer if necessary to produce a uniform homogeneous mixture in which all particles of the mineral aggregate are thoroughly and uniformly coated. For continuous mixing, the total mixing time shall be not less than 45 seconds when calculated by the formula in Section 4.4 of ASTM Standard D995 or longer if necessary to produce a homogeneous mixture.

**7.2.5 Mixing Plant Inspection**

The Contract Administrator shall have access at any time to all parts of the mixing plant in order to ensure the manufacture of the mixture in strict accordance with this Specification.

**7.3 Drum Mix Plant Operations**

Drum mix plants, as approved by the Contract Administrator, shall conform to the requirements of Section 5.4 of Manitoba Highways and Transportation Specification Number 800 for Bituminous Pavement.



**7.4 Transportation of Asphaltic Concrete Paving Mix**

The mixture shall be transported from the mixing plant to the work in tight vehicles with metal bottoms previously cleaned of all foreign materials. The Contractor shall ensure that the vehicles are suitably insulated, as required. Each vehicle shall be equipped with a tarpaulin or other suitable covering material of sufficient size to overhang the truck box on three sides when the vehicle is fully loaded. Such tarpaulins shall be on the truck at all times and shall be used to cover the mixture completely as directed by the Contract Administrator. The inside surface of all vehicles used for hauling mixture may be lightly lubricated with thin fuel oil, paraffin oil, lime water or soap solution just before loading, but an excess of lubricant will not be permitted. No loads of mixture shall be dispatched from the plant after sunset or during hours of darkness unless loads can be placed and compacted in accordance with this Specification and suitable artificial illumination is provided, all of which shall be subject to approval of the Contract Administrator. In no case shall temperatures be increased above 165°C at the plant to offset long distance hauling.

**8. EQUIPMENT**

All equipment shall be of a type approved by the Contract Administrator. The equipment shall be in good working condition and shall be so maintained for the duration of the Contract.

**9. CONSTRUCTION METHODS****9.1 Base Preparation****9.1.1 Preparation of Base for Asphaltic Concrete Pavement**

The placing of the asphaltic concrete paving mixture shall not commence until the construction of the sub-grade, sub-base and base course has been completed in accordance with the requirements of Specification CW 3110, and the installation of pavement and boulevard structures and appurtenances has been completed to the satisfaction of the Contract Administrator.

**9.1.2 Preparation of Existing Pavement for Asphaltic Concrete Overlay****(a) Existing Asphaltic Concrete Surface**

A layer of the existing asphaltic concrete surface course shall be removed to such depth as is specified on the Drawings or as directed by the Contract Administrator. This work will be done and paid for in accordance with Specification CW 3450.

If the existing asphaltic concrete overlay is removed down to the existing Portland cement concrete pavement, the preparation of existing Portland cement concrete pavement for asphaltic concrete overlay shall be in accordance with Section 9.1.2 (b) of this Specification.

If the surface remaining after the removal of the specified layer of asphaltic concrete surface course is asphaltic concrete, the Contractor shall proceed to fill any remaining holes and depressions with asphaltic concrete paving mixture and compact said areas with a steel wheel roller. The asphaltic concrete surface upon which the asphaltic concrete overlay is to be placed shall be as true to grade and cross-section as possible, as approved by the Contract Administrator. At the locations designated on the Drawings and at any other locations designated by the Contract Administrator, the Contractor shall make adjustment to existing structures and appurtenances, reconstruct sections of curb, seal all cracks and do other repair works as required. The adjustment of existing structures and appurtenances shall be done and paid for in accordance with Specification CW 3210, and the curb renewal, crack sealing and other repair works shall be done and paid for in accordance with Specifications CW 3230, CW 3240, and CW 3250.



**(b) Existing Portland Cement Concrete Pavement**

At the locations designated on the Drawings and at any other locations designated by the Contract Administrator, the Contractor shall make adjustments to the existing structures and appurtenances, reconstruct sections of concrete pavement, reconstruct sections of curb, seal all joints and cracks and do other repair works as required. The adjustment of existing structures and appurtenances shall be done and paid for in accordance with Specification CW 3210, and the pavement reconstruction, curb renewal, joint and crack sealing and other repair works shall be done and paid for in accordance with Specifications CW 3230, CW 3240, and CW 3250.

**9.2 Placing Asphaltic Concrete Paving Mixture**

The Contract Administrator shall approve the surface upon which new asphaltic concrete paving mix is to be placed before the paving operations for that course may begin.

The first course shall be laid upon a surface which is dry, clean and free from standing water, and only when weather conditions are suitable. The cleaning operation shall be done with a mechanical street sweeper.

In the case of placing new asphaltic concrete pavement, the base course shall have been previously prepared with one uniform application of Prime Coat prior to the delivery of the asphaltic concrete paving mixture.

In the case of asphaltic concrete overlay, the existing pavement surface shall have been previously prepared with one uniform application of Tack Coat prior to the delivery of the asphaltic concrete paving mixture. The Tack Coat shall be applied in small quantities only sufficient to wet the pavement surface on which the overlay is to be placed.

The type and amount of Prime Coat/Tack Coat applied, and the method of application, shall be as recommended by the manufacturer and shall be subject to the approval of the Contract Administrator.

No paving course shall be started until any frost or moisture from previous inclement weather has evaporated to leave a dry surface. The surface course shall be laid only under such conditions that the Contract Administrator determines to be conducive to obtaining the specified results.

The mixture shall be delivered to the job and placed at a temperature optimum for proper compaction, taking into consideration the weather conditions, the temperature of the surface on which the mixture is to be placed, and the thickness of the lift. In no case shall the mixture be placed at a temperature of less than 125°C nor greater than 155°C.

Unless otherwise permitted by the Contract Administrator, the mixture shall be spread by means of a mechanical self-powered paver capable of spreading the mixture true to the line, grade and crown required.

Pavers shall be equipped with hoppers and distributing screws of the reversing type to place the mixture evenly in front of adjustable screeds. The mixture shall be dumped in the centre of the hoppers and care exercised to avoid overloading and slopping over of the mixture upon the base. When laying the mixture, pavers shall operate so as to provide as continuous an operation as possible at a speed of between three metres and six metres per minute as may be decided by the Contract Administrator. They shall be equipped with a quick and efficient steering device and shall have forward and reverse travelling speeds of not less than 30 metres per minute.

Pavers shall be capable of spreading the mixture, without segregation, in thicknesses of not less than 25 mm and not more than 75 mm. Placement widths shall vary from a minimum of 1.5 metres to a maximum of 4.5 metres unless approved by the Contract Administrator. They shall be equipped with blending or joint leveling devices for smoothing and adjusting all longitudinal joints between strips or courses of the same thickness. Pavers shall be equipped with screeds.



The term screed includes any strike-off device operated by cutting, crowding or other practical action which is effective on the mixtures at workable temperature without tearing, shoving or gouging the finished surface.

Where the thickness of the mixture exceeds 75 mm, the mixture shall be placed in two layers. The leveling course, shall be placed such that the final layer or surface course is of uniform thickness and of minimum thickness of 40 mm. Asphalt material shall be removed from curb inlet grates to ensure a minimum 100 mm vertical opening in the curb inlet grate.

### **9.3 Main Line Paving, Tie-Ins and Approaches**

#### **9.3.1 Main Line Paving**

Main line paving shall include the placement of leveling and surface courses for pavements and overlays utilizing mechanical pavers with automatic grade control for; all through and parallel turning lanes greater than 15.0 metres in length, intersections through which the main line continues, and other lanes greater than 15.0 metres in length. Main line paving also includes major and minor intersecting side streets through and turning lanes over 15.0 metres in length.

Main line paving with mechanical pavers shall utilize automatic grade control, except for; intersections through which the main line continues where side street traffic must be maintained, and the side of the paver adjacent to active traffic.

Asphalt materials placed by mechanical pavers shall be placed in accordance with Section 9.2 of this specification.

Hand placed asphalt materials shall be spread and compacted to match the finished grade to the satisfaction of the Contract Administrator. The Contractor shall ensure that the amount of material delivered to the site is placed within the placement temperatures.

#### **9.3.2 Tie-Ins and Approaches**

Tie-Ins and Approaches shall include the placement of leveling and surface courses for pavements and overlays for all areas other than main line paving lanes. This includes intersecting side streets to the main road under construction except as noted in Section 9.3.1 of this specification, intersection turnouts, right turn cut-offs, median openings, and private approaches. Tie-ins include miscellaneous asphalt for temporary ramping, sidewalk in-fill and isolations.

Tie-Ins and approaches shall utilize mechanical pavers where possible with or without automatic grade control, or hand methods as approved by the Contract Administrator.

Asphalt materials placed by mechanical pavers shall be placed in accordance with Clause 9.2 of this specification.

Hand placed asphalt materials shall be spread and compacted to match the finished grade to the satisfaction of the Contract Administrator. The Contractor shall ensure that the amount of material delivered to the site is placed within the placement temperatures.

### **9.4 Asphalt Patching**

Remove and replace existing asphalt pavements adjacent to proposed or renewed sidewalks and concrete approaches for grade adjustment to ensure drainage and rideability are maintained. Areas to be considered as asphalt patches shall be less than 1.5 metres in width. The locations requiring asphalt patching shall be shown on the Drawings or as directed by the Contract Administrator.

The Contractor shall saw cut the asphalt pavement full-depth along the limits designated. The asphalt pavement shall be removed and disposed of in accordance with CW 3110. Upon removal of asphalt,



the existing base materials shall be levelled and compacted. The Contractor shall place and compact base course material as required to a maximum thickness of 50 mm. The asphalt shall be Type 1A material and match the thickness of the existing pavement. The material shall be placed and compacted by hand methods in accordance with Clause 9.3 of this specification to the satisfaction of the Contract Administrator.

Any additional excavation or base work shall be paid for in accordance with CW 3110.

All costs incurred for asphalt removal, compaction of existing base materials and placement of base course and asphalt materials shall be included in the unit price for “Construction of Asphalt Patches”.

## 9.5 **Joints**

Joints shall be constructed in a careful and workmanlike manner by experienced and competent personnel. Joints shall be smooth, well bonded and tightly sealed. Joints shall conform smoothly and accurately to adjacent pavement surfaces such that when tested with a 3 metre straight edge placed across the joint the distance between the straight edge and the surface of the pavement shall not exceed 5 mm at any point.

Longitudinal joints shall be made true to line and parallel to the pavement edge wherever practicable.

On straight sections the joint line shall not deviate from a straight line by more than 75 mm at any point. On curved or tapered sections the joint shall be shaped so as to be as smooth as possible. Jagged, stepped or wandering edges shall be reshaped to a smooth line, to the satisfaction of the Contract Administrator, before the adjacent mat is laid.

### 9.5.1 **Location of Joints**

The location of joints shall be subject to the approval of the Contract Administrator and in addition shall conform to the following requirements:

#### **(a) Longitudinal Joints**

Longitudinal joints shall not be located within 150 mm of a longitudinal joint in any underlying pavement structure.

#### **(b) Transverse Joints**

Transverse joints shall not be located within 2 m of any other transverse joint in the same paving course or within 1 m of a transverse joint in any underlying pavement structure.

**Note:** Longitudinal cold joints are to be avoided wherever possible. To facilitate this:

- i. Transverse joints shall be established with sufficient frequency to allow the full width of the paving course to be placed in a single shift.
- ii. No paving lane shall progress more than 500 m beyond the end of an adjacent paving lane in the same course without the prior approval of the Contract Administrator.



### 9.5.2 Preparation of Joints

#### (a) Hot Joints

Hot joints shall be considered to be those longitudinal joints between successive mats in which the previously laid mat retains sufficient heat to facilitate good bonding and sealing of the joint. The edge of the previously laid mat shall be inspected prior to laying the new mat. Any areas not conforming to line and grade or having a rounded-off top corner shall be cut out to the full depth of the mat to a minimum width of 100 mm and replaced with fresh material and compacted when laying the new mat.

#### (b) Cold Joints

Cold joints shall be considered to be those longitudinal and transverse joints where the existing pavement mat is at or near ambient temperatures and shall include joints against pavement mats laid on previous days and joints against existing pavement structures. Transverse joints shall be cut back to a straight line for the full depth and width of the mat. The transverse joint shall be cut back to a location such that the pavement immediately before the joint, where checked with a 3 m straight edge, exhibits no tapering or rounding down.

Longitudinal edges of existing mats shall be inspected before laying the new mat. Any areas not conforming to line and grade shall be cut out full depth to a minimum width of 150 mm and replaced with fresh material and compacted when laying the new mat. Any areas with a rounded off top corner shall be cut back to the full depth of the mat to form a vertical face with a square top corner.

Joints against existing asphaltic concrete pavements shall be prepared by saw cutting, cold planing or other method(s) approved by the Contract Administrator, such that the face of the existing pavement is vertical with a square top corner.

All contact surfaces of cold joints shall be painted with a thin uniform coat of tack before the new asphaltic concrete is placed against them.

### 9.5.3 Construction of Joints

Fresh asphaltic concrete shall not be placed against the existing mat until the joint preparation has been completed in accordance with 9.5.2 and is approved by the Contract Administrator. Immediately after placing and before initial rolling the joint shall be checked and "set-up" by experienced and competent personnel so that an absolute minimum of back patching is required after rolling.

The fresh mat shall be laid to an elevation such that, when compacted, it will conform accurately to the grade of the existing pavement. Wherever practicable, this shall be done using mechanical pavers equipped with suitable automatic joints matching controls.

Joints shall always be rolled before the remainder of the mat. Wherever practicable the joint shall be rolled with the roller travelling parallel to the joint and with a minimum of seventy-five (75%) percent of the width of the main roller(s) supported on the existing mat. After the first pass of the roller the joint shall be checked and corrected if necessary before any additional rolling is done.

### 9.6 Compaction of Asphaltic Concrete Paving Mixture

Compaction of the mixture shall be obtained by the methods specified hereinafter.

A rolling pattern shall be established by the Contractor and approved by the Contract Administrator. The Contract Administrator must approve any deviation from the rolling pattern.



### 9.6.1 Static Rolling

A minimum of two approved rollers will be required on every contract. When the output of the mixing plant exceeds 70 tonnes per hour an extra roller will be required for each additional 35 tonnes of mix produced per hour.

The speed of the roller shall not exceed five kilometres per hour and shall at all times be slow enough to avoid displacement of the hot mixture. Any displacements occurring as a result of reversing the direction of the roller or from any other cause shall at once be corrected. Rolling shall proceed continuously until all roller marks are eliminated and no further compression is possible. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened by the use of water, limewater, or approved detergent. An excess of moisture will not be permitted.

Compaction of the paving mixture shall consist of three (3) separate rolling operations as follows:

#### (a) Breakdown Rolling

Breakdown rolling with a tandem steel wheel roller weighing between seven and nine tonnes shall commence as soon as possible after the mixture has been spread without causing undue checking and displacement of the mixture. Delays in rolling freshly spread mixture will not be tolerated. Rolling shall start longitudinally at the sides and proceed toward the centre of the pavement overlapping on successive trips by at least 150 mm. Breakdown rolling shall consist of at least two complete coverages by the roller.

#### (b) Intermediate Rolling

The intermediate rolling shall be performed with a self-propelled pneumatic-tired roller having a minimum wheel load of 1100 kilograms and minimum tire pressure of 450 kPa. Intermediate rolling shall begin while the mix is still of a temperature that will result in the maximum density from this operation.

#### (c) Final Rolling

The final rolling shall be performed with a tandem steel wheel roller weighing not less than nine (9) tonnes, and shall be undertaken while the paving mixture is still warm enough for the removal of roller marks. Where the width permits, the pavement shall be subjected to diagonal rolling in two directions, the second diagonal rolling crossing the lines of the first. Final rolling shall be carried on until there is no further evidence of consolidation.

### 9.6.2 Vibratory Rolling

Vibratory rollers shall be of a type designed for asphalt finish rolling. They shall provide for the adjustment of both amplitude and frequency of vibration, and shall be equipped with an automatic device that positively prevents the drum from vibrating unless the roller is moving.

The optimum combination of amplitude, vibration frequency and roller speed shall be determined by the Contractor and approved by the Contract Administrator except that the maximum rolling speed in m/min. shall not exceed the vibration frequency per minute divided by 40.

$$\text{Maximum rolling speed (m/min.)} = \frac{\text{vibration frequency (VPM)}}{40}$$

Where vibratory rollers are used, the rolling pattern shall in all cases include at least one complete coverage in the static mode as the final rolling pass.



**9.6.3 Compaction of Areas Inaccessible to Rollers**

Along curbs, manholes and similar structures and at all places not accessible to the roller, thorough compaction must be secured by means of hot tampers and at all contacts of this character the joints between these structures and the mixture must be effectively sealed.

**9.7 Requirements After Final Rolling**

After final rolling the surface of each course shall be smooth and true to the established crown and grade. Any low or defective spots shall immediately be remedied by cutting out the course, or planing to a depth of 40 mm, at such spots and replacing it with a fresh hot mixture that shall be immediately compacted to conform with the surrounding area and shall be thoroughly bonded to it. The surface of the finished pavement shall be free from depressions exceeding 5 mm as measured with a three (3) metre straight edge.

The measured in-place density of the completed course shall be an average of ninety-seven (97%) percent of the 75 Blow Marshall Density of the paving mixture, with no individual test being less than ninety-five (95%) percent.

**9.8 Opening to Traffic**

In no case shall traffic or construction equipment be allowed on the asphaltic concrete pavement until completion of quality control testing by the Contract Administrator and until the completed pavement has cooled to atmospheric temperature or to such other temperature, as may be approved by the Contract Administrator, that will ensure no deformation of the pavement surface under traffic loading.

The Contract Administrator's decision as to when the pavement will be opened to traffic shall be final.

**10. QUALITY CONTROL****10.1 Inspection**

All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Contract Administrator reserves the right to reject any materials or works that are not in accordance to the requirements of this Specification.

**10.2 Access**

The Contract Administrator shall be afforded full access for the inspection and control testing of asphaltic concrete paving mixture and constituent materials, both at the site of work and at any plant used for the production of asphaltic concrete paving mixture, to determine whether the mixture is being supplied in accordance with this Specification.

**10.3 Materials**

All materials supplied under this Specification shall be subject to testing and approval by the Contract Administrator in accordance with Section 5.3 of this Specification.

**10.4 Quality of Asphaltic Concrete Paving Mixture**

Quality control tests will be used to determine the acceptability of the asphaltic concrete paving mixture supplied by the Contractor. The latest revisions of the test methods at the time of testing



shall be used.

The Contract Administrator shall obtain samples of asphaltic concrete paving mixture and of the constituent materials required for quality control tests. The Contractor shall make no charge for these materials.

An outline of some of the quality control tests that will be used to check the physical properties of the mixture, and to check the properties, gradations and proportions of the constituent materials is as follows:

Samples of mineral aggregates shall be taken in accordance with ASTM Standard D75, Standard Methods of Sampling Aggregates.

Samples of asphaltic concrete paving mixtures shall be taken in accordance with ASTM Standard D979, Standard Methods of Sampling Bituminous Paving Mixtures.

The determination of the particle size distribution of aggregates shall be made in accordance with ASTM Standard C136, Standard Method of Test for Sieve or Screen Analysis of Fine and Coarse Aggregates.

The specific gravity of aggregates shall be determined in accordance with ASTM Standard C127, Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate, and ASTM Standard C128, Standard Method of Test for Specific Gravity and Absorption of Fine Aggregate.

The determination of the percent of asphalt cement in asphaltic concrete paving mixtures and pavement specimens shall be made in accordance with ASTM D2172, Standard Methods of Test of Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.

The percent air voids, the percent voids in the mineral aggregate, the Marshall density, Marshall stability and flow index shall be determined in accordance with the Standard Marshall Procedure (75 Blows) and in accordance with ASTM Standard D1559, Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures using Marshall Apparatus.

#### **10.5 Quality of Asphaltic Concrete Pavement**

Quality control tests will be used to determine the acceptability of the compacted asphaltic concrete pavement, as placed and compacted by the Contractor. The latest revisions of the test methods at the time of testing shall be used.

Pavement specimens will be taken from each compacted pavement course by the Contract Administrator and the holes made by the removal of said specimens shall be carefully filled by the contractor with the approved asphaltic concrete paving mixture and thoroughly compacted, so as to conform in every way with the adjoining undisturbed pavement.



**10.6 Quality Assurance**

The Contract Administrator shall ensure the frequency and number of quality assurance tests for each type of asphalt as follows:

1. Marshall test:  
A minimum of 1 test for every 300 tonnes of production.
2. Densometer Density test:  
Frequency of tests below shall be per type of asphalt and per lift of asphalt:

Production < 500t: A minimum of one field density test for every 50m per lane with a minimum of three (3) tests per site visit by the test lab.

Production ≥ 500t: A minimum of one field density test for every 100m per lane.

3. Core Sample for thickness and density:  
For all production quantities per day below: A minimum of 3 core samples shall be sufficient for the entire contract if the type of asphalt produced, remains unchanged and production continues from day to day.

Frequency of tests below shall be per type of asphalt and per lift of asphalt:

Production <500t: A minimum of 3 core samples per day.

Production ≥500t: One core sample for every 400m per lane with a minimum of 3 core samples per day.

Additional number and frequency of testing shall be determined by the Contract Administrator.

Copies of test results shall be sent to the Research and Standards Engineer at the Public Works Department and to the Contract Administrator in a timely manner.

An outline of the quality assurance tests that will be used to check the compaction of the completed asphaltic concrete pavement is as follows:

In-place density determinations shall be made in accordance with ASTM Standard D2950, Standard Method of Test for Density of Bituminous Concrete in Place by Nuclear Method.

Density determinations on pavement specimens shall be made in accordance with ASTM Standard D2726, Standard Method of Test for Bulk Specific Gravity of Compacted Bituminous Mixtures using Saturated Surface-Dry Specimens.

**10.7 Corrective Action**

The Contractor shall, at his own expense, correct such work or replace such materials found to be defective under this Specification in an approved manner to the satisfaction of the Contract Administrator.

**12. METHOD OF MEASUREMENT**

As a requirement of this Specification the Contractor, at his own expense, shall provide, install and operate a weigh scale convenient to the mixing plant and of such capacity as to accurately weigh any single loaded truck leaving the plant. The scale shall be tested by the proper authority at the Contractor's expense prior to any paving mix being weighed on said scale and the customary certificate shall be exhibited to the Contract Administrator upon request. Whenever considered



necessary by the Contract Administrator, the scale shall be re-tested at the Contractor's expense.

#### **12.1 Construction of Asphaltic Concrete Pavement**

Construction of asphaltic concrete pavement will be measured on a weight basis. The weight to be paid for shall be the total number of tonnes placed and compacted in accordance with this Specification and accepted by the Contract Administrator, as measured on a certified weigh scale.

#### **12.2 Construction of Asphaltic Concrete Overlay**

Construction of asphaltic concrete overlay will be measured on a weight basis. The weight to be paid for shall be the total number of tonnes placed and compacted in accordance with this Specification and accepted by the Contract Administrator, as measured on a certified weigh scale.

#### **12.3 Construction of Asphaltic Concrete Base Course**

Construction of asphaltic concrete base course will be measured on a weight basis. The weight to be paid for shall be the total number of tonnes placed and compacted in accordance with this Specification and accepted by the Contract Administrator, as measured on a certified weigh scale.

#### **12.4 Construction of Asphalt Patches**

Construction of asphalt patches will be measured on an area basis. The area to be paid for shall be the total number of square metres removed and placed in accordance with this Specification and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator.

### **13. BASIS OF PAYMENT**

#### **13.1 Construction of Asphaltic Concrete Pavement**

Construction of asphaltic concrete pavement will be paid for at the Contract Unit Price per tonne for the "Items of Work" listed here below, measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the work included in this Specification.

##### **Items of Work:**

Construction of Asphaltic Concrete Pavement

- i) Main Line Paving (\*)
- ii) Tie-ins and Approaches (\*)

\* Specify either Type I, Type IA, or Type II

#### **13.2 Construction of Asphaltic Concrete Overlay**

Construction of asphaltic concrete overlay will be paid for at the Contract Unit Price per tonne for the "Items of Work" listed here below, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the work included in this Specification.

##### **Items of Work**

Construction of Asphaltic Concrete Overlay

- i) Main Line Paving (\*)
- ii) Tie-ins and Approaches (\*)



\* Specify either Type I, Type IA, or Type II

**13.3     Construction of Asphaltic Concrete Base Course**

Construction of asphaltic concrete base course will be paid for at the Contract Unit Price per tonne for "Construction of Asphaltic Concrete Base Course (Type III)", measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the work included in this Specification.

**13.4     Construction of Asphalt Patches**

Construction of asphalt patches will be paid for at the Contract Unit Price per square metre for "Construction of Asphalt Patches", measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the work included in this Specification.



**CW 3520 – SEEDING****TABLE OF CONTENTS**

1.	GENERAL CONDITIONS.....	1
3.	DESCRIPTION.....	1
5.	MATERIALS.....	1
	5.1 General .....	1
	5.2 Topsoil .....	1
	<b>5.3 Grass Seed</b> .....	1
	5.4 Herbicides .....	3
	5.5 Insecticides .....	3
	<b>5.6 Hydro Mulching</b> .....	3
9.	CONSTRUCTION METHODS .....	3
	9.1 Site Safety and Traffic Control .....	3
	9.2 Site Grading .....	3
	<b>9.3 General</b> .....	4
	9.4 Topsoil and Finish Grading .....	4
	<b>9.5 Seeding</b> .....	4
	<b>9.6 Hydro Mulching</b> .....	4
	9.7 Commencement of Maintenance Period.....	5
	<b>9.8 Maintenance of Seeded Area</b> .....	5
	9.9 Spring Clean Up.....	6
	9.10 Termination of Maintenance Period .....	6
	9.11 Site Clean Up .....	6
12.	METHOD OF MEASUREMENT.....	7
	12.1 Seeding .....	7
13.	BASIS OF PAYMENT .....	7
	13.1 Seeding .....	7



**CW 3520 - SEEDING****1. GENERAL CONDITIONS**

The General Conditions and Standard Provisions attached hereto shall apply to and be a part of this Specification.

**3. DESCRIPTION**

This Specification shall cover the supply and placement of grass seed for athletic grounds, golf course fairways, general park areas, boulevards, medians and interchange areas.

The work to be done by the Contractor under this Specification shall include the supply of all materials, and the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

**5. MATERIALS****5.1 General**

The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification. All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator and/or the City's designated turf inspector. There shall be no charge to the City for any materials taken by the Contract Administrator or the City's designated turf inspector for inspection purposes.

**5.2 Topsoil**

Topsoil shall be supplied in accordance with Clause 5.2 of CW 3540.

**5.3 Grass Seed**

All seed supplied by the Contractor shall be Canada Certified No. 1 or Canada Certified No. 2 and come complete with a Certificate of Analysis verifying that quality standards for Canada Certified No. 1 or Canada Certified No. 2 seed are met. The Contractor shall submit the Certificates of Analysis to the Contract Administrator.

The seed supplied shall be free of disease and mixed by percentage (%) of weight to meet the following blends **or mixtures**:

**5.3.1 For athletic grounds and golf course fairways a mixture composed of:**

Eighty five (85%) percent Kentucky Bluegrass (100% Class 1 cultivars, 3 cultivars in equal proportion) and fifteen (15%) percent Perennial Ryegrass.

**5.3.2 For general park areas, boulevards, medians and interchange areas a mixture composed of:**

Sixty (60%) percent Kentucky Bluegrass (100% Class 1 or Class 2 cultivars, 3 cultivars in equal proportion), thirty (30%) percent Creeping Red Fescue and ten percent (10%) Perennial Ryegrass.



**5.3.3 Wherever Kentucky Bluegrass is specified, the proportion of the cultivars to be included in the blend shall adhere to the following:**

**Class 1 Cultivars** - specified blend of Class 1 cultivars shall consist of equal proportions of any three of the following:

Able 1	Absolute	Allure	Award	Baron
Bartitia	Blacksburg	Blackstone	Caliber	Challengedr
Chateau	Estate	Explorer	Kelly	Liberator
Limousine	Midnight	Misty	Northstar	NuGlade
Pick 151	Pick 8	Platini	Quantum Leap	Rambo
Rugby II	Serene	Shamrock	SR 2000	Total Eclipse
Touchdown	Unique	VB 16015	Wildwood	

**Class 2 Cultivars** - specified blend of Class 2 cultivars shall consist of equal proportions of any three of the following:

A 34	Abbey	Alpine	America	Apollo
Arcadia	Ascot	ASP 200	Banff	Baronie
Baruzo	Bluechip	Cardiff	Champagne	Chicago
Classic	Compact	Conni	Coventry	Crest
Cynthia	Dragon	Eclipse	Fortuna	Glade
Goldrush	Haga	Huntsville	Impact	Indigo
Jefferson	Kenblue	Langara	Lipoa	Livingston
Marquis	Mercury	Moonlight	Nimbus	NuBlue
NuStar	Odyssey	Park	Pepaya	Pick 3
Pick 4	Pick 855	Princeton 105	Raven	Rugby
Seabring	Sodnet	SR 2100	SR 2109	Washington

**5.3.4 Wherever Perennial Ryegrass is specified, the entire proportion of the blend specified shall consist of any one of the following:**

Admire	Charger II	Jet	Panther	Quest II
Affinity	Charismatic	Inspire	Paradigm	Racer
Advent	Churchill	IQ	Paragon	Racer II
Affirmed	Citation Fore	Kokomo	Passport	Radiant
All Star 2	Courage	Koos R-71	Pearl II	Renaissance
Allsport	Cruiser	Lp 1	Pennant	Salinas
Amazing	Dazzle	Line Drive	Pennant II	Secretariat
Applaud	Divine	Linn	Pentium	Seville II
Arrival	Edge	LS 2100	Phantom	Skyhawk
Ascend	Elka	Mach 1	Pick EX2	Splendid
Barlennium	Elfkin	Majesty	Pick PRNGS	Stellar
Blazer IV	Exacta	Manhattan 2	Pinnacle II	Summerset
Brightstar	Extreme	Manhattan 3	Pizzazz	Sunkissed
Brightstar II	Fiesta 3	Manhattan 4	Pleasure XL	Superstar
Buccaneer	Gallery	Mepy	PR 1-94	Terradyne
BY-100	Gator	Monterey II	Premier	Wilmington
Cabo	Gator 3	MP 103	Premier II	Yatsugreen
Calypso II	Grand Slam	Nighthawk	Promise	
Catalina	Hawkeye	Nexus	Prosport	
Catalina II	Headstart	Pacesetter	Protyme	
Cathedral II	Icon	Palmer II	Prowler	



**5.3.5** Prior to payment for the seeding operation the Contractor shall provide the Contract Administrator with a copy of an invoice or a shipping bill received from the seed distributor specifying the quantities of each type of seed supplied for the Work Site and the delivery date.

**5.3.6** Any variations to the above referenced seed blends or mixtures shall be approved by the Contract Administrator prior to sowing.

**5.4** **Herbicides**

Herbicides shall be standard commercial products registered for sale and use in Canada under the Pest Control Products Act.

**5.5** **Insecticides**

Insecticides shall be standard commercial products registered for sale and use in Canada under the Pest Control Products Act.

**5.6** **Hydro Mulching**

**5.6.1** **Mulch**

Mulch shall be wood cellulose fibre product free of germination or growth-inhibiting ingredients and shall form, after application, a blotter-like ground cover, which will allow absorption and percolation of water.

Mulch shall be dry, free of weeds and all foreign matter.

**5.6.2** **Water**

Water used for hydro mulching shall be free of any impurities, which would inhibit germination, or otherwise adversely affect grass growth.

**5.6.3** **Tackifier**

All wood cellulose fibre mulch shall be applied in slurry containing a tackifier at a rate as directed by the manufacturer.

**9. CONSTRUCTION METHODS**

**9.1** **Site Safety and Traffic Control**

Where work is to be done in boulevard and median areas adjacent to roadways, the Contractor shall maintain traffic and ensure that protection is afforded to the road user and that the Contractors operations in no way interfere with the safe operation of traffic.

The Contractor shall supply, erect and maintain all applicable traffic control devices in accordance with the provisions of the latest edition of the Manual of Temporary Traffic Control in Work Areas on City Streets issued by the Public Works Department of the City of Winnipeg.

**9.2** **Site Grading**

Site grading will be done and paid for in accordance with Specification CW 3110.



**9.3 General**

The Contractor shall not commence seeding operations until the finished topsoil surface is inspected and approved by the Contract Administrator.

The Contractor shall provide the Contract Administrator with a minimum of two working days notice for inspection of the finished topsoil surface.

**9.4 Topsoil and Finish Grading**

Preparation of the finished topsoil surface shall be completed in accordance with Specification of CW 3540.

To prevent the formation of depressions or water pockets, the Contractor shall smooth out any undulations or irregularities in the topsoil surface resulting from fertilizing, seeding, rolling or other operations.

**9.5 Seeding**

Grass seed shall be sown at a rate of 1.0 kilogram per 100 square metres.

The Contractor shall sow the seed into the approved seed bed by using seeding equipment suitable for the area involved and to the satisfaction of the Contract Administrator. Seed shall be embedded into soil to a depth of 5mm within 1 hour of sowing.

All seeded areas shall be rolled with a mechanical roller of a minimum weight of 220kg and minimum width of 760mm to form a uniform even surface, level with adjoining curbs, sidewalks or sod.

Water shall be applied in sufficient quantities and frequencies to obtain seed germination and growth. Watering shall be controlled to prevent seed washout. All costs to provide water for seeded areas shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.

Seeding operations shall be completed within two working days after the commencement of sowing operation. This shall include the application of seed, hydro mulching, rolling and watering.

No seeding shall be done on frozen soil, or when any other conditions unfavourable to successful seed germination exist.

Where the Contractor sows seed, and termination of the Maintenance Period is not achieved in accordance with Clause 9.10 in the same year that the seed was sowed, the Contractor shall be responsible for spring replacement of any seeded areas damaged over the winter due to winter-kill, ice damage, sand/salt applications on adjacent streets, or from snow removal or spring clean-up equipment.

**9.6 Hydro Mulching**

The Contractor shall not commence the hydro mulch application until the seeded area has been inspected and approved by the Contract Administrator.

The Contractor shall provide the Contract Administrator with a minimum of two working days notice for inspection of the seeded area.

The slurry mixture shall be mixed as per manufacturers recommendations and applied evenly over the prepared surface using equipment approved by the Contract Administrator. Apply slurry mixture within 24 hours of seeding at a rate of not less than 200 kilograms per 1000 square metres.



### 9.7 Commencement of Maintenance Period

Immediately after the completion of the seeding operation, to the satisfaction of the Contract Administrator, the Contractor shall commence and pay for continuous maintenance of the seeded area until the criteria specified for Termination of the Maintenance Period in Clause 9.10 has been met.

Any deficient, damaged or vandalized areas shall be reseeded by the Contractor within three working days after receiving notification from the Contract Administrator and the area so reseeded, shall be further maintained until it meets the criteria specified in Clause 9.10.

In situations where commencement of the Maintenance Period is not granted by the Contract Administrator before the end of a growing season, the Maintenance Period will commence on May 15 of the following year or such date as is mutually agreed upon by all parties.

### 9.8 Maintenance of Seeded Area

The Contractor shall mow the turf area at regular intervals to a height of 50 - 60 mm. Do not cut more than thirty (30%) percent of the grass height at any one mowing. Remove clippings that will smother grassed areas.

The Contractor shall water all seeded areas in sufficient quantities and **frequencies to maintain seed germination and grass growth**. Any damage, which may occur through washout of the soil during the maintenance period shall be repaired and maintained until it meets the criteria specified in Clause 9.10. All costs to provide water for seeded areas shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.

The Contractor shall clean and remove all dead vegetation, leaves, debris and snowmold from turf areas to encourage healthy and uniform grass growth.

Given the need for weed control, the Contractor shall have in his possession a Pesticide Applicator's License and a Pesticide Use Permit for pesticide applications related to this Specification.

The Contractor shall apply herbicide when broadleaf weeds start developing in competition with grass. Apply herbicide in accordance with the City of Winnipeg Weed Control Standards and Procedures, manufacturer's instructions and the Manitoba Agriculture Guide to Crop Protection and Herbicide Recommendations for Landscape Applicators, latest editions and the following criteria:

- i. Use 2,4-D Amine or MCPA Amine herbicide for susceptible broadleaf weeds.
- ii. Use a mixture containing 2,4-D Amine or MCPA Amine, Mecoprop and Dicamba for 2,4-D resistant plants.
- iii. Do not apply to newly seeded turf until after the second or third mowing.
- iv. Do not water within one working day after application.
- v. Apply when winds are less than 20 km/h and air temperature is above 10° (degrees) Celsius.
- vi. Avoid use of pure Dicamba solutions near trees and shrubs.

Given the need for insect control, the Contractor shall have in his possession a Pesticide Applicator's License and a Pesticide Use Permit for pesticide applications related to this Specification. Use standard commercial products in accordance with the manufacturer's instructions and the Manitoba Agriculture Guide to Crop Protection (latest edition) for the particular insect/insects involved.

Copies of the Pesticide Applicator's License and the Pesticide Use Permit must be submitted to the Contract Administrator prior to commencement of pesticide application.



All persons handling pesticides shall be fully aware of toxicological rules and regulations governing their use.

The Contractor shall inform the Contract Administrator immediately of any dangerous occurrence.

#### **9.9 Spring Clean Up**

Where termination of the maintenance period has not been achieved in accordance with Clause 9.10 prior to the end of a growing season, the Contractor shall complete all operations related to the clean up of the Work Site in the following spring. This shall include the cleaning and removal of all dead vegetation, leaves, debris, snowmold and any sand or gravel resulting from winter sanding/de-icing operations from turf areas to encourage healthy and uniform grass growth.

All costs for spring clean up operations, including reseeding of areas damaged over the winter shall be borne by the Contractor if in the previous year, seed was sowed, and the termination of the maintenance period in accordance with Clause 9.10, was not achieved in that same year or where the damage was due to defective seed or maintenance not conforming to this Specification.

#### **9.10 Termination of Maintenance Period**

The Contract Administrator will terminate the maintenance period after the following criteria has been met:

- i. The certified seed sowed meets the requirements specified in Clause 5.3.
- ii. The seeded area is free of any visual obstructions such as leaves.
- iii. The seeded area has been rolled and has a firm, uniform even surface.
- iv. The seeded area has established into a healthy, vigorously growing condition.
- v. The seeded area is free of bare and dead spots and without more than ten (10) broadleaf weeds per fifty (50) square metres.
- vi. The seeded area has sufficient shoot growth density that no surface soil is visible when the grass has been cut to a height of 50 - 60 mm.
- vii. Seeded area is cut to a height of 50 - 60 mm within one working day before the final inspection.
- viii. Edges of established seeded areas adjacent to shrub and flower beds are well defined.
- ix. Seeded area is free of any turf damaging insects.

When the Contractor considers that the seeded area meets the criteria listed above, he shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying whether the Maintenance Period can be terminated. Any deficient, damaged or vandalized areas may have to be reseeded within three working days after receiving notification from the Contract Administrator and the area so reseeded, shall be further maintained by and at the expense of the Contractor in accordance with Clauses 9.7 and 9.8 herein.

In situations where the termination of the maintenance period is not granted by the Contract Administrator before the end of a growing season, the maintenance period will commence as described in Clause 9.7.

#### **9.11 Site Clean Up**

During both seeding and maintenance operations, all sidewalks, streets, approaches, driveways and properties near the seeding operations shall be kept clean at all times by the Contractor.

Upon completion of the project, the Contractor shall immediately remove all excess material and debris from the Work Site.



**12. METHOD OF MEASUREMENT****12.1 Seeding**

Supply, placement and maintenance of seed will be measured on an area basis. The area to be paid for shall be the total number of square metres seeded and maintained in accordance with this Specification and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator. No payment will be made for seeding placed outside of the limits of placement as directed by the Contract Administrator.

**13. BASIS OF PAYMENT****13.1 Seeding**

Supply, placement and maintenance of seed will be paid for at the Contract Unit Price per square metre for "Seeding", measured as specified herein, which price shall be payment in full for supplying all materials and for completing all operations herein described and all other items incidental to the work included in this Specification. Payment for seeding shall be in accordance with the following:

- Sixty five (65%) percent of quantity following supply and placement.
- Remaining thirty five (35%) percent of quantity following termination of the maintenance Period.



## **CW 3540 – TOPSOIL AND FINISH GRADING FOR ESTABLISHMENT OF TURF AREAS**

### **TABLE OF CONTENTS**

1.	GENERAL CONDITIONS.....	1
3.	DESCRIPTION.....	1
5.	MATERIALS.....	1
	5.1 General .....	1
	5.2 Topsoil .....	1
	5.3 Fertilizer .....	2
9.	CONSTRUCTION METHODS .....	2
	9.1 Site Safety and Traffic Control .....	2
	9.2 Preparation of Existing Grade .....	2
	9.3 Placing of Topsoil.....	2
	9.4 Application of Fertilizer.....	3
	9.5 Finish Grading and Rolling.....	3
	9.6 Site Clean-Up.....	3
12.	METHOD OF MEASUREMENT .....	3
13.	BASIS OF PAYMENT .....	3



## **CW 3540 - TOPSOIL AND FINISH GRADING FOR ESTABLISHMENT OF TURF AREAS**

### **1. GENERAL CONDITIONS**

The General Conditions and Standard Provisions attached hereto shall apply to and be a part of this Specification.

### **3. DESCRIPTION**

This Specification shall cover the supply and placing of topsoil for areas to be sodded or seeded.

The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for an incidental to the satisfactory performance and completion of all work as shown on the Drawings and hereinafter specified.

### **5. MATERIALS**

#### **5.1 General**

The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification. All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator and/or the City's designated turf inspector. There shall be no charge to the City for any materials taken by the Contract Administrator or the City's designated turf inspector for inspection and testing purposes.

Topsoil will be subject to tests for nitrate, phosphate, potassium, sulphate, pH, E.C. (salinity) and volume of organic matter by a testing laboratory designated by the Contract Administrator.

The Contract Administrator and/or the City's designated turf inspector will collect as many samples as are deemed necessary to ensure that a good representation of the entire topsoil shipment is provided for the soil analysis report.

#### **5.2 Topsoil**

All topsoil required shall consist of a screened clay-textured or loam-textured dark topsoil, a fertile, friable material neither of heavy clay nor of very light sandy nature containing by volume, a minimum of four (4%) percent for clay loams and two (2%) percent for sandy loams to a maximum twenty-five (25%) percent organic matter (peat, rotted manure or composted material) and capable of sustaining vigorous plant growth. Topsoil shall be free of subsoil contamination, roots, stones over 25mm in diameter, baler twine or subsoil clay lumps over 25mm in diameter and other extraneous matter. Topsoil shall not contain quackgrass rhizomes, Canada thistle roots or other noxious weeds. Upon delivery or thirty (30) days following delivery, salinity rating shall be less than 4.0mm hos/cm on a saturated paste basis. The pH range shall be between 6.0 - 8.0.

Topsoil may be either on-site topsoil or imported topsoil.

On-site topsoil which has been stockpiled, can be reused providing that it is shredded or screened prior to being re-spread and that it meets the requirements specified above for topsoil.



Topsoil shall not be blow-in dirt taken from wind erosion sites and topsoil shall not be taken from fields abandoned to corn production where such soil may contain soil incorporated herbicides, such as eradican and atrazine with lasting residual effects.

The Contractor shall inform the Contract Administrator of proposed source of topsoil to be supplied. The Contract Administrator reserves the right to reject topsoil not conforming to the requirements of this Specification.

### 5.3 Fertilizer

Chemical fertilizer with an N-P-K analysis of 1-2-1 ratio at a rate to provide 48 kg actual Nitrogen, 96 kg actual Phosphate and 48 kg actual Potassium per hectare.

Fertilizer shall be standard commercial brands meeting the requirements of the Canada Fertilizer Act and the Canadian Fertilizer Quality Assurance Program.

All fertilizers shall be granular, pelletized or pill form, and shall be dry and free flowing.

## 9. CONSTRUCTION METHODS

### 9.1 Site Safety and Traffic Control

Where work is to be done in boulevard and median areas adjacent to roadways, the Contractor shall maintain traffic and ensure that protection is afforded to the road user and that the Contractor's operations in no way interfere with the safe operation of traffic.

The Contractor shall supply, erect and maintain all applicable traffic control devices in accordance with the provisions of the latest edition of the Manual of Temporary Traffic Control in Work Areas on City Streets issued by the Public Works Department of the City of Winnipeg.

### 9.2 Preparation of Existing Grade

Subsoil shall be graded in accordance with Specification CW 3110 to eliminate uneven areas and low spots, ensuring positive drainage. Any soil contaminated by toxic materials shall be removed and disposed off site.

All surface debris, roots, vegetation, branches and stones in excess of 25mm shall be removed.

Grades on the area to receive topsoil that have been previously established in conformance with the Construction Drawings and/or other applicable specifications shall be maintained in a true and even grade.

Prior to placing topsoil, all sub-grade areas within athletic fields and all athletic field "run out" areas as Identified on the construction drawings shall be scarified to a minimum depth of 75mm.

### 9.3 Placing of Topsoil

The Contractor shall not commence placement of topsoil until the sub-grade has been inspected and approved by the Contract Administrator.

The Contractor shall provide the Contract Administrator with a minimum of two working days notice for inspection of required grading.

The topsoil mix shall be applied to a minimum of 75 mm compacted depth for areas requiring sod and a 100 mm compacted depth for seeding areas. All areas shall be rolled with a mechanical roller of a minimum weight of 220kg and minimum width of 760mm.



Topsoil shall be manually spread around trees, shrubs and other obstacles.

The Contractor shall ensure that topsoil does not come in contact with new asphaltic concrete pavement that is less than 2 weeks old.

#### **9.4     Application of Fertilizer**

The Contractor shall provide the Contract Administrator with a report for each work site indicating the fertilizer formulation used, the rate of application and the date of application.

Fertilizer shall be spread uniformly over the entire area of topsoil at a rate to provide 48 kg actual Nitrogen, 96 kg actual Phosphate and 48 kg actual Potassium per hectare.

#### **9.5     Finish Grading and Rolling**

The area shall be fine graded and the topsoil loosened. Eliminate rough spots and low areas to ensure positive drainage. Prepare a loose friable bed by means of cultivation and subsequent raking.

Topsoil shall be rolled with a mechanical roller of a minimum weight of 220kg, minimum width of 760mm roller, to consolidate it in areas to be seeded or sodded, leaving the surface smooth, uniform, firm against deep foot printing and to the satisfaction of the Contract Administrator.

#### **9.6     Site Clean-Up**

All sidewalks, streets, approaches, driveways and properties near the Work Site shall be kept clean at all times by the Contractor.

Upon completion of the project, the Contractor shall immediately remove all excess material and debris from the Work Site.

### **12.     METHOD OF MEASUREMENT**

There shall be no separate measurement for the work associated with this Specification.

### **13.     BASIS OF PAYMENT**

Payment for work specified under this Specification is to be included with the price for either sodding or seeding.



**CW 3610 – INSTALLATION OF CULVERTS****TABLE OF CONTENTS**

1.	DESCRIPTION.....	1
	1.1 General .....	1
	1.2 Definitions .....	1
	1.3 Referenced Standard Construction Specifications .....	1
2.	MATERIALS.....	1
	2.1 CSP and PCP Culverts, Fittings, and Accessories .....	1
	2.2 High Density Polyethylene (HDPE) Pipe Culverts, Fittings and Accessories .....	1
	2.3 Bedding and Backfill .....	2
	2.4 Capping for Side Slopes .....	2
	2.5 Flowable Cement Stabilized Fill .....	2
	2.6 Culvert End Markers .....	2
	2.7 Approved Products .....	2
3.	CONSTRUCTION METHODS .....	2
	3.1 Excavation, Bedding and Backfill.....	2
	3.2 Culvert Installation .....	3
	3.2.1 General.....	3
	3.2.2 Corrugated Steel Pipe (CSP) Culvert and Pipe Arch Culvert .....	3
	3.2.3 Precast Concrete Pipe (PCP) Culvert .....	3
	3.2.4 High Density Polyethylene Pipe (HDPE) Culvert .....	3
	3.3 Connections to Existing Culverts .....	3
	3.3.1 Corrugated Steel Pipe (CSP) and Pipe Arch Culvert.....	4
	3.3.2 Precast Concrete Pipe (PCP) .....	4
	3.3.3 Removal of Existing Culvert Pipe .....	4
	3.4 Capping for Side Slopes .....	4
	3.5 Plugging and Abandonment of Existing Culvert .....	4
	3.6 Disposal of Existing Culvert .....	4
	3.7 Culvert End Markers .....	4
4.	MEASUREMENT AND PAYMENT .....	5
	4.1 Corrugated Steel Pipe (CSP).....	5
	4.2 Precast Concrete Pipe (PCP) .....	5
	4.3 High Density Polyethylene Pipe (HDPE).....	6
	4.4 Connections to Existing Pipe Culverts .....	6
	4.5 Plugging and Abandonment of Existing Pipe Culverts .....	6
	4.6 Removal of Existing Culverts.....	7
	4.7 Disposal of Existing Culverts .....	7
	4.8 Capping for Side Slopes .....	7
	4.9 Culvert End Markers .....	7



## **CW 3610 - INSTALLATION OF CULVERTS**

### **1. DESCRIPTION**

#### **1.1 General**

This Specification covers the supply and installation of culvert pipe, couplers and fittings for connections, removal, disposal, and abandonment of culvert pipe.

#### **1.2 Definitions**

- .1 Foundation – The natural soil sub-grade or granular material to replace unsuitable soil.
- .2 Bedding – Material placed over the Foundation to the centre elevation of the culvert.
- .3 Backfill – Material placed over the Bedding and culvert to a minimum of 300mm above the top of the culvert or as directed by the Contract Administrator. This definition does not include pavements.
- .4 CSP – Corrugated Steel Pipe
- .5 HDPE - High Density Polyethylene
- .6 PCP – Precast Concrete Pipe

#### **1.3 Referenced Standard Construction Specifications**

- .1 CW 1130 – Site Requirements
- .2 CW 2030 – Excavation, Bedding and Backfill
- .3 CW 2130 – Gravity Sewers
- .3 CW 2160 – Concrete Underground Structures and Works
- .4 CW 3110 – Sub-grade, Sub-base, and Base Course Construction
- .5 CW 3615 - Riprap
- .6 Approved Products for Surface Works

### **2. MATERIALS**

#### **2.1 CSP and PCP Culverts, Fittings, and Accessories**

- .1 Supply CSP culvert, fittings and other accessories in accordance with this Specification and CSA Specification CAN/CSA-G40I.
- .2 Supply PCP culvert and fittings in accordance with one of ASTM Specifications C-I4, C-76 or C-655.

#### **2.2 High Density Polyethylene (HDPE) Pipe Culverts, Fittings and Accessories**

- .1 Supply HDPE culvert fittings and couplers in accordance with CSA B182.8.
- .2 HDPE culvert fittings and couplers shall be made of virgin high density polyethylene material. The HDPE culvert shall have a full circular cross section, be dual walled with a smooth inner liner and an outer corrugated pipe wall. HDPE culvert shall have a minimum



stiffness of 320kPa at 5 percent deflection in accordance with ASTM D2412.

- .3 HDPE culvert lengths shall be coupled with a Type 3 Soil tight external split coupler or better.

### **2.3 Bedding and Backfill**

- .1 Supply Foundation, Bedding and Backfill material in accordance with Section 2 of CW 3110 and the Drawings.
- .2 Clay, silt, or organic soil shall not be used as bedding or backfill material.
- .3 Supply sand in accordance with Section 2 of CW 2030. Sand shall be used as a levelling course.

### **2.4 Capping for Side Slopes**

- .1 Supply impervious clay as capping for approach side slopes around the culvert.

### **2.5 Flowable Cement Stabilized Fill**

- .1 Supply flowable cement stabilized fill in accordance with Table 2160.1 in CW 2160.

### **2.6 Culvert End Markers**

- .1 Supply culvert end markers in accordance with the following:

- .1 Culvert end markers shall be 1500 ± 100mm in height.

- .2 Culvert end markers shall be HDPE, SDR 9.3, 30mm (1¼") in diameter, bright orange in colour with an adhesive backed reflective strip placed around the marker. The reflective strip shall be placed within 25mm of the top of the marker.

### **2.7 Approved Products**

- .1 Use only those products listed as Approved Products for Underground Use in the City of Winnipeg found on the City of Winnipeg, Materials Management web site at: <http://www.winnipeg.ca/matmgt/info.stm>

## **3. CONSTRUCTION METHODS**

### **3.1 Excavation, Bedding and Backfill**

- .1 Excavate in accordance with CW 2030.
- .2 Establish line and grade in accordance with the Drawings.
- .3 Place and compact a Foundation below the proposed pipe and Bedding for commercial approaches and all other approaches as directed by the Contract Administrator.
- .3 Place and compact Bedding material a minimum of 75mm below the invert grade of the



proposed pipe.

- .4 Place sand as a levelling course over the Bedding material; sand is not to be used as Backfill.
- .5 Place the culvert on the Bedding material to line and grade in accordance with Section 3.2 of this specification.
- .6 Place and compact granular material on both sides of the culvert up to the center of the pipe, then Backfill and compact material in 150mm lifts.
- .7 All Bedding and Backfill material shall be compacted to 95% Standard Proctor density.
- .8 Place and compact Backfill to a depth above the top of the pipe in accordance with the manufacturer's specifications, excepting Section 3.2.4 of this Specification.
- .9 Shape Backfill on the side slopes to be in accordance with SD-234 and SD-239.

### **3.2 Culvert Installation**

#### **3.2.1 General**

- .1 Use a minimum number of coupled sections to create one length.
- .2 Install culvert to the line and grade on the Drawings or as set in the field by the Contract Administrator. Vertical variance from grade shall not exceed 25 mm and horizontal variance from line shall not exceed 100 mm without sharp bends.

#### **3.2.2 Corrugated Steel Pipe (CSP) Culvert and Pipe Arch Culvert**

- .1 Install CSP culvert on the compacted Bedding with the separate sections securely joined together by means of tightly drawn coupling bands. For CSP culvert of the round or elongated type, and arch culvert, constructed from individual plates, lap the circumferential joints on the outside of the pipe section on the upstream end, and lap longitudinal seams at the side of the pipe.
- .2 Install CSP culvert and pipe arch culvert with a two percent camber at its center.

#### **3.2.3 Precast Concrete Pipe (PCP) Culvert**

- .1 Install PCP culvert installation in accordance with Specification CW 2130 for PCP pipe.

#### **3.2.4 High Density Polyethylene Pipe (HDPE) Culvert**

- .1 Install HDPE culvert in accordance with the manufacturer's specifications except for private approaches, the minimum Backfill cover above the top of the pipe shall be 300mm or as directed by the Contract Administrator.

### **3.3 Connections to Existing Culverts**



**3.3.1 Corrugated Steel Pipe (CSP) and Pipe Arch Culvert**

- .1 Expose the end of the existing culvert without damaging the existing culvert for connection to an existing CSP culvert.
- .2 Cut off sufficient length of sloped or damaged culvert to provide a straight end in acceptable condition for connection. Coat the end cut of the culvert with a galvanizing compound approved by the Contract Administrator.
- .3 Connect new CSP culvert to existing CSP culvert in accordance with Clause 3.2.2 of this Specification.

**3.3.2 Precast Concrete Pipe (PCP)**

- .1 Connect new PCP culvert to existing PCP culvert in accordance with Specification CW 2130 for PCP pipe.

**3.3.3 Removal of Existing Culvert Pipe**

- .1 Remove existing culverts as directed by the Contract Administrator within the limits of the Contract.
- .2 Separate coupled sections before removing culverts so as not to damage the culvert sections.
- .3 Whenever a culvert is being removed but not replaced, backfill with suitable site material and compact in accordance with CW 3110.

**3.4 Capping for Side Slopes**

- .1 Cap the side slopes around the culvert ends with impervious clay or as directed by the Contract Administrator or the Drawings.

**3.5 Plugging and Abandonment of Existing Culvert**

- .1 Plug the ends of the culvert with concrete, mortar or sand bags, then pump in cement stabilized fill to fill the interior of the culvert.

**3.6 Disposal of Existing Culvert**

- .1 Dispose of existing culvert in accordance with Section 3.4 and 3.5 of CW 1130.

**3.7 Culvert End Markers**

- .1 Install culvert end markers on all new culverts and culvert end repairs.
- .2 Anchor the culvert end markers to the top of both ends of the culvert by bolting with plated bolts, nuts and washers in field drilled mounting holes.



**4. MEASUREMENT AND PAYMENT****4.1 Corrugated Steel Pipe (CSP)**

- .1 Supply and installation of CSP culvert shall be measured on a linear basis and paid for at the Contract Unit price per metre for the “Items of Work” listed below. The length to be paid for shall be the total number of metres of CSP culvert supplied and installed in accordance with this Specification, accepted and measured by the Contract Administrator.

**Items of Work:**

Corrugated Steel Pipe (CSP) Culvert

- i.) Supply\*
- ii.) Install\*

\* Specify Diameter, Gauge, and the material type being either Galvanized, Aluminized Steel or Polymer Coat.

- .2 Separate measurement shall be made for each diameter, gauge, and material type of culvert.
- .3 The linear measurement of corrugated steel pipe shall be measured horizontally at grade above the centre line of the pipe culvert.
- .4 Couplers and fittings shall be included in the payment for corrugated steel pipe (CSP) listed above.
- .5 Excavation, Bedding and Backfill shall be included in payment for Corrugated Steel Pipe (CSP) Culvert and shall be incidental to the Contract.

**4.2 Precast Concrete Pipe (PCP)**

- .1 Supply and installation of PCP culvert shall be measured on a linear measure basis and paid for at the Contract Unit Price per metre for the “Items of Work” listed below. The length of PCP culvert to be paid for shall be the total number of metres of PCP culvert supplied and installed in accordance with this Specification, accepted and measured by the Contract Administrator.

**Items of Work:**

Precast Concrete Pipe (PCP) Culvert

- i.) Supply\*
- ii.) Install\*

\*Specify Diameter and Class of Culvert

- .2 Separate measurement will be made for each diameter and class of culvert.
- .3 The linear measurement of precast concrete pipe shall be measured horizontally at grade above the centre line of the pipe culvert.
- .4 Gaskets, flexible rubber shall be included in the payment for precast concrete pipe listed above.



- .5 Excavation, Bedding and Backfill shall be included in payment for supply and installation of Precast Concrete Pipe (CSP) culvert and shall be incidental to the Contract.

#### **4.3 High Density Polyethylene Pipe (HDPE)**

- .1 Supply and installation of HDPE culvert shall be measured on a linear measure basis and paid for at the Contract Unit Price per metre for the “Items of Work” listed below. The length of HDPE culvert to be paid for shall be the total number of metres of HDPE culvert supplied and installed in accordance with this Specification, accepted and measured by the Contract Administrator.

Items of Work:

High Density Polyethylene Pipe (HDPE)

- i.) Supply\*
- ii.) Install\*

\*Specify Diameter of Culvert

- .2 Separate measurement will be made for each diameter of culvert.
- .3 The linear measurement of High Density Polyethylene (HDPE) pipe shall be measured horizontally at grade above the centre line of the pipe culvert.
- .4 Split couplers shall be included in the payment for High Density Polyethylene (HDPE).
- .5 Excavation, Bedding and Backfill shall included in payment for “High Density Polyethylene Pipe and shall be incidental to the Contract.

#### **4.4 Connections to Existing Pipe Culverts**

- .1 Connections to existing culverts shall be measured on a unit basis and paid for at the Contract Unit Price per unit for “Connections to Existing Culverts”. The number of units to be paid for shall be the total number of connections installed in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Couplers and necessary hardware, and removal and disposal of damaged or otherwise unacceptable lengths of existing culvert and excavation material shall be included in payment for “Connections to Existing Culverts”.
- .3 New culvert required to replace unacceptable existing culvert shall be measured and paid for in accordance with this Specification.

#### **4.5 Plugging and Abandonment of Existing Pipe Culverts**

- .1 Plugging and abandonment of existing culverts shall be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for “Plugging and Abandonment of Existing Culverts”. The volume to be paid for shall be the total number of cubic metres of cement stabilized fill supplied and placed within the culvert in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 The volume of cement stabilized flowable fill will be calculated using the inside diameter and horizontal length of centre line of the existing culvert abandoned.



**4.6 Removal of Existing Culverts**

- .1 Removal of existing culverts shall be measured on a linear measure basis and paid for at the Contract Unit Price per metre for “Removal of Existing Culverts”. The length to be paid for shall be the total number of meters of existing culvert removed in accordance with this Specification, accepted and measured by the Contract Administrator.
- .2 The linear measurement of existing culvert pipe shall be measured horizontally at grade above the centre line of the pipe culvert.
- .3 Excavation and disposal of surplus material due to removal of existing culverts or portions of damaged culvert, and unacceptable lengths of existing culvert shall be included in the payment for “Removal of Existing Culverts”.
- .4 No payment shall be made for backfill of excavated area with suitable site material and shall be incidental to the Contract.

**4.7 Disposal of Existing Culverts**

- .1 Disposal of existing culverts shall be measured on a linear measure basis and paid for at the Contract Unit Price per metre for “Disposal of Existing Culverts”. The length to be paid for shall be the total number of meters of existing culvert disposed in accordance with this Specification, accepted and measured by the Contract Administrator.
- .2 The linear measurement of existing culvert pipe shall be measured horizontally at grade above the centre line of the pipe culvert.

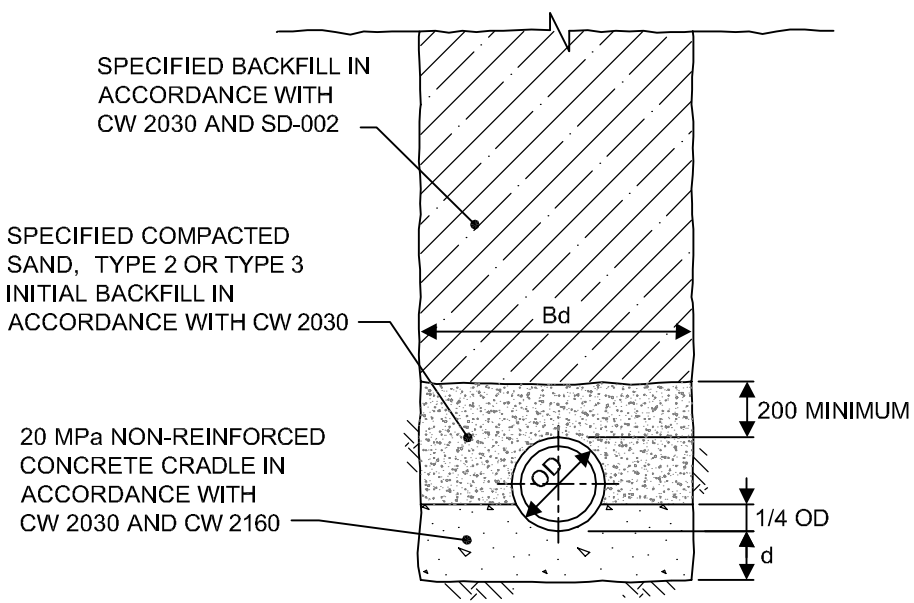
**4.8 Capping for Side Slopes**

- .1 No payment shall be made for capping for side slopes using clay and shall be incidental to the Contract.

**4.9 Culvert End Markers**

- .1 Supply and installation of culvert end markers shall be measured on a unit basis and paid for at the Contract Unit Price per unit for the “Culvert End Markers”. The number of units to be paid for shall be the total number of culvert end markers supplied and installed in accordance with this Specification, accepted and measured by the Contract Administrator.
- .2 No additional payment shall be made for culvert clamps, plated bolts, nuts and washers and are incidental to the Contract.
- .3 One tube and set of hardware for installation to mark one end of a culvert is considered to be a culvert end marker.



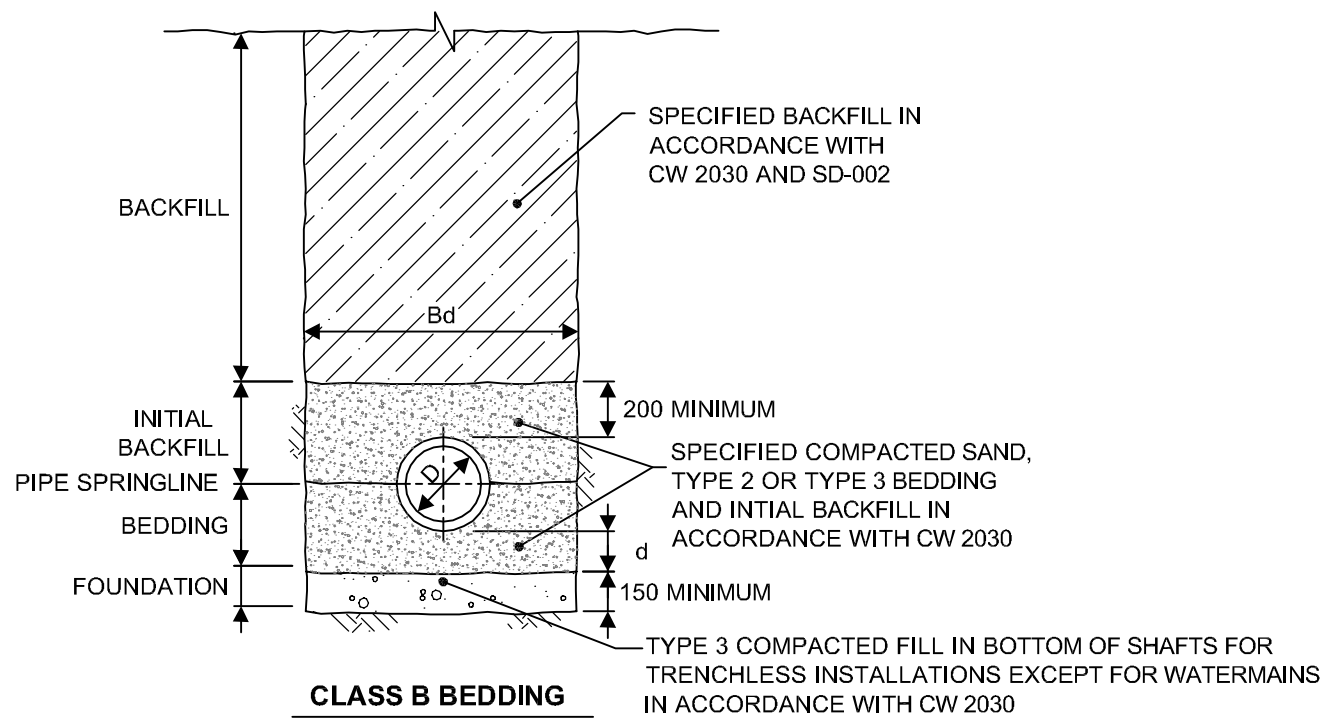


**CLASS A BEDDING  
(CONCRETE PIPE ONLY)**

**NOTES:**

D	d
UP TO 1500	100 MINIMUM
1650 AND UP	150 MINIMUM

Bd = MAXIMUM TRENCH WIDTH FROM UNDERSIDE OF BEDDING OR FOUNDATION TO 600 MILLIMETRES ABOVE TOP OF PIPE  
= GREATER OF 1200 MILLIMETRES OR PIPE OD + 750 MILLIMETRES



**CLASS B BEDDING**

DIMENSIONS IN MILLIMETERS



**THE CITY OF WINNIPEG  
WATER & WASTE DEPARTMENT**

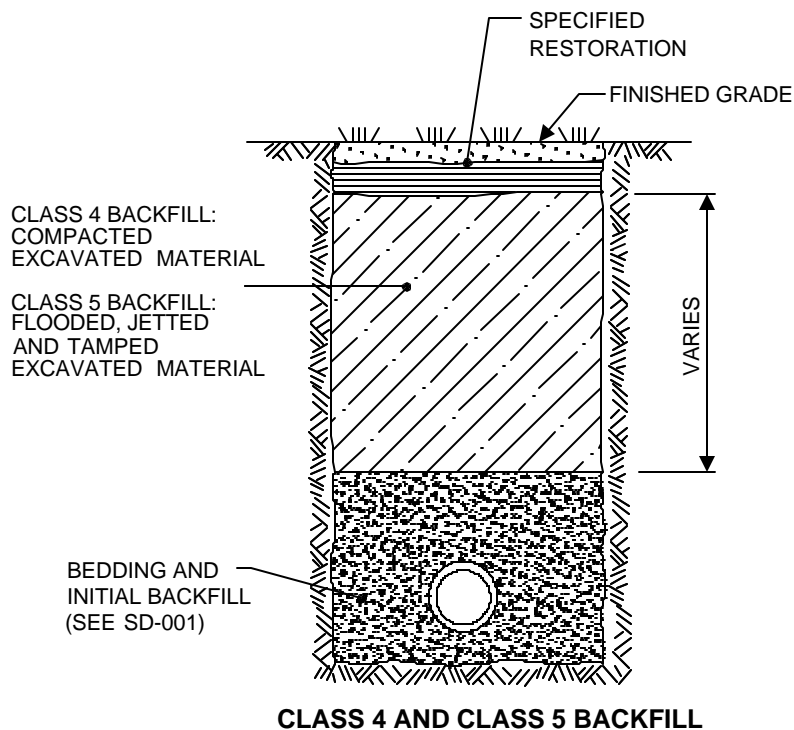
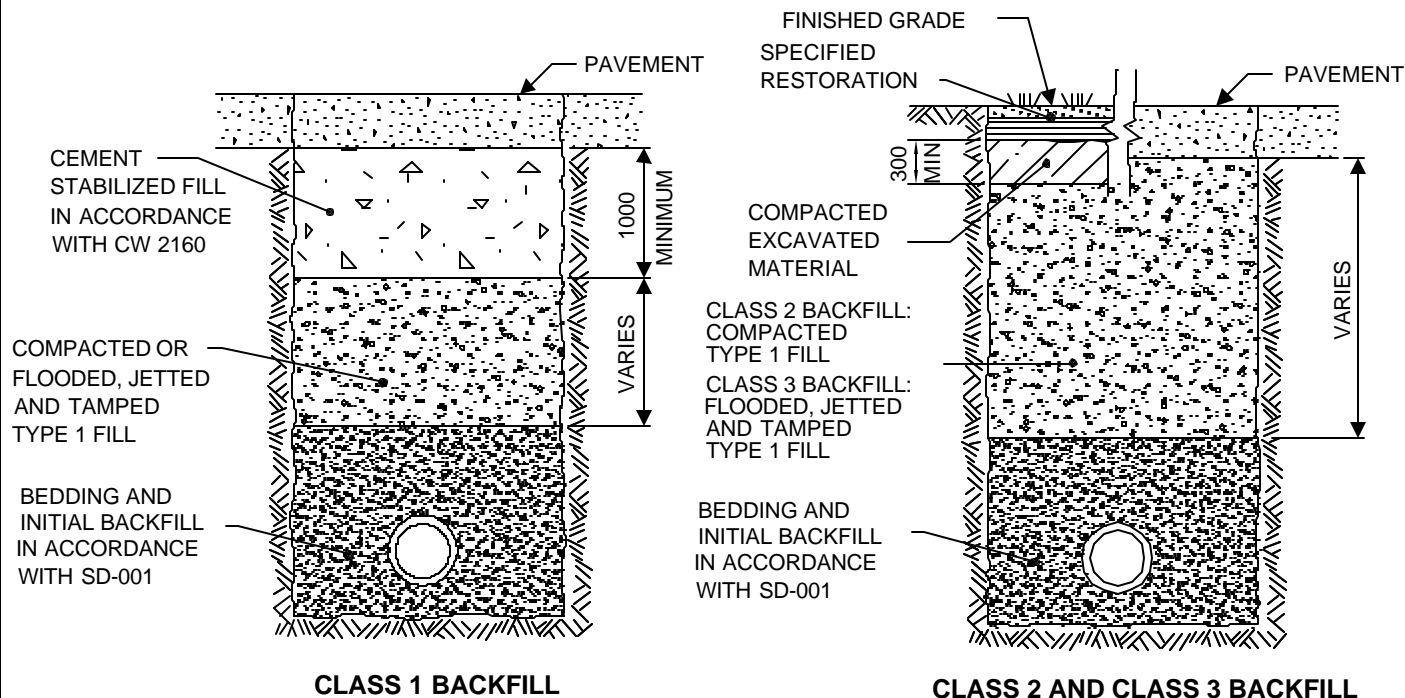
Reference Spec. No.  
CW 2030 CW 2160

**STANDARD PIPE  
BEDDING CLASSES**

Designed By: TW	Drawn By: BH
Checked By: TW	Date: 07-03-01 Revision: 2
Approved: UNDERGROUND WORKS COMMITTEE	

Scale: N.T.S.
Drawing No. SD-001





DIMENSIONS IN MILLIMETERS



# THE CITY OF WINNIPEG

## WATER & WASTE DEPARTMENT

Reference Spec. No.  
CW 2030 CW 2160

### STANDARD TRENCH AND EXCAVATION BACKFILL CLASSES

Designed By:  
TW

Checked By:  
TW

Approved:  
UNDERGROUND WORKS COMMITTEE

Drawn By:  
BH

Date: 04-02-16  
Revision: 2

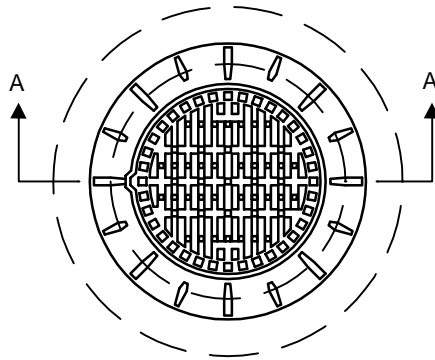
Scale:  
N.T.S.

Drawing No.  
SD-002



**NOTE:** EACH CATCH BASIN TO HAVE SEPARATE CONNECTION TO SEWER OR MANHOLE

USE PREFORMED BITUMINOUS GASKET BETWEEN REDUCER AND BARREL SECTION



STANDARD FRAME (AP-004)  
AND STANDARD GRATED  
COVER (AP-006)

**PLAN**

FINISHED BOULEVARD GRADE

MAXIMUM 2 - 750Ø PRECAST  
CONCRETE ADJUSTING RINGS

900 DIA. x 750 DIA. PRECAST  
CONCRETE REDUCER

900 DIA. PRECAST CONCRETE  
CATCH BASIN BARREL TO  
ASTM C 478 AND C 76 CL II

INITIAL BACKFILL IN ACCORDANCE  
WITH CW 2030 AND SD-001

APPROVED CATCH BASIN  
HOOD

MINIMUM 250 DIA. CATCH BASIN  
LEAD TO SEWER OR MANHOLE

BEDDING IN ACCORDANCE  
WITH CW 2030 AND SD-001

PRECAST CONCRETE  
BASE

19 DIA. RUNGS  
AT 300 O.C.

SPECIFIED BACKFILL  
IN ACCORDANCE WITH  
CW 2030 AND SD-002

100  
MIN.  
200

**SECTION A - A**

DIMENSIONS IN MILLIMETERS



# **THE CITY OF WINNIPEG** **WATER & WASTE DEPARTMENT**

Reference Spec. No.

CW 2030 CW 2130

STANDARD PRE-CAST  
CONCRETE CATCH BASIN  
IN BOULEVARD

Designed By:  
LSWL / TW

Checked By:  
TW

Approved:  
UNDERGROUND WORKS COMMITTEE

Drawn By:  
BH

Date: 05-02-22  
Revision: 1

Scale:

N.T.S.

Drawing No.

SD-025