



# Public Works and Government Services Canada

Requisition No: EZ899-152067/A

**DRAWINGS & SPECIFICATIONS**

For:

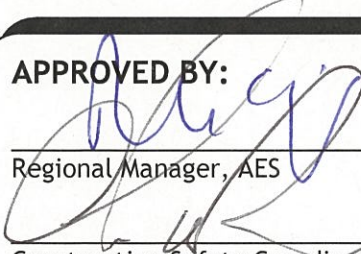
Agassiz BC Kent Institution

**DISHWASHER REPLACEMENT**

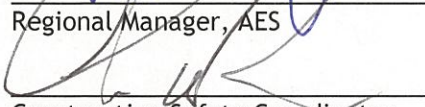
Kitchen Unit Q

Project # R.070775.001

**APPROVED BY:**

  
Regional Manager, AES

2015-07-27  
Date

  
Construction Safety Coordinator

2015-01-15  
Date

**TENDER:**

  
Project Manager

2015-02-02  
Date

**SPECIFICATION**

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**END OF INDEX**

**SEAL & SIGNATURE**

**Discipline**

Mechanical

**Seal & Signature**



**END OF SECTION**

**SEAL & SIGNATURE**

Discipline

Seal & Signature

Electrical



Jan 13, 2015.

**END OF SECTION**

## **1 SUMMARY OF WORK**

- .1 Work covered by Contract Documents:
  - .1 Work under this Contract comprises the removal and disposal of the existing dishwasher unit at Kitchen Unit Q, Dishwasher Area, located within Kent Institution, Agassiz BC. Contract also includes the provision and installation of a new Dishwasher Unit and Blower/Dryer; new Dish Tabling to accommodate new Waste Unit; new Exiting Tabling; and remedial work and painting as required where affected by contract. Do not start construction work until Dishwasher Unit is shipped (est. 6-8 week shipment from receipt of approved shop drawings).
- .2 Occupancy:
  - .1 The Institution and Kitchen Unit Q will be operational during entire construction period.
  - .2 Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate CSC usage of premises.
- .3 Contractor's Use of Premises:
  - .1 Contractor has limited use of Kitchen Unit Q and must phase work as instructed by Departmental Representative to suit operational requirements.
  - .2 Contractor has use of immediate construction areas for performance of Work and limited storage space for materials.
  - .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
  - .4 Vehicular access through the Sally Port will be restricted during the inmate "count" at breakfast, lunch and dinner hours. Confirm times with Departmental Representative. Delays may occur when entering and exiting the Institution with vehicles due to security situations and heavy traffic.
- .4 Contractor Responsibilities:
  - .1 Contractor to remove debris off-site daily.
  - .2 Review shop drawings and manufacturer's instructions. Submit to Departmental Representative notification of observed discrepancies or problems anticipated due to site conditions and/or non-conformance with Contract Documents.
  - .3 Implement contract as per drawings and specifications.
  - .4 Handle products at site, including uncrating and temporary daily storage.
  - .5 Protect products from damage, and from exposure to elements.
  - .6 Assemble, install, connect, adjust, and finish products.
  - .7 Repair items damaged by Contractor on site (under his control).
- .5 Departmental Representative Responsibilities:
  - .1 Departmental Representative to co-ordinate project with Institution.

## **2 WORK RESTRICTIONS**

- .1 Notify, Departmental Representative of intended interruption of power and other services and provide schedule of interruption times.
  - .2 Security Requirements: refer to Section 01 14 10 - Security Requirements.
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- .3 Hours of work:
  - .1 Perform work 017:30 to 05:30, Monday through Friday except holidays, except as noted in Construction Work Schedule .
  - .2 Work may be performed on weekends and holidays. 7 days of notification to the Departmental Representative are required.
  - .3 Notify Departmental Representative forty-eight hours in advance of when after hours work will be required.
  - .4 Provide schedule for prior approval of Departmental Representative.

### **3 CONSTRUCTION WORK SCHEDULE**

- .1 Commence work immediately upon official notification of acceptance of offer and complete the work within twelve (12) weeks from the date of such notification.
- .2 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Substantial Certificate and Final Certificate as defined times of completion are of essence of this contract.
- .3 Submittal:
  - .1 Submit to Departmental Representative within ten (10) working days of Award of Contract schedule of work.
  - .2 Departmental Representative will review schedule and return one copy.
  - .3 Re-submit two (2) copies of finalized schedule to Departmental Representative after return of reviewed preliminary copy.
- .4 Project Meetings:
  - .1 Progress meetings to be bi-weekly.

### **4 SUBMITTAL PROCEDURES**

- .1 Administrative:
    - .1 Submit to Departmental Representative submittal listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
    - .2 Work affected by submittal shall not proceed until review is complete.
    - .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
    - .4 Where items or information is not produced in SI Metric units converted values are acceptable.
    - .5 Review submittal prior to submission to Departmental Representative . This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittal not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be considered rejected.
    - .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
    - .7 Verify field measurements and affected adjacent Work are coordinated.
    - .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative review of submittal.
    - .9 Keep one reviewed copy of each submission on site.
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**5 HEALTH AND SAFETY**

Specified in Section 01 35 33.

**6 ENVIRONMENTAL PROCEDURES**

- .1 Do not dispose of waste or volatile materials such as oil, paint thinner or mineral spirits into storm or sanitary systems.
- .2 Under no circumstances dispose of rubbish or waste materials in CSC waste bins or on adjoining property.

**7 REGULATORY REQUIREMENTS**

- .1 References and Codes:
  - .1 Perform Work in accordance with National Building Code of Canada (NBCC2010) and where applicable British Columbia Building Code (BCBC2006) including all amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
  - .2 Meet or exceed requirements of:
    - .1 Contract documents.
    - .2 Specified standards, codes and referenced documents.

**8 QUALITY CONTROL**

- .1 Inspection:
  - .1 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
  - .2 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
  - .3 Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.
- .2 Rejected Work:
  - .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
  - .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 Equipment and Systems:
  - .1 Install in accordance with manufacturer's instructions.

**9 TEMPORARY UTILITIES**

- .1 Temporary Ventilation:
  - .1 The existing air system will be in use during work of this contract inside existing building. During dust/fume generating construction work block off all outlets and seal air tight.
  - .2 Provide adequate ventilation to meet health regulations for safe working environment.
- .2 Ventilating:
  - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
  - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
  - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .3 Temporary Power and Light:
  - .1 Electrical power and lighting in existence in work area may be used for construction purposes at no extra cost, provided that electrical components used for temporary power are replaced when damaged.
  - .2 Conform to Section 01 35 33 Safety Requirements for use of existing power systems

**10 CONSTRUCTION FACILITIES**

- .1 Installation and Removal:
    - .1 Provide construction facilities in order to execute work expeditiously.
    - .2 Remove from site all such work after use.
  - .2 Site Storage/Loading:
    - .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
    - .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.
  - .3 Construction Parking:
    - .1 Park personnel vehicles outside perimeter fence in designated parking areas.
  - .4 Contractor's Site Office and enclosure:
    - .1 Locate office outside Institution double fence as directed by the Departmental Representative.
  - .5 Equipment, Tools and Material Storage:
    - .1 Provide and maintain, in a clean and orderly condition, lockable bins for storage of tools, and equipment.
    - .2 Locate materials in a manner to cause least interference with work activities.
  - .6 Sanitary Facilities:
    - .1 Existing washroom facilities may be used during the construction period as designated by Departmental Representative.
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- .7 Construction Signs:
  - .1 Signs and notices for safety or instruction to be in English language, or commonly understood graphic symbols.
  - .2 Remove signs from site at completion of project or as directed by Departmental Representative.

## **11 TEMPORARY BARRIERS AND ENCLOSURES**

- .1 Protection of openings:
  - .1 Provide secure protection for openings during construction to maintain security.
- .2 Protection for Off-Site and CSC Property:
  - .1 Protect surrounding CSC property from damage during performance of Work.
  - .2 Be responsible for damage incurred.
- .3 Protection of Building Finishes:
  - .1 Provide protection for building finishes and equipment during performance of Work.
  - .2 Provide necessary screens, covers, and hordings.
  - .3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.
  - .4 Be responsible for damage incurred due to lack of or improper protection.

## **12 COMMON PRODUCT REQUIREMENTS**

- .1 Reference Standards:
  - .1 If there is a question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
  - .2 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.
  - .3 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.
- .2 Quality:
  - .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
  - .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
  - .3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .3 Storage, Handling and Protection:
  - .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
  - .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until

- required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
  - .4 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
  - .5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative .
- .4 Transportation:
- .1 Pay costs of transportation of products required in performance of Work.
- .5 Manufacturer's Instructions:
- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products.
  - .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.
- .6 Quality of Work:
- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
  - .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
  - .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.
- .7 Co-ordination:
- .1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.
  - .2 Be responsible for coordination and placement of openings, and accessories.
- .8 Remedial Work:
- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
  - .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.
- .9 Fastenings:
- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
  - .2 Prevent electrolytic action between dissimilar metals and materials.
  - .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing work, unless stainless steel or other material is specifically requested in affected specification Section.
- .10 Substitution after award of Contract:
- .1 No substitutions are permitted without prior written approval of the Departmental Representative.
  - .2 Proposals for substitution may only be submitted after Contract award. Such request
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must include statements of respective costs of items originally specified and the proposed substitution.

- .3 Proposals will be considered by the Departmental Representative if:
  - .1 Products selected by tenderer from those specified are not available;
  - .2 delivery date of products selected from those specified would unduly delay completion of Contract, or
- .4 Alternative product to that specified, which is brought to the attention of and considered by Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount.
- .5 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as result of substitution.
- .6 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative, and the Contract price will be reduced accordingly.

### **13 EXECUTION REQUIREMENTS**

- .1 Preparation:
  - .1 Inspect existing conditions, including elements subject to damage or movement during drilling and patching.
  - .2 After uncovering, inspect conditions affecting performance of Work.
  - .3 Beginning of drilling or patching means acceptance of existing conditions.
  - .4 Provide devices and methods to protect adjacent surfaces from damage.
- .2 Execution:
  - .1 Execute drilling, fitting, and patching to complete Work.
  - .2 Fit several parts together, to integrate with other Work.
  - .3 Uncover Work to install ill-timed Work.
  - .4 Remove and replace defective and non-conforming Work.
  - .5 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
  - .6 Cut rigid materials using purpose made saw or core drill. Pneumatic or impact tools not allowed on brittle materials without prior approval.
  - .7 Restore work with new products in accordance with requirements of Contract Documents.
  - .8 Fit Work airtight to penetrations through surfaces.
  - .9 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

### **14 CLEANING**

- .1 Project Cleanliness:
  - .1 Maintain Work in tidy condition, free from accumulation of waste products and debris. Remove on a regular basis at the end of each daily work shift.
  - .2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
  - .3 Provide on-site containers for collection of waste materials and debris.
  - .4 Provide and use clearly marked separate bins for recycling. Refer to- Construction/Demolition Waste Management And Disposal.

- .5 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
  - .6 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
  - .7 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
  - .8 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
  - .9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- .2 Final Cleaning:
- .1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
  - .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
  - .3 Prior to final review, remove surplus products, tools, and equipment.
  - .4 Remove waste products.
  - .5 Clean adjacent surfaces affected by renovation work.
  - .6 Remove stains, spots, marks and dirt from adjacent surfaces, walls and floors.
  - .7 Vacuum clean and dust building interior at work areas.

## **15 CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL**

- .1 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and/or recyclable materials and waste.
  - .1 Separate non-salvageable materials from salvaged items.
  - .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.
  - .3 Transport and deliver non-salvageable items to licensed disposal facility.
- .2 Provide containers to deposit reusable and/or recyclable materials. Locate containers in locations, to facilitate deposit of materials without hindering daily operations. Provide containers to deposit reusable and/or recyclable materials.
- .3 Collect, handle, store on-site and transport off-site, salvaged materials in separate condition. Transport to approved and authorized recycling facility and/or users of material for recycling.
- .4 Locate waste and salvage bins on site as directed by Departmental Representative.

## **16 CLOSEOUT PROCEDURES**

- .1 Inspection and Declaration:
  - .1 Contractor's Inspection: Conduct an inspection of Work with all subcontractors, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .2 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  - .3 Request Departmental Representative's Inspection.
- .2 Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

- .3 Completion: submit written certificate that following have been performed:
  - .1 Work has been completed and inspected for compliance with Contract Documents.
  - .2 Defects have been corrected and deficiencies have been completed.
  - .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
  - .4 Work is complete and ready for Final Inspection.
- .4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request reinspection.

## **17 CLOSEOUT SUBMITTAL**

- .1 Record Drawings:
  - .1 As work progresses, maintain accurate records to show all deviations from the Contract Drawings. Note on as-built drawings in red as changes occur. At completion supply:
    - .1 One (1) set of marked up as-built drawings. One disk of As-built CADD drawings.
    - .2 Contractor may place on the upper right-hand title block area a small company logo, the text "AS-BUILT" and the date.

## **18 COMMISSIONING**

- .1 Testing, Demonstration and Training:
  - .1 Arrange, plan and coordinate, with Departmental Representative, for complete demonstration of the equipment with the Owner and their designated staff.
  - .2 Confirm that all equipment has been cleaned, tested, and adjusted by qualified personnel prior to the demonstration to ensure that all correct services have been provided and that the equipment is fully operational.
  - .3 Provide demonstration of all equipment by competent representatives. Demonstration to include proper function, proper operation, and proper cleaning of the equipment.

**END OF SECTION**

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**1 PURPOSE**

- .1 To ensure that both the construction project and the institutional operations may proceed without undue disruption or hindrance and that the security of the Institution is maintained at all times.

**2 DEFINITIONS**

- .1 "Contraband" means:
  - (a) an intoxicant, including alcoholic beverages, drugs and narcotics
  - (b) a weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization,
  - (c) an explosive or a bomb or a component thereof,
  - (d) currency over any applicable prescribed limit, \$25.00, and
  - (e) any item not described in paragraphs (a) to (d) that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization.
- .2 "Unauthorized smoking and related Items" means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing tobacco, cigarette making machines, matches and lighters.
- .3 "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.
- .4 "CSC" means Correctional Service Canada.
- .5 "Director" means Director or Warden of the Institution as applicable or their representative.
- .6 "Construction employees" means persons working for the general contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies. Workers 18 years or younger are not permitted within Institution.
- .7 "Departmental Representative" means the Public Works and Government Services Canada representative defined in General Conditions.
- .8 "Perimeter" means the fenced or walled area of the institution that restrains the movement of the inmates.
- .9 "Construction zone" means the area, as indicated in the contract documents, that the contractor will be allowed to work". This area may or may not be isolated from the security area of the Institution. Limits to be confirmed at construction start-up meeting.
  - .1 Construction zone for this contract includes the project location at Kent Institution - Kitchen Unit Q - Dishwasher Area.

**3 PRELIMINARY PROCEEDINGS**

- .1 At construction start-up meeting:
  - .1 Discuss the nature and extent of all activities involved in the Project.
  - .2 Establish mutually acceptable security procedures in accordance with this instruction and the Institution's particular requirements.
- .2 The contractors's responsibilities:
  - .1 Ensure that all construction employees are aware of the CSC security requirements.
  - .2 Ensure that a copy of the CSC security requirements is always prominently on display at the job site.
  - .3 Co-operate with institutional personnel in ensuring that security requirements are observed by all construction employees.

**4 CONSTRUCTION EMPLOYEES**

- .1 Submit to the Departmental Representative a list of the names with date of birth of all construction employees to be employed on the construction site and a security clearance form for each employee.
- .2 Allow 10 working days for processing of security clearances. Employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's license. Security clearances obtained from other CSC Institutions are not valid at this Institution except as approved otherwise.
- .3 The Director may require that facial photographs may be taken of construction employees and these photographs may be displayed at appropriate locations in the Institution or in an electronic database for identification purposes. The Director may require that Photo ID cards be provided for all construction workers. ID cards will then be left at the designated entrance to be picked upon arrival at the Institution and shall be displayed prominently on the construction employees clothing at all time while employees are at the Institution.
- .4 Entry to Institutional Property will be refused to any person if there is reason to believe that they may be a security risk.
- .5 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:
  - .1 appear to be under the influence of alcohol, drugs or narcotics.
  - .2 behave in an unusual or disorderly manner.
  - .3 are in possession of contraband.
  - .4 are 18 years old or younger.

**5 VEHICLES**

- .1 All unattended vehicles on CSC property must have windows closed; fuel caps locked, doors and trunks locked and keys removed. The keys must be securely in the possession of the owner or an employee of the company that owns the vehicle.
- .2 The director may limit at any time the number and type of vehicles allowed within the Institution.
- .3 Drivers of delivery vehicles for material required by the project will require security clearances and must remain with their vehicle the entire time that the vehicle is in the Institution. The director may require that these vehicles be escorted by Institutional staff or PWGSC Construction Escorts while in the Institution.
- .4 If the Director permits trailers to be left inside the secure perimeter of the Institution, the trailer doors must be locked at all times. All windows must be securely locked bars when left unoccupied. Cover all windows with expanded metal mesh. When not in use lock all storage trailers located inside and outside the perimeter. All storage trailers inside and outside the perimeter must be locked when not in use.

**6 PARKING**

- .1 The parking area(s) to be used by construction employees will be designated by the Director. Parking in other locations will be prohibited and vehicles may be subject to removal.
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**7 SHIPMENTS**

- .1 To avoid confusion with the Institution's own shipments, address all shipments of project material, equipment and tools in the Contractor's name and have a representative on site to receive any deliveries or shipments. CSC or PWGSC staff will **NOT** accept receipt of deliveries or shipments of any material equipment or tools for the contractor.

**8 TELEPHONES**

- .1 The installation of telephones, facsimile machines and computers with Internet connections is not permitted within the Institution perimeter unless prior approved by the Director.
- .2 The Director will ensure that approved telephones, facsimile machine and computers with Internet connections are located where they are not accessible to inmates. All computers will have an approved password protection that will stop an Internet connection to unauthorized personnel.
- .3 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, Blackberries, PDAs, telephone used as 2-way radios are not permitted within the Institution unless approved by the Director. If wireless cellular telephones are permitted, the user will not permit their use by any inmate.
- .4 The Director may approve but limit the use of 2-way radios.

**9 WORK HOURS**

- .1 Work hours within the Institution are: conform to Division 1.
- .2 Work is not permitted during weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waved by the Director.

**10 OVERTIME WORK**

- .1 Conform to Division 1.
- .2 Provide 48 hours advance notice to Director for all work to be performed after normal working hours of the Institution. Notify Director immediately if emergency work is required, such as to complete a concrete pour or make the construction site safe and secure.

**11 TOOLS AND EQUIPMENT**

- .1 Maintain a complete list of all tools and equipment to be used during the construction project. Make this inventory available for inspection when required by the Institution.
  - .2 Throughout the construction project maintain up-to-date the list of tools and equipment specified above.
  - .3 Keep all tools and equipment under constant supervision, particularly power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.
  - .4 Store all tools and equipment in approved secure locations.
  - .5 Lock all tool boxes when not in use. Keys to remain in the possession of the employees of the contractor. Secure and lock scaffolding when not erected and when erected Secure in a manner agreed upon with the Institution designate.
-

- .6 Report all missing or lost tools or equipment immediately to the Departmental Representative/Director.
- .7 The Director will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:
  - .1 At the beginning and conclusion of every work day or shift upon entering and exiting the Institution.
  - .2 At any time when contractor is on Institution property.
- .8 Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Director's representative at the end of each day. Maintain up to date inventory of all used blades/cartridges.
- .9 If propane or natural gas is used for heating the construction, the Institution will require that the contractor supervise the construction site during non-working hours.

## **12 KEYS**

- .1 Security Hardware Keys.
  - .1 Arrange with the security hardware supplier/installer to have the keys for the security hardware to be delivered directly to Institution, specifically the Security Maintenance Officer (SMO).
  - .2 The SMO will provide a receipt to the Contractor for security hardware keys.
  - .3 Provide a copy of the receipt to the Departmental Representative.
- .2 Other Keys
  - .1 Use standard construction cylinders for locks for his use during the construction period.
  - .2 Issue instructions to employees and sub-trades, as necessary, to ensure safe custody of the construction set of keys.
  - .3 Upon completion of each phase of the construction, the CSC representative will, in conjunction with the lock manufacturer:
    - .1 Prepare an operational keying schedule
    - .2 Accept the operational keys and cylinders directly from the lock manufacturer.
    - .3 Arrange for removal and return of the construction cores and install the operational core in all locks.
  - .4 Upon putting operational security keys into use, the PWGSC construction escort will obtain these keys as they are required from the SMO and open doors as required by the Contractor. The Contractor shall issue instructions to his employees advising them that all security keys shall always remain with the PWGSC construction escort.

## **13 SECURITY HARDWARE**

- .1 Turn over all removed security hardware to the Director of the Institution for disposal or for safekeeping until required for re-installation.

## **14 PRESCRIPTION DRUGS**

- .1 Employees of the contractor who are required to take prescription drugs during the workday shall obtain approval of the Director to bring a one day supply only into the Institution.
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**15 SMOKING RESTRICTIONS**

- .1 Smoking is not permitted inside correctional facilities or outdoors within the perimeter of a correctional facility and persons must not possess unauthorized smoking items within the perimeter of a correctional facility.
- .2 Persons in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist will be directed to leave the Institution.
- .3 Smoking is permitted outside the perimeter of a correctional facility in an area designated by the Director.

**16 CONTRABAND**

- .1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on Institutional property.
- .2 The discovery of contraband on the construction site and the identification of the person(s) responsible for the contraband shall be reported immediately to the Director.
- .3 Contractors should be vigilant with both their staff and the staff of their sub-contractors and suppliers that the discovery of contraband may result in cancellation of the security clearance of the affected employee. Serious infractions may result in the removal of the company from the Institution for the duration of the construction.
- .4 Presence of arms and ammunition in vehicles of contractors, sub-contractors and suppliers or employees of these will result in the immediate cancellation of security clearances for the driver of the vehicle.

**17 SEARCHES**

- .1 All vehicles and persons entering Institutional property may be subject to search.
- .2 When the Director suspects, on reasonable grounds, that an employee of the Contractor is in possession of contraband, he may order that person to be searched.
- .3 All employees entering the Institution may be subject to screening of personal effects for traces of contraband drug residue.

**18 ACCESS TO AND REMOVAL FROM INSTITUTIONAL PROPERTY**

- .1 Construction personnel and commercial vehicles will not be admitted to the Institution after normal working hours, unless approved by the Director.

**19 MOVEMENT OF VEHICLES**

- .1 Construction vehicles are not to leave the Institution until an inmate count is completed. Escorted commercial vehicles will be allowed to enter or leave the Institution through the vehicle access gate during the following hours:
  - .1 AM: 0745 hrs. to 1100 hrs.
  - .2 PM: 1300hrs. to 1530 hrs.
- .2 The contractor will advise the Director twenty four (24) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.

- .3 Vehicles being loaded with soil or other debris, or any vehicle considered impossible to search, must be under continuous supervision by CSC staff or PWGSC construction escorts working under the authority of the Director.
- .4 Commercial vehicles will only be allowed access to institutional property when their contents are certified by the Contractor or his representative as being strictly necessary to the execution of the construction project.
- .5 Vehicles will be refused access to institutional property if, in the opinion of the Director, they contain any article which may jeopardize the security of the Institution. Arrange with Director for parking of contractor's vehicles at minimum security Institutions.
- .6 Private vehicles of construction employees will not be allowed within the security wall or fence of medium or maximum security institutions without the authorization of the Director.
- .7 With the approval of the Director, certain equipment may be permitted to remain on the construction site overnight or over the weekend. This equipment must be securely locked, with the battery removed. The Director may require that the equipment be secured with a chain and padlock to another solid object.

## **20 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY**

- .1 Subject to the requirements of good security, the Director will permit the Contractor and his employees as much freedom of action and movement as is possible.
- .2 However, notwithstanding paragraph above, the Director may:
  - .1 Prohibit or restrict access to any part of the Institution.
  - .2 Require that in certain areas of the Institution, either during the entire construction project or at certain intervals, construction employees only be allowed access when accompanied by a member of the CSC security staff or PWGSC Construction Escort Officer.
- .3 During the lunch and coffee/health breaks, all construction employees will remain within the construction site. Construction employees are not permitted to eat in the Institution cafeteria and dining room.

## **21 SURVEILLANCE AND INSPECTION**

- .1 Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met.
- .2 CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among construction employees and maintained throughout the construction project.

## **22 STOPPAGE OF WORK**

- .1 The director may request at any time that the contractor, his employees, sub-contractors and their employees not enter or leave the work site immediately due to a security situation occurring within the Institution. The contractor's site supervisor will note the name of the staff member giving the instruction, the time of the request and obey the order as quickly as possible.
  - .2 The contractor shall advise the Departmental Representative of this interruption of the work within 24 hours.
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**23 CONTACT WITH INMATES**

- .1 Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any employee doing any of the above will be removed from the site and his security clearance revoked.
- .2 Digital cameras (or any other type) are not allowed on CSC property.
- .3 Notwithstanding the above paragraph, if the director approves of the use of cameras, it is strictly forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this contract.

**24 COMPLETION OF CONSTRUCTION PROJECT**

- .1 Upon completion of the construction project or, when applicable, the takeover of a facility, the Contractor shall remove all remaining construction material, tools and equipment that are not specified to remain in the Institution as part of the construction contract.

**END OF SECTION**

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## **1. REFERENCES**

- .1 Government of Canada.
  - .1 Canada Labour Code - Part II
  - .2 Canada Occupational Health and Safety Regulations.
- .2 National Building Code of Canada (NBC):
  - .1 Part 8, Safety Measures at Construction and Demolition Sites.
- .3 Canadian Standards Association (CSA):
  - .1 CSA Z797-2009, Code of Practice for Access Scaffold.
  - .2 CSA S269.1-1975 (R2003), Falsework for Construction Purposes.
  - .3 CSA-S350-M1980, Code of Practice for Safety in Demolition of Structures.
- .4 Fire Protection Engineering Services (HRSDC):
  - .1 FCC No. 301, Standard for Construction Operations.
  - .2 FCC No. 302, Standard for Welding and Cutting.
- .5 American National Standards Institute (ANSI):
  - .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
- .6 Province of British Columbia:
  - .1 Workers Compensation Act Part 3 - Occupational Health and Safety.
  - .2 Occupational Health and Safety Regulation.

## **2. RELATED SECTIONS**

- .1 Refer to the following current NMS sections as required:
  - .1 Submittals procedures: Section 01 01 50

## **3. WORKERS' COMPENSATION BOARD COVERAGE**

- .1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.
- .2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

## **4. COMPLIANCE WITH REGULATIONS**

- .1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
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- .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

## **5. SUBMITTALS**

- .1 Make submittals in accordance with Section 01 01 50.
- .2 Work effected by submittal shall not proceed until review is complete.
- .3 Submit the following:
  - .1 Health and Safety Plan.
  - .2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
  - .3 Copies of incident and accident reports.
  - .4 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
  - .5 Emergency procedures.
- .4 The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative
- .5 Medical surveillance: where prescribed by legislation, regulation or safety program, Submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.
- .6 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
  - .1 Be construed to imply approval by the Departmental Representative.
  - .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
  - .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

## **6. RESPONSIBILITY**

- .1 Assume responsibility as the Prime Contractor for work under this contract.
  - .2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
  - .3 Comply with and enforce compliance by employees with safety requirements of Contract
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- . documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

## **7. HEALTH AND SAFETY COORDINATOR**

- .1 The Health and Safety Coordinator must:
  - .1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.
  - .2 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.
  - .3 Be on site during execution of work.

## **8. GENERAL CONDITIONS**

- .1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- .2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.
  - .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
  - .2 Secure site at night time or provide security guard as deemed necessary to protect site against entry.

## **9. PROJECT/SITE CONDITIONS**

- .1 Work at site will involve contact with:
  - .1 Inmates of the Institution.

## **10. REGULATORY REQUIREMENTS**

- .1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.
- .2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

## **11. WORK PERMITS**

- .1 Obtain specialty permits related to project before start of work.
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**12. FILING OF NOTICE**

- .1 The Contractor is to complete and submit a Notice of Project as required by Provincial authorities.

**13. HEALTH AND SAFETY PLAN**

- .1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.
  - .2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
    - .1 Primary requirements:
      - .1 Contractor's safety policy.
      - .2 Identification of applicable compliance obligations.
      - .3 Definition of responsibilities for project safety/organization chart for project.
      - .4 General safety rules for project.
      - .5 Job-specific safe work, procedures.
      - .6 Inspection policy and procedures.
      - .7 Incident reporting and investigation policy and procedures.
      - .8 Occupational Health and Safety Committee/Representative procedures.
      - .9 Occupational Health and Safety meetings.
      - .10 Occupational Health and Safety communications and record keeping procedures.
    - .2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
    - .3 List hazardous materials to be brought on site as required by work.
    - .4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
    - .5 Identify personal protective equipment (PPE) to be used by workers.
    - .6 Identify personnel and alternates responsible for site safety and health.
    - .7 Identify personnel training requirements and training plan, including site orientation for new workers.
  - .3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.
  - .4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
  - .5 Departmental Representative's review: the review of Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.
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**14. EMERGENCY PROCEDURES**

- .1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:
  - .1 Designated personnel from own company.
  - .2 Regulatory agencies applicable to work and as per legislated regulations.
  - .3 Local emergency resources.
  - .4 Departmental Representative and PWGSC site staff.
- .2 Include the following provisions in the emergency procedures:
  - .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
  - .2 Evacuate all workers safely.
  - .3 Check and confirm the safe evacuation of all workers.
  - .4 Notify the fire department or other emergency responders.
  - .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
  - .6 Notify Departmental Representative and PWGSC site staff.
- .3 Provide written rescue/evacuation procedures as required for, but not limited to:
  - .1 Work at high angles.
  - .2 Work in confined spaces or where there is a risk of entrapment.
  - .3 Work with hazardous substances.
  - .4 Underground work.
  - .5 Work on, over, under and adjacent to water.
  - .6 Workplaces where there are persons who require physical assistance to be moved.
- .4 Design and mark emergency exit routes to provide quick and unimpeded exit.
- .5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

**15. HAZARDOUS PRODUCTS**

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
  - .2 Where use of hazardous and toxic products cannot be avoided:
    - .1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 01 50.
    - .2 In conjunction with Departmental Representative, schedule to carry out work during "off hours" when tenants have left the building.
    - .3 Provide adequate means of ventilation.
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**16. REMOVAL OF LEAD CONTAINING PAINTS**

- .1 All paints containing TCLP lead concentrations above 5 ppm are classified as hazardous.
- .2 Carry out demolition activities involving lead-containing paints in accordance with applicable Provincial or Territorial regulations.

**17. ELECTRICAL SAFETY REQUIREMENTS**

- .1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.
  - .1 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.
  - .2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel site.

**18. ELECTRICAL LOCKOUT**

- .1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.
- .2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.
- .3 Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

**19. OVERLOADING**

- .1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

**20. SCAFFOLDING**

- .1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA-Z797-2009 and B.C. Occupational Health and Safety Regulations.

**21. POWDER-ACTIVATED DEVICES**

- .1 Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.
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**22. FIRE SAFETY AND HOT WORK**

- .1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.
- .2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

**23. FIRE SAFETY REQUIREMENTS**

- .1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

**24. FIRE PROTECTION AND ALARM SYSTEM**

- .1 Fire protection and alarm systems shall not be:
  - .1 Obstructed.
  - .2 Shut off.
  - .3 Left inactive at the end of a working day or shift.
- .2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.
- .3 Be responsible/liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

**25. UNFORESEEN HAZARDS**

- .1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.

**26. POSTED DOCUMENTS**

- .1 Post legible versions of the following documents on site:
    - .1 Health and Safety Plan.
    - .2 Sequence of work.
    - .3 Emergency procedures.
    - .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshaling station, and the emergency transportation provisions.
    - .5 Notice of Project.
    - .6 Floor plans or site plans.
    - .7 Notice as to where a copy of the Workers' Compensation Act and Regulations
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- are available on the work site for review by employees and workers.
- .8 Workplace Hazardous Materials Information System (WHMIS) documents.
- .9 Material Safety Data Sheets (MSDS).
- .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

- .2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
- .3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

## **27. MEETINGS**

- .1 **Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.**

## **28. CORRECTION OF NON-COMPLIANCE**

- .1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.
- .3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

**END OF SECTION**

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**PART 1 GENERAL**

**1.1 DESCRIPTION OF WORK**

- .1 Includes general requirements for commissioning facilities and facility systems.
- .2 Refer to sections of Mechanical, Electrical and Communications disciplines.

**1.2 DEFINITIONS**

- .1 Acronyms:
  - AFD - Alternate Forms of Delivery, service provider.
  - BMM - Building Management Manual.
  - Cx - Commissioning.
  - EMCS - Energy Monitoring and Control Systems.
  - O&M - Operation and Maintenance.
  - PI - Product Information.
  - PV - Performance Verification.
  - TAB - Testing, Adjusting and Balancing.
- .2 Cx - a required program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved.

**1.3 QUALITY ASSURANCE**

- .1 Testing organization: current member in good standing of AABC certified to perform specified services.
- .2 Comply with applicable procedures and standards of the certification sponsoring association.
- .3 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

**1.4 REFERENCES**

- .1 Associated Air Balance Council (AABC): National Standards for Field Measurement and Instrumentation, Total Systems Balance, Air Distribution-Hydronics Systems.

**1.5 SUBMITTALS**

- .1 Prior to start of Work, submit name of organization proposed to perform services. Designate who has managerial responsibilities for coordination of entire testing, adjusting and balancing.
  - .1 Submit documentation to confirm organization compliance with quality assurance provision.
- .2 Submit 3 preliminary specimen copies of each of report forms proposed for use.
- .3 Ten (10) days prior to Substantial Performance, submit 3 copies of final reports on applicable forms.
- .4 Submit reports of testing, adjusting and balancing postponed due to seasonal, climatic, occupancy, or other reasons beyond Contractor's control, promptly after execution of those services.



**1.6 PROCEDURES**

- .1 Comply with procedural standards of certifying association under whose standard services will be performed.
- .2 Notify Departmental Representative 3 days prior to beginning of operations.
- .3 Accurately record data for each step.
- .4 Report to Departmental Representative any deficiencies or defects noted during performance of services.

**1.7 CONTRACTOR'S RESPONSIBILITIES**

- .1 Prepare each system for testing and balancing.
- .2 Cooperate with testing organization and provide access to equipment and systems.
- .3 Provide personnel and operate systems at designated times, and under conditions required for proper testing, adjusting, and balancing.
- .4 Notify testing organization 7 days prior to time project will be ready for testing, adjusting, and balancing.
- .5 Commission cost to be borne by Contractor.

**1.8 PREPARATION**

- .1 Provide instruments required for testing, adjusting, and balancing operations.
- .2 Make instruments available to Departmental Representative to facilitate spot checks during testing.
- .3 Retain possession of instruments and remove at completion of services.
- .4 Verify systems installation is complete and in continuous operation.
- .5 Verify lighting is turned on when lighting is included in cooling load.
- .6 Verify equipment such as computers, laboratory and electronic equipment are in full operation.

**1.9 FINAL REPORTS**

- .1 Organization having managerial responsibility shall make reports.
- .2 Ensure each form bears signature of recorder, and that of supervisor of reporting organization.
- .3 Identify each instrument used, and latest date of calibration of each.

**1.10 COMPLETION OF COMMISSIONING**

- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- .3 Cx deliverables have been submitted and accepted by Departmental Representative.

**END OF SECTION**

**Part 1            General**

**1.1            SUMMARY**

- .1        Comply with requirements of this Section when performing the removal & disposal work of materials noted on drawings where demolition & removal are required at existing floor, walls, and ceiling. All drilling, sawcutting, and grinding of existing concrete to be considered Hazardous Material Removal. Refer to **APPENDIX 1 – Limited Hazardous Building Materials Assessment**.

**1.2            SECTION INCLUDES**

- .1        Requirements and procedures for Hazardous Materials Abatement & Removal.

**1.3            RELATED SECTIONS**

- .1        Section 01 01 50 - Health and Safety Requirements.

**1.4            REFERENCES**

- .1        Department of Justice Canada (Jus).
  - .1        Canadian Environmental Protection Act, 1999 (CEPA).
- .2        Transport Canada (TC).
  - .1        Transportation of Dangerous Goods Act, 1992 (TDGA).

**1.5            DEFINITIONS**

- .1        HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .2        Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow thorough wetting of fibres.
- .3        Asbestos-Containing Materials (ACMs): materials identified under Existing Conditions including fallen materials and settled dust. Ground concrete is equivalent to ACM's.
- .4        Hazardous Materials Work Area: area where work takes place, which will, or may, disturb ACMs.
- .5        Authorized Visitors: Engineers, Consultants or designated representatives, and representatives of regulatory agencies.
- .6        Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- .7        Occupied Area: area of the building that is outside Hazardous Materials Work Area.

- .8 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required providing protection and isolation.
- .9 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for work.

#### **1.6 REGULATORY REQUIRMENTS**

- .1 Comply with Federal, Provincial, and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications the more stringent requirement applies. Comply with regulations in effect at time work is performed.

#### **1.7 HAZARDOUS MATERIAL ASSESSMENT**

- .1 Refer to **APPENDIX 1 – Limited Hazardous Building Materials Assessment**

#### **1.8 SUBMITTALS**

- .1 Submit proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of Hazardous Materials-containing waste in accordance with requirements of authority having jurisdiction.
- .2 Submit copy of “Hazardous/Special Waste Disposal request Form” provided to provincial authorities, in accordance with the provincial “Asbestos Policy Directive”
- .3 Submit proof of Contractor's Asbestos Liability Insurance.
- .4 Submit to Departmental Representative necessary permits for transportation and disposal of Hazardous Materials-containing waste and proof that Hazardous Materials-containing waste has been received and properly disposed.

#### **1.9 INSTRUCTION AND TRAINING**

- .1
  - .1 Before commencing work, provide to Engineer satisfactory proof that every worker has had instruction and training in hazards of Hazardous Materials exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing. Renovation space to be provided with HEPA filter air filtration during work.
- .2 IP+C Dust Control Logistic Plan to be in place throughout construction phase. (Inspection Control Plan for hording). Contractor to be CSA approved for hording. Maintain negative air pressure within the containment area and exhaust to outdoors.
- .3 Instruction and training related to respirators includes, at a minimum:
  - .1 Fitting of equipment.
  - .2 Inspection and maintenance of equipment.
  - .3 Disinfecting of equipment.
  - .4 Limitations of equipment.

- .4 Instruction and training must be provided by a competent, qualified person.

#### **1.10 WORKER PROTECTION**

- .1 Protective equipment and clothing to be worn by workers while in the Hazardous Materials Work Area include:
  - .1 Non-powered reusable or replaceable filter-type respirator equipped with HEPA filter cartridges, personally issued to the worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to the Provincial Authority having jurisdiction.
  - .2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres, consisting of full-body covering including head covering with snug-fitting cuffs at wrists, ankles, and neck.
- .2 Eating, drinking, chewing, and smoking are not permitted in Hazardous Materials Work Area.
- .3 Before leaving the Hazardous Materials Work Area, dispose of protective clothing as contaminated waste as specified.
- .4 Ensure workers wash hands and face when leaving Hazardous Materials Work Area. Facilities for washing are located as indicated on drawings.
- .5 Ensure that no person required to enter an Hazardous Materials Work Area has facial hair that affects the seal between the respirator and the face.

#### **1.11 QUALITY ASSURANCE**

- .1 Regulatory Requirements: comply with Federal, Provincial, and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications, more stringent requirement applies. Comply with regulations in effect at time Work is performed.
- .2 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 01 50 - Health and Safety Requirements.
- .3 Departmental Representative to retain a qualified consultant to specify, inspect and verify successful removal or disturbance of hazardous material.

#### **1.12 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Waste Management Plan.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

- .4 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan.
- .5 Place materials defined as hazardous or toxic in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .7 Fold up metal banding, flatten and place in designated area for recycling.
- .8 Disposal of Hazardous Materials waste generated by removal activities must comply with Federal, Provincial, and Municipal regulations. Dispose of Hazardous Materials waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.
- .9 Provide manifests describing and listing waste created. Transport containers by approved means to licence landfill for burial.

#### **1.13 EXISTING CONDITIONS**

- .1 During tender evaluate existing site conditions.

#### **1.14 SCHEDULING**

- .1 Not later than ten (10) days before beginning Work on this Project notify following in writing:
  - .1 Regional Office of WorkSafeBC.
- .2 Inform sub-trades of presence of Hazardous Materials-containing materials identified in Existing Conditions.
- .3 Submit to Departmental Representative copy of notifications prior to start of Work.

#### **1.15 OWNER'S INSTRUCTIONS**

- .1 Before beginning Work, provide Departmental Representative satisfactory proof that every worker has received instruction and training in hazards of Hazardous Materials exposure, personal hygiene and work practices, and use, cleaning, and disposal of respirators and protective clothing.

#### **1.16 COORDINATION AND SCOPE**

- .1 Demolition, Removal, and Renovation at floor, walls and ceiling. Includes ceiling space.

**Part 2            Products**

**2.1                MATERIALS**

- .1    Drop Sheets:
  - .1    Polyethylene: 0.15 mm thick;
  - .2    FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
- .2    Hoarding Wall:
  - .1    Wood stud framing: 2"x4" studs
  - .2    Plywood sheeting: 3/8" plywood (4'x8'); exterior white primer or white polyethylene
  - .3    Polyethylene: 0.15 mm thick; white
- .3    Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in a concentration to provide thorough wetting of Hazardous Materials-containing material.
- .4    Waste Containers: contain waste in two separate containers.
  - .1    Inner container: 0.15 mm thick sealable polyethylene waste bag.
  - .2    Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise, outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
  - .3    Labelling requirements: affix pre-printed cautionary asbestos warning in both official languages that is visible when ready for removal to disposal site.

**Part 3            Execution**

**3.1                PROCEDURES**

- .1    Do deconstruction in accordance with Section 01 01 50 - Health and Safety Requirements.
- .2    Before beginning Work, isolate Hazardous Materials Work Area using, minimum, pre-printed cautionary Hazardous Materials warning signs in both official languages that are visible at access routes to Hazardous Materials Work Area.
  - .1    Remove visible dust from surfaces in the work area where dust is likely to be disturbed during course of work.
  - .2    Use HEPA vacuum or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate.
  - .3    Do not use compressed air to clean up or remove dust from any surface.
- .3    Prevent spread of dust from Hazardous Materials Work Area using measures appropriate to work to be done.
  - .1    Use FR polyethylene drop sheets over flooring in Hazardous Materials Work Area where dust and contamination cannot otherwise be safely contained.

- .4 Wet materials containing Hazardous Materials, to be cut, ground, abraded, scraped, drilled, or otherwise disturbed unless wetting creates hazard or causes damage.
  - .1 Use garden reservoir type low - velocity fine - mist sprayer.
  - .2 Perform Work to reduce dust creation to lowest levels practicable.
  - .3 Work will be subject to visual inspection and air monitoring.
  - .4 Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- .5 Clean-Up:
  - .1 Frequently during Work and immediately after completion of Work, clean up dust and Hazardous Materials-containing waste using HEPA vacuum or by damp mopping.
  - .2 Place dust and Hazardous Materials-containing waste in sealed dust-tight waste bags. Treat drop sheets and disposable protective clothing as Hazardous Materials waste; wet and fold these items to contain dust, and then place in plastic bags.
  - .3 Clean exterior of each waste-filled bag using damp cloths or HEPA vacuum and place in second clean waste bag immediately prior to removal from Hazardous Materials Work Area.
  - .4 Seal waste bags and remove from site. Dispose of in accordance with requirements of Provincial and Federal Authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and those guidelines and regulations for Hazardous Materials disposal are followed.
  - .5 Perform final thorough clean-up of Work areas and adjacent areas affected by Work using HEPA vacuum.

### **3.2 SCOPE – HAZARDOUS MATERIALS ABATEMENT & REMOVAL**

- .1 Demolition, Removal, and Renovation at floor, walls and ceiling. Includes ceiling space. Refer to **APPENDIX 1 – Limited Hazardous Building Materials Assessment**.

**END OF SECTION**

## **GENERAL**

### **1.1 RELATED SECTION**

- .1 General Instructions:

Section 01 01 50

### **1.2 SAMPLES AND PRODUCT DATA**

- .1 Submit full records of all products used. List each product and include the following:
- .1 Finish formula designation.
  - .2 Product type and use.
  - .3 CGSB number.
  - .4 Manufacturer's product number.
  - .5 Colour number.
  - .6 Manufacturer's Material Safety Data Sheets (MSDS).
  - .7 Maximum VOC classification.
  - .8 Ecologo certification.

### **1.3 ENVIRONMENTAL REQUIREMENTS**

- .1 Do not apply paint finish in areas where dust is being generated.
- .2 Provide paint products certified to meet the requirements of the Environmental Choice Program, Department of the Environment.
- .3 Submit CSA Certification Reports that products proposed for use are certified under the Environmental Choice program. Water-based paints are to be certified to ECP-07-89, and solvent-based paints are to be certified to ECP-12-89.
- .4 Comply with requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials.
- .5 Provide continuous ventilation during and after paint application. of paint. Run ventilation system 24 hours per day during installation, and provide continuous ventilation for 7 days after completion of application of paint.
- .6 Apply paint finishes only when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
- .7 Substrate and ambient temperature must be within limits prescribed in paint standard and by manufacturer, to the approval of the Departmental Representative.
- .8 Apply paint only when surface to be painted is dry, properly cured and adequately prepared.

### **1.4 MAINTENANCE DATA**

- .1 Record final paint type, manufacturers' name and colour selected,



## **1.5 QUALITY ASSURANCE**

- .1 Paint work to standards of the Master Painters Association of B.C. (MPA).
- .2 Retain purchase orders, invoices and other documents to prove that all materials utilized in this Contract meet requirements of the specifications. Produce documents when requested by Departmental Representative.
- .3 Standard of acceptance:
  - .1 Walls: no defects visible from a distance of 1000 mm at 90° to surface.
  - .2 Ceilings: no defects visible from floor at 45° to surface when viewed using final lighting source.
  - .3 Final coat to exhibit uniformity of colour and sheen across full surface area.

## **2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Paint materials: to CGSB Standards listed in Finishing Formulae.
- .2 Paint materials for each coating formula to be products of only one manufacturer.

## **3 EXECUTION**

### **3.1 PREPARATION OF SURFACES**

- .1 Prepare wallboard surfaces to CGSB 85-GP-33M-1979. Fill minor cracks with plaster patching compound.

### **3.2 APPLICATION**

- .1 Sand and dust between each coat to remove defects visible from distance up to 1.0 m.

### **3.4 INTERIOR FINISHES**

- .1 Formula 7: for gypsum board walls :
  - one coat latex primer CAN/CGSB 1.119M (where required).
  - two coats eggshell latex paint CAN/CGSB 1.118M (iwhere required).
- .2 Formula 9: for gypsum board ceilings apply:
  - one coat primer sealer CAN/CGSB 1.119M (where required).
  - two coats flat latex paint CAN/CGSB 1.118M.

**END OF SECTION**

**Part 1        General**

**1.1        RELATED SECTIONS**

- .1        Section 01 01 50 – Submittal Procedures.
- .2        Section 01 01 50 - Construction/Demolition Waste Management And Disposal.
- .3        Section 01 01 50 - Closeout Submittals.

**1.2        REFERENCES**

- .1        American Iron and Steel Institute (AISI)
- .2        American National Standards Institute (ANSI)
  - .1        ANSI Z83.11/CGA 1.8, Gas Food Service Equipment.
- .3        American Society for Testing and Materials (ASTM International)
  - .1        ASTM A167-99, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - .2        ASTM A240/A240M-02, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels, and for General Applications.
- .4        Canadian Standards Association (CSA International)
  - .1        CSA B149.1, Natural Gas and Propane Installation Code.
  - .2        CSA B149.2, Propane Storage and Handling Code.
  - .3        CSA C22.2No.109, Commercial Cooking Appliances.
  - .4        CAN/CSA-C22.2 No.120, Refrigeration Equipment.
  - .5        CAN/CSA-C22.2 No.150, Microwave Ovens.
  - .6        CAN/CSA-C22.2No.168, Commercial Dishwashing Machines.
  - .7        CAN/CSA C22.2No.195, Motor Operated Food Processing Appliances (Household and Commercial).
  - .8        CAN/CSA-C388, Energy Consumption Test Methods for Household Microwave Ovens.
- .5        National Sanitation Foundation (NSF)
- .6        National Fire Protection Association (NFPA)
  - .1        NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, Current Edition
- .7        Underwriter's Laboratories of Canada (ULC)
- .8        Certified Ratings – Exhaust Hoods: catalogued or published ratings obtained from tests carried out by manufacturer or independent testing agency designated by manufacturer and signifying adherence to codes and standards

**1.3 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 01 50 - Submittal Procedures.
- .2 Data to include:
  - .1 Description of equipment giving manufacturers name, type, model, year and capacity.
  - .2 Details of operation, servicing and maintenance.
  - .3 Recommended spare parts list.

**1.4 CLOSEOUT SUBMITTALS**

- .1 Submit operating and maintenance data in accordance with Section 01 01 50 - Closeout Submittals.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 01 50 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal any and all packaging/crating material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers
- .5 Divert unused metal/wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

**Part 2 Products**

**2.1 GENERAL**

- .1 Stainless steel: to AISI, grade 18-8, of types and finishes specified herein.
- .2 Equipment to be National Sanitation Foundation (NSF) listed

**2.2 ITEMIZED EQUIPMENT**

- .1 Waste Unit
  - .1 Quantity: One (1)
  - .2 Scrapping, Pre-Flushing and Food Waste Collecting System
  - .3 Electric: 208V, 60 Hz, 1 phase. NOTE: verify existing site services PRIOR to ordering equipment

- .4 Control panel, water tight, with mounting bracket, stainless steel, water tight controls and fittings,
- .5 Separate component grounding, thermally protected motor, safety line disconnect
- .6 Recirculating water system for pre-flushing; 2gpm water consumption
- .7 Plumbing components as required but not limited to: all corrosion resistant, automatic water blender, solenoid valve, unions, check valves, incoming water valves, non-clogging pump, backflow prevention device
- .8 Integral collector basin to accommodate meal trays
- .9 Adjustable legs, stainless steel
- .10 Salvage basket, high impact polymer
- .11 Scrap basket, high impact polymer; BC option hole size
- .12 Correctional package
- .13 Additional scrap basket
- .14 Warranty: Minimum two (2) year warranty on parts and labour
- .15 Acceptable materials: Salvajor P914
- .2 Hose Reel Assembly – with spray gun
  - .1 Quantity: One (1)
  - .2 Wall mounted hose reel with exposed hose
    - .1 Exposed hose, 15.24 m length, 9mm ID high temperature hose, 3 ply fiber reinforced, inlet hose, adjustable ball stop
    - .2 Adjustable guide arm, nine (9) positions
    - .3 Ratchet lock and easy tension adjustment
    - .4 Stainless steel fluid path
    - .5 Spray gun; 7.0 gpm at 80 psi; locking trigger mechanism; waterproof nylon cover
  - .3 Remote control cabinet, exposed wall mounted with integral mixing valves, hot and cold, with key lock, vandal resistant kit, wrist handle
    - .1 Custom stainless steel chase with access panel(s), removable with tools only – corrections grade, to conceal exposed plumbing lines and vacuum breaker to cabinet and from cabinet to hose reel
  - .4 Plumbing components including but not limited to vacuum breakers, check valves, shut-off valves, backflow prevention
  - .5 Warranty: Minimum two (2) year warranty on parts and labour
  - .6 Acceptable materials: Fisher 29599 with spray gun and Fisher 1801 or approved equivalent
- .3 Pre-Rinse Unit with Faucet
  - .1 Quantity: One (1)
  - .2 Backsplash mounted pre-rinse unit with integral faucet and wall bracket
    - .1 3-ply fiber reinforced internal rubber hose; 915mm hose length

- .2 Adjustable wall bracket – cut to suit site condition
    - .3 Low water use spray valve; 1.15gpm
    - .4 200mm c/c backsplash mounted control valve; hot and cold stem controls; lever handles
    - .5 Add-on control valve with 305mm spout; hot index button
    - .6 Stainless steel components
  - .3 Plumbing components including but not limited to vacuum breakers, check valves, shut-off valves, backflow prevention
  - .4 Warranty: Minimum two (2) year warranty on parts and labour
  - .5 Acceptable materials: Fisher 55468 with add-on faucet or approved equivalent
- .4 Pre-Rinse Unit
- .1 Quantity: One (1)
  - .2 Backsplash mounted pre-rinse unit with integral faucet and wall bracket
    - .1 3-ply fiber reinforced internal rubber hose; 915mm hose length
    - .2 Adjustable wall bracket – cut to suit site condition
    - .3 Low water use spray valve; 1.15gpm
    - .4 200mm c/c backsplash mounted control valve; hot and cold stem controls; lever handles
    - .5 Stainless steel components
  - .3 Plumbing components including but not limited to vacuum breakers, check valves, shut-off valves, backflow prevention
  - .4 Warranty: Minimum two (2) year warranty on parts and labour
  - .5 Acceptable materials: Fisher 13390 or approved equivalent
- .5 Dishwasher with Booster, Loader, Blower Dryer, Curved Tabling, Roller Table
- .1 Quantity: One (1) lot
  - .2 Refer to site for all existing services, reuse existing services where possible
    - .1 Verify electrical service availability
    - .2 Verify incoming water size – may need to be upsize/renewed line
      - .1 Supply shock arrestor and pressure regulating valve
  - .3 Dishwashing machine, multiple tank with prewash: insulated conveyor rack, heated tank 54" (1371mm) automatic rack type dishwasher with 22"(559mm) pre-wash, automatically controlled commercial dishwasher with prewash, wash and rinse, and final rinse cycles, and with washing capacity of 266 racks per hour. The machine must automatically wash and sanitize food service wares when connected to an adequate incoming source of a minimum 54 degree C, fresh water and integrated booster for a final rinse to 82 degree C. The model of the machine is to be 2011 or newer
    - .1 Heat source: electric.

- .2 Electrical specifications: single point connection, machine 600V, 60 Hz, 3 phase. NOTE: verify existing site services PRIOR to ordering equipment
- .3 The dish washer required motor sizes are as follows; Prewash pump minimum 1 HP, wash pump minimum 2 HP, rinse pump minimum 2 HP
- .4 Integral 21 degree C (70 degree F) rise booster, 22kw, 600V, 60 Hz, 3 phase, booster will have field replaceable electric heater elements. NOTE: verify existing site services PRIOR to ordering equipment
- .5 Type of feed: right to left
- .6 Performance standards: processes 266 racks per hour
- .7 Materials: stainless steel, exterior exposed surfaces, machine fully insulated. Stainless steel and copper plumbing connections.
- .8 Splash curtains: at entrance and exit of machine and between prewash and wash/rinse compartments.
- .9 Controls: machine mounted, power "ON" and "OFF" switches, "START" and "STOP" switches, automatic timer with automatic or manual bypass switch, automatic temperature control and water level maintenance, automatic shutdown of sections not in use.
- .10 Limit switch; supply and install as directed by manufacturer
- .11 Thermometers: exterior display, display wash and final rinse water temperatures.
- .12 Spray assemblies: stainless steel, easily removable, upper and lower assemblies.
- .13 Water tank: readily accessible overflow drain, automatic tank fill.
- .14 Strainers: prewash and wash chambers, stainless steel, perforated.
- .15 Access doors: insulated hinged access doors consisting of but not limited to: one per tank, stainless steel, minimum thickness 1.2 mm, safety catches, insulated handles, splashproof, smooth exposed edges, safety switch to stop motor if door opened during operation, locking doors with hasps, per door
- .16 Legs: adjustable, minimum four, minimum height [150 mm], adjustable flanged feet secured to floor per corrections standards.
- .17 Conveyor: corrosion resistant material, to convey racks automatically through dishwasher, factory set overload mechanism in case of obstruction.
- .18 All screens and baskets must be secured in the dishwasher to ensure safety of staff in a correctional environment. Screens & buckets to be secured at two points to prevent removal. Screens and baskets must be removable with a tool that will be controlled by correctional staff. Provide two (2) tamper-proof screw removal tools

- .19 All visible nuts and screws must be tamper proof to ensure the safe operation of the machine in a correctional environment, minimizing opportunity for parts being removed and turned into weapons. A security screen is necessary underneath the dishwasher to avoid someone cannibalizing parts or damaging the equipment
- .20 To ensure security of the unit a stainless steel perforated plate will be fastened under the dishwasher to prevent tampering
- .21 Prewash section
  - .1 The pre-wash section must have a leak proof door with handle, providing access to the interior of the machine. Hinged lid on external scrap bucket, non-removable
  - .2 The machine opening must have a minimum 508mm vertical clearance through the machine to accommodate 457mm x 660mm sheet pans
  - .3 Door safety switches must also be provided
  - .4 Must have an external scrap basket to allow easy removal during pauses in machine operation, without having to open the door and reach into the prewash cavity
    - .1 Basket to have corrections facility use security features
  - .5 Cold water thermostat for prewash section (includes pressure regulating valve)
- .22 Tank sections
  - .1 The tanks must have a removable perforated internal scrap basket that completely covers tank areas.
  - .2 Free access to all parts of each tank must be possible with refuse screens removed for easy cleaning and maintenance
  - .3 The machine must have door activated drain closures.
  - .4 A thermometer for each tank must be provided
  - .5 Fresh water automatic tank fill is required
  - .6 Rods for holding curtains between tanks must be welded in place and curtains to be installed with tamper proof screws for removal
- .23 Spray Arm Assemblies
  - .1 Upper and lower spray arm assemblies in the prewash and wash tanks must be stainless steel or an acceptable equivalent
  - .2 The spray arms must be lockable to ensure safety of staff in a correctional environment. Can be removed by correctional staff for easy cleaning

- .24 Rinse Tank
  - .1 Rinse water must be distributed through nozzles above and below the rack and must cover the entire width of the racks
  - .1 Unit to have dual rinse section
- .25 Rack Conveyor
  - .1 The rack conveyor system must be an anti-jam drive system. It must accept 508mm x 508mm racks without the need of chains
- .26 Control Panel
  - .1 All controls must be water tight to minimize or eliminate any shorting due to over spray.
  - .2 The top mounted control panel must be easily readable and accessible
  - .3 Power start/stop button, pump on/off switch and thermometers for wash and rinse temperature must also be provided
  - .4 All parts should be easily serviceable in the field
  - .5 A security screen will cover all gauges and components to reduce tampering and damage in a correctional environment
- .4 Blower Dryer, interwired with dishwasher
  - .1 Heat source: electric.
  - .2 Electrical specifications: machine 600V, 60 Hz, 3 phase; 2 HP motor. NOTE: verify existing site services PRIOR to ordering equipment
  - .3 Type of feed: right to left, integral with dishwasher
  - .4 Materials: stainless steel, exterior exposed surfaces, machine fully insulated.
  - .5 Automatic heat cut-off
  - .6 Vent cowl on exit end, stainless steel, with 175mm stack and locking dampers (set)
  - .7 Separate auto/off switch
- .5 Side Loader
  - .1 Cantilever side loader, 750mm, no hood, stainless steel
  - .2 Integral with dishwasher
- .6 90 degree Corner Conveyor Table – custom expanded radius
  - .1 Integral with blower dryer
  - .2 Fully automatic with dishwasher operation
  - .3 Type of feed: right to left
  - .4 Materials: stainless steel, exterior exposed surfaces
  - .5 Sloped drain



- .6 Unit with extended section at end of dishwasher for smooth transition of racks into corner
- .7 Wide radius unit with integral straight mid-section to ensure ease of rack movement through turn radius
- .7 Roller Table – fixed
  - .1 Unit to match with corner conveyor tabling to ensure smooth transition of racks from corner section to roller table
  - .2 Gravity rollers, approximately 1650mm
  - .3 Dishwasher limit switch mounted at end
- .8 All components to be from same manufacturer to ensure smooth movement of racks throughout system
- .9 Plumbing components including but not limited to vacuum breakers, check valves, shut-off valves, backflow prevention
- .10 Warranty: Minimum two (2) year warranty on parts and labour
- .11 Acceptable materials: Champion 76DRPW Dishwasher, EBD-48 Blower Dryer, custom Corner Conveyor Tabling with Roller Tabling or approved equivalent

### **Part 3 Execution**

#### **3.1 REMOVAL OF EXISTING EQUIPMENT**

- .1 Disconnect and remove the following equipment and dispose as directed by the Departmental Representative
  - .1 Dishwasher – Hobart CRS66A
  - .2 Booster – Hubbell J1630T6
  - .3 Clean dish tabling
  - .4 Soiled dish tabling with pre-rinse (Over-head racking station to remain)
  - .5 Pass-thru section
- .2 Any services not reused are to be capped

#### **3.2 INSTALLATION**

- .1 Install equipment in accordance with manufacturer's instructions.
- .2 Coordinate connection of mechanical and electrical services.
  - .1 Provide dimensioned rough-in drawings to the applicable trade
  - .2 Coordinate with others for steel block locations as required for rough-in locations
- .3 Adjust equipment for smooth and proper operation.
- .4 Adjust equipment to level position for proper operation

**END OF SECTION**

**Part 1        General**

**1.1        SECTION INCLUDES**

- .1        Materials, fabrication and installation for custom fabricated food service equipment.

**1.2        PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION**

- .1        -

**1.3        RELATED SECTIONS**

- .1        Section 01 01 50 - Submittal Procedures.
- .2        Section 01 01 50 - Construction/Demolition Waste Management And Disposal.
- .3        Section 01 01 50 - Closeout Submittals.

**1.4        REFERENCES**

- .1        American Iron and Steel Institute (AISI)
- .2        American Society for Testing and Materials (ASTM International)
  - .1        ASTM A167-99, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - .2        ASTM A269-01, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
  - .3        ASTM A240/A240M-02, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  - .4        ASTM B456-95, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
  - .5        ASTM A480/A480M-02, Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
- .3        Canadian General Standards Board (CGSB)
  - .1        CAN/CGSB-19.13-M87, Sealing Compound, One Component, Elastomeric, Chemical Curing.
- .4        Canadian Standards Association (CSA International)
- .5        National Sanitation Foundation (NSF)
- .6        SMACNA Guidelines for Seismic Restraints of Kitchen Equipment in applicable jurisdiction

**1.5        SUBMITTALS**

- .1        Submit product data in accordance with Section 01 01 50 - Submittal Procedures.

**1.6 SHOP DRAWINGS**

- .2 Submit shop drawings and product data in accordance with Section 01 01 50 - Submittal Procedures.
- .3 Indicate construction details of equipment including materials, components, metal thicknesses, reinforcements, welds and weld types, interior and exterior corner and joint details, anchorages, locations of exposed fasteners, assembly methods, finishes, mechanical and electrical characteristics.
- .4 Indicate roughing-in service requirements for mechanically and electrically operated equipment.

**1.7 CLOSEOUT SUBMITTALS**

- .1 Submit operating and maintenance data in accordance with Section 01 01 50 - Closeout Submittals.

**1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 01 50 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal any and all packaging/crating material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Divert unused metal/wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
- .6 Unused sealant material must be disposed of at an official hazardous material collections site as approved by Departmental Representative.
- .7 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .8 Fold up metal banding, flatten and place in designated area for recycling.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Stainless steel sheet: to ASTM A240/A240M, Type 304 with No.4 finish unless otherwise indicated.
  - .1 Metal thickness unless otherwise specified or indicated:
  - .2 2.0 mm: Exposed frames, uprights angles, reinforcements.

- .3 2.0 mm: Table tops, counter tops, drainboards, pot sinks and all sinks over 508 mm x 508 mm, backsplash.
- .4 1.6 mm: Shelves, utility sinks 508 mm x 508 mm or smaller, angle slides.
- .5 1.3 mm: Exposed bodies of cabinets, casing of exposed electrical outlets, ventilation ducts.
- .6 1.0 mm: Interior partitions of cabinets, lining of insulated cabinets, skirting, interior and exterior surfaces of doors and drawers.
- .2 Stainless steel tubing: to ASTM A269, Type 304, commercial grade, seamless and welded with AISI No.4 finish.
- .3 Hardware and fastenings: stainless steel.
- .4 Nickel/chromium coating: to ASTM B456, Service Condition Number SC3 finish to match adjacent.
- .5 Filler/trim strip: stainless steel, same material finish as surrounding components.
- .6 Sealant: to CAN/CGSB-19.13, non-toxic aluminum coloured sealing compound, adhesive/sealant, meeting National Sanitation Foundation (NSF) requirements for direct contact with food and stay flexible during long term exposure to temperatures ranging from minus 73°C to plus 232°C.

## **2.2 COMPONENTS**

- .1 Faucets – to be supplied for all sinks are to be supplied with non-splash aerator and water saving devices where required by local code.
  - .1 All faucets are to be supplied by the same manufacturer to ensure continuity in the facility and availability of replacement parts.
  - .2 All faucets are to be supplied with all necessary nipples and connections for a fully operational unit.
  - .3 Water inlets are to be located above the positive water level to prevent siphoning of liquids into the water system. Where conditions require a submerged inlet a suitable type check valve and vacuum breaker is to be used to prevent siphoning.
  - .4 All exposed fitting and piping is to be chrome plated
  - .5 Type - as specified under individual items
- .2 Drains and Wastes as specified under individual items

## **2.3 FABRICATION**

- .1 All exposed surfaces must be stainless steel unless otherwise indicated.
- .2 Fabricate equipment from stainless steel, to sizes and configurations indicated.
- .3 Fabricate work square, true, straight, to suit installation conditions and as indicated. Design to maximum sanitary conditions in accordance with NSF requirements.
- .4 Fit and shop-assemble equipment ready for erection where possible.

- .5 Debur, smooth and round off raw edges prior to forming.
- .6 All straight lengths: to be one continuous piece if 3.0 m or less in length. If over 3.0 m, sections to be fully welded unless otherwise indicated.
- .7 Welding: sound, non-porous, and free from imperfections.
  - .1 Weld metal to be colour matched to, and be as corrosion-resistant as parent metal.
  - .2 Spot welds, if any, to be minimum 3.0 mm diameter and have full penetration.
  - .3 Grind exposed welds smooth and polish to match parent metal.
  - .4 Grind other welds smooth.
  - .5 Welding and finishing is not to impair corrosion resistance of finished article.
  - .6 Welds, except spot welds, shall be continuous unless otherwise indicated.
- .8 Legs and bracing: demountable, of stainless steel tubing, with 12 mm thick stainless steel mounting plates, welded construction with stainless steel sanitary, adjustable, flanged feet with tamper-proof mounting bolts. Mounting screws: welded to 2.5 mm thick stainless steel leg channels.
  - .1 Legs: 41 mm od tubing 1.6 mm thick stainless steel.
  - .2 Bracing: 30 mm od tubing 1.2 mm thick stainless steel as required for equipment use.
- .9 Solid undershelf: 2 mm thick stainless steel, edges boxed, backs up 50 mm and hemmed at back, shelf supports welded to legs and bracing unless otherwise noted to be removable, 255 mm clear of floor at mid-way adjustment of feet. With adjustable shelves, use sanitary type supports.

## **2.4 SINK UNITS**

- .1 Compartment material: minimum 2 mm thick stainless steel.
- .2 Corners:
  - .1 Horizontal and vertical minimum radius 19 mm on both planes, with coved corners.
  - .2 Corners of tops: outside radius minimum 38 mm.
- .3 Construction: welded.
- .4 Compartment bottom: slope down towards drain.
- .5 Corner type drain: 38 mm or as noted complete with tail piece, stainless steel standing overflow and stainless steel perforated strainer.
  - .1 Height of standing overflow to be 50 mm below the counter top or drainboard.
  - .2 - Perforated strainer to extend 19 mm above top of standing overflow.

- .6 Centre drain: stainless steel crumb cup waste with stainless steel strainer basket or lever action type where indicated, 40 mm unless indicated otherwise.
- .7 Where multiple compartments are indicated, space between compartments to be maximum of 25 mm and minimum of 13 mm. Weld compartments into counter top or drainboards.
- .8 Punch holes for hot and cold water faucets.
- .9 Drainboards: 2 mm thick stainless steel, integral with, and sloping down 2% towards compartments.
- .10 Edges: as indicated.
- .11 Top of sink edge and drainboard to be a straight horizontal line.
- .12 Backsplash: 2 mm thick stainless steel, rolled up and splayed, integral with sink, drainboard or top. Where countertop or drainboard meets backsplash or upturn, cove 19 mm unless otherwise indicated.
  - .1 Close all exposed ends and backs of backsplashes
- .13 Legs and bracing: as specified.
- .14 Skirting: 1 mm thick stainless steel on single or multiple compartment sinks. Skirting on exposed external surfaces to extend under sinks 25 mm past bottom radii, be continuously welded under sinks, to follow vertical external radii at extreme ends, or fitted and welded to integral components as appropriate.
  - .1 Space spot welds maximum of 100 mm on centers.
- .15 Undershelf: as specified

## **2.5 DISH TABLING**

- .1 Tops: for manual operation free standing design, from 1200 mm sheets for wide tabling and from 900 mm sheets for narrow tabling, of 2 mm thick stainless steel. Form edges as indicated.
- .2 Legs and bracing: as specified. Legs not over 2400 mm apart longitudinally.
- .3 Slatted undershelves: as specified

## **2.6 VENTILATION WORK**

- .1 Provide all labour, material and services required; verify sizes and locations of duct connections; and provide all exposed duct work from dishwasher to building duct work, including trim and watertight or grease tight connection. Slope as required

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Coordinate connection of mechanical and electrical services.

- .1 Provide dimensioned rough-in drawings to the applicable trade
- .2 Coordinate with others for steel block locations as required for rough-in locations
- .2 Install food service equipment plumb with cabinets and counters level to 1.5 mm in 3050 mm
- .3 Prefit and assemble all work in the shop, to confirm alignment and fit.
- .4 Level base cabinets and counters by adjusting levelling legs.
- .5 Scribe and fit stainless steel filler strips to irregularities of adjacent surfaces, maximum gap opening 0.5 mm.
- .6 Joints and intersecting members are to be accurately fitted, and made in true planes with adequate concealed fastening. Overall work is to be fabricated and erected square, straight, true and accurately fitted. Provide adequate anchorage and reinforcing as required for use
- .7 Secure equipment to floor and wall as indicated.
- .8 Securely fasten wall cabinets as indicated.
- .9 Fastening: where stationary or fixed and matching items butt against one another, join with concealed non-removable/tamper-proof stainless steel fasteners.
- .10 Seal joints in accordance with approved industry standard as directed by the Departmental Representative.
  - .1 Where joints cannot be sealed with single pass, use stainless steel filler strip in conjunction with sealant.
  - .2 Where items are against or through walls or partitions seal resultant joint.
- .11 Field weld all joints over 3 m long.
- .12 Provide service access areas on custom equipment requiring electrical or mechanical work
- .13 Provide all inserts, anchors, sleeves, bolts and similar items required to be attached or built into the building components to provide proper anchorage of equipment to Correctional use standards. Provide all necessary templates, instructions, direction and coordination of such items. Provide necessary tamper-proof removal tool as used for screws or bolts
- .14 Sealing and Trimming Equipment
  - .1 Gaps and spaces between all equipment and walls, ceilings, floors and adjoining units not portable and with enclosed bodies are to be completely sealed against entrance of food particles or vermin. Close gaps and spaces by means of trim strips, welding, soldering or commercial joint materials as suited to the nature of the equipment and in compliance with local Environmental Health Office regulations.
  - .2 Sealant to be mildew resistant silicone, Dow Corning 786 or approved alternate in either clear or approved color matching surrounding surfaces. Or as required for Correctional Facility. Apply in accordance to manufacturer's directions with a smooth and sealed finish.

- .3 Trim is not an acceptable substitute for accuracy and neatness. When trim is required and accepted in lieu of rejection of items of equipment, it is the responsibility of the Contractor to provide such trim at no additional cost

### **3.2 SHOP QUALITY CONTROL**

- .1 Departmental Representative will conduct shop inspections of equipment fabrication prior to delivery to site.

### **3.3 ADJUSTING**

- .1 After installation, fit and adjust operating hardware.

### **3.4 DEMONSTRATION**

- .1 Manufacturer to demonstrate equipment capabilities, operation, safety and minor user maintenance to approval of Departmental Representative.

### **3.5 ITEMIZED EQUIPMENT**

- .1 Soiled Dish Table
  - .1 Quantity: One (1)
  - .2 Size: Refer to site and Elevation/Detail drawing(s)
  - .3 Description: Refer to Elevation/Detail drawing(s)
    - .1 One (1) rack slider over waste unit – removable
    - .2 One (1) soak sink with lever waste with support
  - .4 Integral with Dishwasher loader
- .2 Vent Ducts
  - .1 Quantity: Two (2) required
  - .2 To accommodate extended/vent hoods and collars on Dishwasher, length to ceiling – refer to site for site conditions (not a straight run)
  - .3 Stainless steel water tight all welded ducting with locking type damper
- .3 Stainless Steel Wall Cladding
  - .1 Quantity: Lot (as required for site conditions)
  - .2 Size: Refer to site
  - .3 Stainless steel, vertical grain, minimal joints
    - .1 Seal all joints
    - .2 Adhere to wall with full bed of moisture resistant mastic/adhesive
    - .3 Utilize stainless steel vertical divider strips where sheets meet
    - .4 Provide cutouts/penetrations/ stainless steel cover plates through flashing as required for wall penetrations – coordinate with site contractor

**END OF SECTION**



## **PART 1      GENERAL**

### **1.1      Related Sections**

- |    |                  |                                |
|----|------------------|--------------------------------|
| .1 | Section 01 01 50 | General Instructions           |
| .2 | Section 01 35 33 | Health and Safety Requirements |
| .3 | Section 23 05 05 | Installation of Pipework       |
| .4 | Section 23 07 19 | Thermal Insulation for Piping  |

### **1.2      References**

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME).
  - .1 ANSI/ASME B16.15-02, Cast Bronze Threaded Fittings, Classes 125 and 250
  - .2 ANSI/ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.
  - .3 ANSI/ASME B16.22-01, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  - .4 ANSI/ASME B16.24-01, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .2 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM A 307-03 Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
  - .2 ASTM B 88M-03, Standard Specification for Seamless Copper Water Tube (Metric).
- .3 American Water Works Association (AWWA).
  - .1 AWWA C111-00, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .4 Canadian Standards Association (CSA International).
  - .1 CSA B242-M1980(R1998), Groove and Shoulder Type Mechanical Pipe Couplings.
- .5 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
  - .1 MSS-SP-70-1998, Cast Iron Gate Valves, Flanged and Threaded Ends.
  - .2 MSS-SP-71-1997, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
  - .3 MSS-SP-80-2003, Bronze Gate, Globe, Angle and Check Valves.
- .6 National Sanitation Foundation (NSF).
  - .1 NSF 61, Drinking Water System Components.

### **1.3      Submittals**

- .1 Submittals in accordance with Section 01 01 50 - General Instructions.
- .2 Provide maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

#### **1.4 Health and Safety**

- .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

#### **1.5 Waste Management and Disposal**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- .5 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan
- .6 Fold up metal banding, flatten and place in designated area for recycling.

#### **1.6 Quality Assurance**

- .1 All potable water system components shall conform to NSF Standard 61.

### **PART 2 PRODUCTS**

#### **2.1 Piping**

- .1 Domestic hot, cold and hot recirculation water systems, within building.
  - .1 Above ground: copper tube, hard drawn, type L: to ASTM B 88M to NPS 4 size.
  - .2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B 88M, in long lengths and with no buried joints.
- .2 Water service pipe NPS6 or larger in building shall be Ductile Iron, minimum Pressure Class 350 designed and manufactured in accordance with ANSI/AWWA C150/A21.50 and C151/A21.51. All pipe shall be cement –mortar lined in accordance with ANSI/AWWA C104/A2.4 and grooved to BS 4772/2531 standards.
- .3 Underground water supply piping 100mm [4"] or larger shall be AWWA C900 PVC pressure pipe with compatible fittings. Provide concrete thrust blocks for joint restraint at changes of pipe direction.

#### **2.2 Fittings**

- .1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI B16.24.
- .2 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI B16.18.
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 NPS 2 to NPS 4: roll grooved to CSA B242.



- .6 NPS 6 and larger: fittings shall be British Standard/ISO cement-mortar lined and bituminous coated ductile iron fittings conforming to ASTM A-536 with Grade "M" Flushseal gaskets suitable for a temperature range of 20°F to + 200°F.

### **2.3 Joints**

- .1 Rubber gaskets, 1.6mm thick: to ANSI/AWWA C111/A21.11.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .3 Solder: 95/5 tin copper alloy or brazing.
- .4 Teflon tape: for threaded joints.
- .5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM flush seal gasket.
- .6 Dielectric connections between dissimilar metals: dielectric fitting to ASTM F492, complete with thermoplastic liner.

### **2.4 Gate Valves**

- .1 NPS2 and under, soldered:
  - .1 Rising stem: to MSSSP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc.
- .2 NPS2 and under, screwed:
  - .1 Rising stem: to MSSSP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc.
- .3 NPS2-1/2 and over, in mechanical rooms, flanged:
  - .1 Rising stem: to MSSSP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS & Y bronze trim.
- .4 NPS2-1/2 and over, other than mechanical rooms, flanged:
  - .1 Non-rising stem: to MSSSP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, bronze trim, bolted bonnet.

### **2.5 Globe Valves**

- .1 NPS2 and under, soldered:
  - .1 To MSSSP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet.
  - .2 Lockshield handles: as indicated.
- .2 NPS2 and under, screwed:
  - .1 To MSSSP-80, Class 150, 1MPa, bronze body, screwed over bonnet, renewable composition disc.
  - .2 Lockshield handles: as indicated.

## **2.6 Swing Check Valves**

- .1 NPS 2 and under, soldered:
  - .1 To MSSSP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat.
- .2 NPS2 and under, screwed:
  - .1 To MSSSP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat.
- .3 NPS2-1/2 and over, flanged:
  - .1 To MSSSP-71, Class 125, 860 kPa, cast iron body, flat flange faces, renewable seat, bronze disc, bolted cap.

## **2.7 Ball Valves**

- .1 NPS2 and under, screwed:
  - .1 Class150.
  - .2 Bronze body, chrome plated brass ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon seat, steel lever handle.
- .2 NPS2 and under, soldered:
  - .1 To ANSI B16.18, Class150.
  - .2 Bronze body, chrome plated brass ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon seat, steel lever handle, with NPT to copper adaptors.

## **2.8 Drain Valves**

- .1 Drain valves shall be provided with cap and chain.
- .2 Drain and hose valves 20mm (3/4") and smaller:
  - .1 Sediment Faucets.
  - .2 Ball valves.

## **2.9 Plumbing Piping**

- .1 Water supply piping under concrete slabs or in walls shall be encased in standard weight flexible polyethylene pipe one size larger than copper tubing. All joints to be wrapped in plastic wrapping tape.

## **2.10 Dielectric Unions**

- .1 Insulating dielectric unions and flange unions shall be installed when adapting between dissimilar metallic pipe for domestic water supply piping, and domestic water storage tanks. Elsewhere, unions and adaptors for copper piping shall be cast brass pressure fittings.

## **2.11 Expansion Joints**

- .1 Domestic and industrial water: Annular close pitch corrugated metal hose with Type 316L stainless steel butt welded tube. Type 304 single stainless steel outer brain, flanged, welded or screwed ends. Suitable for 1034 kPa (150 psi) working pressure and 50mm traverse.



## **2.12 Strainers**

- .1 NPS 2 and under: Full pipeline size, 250 lb. SWP bronze, with screwed ends and a removable plug type screen retainer.
- .2 NPS 2-1/2 and over: Full pipeline size, 250 lb. SWP semi-steel, with flanged ends and a bolted screen retainer.

## **PART 3 EXECUTION**

### **3.1 Installation**

- .1 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.
- .2 Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.
- .3 Assemble all piping using fittings manufactured to ANSI standards.
- .4 Install tubing close to building structure to minimize furring, conserve headroom and space. Group exposed piping and run parallel to walls.
- .5 Install CWS piping below and away from HWS and HWR and all other hot piping so as to maintain temperature of cold water as low as possible.
- .6 Connect to fixtures and equipment in accordance with manufacturers instructions unless otherwise indicated.
- .7 Buried tubing:
  - .1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.
  - .2 Bend tubing without crimping or constriction. Minimize use of fittings.

### **3.2 Valves**

- .1 Isolate equipment, fixtures and branches with gate or ball valves.
- .2 Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.

### **3.3 Pressure Tests**

- .1 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

### **3.4 Pre- Start-Up Inspections**

- .1 Systems to be complete, prior to flushing, testing and start-up.
- .2 Verify that system can be completely drained.
- .3 Ensure that pressure booster systems are operating properly.
- .4 Ensure that air chambers, expansion compensators are installed properly.

### **3.5 Disinfection**

- .1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction and approval of Departmental Representative.

- .2 Upon completion, provide laboratory test reports on water quality for Departmental Representative's approval.

### **3.6 Performance Verification**

- .1 Timing: Starts after:
  - .1 Pressure and leakage tests and disinfection completed, and certificate of completion has been issued by authority having jurisdiction.
- .2 Procedures:
  - .1 Verify that flow rate and pressure meet Design Criteria.
  - .2 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
  - .3 Sterilize HWS and HWR systems for Legionella control.
  - .4 Verify performance of temperature controls.
  - .5 Verify compliance with safety and health requirements.
  - .6 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut off water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
  - .7 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.

**END OF SECTION**



## **PART 1 GENERAL**

### **1.1 Related Sections**

- |    |                  |   |
|----|------------------|---|
| .1 | Section 01 01 50 | Shop Drawings, Product Data and Samples |
| .2 | Section 01 35 33 | Health and Safety Requirements          |
| .3 | Section 23 05 00 | Common Work Results for Mechanical      |
| .4 | Section 23 05 05 | Installation of Pipework                |

### **1.2 References**

- .1 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM B 32-03, Specification for Solder Metal.
  - .2 ASTM B 306-02, Specification for Copper Drainage Tube (DWV).
  - .3 ASTM C 564-03a, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .2 Canadian Standards Association (CSA International).
  - .1 CAN/CSA-B70-02, Cast Iron Soil Pipe, Fittings and Means of Joining.
  - .2 CAN/CSA-B125-01, Plumbing Fittings.

### **1.3 Submittals**

- .1 Submittals in accordance with Section 01 01 50 - General Instructions.
- .2 Provide maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

### **1.4 Health and Safety**

- .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

### **1.5 Waste Management and Disposal**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- .5 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan
- .6 Fold up metal banding, flatten and place in designated area for recycling.

## **PART 2 PRODUCTS**

### **2.1 Copper Tube and Fittings**

- .1 Above ground sanitary storm and vent, Copper Type DWV to: ASTM B 306.
  - .1 Fittings.
    - .1 Cast brass: to CAN/CSA-B125.
    - .2 Wrought copper: to CAN/CSA-B125.
  - .2 Solder: tin-lead, 50:50, type 50A or lead free, tin-copper alloy 95:5, type TA to ASTM B 32.

### **2.2 Cast Iron Piping and Fittings**

- .1 Buried sanitary storm and vent, cast iron (minimum NPS 2) to: CAN/CSA-B70.
  - .1 Joints.
    - .1 Mechanical joints.
      - .1 Neoprene or butyl rubber compression gaskets: to ASTM C 564 or CAN/CSA-B70.
      - .2 Stainless steel clamps.
- .2 Above ground sanitary storm and vent: Cast iron to CAN/CSA-B70.
  - .1 Joints.
    - .1 Mechanical joints.
      - .1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

## **PART 3 EXECUTION**

### **3.1 Installation**

- .1 In accordance with Section 23 05 05 - Installation of Pipework.
- .2 Install in accordance with Canadian Plumbing Code, Provincial Plumbing Code and local authority having jurisdiction.
- .3 Install buried pipe on 150 mm bed of clean washed sand, shaped to accommodate hubs and fittings, to line and grade as indicated. Backfill with 150 mm of clean washed sand.
- .4 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.

### **3.2 Testing**

- .1 Pressure test buried systems before backfilling.
- .2 Hydraulically test to verify grades and freedom from obstructions.



**3.3 Performance Verification**

- .1 Cleanouts:
  - .1 Ensure accessible and that access doors are correctly located.
  - .2 Open, cover with linseed oil and re-seal.
  - .3 Verify that cleanout rods can probe as far as the next cleanout, at least.
- .2 Test to ensure traps are fully and permanently primed.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 Summary**

- .1 Section Includes:
  - .1 The supply and installation of Plumbing Specialties and Accessories.
- .2 Products Installed but not Supplied Under this Section:
  - .1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.
  - .2 Equipment installed by others.
    - .1 Connect with unions.
  - .3 Equipment not installed.
    - .1 Capped for future connection by others.

### **1.2 Related Section**

- .1 Section 01 01 50 General Instructions
- .2 Section 01 35 33 Health and Safety Requirements
- .3 Section 23 05 00 Common Work Results for Mechanical
- .4 Section 23 08 01 Performance Verification Mechanical Piping Systems

### **1.3 References**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM A 126-95(2001), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
  - .2 ASTM B 62-93, Specification for Composition Bronze or Ounce Metal Castings.
- .2 American Water Works Association (AWWA)
- .3 Canadian Standards Association (CSA)
  - .1 CSA-B64 Series-01, Backflow Preventers and Vacuum Breakers.
  - .2 CSA-B356-00, Water Pressure Reducing Valves for Domestic Water Supply Systems.
- .4 Plumbing and Drainage Institute (PDI)
  - .1 PDI-WH201-92, Water Hammer Arresters Standard.
- .5 National Sanitation Foundation (NSF).
  - .1 NSF 61, Drinking Water System Components.

### **1.4 Submittals**

- .1 Submittals in accordance with Section 01 01 50 - General Instructions.

- .2 Indicate, for all plumbing specialties and accessories:
  - .1 Dimensions, construction details, roughing-in dimensions.

**1.5 Closeout Submittals:**

- .1 Submit maintenance data in accordance with Section 01 01 50 – General Instructions.
- .2 Include:
  - .1 Description of plumbing specialties and accessories, giving manufacturer's name, type, model, year, capacity.
  - .2 Details of operation, servicing, maintenance.
  - .3 List of recommended spare parts.

**1.6 Health and Safety**

- .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

**1.7 Delivery Storage and Disposal**

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for recycling in accordance with Section 01 01 50 – General Instructions.
  - .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan
  - .3 Fold up metal banding, flatten and place in designated area for recycling.

**1.8 Quality Assurance**

- .1 All potable water system components shall conform to NSF Standard 61.

**PART 2 PRODUCTS**

**2.1 Cleanouts**

- .1 Cleanout plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
- .2 Access covers:
  - .1 Wall access: face or wall type, polished nickel bronze or stainless steel round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
  - .2 Floor access: round cast iron body and frame with adjustable secured nickel bronze top cast box with anchor lugs and:
    - .1 Plugs: bolted bronze with neoprene gasket.



- .2 Cover for unfinished concrete floors: cast iron round gasket, vandal-proof screws.
- .3 Cover for terrazzo finish: polished nickel bronze with recessed cover for filling with terrazzo, vandal-proof locking screws
- .4 Cover for tile and linoleum floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.
- .5 Cover for carpeted floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.

## **2.2 Water Hammer Arrestor**

- .1 Copper construction, bellows type: to PDI-WH201.

## **2.3 Back Flow Preventer**

- .1 To CSA-B64 Series.
- .2 Application: as indicated.

## **2.4 Vacuum Breaker**

- .1 To CSA-B64 Series.

## **2.5 Pressure Regulator**

- .1 Capacity and performance:
- .2 Up to NPS1-1/2 bronze bodies, screwed: to ASTM B 62.
- .3 NPS2 and over, semi-steel bodies, Class 125, flanged: to ASTM A 126, Class B.
- .4 Semi-steel spring chambers with bronze trim.

## **2.6 Trap Seals Primer**

- .1 Brass, with integral vacuum breaker, NPS1/2 solder ends, NPS1/2 drip line connection.

## **2.7 Strainers**

- .1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
- .2 NPS2 and under, bronze body, screwed ends, with brass cap.
- .3 NPS2 1/2 and over, cast iron body, flanged ends, with bolted cap.

# **PART 3 EXECUTION**

## **3.1 Installation**

- .1 Install in accordance with Canadian Plumbing Code provincial codes, and local authority having jurisdiction.
- .2 Install in accordance with manufacturer's instructions and as specified.

**3.2 Cleanouts**

- .1 In addition to those required by code, and as indicated, install at base of soil and waste stacks, and rainwater leaders.
- .2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
- .3 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

**3.3 Water Hammer Arrestor**

- .1 Install on branch supplies to each fixture or group of fixtures and where indicated.

**3.4 Back Flow Preventers**

- .1 Install in accordance with CAN/CSA-B64 Series, where indicated and elsewhere as required by code.
- .2 Pipe discharge to terminate over nearest drain and/ or service sink.

**3.5 Trap Seal Primers**

- .1 Install for all floor drains and elsewhere, as indicated.
- .2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Departmental Representative.
- .3 Install soft copper or plastic tubing to floor drain.

**3.6 Performance Verification:**

- .1 General:
  - .1 In accordance with Section 23 08 01 – Performance Verification Mechanical Piping Systems.
- .2 PV procedures:
  - .1 Vacuum breakers, backflow preventers: operation under all conditions.
  - .2 Thermostatic controls: Verify temperature settings, operation of control, limit and safety controls.

**END OF SECTION**



## **PART 1 GENERAL**

### **1.1 Summary**

- .1 Section Includes:
  - .1 The supply and installation of Plumbing Fixtures and Trim.
- .2 Products Installed but not Supplied Under this Section:
  - .1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.
  - .2 Equipment installed by others.
    - .1 Connect with unions.
  - .3 Equipment not installed.
    - .1 Capped for future connection by others.

### **1.2 Related Section**

- .1 Section 01 01 50 General Instruction
- .2 Section 01 35 33 Health and Safety Requirements
- .3 Section 23 05 00 Common Work Results for Mechanical

### **1.3 References**

- .1 Canadian Standards Association (CSA International).
  - .1 CAN/CSA-B45 Series 02, Plumbing Fixtures.
  - .2 CAN/CSA-B125-01, Plumbing Fittings.
  - .3 CAN/CSA-B651-95 (R2001), Barrier-Free Design.
- .2 National Sanitation Foundation (NSF).
  - .1 NSF 61, Drinking Water System Components.

### **1.4 Submittals**

- .1 Submittals in accordance with Section 01 01 50 – General Instructions.
- .2 Indicate, for all fixtures and trim:
  - .1 Dimensions, construction details, roughing-in dimensions.

### **1.5 Closeout Submittals:**

- .1 Submit maintenance data in accordance with Section 01 01 50 – General Instructions.
- .2 Include:
  - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
  - .2 Details of operation, servicing, maintenance.

- .3 List of recommended spare parts.

**1.6 Health and Safety**

- .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

**1.7 Delivery Storage and Disposal**

- .1 Waste Management and Disposal:
- .1 Separate waste materials for recycling in accordance with Section 01 01 50 – General Instructions.
  - .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan
  - .3 Fold up metal banding, flatten and place in designated area for recycling.

**1.8 Quality Assurance**

- .1 All potable water system components shall conform to NSF Standard 61.

**PART 2 PRODUCTS**

**2.1 Manufactured Units**

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
- .3 Exposed plumbing brass shall be chrome plated finish. Water supply piping exposed in finished areas shall be chrome plated brass pipe and fittings.
- .4 Number, locations: architectural drawings to govern.
- .5 Fixtures in any one location to be product of one manufacturer and of same type.
- .6 Trim in any one location to be product of one manufacturer and of same type.
- .7 Fixture Schedule:

**FD-1 Floor Drain**

Floor drain, all duco coated, 9" (220mm) dia. cast iron body, reversible flashing clamp with seepage openings, no-hub outlet oval Funnel 8-1/4" x 3-1/4" (210mm x 83mm) (Bolted-on to grate), trap primer connection 1/2" (13mm).

**TP Trap Primer**

Trap primer for each floor drain. No trap primer required for shower drains.



## **PART 3 EXECUTION**

### **3.1 Installation**

- .1 Mounting heights:
  - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
  - .2 Wall-hung fixtures: as indicated, measured from finished floor.
  - .3 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA B651.
- .2 All gaps between fixtures, wall and floors are to be sealed with acrylic caulking compound.

### **3.2 Supplies**

- .1 Provide isolation valves or stops for every fixture or appliance connection.
- .2 Provide water hammer arrestors for flush valves and solenoid controlled appliances.

### **3.3 Adjusting**

- .1 Conform to water conservation requirements specified this section.
- .2 Adjustments:
  - .1 Adjust water flow rate to design flow rates.
  - .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.

### **3.4 Performance Verification:**

- .1 PV procedures:
  - .1 Aerators: operation, cleanliness.
  - .2 Vacuum breakers, backflow preventers: operation under all conditions.
  - .3 Wash fountains: operation of flow-actuating devices.
  - .4 Thermostatic controls: Verify temperature settings, operation of control, limit and safety controls.
  - .5 Trap primers: Verify operation.

**END OF SECTION**



**PART 1 GENERAL**

**1.1 Related Sections**

- .1 Read Division 1 General Requirements in conjunction with these specifications. Division 1 and this section shall form a part of and shall apply to all Mechanical Sections. The most stringent requirements of this and other Mechanical Sections must be adhered to.
- .2 The Mechanical work shall consist of the supply and installation of complete and operable mechanical systems and shall include all necessary labour, plant, materials, and incidentals for the work involved as listed in the following division sections:
  - .1 Section 22 Plumbing
  - .2 Division 25 Integrated Automation (EMCS)

**1.2 Submittals**

- .1 Submittals: in accordance with Section 01 01 50 – General Instructions.
- .2 Shop drawings to show:
  - .1 Mounting arrangements.
  - .2 Operating and maintenance clearances.
- .3 Shop drawings and product data accompanied by:
  - .1 Detailed drawings of bases, supports, and anchor bolts.
  - .2 Acoustical sound power data, where applicable.
  - .3 Points of operation on performance curves.
  - .4 Manufacturer to certify current model production.
  - .5 Certification of compliance to applicable codes.
- .4 In addition to transmittal letter referred to in Section 01 01 50 – General Instructions: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
- .5 Closeout Submittals:
  - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.
  - .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
  - .3 Operation data to include:
    - .1 Control schematics for systems including environmental controls.
    - .2 Description of systems and their controls.
    - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
    - .4 Operation instruction for systems and component.
    - .5 Description of actions to be taken in event of equipment failure.
    - .6 Valves schedule and flow diagram.

- .7 Colour coding chart.
- .4 Maintenance data to include:
  - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
  - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .5 Performance data to include:
  - .1 Equipment performance verification test results.
  - .2 Special performance data as specified.
- .6 Approvals:
  - .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
  - .2 Make changes as required and re-submit as directed by Departmental Representative.
- .7 Additional data:
  - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .8 Site records:
  - .1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
  - .2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
  - .3 Use different colour waterproof ink for each service.
  - .4 Make available for reference purposes and inspection.
- .9 As-built drawings:
  - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
  - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
  - .3 Submit to Departmental Representative for approval and make corrections as directed.



- .4 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

### **1.3 Regulations**

- .1 Comply with most stringent requirements of NBC, Provincial and Municipal regulations and by-laws, specified standards, codes and this specification. Practices contained in these standards or standards suggested or recommended by reference organizations, are to be taken as minimum requirements.
- .2 Furnish certificates confirming work installed conforms to requirements of authorities having jurisdiction.
- .3 The "Authority Having Jurisdiction" is Fire Protection Engineering Services of Human Resources and Skills Development Canada (HRSDC).
- .4 Drawings and specifications should not conflict with these Regulations but where there are apparent discrepancies, notify the Departmental Representative in writing and obtain clarifications before proceeding with the work.

### **1.4 Quality Assurance**

- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

### **1.5 Definitions**

- .1 Definitions used in this Division will have the following meaning:
  - .1 "Concealed": pipes, ducts, etc., in trenches, chases, furred spaces, pipe shafts, or hung ceilings.
  - .2 "Exposed": regarding insulation and painting of piping, ducts, etc., will mean that they are not "concealed", as defined herein.
  - .3 "Piping": includes, in addition to pipe, all fittings, valves, hangers, other accessories which comprise a system.
  - .4 "Provide": to supply and install, complete and ready for use.

### **1.6 Drawings**

- .1 Drawings:
  - .1 Are not intended to show structural details or architectural features.
  - .2 Are not to be scaled.
  - .3 Except where dimensioned, indicate general mechanical layouts only.
- .2 Provide field (shop) drawings to indicate relative position of various services when required by Departmental Representative and obtain approval before commencing work.

### **1.7 Maintenance**

- .1 Furnish spare parts in accordance with Section 01 01 50 – General Instructions as indicated in the detailed product specification clauses.
- .2 Provide access doors for concealed expansion joints, traps, strainers, cleanouts, balance dampers, fire dampers, other parts requiring accessibility for operating and maintenance.

- .3 In suspended panel ceilings, use panel in place of access door; provide in such panel a button or other means of identification and easy removal when necessary.

#### **1.8 Delivery, Storage and Handling**

- .1 Waste Management and Disposal:
  - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.

### **PART 2 PRODUCTS**

#### **2.1 Access Doors**

- .1 Access door size shall be as indicated and where not indicated, make 305mm x 406mm [12" x 16"] minimum or 610mm x 457mm [24" x 18"] where persons have to enter. For acoustical ceilings, conform to architectural panel pattern.
- .2 Unless otherwise indicated, access doors shall be hinged, flush type, steel framed panel, 14 gauge minimum, satin finished galvanized steel or type 304 stainless steel, with anchor straps for wet areas, washrooms, and all walls finished in ceramic tile.
- .3 Hinges shall be concealed, spring hinge to allow door to open 175°. Locking devices shall be flush cam type, screwdriver operated, doors and frames shall have prime coated rust inhibiting paint, unless made of stainless steel.
- .4 Where doors are required in fire rated walls, access doors shall be uninsulated and for all fire rated ceilings and walls where maximum temperature rise limitation is applicable, shall be insulated. All fire rated access doors shall have Warnock Hersey or ULC listed 2 hour fire rating and shall be installed in accordance with NFPA 80 and manufacturer's installation instructions.

### **PART 3 EXECUTION**

#### **3.1 Co-ordination**

- .1 Co-ordinate work with work of other sections to avoid conflict.
- .2 Locate distribution systems, equipment, and materials to provide minimum interferences and maximum usable space.
- .3 Where interference occurs, Departmental Representative shall approve relocation of equipment and materials, regardless of installation sequence.

#### **3.2 Cleaning**

- .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

#### **3.3 Cutting and Patching**

- .1 Make arrangements with General Contractor for all cutting and patching in this work.
- .2 Minimize cutting and patching. Set sleeves and mark openings in concrete or masonry.



### **3.4 Waterproofing**

- .1 Where any work pierces waterproofing including waterproofing concrete, the method of installation shall be as approved by the Departmental Representative before the work is done. Supply and install all necessary sleeves, caulking, roof curbs, and flashing required and make the openings watertight.

### **3.5 Protection of Work**

- .1 Protect equipment and material during construction from the weather, moisture, dust, painting, plastering and physical damage. Clean and return to "as new" condition.
- .2 Mask or grease and cover machined surfaces. Firmly secure covers over equipment openings and open ends of piping, conduit and ductwork as work progresses. Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.
- .3 Any equipment that has operating parts, bearings or machined surfaces that show signs of rusting, pitting or physical damage will be rejected.
- .4 Refinish damaged or marred factory finishes to the satisfaction of the Departmental Representative, using equal quality materials.

### **3.6 Field Quality Control**

- .1 Site Tests: conduct following tests in accordance with Section 01 01 50 – General Instructions and submit report as described in PART 1 - SUBMITTALS.
- .2 Manufacturer's Field Services:
  - .1 Where specified, obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

### **3.7 Demonstration**

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .3 Use operation and maintenance manual and as-built drawings as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 Use of Systems**

- .1 Use of new permanent heating and ventilating systems for supplying temporary heat or ventilation is permitted only under the following conditions:
  - .1 Entire system is complete, pressure tested, cleaned, flushed out.
  - .2 Specified water treatment system has been commissioned, water treatment is being continuously monitored.
  - .3 Building has been closed in, areas to be heated/ventilated are clean and will not thereafter be subjected to dust-producing processes.
  - .4 There is no possibility of damage from any cause.
  - .5 Supply ventilation systems are protected by filters, which shall be inspected daily, changed every week or more frequently as required.
  - .6 Return systems have approved filters over all openings, inlets, outlets.
  - .7 All systems will be:
    - .1 operated as per manufacturer's recommendations or instructions.
    - .2 operated by Contractor.
    - .3 monitored continuously by Contractor.
  - .8 Warranties and guarantees are not thereby relaxed.
  - .9 Regular preventive and all other manufacturers recommended maintenance routines are performed by Contractor at his own expense and under supervision of Departmental Representative.
  - .10 Before static completion, entire system to be refurbished, cleaned internally and externally, restored to "as- new" condition, filters in air systems replaced.
- .2 Filters referred to herein are over and above those specified elsewhere in this specification.
- .3 Exhaust systems are not included in any approvals for temporary heating ventilation.

**PART 2 PRODUCTS**

**2.1 Not Used**

- .1 Not Used.

**PART 3 EXECUTION**

**3.1 Not Used**

- .1 Not Used.

**END OF SECTION**



## **PART 1 GENERAL**

### **1.1 Related Sections**

- .1 Section 01 01 50 General Instructions
- .2 Section 23 05 00 Common Work Results – Mechanical
- .3 Section 23 08 02 Cleaning and Start-up of Mechanical Piping Systems

### **1.2 References**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.181-1999, Ready-Mixed Organic Zinc-Rich Coating.

### **1.3 Waste Management and Disposal**

- .1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

## **PART 2 PRODUCTS**

### **2.1 Not Used**

- .1 Not Used

## **PART 3 EXECUTION**

### **3.1 Connections to Equipment**

- .1 In accordance with manufacturer's instructions unless otherwise indicated.
- .2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

### **3.2 Clearances**

- .1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.
- .2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment, or components.

### **3.3 Pipework Installation**

- .1 Protect openings against entry of foreign material.
- .2 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
- .5 Install concealed pipework to minimize furring space, maximize headroom, conserve space.
- .6 Valves:
  - .1 Install in accessible locations.
  - .2 Remove interior parts before soldering.
  - .3 Install with stems above horizontal position unless otherwise indicated.
  - .4 Valves accessible for maintenance without removing adjacent piping.
  - .5 Install globe valves in bypass around control valves.
  - .6 Use chain operators on valves NPS 2-1/2 and larger where installed more than 2400mm above floor in Mechanical Rooms.
- .7 Install dielectric coupling between dissimilar metals.

### **3.4 Sleeves**

- .1 General: Install where pipes pass through masonry, concrete structures, fire rated assemblies, and elsewhere as indicated.
- .2 Material: Schedule 40 black steel pipe.
- .3 Construction: Foundation walls and where sleeves extend above finished floors to have annular fins continuously welded on at mid-point.
- .4 Sizes: 6 mm minimum clearance between sleeve and un-insulated pipe or between sleeve and insulation.
- .5 Installation:
  - .1 Concrete, masonry walls, concrete floors on grade: Terminate flush with finished surface.
  - .2 Other floors: Terminate 25mm above finished floor.
- .6 Sealing:
  - .1 Foundation walls and below grade floors: Fire retardant, waterproof non-hardening mastic.
  - .2 Elsewhere: Provide space for firestopping. Maintain fire rating integrity.
  - .3 Sleeves installed for future use: Fill with lime plaster or other easily removable filler.



- .4 Ensure no contact between copper pipe or tube and sleeve.

### **3.5 Escutcheons**

- .1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.
- .2 Construction: One piece type with set screws. Chrome or nickel plated brass or type 302 stainless steel.
- .3 Sizes: Outside diameter to cover opening or sleeve. Inside diameter to fit around pipe.

### **3.6 Cleaning of Piping Systems**

- .1 Before start-up, clean interior of piping systems in accordance with requirements of Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
- .2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

### **3.7 Pressure Testing of Equipment and Pipework**

- .1 Advise Departmental Representative 48 hours minimum prior to performance of pressure tests.
- .2 Pipework: Test as specified in relevant sections.
- .3 Maintain specified test pressure without loss for 4 hours minimum, unless specified for longer period of time.
- .4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.
- .5 Pay costs for repairs or replacement, retesting, and making good. Departmental Representative to determine whether repair or replacement is appropriate.
- .6 Conceal work only after approval and certification of tests by Departmental Representative.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 Related Sections**

- .1 Section 01 01 50 General Instructions
- .2 Section 23 05 00 Common Work Results – Mechanical

**1.2 References**

- .1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)
  - .1 ASHRAE 90.1-2001, Energy Code for Buildings Except Low-Rise Residential Buildings.
- .2 Electrical Equipment Manufacturers' Advisory Council (EEMAC)
- .3 Workplace Hazardous Material Information System (WHMIS)

**1.3 Section Includes**

- .1 Electrical work to conform to Division 26 including the following:
  - .1 Supplier and installer responsibility is indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.
  - .2 Control wiring and conduit is specified in Division 26 except for conduit, wiring and connections below 50 V which are related to control systems specified in Division 23. Refer to Division 26 for quality of materials and workmanship.

**1.4 Shop Drawings**

- .1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

**1.5 Closeout Submittals**

- .1 Provide maintenance data for motors, drives and guards for incorporation into manual specified in Section 01 01 50 – General Instructions.

**1.6 Waste Management and Disposal**

- .1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions.
- .2 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Departmental Representative.
- .3 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .4 Dispose of packaging material in appropriate on-site bin for recycling in accordance with site waste management program.



## **PART 2 PRODUCTS**

### **2.1 General**

- .1 Motors to be high efficiency, in accordance with local Hydro company standards and the requirements of ASHRAE 90.1.

### **2.2 Motors**

- .1 Provide motors for mechanical equipment as specified.
- .2 Motors under 373 W (1/2 HP) and under : speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120V, unless otherwise specified or indicated.

### **2.3 Belt Drives**

- .1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.
- .2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.
- .3 For motors under 7.5 kW (10HP) : standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.
- .4 For motors 7.5 kW (10HP) and over: sheave with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned. Provide sheave of correct size to suit balancing.
- .5 Correct size of sheave to be determined during commissioning.
- .6 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.
- .7 Motor slide rail adjustment plates to allow for centre line adjustment.

### **2.4 Drive Guards**

- .1 Provide guards for unprotected drives.
- .2 Guards for belt drives:
  - .1 Expanded metal screen welded to steel frame.
  - .2 Minimum 1.2mm thick sheet metal tops and bottoms.
  - .3 38mm dia holes on both shaft centres for insertion of tachometer.
  - .4 Removable for servicing.
- .3 Provide means to permit lubrication and use of test instruments with guards in place.
- .4 Install belt guards to allow movement of motors for adjusting belt tension.
- .5 Guard for flexible coupling:
  - .1 "U" shaped, minimum 1.6 mm thick galvanized mild steel.
  - .2 Securely fasten in place.
  - .3 Removable for servicing.
- .6 Unprotected fan inlets or outlets:

- .1 Wire or expanded metal screen, galvanized, 19 mm mesh.
- .2 Net free area of guard: not less than 80% of fan openings.
- .3 Securely fasten in place.
- .4 Removable for servicing.

### **PART 3 EXECUTION**

#### **3.1 Installation**

- .1 Fasten securely in place.
- .2 Make removable for servicing, easily returned into, and positively in position.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 Related Section**

- |    |                  |  |
|----|------------------|--|
| .1 | Section 01 01 50 | General Instructions   |
| .2 | Section 23 05 00 | Common Work Results – Mechanical                               |
| .3 | Section 23 05 48 | Vibration & Seismic Control for Ductwork, Piping and Equipment |

### **1.2 References**

- .1 Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
  - .1 Seismic Restraint Manual, Guidelines for Mechanical Systems, 1998.
- .2 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME):
  - .1 ANSI/ASME B31.1-01, Power Piping, (SI Edition).
- .3 American Society for Testing and Materials (ASTM):
  - .1 ASTM A 125-1996, Specification for Steel Springs, Helical, Heat-Treated.
  - .2 ASTM A 307-00, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  - .3 ASTM A 563-00, Specification for Carbon and Alloy Steel Nuts.
- .4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS):
  - .1 MSS SP58-1993, Pipe Hangers and Supports - Materials, Design and Manufacture.
  - .2 MSS SP69-1996, Pipe Hangers and Supports - Selection and Application.
  - .3 MSS SP89-1998, Pipe Hangers and Supports - Fabrication and Installation Practices.
- .5 National Plumbing Code.

### **1.3 System Description**

- .1 Design Requirements:
  - .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
  - .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP58.
  - .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
  - .4 Design hangers and supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.



- .5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP58.
- .2 Performance Requirements:
  - .1 Design supports and hangers to withstand seismic events as specified Section 23 05 48 – Vibration & Seismic Control for Ductwork, Piping and Equipment.

#### **1.4 Submittals**

- .1 Submittals: in accordance with Section 01 01 50 – General Instructions.
- .2 Submit shop drawings and product data for following items:
  - .1 Bases, hangers and supports.
  - .2 Connections to equipment and structure.
  - .3 Structural assemblies.
- .3 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.
- .4 Closeout Submittals:
  - .1 Provide maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

#### **1.5 Quality Assurance**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

#### **1.6 Delivery, Storage and Handling**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with Section 01 01 50 – General Instructions.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
  - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.

## **PART 2 PRODUCTS**

### **2.1 General**

- .1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP58.
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

### **2.2 Pipe Hangers**

- .1 Finishes:
  - .1 Pipe hangers and supports: galvanized after manufacture.
  - .2 Use electro-plating galvanizing process.
  - .3 Ensure steel hangers in contact with copper piping are copper plated or epoxy coated.
- .2 Upper attachment to concrete.
  - .1 Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye [6] mm minimum greater than rod diameter.
  - .2 Concrete inserts: wedge shaped body with knockout protector plate to MSS SP69.
- .3 Hanger rods: threaded rod material to MSS SP58.
  - .1 Ensure that hanger rods are subject to tensile loading only.
  - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
- .4 Pipe attachments: material to MSS SP58.
  - .1 Attachments for steel piping: carbon steel galvanized.
  - .2 Attachments for copper piping: copper plated black steel.
  - .3 Use insulation shields for hot pipework.
  - .4 Oversize pipe hangers and supports.
- .5 Hanger rod attachment: material to MSS SP58.
  - .1 Use expansion anchor on existing concrete structure.
- .6 Adjustable clevis: material to MSS SP 69, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
  - .1 Ensure "U" has hole in bottom for rivetting to insulation shields.



## **PART 3 EXECUTION**

### **3.1 Installation**

- .1 Install in accordance with:
  - .1 Manufacturer's instructions and recommendations.
- .2 Vibration Control Devices:
  - .1 Install on piping systems per Section 23 05 48 – Vibration and Seismic Controls for HVAC Ductwork, Piping and Equipment.
- .3 Clevis plates:
  - .1 Attach to concrete with 4 minimum concrete inserts, one at each corner.
- .4 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations. Supporting piping from underside of light weight roof deck (without concrete) is not permitted.

### **3.2 Hanger Spacing**

- .1 HVAC piping: in accordance with table below.
- .2 Plumbing piping: in accordance with the most stringent requirements of the table below as well as the following:
  - .1 National Plumbing Code.
  - .2 Authority Having Jurisdiction.
- .3 Pipe hanger rods shall be sized in accordance to SMACNA Seismic Restraint Manual based on Seismic Hazard Level (SHL). For SHL, see Section 23 05 48 – Vibration and Seismic Controls for HVAC Ductwork, Piping and Equipment.

<b>MAXIMUM HANGER SPACING</b>						
<b>PIPE DIA. NPS</b>	<b>STEEL SCH.40</b>	<b>COPPER L,K Hard Drawn</b>	<b>CAST.I STD.</b>	<b>GLASS</b>	<b>ABS/PVC</b>	<b>PEX</b>
1/2	1.8 m [6'-0"]	1.8 m [6'-0"]			1.2 m [4'-0"]	0.8 m [2'-6"]
3/4 & 1	2.4 m [8'-0"]	2.4 m [8'-0"]			1.2 m [4'-0"]	0.8 m [2'-6"]
1-1/4	2.4 m [8'-0"]	3.0 m [10'-0"]			1.2 m [4'-0"]	0.8 m [2'-6"]
1-1/2 & 2	2.4 m [8'-0"]	3.0 m [10'-0"]	3.0 m [10'-0"]		1.2 m [4'-0"]	0.8 m [2'-6"]
2-1/2, 3, 4 & 5	2.4 m [8'-0"]	3.0 m [10'-0"]	3.0 m [10'-0"]	2.4 m [8'-0"]	1.2 m [4'-0"]	0.8 m [2'-6"]
6 & 8	3.0 m [10'-0"]	3.0 m [10'-0"]	3.0 m [10'-0"]	2.4 m [8'-0"]	1.2 m [4'-0"]	0.8 m [2'-6"]



### **3.3 Hanger Installation**

- .1 Install hanger so that rod is vertical under operating conditions.
- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

### **3.4 Horizontal Movement**

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- .2 Where horizontal pipe movement is less than 13mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

### **3.5 Final Adjustment**

- .1 Adjust hangers and supports:
  - .1 Ensure that rod is vertical under operating conditions.
  - .2 Equalize loads.
- .2 Adjustable clevis:
  - .1 Tighten hanger load nut securely to ensure proper hanger performance.
  - .2 Tighten upper nut after adjustment.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 Related Sections**

- .1 Section 01 01 50 General Instruction
- .2 Section 23 05 00 Common Work Results – Mechanical

### **1.2 References**

- .1 National Building Code of Canada (NBC)
- .2 Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
  - .1 Seismic Restraint Manual, Guidelines for Mechanical Systems, 1998.

### **1.3 Shop Drawings**

- .1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.
- .2 Provide vibration isolation systems shop drawings complete with performance and product data. Shop drawings shall demonstrate compliance with the National Building Code and shall bear the seal of a Professional Engineer.
- .3 Provide detailed drawings of all seismic restraint systems for ductwork, piping and equipment.

### **1.4 Waste Management and Disposal**

- .1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions.
- .2 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Departmental Representative.
- .3 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .4 Dispose of packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

## **PART 2 PRODUCTS**

### **2.1 Vibration Isolation System – General**

- .1 Performance of vibration isolation systems shall be designed by manufacturer specializing in vibration isolation materials and devices.
- .2 Size and shape of bases type shall be coordinated with submitted equipment.
- .3 Products shall of the same manufacturer unless otherwise noted.

### **2.2 Elastomeric Pads**

- .1 Type EP1 - neoprene waffle or ribbed; 9 mm [3/8"] minimum thick; 50 durometer; maximum loading 350 kPa [50 psi].
- .2 Type EP2 - rubber waffle or ribbed; 9 mm [3/8"] minimum thick; 30 durometer natural rubber; maximum loading 415 kPa [60 psi].



- .3 Type EP3 - neoprene-steel-neoprene; 9 mm [3/8"] minimum thick neoprene bonded to 1.71 mm [16 gauge] steel plate; 50 durometer neoprene, waffle or ribbed; holes sleeved with isolation washers; maximum loading 350 kPa [50 psi].
- .4 Type EP4 - rubber-steel-rubber; 9 mm [3/8"] minimum thick rubber bonded to 1.71 mm [16 gauge] steel plate; 30 durometer natural rubber, waffle or ribbed; holes sleeved with isolation washers; maximum loading 415 kPa [60 psi].

### **2.3 Hangers**

- .1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30° arc without metal to metal contact.
- .2 Type H1 - neoprene - in-shear, molded with rod isolation bushing which passes through hanger box.
- .3 Type H2 - stable spring, elastomeric washer, cup with molded isolation bushing which passes through hanger box.
- .4 Type H3 - stable spring, elastomeric element, cup with molded isolation bushing which passes through hanger box.
- .5 Type H4 - stable spring, elastomeric element with pre-compression washer and nut with deflection indicator.

### **2.4 Acoustic Barriers for Anchors and Guides**

- .1 Acoustic barriers: between pipe and support, consisting of 25 mm [1"] minimum thick heavy duty duck and neoprene isolation material.

### **2.5 Flexible Pipe Connectors**

- .1 Inner corrugated hose: stainless steel.
- .2 Outer braid: Braided wire mesh stainless steel outer jacket.
- .3 Type of end connection: threaded for 50mm [2"] or smaller; flange for 65mm [2-1/2"] or larger.
- .4 Operating conditions:
  - .1 Working pressure: 1379 kPa [200 psi].
  - .2 Working temperature: 4540 °C [850 °F].

### **2.6 Seismic Control Measures**

- .1 General:
  - .1 Design anchorage and attachment methods for all systems and/or equipment as specified herein.
  - .2 Seismic control systems to work in all directions.
  - .3 Fasteners and attachment points to resist same maximum load as seismic restraint.
  - .4 Drilled or power driven anchors and fasteners not permitted.
  - .5 No equipment, equipment supports or mounts to fail before failure of structure.

- .6 Supports of cast iron or threaded pipe not permitted.
- .7 Seismic control measures not to interfere with integrity of firestopping.
- .8 For equipment mounted on housekeeping pad, specify the minimum distance between anchor bolt and edge of housekeeping pad.
- .2 Static equipment:
  - .1 Anchor equipment to equipment supports. Anchor equipment supports to structure.
  - .2 Seismic restraints:
    - .1 Cushioning action to be gentle and steady.
    - .2 Shall never reach metal-like stiffness.
- .3 Vibration isolated equipment:
  - .1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9mm clearance during normal operation of equipment and systems between seismic restraint and equipment.
  - .2 Provide seismic restraints in addition to vibration isolation system to resist complete isolator unloading.
- .4 Piping systems:
  - .1 Provide seismic restraints for all piping in accordance to the latest edition of SMACNA Seismic Restraint Manual as described below:
    - .1 All compressed air piping NPS 1 or larger.
  - .2 Seismic restraints may be omitted for the following conditions:
    - .1 All piping suspended by individual hangers 305mm [12"] or less in length, as measured from the top of the pipe to the bottom of the structural support for the hanger.
  - .3 To be compatible with requirements for anchoring and guiding of piping systems.
  - .4 Wet weight of piping shall be to be used for designing seismic restraint systems.
  - .5 Small pipes may be rigidly secured to larger pipes for restraint purposes, but not reverse.
  - .6 Where cable is used for restraining vibration isolated piping systems, install cable with sufficient slack to avoid short-circuiting of vibration isolators.
- .5 Ductwork systems:
  - .1 Provide seismic restraints for all ductwork in accordance to the latest edition of SMACNA Seismic Restraint Manual as described below:
    - .1 All rectangular ducts with cross sectional areas  $0.56\text{m}^2$  [6 ft<sup>2</sup>] and larger.
    - .2 All round ducts with diameters 711 mm [28"] and larger.
  - .2 Seismic restraints may be omitted for the following conditions:
    - .1 All ductwork suspended by hangers 305mm [12"] or less in length, as measured from the top of the duct to the bottom of the structural support for the hanger.



- .6 Bracing methods:
  - .1 Approved by Departmental Representative.
  - .2 Structural angles or channels.
  - .3 Cable restraint system incorporating grommets, shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points. Incorporate neoprene into cable connections to reduce shock loads.

### **PART 3 EXECUTION**

#### **3.1 Manufacturer's Instructions**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

#### **3.2 Installation**

- .1 Seismic control measures to meet requirements of NBC.
- .2 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.
- .3 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.
- .4 Where isolation is bolted to floor use vibration isolation rubber washers.
- .5 Block and shim level bases so that ductwork and piping connections can be made to rigid system at operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.

#### **3.3 Field Quality Control**

- .1 Provide the services of the Professional Engineer(s) who designed the restraint systems for "Field Review" of the installed components, and submit the following to the Departmental Representative:
  - .1 Assurance commitment letter, signed and sealed; provided at the commencement of the project.
  - .2 Signed and sealed shop drawings of seismic restraints for equipment, piping and ductwork; provided prior to installation.
  - .3 Typewritten inspection reports; provided during the construction period.
  - .4 Schedule C-B, signed and sealed; provided after performing "Field Review".

**END OF SECTION**

**PART 1 GENERAL**

**1.1 Related Sections**

- .1 Section 01 01 50 General Instructions
- .2 Section 01 35 33 Health and Safety Requirements
- .3 Section 23 05 00 Common Work Results – Mechanical

**1.2 References**

- .1 Canadian Gas Association (CGA)
  - .1 CSA/CGA B149.1, Natural Gas and Propane Installation Code.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.
  - .2 CAN/CGSB-24.3, Identification of Piping Systems.
- .3 National Fire Protection Association (NFPA)
  - .1 NFPA 13, Standard for the Installation of Sprinkler Systems.
  - .2 NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

**1.3 Submittals**

- .1 Product Data:
- .2 Submittals: in accordance with Section 01 01 50 – General Instructions.
- .3 Product data to include paint colour chips, other products specified in this section.
- .4 Samples:
  - .1 Submit samples in accordance with Section 01 01 50 – General Instructions.
  - .2 Samples to include nameplates, labels, tags, lists of proposed legends.

**1.4 Quality Assurance**

- .1 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.
- .2 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 01 50 – General Instructions.

**1.5 Delivery, Storage, and Handling**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with Section 01 01 50 – General Instructions
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.



- .2 Waste Management and Disposal:
  - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.
  - .2 Dispose of unused paint and coating material at official hazardous material collections site approved by Departmental Representative.
  - .3 Do not dispose of unused paint and coating material into sewer system, into streams, lakes, onto ground or in locations where it will pose health or environmental hazard.

## **PART 2 PRODUCTS**

### **2.1 Manufacturer's Equipment Nameplates**

- .1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.
- .2 Lettering and numbers raised or recessed.
- .3 Information to include, as appropriate:
  - .1 Equipment: manufacturer's name, model, size, serial number, capacity.
  - .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

### **2.2 System Nameplates**

- .1 Colours:
  - .1 Hazardous: red letters, white background.
  - .2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).
- .2 Construction:
  - .1 3 mm thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

- .3 Sizes:

- .1 Conform to following table:

	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	11 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

- .2 Use maximum of 25 letters/numbers per line.

- .4 Identification for PWGSC Preventive Maintenance Support System (PMSS):
  - .1 Use arrangement of Main identifier, Source identifier, Destination identifier.
  - .2 Equipment in Mechanical Room:
    - .1 Main identifier: Size #9.
    - .2 Source and Destination identifiers: Size #6.
    - .3 Terminal cabinets, control panels: Size #5.
  - .3 Equipment elsewhere: Sizes as appropriate.

### **2.3 Existing Identification Systems**

- .1 Apply existing identification system to new work.
- .2 Where existing identification system does not cover for new work, use identification system specified this section.
- .3 Before starting work, obtain written approval of identification system from Departmental Representative.

### **2.4 Piping Systems Governed by Codes**

- .1 Identification:
  - .1 Natural gas and propane: to CSA/CGA B149.1.
  - .2 Sprinklers: to NFPA 13.

### **2.5 Identification of Piping Systems**

- .1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
- .2 Pictograms:
  - .1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations..
- .3 Legend:
  - .1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.
- .4 Arrows showing direction of flow:
  - .1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
  - .2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
  - .3 Use double-headed arrows where flow is reversible.
- .5 Extent of background colour marking:
  - .1 To full circumference of pipe or insulation.
  - .2 Length to accommodate pictogram, full length of legend and arrows.
- .6 Materials for background colour marking, legend, arrows:
  - .1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.



- .2 Other pipes: pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.
- .7 Colours and Legends:
  - .1 Where not listed, obtain direction from Departmental Representative.
  - .2 Colours for legends, arrows: to following table:  

<b>Background colour: Legend, arrows:</b>	
Yellow	BLACK
Green	WHITE
Red	WHITE
  - .3 Background colour marking and legends for piping systems:

Contents	Background Colour Marking	Legend
Domestic hot water supply	Green	DOM.HWSUPPLY
Domestic HW recirculation	Green	DOM.HWCIRC
Domestic cold water supply	Green	DOM.CWS
Sanitary	Green	SAN
Plumbing vent	Green	SAN.VENT

## 2.6 Identification Ductwork Systems

- .1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high.
- .2 Colours: back, or co-ordinated with base colour to ensure strong contrast.

## 2.7 Language

- .1 Identification in English.

# PART 3 EXECUTION

## 3.1 Manufacturer's Instructions

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

## 3.2 Timing

- .1 Provide identification only after painting has been completed.

### **3.3 Installation**

- .1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- .2 Provide CSA registration plates as required by respective agency.
- .3 Identify systems, equipment to conform to PWGSC PMSS.

### **3.4 Nameplates**

- .1 Locations:
  - .1 In conspicuous location to facilitate easy reading and identification from operating floor.
- .2 Standoffs:
  - .1 Provide for nameplates on hot and/or insulated surfaces.
- .3 Protection:
  - .1 Do not paint, insulate or cover.

### **3.5 Location of Identification on Piping and Ductwork Systems**

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.
- .3 At least once in each small room through which piping or ductwork passes.
- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification easily and accurately readable from usual operating areas and from access points.
  - .1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

### **3.6 Valves, Controllers**

- .1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.
- .2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Departmental Representative. Provide one copy (reduced in size if required) in each operating and maintenance manual.
- .3 Number valves in each system consecutively.

**3.7     Cleaning**

- .1     Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**



## **PART 1 - GENERAL**

### **1.1 General**

- .1 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

### **1.2 Qualifications of TAB Company**

- .1 Testing and balancing shall be performed by an agency that specializes in this type of work. Provide proof that the agency has successfully completed five projects of similar size and scope
- .2 All work shall be performed by persons with proven ability and thoroughly versed in the type of testing and balancing. Submit names, complete with experience, record and references for review by the Consultant prior to work being carried out.

### **1.3 Purpose of TAB**

- .1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads
- .2 Adjust and regulate installed equipment and systems so as to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.
- .3 Balance systems and installed equipment to regulate flow rates to match load requirements over full operating ranges.

### **1.4 Exceptions**

- .1 TAB of systems and equipment regulated by codes, standards to be to satisfaction of authority having jurisdiction.
- .2 TAB of existing equipment already in operation.

### **1.5 Co-Ordination**

- .1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule so as to ensure completion before acceptance of project.
- .2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

### **1.6 Pre-TAB Review**

- .1 Review contract documents before project construction is started.
- .2 Review specified standards and report to Departmental Representative in writing all proposed procedures which vary from standard.
- .3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

### **1.7 Start-Up**

- .1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
- .2 Follow special start-up procedures specified elsewhere in Division 23.

**1.8 Operation of Systems During TAB**

- .1 Operate systems for length of time required for TAB and as required by Departmental Representative for verification of TAB reports.

**1.9 Start of TAB**

- .1 Notify Departmental Representative 7 days prior to start of TAB.
- .2 Start TAB when building is essentially completed, including:
  - .1 Installation of ceilings, doors, windows, other construction affecting TAB.
  - .2 Application of weather-stripping, sealing, caulking.
  - .3 All pressure, leakage, other tests specified elsewhere Division 23.
  - .4 All provisions for TAB installed and operational.
- .3 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
  - .1 Proper thermal overload protection in place for electrical equipment.
  - .2 Air systems:
    - .1 Duct systems clean.
    - .2 Correct fan rotation.
    - .3 Fire, smoke, volume control dampers installed and open.
    - .4 Access doors, installed, closed.
    - .5 Outlets installed, volume control dampers open.

**1.10 Application Tolerances**

- .1 Do TAB to following tolerances of design values:
  - .1 HVAC systems: plus 5%, minus 5%.
  - .2 Hydronic systems: plus or minus 10%.

**1.11 Accuracy Tolerances**

- .1 Measured values to be accurate to within plus or minus 2% of actual values.

**1.12 Instruments**

- .1 Prior to TAB, submit to Departmental Representative list of instruments to be used together with serial numbers.
- .2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
- .3 Calibrate within 3 months of TAB. Provide certificate of calibration to Departmental Representative.

**1.13 Submittals**

- .1 Submit, prior to commencement of TAB:
- .2 Proposed methodology and procedures for performing TAB if different from referenced standard.



**1.14 Preliminary TAB Report**

- .1 Submit for checking and approval of Departmental Representative prior to submission of formal TAB report, sample of rough TAB sheets. Include:
  - .1 Details of instruments used.
  - .2 Details of TAB procedures employed.
  - .3 Calculations procedures.
  - .4 Summaries.

**1.15 TAB Report**

- .1 Format to be in accordance with Associated Air Balance Council Manual.
- .2 TAB report to show results in SI units and to include:
  - .1 Project record drawings.
  - .2 System schematics.
- .3 Submit 6 copies of TAB Report to Departmental Representative for verification and approval, in English in D-ring binders, complete with index tabs.

**1.16 Verification**

- .1 Reported results subject to verification by Departmental Representative.
- .2 Provide manpower and instrumentation to verify up to 30% of reported results.
- .3 Number and location of verified results to be at discretion of Departmental Representative.
- .4 Bear costs to repeat TAB as required to satisfaction of Departmental Representative.

**1.17 Settings**

- .1 After TAB is completed to satisfaction of Departmental Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.
- .2 Permanently mark settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.

**1.18 Completion of TAB**

- .1 TAB to be considered complete when final TAB Report received and approved by Departmental Representative.

**1.19 Air Systems**

- .1 Standard: TAB to be to most stringent of this section or TAB standards of ASHRAE.
- .2 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop, temperatures (dry bulb, wet bulb, dew point, duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.
- .3 Locations of equipment measurements: To include, but not be limited to, following as appropriate:
  - .1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.

- .2 At controllers, controlled device.
- .4 Locations of systems measurements to include, but not be limited to, following as appropriate: Main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

#### **1.20 Domestic Hot Water Systems**

- .1 Meet requirements as specified for liquid systems.
- .2 Locations of equipment measurements: To include, but not be limited to, following as appropriate: Inlet and outlet of heaters, tank, pump, circulator, at controllers, controlled device.
- .3 Locations of systems measurements to include but not be limited to, following as appropriate: main, main branch, branch, sub-branch.

### **PART 2 - PRODUCTS**

#### **2.1 Not Used**

- .1 Not used.

### **PART 3 - EXECUTION**

#### **3.1 Not Used**

- .1 Not used.

**END OF SECTION**



## **PART 1 - GENERAL**

### **1.1 Related Sections**

- |    |                  |  |
|----|------------------|--|
| .1 | Section 01 01 50 | General Instructions                               |
| .2 | Section 01 35 33 | Health and Safety Requirements                     |
| .3 | Section 23 05 00 | Common Work Results - Mechanical                   |
| .4 | Section 23 05 05 | Installation of Pipe Work.                         |
| .5 | Section 23 05 29 | Hangers and Supports for HVAC Piping and Equipment |

### **1.2 References**

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  - .1 ANSI/ASHRAE/IESNA 90.1-2004; Energy Standard for Buildings Except Low-Rise Residential Buildings.
- .2 American Society for Testing and Materials (ASTM):
  - .1 ASTM B 209M-2001, Specification for Aluminum and Aluminum Alloy Sheet and Plate [Metric].
  - .2 ASTM C 335-1995, Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  - .3 ASTM C 411-1997, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  - .4 ASTM C 449/C449M-2000, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  - .5 ASTM C 534-2005, Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
  - .6 ASTM C 795-1992(1998), Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  - .7 ASTM C 921-1989(1996), Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Manufacturer's Trade Associations
  - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.
- .4 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-M88, Surface Burning characteristics of Building Materials and Assemblies.

### **1.3 Definitions**

- .1 For purposes of this section:
  - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
  - .2 "EXPOSED"-will mean "not concealed" as defined herein.

- .2 TIAC Codes:
  - .1 CRF: Code Rectangular Finish.
  - .2 CPF: Code Piping Finish.

#### **1.4 Submittals**

- .1 Submittals: in accordance with Section 01 01 50 – General Instructions.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions. Include product characteristics, performance criteria, and limitations.
  - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 01 50 – General Instructions.
- .3 Shop Drawings:
  - .1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.
- .4 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.

#### **1.5 Quality Assurance**

- .1 Qualifications:
  - .1 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, qualified to standards of TIAC.
- .2 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

#### **1.6 Delivery, Storage and Handling**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 01 50 – General Instructions.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Storage and Protection:
  - .1 Protect from weather, construction traffic.



- .2 Protect against damage.
- .3 Store at temperatures and conditions required by manufacturer.
- .3 Waste Management and Disposal:
  - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.
  - .2 Place excess or unused insulation and insulation accessory materials in designated containers.
  - .3 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.
  - .4 Dispose of unused adhesive material at official hazardous material collections site approved by Departmental Representative.

## **PART 2 - PRODUCTS**

### **2.1 Fire and Smoke Rating**

- .1 In accordance with CAN/ULC-S102:
  - .1 Maximum flame spread rating: 25.
  - .2 Maximum smoke developed rating: 50.

### **2.2 Insulation**

- .1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C mean temperature when tested in accordance with ASTM C 335.
- .3 TIAC Code A-1: Rigid molded mineral fibre without factory applied vapour retarder jacket.
  - .1 Mineral fibre: to CAN/CGSB-51.9.
  - .2 Maximum "k" factor: to CAN/CGSB-51.9.
- .4 TIAC Code A-3: Rigid molded mineral fibre with factory applied vapour retarder jacket.
  - .1 Mineral fibre: to CAN/CGSB-51.9.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: to CAN/CGSB-51.9.
- .5 TIAC Code C-2: Mineral fibre blanket faced [with] [without] factory applied vapour retarder jacket (as scheduled in PART 3 of this section).
  - .1 Mineral fibre: to CAN/ULC-S702.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: to CAN/ULC-S702.

- .6 TIAC Code A-6: Flexible unicellular tubular elastomer.
  - .1 Insulation: flexible closed-cell elastomer to ASTM C534.
  - .2 Jacket: to CGSB 51-GP-52Ma. Required for outdoor application.
  - .3 Maximum "k" factor: 0.27.
  - .4 Vapour transmission: 0.08 perm-inch.
  - .5 To be certified by manufacturer to be free of potential stress corrosion cracking corrodants.
- .7 To be formaldehyde free, low VOC; resists mold and mildew.
- .8 Evidence shall be provided to the Departmental Representative on the site of ULC listings of all products being used. Duct insulation adhesives and coatings shall be non-toxic as defined by WCB Regulations.

### **2.3 Insulation Securement**

- .1 Tape: Self-adhesive, aluminum, reinforced, 50mm wide minimum.
- .2 Contact adhesive: Quick setting.
- .3 Canvas adhesive: Washable.
- .4 Tie wire: 1.5mm diameter stainless steel.
- .5 Bands: Stainless steel, 19mm wide, 0.5mm thick.

### **2.4 Cement**

- .1 Thermal insulating and finishing cement:
  - .1 To CAN/CGSB-51.12.
  - .2 Hydraulic setting or Air drying on mineral wool, to ASTM C 449.

### **2.5 Vapour Retarder Lap Adhesive**

- .1 Water based, fire retardant type, compatible with insulation.

### **2.6 Indoor Vapour Retarder Finish**

- .1 Vinyl emulsion type acrylic, compatible with insulation.

### **2.7 Outdoor Vapour Retarder Finish**

- .1 Vinyl emulsion type acrylic, compatible with insulation.
- .2 Reinforcing fabric: Fibrous glass, untreated 305 g/m.

### **2.8 Jackets**

- .1 Polyvinyl Chloride (PVC):
  - .1 One-piece moulded type and sheet to CGSB 51-GP-53M with pre-formed shapes as required.
  - .2 Colours: White.
  - .3 Minimum service temperatures: 20°C [68°F].



- .4 Maximum service temperature: 65°C [150°F].
- .5 Moisture vapour transmission: 0.02 perm.
- .6 Fastenings:
  - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
  - .2 Tacks.
  - .3 Pressure sensitive vinyl tape of matching colour.
- .2 Canvas:
  - .1 220 and 120 gm/m cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.
  - .2 Lagging adhesive: Compatible with insulation.
- .3 Aluminum foil laminate
  - .1 Multi-layer aluminum foil laminate; highly puncture and resistant, non-permeable vapour barrier for complete moisture protection. Inhibits mold growth. UL listed.
  - .2 Total thickness: 0.20 mm.
  - .3 Substrate thickness: 0.15 mm sheet.
  - .4 Finish: Aluminum, stucco embossed.
  - .5 Adhesive: cold weather acrylic adhesive.

### **PART 3 - EXECUTION**

#### **3.1 Pre-Installation Requirement**

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
- .2 Surfaces to be clean, dry, free from foreign material.

#### **3.2 Installation**

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturer's instructions and this specification.
- .3 Use two layers with staggered joints when required nominal wall thickness exceeds 75mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
  - .1 Hangers, supports to be outside vapour retarder jacket.
- .5 Supports, hangers:
  - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

### **3.3 Removable, Pre-fabricated, Insulation and Enclosures**

- .1 Application: At expansion joints, valves, primary flow measuring elements flanges and unions at equipment.
- .2 Design: To permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.
- .3 Insulation:
  - .1 Insulation, fastenings and finishes: same as system.
  - .2 Jacket: PVC.

### **3.4 Installation of Elastomeric Insulation**

- .1 Insulation to remain dry at all times. Overlaps to manufacturer's instructions. Ensure tight joints.
- .2 Provide vapour retarder as recommended by manufacturer.

### **3.5 Piping Insulation Schedules**

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 TIAC Code: A-1.
  - .1 Securements: SS Bands at 300mm on centre.
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code 1501-H.
- .3 TIAC Code: A-3.
  - .1 Securements: SS Bands at 300mm on centre.
  - .2 Seals: VR lap seal adhesive, VR lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C.
- .4 TIAC Code: A-6.
  - .1 Seals: lap seal adhesive, lagging adhesive.
  - .2 Installation: TIAC Code: 1501-CA; per manufacturer's recommendation.
- .5 TIAC Code: C-2 with vapour retarder jacket.
  - .1 Insulation securements: SS Bands at 300mm on centre.
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C.
- .6 Thickness of insulation to be as listed in following table.
  - .1 Run-outs to individual units and equipment not exceeding 4000mm long.
  - .2 Do not insulate exposed run-outs to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp °C	TIAC Code	Run out	To NPS1	1 ¼-2	2 ½-4	5-6	8 & over
Domestic HWS & recirculation		A-1	25	25	25	38	38	38
Domestic CWS		A-3	25	25	25	25	25	25

.7 Finishes:

- .1 Exposed indoors: Canvas and/or PVC jacket.
- .2 Exposed in mechanical rooms: Canvas and/or PVC jacket.
- .3 Concealed, indoors: ASJ, no further finish.
- .4 Exposed outdoors: Aluminum foil laminate

**3.6 Cleaning**

- .1 Proceed in accordance with Section 01 01 50 – General Instructions.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**



## **PART 1 - GENERAL**

### **1.1 Related Sections**

- .1 Section 01 91 00 Commissioning
- .2 Section 23 05 93 Testing, Adjusting and Balancing for HVAC

### **1.2 Quality Assurance**

- .1 The commissioning of mechanical systems shall be executed in accordance with the intent of ASHRAE Standard 1-1996 "Guideline for Commissioning of HVAC Systems"

### **1.3 General**

- .1 Commissioning of the mechanical systems, including the HVAC, and Plumbing and Drainage Systems, shall be carried out by an independent Commissioning Agent acceptable to the Departmental Representative with technicians specifically trained in commissioning procedures.
- .2 The Mechanical Subcontractor shall retain a Commissioning Agent, who shall be active in the commissioning process and actively encourage his own forces and subtrades to work together to achieve optimum system performance for the mechanical systems in a timely manner. Refer to Commissioning Authority Plan for responsibilities of Commissioning Agent.
- .3 It is not intended that this work shall, in any way, replace normal factory start-up service for equipment or relieve the Contractor or his sub-trades of their responsibility for providing first-class installation in satisfactory working order.
- .4 As part of the final commissioning report, submit a Certificate stating that the commissioning procedures have been completed, that complete factual reports have been distributed and that directions have been given to the Contractor to correct faults and omissions and finally, that follow-up testing, after the correction of faults and omissions has been completed and recorded.
- .5 Be responsible for the performance and commissioning of all equipment supplied under the Sections of Division 21, 22, 23. Commissioning is the process of advancing the installation from the stage of static completion to full working order in accordance with the contract documents and design intent. It is the activation of the completed installation.
- .6 In consultation with the General Contractor, ensure that sufficient time is allowed and fully identified on the construction schedule for the proper commissioning of all mechanical systems.

### **1.4 Commissioning and Demonstration**

- .1 Submit a schedule for the commissioning phase of the work. This schedule shall show:
  - .1 Equipment start-up schedule.
  - .2 Submission dates for the various documents required prior to substantial completion.
  - .3 Timing of the commissioning, testing, balancing, and demonstration process.



- .2 Commissioning is concluded when the air and water system is balanced and the installation is in full working order and acceptable for use. The work shall include the following:
  - .1 Balancing of the air systems as specified in this section.
  - .3 Plug all air pressure and flow measuring holes.
  - .4 Adjust vibration isolators and earthquake restraints for optimum performance.
  - .5 Verification and certification of the sealing of all HVAC penetrations through fire separations (rated & non-rated) and sound separations. Forms in Section 23 08 02 shall be used for this purpose.
  - .6 Verification of water tightness of all roof and exterior wall penetrations.
  - .8 Set up all automatic control dampers and automatic temperature control devices.
  - .9 Set up and test all alarm and protective devices.
- .3 In addition to the piping, equipment and systems listed above provide commissioning of all plumbing piping, equipment and systems including the following:
  - .1 Domestic cold water including PRV setpoint.
  - .2 Domestic hot water and recirculation including temperature set points.
  - .3 Domestic tempered water including setpoints.
  - .4 Sanitary waste and venting.
  - .5 Plumbing fixtures.
- .4 At the conclusion of commissioning, demonstrate the operation of the systems to the Departmental Representative. For demonstration and instruction to Operating staff requirements, refer to this section of the specification and also to section 25 05 01 EMCS: General Requirements.
- .5 The verification process shall include the demonstration of the following:
  - .1 The ease of access that has been provided throughout for servicing coils, motors, drives, control dampers and damper operators.
  - .2 Location of and opening and closing of all access panels.
  - .3 Operation of all automatic control dampers and automatic temperature control devices.
  - .4 Operation of all alarm and protective devices.
  - .5 Operation of all equipment and systems under each mode of operation, and failure.
- .6 At the completion of commissioning, testing, balancing and demonstration submit the following to the Departmental Representative:
  - .1 A letter certifying that all work specified under this contract is complete, clean and operational in accordance with the specification and drawings.
  - .2 Completed copies of all commissioning check lists plus copies of start-up reports from specialty contractors and vendors.
  - .3 "As-Built" record drawings, as specified.

- .4 A list of all alarm and protective devices tested, with the final operating settings.
- .7 Training
  - .1 During "Substantial Performance" review, the Mechanical Contractor, Control Sub-contractor, and other Sub-contractors designated by the Departmental Representative shall provide training to the Owner's operating personnel in the proper operation and maintenance of all systems and equipment installed under the contract.
  - .2 It shall be the Mechanical Contractor's responsibility to have the specified equipment manuals prepared, previously approved by the Departmental Representative, and ready for presentation to the Owner at this meeting.
  - .3 Convene the meeting with the aforementioned parties at the time called for in the substantial performance review. The arrangements shall include written notices to all the parties concerned. Should the equipment manuals, or system installation not be complete and operable at the proper time, he shall then convene the operating instruction meeting at a later date and pay any additional costs including time and traveling expenses for the personnel involved which are attributable to the delay.

**END OF SECTION**



**PART 1 GENERAL**

**1.1 Related Sections**

- .1 Section 01 91 00 Commissioning
- .2 Section 22 42 01 Plumbing Specialties and Accessories
- .3 Section 23 05 93 Testing, Adjusting and Balancing for HVAC

**1.2 Potable Water Systems**

- .1 When cleaning is completed and system filled:
  - .1 Verify performance of equipment and systems as specified elsewhere in Division 22.
- .2 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or recharge air chambers. Repeat for each outlet and flush valve.
- .3 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.

**1.3 Sanitary and Storm Drainage Systems**

- .1 Buried systems: Perform tests prior to back-filling. Perform hydraulic tests to verify grades and freedom from obstructions.
- .2 Ensure that traps are fully and permanently primed.
- .3 Ensure that fixtures are properly anchored, connected to system.
- .4 Operate flush valves, tank and operate each fixture to verify drainage and no leakage.
- .5 Cleanouts: Refer to Section 22 42 01 - Plumbing Specialties and Accessories.
- .6 Roof drains:
  - .1 Refer to Section 22 42 01 - Plumbing Specialties and Accessories.
  - .2 Remove caps as required.

**PART 2 PRODUCTS**

**2.1 Not Used**

- .1 Not Used.

**PART 3 EXECUTION**

**3.1 Not Used**

- .1 Not Used.

**END OF SECTION**

**PART 1      GENERAL**

**1.1      Related Sections**

- |    |                  |   |
|----|------------------|---|
| .1 | Section 01 01 50 | General Instructions  |
| .2 | Section 01 35 33 | Health and Safety Requirements                                    |
| .3 | Section 23 05 00 | Common Work Results - Mechanical                                  |
| .4 | Section 23 05 48 | Vibration and Seismic Controls for Ductwork, Piping and Equipment |
| .5 | Section 23 07 13 | Thermal Insulation for Ducting                                    |

**1.2      References**

- .1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).
- .2 American Society for Testing and Materials (ASTM)
  - .1 ASTM A 480/A 480M-2003c, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
  - .2 ASTM A 635/A 635M-2002, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.
  - .3 ASTM A 653/A 653M-2003, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 Department of Justice Canada (Jus).
  - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .5 National Fire Protection Agency (NFPA)
  - .1 NFPA 90A-1999, Installation of Air Conditioning and Ventilating Systems.
  - .2 NFPA 90B-1999, Installation of Warm Air Heating and Air Conditioning Systems.
  - .3 NFPA 91-1995, Standard for Exhaust System for Air Conveying of Vapours, Gases, Mists, and Non-combustible Particle Solids.
- .6 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
  - .1 SMACNA HVAC Duct Construction Standards, Metal and Flexible, 2nd Edition 1995 and Addendum No. 1, 1997.
  - .2 SMACNA HVAC Duct Leakage Test Manual, 1985, Technical Research Update-92.



- .3 IAQ Guideline for Occupied Buildings Under Construction 1995, 1st Edition.
- .7 Transport Canada (TC).
- .1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

### **1.3 Submittals**

- .1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.
- .2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets for the following:
  - .1 Sealants.
  - .2 Adhesive
  - .3 Duct tape.
  - .4 Duct liners.

### **1.4 Quality Assurance**

- .1 Certification of Ratings:
  - .1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.
- .2 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

### **1.5 Delivery Storage and Handling**

- .1 Protect on site stored or installed absorptive material from moisture damage.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.
  - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  - .3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.
  - .4 Separate for reuse and recycling and place in designated containers in accordance with Waste Management Plan.
  - .5 Place materials defined as hazardous or toxic in designated containers.
  - .6 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
  - .7 Fold up metal and plastic banding, flatten and place in designated area for recycling.

## **PART 2 PRODUCTS**

### **2.1 Ductwork - General**

- .1 Duct dimension noted on drawings are clear inside dimensions. Insulation thickness shall be as noted on the drawings.
- .2 All seams, joints and raw edges shall be sealed and covered with glassfab.
- .3 Insulation shall be applied with mechanical fasteners and suitable adhesives. Duct insulation adhesive and coatings shall be non-toxic as defined by WCB Regulations.
- .4 Round duct: with spiral seams. Sections shall be joined with a RT1 slip joint, screw fastened and sealed with no visible duct sealant to interfere with finish painting.
- .5 Exposed round duct shall be installed in a neat workmanlike manner parallel to building walls and roof with no sags or misalignment, and shall be true and round.
- .6 Ductwork shall be constructed to 500 Pa low pressure duct.

### **2.2 Fittings**

- .1 Fabrication: to SMACNA. Fittings shall be 2 gauges heavier than connecting ductwork.
- .2 Radius elbows:
  - .1 Rectangular: Centre-line radius equal to 1.5 times width of duct, with single thickness turning vanes.
  - .2 Round: Centre-line radius equal to 1.5 times diameter. 5-gore for 300mm [12"] and larger; die-stamped for 254mm [10"] and smaller.
- 3 Mitered elbows, rectangular:
  - .1 To 400mm [16"]: with single thickness turning vanes.
  - .2 Over 400mm [16"]: with double thickness turning vanes.
- .4 Branches:
  - .1 Rectangular main and branch: 45° entry on branch.
  - .2 Round main and branch: enter main duct at 45° or with conical connection. The use of spin-in collars is not acceptable.
- .5 Transitions:
  - .1 Diverging: 20° maximum angle.
  - .2 Converging: 30° maximum angle.
- .6 Offsets: full radius elbows.
- .7 Obstruction deflectors: maintain full cross-sectional area.
- .8 Elbows in autoclave exhaust shall be un-vaned, smooth radius construction with centre-line equal to 1.5 times width of duct.

### **2.3 Stainless Steel**

- .1 Material: 316 stainless steel to ASTM A312.



- .2 Thickness: 1.2mm [18 gauge], built for structural strength.
- .3 Joints: to be continuous welded construction.
- .4 Duct system shall be fitted with copper-grounding straps, connected to the duct and to an effective grounding system.
- .5 Applications:
  - .1 As noted on drawings.

#### **2.4 Hangers and Supports**

- .1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct. Maximum size duct supported by strap hanger: 500mm [20"].
- .2 Hangers, hanger configuration and attachment to structure: to SMACNA.

### **PART 3 EXECUTION**

#### **3.1 General**

- .1 Do work in accordance with NFPA 90A, NFPA 90B, ASHRAE, SMACNA, and as indicated.
- .2 Do not break continuity of insulation vapour barrier with hangers or rods.
- .3 Support risers in accordance with SMACNA.
- .4 Install breakaway joints in ductwork on sides of fire separation.
- .5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.
- .6 Manufacture duct in lengths and diameter to accommodate installation of acoustic duct lining.
- .7 All openings in ductwork shall be sealed with temporary duct cover during construction. Failure to maintain duct cleanliness will require the inside of all air ducts, plenums and equipment in the air stream to be cleaned with an industrial vacuum cleaner before system balancing is started.
- .8 Apply protective galvanize coating to galvanized ductwork and accessories which have been welded.
- .9 Apply duct sealer to all joints of metal ducts, connections to diffusers, plenums and flexible duct.
- .10 The use of plastic duct tape is not permitted.
- .11 Thermal insulation to Section 23 07 13 – Thermal Insulation for Ducting.

#### **3.2 Hangers**

- .1 Strap hangers: Install in accordance with SMACNA.

- .2 Rectangular duct: Extend strap hanger down on both sides of duct, turn under bottom 25mm [1"] minimum. On each strap provide two sheet metal screws on the side and one in the bottom.
- .3 Angle hangers: complete with locking nuts and washers.
- .4 Hanger spacing: to SMACNA.
- .5 Seismic restraint to Section 23 05 48 – Vibration and Seismic Controls for Ductwork, Piping and Equipment.

### **3.3 Sealing and Taping**

- .1 Apply sealant to outside of joint to manufacturer's recommendations.
- .2 Bed tape in sealant and recoat with minimum of one coat of sealant to manufacturers recommendations.

**END OF SECTION**



**PART 1 GENERAL**

**1.1 Related Sections**

- .1 Section 01 01 50 General Instructions
- .2 Section 01 35 33 Health and Safety Requirements
- .3 Section 23 05 00 Common Work Results - Mechanical

**1.2 References**

- .1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
  - .1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, 1995 and Addendum No. 1, 1997.
- .2 National Fire Protection Association (NFPA)
  - .1 NFPA 90A-2009, Installation of Air Conditioning and Ventilating Systems.
  - .2 NFPA 90B-2009, Installation of Warm Air Heating and Air Conditioning Systems.
- .3 Underwriter's Laboratories of Canada (ULC)
  - .1 CAN/ULC-S110-M86(R2001), Fire Tests for Air Ducts.
  - .2 UL 181-1996, Factory Made Air Ducts and Connectors.

**1.3 Submittals**

- .1 Submittals in accordance with Section 01 01 50 – General Instructions.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:
    - .1 Flexible connections.
    - .2 Duct access doors.
    - .3 Turning vanes.
    - .4 Instrument test ports.
- .3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
  - .1 Certification of ratings: catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Instructions: submit manufacturer's installation instructions.
- .6 Manufacturer's Field Reports: manufacturer's field reports specified.
- .7 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 01 50 – General Instructions.

#### **1.4 Quality Assurance**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

#### **1.5 Delivery, Storage and Handling**

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.
  - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  - .3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan (WMP).
  - .4 Separate for reuse and recycling and place in designated containers in accordance with Waste Management Plan (WMP).
  - .5 Divert unused materials from landfill to recycling facility as approved by Departmental Representative.

### **PART 2 PRODUCTS**

#### **2.1 General**

- .1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

#### **2.2 Access Doors in Ducts**

- .1 Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6mm [24 gauge] thick complete with sheet metal angle frame.
- .2 Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6mm [24 gauge] thick complete with sheet metal angle frame and 25mm [1"] thick rigid fibreglass insulation.
- .3 Gaskets: neoprene.
- .4 Hardware:
  - .1 Up to 300 x 300 mm: two sash locks complete with safety chain.
  - .2 301 to 450 mm: four sash locks complete with safety chain.
  - .3 451 to 1000 mm: piano hinge and minimum two sash locks.
  - .4 Doors over 1000 mm: piano hinge and two handles operable from both sides.

#### **2.3 Turning Vanes**

- .1 Factory-made, single or double thickness as specified elsewhere, with trailing edge. Vanes shall be constructed of same material as duct, 0.55mm [26 gauge].



- .2 Rails shall be fabricated of same material as duct, 0.66m [24 gauge]. Vanes shall be attached to rails using fasteners.

#### **2.4 Instrument Test Ports**

- .1 Alloy casting with screw-in cap, neoprene gasket, 18 mm [3/4"] inside diameter opening for pitot tube or velometer.

### **PART 3 EXECUTION**

#### **3.1 Manufacturer's Instructions**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

#### **3.2 Installation**

##### **.1 Flexible Duct**

- .1 Provide flexible duct connecting air outlets as indicated. Flexible duct with integral volume damper is not acceptable.
- .2 Install flexible duct fully extended, without tight bends and kinks. The radius at the centre-line shall not be less than one duct diameter. Do not install in compressed state.
- .3 Length of flexible duct shall within 1,500mm to 2,100mm (5'-0" to 7'-0").
- .4 Provide support for flexible duct at 1,200mm (4'-0") on centre. Maximum permissible sag is 42 mm/m (1/2 inch per foot) of spacing between support. A connection to a rigid duct or equipment shall be considered a support joint.
- .5 Sheet metal strap for flexible duct support shall be minimum 38mm (1-1/2") wide.
- .6 Sheet metal collars to which the flexible ducts are attached shall be minimum 50mm (2") in length.
- .7 Repair torn or damaged vapour barrier jackets approved duct tape. If the internal core is penetrated, replace the flexible duct.
- .8 Do not use flexible duct for connecting mixing box and air terminal unit inlets.
- .9 Do not use flexible duct on return and exhaust ductwork.

##### **.2 Flexible Duct Connectors**

- .1 Install in following locations:
  - .1 Inlets and outlets to supply air units and fans.
  - .2 Inlets and outlets of exhaust and return air fans.
  - .3 As indicated.
- .2 Length of connection: 100mm [4"].

- .3 Minimum distance between metal parts when system in operation: 75mm [3"].
- .4 Install in accordance with recommendations of SMACNA.
- .5 When fan is running:
  - .1 Ducting on sides of flexible connection to be in alignment.
  - .2 Ensure slack material in flexible connection.
- .3 Access Doors in Ducts
  - .1 Size:
    - .1 610mm x 1520 mm [24"x60"] for person size entry.
    - .2 460mm x 460 mm [18"x18"] for service.
    - .3 300mm x 200mm [12"x8"] for cleaning.
    - .4 As indicated.
  - .2 Locations:
    - .1 Fire dampers and smoke dampers.
    - .2 Control dampers.
    - .3 Devices requiring maintenance.
    - .4 Required by code.
    - .5 Reheat coils.
    - .6 On both sides of turning vanes.
    - .7 At the base of all duct risers.
    - .8 At 12,000m [40'-0"] intervals in all duct systems, and 6,000mm [20'-0"] intervals in horizontal exhaust ducts for cleaning purposes.
- .4 Instrument Test Ports
  - .1 Install in accordance with manufacturer's instructions.
  - .2 Locate to permit easy manipulation of instruments.
  - .3 Locations:
    - .1 For traverse readings:
      - .1 Ducted inlets to roof and wall exhausters.
      - .2 Inlets and outlets of other fan systems.
      - .3 Main and sub-main ducts.
      - .4 And as indicated.
    - .2 For temperature readings:
      - .1 At outside air intakes.
      - .2 In mixed air applications in locations.
      - .3 At inlet and outlet of coils.
      - .4 Downstream of junctions of two converging air streams of different temperatures.
      - .5 And as indicated.



**Project No.: R.070775.001**  
**Agassiz BC Kent Institution**  
**DISHWASHER REPLACEMENT**  
**Kitchen Unit Q**

**Section 23 33 00**  
**Air Duct Accessories**  
**Page 5 of 5**

.5      Turning Vanes

.1      Install in accordance with manufacturer's recommendations.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 Related Sections**

- |    |                  |                                  |
|----|------------------|----------------------------------|
| .1 | Section 01 01 50 | General Instructions             |
| .2 | Section 01 35 33 | Health and Safety Requirements   |
| .3 | Section 23 05 00 | Common Work Results – Mechanical |
| .4 | Section 23 33 00 | Air Duct Accessories             |

**1.2 References**

- .1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
  - .1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, 1995 and Addendum No. 1, 1997.
  - .2 SMACNA – Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems, 2002.
- .2 Underwriters Laboratories of Canada (ULC)
  - .1 CAN4-S112-M82(R1987), Fire Test of Fire Damper Assemblies.
  - .2 CAN4-S112.2-M84, Fire Test of Ceiling Firestop Flap Assemblies.
  - .3 ULC-S505-1974, Fusible Links for Fire Protection Service.
- .3 National Fire Protection Agency (NFPA)
  - .1 NFPA 90A-1999, Installation of Air Conditioning and Ventilating Systems.

**1.3 Submittals**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions. Include product characteristics, performance criteria, and limitations.
    - .1 Indicate the following:
      - .1 Volume dampers.
      - .2 Remote control damper regulators.
      - .3 Fire dampers.
      - .4 Fire stop flaps.
      - .5 Smoke dampers.
      - .6 Backdraft dampers.
      - .7 Relief dampers.
- .2 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

- .2 Instructions: submit manufacturer's installation instructions.

#### **1.4 Quality Assurance**

- .1 Health and Safety Requirements:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

#### **1.5 Delivery, Storage and Handling**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with Section 01 01 50 – General Instructions.
- .2 Waste Management and Disposal:
  - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.

#### **1.6 Extra Materials**

- .1 Provide maintenance materials in accordance with Section 01 01 50 – General Instructions.
- .2 Provide following:
  - .1 Six (6) fusible links for each type of fire damper.

### **PART 2 PRODUCTS**

#### **2.1 General**

- .1 Manufacture to SMACNA standards.

#### **2.2 Single Blade Volume Dampers**

- .1 Blade: Of same material as duct. Two gauges heavier than duct but not less than 0.6mm [24 gauge], stiffened.
- .2 Maximum dimension: 305mm [12"] height for rectangular ducts.
- .3 Axles: 9.5mm [3/8"] continuous square rod up to 457mm [18"] wide duct, and 13mm [1/2"] continuous square rod up to 1,219mm [48"] wide duct.
- .4 Linkage: shaft extension with locking quadrant and position indicator.
- .5 Bearings: bronze oilite.
- .6 Frame: of the same material as duct. Complete with angle stop for rectangular duct.

### **PART 3 EXECUTION**

#### **3.1 General**

- .1 Install where indicated.

- .2 Install in accordance with recommendations of SMACNA and manufacturer's instructions.
- .3 Seal multiple damper modules with silicon sealant.

### **3.2 Volume Damper**

- .1 For supply, return and exhaust systems, locate balancing dampers in each branch duct.
- .2 Run-outs to registers and diffusers: install single blade damper located as close as possible to main ducts.
- .3 All dampers to be vibration free.
- .4 Attach fluorescent tape to regulator handle for concealed volume dampers.
- .5 Provide remote control damper regulator for volume dampers above inaccessible ceiling where ceiling access panel is not provided, and as indicated.

### **3.3 Field Quality Control**

- .1 Tests:
  - .1 Tests to cover period of not less than 2 days and demonstrate that system is functioning as specified.

**END OF SECTION**



**PART 1 GENERAL**

**1.1 Related Sections**

- |    |                  |  |
|----|------------------|--|
| .1 | Section 01 01 50 | General Instructions                                     |
| .2 | Section 01 35 33 | Health and Safety Requirements                           |
| .3 | Section 01 91 00 | Commissioning  |
| .4 | Section 23 05 13 | Common Motor Requirements for HVAC Equipment             |
| .5 | Section 23 05 48 | Vibration & Seismic Controls for HVAC Piping & Equipment |
| .6 | Section 23 08 00 | Commissioning of Mechanical Systems                      |
| .7 | Section 23 33 00 | Air Duct Accessories                                     |

**1.2 References**

- .1 Air Conditioning and Mechanical Contractors (AMCA)
  - .1 AMCA Publication 99-2003, Standards Handbook.
  - .2 AMCA 300-1996, Reverberant Room Method for Sound Testing of Fans.
  - .3 AMCA 301-1990, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
- .2 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
  - .1 ANSI/AMCA 210-1999, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB 1.181-1999, Ready-Mixed Organic Zinc-Rich Coating.

**1.3 System Description**

- .1 Performance Requirements:
  - .1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards in force.
  - .2 Capacity: flow rate, static pressure, BHP, HP, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.
  - .3 Fans: statically and dynamically balanced, constructed in conformity with AMCA 99.
  - .4 Sound ratings: comply with AMCA 301, tested to AMCA 300.
  - .5 Performance ratings: based on tests performed in accordance with ANSI/AMCA 210.

#### **1.4 Submittals**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions. Include product characteristics, performance criteria, and limitations.
- .2 Shop Drawings:
  - .1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.
- .3 Provide:
  - .1 Fan performance curves showing point of operation, BHP and efficiency.
  - .2 Sound rating data at point of operation.
- .4 Indicate:
  - .1 Motors and sheaves details.
- .5 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.
- .6 Closeout Submittals:
  - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

#### **1.5 Quality Assurance**

- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

#### **1.6 Delivery, Storage and Handling**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with Section 01 01 50 – General Instructions.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .3 Waste Management and Disposal:
- .2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.



## **PART 2 PRODUCTS**

### **2.1 Fans General**

- .1 Motors:
  - .1 In accordance with Section 23 05 13 - Common Motors Requirements for HVAC Equipment supplemented as specified herein.
  - .2 For use with variable speed controllers where specified.
  - .3 Sizes as specified.
- .2 Accessories and hardware: as specified.
- .3 Scroll casing drains: as indicated.
- .4 Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.
- .5 Vibration isolation: to Section 23 05 48 - Vibration and Seismic Controls for Ductwork Piping and Equipment.
- .6 Flexible connections: to Section 23 33 00 - Air Duct Accessories.

### **2.2 Roof-Mounted Centrifugal Exhaust Fans**

- .1 General: Spun aluminum, roof-mounted, centrifugal exhaust ventilator as scheduled:
- .2 Construction: Bolted and welded construction with corrosion resistant fasteners. Spun aluminum structural components, minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base with one piece inlet spinning, continuously welded curb cap corners. Discharge baffle and/or windband with rolled bead. Two piece top cap with stainless steel quick release latches. Integral conduit chase into motor compartment. Lifting lugs.
- .3 Wheel: centrifugal backward inclined, all aluminum construction, cast aluminum hub, aerodynamic aluminum inlet cone. Balanced in accordance with AMCA Standard 204.
- .4 Motor: heavy duty type with permanently lubricated sealed bearings.
- .5 Discharge: upblast or downblast as schedule.
- .6 Drive: direct or belt drive as scheduled.
- .7 Belt drive units shall have motor, bearings and drives mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators. Enclosed in a weather-tight compartment, separated from the exhaust airstream.
  - .1 Bearings - Heavy duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.
  - .2 Drives - Precision machined, cast iron type, keyed and securely attached to the wheel and motor shafts. Sized for 150 percent of the installed motor horsepower.
- .8 Accessories: Stainless steel backdraft damper, disconnect switch.

**PART 3 EXECUTION**

**3.1 Manufacturer's Instructions**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**3.2 Fan Installation**

- .1 Install fans as indicated, complete with resilient mountings specified in Section 23 05 48 – Vibration and Seismic Controls for Ductwork, Piping and Equipment, flexible electrical leads and flexible connections in accordance with Section 23 33 00 - Air Duct Accessories.
- .2 Provide sheaves and belts required for final air balance.
- .3 Bearings and extension tubes to be easily accessible.
- .4 Access doors and access panels to be easily accessible.

**3.3 Anchor Bolts and Templates**

- .1 Size anchor bolts to withstand seismic acceleration and velocity forces as specified in Section 23 05 48 – Vibration and Seismic Controls for Ductwork, Piping and Equipment.

**3.4 Field Quality Control**

- .1 Commissioning:
  - .1 In accordance with Section 01 91 00 – Commissioning, and Section 23 08 00 – Commissioning of Mechanical Systems.

**END OF SECTION**



EXHAUST FANS									
Mark	EF-S7								
Service	DISHWASHER								
Model									
Air Flow - L/s (cfm)	520	1100							
External S.P. - Pa (in w.g.)	187.5	0.75							
Horsepower	0.5								
RPM	1110								
Tip Speed	4250								
Sones									
Notes									

Refer to Specification for accessories not scheduled. Refer to drawings for installation details.

1. Fan to be interlocked with dishwasher by Div. 26.
2. Fan operation monitored by DDC controls.

#### **Belt Drive Centrifugal Roof Exhaust Fan**

##### **Standard Construction Features:**

- Aluminum housing - Backward inclined Aluminum wheel
- Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts
- Birdscreen - Ball bearing motors - Adjustable motor pulley - Adjustable motor plate
- Fan shafted mounted in ball bearing pillow blocks - Bearings meet or exceed temperature rating of fan -
- Static resistant belts - Corrosion resistant fasteners - Sizes 141 and larger have internal Lifting lugs

##### **Options & Accessories:**

High Efficient Motor - meets Greenheck High Efficiency Table  
 Motor with Thermal Overload  
 Motor with CSA Approval  
 Motor with 1.15 or Greater Motor Service Factor  
 Spare Belt(s) - 2 Sets  
 UL/cUL 705 Listed - "Power Ventilators"  
 Switch, NEMA-4X, Toggle, Junction Box Mounted & Wired  
 Curb Seal  
 Adapter-Galv., Curb Cap Adapted to 26x26 - Size is to be confirmed  
 Stainless Steel Fasteners - 300 Series  
 Stainless Steel Shaft - 300 Series  
 Birdscreen: Stainless Steel  
 Unity Warranty: 1 Yr (Standard)

**Coordinate fan and curb installation with General Contractor.**

**PART 1 GENERAL**

**1.1 Related Sections**

.1	Section 01 01 50	General Instructions
.2	Section 01 91 00	Commissioning
.3	Section 02 41 99	Demolition of Minor Work
.4	Section 07 84 00	Fire Stopping
.5	Section 23 05 00	Common Work Results – Mechanical
.6	Section 23 08 00	Commissioning of Mechanical Systems

**1.2 General**

- .1 Provide, install and commission a BACnet-based DDC controls system to achieve the performance specified in the following clauses. The DDC system shall be integrated to the existing Reliable Controls DDC system at this site.
- .2 Refer to specification section 01 01 50 for project scheduling and phasing responsibilities by the Contractors including Sub-Contractors.
- .3 Work covered by sections referred to above consists of fully operational EMCS, including, but not limited to, following:
  - .1 Building Controllers.
  - .2 Control devices as listed in I/O Summaries.
  - .3 Data communications equipment necessary to effect an EMCS data transmission system including gateway and LAN hardware and software for connection to BACnet network. See Contract Drawing M-4 – Controls Architecture.
  - .4 Field control devices.
  - .5 Acceptance tests, technical support during commissioning, full documentation.
  - .6 Wiring interface co-ordination of equipment supplied by others.
  - .7 Miscellaneous work as specified in these sections and as indicated.
  - .8 Coordinate with an electrical contractor to provide electrical work as covered in Division 26. Refer to Division 26 documents.
  - .9 Firestopping for new penetrations through existing fire rated assemblies. Refer to Section 07 84 00 – Fire Stopping.
- .4 Refer to the Specifications for the equipment that is in the DDC upgrade scope and read in conjunction with the partial Record drawings (refer to Appendix A). Record drawings are provided for reference and may not reflect the most current floor layout, room names/numbers and equipment count (e.g. some equipment may have been added or deleted; floor layout, room names/numbers use may have changed). Contractor shall refer to Record drawings for approximate locations of equipment, and shall verify the exactly location on site.



**1.3 Metric Reference**

- .1 Conform to CAN/CSA-Z234.1.
- .2 Provide required adapters between Metric and Imperial components.

**1.4 Standard Compliance**

- .1 All equipment and material to be from manufacturer's regular production, CSA certified, manufactured to standard quoted plus additional specified requirements.
- .2 Where CSA certified equipment is not available submit such equipment to inspection authorities for special inspection and approval before delivery to site.
- .3 Submit proof of compliance to specified standards with shop drawings and product data. Label or listing of specified organization is acceptable evidence.
- .4 In lieu of such evidence, submit certificate from testing organization, approved by Departmental Representative, certifying that item was tested in accordance with their test methods and that item conforms to their standard/code.
- .5 For materials whose compliance with organizational standards/codes/specifications is not regulated by an organization using its own listing or label as proof of compliance, furnish certificate stating that material complies with applicable referenced standard or specification.

**1.5 Submittals**

- .1 Submit in accordance with Section 01 01 50 – General Instructions.
- .2 Provide one copy of schematic control diagrams for review. Each instrument shall be given an identification label which will refer directly to control diagram.
- .3 Provide shop drawings including complete operating data, system drawings, wiring diagrams, and type written detailed operational description of sequences, and description and engineering data on each control system component.
- .4 At completion of work, make detailed check of automatic control system and submit written report to the Departmental Representative.
- .5 Provide sufficient copies of complete parts and repair manuals for binding in O&M Manuals.
- .6 Provide "record" control drawings and schedules in accordance with Section 01 01 50 – General Instructions; incorporate into O&M Manuals.

**1.6 Electrical Components, and Conduit (as required)**

- .1 Provide all control system components, except those supplied as part of packaged equipment controls, but including all auto sequencing devices, electric relays, safety devices and electrical interlocks required to accomplish specified sequences.
- .2 All line voltage wiring shall be copper with RW90 X-Link P.E. insulation #12 minimum size. AWG wire shall be sized to meet code.
- .3 Wiring is to be in conduit in all wall spaces and exposed locations as well as in pipe chases, service spaces, attics, and crawl spaces which are entered for service access. Wiring in suspended ceiling spaces does not require conduit but shall be neatly installed parallel to building lines using bridle rings. All wiring installed under this contract shall



be plenum rated FT-6 or FT-4, if approved by all authorities having jurisdiction. Locate wiring away from top or bottom of ceiling joists or trusses to minimize possibility of accidental damage. Number 18 gauge wire may be used in Class 2 circuits unless voltage drops are excessive. THHN wire will not be acceptable. Twisted shielded wiring, minimum of 22 gauge wire shall be used for all DDC or co-axial communication wiring. Line voltage alternating current wiring shall not be run in the same conduit, or cabling as DDC wiring. Exposed conduits located in areas where inmates have access (see Section 23 05 00 – Common Works Results - Mechanical, Clause 3.8, Table 1) shall be rigid galvanized screw steel type conforming to CSA C22.2 No. 45.

- .4 Use 1m of flexible conduit for all connections to vibrating equipment. Use liquid tight flex cable and connections where required.
- .5 The Control Contractor shall locate magnetic starters from the electrical drawings, where applicable. All electrical work provided by this Contractor shall comply with all requirements of the Canadian Electrical Code and Local Codes and Ordinances.
- .6 Wire all line voltage thermostats, pressure switches or aquastats for single phase equipment.
- .7 The Control Contractor shall provide all necessary normally open and normally closed contacts, wired to a terminal strip within the starter enclosure, required to achieve the specified control interlocking and sequencing. Manual starters for 120 volt equipment are to contain On-Off selector, external H.O.A., integral overload protection and pilot lights. The Controls Contractor shall provide control wiring interlocks from the control contacts provided on the automatic branch lines of the assembly, which will be contained within the associated Motor Control or Starter Assembly.
- .8 Line voltage will not be run with signal or trunk wiring or be present in the same junction box.
- .9 All shielded wiring will be grounded at the BMS panels and prevented from grounding at the terminal end.
- .10 Run all wiring parallel to building lines. All wiring to be installed in a neat, workmanlike manner.
- .11 Support wiring independent of piping, ductwork, and equipment. Keep wiring clear of hot piping, ductwork/equipment.
- .12 Identify all junction boxes with control company label.
- .13 There are to be no splices in any of the control wiring except at devices or control panels.
- .14 LAN wiring shall be CAT5E UTP to TIA/EIA-568.

#### **1.12 Identification, Calibration and Programming**

- .1 Mount an input/output layout sheet within each controller. This sheet shall include the name of the points connected to each controller channel.
- .2 Identify all controllers and associated devices with symbols relating directly to the control diagram. Reinstate the existing plastic labels for each input and output point with the following information:
  - .1 Point descriptor.



- .2 Point type and channel number.
- .3 Corresponding controller number.
- .3 At the time of the Owner's Demonstration and Instruction Period:
  - .1 Demonstrate and confirm that all systems are operating correctly.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

### **3.1 General**

- .1 Check and verify location of current control sensor.
- .2 Equipment shall be installed so as to allow for easy maintenance access. Equipment shall be installed such that it does not interfere in any way with access to adjacent equipment and personnel traffic in the surrounding space.
- .3 Equipment shall be installed in locations providing adequate ambient conditions for its specified functioning, allowing for adequate ventilation.
- .4 Permanently identify each wire, cable, conduit and tube at each terminal.
- .5 Wiring and tubing shall be identified at each DDC panel by termination number. Wiring and tubing shall be identified at terminal device by termination and DDC panel numbers.

### **3.3 Enclosure and Conduit**

- .1 Relays, transformers, and I/O devices and peripherals shall be installed in separate enclosures and not in the enclosures containing the controllers.
- .2 All wires penetrating the enclosure that are not required to be in conduit must be neatly bundled and strapped in place.
- .3 The inside bottom of the enclosure shall be clean of dirt, metal shavings, and debris.
- .4 Provide EMT conduit with set screw metal fittings where wiring is exposed and in all mechanical rooms. All conduit will be piped smoothly and neatly following building lines. Wiring above accessible ceilings and in wall cavities may be run free-air. Exposed conduits located in areas where inmates have access (see Section 23 05 00 – Common Works Results - Mechanical, Clause 3.8, Table 1) shall be rigid galvanized screw steel type conforming to CSA C22.2 No. 45.
- .5 Liquid-tight flexible conduit to be used for rooftop unit wiring c/w liquid-tight fittings. Provide spun aluminum roof jack where control wiring penetrates roof unless penetration is within waterproof rooftop unit curb.
- .6 All junction boxes will have covers properly and firmly affixed after installation completion.
- .7 Control panels located in occupied areas for relays or other similar field devices shall be accessible and located above corridor ceilings. For areas accessible by inmates, provide

security type access panels. Refer to Section 23 05 00 – Common Work Results – Mechanical.

### **3.4 I/O Wiring**

- .1 All input/output device wiring will use #18-2 solid core cable with individually jacketed conductors and jacketed sheath over the pair.
- .2 Use plenum cable where required.
- .3 All I/O wiring will be identified using Panduit adhesive wire-marker at the controller and end device ends. Description of point to include point mnemonic, point type and network location.
- .4 All I/O wiring within controller enclosure shall be neat and tidy and suitably bundled and strapped or contained in plastic wire duct or equivalent.
- .5 All I/O wiring that requires a transition to a different conductor to meet electrical code requirement shall be executed using a terminal strip.
- .6 Low voltage I/O wiring may be mixed together within a conduit. Low and line voltages may not be mixed together within a conduit

### **3.5 LAN Wiring**

- .1 Provide LAN wiring as per manufacturer's specification.

### **3.6 Cleaning**

- .1 Proceed in accordance with Section 01 01 50 – General Instructions.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**



## **PART 1 GENERAL**

### **1.1 Related Sections**

- .1 Section 01 01 50 General Instructions
- .2 Section 25 05 01 EMCS: General Requirements

### **1.2 References**

- .1 American National Standards Institute (ANSI)
  - .1 ANSI C12.7-1993, Requirements for Watthour Meter Sockets.
  - .2 ANSI/IEEE C57.13-1978(R1987), Requirements for Instrument Transformers.
- .2 National Electrical Manufacturer's Association (NEMA)

### **1.3 Submittals**

- .1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 01 01 50 – General Instructions and 25 05 01 – EMCS: General Requirements.
- .2 Include:
  - .1 Information as specified for each device.
  - .2 Manufacturer's detailed installation instructions.
- .3 Pre-Installation Tests
  - .1 Submit samples at random from equipment shipped, as requested by Departmental Representative, for testing before installation. Replace devices not meeting specified performance and accuracy.
- .4 Manufacturer's Instructions
  - .1 Submit manufacturer's installation instructions for specified equipment and devices.

### **1.4 Closeout Submittals**

- .1 Submit operating and maintenance data for inclusion in operation and maintenance manual in accordance with Section 01 01 50 – General Instructions and 25 05 01 – EMCS: General Requirements.

## **PART 2 PRODUCTS**

### **2.1 General**

- .1 External trim materials to be corrosion resistant. Internal parts to be assembled in watertight, shockproof, vibration-proof, heat resistant assembly.
- .2 Operating conditions: 0 - 32 °C with 10 - 90 % RH (non-condensing) unless otherwise specified.
- .3 Terminations: use standard conduit box with slot screwdriver compression connector block unless otherwise specified.



- .5 Transmitters to be unaffected by external transmitters (eg. walkie talkies).
- .6 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.
- .7 Outdoor installations: use weatherproof construction in NEMA 3R enclosures.
- .8 Devices to be installed in user occupied space must not exceed Noise Criteria (NC) of 35. Noise generated by any device must not be detectable above space ambient conditions.

## **2.2 Current Sensors (CT)**

- .1 Shall vary the output voltage with a change in current.
- .2 Provide actual analog current indication for status of all motors 1 horsepower and larger.
- .3 In software provide multiple switch points to determine both motor status and belt breakage. Size for inrush and F.L.A.
- .4 Provide alarm indication for high and low current.
- .5 Provide digital current indication for all motors 3/4 HP and smaller by using current switches (CS) which shall open or close a contact from motor induced current to indicate motor status.

## **2.3 Combination Relay, HOA and Current Sensor (CR-HOA)**

- .1 Enclosed relay, current sensor, SPST and built in HOA for manual control. Designed for fractional HP motors (up to 1 HP at 120/1/60).
- .2 Relay type: One (1) SPST.
- .3 Relay status: LED with
- .4 Current sensor range: adjustable set point;
- .5 Current sensor range: 0-10 Amps
- .6 Current sensor output: 0-5 VDC, 0-10 VDC.

# **PART 3 EXECUTION**

## **3.1 General**

- .1 The installation shall conform to each manufacturer's recommended procedures and to all applicable codes, statutes and ordinances.
- .2 Equipment shall be installed so as to allow for easy maintenance access. Equipment shall be installed such that it does not interfere in any way with access to adjacent equipment and personnel traffic in the surrounding space.
- .3 All transmitters, interfaces, terminations and control relays, etc. shall be mounted in field cabinets that may be locked.
- .4 All wall mounted devices in new finished space shall be mounted on a wall box. The wall box shall be connected to the ceiling space by a conduit stub. On renovations, when sensors are mounted in existing finished walls, wiring or tubing may be fished into the walls without conduit.

**3.2 Combination Relay, HOA and Current Sensor (CR-HOA)**

- .1 Provide Combination Relay, HOA and Current Sensor for equipment up to 3/4 horsepower (e.g., fan coil units, unit heaters, fans, circulating pumps, etc.) where starters are not provided under Division 26.

**END OF SECTION**



## PART 1 GENERAL

### 1.1 Related Sections

- .1 Section 25 05 01

EMCS: General Requirements

### 1.2 Field Control Devices

- .1 Unless otherwise noted, all field control devices specified in this Section shall be new.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

### 3.1 Sequence of Operation

- .1 Exhaust Fans:
- .1 Where noted in the points list, exhaust fans shall be monitored at the DDC
  - .2 The existing dishwasher fan EF-S7EX is monitored at the DDC (Delta Controls). Temporarily remove and re-install the current sensor. Coordinate work with Div.26.
  - .3 The Control Contractor is to re-instate the status of the new fan EF-S7 on the DDC system. The new fan will be interlocked with the dishwasher. Refer to Div.26 drawings.
  - .4 Refer to Appendix A for existing fan sequence of operation, system drawing report and control panel report.

Exhaust Fans	Locations	DDC Control		AHU Interlock (via DDC)
		Start/Stop	Status	
EF-S7	Dishwasher	n/a	DDC	Dishwasher

### Existing Exhaust Fan Point List

EXHAUST FANS							
POINT DESCRIPTION	POINTS				ALARM/INDICATION		
	AI	AO	DI	DO	HI	LO	FAIL
EXHAUST FANS START/STOP/STAT	CT						X



**Project No.: R.070775.001**  
**Agassiz BC Kent Institution**  
**DISHWASER REPLACEMENT**  
**Kitchen Unit Q**

Section 25 90 11  
EMCS: Sequences of Operation  
Page 2 of 2

NOTE: POINT COUNT IS APPROXIMATE. CONTROLS CONTRACTOR SHALL VERIFY EXACT QUANTITY AND PROVIDE ADDITIONAL POINTS AS REQUIRED TO ACHIEVE THE SEQUENCE OF OPERATION DESCRIBED IN THE CONTRACT DOCUMENT.

ATS	Averaging Temperature Sensor	DTS	Duct Temperature Sensor	OTS	Outdoor Air Temp. Sensor
ASD	Adjustable Speed Drive	DHS	Duct Humidity Sensor	PF	Position Feedback
CDS	Carbon Dioxide Sensor	EPS	E/P Switch	POT	Potentiometer
CS	Current Switch	EPT	E/P Transducer	R-ST	Relay Status
CR	Digital Relay	ES	End Switch	RHS	Room Humidity Sensor
CT	Analog Current Transformer	FSA	Flow sensor - Air	RTS	Room Temperature Sensor
DCI	Dry Contact Input	FSW	Flow sensor - Water	VMA	Valve Motor (Analog)
DHS	Duct Humidity Sensor	LTS	Low Temperature Switch	VMD	Valve Motor (Digital)
DMA	Damper Motor (Analog)	MOP	Proportional A.O. (4-20 ma)	VPM	Variable pump motor
DMD	Damper Motor Digital	MD	Motion Detector	WTS	Water Temperature Sensor
DPS	Diff. Press. Switch (Analog)	O-SW	Override Switch		

**END OF SECTION**

**Project No.: R.070775.001**  
**Agassiz BC Kent Institution**  
**DISHWASER REPLACEMENT**  
**Kitchen Unit Q**

## **APPENDIX A**

### **EXISTING SEQUENCE OF OPERATION SYSTEM DRAWING REPORT CONTROL PANEL REPORT**

# Kent Institution - Sequence of Operations

97.

Exhaust Faus	Locations	DOC Control		AHU
		Star/JStop	Status	Interlock (via DOC)
EF-S1	Dwg M-12, Room XI06	DDC	DDC	ABU-S1
EF-S2	Dwg M-12, Room TI18	DDC	DDC	ABU-S1
EF-S3	Dwg M-12, Room WIOO	DDC	DDC	ABU-S1
EF-S5	Dwg M-14, Room R208	Manual	nla	nfa
EF-S6	Dwg M -15 Room FR200 (on Root)	Ex.DDC	Ex.DDC	ABU-S5
EF-S7	Dishwasher	nla	DDC	Dishwasher
EF-S8	Dwg M-14, Room QI25	DDC	DDC	ABU-S4
EF-S9	Dwg M-15, Room FR200 on Roof * Fan Room Ventilation *	DDC	DDC	nla
EF-SIO	Dwg M-13, Room RIOS	Manual	nla	ABU-S8 (existing) *
EF-SII	Dwg M-13, Room RIOS	Manual	nla	ABU-S8 (existing) *
EF-SI2	Dwg M-14, Room R209 (Washroom)	Manual	nla	nfa
EF-N1	Dwg M-19, LIOO (on Root)	DDC	DDC	ABU-N2
EF-N2	Dwg M-20, Room M200 (on Root)	DDC	DDC	ABU-N1
EF-N3	Dwg M-25, Room M203 (on Root)	DDC	DDC	ABU-N3
EF-N4	Dwg M-21, Room KI22 (on Root)	DDC	DDC	ABU-N2
EF-N5	Dwg M-21, Room KI22 (on Root)	DDC	DDC	ABU-N2
EF-N6	Dwg M-22, Room PI03 (on Root)	DDC	DDC	ABU-N3
EF-N8	Dwg M-24, Room N203 (on Root)	DDC	DDC	ABU-N4
EF-LA1, EF-LB1, EF-LC1, EF-LD1, EF-LE1, EF-LF1, EF-LG1, EF-LH1	Toilet, typical for Living Units A to H	nfa	DDC	nla
EF-LA2, EF-LB2, EF-LC2, EF-LD2, EF-LE2, EF-LF2, EF-LG2, EF-LH2	Servery, typical for Living Units A to H	nfa	DDC	nfa
EF-1	Segregation & Dissociation, Dwg M-7	DDC	DDC	ABU-1
EF-2	Segregation & Dissociation, Dwg M-7	DDC	DDC	ABU-2
EF-4	Segregation & Dissociation, Dwg M-7	Manual	nla	nfa
EF-1	Principal Entrance, Dwg M-IG	DDC	DDC	HP-IIHP-2
EF-2	Principal Entrance, Dwg M-IG	DDC	DDC	HP-IIHP-2
EF-3	Principal Entrance, Dwg M-I G	DDC	DDC	HP-IIHP-2
EF-N9	Line Drawing No. 21, Room N104, N150 (not shown on record drawing; confirm exact location on site)	DDC	DDC	ABU-N4

\* Noted for reference only.

98.

## 99. **Domestic Hot Water Tank Control:**

100. At each domestic hot water tank (typical of 4), provide water temperature sensor to cycle pump and maintain temperature set point. Heater circulating pumps and tank internal circulating pumps will be started, stopped and monitored at the DOC. Heater circulating pumps will cycle to maintain tank set point. Tank internal circulating pumps will operate based on user defined schedule. Provide hard



# Kent Institute

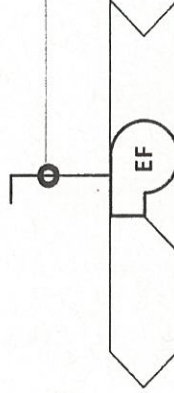
## System Drawings Report

### Exhaust Fans - Status Only

Typical for:

- EF-S7: Dishwasher
- EF-LA1: Toilet
- EF-LB1: Toilet
- EF-LC1: Toilet
- EF-LD1: Toilet
- EF-LE1: Toilet
- EF-LF1: Toilet
- EF-LG1: Toilet
- EF-LH1: Toilet
- EF-LA2: Servery
- EF-LB2: Servery
- EF-LC2: Servery
- EF-LD2: Servery
- EF-LE2: Servery
- EF-LF2: Servery
- EF-LG2: Servery
- EF-LH2: Servery

EF_S7_EFS
RIBXKTV5-10
11200 IP3501



System:

System Location:



Project: 1133370

Engineer: KD

Date: 09-Jul-14

Revision:

EF\_S7

System Description:

Exhaust Fans Status Only

Control Panel:

Local Panel:

11200.3



B3-40

# Kent Institute

## Control Panel Report

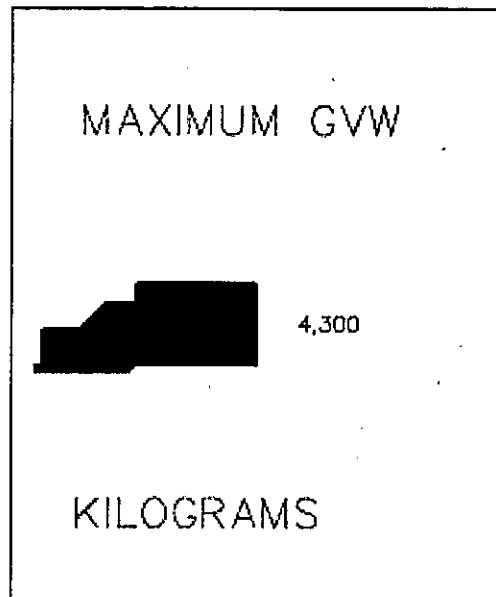
③

Control Panel: 30700.4 CP Model : eBX-08 Local Panel: 700.3 Power Circuit #:  
 Mechanical Dwg: Enclosure: Power Panel #:  
 CP Location: V203  
 Exp1: eBM-404- Exp2: eBM-404- Exp3: eBM-404- Exp4: eBM-440- Exp5: Exp6: Exp7: Exp8:

Point #	Descriptor	Field Part	Wiring Detail	Point #	Descriptor	Field Part	Wiring Detail
30700.IP4101	AHU_S3_SFS	RIBXKTV5-10	FBK CT	30700.OP4101	AHU_S3_RFC	MZPA001921	
30700.IP4102	AHU_S3_RFS	RIBXKTV5-10	FBK CT	30700.OP4102	EF_S8_EFC	MZPA001921	MAG M15
30700.IP4103	EF_S8_EFS	RIBXKTV5-10	FBK CT	30700.OP4103	EF_S9_EFC	MZPA001921	MAG M15
30700.IP4104	EF_S7_EFS	RIBXKTV5-10	FBK CT	30700.OP4104	CUH_S7_FC	MZPA001921	MAG M15
30700.IP4201	EF_S9_EFS	RIBXKTV5-10	FBK CT	30700.OP4201	CUH_S5_FC	MZPA001921	MAG M15
30700.IP4202	EF_S9_RT	RTS403	TMP 10K Device	30700.OP4202	UH_S19_FC	MZPA001921	MAG M15
30700.IP4203	UH_S19_FS	RIBXKTV5-10	FBK CT	30700.OP4203	UH_S19_HCV_C	35AFW24VAC	VLV 24VAC
30700.IP4204	UH_S19_HWST	BA/10K-3-S	TMP 10K Device	30700.OP4204	UH_S22_FC	MZPA001921	MAG M15
30700.IP4301	UH_S19_RT	RTS403	TMP 10K Device	30700.OP4301	UH_S23_FC	MZPA001921	MAG M15
30700.IP4302	UH_S22_FS	RIBXKTV5-10	FBK CT	30700.OP4302	UH_S24_FC	MZPA001921	MAG M15
30700.IP4303	UH_S23_FS	RIBXKTV5-10	FBK CT	30700.OP4303	AHU_S5_RHC_S14_PC	MZPA001921	
30700.IP4304	UH_S24_FS	RIBXKTV5-10	FBK CT	30700.OP4401	FCU_S12_HCV	EPT9510	
30700.IP4401	AHU_S5_RHC_S14_PS	RIBXKTV5-10	FBK CT	30700.OP4402	AHU_S5_RHC_HCV	EPT9510	
30700.IP4402	AHU_S5_RHC_SAT	BA/10K-3-P-8-TFE	TMP 10K Device	30700.OP4403	UH1_KITCH_FC	M15MAH12DC	MAG M15
30700.IP4403	AHU_S5_RHC_MAIN_HWST	BA/10K-3-S	TMP 10K Device	30700.OP4404	UH2_KITCH_FC	M15MAH12DC	MAG M15
30700.IP4404	AHU_S5_RHC_HWST	BA/10K-3-S	TMP 10K Device				

#### 4.2 Recommended Load Limit Signage

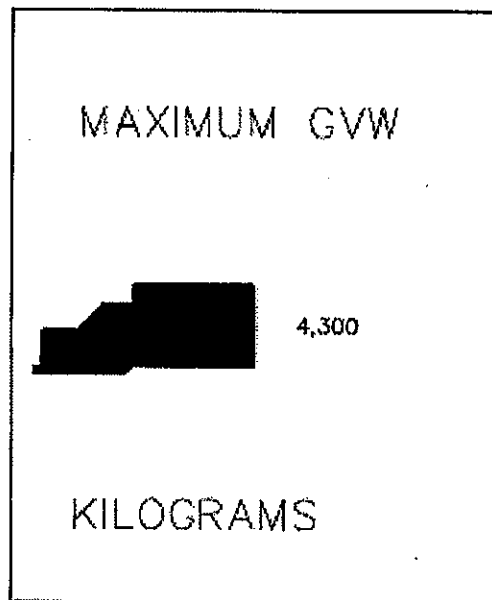
The following is a detailed diagram for the preparation of recommended load limit signage for the facility.





#### 4.2 Recommended Load Limit Signage

The following is a detailed diagram for the preparation of recommended load limit signage for the facility.



**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 01 01 50 – General Instructions
- .2 All specification sections prefix-numbered 26

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22<sup>nd</sup> Edition), Safety Standard for Electrical Installations.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
  - .1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.

**1.3 DEFINITIONS**

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

**1.4 DESIGN REQUIREMENTS**

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
  - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates and labels for control items in English and French.
- .4 Use one nameplate or label for each language.

**1.5 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 01 50 – General Instructions.
- .2 Submit copy of electrical permit for the project to Departmental Representative prior to commencement of work. Departmental Representative will provide drawings required by Electrical Inspection Department at no cost.
  - .1 Pay associated fees.
  - .2 Notify Departmental Representative of changes required by Electrical Inspection Department prior to making changes.
  - .3 Furnish certificate of acceptance from Electrical Inspection Department upon completion of the work.

- .3 Shop drawings:
  - .1 Submit shop drawings and product data.
  - .2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.
  - .3 Where applicable, include wiring, single line and schematic diagrams.
  - .4 Include wiring drawings or diagrams showing interconnection with work of other Sections.
  - .5 Submit 6 copies of shop drawings and product data to the Departmental Representative.
- .4 Provide operation and maintenance data for incorporation into operation and maintenance manual specified in Section 01 01 50 – General Instructions.  
Include in operations and maintenance data:
  - .1 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.
  - .2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts list. Advertising or sales literature not acceptable.
  - .3 Wiring and schematic diagrams and performance curves.
  - .4 Names and addresses of local suppliers for items included in maintenance manuals.
  - .5 Copy of reviewed shop drawings.
- .5 Quality Control: in accordance with Section 01 01 50 – General Instructions.
  - .1 Provide CSA certified equipment and material.
  - .2 Submit test results of installed electrical systems.
  - .3 Permits and fees: in accordance with General Conditions of contract.
  - .4 Submit to Departmental Representative certificate of acceptance from authority having jurisdiction upon completion of Work.
- .6 Record Drawings
  - .1 Provide record drawings of the installation as specified in Section 01 01 50 – General Instructions.

## **1.6 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 01 50 – General Instructions.
- .2 Qualifications: electrical Work to be carried out by qualified personnel in accordance with the requirement of authorities having jurisdiction.

## **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.



- .2 Construction/Demolition Waste Management and Disposal: where applicable separate waste materials for recycling in accordance with Section 01 01 50 – General Instructions.

## **1.8 SYSTEM STARTUP**

- .1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Where applicable and as further specified, arrange and pay for services of manufacturer's factory service Departmental Representative to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

## **1.9 OPERATING INSTRUCTIONS**

- .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- .2 Operating instructions to include following:
  - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
  - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
  - .3 Safety precautions.
  - .4 Procedures to be followed in event of equipment failure.
  - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

## **Part 2 Products**

### **2.1 MATERIALS AND EQUIPMENT**

- .1 Provide material and equipment in accordance with Section 01 01 50 – General Instructions.
- .2 Material and equipment to be CSA certified.
- .3 Factory assemble control panels and component assemblies.

### **2.2 WIRING TERMINATIONS**

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

### **2.3 EQUIPMENT IDENTIFICATION**

- .1 Identify electrical equipment with nameplates and labels as follows:

- .1 Nameplates: lamicoid plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core attached with Loctite 414 adhesive. No pre-gummed labels are acceptable.

- .2 Sizes as follows:

**NAMEPLATE SIZES**

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Labels: plastic labels with 4mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per nameplate and label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.

**2.4 WIRING IDENTIFICATION**

- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout to the existing systems that have been installed.

**2.5 FINISHES**

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.



**Part 3          Execution**

**3.1            INSTALLATION**

- .1      Do complete installation in accordance with CSA C22.1, BC Amendments, Directives and Bulletins except where specified otherwise.

**3.2            NAMEPLATES AND LABELS**

- .1      Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

**3.3            FIRESTOPPING**

- .1      Where cables or conduits pass through floors and fire rated walls, pack space full with a ULC approved firestopping system.
- .2      Fire stopping is specified in Section 01 01 50 – General Instructions.

**3.4            LOCATION OF OUTLETS**

- .1      Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
- .2      Change location of outlets at no extra cost or credit, providing distance does not exceed 3000mm, and information is given before installation.

**3.5            FIELD QUALITY CONTROL**

- .1      Carry out tests in presence of Departmental Representative or his representative. Submit written test results for review.
- .2      Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

**3.6            CLEANING**

- .1      Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2      Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.
- .3      At time of final cleaning, clean lighting reflectors, lenses and other lighting surfaces that have been exposed to construction dust and dirt.

**END OF SECTION**



**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 Materials and installation for wire and box connectors.

**1.2 RELATED SECTIONS**

- .1 Section 01 01 50 – General Instructions
- .2 Section 26 05 21 – Wires and Cables (0-1000V)
- .3 Section 26 05 00 – Common Work Results – For Electrical

**1.3 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-C22.2No.18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
  - .2 CSA C22.2No.65, Wire Connectors.
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
  - .1 EEMAC 1Y-2 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

**Part 2 Products**

**2.1 MATERIALS**

- .1 Pressure type wire connectors to: CSA C22.2No.65, with current carrying parts of copper or copper alloy sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CSA C22.2No.65, with current carrying parts of copper or copper alloy sized to fit copper conductors 10 AWG or less.
- .3 Bushing stud connectors: to EEMAC 1Y-2.
- .4 Clamps or connectors as required to: CAN/CSA-C22.2No.18.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Remove insulation carefully from ends of conductors and:
  - .1 Install mechanical pressure type connectors and tighten screws or secure with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2No.65.

- .2 Install fixture type connectors and tighten. Replace insulating cap.
- .3 Install bushing stud connectors in accordance with EEMAC 1Y-2.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 01 01 50 – General Instructions
- .2 Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.
- .3 Section 26 05 00 – Common Work Results – For Electrical

**1.2 REFERENCES**

- .1 CSA C22.2 No .0.3, Test Methods for Electrical Wires and Cables.

**1.3 PRODUCT DATA**

- .1 Submit product data in accordance with Section 01 01 50 – General Instructions.

**Part 2 Products**

**2.1 BUILDING WIRES**

- .1 Conductors: Minimum size: 12 AWG.
- .2 Copper conductors: size as indicated, with 600V insulation of chemically cross-linked thermosetting polyethylene material rated RW90. Note: THHN not acceptable.

**Part 3 Execution**

**3.1 INSTALLATION OF BUILDING WIRES**

- .1 Install wiring as follows:
  - .1 In conduit systems in accordance with Section 26 05 34.
  - .2 In wireways and auxiliary gutters in accordance with Section 26 05 37.

**END OF SECTION**



**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 01 01 50 – General Instructions
- .2 Section 26 05 00 – Common Work Results for Electrical
- .3 Section 26 05 31 – Splitters, Junctions, Pull Boxes and Cabinets
- .4 Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings
- .5 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings
- .6 Section 26 05 37 – Wireways and Auxiliary Gutters

**Part 2 Products**

**2.1 SUPPORT CHANNELS**

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted or suspended.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Secure equipment to masonry, tile and plaster surfaces with lead anchors.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .5 Fasten exposed conduit or cables to building construction or support system using straps.
  - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
  - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
  - .3 Beam clamps to secure conduit to exposed steel work.
- .6 Suspended support systems.
  - .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
  - .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.
- .7 For surface mounting of two or more conduits use channels at code required centre spacing to suit smallest conduit installed.

- .8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .10 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .11 Do not use supports or equipment installed for other trades for conduit or cable support.
- .12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.
- .13 All hangers, supports and brackets shall be provided and be installed to be consistent with the requirements of Table 4.1.8.18 of Section 4 of the British Columbia Building Code.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 01 01 50 – General Instructions
- .2 Section 26 05 00 – Common Work Results – For Electrical

**1.2 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data for cabinets in accordance with Section 01 01 50 – General Instructions.

**Part 2 Products**

**2.1 SPLITTERS**

- .1 Sheet metal enclosure, welded corners and formed hinged or screw on cover. If hinged, suitable for locking in closed position.
- .2 Main and branch lugs or connection bars to match required size and number of incoming and outgoing conductors as indicated.
- .3 At least three spare terminals on each set of lugs in splitters less than 400 A.

**2.2 JUNCTION AND PULL BOXES**

- .1 Welded steel or aluminum construction with screw-on flat covers for surface mounting.
- .2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.

**2.3 CABINETS**

- .1 Painted sheet steel, hinged door and return flange overlapping sides, handle, lock and catch, for surface mounting.

**Part 3 Execution**

**3.1 SPLITTER INSTALLATION**

- .1 Install splitters and mount plumb, true and square to the building lines.
- .2 Extend splitters full length of equipment arrangement except where indicated otherwise.

**3.2 JUNCTION AND PULL BOXES INSTALLATION**

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Install pull boxes so as not to exceed 30m of conduit run between pull boxes.



**3.3 CABINETS**

- .1 Install cabinets for components as indicated.

**3.4 IDENTIFICATION**

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Install size 2 identification labels indicating system name, voltage and phase.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 CSA C22.1-2012, Canadian Electrical Code, Part 1.

**Part 2 Products**

**2.1 OUTLET AND CONDUIT BOXES GENERAL**

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm square or larger outlet boxes as required for special devices.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 Combination boxes with barriers where outlets for more than one system are grouped.

**2.2 SHEET STEEL OUTLET BOXES**

- .1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.
- .3 102 mm square or octagonal outlet boxes for lighting fixture outlets.
- .4 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster or tile walls.

**2.3 CONDUIT BOXES**

- .1 Cast FS or FD aluminum or feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of components and devices.

**2.4 FITTINGS - GENERAL**

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.
- .5 Screwed fittings for rigid galvanized screwed steel conduit installations.

**Part 3          Execution**

**3.1            INSTALLATION**

- .1      Support boxes independently of connecting conduits.
- .2      Use FS or FD boxes for outlets and junction boxes in areas normally accessible to inmates. See section 26 05 34.
- .3      For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4      Provide correct size of openings in boxes for conduit connections. Reducing washers are not allowed.

**END OF SECTION**



**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 01 01 50 – General Instructions
- .2 Section 26 05 00 – Common Work Results – For Electrical

**1.2 REFERENCES'**

- .1 Canadian Standards Association
  - .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
  - .2 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
  - .3 CSA C22.2 No. 83, Electrical Metallic Tubing.
  - .4 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.

**1.3 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 01 50 – General Instructions.

**Part 2 Products**

**2.1 CONDUITS**

- .1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with steel fittings.
- .2 Rigid pvc conduit: to CSA C22.2 No. 211.2.
- .3 Flexible metal conduit: to CSA C22.2 No. 56, steel or aluminum liquid-tight flexible metal.
- .4 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.

**2.2 CONDUIT FASTENINGS**

- .1 One hole steel straps to secure surface conduits 50 mm and smaller, except as otherwise noted. See drawings and clause 3.2.5 in this section.
  - .1 Two hole steel straps for conduits larger than 50 mm, except as otherwise noted for smaller conduits. See drawings and clause 3.2.5 in this section.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits.
- .4 Threaded rods, 6 mm diameter, to support suspended channels.

**2.3 CONDUIT FITTINGS**

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified.
  - .1 Coating: same as conduit.
  - .2 Material: Steel (Cast fittings are not acceptable).
- .2 Factory "ells" where 90 degrees bends for 21 mm and larger conduits.

**2.4 FISH CORD**

- .1 Polypropylene.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits where possible except in mechanical and electrical service rooms and in unfinished areas.
- .3 Surface mount conduits in mechanical and electrical rooms, unfinished areas and elsewhere as noted on the drawings.
- .4 Use electrical metallic tubing EMT except as otherwise indicated.
- .5 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp or wet locations.
- .6 Minimum conduit size: 21mm.
- .7 Bend conduit cold:
  - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .8 Mechanically bend steel conduit over 19 mm diameter.
- .9 Unless indicated otherwise, provide conduit for all wiring and for future use as further specified or noted on the drawings.

**3.2 SURFACE CONDUITS**

- .1 Run parallel or perpendicular to building lines.
- .2 Run conduits in flanged portion of structural steel.
- .3 Group conduits wherever possible on suspended or surface U-channels.
- .4 Do not pass conduits through structural members except as indicated.

- .5 All wiring in areas in which inmates have access including outside the building shall be installed in rigid galvanized screwed steel conduit with screwed fittings not set screw type fittings.
  - .1 Fixings for conduit in areas in which inmates have access including outside the building shall be two hole galvanized steel straps installed on 610 mm centers using stainless steel machine screws into metal expansion inserts in pre-drilled holes.
  - .2 In areas inside the building outside of the spaces to which inmates have access, wiring shall be EMT with steel fittings.

**END OF SECTION**



**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 01 01 50 – General Instructions
- .2 Section 26 05 00 - Common Work Results - Electrical.

**1.2 REFERENCES**

- .1 Canadian Standards Association.
  - .1 CSAC22.2No.26, Construction and Test of Wireways, Auxiliary Gutters and Associated Fittings.

**1.3 PRODUCT DATA**

- .1 Submit product data in accordance with 01 01 50 – General Instructions.

**Part 2 Products**

**2.1 WIREWAYS**

- .1 Wireways and fittings: to CSA C22.2 No.26.
- .2 Sheet steel with hinged or bolted cover to give uninterrupted access.
- .3 Finish: baked grey enamel if of steel, aluminum.
- .4 Elbows, tees, couplings and hanger fittings manufactured as accessories to wireway supplied.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install wireways and auxiliary gutters.
- .2 Keep number of elbows, offsets, connections to minimum.
- .3 Install supports, elbows, tees, connectors, fittings.
- .4 Install barriers where required.
- .5 Install gutter to full length of equipment.
- .6 Do not install wireways or auxiliary gutters in areas accessible to inmates.

**END OF SECTION**

# **DISHWASHER REPLACEMENT**

Kitchen Unit Q

Project No. R.070775.001

Agassiz BC Kent Institution

## **APPENDIX 1**

### **Limited Hazardous Building Materials Assessment**

Kitchen of Unit Q – Dishwasher Replacement

Kent Institution

4732 Cemetery Road Agassiz BC



**DST Consulting Engineers Inc.**  
Unit B – 4125 McConnell Drive  
Burnaby, British Columbia  
V5A 3J7

Office: 604.436.4588

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Public Works and Government Services Canada  
19<sup>th</sup> Floor – 800 Burrard Street  
Vancouver, British Columbia  
V6Z 2V8

January 6, 2015

Attention: Ms. Karen Muttersbach  
Environmental Specialist

**Subject: Limited Hazardous Building Materials Assessment  
Kitchen of Unit Q – Dishwasher Replacement – Kent Institution, 4732  
Cemetery Road, Agassiz, British Columbia**

DST File No.: BE-VC-020166

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## **1.0 INTRODUCTION**

DST Consulting Engineers Inc. (DST) was retained by Public Works and Government Services Canada (PWGSC) for the purposes of completing a hazardous building material assessment, limited to surfaces to be potentially disturbed through the replacement of the dishwasher located in Kitchen Area of Unit Q (herein referred to as the Subject Area) at Kent Institution, located at 4732 Cemetery Road, Agassiz, BC (herein referred to as the Subject Facility).

The assessment was conducted in support of upcoming renovation activities planned for the Subject Area.

The assessment was completed on November 13, 2014 and December 22, 2014 by David Kernel, Project Manager of DST.

## **2.0 SCOPE OF WORK**

The assessment was completed to identify the presence of asbestos-containing materials (ACMs), lead-based coatings (LBCs) and mould that may be impacted through the replacement of the dishwasher in the Subject Area.

Proposed renovation activities and the boundaries of DST's assessment are detailed on Drawing A-2, Kitchen Floor Plan, dated October 2014. A copy of this drawing is presented in **Appendix II**.



### **3.0 REGULATIONS AND GUIDELINES**

#### **3.1 Federal Regulations**

##### **3.1.1 Canada Labour Code**

In federal jurisdictions, hazardous building materials are regulated under the *Canada Labour Code, Part II, Part X, Hazardous Substances*.

##### **3.1.2 Asbestos-Containing Materials (ACMs)**

ACMs are regulated under the Canada Occupational Health and Safety Regulations, (SOR/86-304). An asbestos-containing material is defined as a manufactured product that contains >0.5 % asbestos fibres by weight, at the time of manufacture, or vermiculite insulation that contains any asbestos fibres.

In addition, PWGSC Departmental Policy 057 provides specific requirements for the management and abatement of ACMs.

##### **3.1.3 Lead-Based Coatings (LBCs)**

Sections 6.59 to 6.69 of the BC OH&S Regulation describe specific requirements for workplace exposure to lead.

##### ***WorkSafeBC Manual – Lead-Containing Paints and Coatings – Preventing Exposure in the Construction Industry***

This manual provides a guide to current practices that are to be followed in the Province of British Columbia, providing basic information on lead and lead products, health hazards and requirements for worker protection, safe work procedures and principles that should be followed in selecting the most suitable technique for the safe abatement of lead.

##### **3.1.4 Hazardous Products Act**

The *Hazardous Products Act (HPA), Surface Coating Materials Regulation (SOR/2005-109)* provides regulatory requirements for the sale and labeling of surface coatings.

The Surface Coating Materials Regulation reduced the threshold for lead in paint from 5,000 mg/kg to 600 mg/kg, and in 2010, to 90 mg/kg. However, Provincial regulations do not require lead controls for surface coatings containing <600 mg/kg, as such, DST identifies a lead-based coating as a coating containing >600 mg/kg or >0.05 mg/cm<sup>2</sup> (by XRF analyzer).



### **3.2 Transportation of Dangerous Goods Act**

The Transportation of Dangerous Goods Act provides detailed requirements for the transportation of hazardous materials, including lead-containing wastes.

### **3.3 Provincial Regulations**

In British Columbia, the management of hazardous building materials in the work place is regulated by WorkSafeBC under the Workers' Compensation Act (effective April 15, 1998), as amended by the Workers' Compensation (Occupational Health and Safety) Amendment Act (effective October 1, 1999). Specific requirements of the Occupational Health and Safety Amendment Act are prescribed in the British Columbia Occupational Health and Safety (BC OH&S) Regulation.

Part 4.81 – Workplace Indoor Air Quality, of British Columbia Occupational Health and Safety Regulation (BC Reg.) 296/97, as amended periodically, regulating the requirements for the management of indoor air quality (including fungi) in the workplace. WorkSafeBC has also developed a guideline entitled, "G4.79 Moulds and Indoor Air Quality Guideline" that details appropriate methodologies relating to the assessment and abatement of mould impacted building materials in the workplace.

In addition, DST referenced the following standards/guidelines through the assessment and reporting:

- "Guideline on Assessment and Remediation of Fungi in Indoor Environments", (New York Protocol) New York City Department of Health; and,
- "Mould Guideline for the Canadian Construction Association - Canadian Construction Document 82, 2004", Canadian Construction Association.

#### **3.3.1 Hazardous Materials & Demolition/Renovations**

Section 20.112 of the BC OH&S Regulation details the requirements that employers and owners are responsible for before beginning work on the demolition, renovation or salvage of machinery, equipment, buildings, or structures. The employer or owner must:

- Inspect the site to identify any asbestos, lead and/or other potentially hazardous materials that may be handled, disturbed, or removed;
- Have the inspection results available at the worksite; and,
- Ensure that the hazardous materials are safely contained or removed.



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### **3.3.2 Hazardous Wastes**

In British Columbia, environmental matters pertaining to waste generally fall under the jurisdiction of the British Columbia Ministry of Environment (MoE), pursuant to the Environmental Management Act. The key waste regulation under the Environmental Management Act relating to hazardous building materials is the Hazardous Waste Regulation (HWR), as amended from time to time. The HWR provides the requirements for the proper handling, storage, transportation, treatment, recycling and disposal of hazardous wastes in the province. The regulation also outlines the materials and criteria to be used to characterize waste as hazardous.

## **4.0 METHODOLOGY**

The assessment was completed by DST on Thursday, November 13, 2014 and December 23, 2014.

Suspect hazardous building materials were visually identified, based on the surveyor's knowledge of the historic composition of building products. Visual identification of materials suspected to contain hazardous materials were supported by the analysis of representative samples.

Suspect ACM samples were analyzed for asbestos content at Asbestos Analytical Services laboratory (AASL) following the National Institute for Occupational Safety and Health (NIOSH) Method 9002.

Suspect LBCs samples were tested for lead content using a Niton X-Ray Fluorescence (XRF) spectroscopy detector. The Niton XRF is designed to detect and quantify the amount of lead present in painted surfaces. Measurements were made following Niton XRF standard operating procedures for lead in surface coating measurements.

The visual assessment was conducted in general accordance with Health Canada, Canadian Construction Association (CCA), and the American Conference of Industrial Hygienists (ACGIH) protocols for microbiological assessment and control.

The rank assessment of the visible fungal contamination was completed based on surface area. The assessment was made in accordance with the New York City Department of Health *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*, (New York Protocol).



## 5.0 FINDINGS

### 5.1 Asbestos-Containing Materials (ACMs)

Two (2) sample of suspect ACMs was collected and analyzed for asbestos content from the Subject Area. Asbestos analytical reports are included in **Appendix I**. The sample descriptions and analytical results are summarized in **Table 1**, below.

Table 1: Analysis of Suspect ACMs Kitchen Area of Unit Q – Kent Institution, Agassiz, BC			
Sample I.D.	Sample Description	Sample Location	Asbestos Content & Type
K-1	Drywall Joint Compound	Dishwasher Area Ceiling (Kitchen)	1-5% Chrysotile
K-2	Blue Vinyl Sheet Flooring	Dishwasher Area Floor (Kitchen)	None Detected

Based on the analysis of suspect materials, drywall joint compound within the Subject Area was found to be asbestos-containing.

A photographic log is presented in **Appendix III**.

**NOTE:** DST observed previously identified, asbestos-containing brown/red duct mastic applied to the HVAC system inside the ceiling space. The asbestos-containing mastic is not present on the ventilation ducting associated with the dishwasher exhaust ducting, however, this mastic is present on HVAC ducting within the ceiling space of the Subject Area.

### 5.2 Lead-Based Coatings (LBCs)

Two (2) suspect LBCs were identified, sampled and analyzed within the Subject Area. The sample descriptions and analytical results are summarized in **Table 2**, below.

Table 2 – Lead-Based Coating Sample Results Kitchen Area of Unit Q – Kent Institution, Agassiz, BC				
Sample Number	Location / Description	Color	Result (mg/cm <sup>2</sup> )	Lead-Based Coating
L-01	Cinder Block Wall	Off-White	0.09	Yes
L-02	Drywall Ceiling	Off-White	0.24	Yes

Notes: **Bold print** indicates a coating containing potentially hazardous levels of lead.



Based on the results of DST's assessment, the two (2) suspected lead-based coatings were found to contain potentially hazardous levels of lead (i.e. these surface coatings are considered to be lead-based coatings).

A photographic log is presented in **Appendix III**.

### **5.3 Mould Amplification**

Based on DST's assessment, suspect visible mould growth (mould amplification) was identified within the Subject Area, on the surfaces of the cinder block walls and vinyl sheet flooring.

A photographic log is presented in **Appendix III**.

## **6.0 CONCLUSIONS**

### **6.1 Asbestos-Containing Materials**

Based on the analysis of suspect materials, drywall joint compound within the Subject Area was found to be asbestos-containing.

**NOTE:** DST observed previously identified, asbestos-containing brown/red duct mastic applied to the HVAC system inside the ceiling space. The asbestos-containing mastic is not present on the ventilation ducting associated with the dishwasher exhaust ducting, however, this mastic is present on HVAC ducting within the ceiling space of the Subject Area.

### **6.2 Lead-Based Coatings**

Based on the results of DST's assessment, the two (2) suspected lead-based coatings were found to contain potentially hazardous levels of lead (i.e., equal to or  $>0.05 \text{ mg/cm}^2$ ).

### **6.3 Mould Amplification**

Based on DST's assessment, suspect visible mould growth (mould amplification) on the surfaces of the (cinder block walls and vinyl sheet flooring) was identified within the Subject Area.

## **7.0 RECOMMENDATIONS**

### **7.1 Asbestos-Containing Materials**

Prior to any renovation and/or demolition activities, identified ACMs should be removed in accordance with the requirements of the Canada Labour Code, Part II, Department Policy 057-Asbestos Management and WorkSafeBC, specifically but not limited to include those requirements prescribed through Parts 5.48-5.59 – Controlling Exposure, and Parts 6.1 - 6.32 –



Asbestos. The abatement of identified ACMs should be conducted following Moderate Risk safe work procedures.

DST recommends reference to WorkSafeBC publication "*Safe Handling of Asbestos, A Manual of Standard Practices*". This document provides a guide to current practices that are to be followed in the Province of British Columbia, providing basic information on asbestos and asbestos products, health hazards and requirements for worker protection, safe work procedures and principles that should be followed in selecting the most suitable technique for the safe abatement of ACMs.

Asbestos-containing wastes should be managed in accordance with the British Columbia Ministry of Environment and should be transported in accordance with the requirements of the Federal Transportation of Dangerous Goods Act.

## **7.2 Lead-Based Coatings**

Based on the proposed scope of renovation activities, abrasive (i.e. grinder, blasting, etc.) removal procedures that may impact upon identified LBCs should not be required. Based on the proposed scope of renovation activities, identified lead-based coatings applied to the cinder block walls could be removed whole, and limiting the potential for disturbance to the LBCs.

Due to the potential exposure to airborne silica (through concrete grinding), DST recommends that personal protective equipment (respiratory protection, protective clothing, etc.) and engineering controls (i.e. the use of water) be utilized during concrete grinding activities.

Control the disturbance to identified LBCs in accordance with the requirements of the Canada Labour Code, and WorkSafeBC, specifically but not limited to include those requirements prescribed in Parts 5.48-5.59 – Controlling Exposure and Parts 6.59-6.69 – Lead of the BC OH&S Regulation.

DST recommends reference to WorkSafeBC publication "*Lead-Containing Paints and Coatings – Preventing Exposure in the Construction Industry*", 2011. This manual provides a guide to current practices that are to be followed in the Province of British Columbia, providing basic information on lead and lead products, health hazards and requirements for worker protection, safe work procedures and principles that should be followed in selecting the most suitable technique for the safe abatement of LBCs.

Based on the relatively low concentration of lead in tested surface coatings, DST does not recommend completing leachate testing on identified LBCs. In DST's experience, surface coatings containing less than 5,000 parts per million or less than 1.0 mg/cm<sup>2</sup> do not have the potential to leach lead above 5 mg/L.



Leachable lead-containing wastes should be disposed of in accordance with the British Columbia Ministry of Environment and should be transported in accordance with the requirements of the Federal Transportation of Dangerous Goods Act.

### **7.3 Mould Amplification**

Based on the above-noted findings and conclusions, DST provides the following recommendations for your consideration:

- Remediate the identified mould impacted and/or moisture damaged building materials. Complete the remedial work in accordance with procedures detailed in WorkSafeBC Guideline "G4.79 Moulds and Indoor Air Quality Guideline".

### **7.4 Additional Observations**

In addition to ACMs and LBCs, water staining (~5 ft<sup>2</sup>) was identified on the Southeast wall within the Subject Area. If proposed renovation activities may impact upon this area, DST recommends that a cut test (6"x6" section) be performed to identify potential mould amplification within this area. If mould amplification is identified in this area, DST recommends that mould amplification be abated following work procedures detailed in WorkSafeBC guideline "G4.79 – Moulds and Indoor Air Quality", 2006.

## **8.0 REPORT LIMITATIONS**

This report is intended for client use only. Any use of this document by a third party, or any reliance on or decisions made based on the findings described in this report, are the sole responsibility of such third parties, and DST Consulting Engineers Inc. accepts no responsibility for damages, suffered by any third party as a result of decisions made or actions conducted based on this report. No other warranties are implied or expressed.

The data, conclusions and recommendations which are presented in this report, and the quality thereof, are based on a scope of work authorized by the client. The sampling program included asbestos bulk sampling and paint chip sampling in select representative areas for laboratory analysis. Note, however, that no scope of work, no matter how exhaustive, can guarantee to identify all contaminants. This report therefore cannot warranty that all building conditions are represented by those identified at specific locations.

Recommendations, when included, are made in good faith and are based on several successful experiences.

Note also that standards, guidelines and practices related to environmental investigations may change with time. Those which were applied at the time of this investigation may be obsolete or unacceptable at a later date.

Any comments given in this report on potential remediation problems and possible methods are intended only for the guidance of the designer. The scope of work may not be sufficient to determine all of the factors that may affect construction, clean-up methods and/or costs. Contractors bidding on this project or undertaking clean-ups should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the conditions may affect their work.

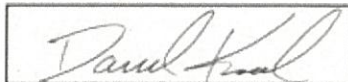
Any results from an analytical laboratory or other subcontractor reported herein have been carried out by others, and DST Consulting Engineers Inc. cannot warranty their accuracy. Similarly, DST cannot warranty the accuracy of information supplied by the client.

## 9.0 CLOSURE

We trust that the information contained herein meets your needs. Should you have any questions or comments, please do not hesitate to contact us.

### ***DST CONSULTING ENGINEERS INC.***

Report prepared by:

A rectangular box containing a handwritten signature in cursive script, which appears to read "David Kernel".

David Kernel, CLR, CLI  
*Project Manager*

Report Reviewed by:

A handwritten signature in cursive script, which appears to read "Christian J. Injates".

Christian J. Injates, CEC, CEM  
*Sector Head, Building Environments*

**APPENDIX I**  
**LABORATORY CERTIFICATES OF ANALYSIS**





# Asbestos Analytical Services Ltd.

7 - 2883 East Kent Avenue N., Vancouver, BC, V5S 3T9

## ASBESTOS ANALYSIS REPORT

AASL Report #: **B00826**

Analyst: Gabrielle Sutton

Report Date: 14NOV2014

Method: NIOSH Method 9002

Project Location: 4732 Cemetery Road, Agassiz, BC

Reference #s: BE-VC-020166

Number of Samples: 2

# B00826	Sample	Sub-Sample	Sample Description / Location	Results	ASB
1. 1 **	K-1	Layer 1 - white, pliable	Drywall Joint Compound / Caulking, Kitchen Ceiling, Kent Kitchen	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
1. 2	K-1	Layer 2 - thin creamy-white (paint)	Drywall Joint Compound / Caulking, Kitchen Ceiling, Kent Kitchen	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
1. 3	K-1	Layer 3 - off-white	Drywall Joint Compound / Caulking, Kitchen Ceiling, Kent Kitchen	1 - 5 % Chrysotile Asbestos > 95 % Non-Fibrous	T
2 **	K-2	Single Phase - blue, pliable / weave	Blue Vinyl Sheet Flooring, Kitchen Floor, Kent Kitchen	Asbestos Fibres Not Detected 1 - 5 % Fibrous Glass 1 - 5 % Synthetic Fibres > 90 % Non-Fibrous	---

### Comments

Samples analyzed in accordance with NIOSH Laboratory Method 9002

American Industrial Hygiene Association (AIHA) BAPAT Program Laboratory Number 204301

Estimated Limit of Detection is <0.5 %

ASB = Asbestos present/absent in material

T = Asbestos Present

AASL Asbestos Analytical Services Ltd. will not accept any responsibility as to the manner of interpretation or application of these results.

\*\* Sample preparation included ashing process.

Analyst: Original Signed By

Gabrielle Sutton, B.A.

Date: November 14, 2014

Original Signed By

Reviewed By: Gabrielle Sutton, B.A.



---

## LEAD ANALYSIS REPORT

<b>Client:</b> Public Works Government Services	<b>Date:</b> November 14, 2014
<b>Attention:</b> Karen Muttersbach	<b>Date Submitted:</b> November 13, 2014
<b>Project Name:</b> 4732 Cemetery Road, Agassiz, BC	
<b>Project Number:</b> BE-VC-020166	

### LEAD-BASED COATING SAMPLE ANALYTICAL RESULTS DISHWASHER AREA – KENT INSTITUTION

Sample Number	Location / Description	Color	Result (mg/cm2)	Lead-Based Coating
L-01	Block Wall	Off White	0.09	Yes
L-02	Drywall Ceiling	Off White	0.24	Yes

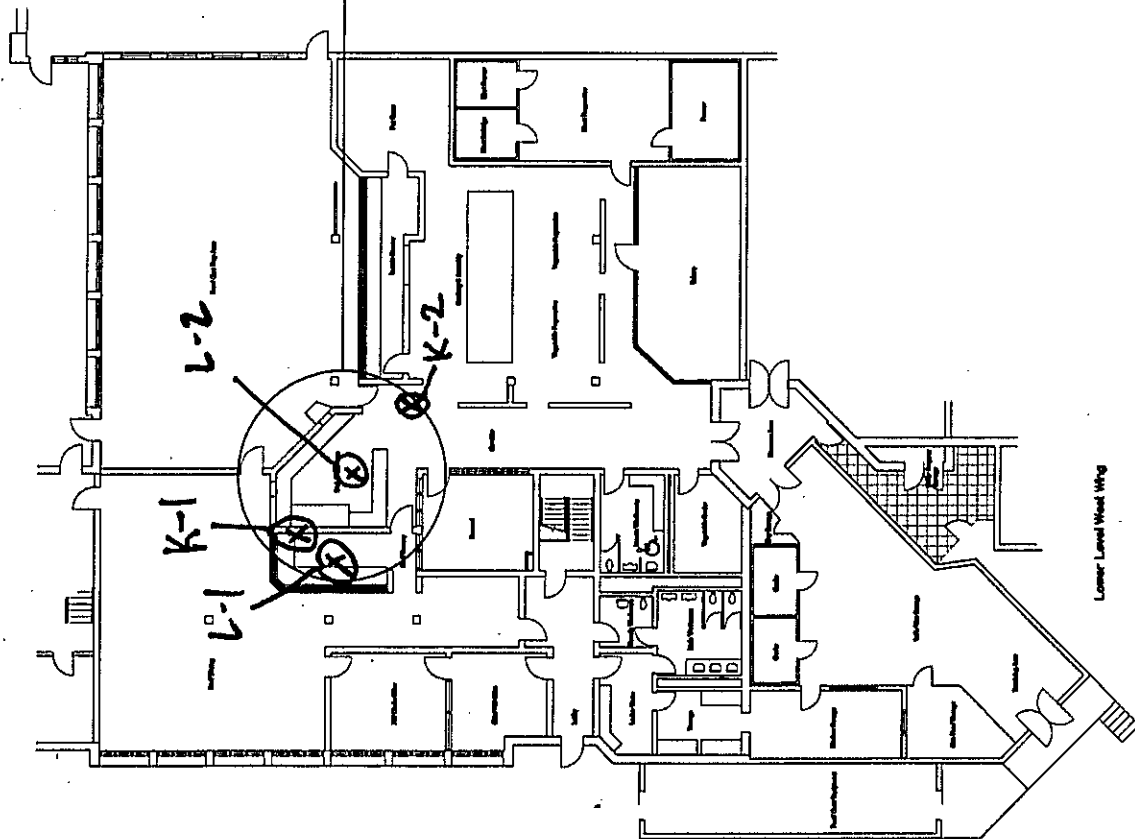
#### ANALYTICAL METHODOLOGY:

A Niton X-Ray Fluorescence (XRF) spectroscopy detector was used to make measurements on suspect building painted surfaces. The Niton XRF is designed to detect and quantify the amount of lead present primarily in painted surfaces. Measurements were made following Niton XRF standard operating procedures for lead in surface coating measurements.

Suspect surface coating samples analyzed were identified to have hazardous levels of lead (600 or greater) with a detection limit of  $\geq 0.05$  of lead per square centimeter of surface area (mg/cm<sup>2</sup>).

**APPENDIX II**  
**DRAWING A-2**



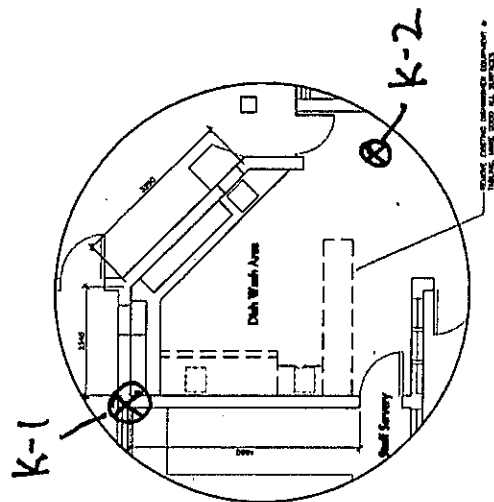


**Existing  
Kitchen Floor Plan**

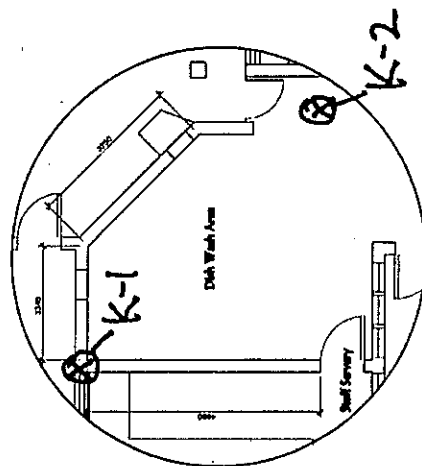
Lower Level West Wing

### General Notes

1. CONFIRM ALL DELIVERIES ON SITE.
2. THE EMPLOYEES FOR MONITORING OF CURRENT DELIVERIES ARE:



**Eating**  
**Dish Wash Area**  
**1:50**



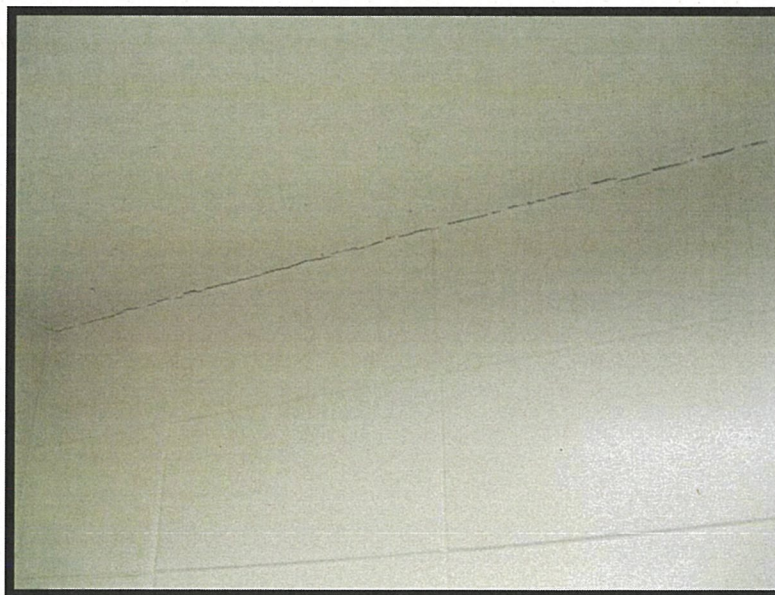
**Dish Wash Area**

**APPENDIX III**  
**PHOTOGRAPHIC LOG OF SITE CONDITIONS**

### Photographic Log of Site Conditions



**Photo #1 – Illustration of identified asbestos-containing drywall joint compound ceiling.**



**Photo #2 – Illustration of identified lead-based paint on cinder block walls and lead-based paint of drywall ceiling.**

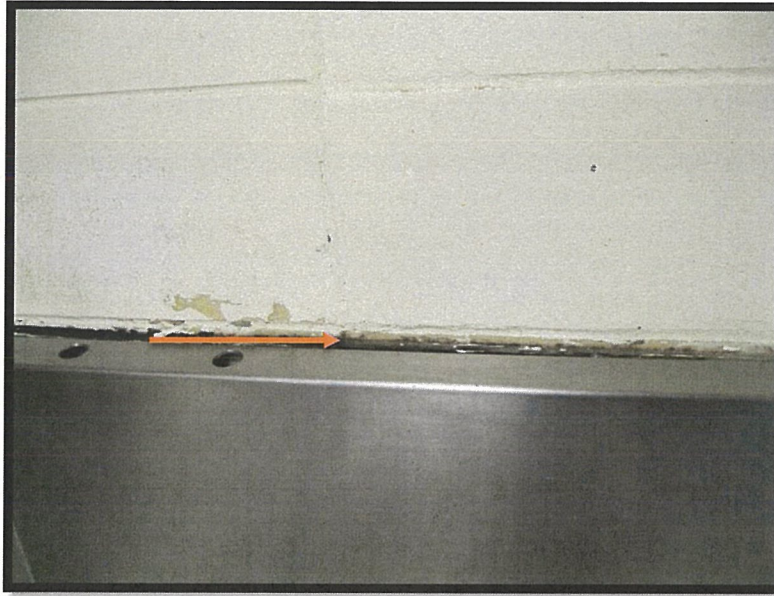




**Photo #3 – Illustration of suspect visible mould identified on cinder block walls.**



**Photo #4 – Illustration of suspect visible mould identified on cinder block walls.**



**Photo #5 – Illustration of suspect visible mould identified on caulking around the sinks.**

# **DISHWASHER REPLACEMENT**

Kitchen Unit Q

Project No. R.070775.001

Agassiz BC Kent Institution

## **APPENDIX 2**

### **Existing Photos**

Kitchen Unit Q

Dishwasher Area

Kent Institution











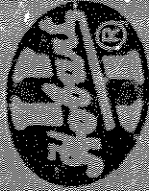
# HOBART

CORPORATION

HOBART CANADA, NORTH YORK, ONTARIO

LISTED

776A



MODEL / MODÈLE	CRS336A	ML/LM	110403
DATE CODE/CODE DE DATE	LAF		OR
SERIAL/SÉRIE	23-1053081		H
VOLT/V	300	HZ	60
		PH	
DATA	MOTORS MOTEURS	ELECTRIC HEAT CHAUFFAGE ELECTRIQUE	ELECTRIC BOOSTER SURCHAUFFEUR ELECTRIQUE
AMP/A	7.4		
WATT/W		15 KW	

COMMERCIAL DISHWASHER/LAVE - VAISSELLE COMMERCIAL

MADE IN CANADA  
FABRIQUE AU CANADA

163568

MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING U.S. PATENTS

FABRICATION BREVETEE SOUS UN OU PLUSIEURS

NUMEROS BREVETS AMERICAINS SUIVANTS

4,326,551	4,689,089	5,383,486	5,775,347	6,170,440
4,420,242	4,735,222	5,443,655	5,810,036	6,178,625
			5,850,904	6,510,819



# **DISHWASHER REPLACEMENT**

Kitchen Unit Q

Project No. R.070775.001

Agassiz BC Kent Institution

## **APPENDIX 3**

### **Preliminary Dishwash Equipment Services**

November 9, 2014

**KENT INSTITUTION**

PRELIMINARY EQUIPMENT LIST			PRELIMINARY ELECTRICAL SERVICES					PRELIMINARY MECHANICAL SERVICES										Rev.
Description	Qty.	Eq. Sup.	Load	Volt.	Ph	Junc	Rec	Conn	Remarks	Water	Conn	Waste	Conn	Gas	Conn	Exhaust	Conn	Remarks
HOSE REEL GUN	1	CSCI								13	13	1370						
SOILED DISHTABLE	1	CSCI								13	13	450						
PRE-RINSE UNIT	1	CSCI								13	13	450						
PRE-RINSE UNIT	1	CSCI								18	19	150	100					
WASTE UNIT	1	CSCI	5.5A	208	1	X		450	INTERWIRE THRU CONTROLS									
DISHWASHER W/BOOSTER	1	CSCI	47A	600	3	X		1525	INTERCONNECT W/FAN	19						200	100 X 406	1658
BLOWER/DRYER	1	CSCI	15A	600	3	X		1540	VERIFY W/SITE			38	150			400	100 X 406	1658
VENT DUCTS	2	CSCI							VERIFY W/SITE							*		(REFER TO DW)
DISHTABLE - CURVED	1	CSCI														*		(REFER TO DW)
DISHTABLE W/ROLLERS	1	CSCI							INTERCONNECTED W/DISHWASHER			38	HUB					
S.S.T. WALL CLADDING	LOT	CSCI																
ELEC. DISCONN. SWT	LOT	CSCI							AS REQ'D BY EC									
BACKFLOW PR. (BFP)	LOT	CSCI											HUB					BY MECHANICAL

CSCI - CONTRACTOR SUPPLY, CONTRACTOR INSTALL  
 OSCI - OWNER SUPPLY, CONTRACTOR INSTALL (VERIFY SERVICES W/EQUIP. SUPPLIED)  
 EX - EXISTING EQUIPMENT VERIFY SERVICES NOTED  
 W - WALL MOUNTED REC. BY ELECTRICAL CONTRACTOR  
 F - FIXTURE MOUNTED REC. BOX AND COVER  
 SERVICES NOTED DENOTE LOADS FOR EQUIPMENT SPECIFIED, APPLICABLE TRADES TO REFER TO FEC SUPPLIED SHOP DRAWINGS AND BROCHURES  
 FOR ACCURATE SERVICE INFORMATION AND CONNECTION POINTS.  
 REFER TO ENGINEERS DRAWINGS FOR SUPPLY SERVICES, GREASE INTERCEPTOR, ETC.  
 EQ, SUPPLIER REFERS TO SUPPLIER OF EQUIPMENT, APPLICABLE TRADES (EC/MP/PC) ARE RESPONSIBLE FOR SERVICE CONNECTIONS

# **DISHWASHER REPLACEMENT**

**Kitchen Unit Q**

**Project No. R.070775.001**

**Agassiz BC Kent Institution**

## **APPENDIX 4**

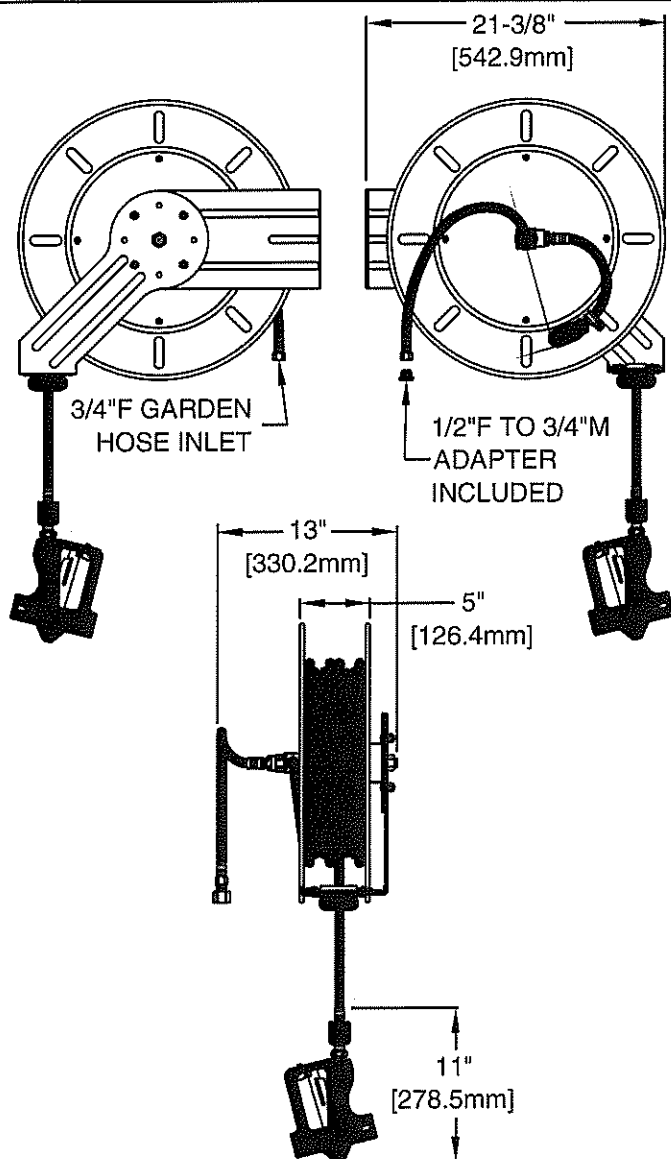
### **Dishwash Brochures**



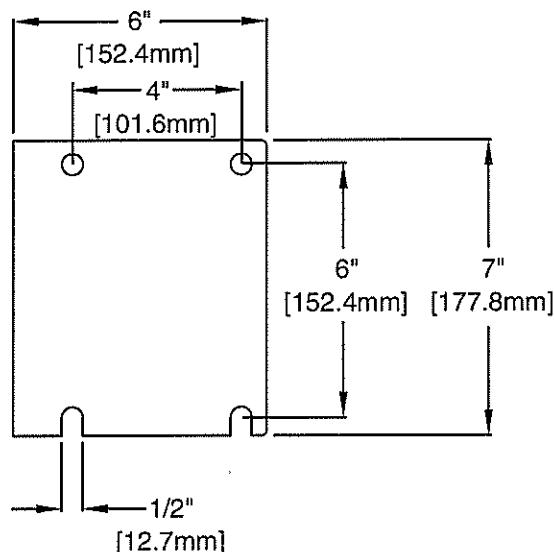
JOB NAME:

QUANTITY:

ITEM NO.:

C  
T  
C  
P  
C  
C  
C  
C  
C

ROUGH-IN: SEE MOUNTING PLATE BELOW



ANSI/A112.18.1M

PRODUCT NAME:

## STAINLESS STEEL REEL RINSE EXPOSED WITH SPRAY GUN

☐ SPECIAL CONFIGURATION  
(CHECK BASE MODEL AND OPTIONS)

MODEL:

- ☐ 29599 W/ 35' LENGTH HOSE
- ☐ 29262 W/ 50' LENGTH HOSE

OPTIONS OR MODIFICATIONS:

☐ OTHER \_\_\_\_\_

FEATURES:

### REEL RINSE

- \* EXPOSED DESIGN
- \* STAINLESS STEEL CONSTRUCTION
- \* GUIDE ARM ADJUSTABLE TO 9 POSITIONS
- \* RATCHET LOCK AND EASY TENSION ADJUST
- \* STAINLESS STEEL OR BRASS FLUID PATH

### HOSE

- \* 35' OR 50' LENGTH REEL HOSE
- \* 5/8" ID HIGH TEMPERATURE HOSE
- \* 3-PLY FIBER REINFORCED
- \* 1/2"F NPT OR 3/4"F GARDEN HOSE INLET
- \* 18" LENGTH INLET HOSE
- \* ADJUSTABLE BALL STOP

### SPRAY GUN

- \* STAINLESS STEEL CONSTRUCTION
- \* WATERPROOF NYLON COVER
- \* ERGONOMIC DESIGN
- \* LOCKING TRIGGER MECHANISM
- \* 7.0 GPM AT 80 PSI

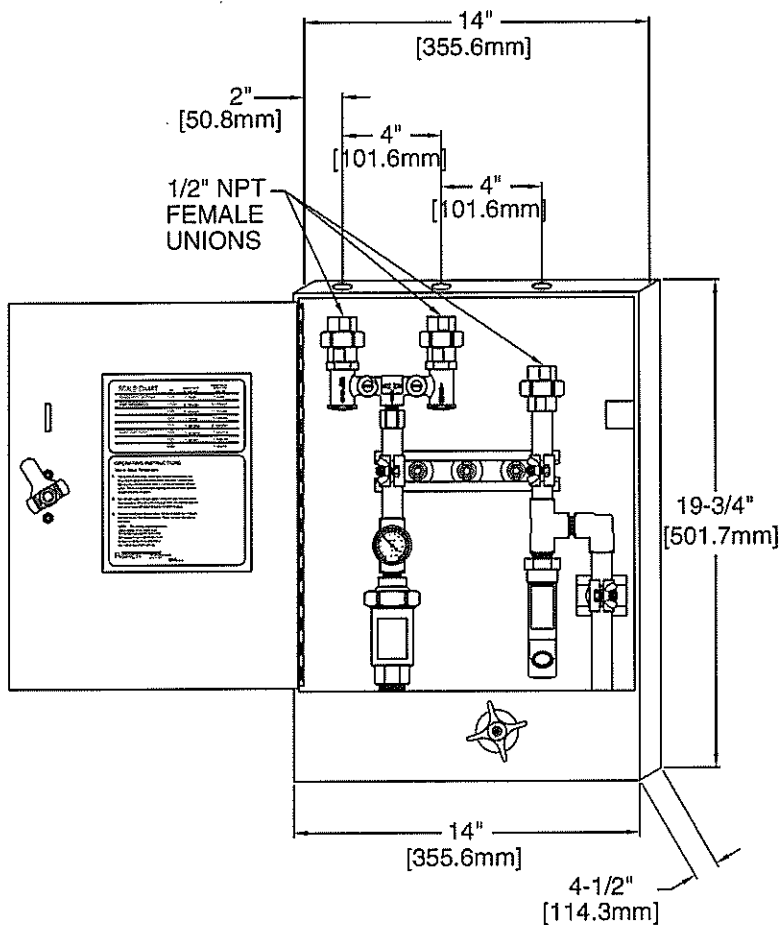
### SYSTEM LIMITS

- \* TEMP: 40°F MIN. TO 140°F MAX.
- \* PRESSURE 150 PSI MAX. STATIC

### SHIPPING WEIGHT

- \* 29599 - 55.0 LBS
- \* 29262 - 60.0 LBS

FISHER MANUFACTURING COMPANY  
1900 SOUTH "O" STREET, TULARE, CALIFORNIA 93274  
MAILING ADDRESS: P.O. BOX 60, TULARE, CALIFORNIA 93275  
PHONE: (800) 421-6162 FAX: (800) 832-8238  
MADE IN U S A



PRODUCT NAME:  
REEL RINSE CONTROL BOX ASSEMBLY

☐ SPECIAL CONFIGURATION  
(CHECK BASE MODEL AND OPTIONS)

MODEL:  
☐ 1801

OPTIONS OR MODIFICATIONS:

- ☐ HANDLES (LEVER OR WRIST) CIRCLE STYLE
- ☐ VANDAL RESISTANT KIT
- ☐ OTHER \_\_\_\_\_

FEATURES:

- \* TEMPERATURE ADJUSTING VALVE
- \* THERMOMETER
- \* SHUT-OFF VALVE
- \* IN-LINE BACKFLOW PREVENTER
- \* PADLOCK HASP ON DOOR
- \* STAINLESS STEEL FRAME FOR RECESSED MOUNTING

SYSTEM LIMITS

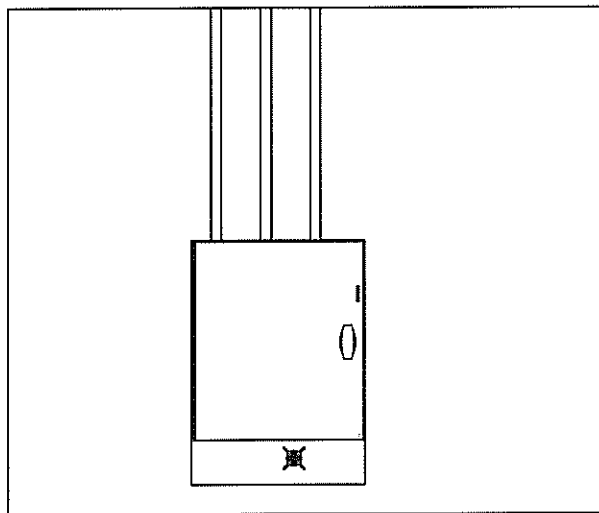
- \* TEMP: 40°F MIN. TO 140°F MAX.
- \* PRESSURE 200 PSI MAX. STATIC

SHIPPING WEIGHT

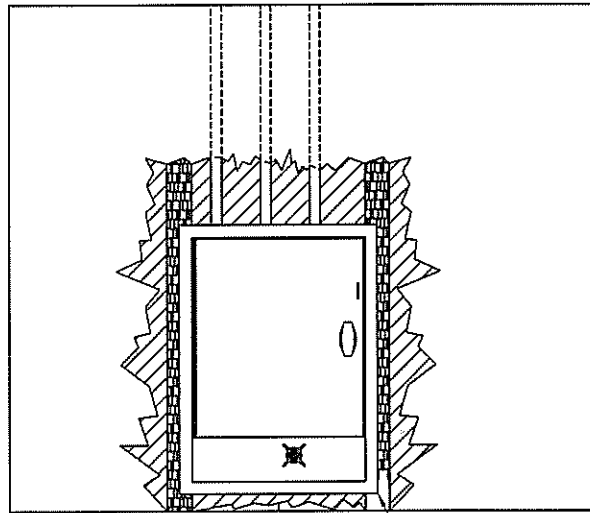
- \* 36.25 LBS

ROUGH-IN'S:

EXPOSED MOUNTING

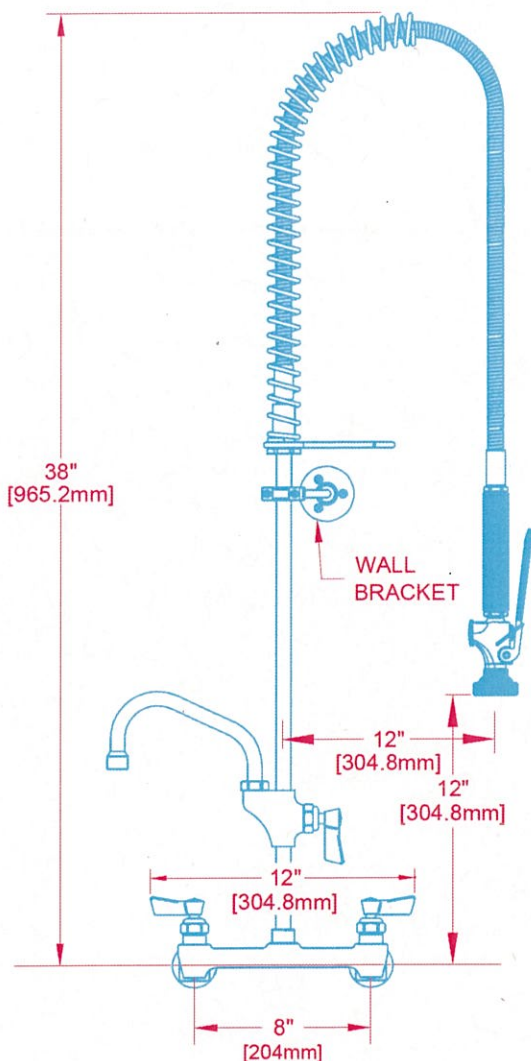


RECESSED MOUNTING

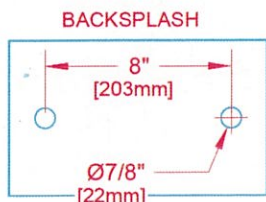
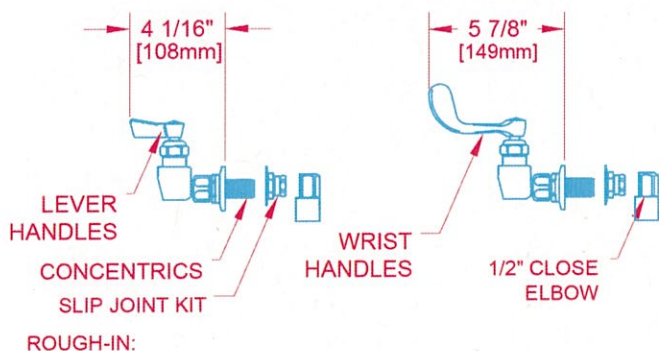


ANSI/A112.18.1M

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1900 SOUTH "O" STREET, TULARE, CALIFORNIA 93274  
MAILING ADDRESS: P.O. BOX 60, TULARE, CALIFORNIA 93275  
PHONE: (800) 421-6162, FAX: (800) 832-8238



8" C/C BACKSPASH FAUCET



## PRODUCT NAME:

8" BACKSPASH PRE-RINSE WITH  
ADD-ON & ELBOWS

## MODEL:

- ☐ 55425 6" SWING SPOUT W/ LEVER HANDLES  
☐ 55433 8" SWING SPOUT W/ LEVER HANDLES  
☐ 55441 10" SWING SPOUT W/ LEVER HANDLES  
☒ 55468 12" SWING SPOUT W/ LEVER HANDLES  
☐ 55476 14" SWING SPOUT W/ LEVER HANDLES  
☐ 55484 16" SWING SPOUT W/ LEVER HANDLES

## FEATURES:

## CONTROL VALVE

- \* 8" C/C BACKSPASH MOUNT
- \* CONCENTRICS
- \* INTERNAL SPRING LOADED CHECK VALVES
- \* SWIVELLING SEAT DISKS
- \* HOT SIDE STEM - RIGHT HAND
- \* COLD SIDE STEM - LEFT HAND
- \* STAINLESS STEEL SEATS
- \* STAINLESS STEEL SEAT SCREWS
- \* STAINLESS STEEL HANDLE SCREWS
- \* 1/2" CLOSE ELBOWS

## ADD-ON CONTROL VALVE

- \* STEM - RIGHT HAND SWIVEL
- \* HOT INDEX BUTTON
- \* SWIVELLING SEAT DISKS
- \* STAINLESS STEEL SEATS, SEAT SCREWS AND HANDLE SCREWS.

## HOSE

- \* 36" LENGTH
- \* STAINLESS STEEL END FITTINGS
- \* STAINLESS STEEL EXTERNAL JACKET
- \* 3-PLY FIBER REINFORCED INTERNAL RUBBER HOSE
- \* REPAIRABLE IN FIELD WITH SIMPLE TOOLS

## ULTRA SPRAY VALVE

- \* LOWEST ENERGY USER - 1.15 GPM @ 60 PSI
- \* CLEANS FASTER - TEST PROVEN
- \* ENGINEERED TO LAST - NO 'O' RINGS TO LEAK
- \* INTERCHANGEABLE - FITS ALL BRANDS

## WALL BRACKET

- \* ADJUSTS FROM 2" TO 12"

## SYSTEM LIMITS

- \* TEMP: 40°F MIN. TO 140°F MAX. STATIC
- \* PRESSURE 200 PSI MAX. STATIC
- \* SHIPPING WEIGHT: 15.0 LBS



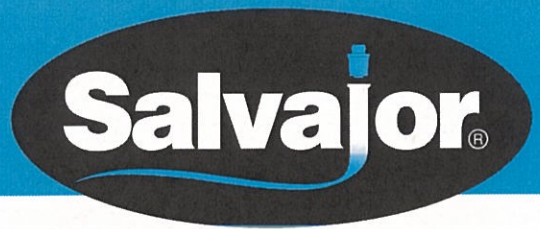
APPLICATION:		PRODUCT NAME: PRE-RINSE, SPRING STYLE, BACKSPASH MOUNT	
JOB NAME:		<input type="checkbox"/> SPECIAL CONFIGURATION CHECK BASE MODEL AND OPTIONS	
QUANTITY:	ITEM NO.	MODEL:	
		<input checked="" type="checkbox"/> 13390 ULTRA SPRAY VALVE, WALL BRACKET <input type="checkbox"/> 13366 ULTRA SPRAY VALVE, NO WALL BRACKET	
		OPTIONS OR MODIFICATIONS:	
		<input checked="" type="checkbox"/> SUPPLY LINES (24" OR 36") CIRCLE LENGTH <input type="checkbox"/> ADD-ON FAUCET (6", 8", 10", 12", 14", 16") CIRCLE <input checked="" type="checkbox"/> IN-LINE DUAL CHECK VALVE <input type="checkbox"/> BRUSH <input type="checkbox"/> ELBOWS <input type="checkbox"/> VANDAL RESISTANT KIT <input checked="" type="checkbox"/> HANDLES (CROSS OR WRIST) CIRCLE STYLE <input type="checkbox"/> OTHER _____	
		FEATURES	
		CONTROL VALVE * 8" BACKSPASH MOUNT * INTERNAL SPRING LOADED CHECK VALVES * SWIVELLING SEAT DISKS * HOT SIDE STEM - RIGHT HAND * COLD SIDE STEM - LEFT HAND * STAINLESS STEEL SEATS * STAINLESS STEEL SEAT SCREWS * STAINLESS STEEL HANDLE SCREWS * 1/2" SLIP JOINT KIT	
		HOSE * 36" LENGTH * STAINLESS STEEL END FITTINGS * STAINLESS STEEL EXTERNAL JACKET * 3 PLY FIBER REINFORCED INTERNAL RUBBER HOSE * REPAIRABLE IN FIELD WITH SIMPLE TOOLS	
		ULTRA SPRAY VALVE * LOWEST ENERGY USER - 1.15 GPM @ 60 PSI * CLEANS FASTER - TEST PROVEN * ENGINEERED TO LAST - NO 'O' RINGS TO LEAK * INTERCHANGEABLE - FITS ALL BRANDS	
		SYSTEM LIMITS * TEMP: 40°F MIN. TO 140°F MAX. * PRESSURE: 200 PSI MAX. STATIC	
		SHIPPING WEIGHT * 12.0 LBS	
ROUGH-IN:			
EPAct 2005 Compliant		ANSI/A112.18.1M	

# FISHER

FISHER MANUFACTURING COMPANY  
 TOLL FREE: 800-421-6162 - FAX: 800-832-8238  
 information@fisher-mfg.com - www.fisher-mfg.com



# Scrap Collector



Job: \_\_\_\_\_ Item No.: \_\_\_\_\_

**Model S914**



## A Scrapping, Pre-Flushing and Food Waste Collecting System

- Standard Scrap Basin, Model S914
- Pot/Pan Scrap Basin, Model P914

*Widely accepted in areas that restrict the use of food waste disposers.*

**An Economical Pulper Alternative,** the Collector washes soluble food waste harmlessly through the sewer, reducing bulk food waste by as much as 50% and weight by as much as 80%.

**Recirculated Water** used for pre-flushing typically reduces water and sewer costs dramatically. The Collector consumes only 2 gallons of new water per minute while the pre-flushing water plume recirculates at a 30-gallon rate.

**Scrapping Speed** is more than doubled compared to an overhead pre-rinse since the worker's hands are free for scrapping. The Collector lets you keep up with small to medium size conveyor dishmachines.

**Problem Dishes, Trays and Cookware** with dried or baked-on food need much less hand work. They can be soaked in the Collector basin while scrapping continues on other dishes.

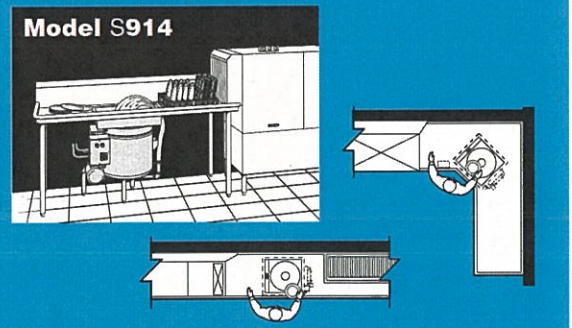
Job: \_\_\_\_\_ Item No.: \_\_\_\_\_

**Model P914**

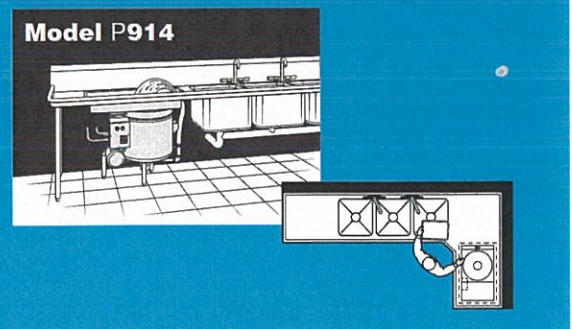


## TYPICAL INSTALLATIONS

**Model S914**



**Model P914**







# Scrap Collector Model S914

## Pot/Pan Scrap Collector Model P914

### Model S914

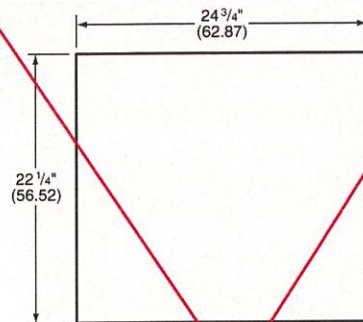
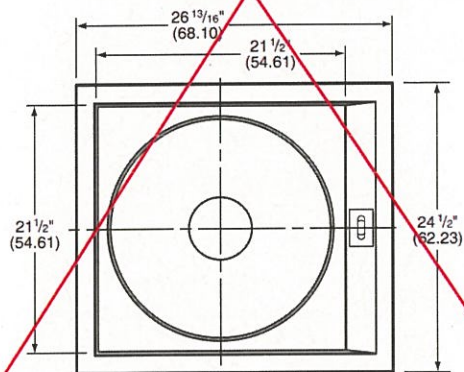


TABLE CUTOUT DETAIL



TOP VIEW

### Model P914

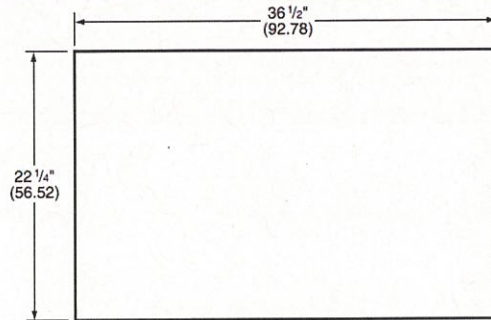
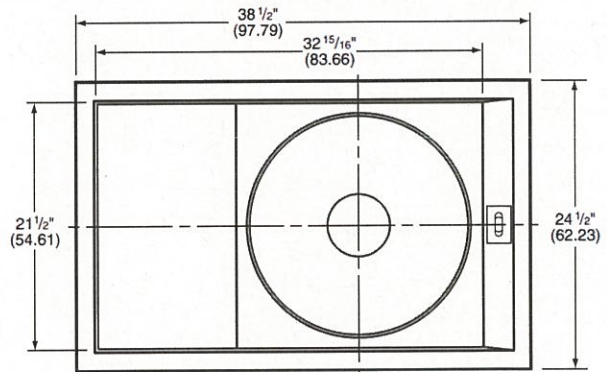


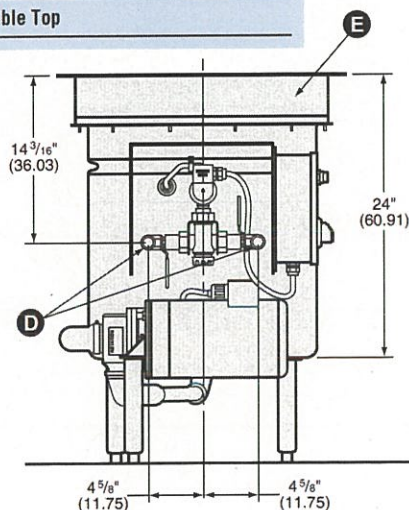
TABLE CUTOUT DETAIL



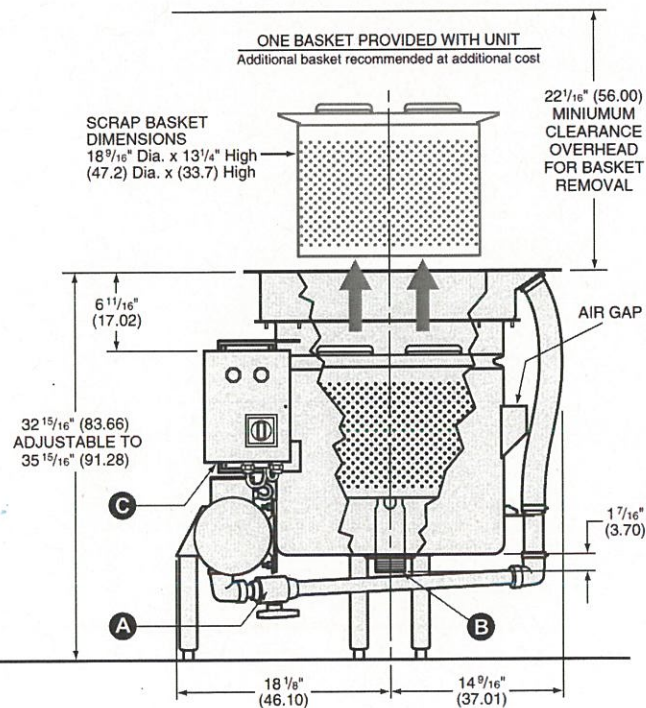
TOP VIEW

### Collector Legend

- A** Plume height adjustment valve
- B** Tank drain 2" NPT
- C** 1/2" conduit knockout electrical connection
- D** Hot/cold shutoff valves 1/2" NPT
- E** Removable Top



LEFT SIDE VIEW



FRONT VIEW

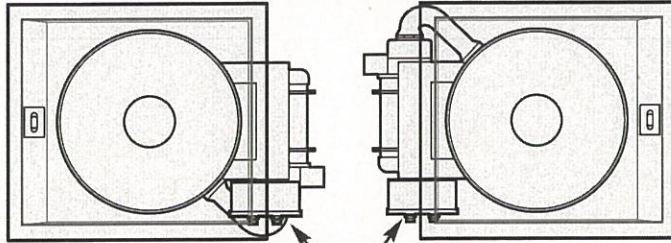
Model S914 shown - P914 similar





# Scrap Collector Model S914

## Pot/Pan Scrap Collector Model P914

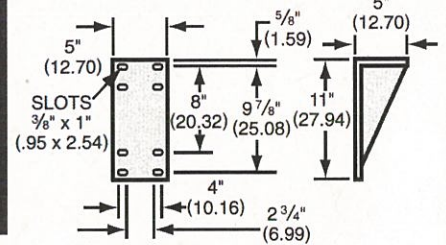


### MSS-LD Control

The MSS-LD control can be mounted on either side of the Collector with existing fasteners, mounting holes and wiring for left or right hand operation.

#980104

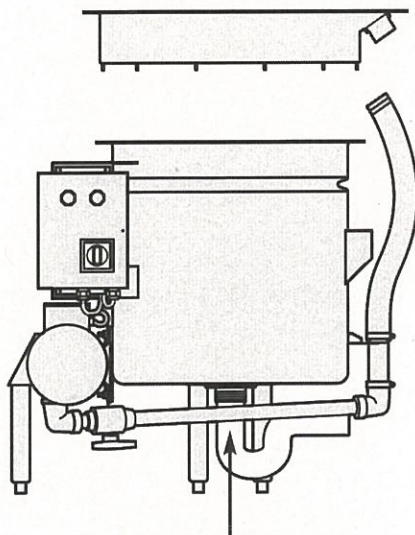
### MSS-LD Mounting Bracket



The control can be mounted remotely using optional mounting bracket.

*Note: additional field wiring is necessary.*

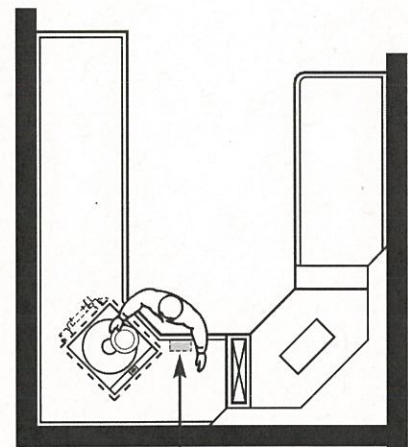
Upon request, the Collector top may be shipped separately to an alternate location for fabrication.



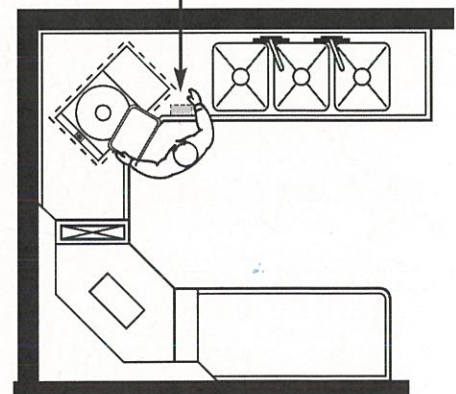
2" TANK DRAIN  
(Piping not furnished)

*Model S914 shown - P914 similar*

ALL CONNECTIONS ARE TO BE MADE BY QUALIFIED PERSONNEL WHO WILL OBSERVE ALL LOCAL AND NATIONAL CODES.



Remote Mounting  
of MSS-LD Control



NOTE: Dimensions in parenthesis are in centimeters



# Salvajor Scrap Collector

## MODEL S914 & Model P914

S P E C I F I C A T I O N S

### CONSTRUCTION

- Tank - 2 Piece Stainless Steel
- Adjustable Legs - Stainless Steel
- Control Panel - Stainless Steel
- Salvage Basin - High Impact Polymer
- Scrap Basket - High Impact Polymer

### ELECTRICAL

- Pre-wired NEMA 4 Control Panel
- Watertight Conduit/Fittings
- Separate Component Grounding
- Thermally Protected Motor
- Safety Line Disconnect

### PLUMBING

- Corrosion Resistant Components
- Automatic Water Blender
- Solenoid Valve
- Unions
- Check Valves
- Incoming Water Valves
- Non-clogging Pump Design
- Backflow Prevention Device

### ACCESSORIES

- ☐ Remote Start-Stop
- ☐ Remote Mounting Bracket
- ☒ Correctional Package
- ☒ MSS-LD Mounting Bracket
- ☒ Additional Scrap Basket

### VOLTAGES AVAILABLE

(SPECIFY EXACT OPERATING VOLTAGE)

- ☐ 115V ☒ 208V ☐ 230V, 60 Cycle, 1 Phase  
☐ 208V ☐ 230V ☐ 460V, 60 Cycle, 3 Phase

Pump Motor 3/4 HP

### FULL LOAD AMPS

(SPECIFY EXACT OPERATING VOLTAGE)

1 PHASE			3 PHASE		
115V	208V	230V	208V	230V	460V
11	5.5	5.5	3.2	3	1.5

### UTILITIES REQUIRED

1. Electric service
2. 3/4" hot and cold water supply and reduce to 1/2" at connection.
3. 2" tank drain.

(Specifications subject to change without notice.)

### SAMPLE SPECIFICATIONS

Unit shall be a Scrap Collector (or Pot/Pan Scrap Collector) scrapping, pre-flushing and food waste collecting system with recirculating water as manufactured by Salvajor.

**Model S914** (or **P914**), \_\_\_ Volts, 60Hz, \_\_\_ Phase.

Furnished with a pre-wired control panel and stainless steel NEMA 4 watertight enclosure.



**The Salvajor Company** 4530 East 75th Terrace Kansas City, Missouri 64132-2081, USA

1-800-SALVAJOR

(816) 363-1030

FAX: 1-800-832-9373

www.salvajor.com

Email: sales@salvajor.com

service@salvajor.com

Manufacturers of Commercial Food Waste Disposing Systems since 1944





# Champion®

The Dishwashing Machine Specialists

Project \_\_\_\_\_  
Item No. \_\_\_\_\_  
Quantity \_\_\_\_\_

## STANDARD FEATURES

- **ENERGY STAR® Qualified**
- **Exclusive DualRinse Technology**
- Dual-pawl cradle drive system
- One-piece cast stainless steel upper & lower spray arm assemblies
- Internal removable scrap basket and three-piece scrap screen
- Standard vertical opening accommodates 18" x 26" sheet pans
- Wide leakproof swing out insulated hinged doors on wash tank
- Anti-jam conveyor drive system
- Energy Sentinel (Idle pump shut-off)
- Convenient top-mounted controls
- Automatic tank fill
- Door safety switch
- Never leak, ball valve drain closure
- Enclosure panels (front and sides)
- Stainless steel heavy-gauge construction, including base and feet
- Electric tank heat
- Wash pump 2 Hp motor
- Stainless steel pump and impeller
- Single-point electrical connection
- Vent fan control switch
- Self-diagnostic controls
- Stainless steel rear manifolds

## PREWASH MODELS ONLY

- External prewash scrap basket
- Prewash pump 1 Hp motor
- 22" Prewash
- 26" Prewash
- 36" Prewash

*The DualRinse feature offers the  
**Lowest Water/Utility/Chemical Consumption**  
while circulating a generous  
300+ gallons of water for  
**Consistently Good Results***

Champion Industries, Inc.  
2674 N. Service Road,  
Jordan Station, Ontario, Canada L0R 1S0  
Tel: 905/562-4195 Fax: 905/562-4618

**DualRinse**  
**54 DR SERIES**  
54 DR, 76 DRPW, 80 DRFFPW, 90 DRHDPW  
High-Temperature  
Rack Conveyor Dishwashing Machines with  
**Dual Stage Rinse**



Model 54 DR Shown with  
Vent Cowl and Damper Option

## SPECIFIER STATEMENT

Specified unit will be a Champion model 54 DR Series high temperature dual rinse rack conveyor dishwashing machine. Features top mounted control cabinet; upper and lower one-piece stainless steel spray arm assemblies, removable internal scrap basket with three-piece scrap screen. Swing out insulated front access door. Anti-jam conveyor drive system.

1 year parts and labor warranty.



Champion Industries, Inc.  
3765 Champion Blvd., Winston-Salem, NC 27105  
Tel: 336/661-1556 Fax: 336/661-1979  
[www.championindustries.com](http://www.championindustries.com)





# 54 DR SERIES

54 DR, 76 DRPW, 80 DRFFPW, 90 DRHDPW

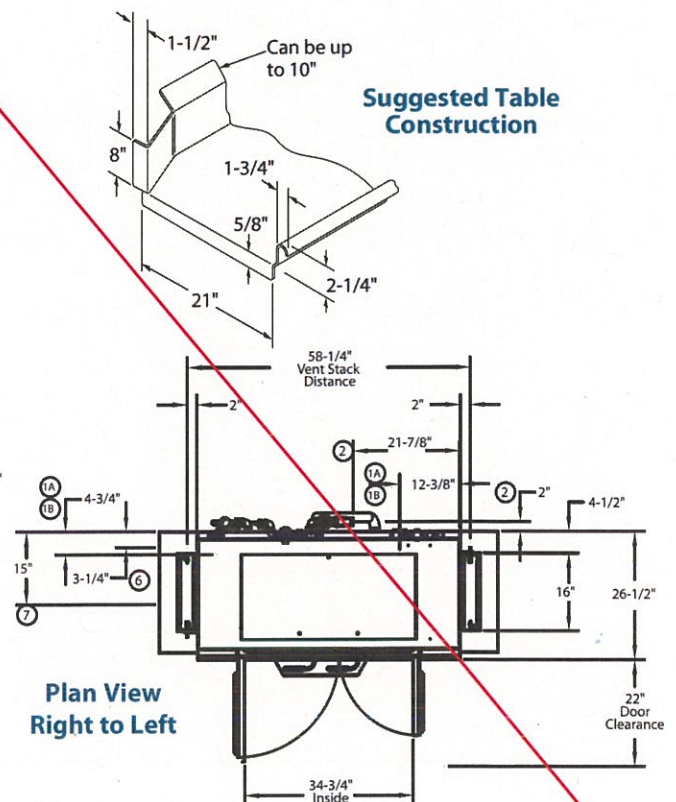
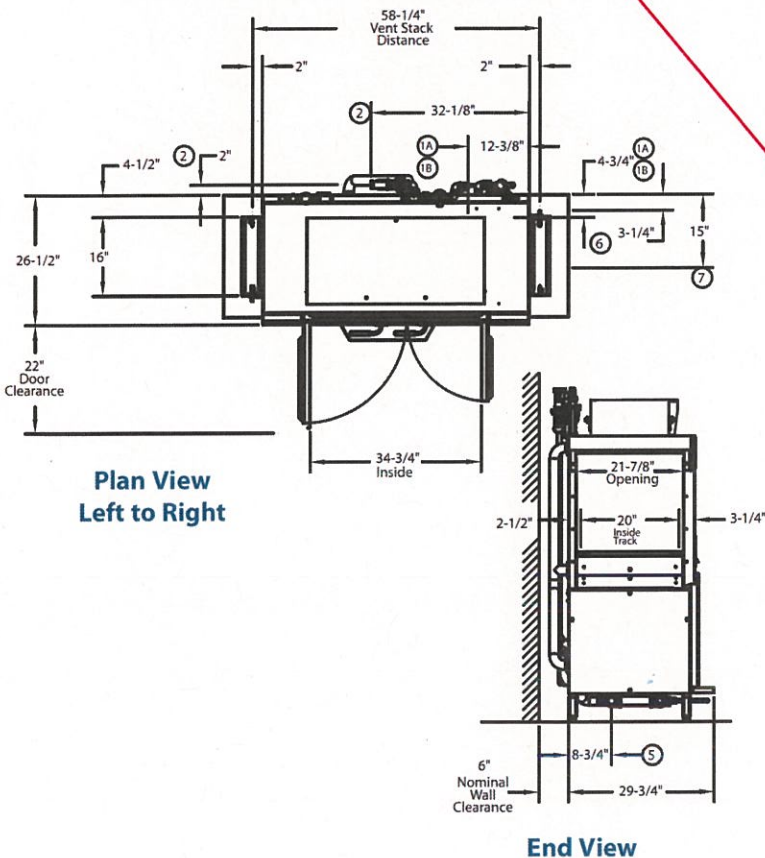
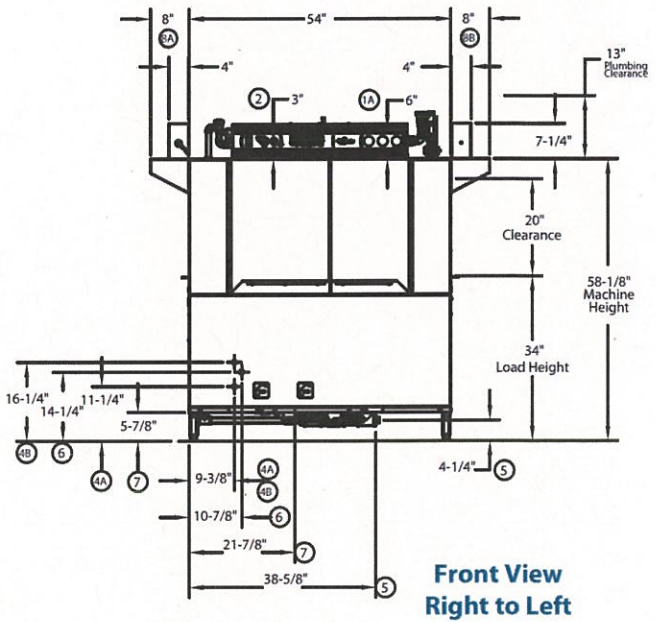
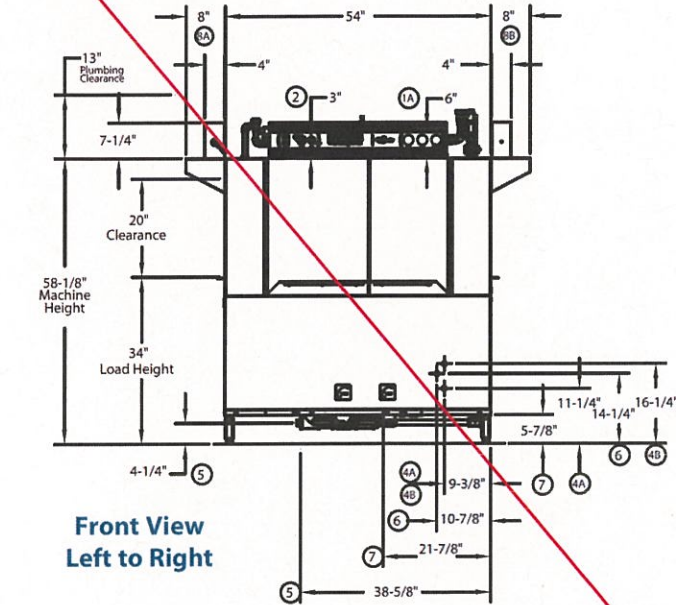
High-Temperature  
Rack Conveyor Dishwashing Machine with  
**Dual Stage Rinse**

**Champion®**  
The Dishwashing Machine Specialists

Dimensions shown in inches [mm]

## MODEL 54 DR

Shipping weight crated: **850 lbs.**



Due to an ongoing value analysis program at Champion, specifications contained in this catalog are subject to change without notice.

Champion Industries, Inc., 3765 Champion Blvd., Winston-Salem, NC 27105 • 336/661-1556 • Fax: 336/661-1979 • [www.championindustries.com](http://www.championindustries.com)  
2674 N. Service Road, Jordan Station, Ontario, Canada L0R 1S0 • 905/562-4195 • Fax: 905/562-4618

# 54 DR SERIES

54 DR, 76 DRPW, 80 DRFFPW, 90 DRHDPW

High-Temperature  
Rack Conveyor Dishwashing Machine with  
**Dual Stage Rinse**

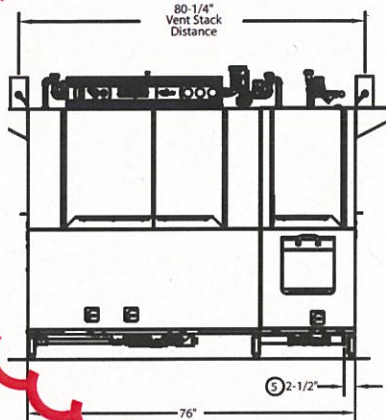
# Champion®

The Dishwashing Machine Specialists

Dimensions shown in inches [mm]

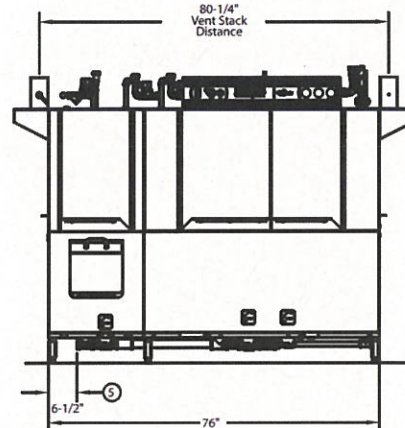
## MODEL 76 DRPW WITH 22" PREWASH

Shipping weight crated: **923 lbs.**



Front View

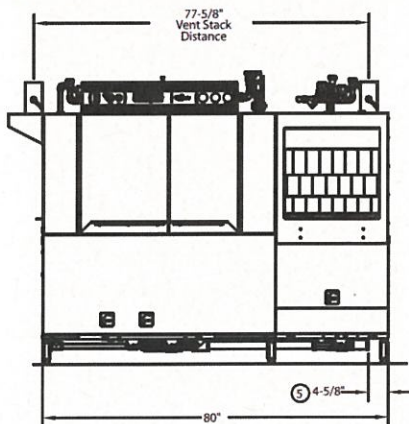
Right to Left



Left to Right

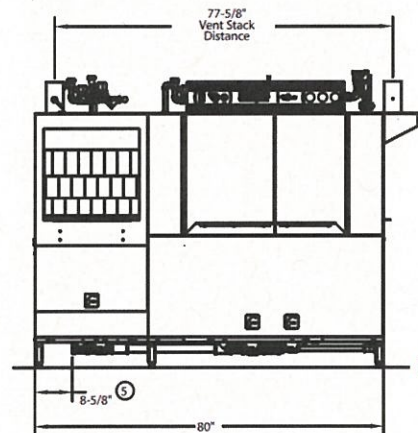
## MODEL 80 DRFFPW WITH 26" FRONT FREED PREWASH

Shipping weight crated: **975 lbs.**



Front View

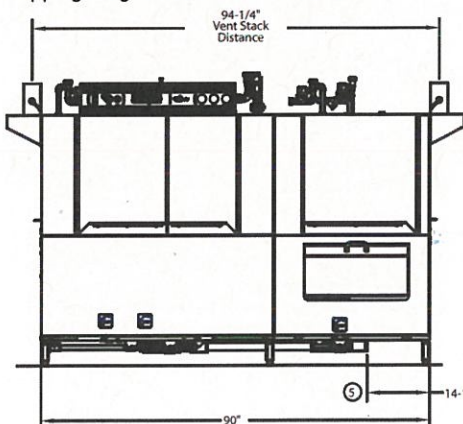
Right to Left



Left to Right

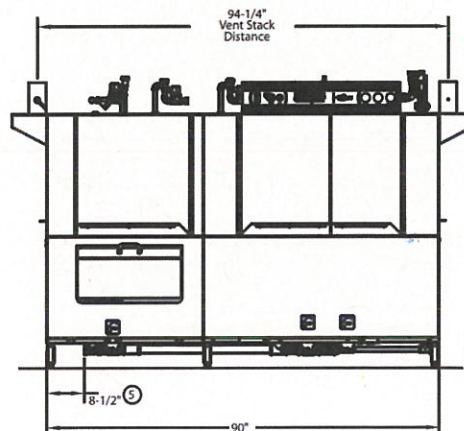
## MODEL 90 DRHDPW WITH 36" HEAVY DUTY PREWASH

Shipping weight crated: **1050 lbs.**



Front View

Right to Left



Left to Right

**NOTE:** For complete machine dimensions, plan view, end view, specifications and table construction see 54 DR drawing page.



# Champion®

The Dishwashing Machine Specialists

## 54 DR SERIES

54 DR, 76 DRPW, 80 DRFFPW, 90 DRHDPW

High-Temperature  
Rack Conveyor Dishwashing Machine with  
**Dual Stage Rinse**

### SPECIFICATIONS

#### Capacity

Racks per hr. (NSF rated)	266
Wash tank (US gal.)	21
Conveyor speed (ft./min.)	7.4

#### Motor Horsepower

Drive	1/6
Wash	2
Dual Rinse	1/10

#### Water Consumption

US Gal. per hr. (max. use)	115
US Gal. per rack	.43

#### Heating

Tank Heat, electric (kW)	15
DualRinse Tank Heat, electric (kW)	3
Tank heat, steam	
(lbs./hr. required at 15 PSI flow pressure)	75
Electric booster (built-in)	
(kW supplied for 40°F rise)	12
Electric booster (built-in)	
(kW supplied for 70°F rise)	22
Steam booster	
(lbs./hr. required for 40°F rise)	60
Steam booster	
(lbs./hr. required for 70°F rise)	110

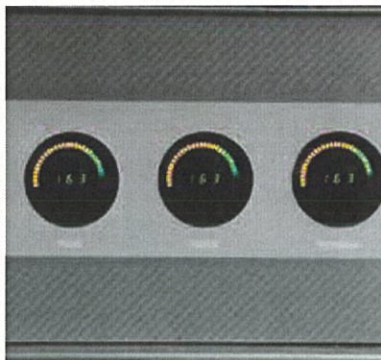
*Booster heaters completely inter plumbed,  
Controls are interwired*

#### Venting

Load end (minimum CFM)	200
Unload end (minimum CFM)	400

#### Standard 20" x 20" rack complement

Peg	2
Flat	1



**NEW** Exclusive Digital Gauges



**NEW** Durable Stainless Steel Start/Stop Switches



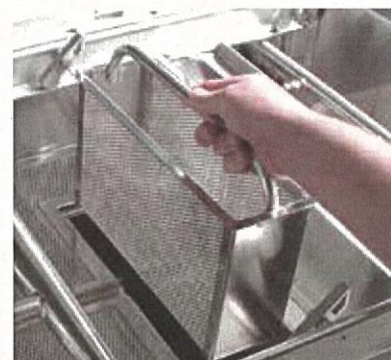
One-Piece Cast Stainless Steel Spray Assembly



Stainless Steel Built-in Nested Booster



Two-Piece Scrap Screen



Built-in Scrap Basket for ease of cleaning

### LESS IS MORE WITH CHAMPION'S DUAL RINSE MODEL 54 DR SERIES

Check our NSF listings and you'll see the Dual Rinse offers the lowest water consumption in its class with less than .43 US gallons per rack. This ENERGY STAR® qualified product brings energy savings. Our 40°F rise booster only requires 12 kW and 70°F rise is only 22 kW.

What the numbers don't show you is the advantage that our Dual Rinse technology provides by making sure all wares are fully rinsed with more than 300 gallons per hour while actual fresh water consumption is only 115 gallons per hour.



# 54 DR SERIES

54 DR, 76 DRPW, 80 DRFFPW, 90 DRHDPW

High-Temperature  
Rack Conveyor Dishwashing Machine with  
**Dual Stage Rinse**

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## OPTIONS & ACCESSORIES

- ☐ Tank heat: choice of steam coil, steam injector, hot water coil
- ☒ 2 Hp prewash motor
- ☒ 48" Blower-dryer - steam or electric
- ☒ Booster Heaters (completely interplumbed, controls are interwired)
  - ☐ Steam: 40°F or 70°F rise
  - ☐ Electric: 12 kW (40°F rise) (built-in only)
  - ☒ Electric: 22 kW (70°F rise) (built-in only)
- ☐ Heat Recovery
- Cantilever sideloader (with or without hood) for 90° load operation
  - ☒ 24" Sideload
  - ☐ 30" Sideload (accepts sheet pans)
- ☒ Extended pawl bar (extended drive unit) for use with load tabling
- ☐ Racks: peg or flat racks (specify type)
- ☐ Steam pressure regulating valve (unmounted)
- ☒ Table limit switch, unmounted (recommended on all rack conveyor installations)
- ☒ Vent cowl, stainless steel with 7" stack and locking damper
- ☐ Extended vent hood, stainless steel with 7" stack and locking damper
- ☒ Water pressure regulating valve (unmounted) (standard with booster)
- ☐ Two-point electrical connection
- ☒ Water hammer kit
- ☐ Drain tempering kit
- ☒ Vertical clearance through machine: 24" (instead of standard 20") for larger ware
- ☐ Model CCT 180 (180° Corner Conveyor Table)
- ☒ Model CCT 90 (90° Corner Conveyor Table)
- ☒ Model RCT 64 or RCT 84 Roller Conveyor Table (See factory for custom length)
- ☐ Splash shields

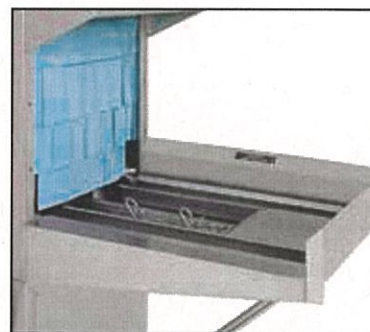


### NEW CCT 90

90° Corner Conveyor Table (shown)

### NEW CCT 180

180° Corner Conveyor Table  
also available



**Cantilever  
Sideloader**  
(No hood)

**VERIFY REQ'MT W/SITE CONDITIONS  
& EQUIPMENT SPECIFIED**



**Model RCT 64  
or RCT 84**  
Roller  
Conveyor Table

Due to an ongoing value analysis program at Champion, specifications contained in this catalog are subject to change without notice.  
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# 54 DR SERIES

54 DR, 76 DRPW, 80 DRFFPW, 90 DRHDPW

High-Temperature  
Rack Conveyor Dishwashing Machine with  
**Dual Stage Rinse**

# Champion®

The Dishwashing Machine Specialists

Dimensions shown in inches

Utilities	
1	<b>Electrical Connection</b> A Machine electrical connection B Booster electrical connection
2	<b>Hot Water</b> Main connection 3/4" NPT
3	<b>Cold Water</b> Contact Factory
4	<b>Hot Water Tank</b> A Heat inlet connection 1" NPT B Heat return connection 1" NPT
5	<b>Drain</b> Connection 1 1/2" NPT
6	<b>Steam</b> Inlet connection 1 1/4" NPT
7	<b>Condensate</b> Connection 1" NPT return to boiler
8	<b>Vents</b> A Stack connection - Load end 150 CFM @ 1/4" static pressure B Stack connection - Unload end 400 CFM @ 1/4" static pressure

**Warning:** Plumbing and electrical connections should be made by qualified personnel who will observe all the applicable plumbing, sanitary, safety codes and the National Electrical Code.

**Note:** Water Hammer Arrestor (meeting ASSE-1010 standard or equivalent) to be supplied (by others) in common water supply line at service connection.

**Plumbing Notes:** Because of the variation in house-supplied steam and water pressures, steam and water pressure regulating valves (PRVs) may be needed. (Water PRV is standard on machines with booster.) The PRVs can either be purchased from Champion or obtained locally.

**Venting Notes:** Fabricated duct size: 3-7/8" x 15-7/8" (Outside dimensions)

**54 DR Only**  
**TABLE A - Machine Connection**

Machine Only			
Elec. Specs.	Rated Amps	Minimum Supply Ckt. Conductor Ampacity	Maximum Overcurrent Protective Device
208/60/3	70	90	90
240/60/3	62	80	80
480/60/3	31	40	40
575/60/3	24	35	35

**54 DR Only**  
**TABLE B - Machine & Booster Connection**

40°F/22°C Rise - 12 kW Machine and Electric built-in booster			
Elec. Specs.	Rated Amps	Minimum Supply Ckt. Conductor Ampacity	Maximum Overcurrent Protective Device
208/60/3	104	150	150
240/60/3	91	125	125
480/60/3	46	60	60
575/60/3	37	50	50

70°F/39°C Rise - 22 kW Machine and Electric built-in booster			
Elec. Specs.	Rated Amps	Minimum Supply Ckt. Conductor Ampacity	Maximum Overcurrent Protective Device
208/60/3	131	175	175
240/60/3	115	150	150
480/60/3	58	80	80
575/60/3	47	60	60

Machine and steam built-in booster			
Elec. Specs.	Rated Amps	Minimum Supply Ckt. Conductor Ampacity	Maximum Overcurrent Protective Device
208/60/3	25	35	35
240/60/3	22	30	30
480/60/3	12	15	15
575/60/3	9	15	15

Contact factory for single phase information.

**76 DRPW, 80 DRFFPW, 90 DRHDPW**  
**TABLE A - Machine Connection**

Machine Only			
Elec. Specs.	Rated Amps	Minimum Supply Ckt. Conductor Ampacity	Maximum Overcurrent Protective Device
208/60/3	74	100	100
240/60/3	65	90	90
480/60/3	33	45	45
575/60/3	25	35	35

**76 DRPW, 80 DRFFPW, 90 DRHDPW**  
**TABLE B - Machine & Booster Connection**

40°F/22°C Rise - 12 kW Machine and Electric built-in booster			
Elec. Specs.	Rated Amps	Minimum Supply Ckt. Conductor Ampacity	Maximum Overcurrent Protective Device
208/60/3	108	150	150
240/60/3	94	125	125
480/60/3	47	60	60
575/60/3	37	50	50

70°F/39°C Rise - 22 kW Machine and Electric built-in booster			
Elec. Specs.	Rated Amps	Minimum Supply Ckt. Conductor Ampacity	Maximum Overcurrent Protective Device
208/60/3	136	175	175
240/60/3	118	150	150
480/60/3	60	80	80
575/60/3	47	60	60

Machine and steam built-in booster			
Elec. Specs.	Rated Amps	Minimum Supply Ckt. Conductor Ampacity	Maximum Overcurrent Protective Device
208/60/3	29	40	40
240/60/3	26	35	35
480/60/3	12	15	15
575/60/3	10	15	15

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# Champion®

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Project \_\_\_\_\_

Item No. \_\_\_\_\_

Quantity \_\_\_\_\_

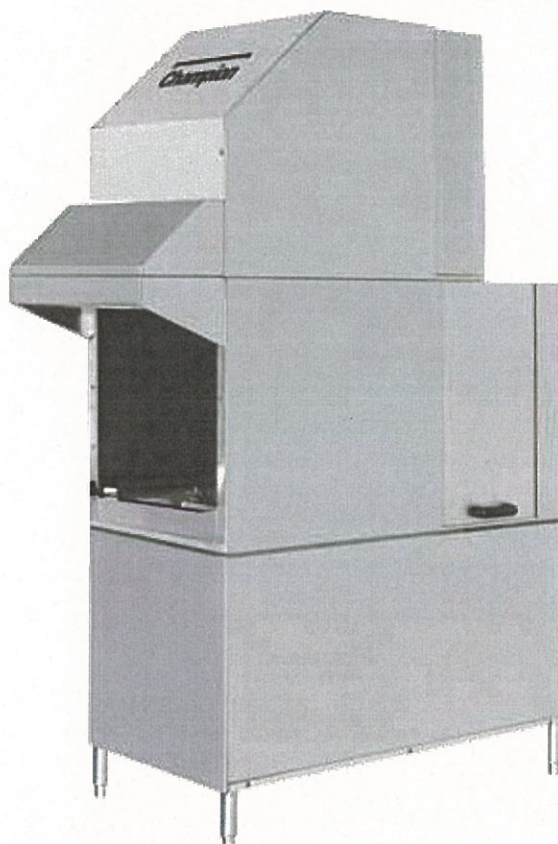
**EBD-48 BLOWER DRYER**

## STANDARD FEATURES

- Automatic heat cutoff (when conveyor stops)
- Blower motor, 2-Hp
- Blower-Dryer vent cowl on exit end
- Choice of electric or steam heat
- Control circuit, 120-volt, completely interwired with dishwashing machine controls
- Heavy gauge stainless steel frame and cabinet
- Machine vent connection, 7" stack with locking damper
- Separate blower-dryer "auto/off" switch
- Thermal overload protection for electric blower-dryer
- 48" hood design

## EBD-48

Blower-dryer for Flight and Rack Conveyor Dishwashing Machines



## SPECIFICATIONS

<b>Motor horsepower</b>	2
<b>Heating</b>	
Electric, (kW)	12
Steam (lbs/hr. required at 15 psi flow pressure)	65

## SPECIFIER STATEMENT

Specified unit will be Champion model EBD-48 blower-dryer for rack and flight conveyor dishwashing machines. Features include automatic heat cut-off, 2 Hp blower motor, vent cowl on exit end, separate auto/off switch for blower / dryer.

1 year parts and labor warranty.

This EBD-48 catalog sheet is designed to be used in conjunction with the Champion Rack and Flight Conveyor Series catalog sheets.

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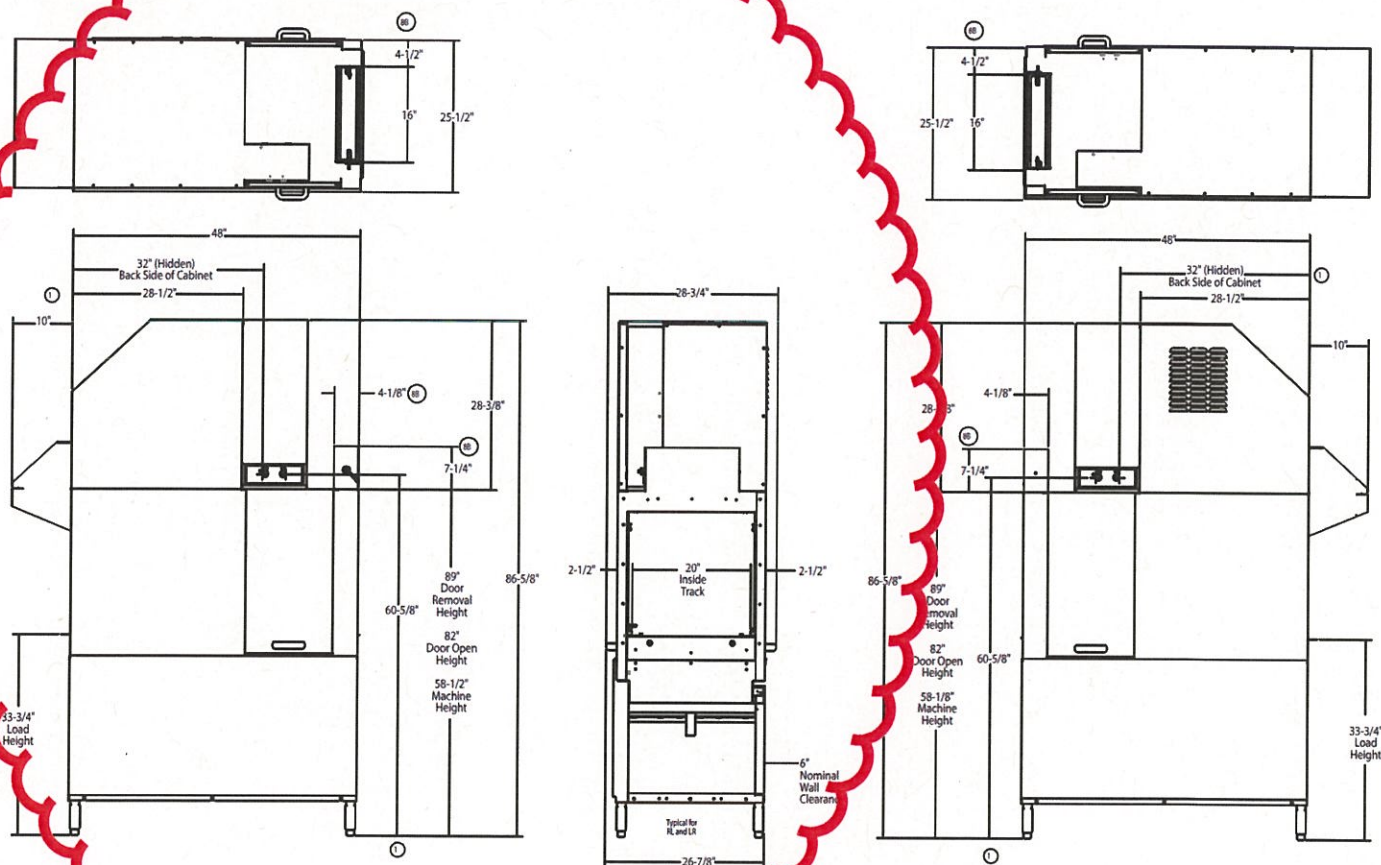




## EBD-48 Blower Dryer For Rack Machine Electric

**Right-to-Left**

**Left-to-Right**



**Model EBD Electric Heat**

Voltage	Rated Amps	Minimum Supply Circuit Ampacity	Maximum Overcurrent Protective Device (Nontime delay)
208/60/3	40	50	50
240/60/3	35	45	45
480/60/3	17	25	25
575/60/3	15	20	20

**EUCC, EUCCW**

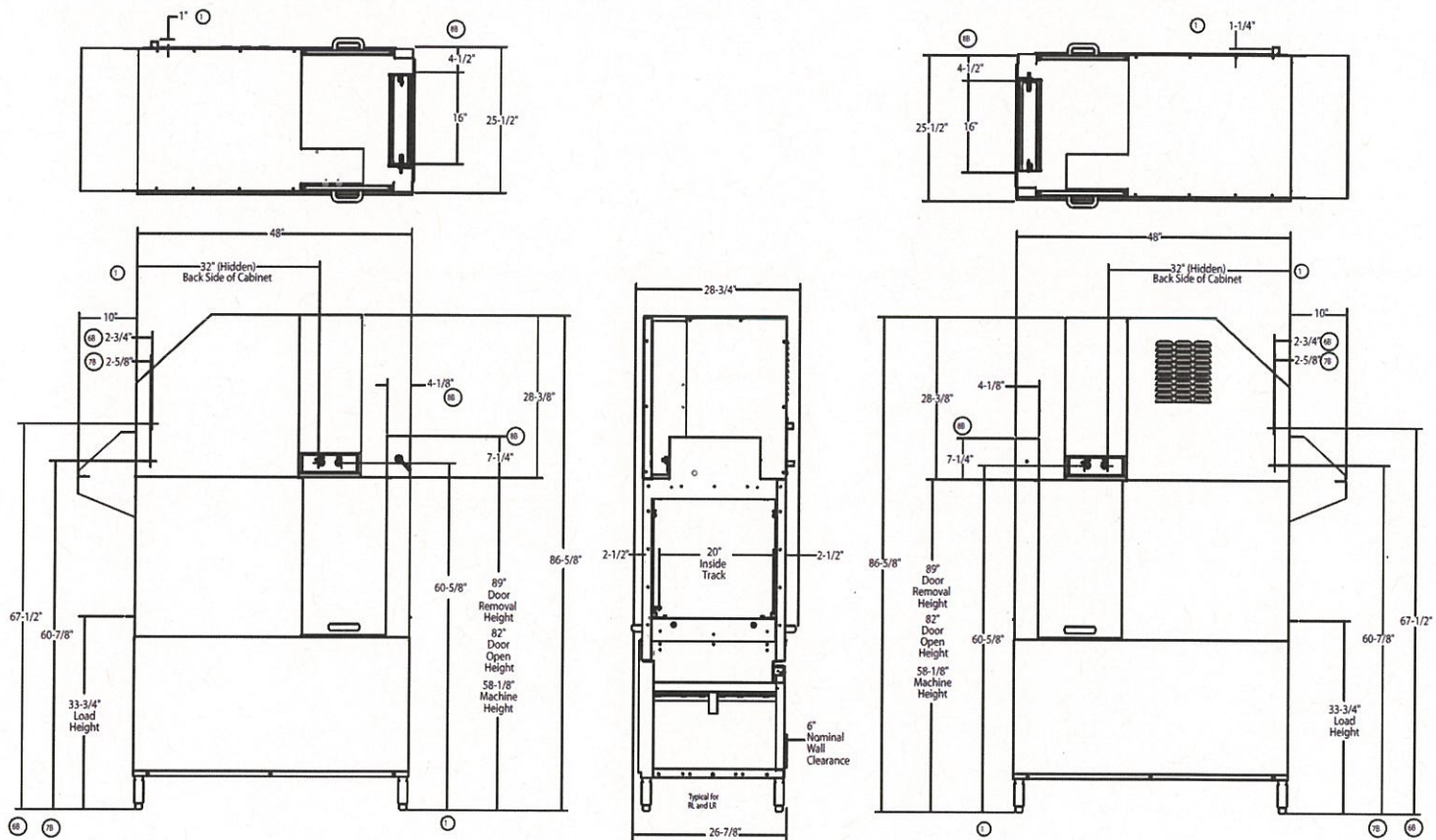
### Utilities

<b>1</b>	<b>Electrical</b> – See chart
<b>5A</b>	<b>Drain Trunk</b>
<b>8B</b>	<b>Vent</b> Unload 800 CFM 1/4" S.P.

## EBD-48 Blower Dryer For Rack Machine Steam

**Right-to-Left**

**Left-to-Right**



**Model EBD Steam Heat**

Voltage	Rated Amps	Minimum Supply Circuit Ampacity	Maximum Overcurrent Protective Device (Nontime delay)
208/60/3	7	15	15
240/60/3	6	15	15
480/60/3	3	15	15
575/60/3	3	15	15

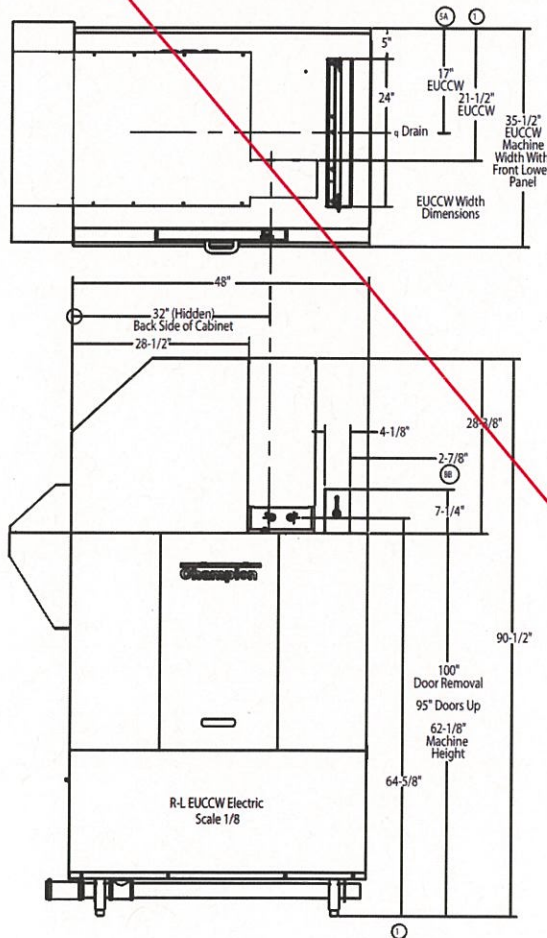
**EUCC, EUCCW**

Utilities	
<b>1</b>	<b>Electrical</b> – See chart
<b>5A</b>	<b>Drain Trunk</b>
<b>6B</b>	<b>Steam</b> 3/4" steam inlet connection 65 lbs./hr. @ 15-30 PSI
<b>7B</b>	<b>Condensate</b> 1/2" return to boiler (no back pressure)
<b>8B</b>	<b>Vent</b> Unload 800 CFM 1/4" S.P.

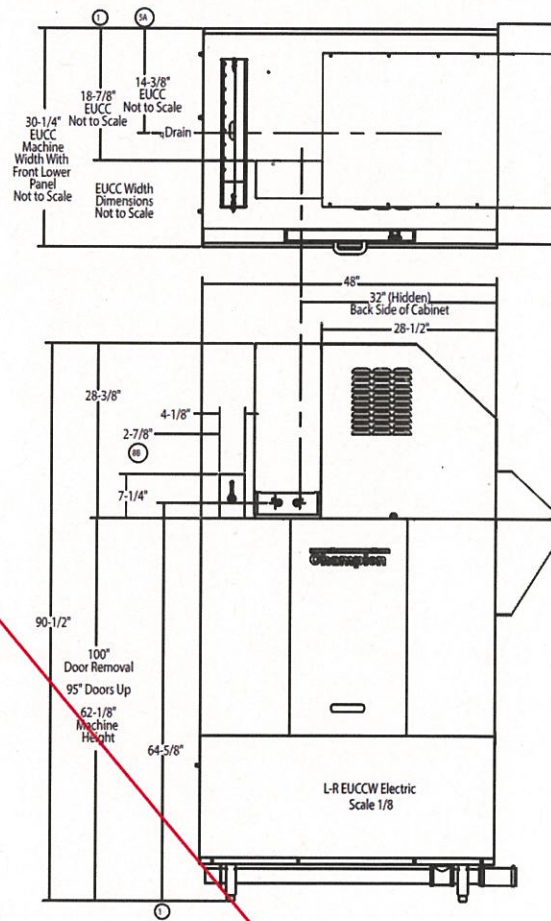


## EBD-48 Blower Dryer For Flight Machine Electric

**Right-to-Left**



**Left-to-Right**



**Model EBD Electric Heat**

Voltage	Rated Amps	Minimum Supply Circuit Ampacity	Maximum Overcurrent Protective Device (Nontime delay)
208/60/3	40	50	50
240/60/3	35	45	45
480/60/3	17	25	25
575/60/3	15	20	20

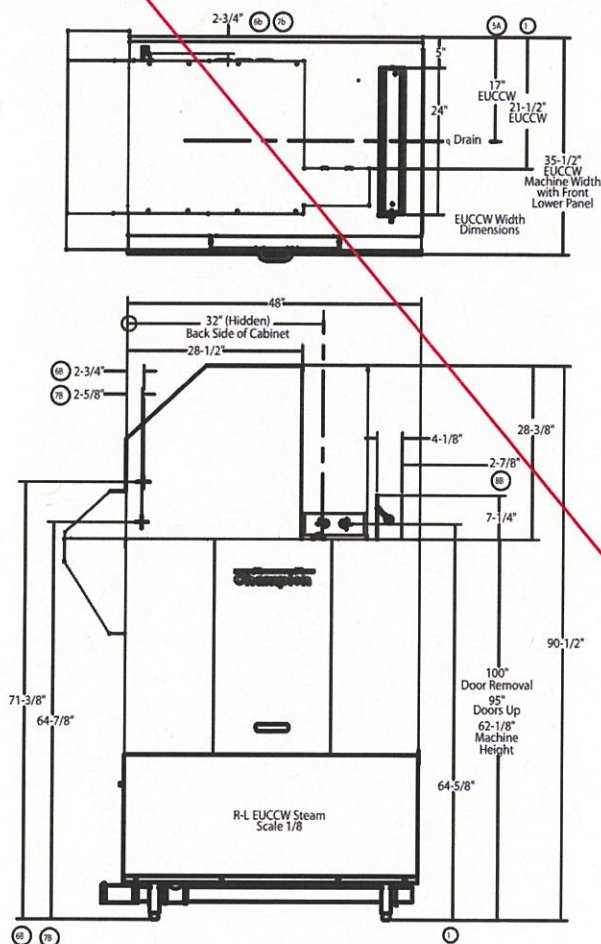
**EUCC, EUCCW**

Utilities	
<b>1</b>	Electrical – See chart
<b>5A</b>	Drain Trunk
<b>8B</b>	Vent Unload 800 CFM 1/4" S.P.

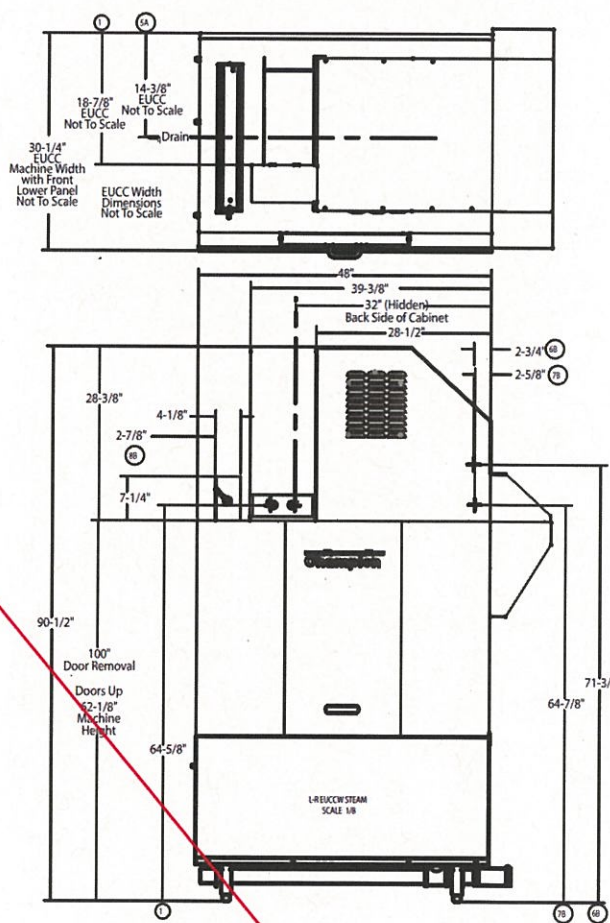


### EBD-48 Blower Dryer For Flight Machine Steam

Right-to-Left



Left-to-Right



Model EBD Steam Heat

Voltage	Rated Amps	Minimum Supply Circuit Ampacity	Maximum Overcurrent Protective Device (Nontime delay)
208/60/3	7	15	15
240/60/3	6	15	15
480/60/3	3	15	15
575/60/3	3	15	15

EUCC, EUCCW

Utilities	
<b>1</b>	<b>Electrical</b> – See chart
<b>5A</b>	<b>Drain Trunk</b>
<b>6B</b>	<b>Steam</b> 3/4" steam inlet connection 65 lbs./hr. @ 15-30 PSI
<b>7B</b>	<b>Condensate</b> 1/2" return to boiler (no back pressure)
<b>8B</b>	<b>Vent</b> Unload 800 CFM 1/4" S.P.

# Champion®

The Dishwashing Machine Specialists

Project \_\_\_\_\_

Item No. \_\_\_\_\_

Quantity \_\_\_\_\_

## STANDARD FEATURES

- Compact, flexible design 90° or 180° to fit high volume operations
- Quality stainless steel construction
- 1/8-Hp drive motor protected from overload
- Fully-automatic operation
- Extend the drying space for clean wares and save operator steps
- Easy-to-reach rack storage
- Table limit switch
- Sloped drain
- Cantilever table – load racks from the front, offering layout flexibility and saving valuable space
- Durable welded heavy-gauge #304 stainless steel with removable rack guide for ease of cleaning
- Optional hood for splash protection, cantilever tables are available with an optional stainless steel hood with vent cowl opening



**90° Corner  
Conveyor Table**

**Also available  
180° Corner  
Conveyor Table**

## TABLE SYSTEMS

For Rack Conveyor Series  
Dishwashing Machines



**64 RCT Table**

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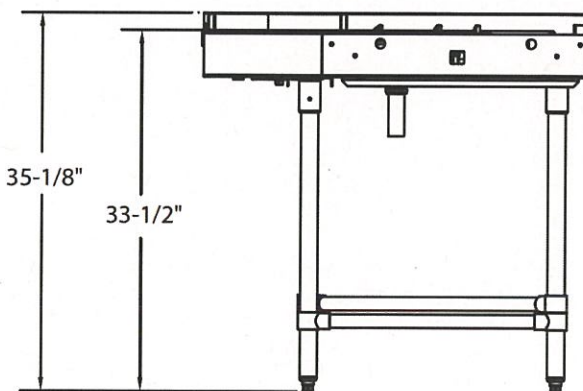
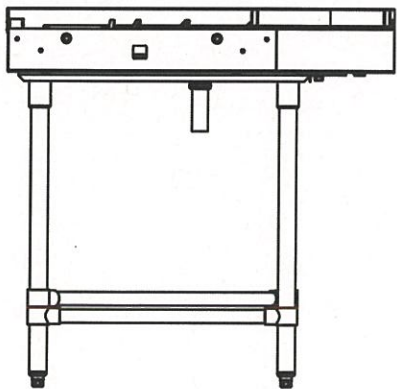
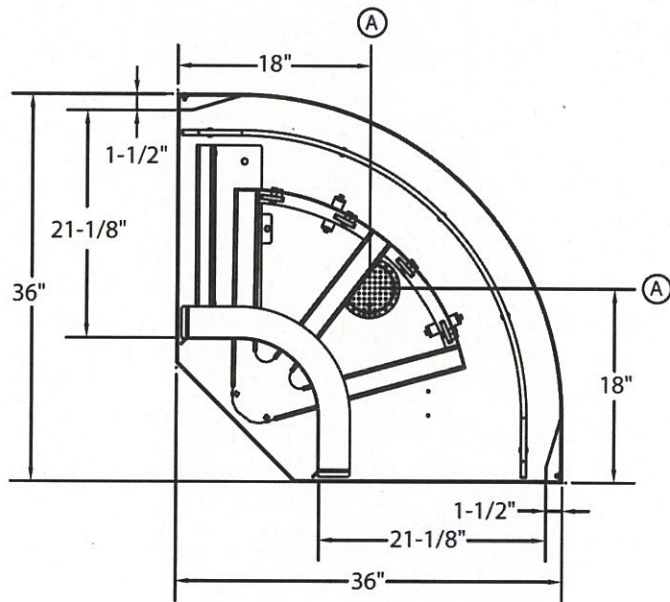
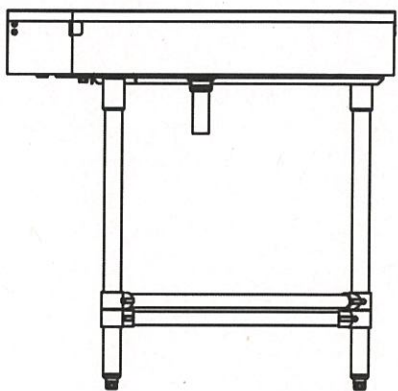
## TABLE SYSTEMS

### For Rack Conveyor Series Dishwashing Machines

# Champion®

## The Dishwashing Machine Specialists

### 90° Corner Conveyor Table



<b>180° CCT</b>	<b>64 RCT</b>
Shipping weight: <b>300 lbs.</b>	Shipping weight: <b>180 lbs.</b>
Volume crated: <b>107 cu. ft.</b>	Volume crated: <b>60 cu. ft.</b>
<b>90° CCT</b>	<b>84 RCT</b>
Shipping weight: <b>250 lbs.</b>	Shipping weight: <b>200 lbs.</b>
Volume crated: <b>47 cu. ft.</b>	Volume crated: <b>72 cu. ft.</b>

**Note:** 90° and 180° CCT must be ordered with roller conveyor table.

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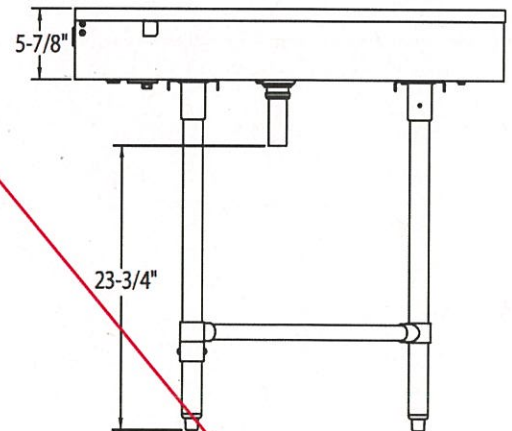
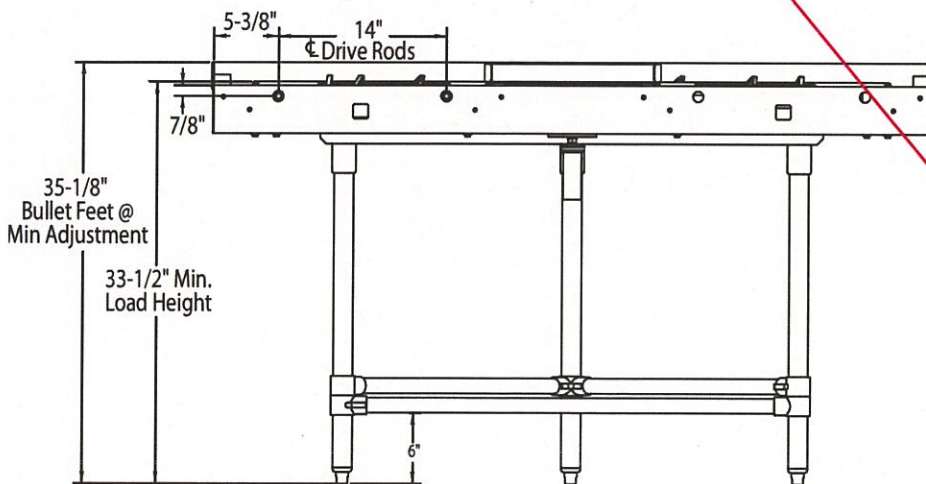
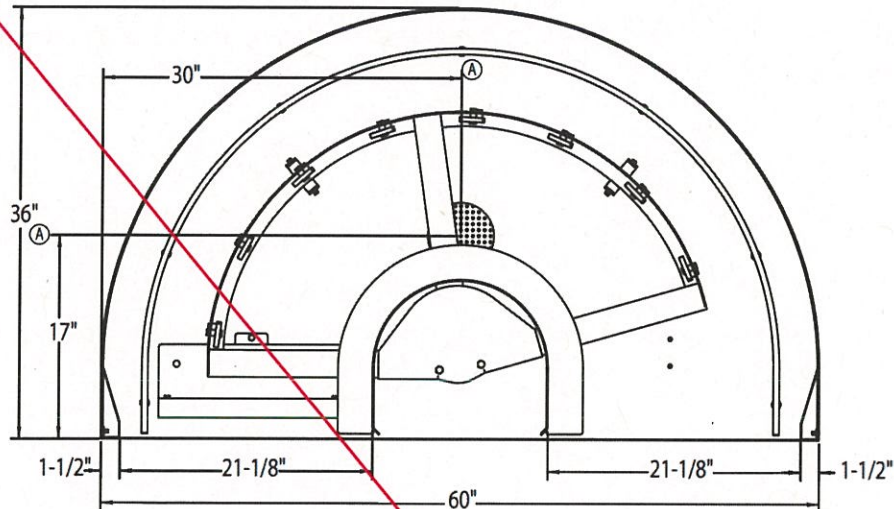


# TABLE SYSTEMS

For Rack Conveyor Series  
Dishwashing Machines

**Champion®**  
The Dishwashing Machine Specialists

**180° Corner Conveyor Table**



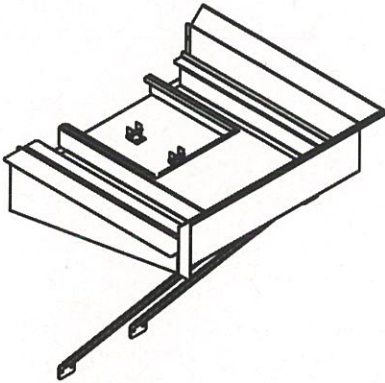
## Utilities

- 1 Electrical** - See rack machine electrical requirements. CCT will run on same amps
- 2 Drain**
  - A** 1-1/2" O.D. connection on CCT
  - B** No drain on the roller table

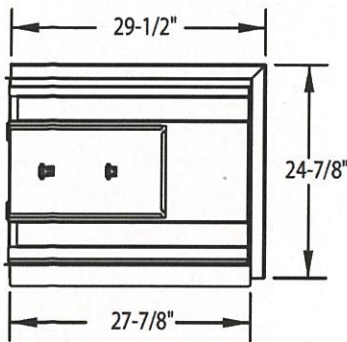
# TABLE SYSTEMS

For Rack Conveyor Series  
Dishwashing Machines

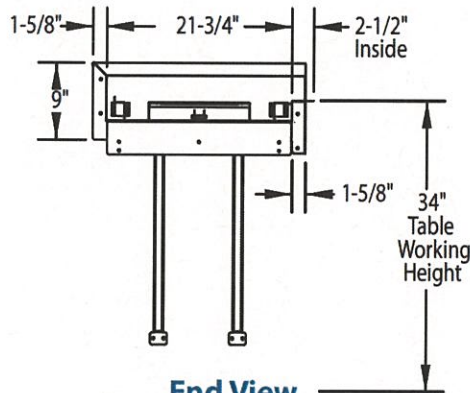
**Champion®**  
The Dishwashing Machine Specialists



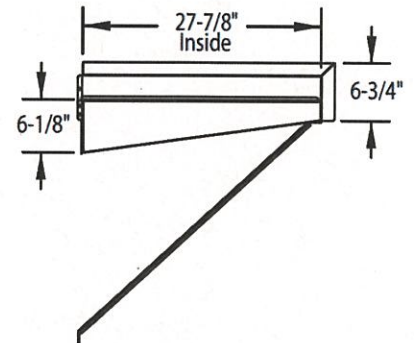
## 30" Cantilever Sideloader For 20" racks up to 30" long



Plan View

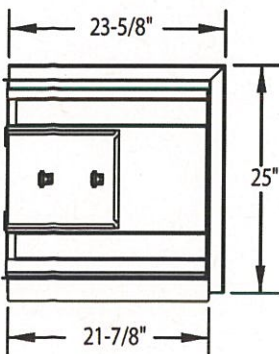


End View

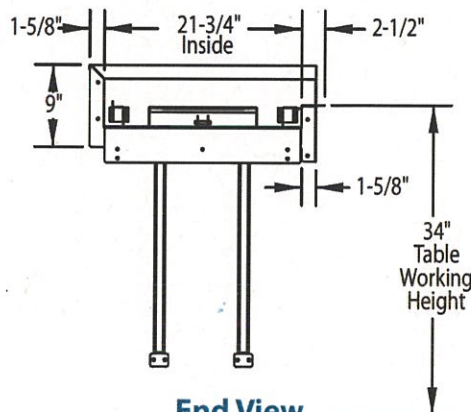


Side View

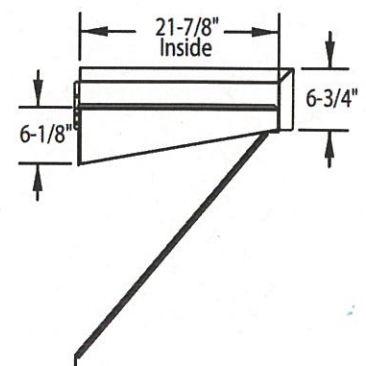
## 24" Cantilever Sideloader For standard 20" x 20" racks



Plan View



End View



Side View