

**Part 1            General**

**1.1                GENERAL**

- .1 All Drawings and all sections of the Specifications shall apply to and form an integral part of this section.

**1.2                SCOPE OF WORK**

- .1 Work to include all labour, Material and equipment required for installing, testing and placing in initial operation the following systems as detailed in Specifications of each section and as shown on Drawings.
- .2 All Mechanical Work to be Bid as a single complete Contract even though Work of various mechanical trades has been further sub-divided into each Section noted above.

**1.3                EXISTING CONDITIONS**

- .1 Examine Site, existing adjacent buildings and local conditions affecting Work under this contract. Examine Mechanical and Electrical and all other Contract Drawings to ensure Work can be performed without changes to the building as shown on plans. No allowance will be made later for necessary changes, unless notification of interferences have been brought to Contract Administrator's attention, in writing, in accordance with B4.

**1.4                REGULATIONS**

- .1 Comply with, most stringent requirements of Manitoba Building Code, National Building Code and local regulations and by-laws, with specified standards and codes and this Specification. Before any Work is proceeded with, approved layouts to be filed with and approved by proper authorities.
- .2 Provide necessary notices, obtain permits and pay all fees, in order that Work specified may be carried out. Charges and alterations required by authorized inspector of any authority having jurisdiction, to be carried out without charge or expense to City.
- .3 Furnish certificates confirming Work installed conforms to requirements of authorities having jurisdiction.

**1.5                LIABILITY**

- .1 Ducts and equipment installed improperly, to be removed and replaced without cost to City.
- .2 Protect and maintain Work until building has been completed and accepted. Protect Work against damage during installation. Cover with tarpaulins if necessary. Repair all damage to floor and wall surfaces resulting from carrying out of Work, without expense to City.
- .3 During welding or soldering ensure structure is protected against fire by shielding, using fire-rated sheets and galvanized iron sheets. Contractor shall provide trained persons

armed with suitable type extinguishers, with no other duties than to watch for and extinguish sparks, etc.

- .4 Co-ordinate Work with other sections to avoid conflict and to ensure proper installation of all equipment. Review all contract Drawings.
- .5 On completion of Work, remove tools, surplus and waste Material and leave Work in clean, perfect condition.

## **1.6 GUARANTEE**

- .1 Guarantee satisfactory operation of all Work and apparatus installed under this Contract. Replace, at no expense to City, all items which fail or prove defective within a period of one year after final acceptance of complete Contract by City, always provided such failure is not due to improper usage by City. Make good all damage to building incurred as a result of failure or repair of mechanical Work.
- .2 No certification given, payment made, partial or entire use of equipment by City, shall be construed as acceptance of defective Work or acceptance of improper Materials. Make good at once, without cost to the City all such defective Work or Materials and consequence resulting therefore, within one year of final acceptance date.
- .3 This general guarantee shall not act as a waiver for any specified guarantee and/or warranty of greater length of time noted elsewhere in these documents.

## **1.7 ENGINEERING OBSERVATIONS**

- .1 Contractor's Work will be observed periodically by the Contract Administrator, solely for purpose of determining general quality of Work, and not for any other purpose. Guidance will be offered to Contractor in interpretation of plans and Specifications to assist him to carry out Work. Observations and directives given to Contractor does not relieve Contractor and his agents, servants and employees of their responsibility to erect and install Work in all its parts in a safe and Workmanlike manner, and in accordance with plans and Specifications, nor impose The Contract Administrator, any responsibility to supervise or oversee erection or installation of any Work.

## **1.8 WELDING REGULATIONS**

- .1 Do not weld when temp. of base metal is lower than -17 deg. C except with consent of Contract Administrator. At temp. below 0 deg. C, surface of all areas within 75mm (3") of point where weld is to be started to be heated to temp. at least warm to hand before welding is commenced. At all temperatures below +4 deg. C, operator and Work to be protected against direct effect of wind and snow.
- .2 Welding shall be performed by welder holding current welder's certificate from Provincial Department of Labour.
- .3 Comply with CSA W117.2 "Safety in Welding, Cutting, and Allied Processes".

### **1.9 MECHANICAL SHOP DRAWINGS**

- .1 Submit for review a minimum of six sets of detailed Shop Drawings. Refer to Section 210501.13 "Acceptable Materials & Equipment" for Shop Drawings requirements.
- .2 Check Shop Drawings for conformity to plans and Specifications before submission in accordance with B4 enquiries.
- .3 Each Drawing to bear a signed stamp including project name and Contractor's Firm name verifying Drawings have been checked prior to submission to Contract Administrator. Signature of stamp shall signify the contractor has checked and found all dimensions to be compatible with the Contract Drawings and all capacities, quantities, sizes and other data contained in the Contract documents have been listed by the supplier on the Drawings and have been checked by the undersigned and found correct.
- .4 Clearly show division of responsibility. No item, equipment or description of Work shall be indicated to be supplied or Work to be done "By Other's or By Purchaser". Any item, equipment or description of Work shown on Shop Drawings shall form part of Contract, unless specifically noted to contrary.
- .5 Take full responsibility for securing and verifying field dimensions. In case where fabrication must proceed prior to field dimensions being available, check all Shop Drawings and approve for dimensions only. In this case guarantee that dimensions will be Worked to and ensure that other Subcontractors are aware of these dimensions and shall comply to them.
- .6 Review by Contract Administrator shall be mutually understood to refer to general design only. If errors in detailed dimensions or interference with Work are noticed, attention of Contractor will be called to such errors of interferences, but Contract Administrator's review of Drawings will not in any way relieve Contract Administrator from responsibility for said errors or interferences, or from necessity of furnishing such Work, and Materials as may be required for completion of Work as called for in Contract documents.

### **1.10 MECHANICAL SUBCONTRACTORS**

- .1 Contractor to have minimum five years experience in field of mechanical contracting and to have successfully performed Work of similar nature and approximate size to that indicated in Specifications and on Drawings. Subcontractors shall employ, on this project, foremen or supervisory personnel who have had similar experience to that required of Contractor.

### **1.11 SCHEDULING OF WORK**

- .1 Complete building to be occupied during term of this contract. Schedule new Work so normal functions within building are not unduly interrupted. In general, Work on the new areas to be performed during normal hours. Work in remainder of building to be scheduled so as to provide minimum of inconvenience to City. i.e. Perform Work either where areas are vacated during night period or at periods when it is permissible to Work in the existing areas to be approved by City. Suitable periods for shutting off mechanical services to be arranged with City's appointed representative. Perform Work requiring shutdown of air systems during night period or on weekends.

- .2 Existing buildings to be in use during construction of the addition. Arrange Work so that interruption of services is kept to minimum. Obtain permission from Contract Administrator, prior to cutting into mechanical services. Where deemed necessary by Contract Administrator, temporary piping to be installed, and/or Work to be carried out at night and on weekends.

## **1.12 DRAWINGS**

- .1 Drawings are diagrammatic only and do not show all details. Information involving accurate measurements of building to be taken at building. Make, without additional expense to City, all necessary changes or additions to runs to accommodate structural conditions. Locations of ducts and other equipment to be altered without charge to City, provided change is made before installation and does not necessitate additional Materials and that all such changes are ratified by Contract Administrator, recorded on Record Set of Drawings.
- .2 Drawings and Specifications to be considered as an integral part of Contract Documents. Neither Drawings nor Specifications to be used alone. Misinterpretation of requirements of plans or Specifications shall not relieve Contractor of responsibility of properly completing Work to approval of Contract Administrator.
- .3 As Work progresses and before installing ductwork and equipment interfering with interior treatment and use of building, consult Contract Administrator for comments. If Contractor fails to perform above checking and fails to inform Contract Administrator of such interference, Contractor to bear all subsequent expense to make good the installation.
- .4 Drawings indicate general location and route to be followed by pipes and ducts. Where required ducts are not shown on plans or only shown diagrammatically, install in such a way as to conserve head room and interfere as little as possible with free use or space through which they pass.

## **1.13 MATERIALS**

- .1 Materials and equipment specified and acceptable manufacturers are named in this Specification for the purpose of establishing the standard of Materials and Workmanship to which Contractor shall adhere. Bid price shall be based on the use of Materials and equipment as specified.
- .2
  - .1 Materials of same general type to be of same manufacture (e.g. all air supply units shall be of same manufacturer). Contractor to ensure that all Subcontractor provide products of same manufacturer.
    - .1 Follow manufacturer's recommendations for safety, adequate access for inspection, maintenance and repairs of individual equipment installed.
    - .2 Permit equipment maintenance and disassembly with minimum disturbance to connecting duct systems and without interference with building structure or other equipment.
    - .3 Provide accessible lubricating means for bearings, including permanent lubricated 'Lifetime' bearings.

- .3 Alternates for any specified item which Contractor considers equal to that specified shall be submitted in accordance with B6.
- .4 Equipment listed as 'equal' in Specifications or submitted as alternate by Contractor must meet all space requirements, specified capacities and must have equipment characteristics of specified equipment as interpreted by Contract Administrator. Install equipment in strict accordance with manufacturer's published recommendations.
- .5 Equipment and Materials shown on Drawings and not specified herein, or specified herein and not shown on Drawings, shall be included in this Contract as though both shown and specified.

#### **1.14 REMOVAL AND DISCONNECTION OF CITY'S EXISTING EQUIPMENT**

- .1 All mechanical equipment conflicting with new equipment being installed to be removed or disconnected by Contractor shall remain property of City. Remove ducts not required in revised systems and interfering with new installation which shall become property of Contractor.

#### **1.15 ELECTRIC MOTORS, STARTERS AND WIRING**

- .1 Provide electric motors for all equipment supplied in this Division. Motors to operate at 29 r/S (1800 rpm), unless noted otherwise. Motor design shall comply with Canadian Electrical Code requirements. All electric motors supplied shall be capable of being serviced locally.
- .2 All three phase motors shall have a service factor of 1.15 times nominal rated horsepower of the motor.
- .3 Operating voltages: to CAN3-C235-83, motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .4 Motors 0.75 kW (1 hp) and larger shall be high efficiency motors as defined in CSA C390 or IEEE 112B Nominal Standards. Minimum efficiency (%) shall be per the following table.

kW	Minimum efficiency (%)			
	3600 RPM	1800 RPM	1200 RPM	900 RPM
.75	79.0	82.4	81.1	74.4
1.11	81.0	82.8	83.8	76.8
1.50	81.7	83.8	84.4	83.8
2.24	84.6	86.1	86.4	83.6
3.73	86.4	86.9	87.2	85.4
5.60	87.4	88.4	88.2	86.2
7.46	88.4	89.4	88.6	88.6
11.19	89.3	90.1	89.0	88.0
14.92	89.7	90.9	89.8	89.8
18.65	90.0	91.1	90.9	89.6
22.38	90.6	91.5	91.1	90.3
29.84	91.0	92.0	91.6	90.1

List information on Shop Drawing submittals

- .5 Determine from electrical Drawings and Specifications, voltage characteristics applying to each individual motor. Where motor voltages are mentioned in this Specification, confirmation to be made by reference to electrical Drawings and Specifications ordering motors.
- .6 Electrical to provide starters for all motors.
- .7 Electrical shall wire from starters to motors.
- .8 Wiring required between starters and switching apparatus such as wiring from starters to float switches, pressure switches and all control wiring to be by Electrical except as noted otherwise on Drawings and in Specifications. Provide proper terminal connections and lead wires at motors and other apparatus ready for connection by Electrical. Provide Electrical with accurate locations of electrical connection points and all necessary schematic and other Drawings to facilitate electric Work.
- .9 Wiring required under Control Section to be performed by Electrical as described on the drawing. Refer also to Control Section for further requirements.
- .10 Mechanical shall provide wiring diagrams indicating all power and control wiring requirements for equipment supplied by Division 15.

## 1.16 HANGERS AND SUPPORTS

- .1 General
  - .1 Piping, ductwork and equipment shall be securely supported from building structure. Perforated strap or wire hangers are not permitted.
  - .2 Support components shall conform to Manufacturers Standardization Society Specification SP-38.

## 1.17 FLASHING

- .1 Where pipes or ducts go through a roof or wall, they should be boxed-in and flashed. Allow for expansion and contraction of pipe. Flashing shall be waterproof.

**1.18 IDENTIFICATION OF EQUIPMENT**

- .1 Provide manufacturer's nameplate on each piece of equipment.
- .2 In addition Mechanical Contractor shall provide equipment I.D. tag minimum size 87mm x 32mm x 2.3mm (3-1/2" x 1-1/2" x 3/32") nominal thickness laminated phenolic plastic with black face and white centre. Engraved 6mm (1/4") high lettering. For motors and controls and for larger equipment such as chillers, tanks, 25mm (1") high lettering; for hot equipment such as boilers and convertors, provide engraved brass or bronze plates with black paint filled identification.
- .3 Identify as follows: equipment type and number (e.g. pump no. 2), service or areas or zone building served (e.g. south zone chilled water primary).
- .4 Provide manufacturers' registration plates (e.g. pressure vessel, Underwriters' Laboratories and CSA approval plates) as required by respective agency and as specified.

**1.19 MECHANICAL EQUIPMENT GUARDS**

- .1 Meet safety requirements of Provincial Department of Labour and local authorities having jurisdiction.
- .2 Guards for drives shall have:
  - .1 No. 2.5mm (12 US std. ga.) galv. 18mm (3/4") mesh wire screen welded to steel angle frame.
  - .2 No. 1.2mm (18 US std. ga.) galv. sheet metal tops and bottoms.
  - .3 Removable sides for servicing.
- .3 For flexible couplings, provide removable, 'U' shaped, 2.5mm (12 ga.) galv. frame and 1.2mm (18 ga.) expanded mesh face.
- .4 Provide means to permit lubrication and use of test instruments with guards in place.
- .5 Install belt guards to permit movement of motors for adjusting belt tension.
- .6 Provide 18mm (3/4") mesh wire screen on inlet or outlet of exposed fan blades.
- .7 Provide 37mm (1-1/2") diameter hole on shaft centre for insertion of tachometer.

**1.20 SCREWS, BOLTS AND FASTENERS**

- .1 Use standard commercial sizes and patterns with Material and finish suitable for service.
- .2 Use heavy hex heads, semi-finished unless otherwise specified. Use type 304 stainless steel for exterior areas.
- .3 Bolts used on fan equipment for access to motors, bearings, filters and the like shall be heavy-duty.
- .4 Bolts shall not project more than one diameter beyond nuts.
- .5 Washers

- .1 Use plain-type washers on equipment, sheet metal and soft gaskets, lock-type washers where vibration occurs, and resilient washers with stainless steel.

**1.21 SPECIAL TOOLS AND SPARE PARTS**

- .1 Provide one set of all specialized tools required to service equipment as recommended by manufacturers.

**1.22 TRIAL USAGE**

- .1 City reserves right to use any piece of mechanical equipment, device or Material installed under this Contract, for such reasonable lengths of time and at such times as Contract Administrator may require, to make complete and thorough test of same, before final completion and acceptance of any part of Contract. It is agreed and understood, that no claim for damage will be made for any injury or breakage to any part or parts of the above due to aforementioned tests, whether caused by weakness or inaccuracy of parts, or by defective Materials or Workmanship of any kind whatsoever. Supply all labour and equipment for such tests.

**1.23 SAFETY DEVICE TESTING**

- .1 Make complete inspection of all safety devices to ensure:
  - .1 That safety devices are complete and in accordance with Specifications and manufacturer's recommendations.
  - .2 That the safety devices are connected and operating according to all local regulations.
- .2 On completion of inspections, supply to Contract Administrator letters and/or certificates for their record, confirming that inspections have been completed.

**1.24 TEMPORARY USE OF EQUIPMENT**

- .1 Permanent systems and/or equipment not to be used during construction period, without Contract Administrator's written permission.
- .2 Equipment used during construction period to be thoroughly cleaned and overhauled. Replace worn or damaged parts so equipment is in perfect condition, to entire satisfaction of Contract Administrator and City.
- .3 Provide proper care, attention and maintenance for equipment while it is being used. If, in opinion of Contract Administrator, sufficient care and maintenance is not being given to equipment and systems, Contract Administrator reserves right to forbid further use of said equipment and systems.
- .4 Temporary use of equipment shall in no way relieve Contractor of providing twelve month guarantee on all equipment so used this guarantee period to commence as of date of final acceptance of building by City as interpreted by Contract Administrator.



**1.25 RECORD DRAWINGS**

- .1 Provide one set of Contract prints to form Record Drawings, marked clearly with all changes and deviations from piping and ductwork, including all Contract Changes.
- .2 Use different colour ink for each service.
- .3 Update Record Drawings on a regular basis to ensure they are accurate, and have available for reference and inspection at all times.
- .4 This information will be used by others to create Record Drawings on CAD.

**1.26 INSTRUCTIONS TO CITY'S PERSONNEL**

- .1 In addition to start-up supervision and instruction of City's personnel required of individual equipment manufacturers and systems as noted, Contractor's construction supervisor to instruct City's personnel in operation and maintenance of all equipment and systems to satisfaction of Contract Administrator.
- .2 Provide City with four copies of manuals incorporating following:
  - .1 Service instructions - including lists of spare and replacement parts and names and addresses of suppliers.
  - .2 Maintenance & Operating instructions.
  - .3 Revised Shop Drawings.
- .3 Forward manuals to Contract Administrator for review. Final payment will not be made until all required manuals have been received.
- .4 Review instructions with City's representative to ensure City's representative has a thorough understanding of equipment and its operation.
- .5 Contractor shall submit to Contract Administrator, suitable document signed by City's representative, stating:
  - .1 City has received satisfactory instruction in operation and maintenance of all equipment and systems.
  - .2 Operation and maintenance manuals have been reviewed with City.
  - .3 Specified spare parts, keys, removable handles and the like, have been turned over to City.

**1.27 IDENTIFICATION OF DUCTWORK**

- .1 Use black 50mm (2") high stencilled letters with arrow indicating air flow direction.
- .2 Distance between markings 15m (50') maximum.
- .3 Identify ducts on each side of dividing walls or partitions and beside each access door.
- .4 Stencil only over final finish.
- .5 Prior to installation, review general application of identification with Contract Administrator.

**1.28 CUTTING AND PATCHING**

- .1 Cutting, patching and repairs to existing surfaces, including the roof, required as a result of the removal and/or relocation of existing equipment and piping, and/or installation of new equipment and piping in existing building to be included by Div. 15 - Mechanical in Bid price. Division 15 - Mechanical to employ and pay appropriate Subcontractor whose Work is involved, for carrying out Work described above.
- .2 Where services are concealed within walls, floors or ceilings and cannot be visually identified, Contractor shall provide electronic scanning devices or other approved means to locate and identify concealed services prior to drilling.

**1.29 SALVAGE**

- .1 All usable salvaged equipment and Materials shall remain the property of the City unless specifically noted otherwise. Such Material shall be neatly stored on Site for removal by the City. Contractor shall remove all rejected salvage from the site and legally dispose of it.

**END OF SECTION**

**Part 1 General**

**1.1 GENERAL**

- .1 Following Appendix of Manufacturers lists manufacturers of equipment and Materials acceptable to Contract Administrator, subject to individual clauses under the various sub-sections of Mechanical Work Specifications. See item 'Materials' under this section of Specification.
- .2 Product noted in individual Specification clauses is an item that meets Specification in all respects regarding performance, quality of Material and Workmanship, and is acceptable to Contract Administrator without qualification. Equipment proposed from other manufacturers listed as 'Approved Manufacturers' and alternates shall meet same standards.
- .3 Submit Shop Drawings for all items marked with asterisk (\*).
- .4 Request for equals in accordance with B6.

**1.2 EQUIPMENT OR MATERIAL & APPROVED MANUFACTURERS**

- .1 ELECTRIC MOTORS
  - .1 G.E.; Siemens; Tamper; Reliance; Leland; Lincoln; U.S. Electric; Century; Baldor; WEG; Toshiba
- .2 VARIABLE FREQUENCY DRIVES
  - .1 Variable Frequency Drives Cutler-Hammer, Siemens, Danfoss, ABB,
- .3 INSULATION
  - .1 External Duct Insulation Manville; Fibreglas; Knauf
- .4 AIR DISTRIBUTION
  - .1 Direct fired makeup air unit \* Engineered Air, Price Mechanical Industrial
  - .2 Inline Centrifugal Roof Greenheck or equals in accordance with B6
  - .3 Upblast Fan\*
  - .3 Ducturns, damper hardware, fan connections\* Duro-Dyne
  - .4 Duct Sealer Duro-Dyne; 3M; Flexa-Duct; United; Bakelite
- .5 H.V.A.C. BALANCE AND TESTING
  - .1 H.V.A.C. Balance & Testing Agency Airdronics Inc.; DFC; AHS (2010); AMS

**END OF SECTION**

**Part 1            General**

**1.1                SUMMARY**

.1            Section Includes:

- .1            Materials and installation for wet pipe fire protection and sprinkler systems for heated areas.

**1.2                REFERENCES**

.1            American National Standards Institute/National Fire Prevention Association

- .1            (ANSI/NFPA)ANSI/NFPA 13, Installation of Sprinkler Systems, latest edition.
- .2            ANSI/NFPA 24-Installation of Private Fire Service Mains and Their Appurtenances latest edition.
- .3            ANSI/NFPA 25- Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems latest edition.

.2            Underwriter's Laboratories of Canada (ULC)

- .1            CAN4 S543-M984, Standard for Internal Lug Quick Connect Couplings for Fire Hose.

**1.3                SUBMITTALS**

.1            Product Data:

- .1            Submit manufacturer's printed product literature, specifications and datasheet.
  - .1            Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

.2            Shop Drawings:

- .1            Submit shop drawings.
  - .1            Indicate:
    - .1            Materials.
    - .2            Finishes.
    - .3            Method of anchorage
    - .4            Number of anchors.
    - .5            Supports.
    - .6            Reinforcement.
    - .7            Assembly details.
    - .8            Accessories.

.3            Quality assurance submittals: submit following.

- .1            Test reports:
  - .1            Submit certified test reports for wet pipe fire protection sprinkler systems from approved independent testing laboratories, indicating compliance

- with specifications for specified performance characteristics and physical properties.
- .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.
- .2 Manufacturer's Field Reports: manufacturer's field reports specified.
- .4 Closeout Submittals:
  - .1 Submit maintenance and engineering data for incorporation into manual.
  - .2 Manufacturer's Catalog Data, including specific model, type, and size for:
    - .1 Pipe and fittings.
    - .2 Valves, including gate, check, and globe.
    - .3 Sprinkler heads.
    - .4 Pipe hangers and supports.
    - .5 Mechanical couplings.
  - .3 Drawings:
    - .1 Sprinkler heads and piping system layout.
      - .1 Prepare 760mm by 1050mm detail working drawings of system layout in accordance with NFPA 13, "Working Drawings (Plans)".
      - .2 Show data essential for proper installation of each system.
      - .3 Show details, plan view, elevations, and sections of systems supply and piping.
      - .4 Show piping schematic of systems supply, devices, valves, pipe, and fittings. Show point to point electrical wiring diagrams.
    - .2 Electrical wiring diagrams.
  - .4 Field Test Reports: Preliminary tests on piping system.
  - .5 Records:
    - .1 As-built drawings of each system.
      - .1 After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes.
      - .2 Submit 760 mm by 1050 mm drawings on reproducible Mylar film with title block similar to full size contract drawings.

#### **1.4 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Installer: company or person specializing in wet sprinkler systems with documented experience.

#### **1.5 MAINTENANCE**

- .1 Extra Materials: Provide spare sprinklers and tools as required by ANSI/NFPA 13.

## **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 Storage and Protection:
  - .1 Store materials indoors in dry location.
  - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

## **Part 2 Products**

### **2.1 ABOVE GROUND PIPING SYSTEMS**

- .1 Provide fittings for changes in direction of piping and for connections.
  - .1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.
- .2 Perform welding in shop; field welding will not be permitted.
- .3 Conceal piping in areas with suspended ceiling.

### **2.2 PIPE, FITTINGS AND VALVES**

- .1 Pipe:
  - .1 Ferrous: to ANSI/NFPA 13.
  - .2 Copper tube: to ANSI/NFPA 13.
- .2 Fittings and joints to ANSI/NFPA 13:
  - .1 Pipe and fittings to be a product of North America.
  - .2 Ferrous: screwed, welded, flanged or roll grooved.
  - .3 Copper tube: screwed, soldered, brazed.
  - .4 Provide welded, threaded, grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.
  - .5 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will not be permitted.
  - .6 Rubber gasketed grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.
  - .7 Fittings: ULC approved for use in wet pipe sprinkler systems.
  - .8 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.
  - .9 Side outlet tees using rubber gasketed fittings are not permitted.
  - .10 Sprinkler pipe and fittings: metal.

- .3 Valves:
  - .1 ULC listed for fire protection service.
  - .2 Gate valves: open by counter clockwise rotation.
  - .3 Check valves: flanged clear opening swing-check type with flanged inspection and access cover plate for sizes 10 cm and larger.
  - .4 Provide gate valve in piping protecting machine rooms, and machinery spaces.
- .4 Pipe hangers:
  - .1 ULC listed for fire protection services in accordance with NFPA.

### **2.3 SPRINKLER HEADS**

- .1 Provide Reliable Model FIFR recessed automatic sprinklers in finished ceilings. Sprinkler heads shall be chrome plated, white painted ceiling cup unless noted otherwise on drawings. Provide chrome plated sidewall type where noted.
- .2 In unfinished areas or in areas where sprinkler piping cannot be concealed. Provide Reliable Model FIFR bronze upright sprinkler. Provide bronze sidewall type where noted.
- .3 Provide Reliable Model G5-56 flush mounted concealed sprinkler c/w plain cover plate. Cover plate colour to coordinate with Contract administrator. Contractor is to obtain colour sample from Contract administrator. The sample is to be sent to sprinkler manufacturer for matching. Contract administrator to approve plate cover before ordering.
- .4 Provide Reliable Model G4FR "sealing" concealed sprinkler c/w cover plate. Cover plate colour to coordinate with Contract administrator. Contractor is to obtain colour sample from Contract administrator. The sample is to be sent to sprinkler manufacturer for matching. Contract administrator to approve plate cover before ordering.
- .5 Locations for G4FR sealing will be in
  - .1 Main floor at main floor zone # 7 pre action ordinary hazard, Eco/ Holter 1D:05, Procedure 1D:15, Large Procedure 1D:36 zone # 4 pre action ordinary hazard as noted on the drawings.
  - .2 Second floor second floor zone # 7 pre action ordinary hazard, second floor zone # 9 pre action ordinary hazard and second floor zone # 8 pre action ordinary hazard.
- .6 Locations for G5-56 will be in all other locations not mentioned in above item 2.3.5 as noted on drawings.
- .7 Provide Reliable Model F3QR dry pendant sprinkler in locations noted on drawings.
- .8 Provide Reliable Model F4FR non-ferrous QR sprinkler for MRI application c/w cover plate in MRI 1M:18. Cover plate colour to coordinate with Contract administrator. Contractor is to obtain colour sample from Contract administrator. The sample is to be sent to sprinkler manufacturer for matching. Contract administrator to approve plate cover before ordering.
- .9 When sprinklers are exposed to damage, fit with approved wire guards.

**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 Install, inspect and test to acceptance in accordance with ANSI/NFPA 13 and ANSI/NFPA 25.

**3.3 PIPE INSTALLATION**

- .1 Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.
- .2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.
- .3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.
- .4 Inspect piping before placing into position.

**3.4 FIELD QUALITY CONTROL**

- .1 Site Test, Inspection:
  - .1 Perform test to determine compliance with specified requirements in presence of Departmental Representative.
  - .2 Test, inspect, and approve piping before covering or concealing.
  - .3 Preliminary Tests:
    - .1 Hydrostatically test each system at 200 psig for a 2 hour period with no leakage or reduction in pressure.
    - .2 Flush piping with potable water in accordance with NFPA 13.
    - .3 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.
    - .4 Test alarms and other devices.
    - .5 Test water flow alarms by flowing water through inspector's test connection. When tests have been completed and corrections made, submit signed and dated certificate in accordance with NFPA 13.
  - .4 Formal Tests and Inspections:
    - .1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.
    - .2 Submit written request for formal inspection at least 15 days prior to inspection date.



- .3 Repeat required tests as directed.
  - .4 Correct defects and make additional tests until systems comply with contract requirements.
  - .5 Furnish appliances, equipment, instruments, connecting devices, and personnel for tests.
- .2 Site Tests:
- .1 Testing to be witnessed by authority having jurisdiction.
  - .2 Develop, with Contract administrator assistance, detailed instructions for O & M of this installation.
- .3 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**