

1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 00 Summary of Work.
- .2 Section 21 05 01 Mechanical General Requirements
- .3 Section 25 05 01 EMCS General Requirements.
- .4 Section 26 05 00 Electrical General Requirements.

1.2 REFERENCES

- .1 Canadian Federal Legislation.
- .2 Canadian Environmental Protection Act (CEPA), 1988.
- .3 Canadian Environmental Assessment Act (CEAA), 1995.

1.3 EXISTING CONDITIONS AND DOCUMENTATION

- .1 Demolition of spray or trowel-applied asbestos can be hazardous to health. Should material resembling spray or trowel-applied ASBESTOS be encountered in the course of demolition work, stop work and notify the Departmental Representative immediately. Do not proceed until written instructions have been received from the Departmental Representative.
- .2 Hazardous materials (if discovered) removal shall be treated as an additional expense; to be negotiated with the successful Contractor during the demolition phase of this project.
- .3 Drawings indicating the existing conditions have been provided based on the original design drawings. On-site conditions may vary somewhat from what is indicated on the drawings. Make allowances for actual on-site conditions.

1.4 PROTECTION

- .1 Protect all existing systems and premises. Be responsible for any damage and make good.

1.5 SUMMARY OF WORK

- .1 See also Section 01 11 00 Summary of Work.
- .2 Remove, re-locate, reinstate and/or replace with new - as indicated, to facilitate the Work described in the Specifications and shown on the Drawings.
- .3 Comply with the Departmental Representative Waste Reduction Procedure.
- .4 Hazardous Materials (if encountered) shall be removed in accordance with Provincial and/or Federal regulations, standards and guidelines. Notify the Departmental Representative if encountered and await further direction.

- .5 The Contractor is responsible to obtain and pay for all necessary permits and inspections as required by the specifications or local authorities to perform the Work.
- .6 The Contractor shall protect adjacent properties, vehicles and pedestrians. Provide all temporary works and protection for the complete scope including any associated fees.
- .7 The Contractor shall coordinate all work with the work of other trades on site.
- .8 The Contractor shall assume full responsibility for the protection and safe-keeping of all products that are stored on site.
- .9 Do all work in accordance with the requirements of the Halifax Regional Municipality (HRM) and the Province of Nova Scotia.
- .10 Do all work in accordance with the Fire Marshal's office.
- .11 Do all work in accordance with the Nova Scotia Department of Labour.
- .12 Do all work in accordance with the requirements set-forth by the local Nova Scotia Occupational Health & Safety.
- .13 All work must be coordinated with the requirements of the new construction which shall follow the completion of the demolition and disposal of redundant items. Work shall be completed as per Section 01 14 00 Work Restrictions or as otherwise directed by the Departmental Representative.

2 Products

2.1 EQUIPMENT

- .1 Equipment and heavy machinery used to meet or exceed all applicable emission requirements.
- .2 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

3 Execution

.1 PREPARATION

- .2 Review and thoroughly inspect site with the Departmental Representative to verify extent and location of items designated for removal and disposal, recycling and salvage.
- .3 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .4 Notify and obtain approval of utility companies before starting demolition.

3.2 DEMOLITION – GENERAL

- .1 Take care not to damage or alter existing services that are to remain.
- .2 At end of each day's work, leave work in safe and stable condition. Protect parts not to be demolished at all times.
- .3 Demolish to minimize dusting.
- .4 Remove and dispose of demolished materials except where noted otherwise and in accordance with the Authorities Having Jurisdiction (AHJ).
- .5 Materials cannot be left on the grounds or within the Buildings. All Contractors and their materials must be accounted for daily. Co-ordinate materials storage on-site. All materials shall be secured.

3.3 SEQUENCES OF OPERATION

- .1 Schedule demolition to create the least amount of disturbance. Co-ordinate timing of work with the Departmental representative.
- .2 Any equipment, components, etc. deemed salvageable will be removed prior to the demolition.
- .3 Ensure that all debris is immediately taken away and all access and firefighting lanes and parking areas must be kept clear at all times.
- .4 Contractor to ensure all Mechanical systems, (i.e. ductwork, piping, etc.) are all disconnected, and that systems disconnected are not associated with the operational portion of the facility.
- .5 Remove the existing units made redundant by this work.
- .6 Disposal of Material:
 - .1 Dispose of materials not designated for salvage or reuse off site at authorized facilities and in accordance with the requirements of the Nova Scotia Department of Environment and Labour.
 - .2 Do not stockpile debris on site, remove from site immediately.

3.4 RESTORATION

- .1 Restore work areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.

3.5 CLEANUP

- .1 Upon completion of work, remove debris, trim surfaces and leave work site clean.

- .2 Use only cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.6 EXISTING PIPING AND EQUIPMENT

- .1 Remove all piping and equipment as indicated on the Drawings in accordance with the AHJ and Provincial Regulations.

END OF SECTION

1 General

1.1 GENERAL

- .1 Provide new materials and equipment of proven design and quality and of current models with published ratings for which replacement parts are readily available.
- .2 **Within the progress claims for the project, as a minimum the Contractor shall include the following line items for consideration:**
 - .1 **Mobilization.**
 - .2 **Site facilities and administration.**
 - .3 **Shop drawings.**
 - .5 **Laboratory terminal units (i.e. section 23 36 00).**
 - .6 **Ventilation distribution (i.e. ductwork, fire dampers, connection with existing, grilles, etc.)**
 - .7 **Control integration with existing EMCS.**
 - .8 **Testing, adjusting and balancing.**
 - .9 **Commissioning.**
 - .10 **Contract closeout.**

1.2 RELATED SECTIONS

- .1 Section 01 11 00 Summary of Work.
- .2 Section 01 14 00 Work Restrictions.
- .3 Section 01 33 00 Submittal Procedures.
- .4 Section 01 35 25 Special Procedures on Lockout Requirements.
- .5 Section 01 35 30 Health and Safety Requirements.
- .6 Section 01 35 35 Fire Safety Requirements.
- .7 Section 01 45 00 Quality Control.
- .8 Section 01 51 00 Temporary Utilities.
- .9 Section 01 56 00 Temporary Barriers and Enclosures.
- .10 Section 01 61 00 Common Product Requirements.
- .11 Section 01 74 11 Cleaning
- .12 Section 01 74 21 Construction/Demolition Waste Management and Disposal.
- .13 Section 01 77 00 Closeout Procedures.
- .14 Section 01 78 00 Closeout Submittals.
- .15 Section 01 79 00 Demonstration and Training.
- .16 Section 01 91 13 General Commissioning (Cx) Requirements.
- .17 Section 02 41 99 Demolition for Minor Works.

1.3 REFERENCED CODES AND STANDARDS

- .1 Use the following latest editions and amendments in effect at time of Tender:
 - AABC Associated Air Balance Council
 - ASHRAE American Society of Heating, Refrigeration and Air Conditioning Engineers
 - ASME American Society of Mechanical Engineers
 - ASSE American Society of Sanitary Engineers
 - ASTM American Society for Testing and Materials
 - AWWA American Water Works Association
 - CEMA Canadian Electrical Manufacturers Association

CFUA	Canadian Fire Underwriters' Association
CGSB	Canadian General Standards Board
CHVAC	Canadian Heating, Ventilation and Air Conditioning Code
CSA	Canadian Standards Association
CUA	Canadian Underwriters' Association
HRA	Heating, Refrigeration and Air Conditioning Institute of Canada
NACE	National Association of Corrosion Engineers
NBC	National Building Code of Canada
NBFU	National Board of Fire Underwriters'
NBS	National Bureau of Standards
NECC	National Energy Code of Canada for Buildings
NFC	National Fire Code of Canada
NPC	National Plumbing Code of Canada
NS DOL	Nova Scotia Department of Labour
NSC	National Standards of Canada
SAE	Society of Automotive Engineers
TIAC	Thermal Insulation Association of Canada
TIMA	Thermal Insulation Manufacturers Association
UL	Underwriters' Laboratories
ULC	Underwriters' Laboratories of Canada

1.4 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 Submittal Procedures.
- .2 Submittals shall be based on the metric system, and shall use the same units as indicated in the project contract documents.
- .3 Shop Drawings:
 - .1 Submit shop drawings stamped and signed by a Professional Engineer registered or licensed to practice in the Province of Nova Scotia - where noted.
 - .2 Submit shop drawings for all equipment listed and/or installed, and for all equipment the Contractor wishes to substitute for provided such alternative equipment has received prior approval.
 - .3 Work is not to commence until shop drawings have been reviewed by the Departmental Representative.
 - .4 The Departmental Representative's review of these drawings is general. It is not intended to release the Contractor from necessity of furnishing materials and performing the work as required by the drawings and specifications.
 - .5 All shop drawings must be checked against the requirements of the drawings and the specifications by this Contractor prior to submitting them. Drawings not checked will be returned without approval.
 - .6 All shop drawings must be first quality reproductions with all details, lettering, etc., distinct and legible.
 - .7 Shop drawings to show:
 - a) Mounting arrangements.
 - b) Operating and maintenance clearances.
 - .8 Shop drawings and product data accompanied by:
 - a) Detailed drawings of bases, supports, and anchor bolts.
 - b) Acoustical sound power data, where applicable.

- c) Points of operation on performance curves. (provide complete family of curves).
 - d) Manufacturer to certify current model production.
 - e) Certification of compliance to applicable codes.
 - .9 Upon receipt of product shop drawings by the Contractor, he/she shall review them to ensure that they meet the requirements of the specification in all respects, that they are clear and legible, all options are being provided are clearly indicated and that dimensions, weights, power requirements, quantities and capacities are consistent with the requirements of the plans and specifications. The Contractor shall complete Appendix "A" at the end of this section verifying that he has completed these tasks. The Contractor shall then forward the shop drawings through the appropriate channels for final review by the Departmental Representative. Shop drawings that are not accompanied by Appendix "A" clearly indicating that the Contractor has completed this review will not be reviewed by the Departmental Representative and will be returned to the Contractor.
 - .10 Equipment of each specification section to be submitted separately.
 - .11 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 Operation and Maintenance (O&M) Manuals:
 - .1 Operation and maintenance manuals shall be approved by, and final copies deposited with, the Departmental Representative before final inspection.
 - .2 Provide three (3) copies to the Departmental Representative of the Maintenance manual in addition to one (1) electronic PDF copy on a flash drive. Each copy to be suitably bound, three (3) ring binders containing letter sized pages. Larger pages, suitably folded, or folded in pockets may be used where necessary.
 - .3 Binders shall be no more than 2/3 full leaving room to add material in the future. Where necessary additional binders shall be provided.
 - .4 The Operation and Maintenance Manuals shall include the following:
 - .1 Have a title sheet, or sheets, preceding data on which shall be recorded Project name, date, list of contents, and Trade Contractor's name.
 - .2 Be organized into applicable Sections of work with each Section separated by hard paper dividers with plastic covered tabs marked by Section.
 - .3 Contain a list of local (or nearest) representative of each piece of equipment including mail address, e-mail address, web site, and phone number.
 - .4 One (1) copy of each final approved shop drawing on which have been recorded changes made during fabrication and installation.
 - .5 Typed or printed information and notes, and neatly drafted drawings.
 - .6 Maintenance and operating instructions on all building equipment supplied by the Trade Contract.
 - .7 General and specific instructions for the maintenance and operation of automatic and adjustable controls. (Refer also to Section 25 05 03- EMCS Project Record Documents).
 - .8 Brochures and parts list for all equipment.

- .6 As-Built Drawings:
 - .1 The Departmental Representative will provide one set of reproducible mechanical drawings for As-Built Drawing purposes. The Contractor shall mark thereon all significant changes and deviations from contract documents as work progresses and as changes occur.
 - .2 On a daily and/or weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
 - .3 Mark changes on white prints in 'Red'.
 - .4 Make available for reference purposes and inspection at all times.
 - .5 Prior to start of Testing, Adjusting and Balancing (TAB), finalize production of as-built/record drawings.
 - .6 Identify each drawing in lower right-hand corner in letters at least ½" high as follows: "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).
 - .7 Submit to the Departmental Representative for approval and make corrections as directed.
 - .8 TAB to be performed using As-Built drawings.
 - .9 Submit completed reproducible As-Built to the Departmental Representative for review.

1.5 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 Quality Control.
- .2 Health and Safety Requirements: do construction and occupational health and safety in accordance with Section 01 35 30 Health and Safety Requirements.

1.6 MAINTENANCE MATERIAL

- .1 Furnish one (1) set of special or proprietary tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 Closeout Submittals.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle in accordance with Section 01 61 00 Common Product Requirements.
- .2 Deliver materials to site in original factory packaging, labelled with the manufacturer's name and address.
- .3 Store materials in a clean, dry location protected from damage. Protect equipment from dirt and dust.
- .4 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.

1.8 TEMPORARY HEAT

- .1 Temporary Heat (if deemed necessary by this Contractor during construction to complete the Work) shall be the responsibility of this Contractor.
- .2 All costs for temporary heat shall be the responsibility of this Contractor.

1.9 PROTECTION OF OPENINGS

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.10 PAINTING

- .1 Finish painting by this Contractor, unless specifically noted.
- .2 Apply to materials including equipment fabricated from ferrous metals at least one (1) coat of corrosion resistant paint before shipment to job site.
- .3 Prime and touch up marred finished paintwork to match original.
- .4 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up. Do not paint over nameplates.
- .5 Patch cuts and paint to match existing conditions.

1.11 DEMONSTRATION OF COMPLETE SYSTEM

- .1 At the conclusion of the job, the Contractor shall review and demonstrate to the Departmental Representative all equipment and their respective functions, operation, and maintenance. Such demonstration shall be provided for such reasonable periods of time as the complexity of the job warrants, and as approved by the Department Representative. Such review and demonstration shall be made by an authorized representative of the Contractor, fully knowledgeable of the project, its installation, and operation.
- .2 Provide the Department Representative with a schedule of system demonstration at least two (2) weeks prior to demonstration.
- .3 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.
- .4 Use operation and maintenance manual, As-Built drawings, audio visual aids, etc. as part of instruction materials.
- .5 Instruction duration time requirements as specified in appropriate sections.
- .6 Where deemed necessary, the Department Representative may record these demonstrations for future reference.

1.12 CLEANING

- .1 Clean the job site daily. If the site is not cleaned to the Department Representative's satisfaction, then the Department Representative shall make arrangements for cleaning and charge the cost against the Contract.
- .2 At conclusion of project remove surplus material, rubbish, tools, and equipment.

1.13 DEFINITIONS

- .1 Acceptable Materials - Any product mentioned may be used provided it meets or exceeds the quality, performance capability, and space requirements of the equipment shown and called for on the plans and in the specifications.
- .2 Provide - "supply and install" unless otherwise indicated.
- .3 Standard of Acceptance – Only the product listed may be used unless alternate products are included in an addendum.

1.14 DRAWINGS AND SPECIFICATIONS

- .1 Not intended to show Structural details nor Architectural features.
- .2 Except where dimensioned, indicates general mechanical layouts only. Do not scale.
- .3 If required by the Departmental Representative, provide field drawings to show the relative position of various services. Obtain the Department Representative's review before beginning work.
- .4 The Contractor shall check the content of the drawings, specifications and dimensions, and before proceeding, report to the Departmental Representative any error or omission between the Mechanical and the Electrical drawings and/or specifications.
- .5 These specifications are to be considered as an integral part of the drawings which accompany them, neither the drawings nor the specifications shall be used alone. Any item which is omitted in one but which is reasonably implied in the other, shall be considered properly and sufficiently specified and must, therefore, be provided under the Contract. The decision of the Department Representative shall be final, if interpretation is required.
- .6 Misinterpretation of drawings and specifications shall not relieve the Contractor of responsibility.
- .7 The Contractor(s) shall make themselves familiar with the overall intended operation of the project prior to installation, so that all necessary accessories such as valves, hangers, supports, electrical heat tracing, controls, etc., can be installed during the normal progress of the work. Failure to do so will result in the Contractor's responsibility in providing such devices, at his/her expense when the need of such devices becomes apparent during start-up.

1.15 SITE VISITS

- .1 Before commencing work, visit site and verify that requirements of Drawings and Specifications are consistent with site conditions.
- .2 Advise the Department Representative in writing, of any discrepancies or conflicts.
- .3 No allowance shall be made for failure to include items which a thorough investigation would have shown to be required.

1.16 GUARANTEES

- .1 The Contractor shall guarantee their work free from defects for a minimum period of one (1) year, unless specifically noted otherwise, after final acceptance of such work by the Department Representative and shall make good all defects other than normal wear and tear during the life of the guarantee. The Contractor shall guarantee all work and equipment supplied by him to work quietly and satisfactorily and to accomplish the work for which it was installed during the life of the above guarantee. At any time during this period, the Contractor shall make any necessary changes and adjustments or replacements, to accomplish this at his/her own expense.
- .2 Submit the Manufacturers' written guarantees to the Department Representative for review.
- .3 Provide copies of all guarantees/warrantees in a separate tab of the O & M Manuals.
- .4 Each guarantee/warranty shall include:
 - .1 Project name and address.
 - .2 Guarantee time period (commencement date shall be as date shown on Project Final Certificate of Completion unless otherwise indicated).
 - .3 Clear and concise definition of what is guaranteed and remedial action provided.
 - .4 Signatures of the Contractor(s) and a company officer of the manufacturing firm.
 - .5 Include all extended guarantees/warrantees (and service contracts) as specified in individual sections.

1.17 PERMITS AND REGULATIONS

- .1 The Contractor(s) shall comply with all regulations of the Authorities Having Jurisdiction (AHJ), where applicable, including but not limited to the following:
 - .1 Provincial Department of Labour
 - .2 Federal Fire Commissioner
 - .3 Provincial Fire Marshal
 - .4 Municipal Plumbing Inspector
 - .5 Provincial Board of Insurance Underwriters

- .2 The Contractor shall obtain and pay for any permits required by Local Codes and Regulations and arrange for inspections.
- .3 Any additional materials or labour required to conform to any of these rules and regulations will be furnished under the Contract with no additional cost to the Departmental Representative.

1.18 CO-ORDINATION

- .1 The Contractor shall co-ordinate work with all Contractors to avoid conflict, prior to installation of systems and/or equipment.
- .2 Locate distribution systems, equipment and materials to provide minimum interference and maximum useable space.
- .3 Co-ordinate location of duct drops, pipe drops and risers with trades erecting walls and ceilings to ensure that all pipes and ducts are concealed in walls or ceilings spaces. If space is not available in walls or ceilings, locate ducts and pipes so that they can be easily boxed in by the relevant trades. Where pipes are shown rising in concrete block walls, placement of the pipe shall be done in conjunction with the erection of the wall.
- .4 The Contractor shall meet regularly with all sub-trades during construction to coordinate the Work, discuss and update the construction schedule, and discuss/review progress with the Departmental Representative. Coordination shall include, but not necessarily be limited to, to obtain physical dimensions, access requirements and preferred locations for the services.
- .5 In the event that conflicts arise, the Contractor shall work with all other trades involved to ensure that the necessary adjustments are made so that all components fit in the space available with adequate clearance for servicing and removal. If after a thorough effort to fit equipment in a space and provide adequate space for servicing and removal, the Departmental Representative determines that additional space is required, he may request assistance to resolve the issue through the Departmental Representative.
- .6 All adjustments or re-routing of the piping systems required to avoid conflict and provide adequate space for servicing and removal of equipment shall be made at the expense of the relevant trade Contractor.
- .7 Any required re-routing of piping to be reviewed by the Departmental Representative.

1.19 EXISTING MATERIALS

- .1 The design plans do not show all of the existing piping, ductwork, and/or equipment. Where these items are not shown to be reused or removed, upon confirmation from the Departmental Representative that such items are redundant, the Contractor shall remove and dispose of the items.

- .2 All materials not shown to be removed and disposed of that are damaged throughout the course of work shall be replaced without additional compensation provided.
- .3 It is assumed that all existing piping, ductwork, and equipment being retained is safe and adequate. Should the Contractor discover any faulty, deteriorated or otherwise questionable material, equipment or workmanship, they shall notify the Departmental Representative for further instructions.
- .4 The Contractor shall confirm and determine exact piping, ductwork, and equipment locations, sizes and elevations on-site.
- .5 Any damages to existing finishes (for example: floors, ceilings / roofs or walls) shall be repaired by the Mechanical Contractor to match the existing finishes. All repair work shall be completed by an appropriate Tradesperson.

1.20 ALTERNATES

- .1 Wherever an item or class of material is specified exclusively by trade name of maker or by catalogue reference or under "Acceptable Materials", only such item shall be used.
- .2 The Contractor shall note that all layouts on the mechanical drawings are based on the specified equipment and any changes necessitated in service connections, etc., will be done at the Contractor's expense. Furthermore, if it is found that the provisions made regarding space conditions are not met, the right is reserved by the Departmental Representative to require installation of the equipment used preparing the layout.

1.21 CUTTING AND PATCHING

- .1 Make every effort to minimize cutting and patching and provide dimensions, locations and other data for bases, sleeves, boxes, etc., to be built in as construction proceeds. Set sleeves and make openings in concrete forms and masonry before placing concrete and masonry.

1.22 PIPE TESTS

- .1 Notice of Tests: Give written notice for a minimum of four (4) working days prior to date when tests will be made.
- .2 Prior Tests: Concealed or insulated work shall remain uncovered until completely tested and approved, but if construction schedule requires, arrange for prior tests on parts of system as approved.
- .3 Acceptance Tests: Conduct in presence of the Department representative or representative of the Authorities Having Jurisdiction (AHJ).
- .4 Costs: Bear all costs in connection with tests conducted.

- .5 Certificates: Obtain acceptance certificates from the authorities having jurisdiction. Work is not considered complete until certificates have been delivered to the Department Representative.
- .6 Water Systems: Fill with water and hydraulically test at 1½ times system operating pressure or at 689 kPa, whichever is greatest. Unless otherwise noted maintain test pressures without loss for a four (4) hour period. Use valves to isolate equipment not rated for this pressure. An air test is acceptable for metal piping systems.

1.23 SLEEVES AND ESCUTCHEONS

- .1 Sleeves:
 - .1 Unless otherwise specified, supply pipe sleeves for all points where pipe passes through masonry or concrete walls or floors, fire-rated assemblies, and elsewhere as indicated. Sleeves shall be supplied by this Contractor.
 - .2 Where concrete walls or floors are core drilled to accommodate pipe, sleeves are not required except where indicated below.
 - .3 Unless otherwise specified, construct sleeve of galvanized sheet steel with lock seam joints of minimum 22 gauge.
 - .4 Use galvanized Schedule 10 steel pipe sleeves with perimeter fin continuously welded at mid point.
 - .1 Where sleeve extends above finished floor.
 - .2 Pipe penetrations through concrete foundation walls shall be sealed using proprietary pre-manufactured, water-tight seals.
 - .1 Acceptable Materials: Link-Seal, Metraflex.
- .2 Sizes:
 - .1 Provide approximately 12 mm clearance, all around, between sleeve and pipes or between sleeve and insulation.
 - .2 Through footings, use sleeves large enough to accommodate hub of cast iron soil pipe (where applicable).
 - .3 Where piping passes below footings, provide minimum all-round clearance of 50 mm between piping and sleeves. Backfill up to underside of footing with concrete of same strength as footing.
 - .4 Unless otherwise specified, terminate sleeves flush with walls and ceilings.
 - .5 Sleeves shall be sized to accommodate the insulated pipe diameter.
- .3 Unless otherwise indicated for pipes passing through roofs, use galvanized or cast-iron sleeves with caulking recess and flashing clamp device. Anchor sleeves in roof construction; caulk between sleeve recess and pipe; fasten roof flashing to clamp device; make watertight durable joint.
- .4 Caulking:
 - .1 Where pipes pass through on grade concrete slab floors, caulk open spaces with non-hardening mastic.
 - .2 Ensure no contact between copper tube or pipe and ferrous sleeve.
- .5 Escutcheons and Plates:
 - .1 Provide on pipes passing through finished walls, partition floors and ceilings.

- .2 Use chrome or nickel-plated brass, either split or solid type, with set screws for ceiling or wall-mounted. For equipment rooms and/or equipment tunnels, use cast iron type.
- .3 Inside diameter shall fit around finished pipe insulation or uninsulated pipe. Outside diameter shall cover sleeve.
- .4 Where sleeve extends above finished floor, escutcheons or plates shall be bell shaped to cover the sleeve extension.
- .5 Secure to pipe or sleeve but not to insulation.
- .6 Penetrations of Fire Separations:
 - .1 Where pipes pass through walls or floors which provide fire separations, seal around openings with ULC or cUL classified fire stop system. Material shall be installed to manufacturers' recommendations by factory trained installers and shall provide a fire rating equal to that of the separation which has been penetrated.
 - .2 Departmental Representative reserves the opportunity for destructive testing of a sample of the installation in order to examine the thickness of sealant and installation of the backing material.

1.24 DI-ELECTRIC UNIONS

- .1 All connections between steel and copper or brass for pipe 50 mm and smaller shall be made of di-electric unions, except on all closed systems.

1.25 COMPLETION

- .1 Nothing herein contained can be constructed to relieve the Contractor from making good and perfect work in all usual details of construction and in accordance with best standard practice and in strict compliance with provisions of any and all laws and ordinances, and the rules and regulations of any duly constituted public body having jurisdiction over this work.
- .2 This Contractor shall be held responsible to provide and furnish all necessary labour and to bear all expenses incidental to the satisfactory completion of the work.

1.26 RELATED WORK PERFORMED BY OTHERS

- .1 Work of other trades not to be supported from mechanical equipment, pipes or electrical conduits.

1.27 RELATED WORK PERFORMED BY THIS SECTION

- .1 Work of each sub-trade to be supported directly from structure independent of other sub-trades unless prior approval obtained from the Departmental Representative.

1.28 FIELD QUALITY CONTROL

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 Quality Control and submit report as described in Submittal section above.

- .2 All work to be performed by qualified personal or with appropriate training and qualifications in the field in which they are engaged. Apprentices and laborers shall be under the continuous supervision of a qualified tradesperson.
- .3 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 Submittal section above.
 - .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.

2 Products

2.1 Not Used.

3 Execution

3.1 EXAMINATION

- .1 Do not begin installation until sub-strates have been properly prepared.
- .2 Conduct tests according to manufacturer's written recommendations to verify that substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt and other foreign substances capable of impairing bond of fire-stopping.
- .3 Verify that items penetrating fire rated assemblies are securely attached, including sleeves, supports, hangers, and clips.
- .4 Verify that openings and adjacent areas are not obstructed by construction that would interfere with installation of fire-stopping, including ducts, piping, equipment, and other suspended construction.
- .5 Verify that environmental conditions are safe and suitable for installation of fire-stopping.
- .6 If substrate preparation is the responsibility of another installer, notify the Departmental Representative of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- .1 Prepare sub-strates in accordance with the manufacturer's instructions and recommendations.
- .2 Install masking and temporary coverings as required to prevent contamination or defacement of adjacent surfaces due to fire-stopping installation.

3.3 INSTALLATION

- .1 Install in strict accordance with manufacturer's detailed installation instructions and procedures.

- .2 Install so that openings are completely filled and material is securely adhered.
- .3 Where fire-stopping surface will be exposed to view, finish to a smooth, uniform surface flush with adjacent surfaces.
- .4 After installation is complete, remove combustible forming materials and accessories that are not part of the listed system.
- .5 Repair or replace defective installations in accordance with manufacturer's recommendations, listed systems details and applicable code requirements.
- .6 At each through penetration, attach identification labels on both sides in location where label will be visible to anyone seeking to remove penetrating items or fire-stopping.
- .7 Clean fire-stop materials off surfaces adjacent to openings as work progresses, using methods and cleaning materials approved in writing by fire-stop system manufacturer and which will not damage the surfaces being cleaned.
- .8 Notify Authority Having Jurisdiction (AHJ) when fire-stopping installation is ready for inspection; obtain advance approval of anticipated inspection dates and phasing, if any, required to allow subsequent construction to proceed.
- .9 Do not cover fire-stopping with other construction until approval of authority having jurisdiction has been received.

3.4 CLEANING AND PROTECTION

- .1 Remove left over material and debris from Work area. Use necessary means to protect fire protection product(s) before, during, and after installation.
- .2 Touch-up, repair or replace damaged products before Substantial Completion.
- .3 Install identification Labels for Through Penetration: Pressure sensitive self-adhesive vinyl labels, preprinted with the following information:
 1. The words "Warning - Through Penetration Fire-stop System - Do Not Disturb. Notify Building Management of Any Damage."
 2. Listing agency's system number or designation.
 3. System manufacturer's name, address, and phone number.
 4. Installer's name, address, and phone number.
 5. General contractor's name, address, and phone number (if applicable).
 6. Date of installation.

3.5 FIRE-STOPPING

- .1 The Contractor shall provide labeling for each through-the-wall or thru the floor penetration.
- .2 Installation shall be completed by qualified Tradesmen, properly trained by the manufacturer and in accordance with the product listing. In lieu of this, the Contractor shall engage the services of a qualified firm/company to complete the fire-stopping.

APPENDIX A

ONSA #17238

SHOP DRAWINGS

MECHANICAL CONTRACTOR'S REVIEW CONFIRMATION

The Shop Drawings Have Been Reviewed by the Mechanical Contractor and All
Items Are in Conformance with the Plans and Specifications? Yes No

Are Specified Model Numbers and/or Options Indicated? Yes No

If No, Explain: _____

Confirmed by Contractor: _____

(Print Name)

Contractor's Signature: _____

Date: _____

Item: _____

Specification Section and Item Number: _____

Drawing Reference: _____

General Contractor: _____

Mechanical Contractor: _____

Mechanical Contractor's Project Representative: _____

Phone Number: _____ Fax Number: _____ E-mail: _____

END OF SECTION