

PART 1 - GENERAL

- 1.1 GENERAL .1 Refer to Division 1 for the requirement for Contractor provided interference drawings. Coordinate and cooperate with the production of these interference drawings and note that the installation of mechanical systems shall not commence until the interference drawings have been reviewed by the Departmental Representative.
- 1.2 EQUIPMENT LIST .1 Complete list of equipment and materials to be used on this project and forming part of tender documents by adding manufacturer's name, model number and details of materials, and submit for approval.
- .2 Submit for approval at time of tender within 48 hours within ten (10) days after award of contract.
- 1.3 ALTERNATES .1 The equipment listed on the project equipment schedules is the "basis of design equipment", the Contractor is permitted to find alternates to this equipment that meet the technical and quality requirements of the project specifications. If there are necessary changes to the building systems to accommodate these alternates, the changes shall be coordinated and provided by the Contractor at no additional cost to the Owner.
- 1.4 TRIAL USAGE .1 Departmental Representative may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .1 Trial usage to apply to systems only after prior approval of Departmental Representative.
- .2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix typewritten label beneath sample indicating service.
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1.5 PROTECTION
OF OPENINGS

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.
- .2 Seal all ductwork openings with 6 mil plastic to protect it from dirt, dust, and foreign materials during the course of the day's installation. Further ensure that at the end of the day, all open joints are closed off. Tape all plastic with duct tape. Cover and protect all un-installed ductwork before it is installed.
- .3 Protect all existing ductwork to be re-used, closing off openings with 6 mil plastic.

1.6 PAINTING

- .1 To Section 09 91 23 - Interior Painting.
- .2 Prime and touch up marred finished paintwork to match original.
- .3 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

1.7 SPARE PARTS

- .1 Furnish spare parts in accordance with Section 01 78 00 Closeout Submittals as follows:
 - .1 One (1) set of belts for each piece of machinery.
 - .2 Three (3) sets of filters for each filter bank.
 - .3 One (1) glass for each gauge glass.
 - .4 One (1) set of packing seals for each pump.
 - .5 Two (2) pressure gauges and two thermometers for each type and range used on the project.
 - .6 Enzymatic for grease interceptors.
 - .7 Keys for vandal resistant outlets.

1.8 SPECIAL TOOLS

- .1 Provide one (1) set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 Closeout Submittals.
- .2 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.9 DEMONSTRATION
AND OPERATING
AND MAINTENANCE

- .1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, troubleshooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .2 Where specified elsewhere in Divisions 21, 22 and 23, manufacturers to provide demonstrations and instructions.
- .3 In addition to where training is specified elsewhere in other divisions, factory trained personnel shall provide on-site instruction in operation and maintenance as follows:
 - .1 Ventilation Systems - minimum eight (8) hours.
 - .2 Heating Systems - minimum eight (8) hours.
 - .3 Plumbing Systems - minimum four (4) hours.
 - .4 Fire Protection Systems - minimum four (4) hours.
- .4 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.

1.10 CLOSEOUT
SUBMITTALS

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 Closeout Submittals.
- .2 Operation and maintenance manual to be approved by Departmental Representative, and final copies deposited with, Departmental Representative before final inspection.
- .3 Operation data to include:
 - .1 Control schematics for each system including environmental controls.
 - .2 Description of each system and its controls.
 - .3 Description of operation of each system at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for each system and each 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 troubleshooting instructions for each item of equipment and parts list.

1.10 CLOSEOUT
SUBMITTALS
(Cont'd)

- .4 Maintenance data to include:(Cont'd)
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .5 Performance data to include:
 - .1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified elsewhere.
 - .4 Commissioning reports and forms.
- .6 Approvals:
 - .1 Submit copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless so directed by Departmental Representative.
 - .2 Make changes as required and resubmit two (2) copies as directed by Departmental Representative.
- .7 Additional data:
 - .1 Prepare and insert into operation and maintenance manual when need for same becomes apparent during demonstrations and instructions specified above.

1.11 SHOP DRAWINGS
AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 Submittal Procedures.
- .2 Shop drawings and product data to show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances. eg. access door swing spaces.
 - .3 Installation requirements and procedures.
- .3 Shop drawings and product data to be 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 as to current model production.
 - .5 Certification of compliance to applicable codes.
- .4 In addition to transmittal letter referred to in Section 01 33 00 Submittal Procedures. Identify section and paragraph number.

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- 1.12 CLEANING .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.
- 1.13 PROJECT RECORD DRAWINGS .1 Site records:
.1 Departmental Representative will provide one (1) set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of the work. Mark there on all changes as work progresses and as changes occur. This shall include changes to existing mechanical systems, control systems and low voltage control wiring.
.2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
.3 Use different colour waterproof ink for each service.
.4 Make available for reference purposes and inspection at all times.
- .2 Project Record drawings:
.1 Prior to start of Testing, Adjusting and Balancing (TAB), finalize production of as-built drawings.
.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: "Project Record 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 Perform TAB using Project Record drawings.
.5 Submit completed reproducible Project Record drawings with Operating and Maintenance Manuals.
- .3 Submit copies of Project Record drawings for inclusion in final TAB report.
- 1.14 WASTE MANAGEMENT AND DISPOSAL .1 Separate and recycle waste materials in accordance with Section 01 74 21.
- 1.15 ELECTRICAL .1 Electrical work to conform to Division 26 including the following:
.1 Starters, motor protection and manual control devices are specified and indicated in Division 26 except where otherwise indicated or specified. Wiring
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1.15 ELECTRICAL
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to packaged mechanical equipment is indicated on electrical drawings. Coordinate as required.
- .2 Supplier and installer responsibility is indicated on electrical drawings and related mechanical responsibility as indicated on mechanical equipment schedules on mechanical drawings or in specifications.
- .3 Control wiring 50 V and greater, specified and installed by Division 26. Control wiring 50 V or less, is responsibility of EMCS contractor, except as indicated elsewhere in the specifications.

1.16 EQUIPMENT
SUPPORTS

- .1 Equipment supports supplied by equipment manufacturer specified elsewhere in Divisions 21, 22 and 23.
- .2 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of Section 05 50 00 - Metal Fabrication. Submit structural calculations with shop drawings.
- .3 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 150mm high and 100mm larger than equipment dimensions all around. Concrete specified in Section 03 30 00 - Cast-in- Place Concrete.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

PART 1 - GENERAL

1.1 RELATED
SECTIONS

- .1 Section 01 74 21 - Construction/Demolition, Waste Management and Disposal.
- .2 Section 23 05 05 - Installation of Pipework.
- .3 Section 23 05 20 - Thermometers and Pressure Gauges
- .4 Section 28 31 02 - Multiplex Fire Alarm System.

1.2 REFERENCES

- .1 American National Standards Institute/National Fire Protection Association (ANSI/NFPA)
- .2 ANSI/NFPA 13-2013, Standard for the Installation of Sprinkler Systems.
- .3 ANSI/NFPA 25-2011, Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .5 Material Safety Data Sheets (MSDS).
- .6 Underwriter's Laboratories of Canada (ULC)
- .7 CAN/ULC S543-09AMI, Internal Lug Quick Connect Coupling for Fire Hose.

1.3 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit two (2) copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures and in accordance with ANSI/NFPA 13.
 - .1 Shop drawings: submit drawings stamped and signed by engineer registered and acceptable to the authority having jurisdiction.

1.3 SUBMITTALS
(Cont'd)

- .3 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit samples of following:
 - .1 Each type of sprinkler head.
 - .2 Signs and valve tags.
- .4 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Test reports:
 - .1 Submit certified test reports for packaged fire pumps from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 Test each pump/driver package at factory to provide detailed performance data and to demonstrate compliance with ANSI/NFPA and specification. Submit certified test curves for approval of Owner's Representative.
 - .3 Test hydrostatically to meet requirements of fire protection system to which it will be connected.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Instructions: submit manufacturer's installation instructions.
 - .4 Manufacturer's Field Reports: manufacturer's field reports specified.
 - .5 Closeout Submittals:
 - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
 - .2 Provide detailed hydraulic calculations including: summary sheet, Contractor's Material and Test Certificate for aboveground and underground piping, as well as other deliverables for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, in accordance with ANSI/NFPA 13.

1.4 QUALITY
ASSURANCE

- .1 Qualifications:
 - .1 Installer: certified journeyperson in dry pipe sprinkler installations.
- .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.5 ENGINEERING
DESIGN CRITERIA

- .1 Design system in accordance with ANSI/NFPA 13, using following parameters:
 - .1 Hazard:
 - .1 To suit occupancy.
 - .2 Pipe size and layout:
 - .1 Hydraulic design.
 - .2 Sprinkler head layout: to ANSI/NFPA 13 or as directed by authority having jurisdiction.
 - .3 Water supply:
 - .1 Conduct flow and pressure test of water supply in vicinity of project to obtain criteria for bases of design in accordance with ANSI/NFPA 13.
 - .4 Zoning:
 - .1 System zoning as indicated.

1.6 DELIVERY,
STORAGE, AND
HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
 - .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 74 21 - Construction/Demolition Waste Management and Disposal.

1.7 MAINTENANCE

- .1 Extra Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Provide spare sprinklers and tools as required by ANSI/NFPA 13.

PART 2 - PRODUCTS

2.1 PIPE,
FITTINGS AND
VALVES

- .1 Pipe:
 - .1 Ferrous, Galvanized: to ANSI/NFPA 13.
 - .2 Copper tube: to ANSI/NFPA 13.
- .2 Fittings and joints to ANSI/NFPA 13:
 - .1 Ferrous, Galvanized: screwed, welded, flanged or roll grooved.
 - .2 Copper tube: screwed, soldered, brazed.

2.1 PIPE, FITTINGS AND VALVES (Cont'd)	.3 Auxiliary valves: .1 ULC listed for fire protection service. .2 Up to NPS 2: bronze, screwed ends, ball valves. .3 NPS 2 1/2 and over: cast iron, flanged or roll grooved ends, indicating butterfly valve or OS & Y gate. .4 Swing check valves. .5 Ball drip. .6 Tamper devices wired back to fire alarm panel.
	.4 Pipe hangers: .1 ULC listed for fire protection services.
2.2 SPRINKLER HEADS	.1 General: to ANSI/NFPA 13 and ULC listed for fire services.
2.3 SPRINKLER HEAD TYPE A	.1 Upright bronze.
2.4 SPRINKLER HEAD TYPE B	.1 Pendant chrome glass bulb semi- recessed type.
2.5 SPRINKLER HEAD TYPE C	.1 Pendant chrome glass bulb type.
2.6 SPRINKLER HEAD TYPE D	.1 Recessed polished chrome glass bulb type with ring and cup.
2.7 SPRINKLER HEAD TYPE E	.1 Concealed glass bulb type with cover to match ceiling finish.
2.8 SPRINKLER HEAD TYPE F	.1 Side wall polished chrome glass bulb type.

<u>2.9 AUXILIARY SUPERVISORY SWITCHES</u>	.1	General: to ANSI/NFPA 13 and ULC listed for fire service.
	.2	Valves: .1 Mechanically attached to valve body, with normally open and normally closed contacts and supervisory capability.
	.3	Flow switch type: .1 With normally open and normally closed contacts and supervisory capability.
	.4	Pressure alarm switch: .1 With normally open and normally closed contacts and supervisory capability.
<u>2.10 RELIEF VALVE</u>	.1	ULC listed.
<u>PART 3 - EXECUTION</u>		
<u>3.1 MANUFACTURER'S INSTRUCTIONS</u>	.1	Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.
<u>3.2 INSTALLATION</u>	.1	Install, inspect and test to acceptance in accordance with ANSI/NFPA 13 and NFPA 25.
	.2	Testing to be witnessed by authority having jurisdiction.
	.3	Valve identification: .1 Identify drain valve, by- pass valves and main shut-off valve and all auxiliary valves.
<u>3.3 FIELD QUALITY CONTROL</u>	.1	Manufacturer's Field Services: .1 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

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| 3.3 FIELD
QUALITY
CONTROL
(Cont'd) | .1 (Cont'd)
.2 (Cont'd)
installation in accordance with manufacturer's
instructions.
.3 Schedule site visits, to review Work, as
directed in PART 1 - QUALITY ASSURANCE. |
| 3.4 CLEANING | .1 Proceed in accordance with Section 01 74 11 -
Cleaning

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