

1. GENERAL

1.1 Intent

- .1 Provide complete, fully tested and operational process systems to meet requirements described herein and in complete accord with applicable codes and ordinances.
- .2 Contract documents of this Division and Process Drawings are diagrammatic and approximately to scale unless detailed otherwise. They establish scope, material and installation quality and are not detailed installation instructions.
- .3 Follow manufacturer's recommended installation details and procedures for equipment, supplemented by requirements of Contract Documents.
- .4 Install equipment generally in locations and routes shown, close to building structure with minimum interference with other services or free space. Remove and replace improperly installed equipment to satisfaction of the Contract Administrator at no extra cost.
- .5 Install equipment to provide access and ease of maintenance.
- .6 Connect to equipment specified in other Sections and to equipment supplied and installed by other Contractors or by the City. Uncrate equipment, move in place and install complete; start up and test.

1.2 Regulations

- .1 All work carried out under this Division shall be in full accordance with all applicable codes, regulations, by-laws and ordinances and nothing in the plans and specifications shall remove this responsibility.

1.3 Permits, Fees and Inspections

- .1 Apply for all permits, supply all test certificates and pay all fees to authorities having jurisdiction regarding the installation and inspection of the complete process systems, installed under Division 13 of these specifications.

1.4 Existing Conditions and Other Trades

- .1 Visit the site to determine existing conditions affecting the work of this Division. Failure to do so shall not remove the responsibility for the effects of such conditions on the work.
- .2 Examine the Mechanical, Structural, Electrical, and Controls and Instrumentation drawings and become fully familiar with the work of other trades under this contract.
- .3 Maintain the utmost co-operation with all other trades. Particular attention must be paid to the proximity of all electrical cables, control conduits, and utilities to the Work. Maintain maximum clear ceiling heights throughout. Provide connections of sizes as shown on the Drawings for connection by other trades.

1.5 Materials

- .1 Materials and equipment installed shall be new, full weight and of quality specified. Use same brand or manufacturer for each specific application.

1.6 Scope of Work

- .1 Refer to Section 01010 for the scope of work. The work requires the supply and installation of such components as are necessary to construct complete functional and operational systems for all sections of the work.
- .2 Consideration will not be granted for any alleged misunderstanding of the extent of the work to be performed. Tendering a proposal shall convey full agreement to all items and conditions specified, indicated on the drawings, and/or required by the nature of the site.

1.7 Discrepancies and Omissions

- .1 These specifications shall be considered as an integral part of the Drawings, which accompany them, and neither the Drawings nor Specifications shall be used alone. Any items or subject omitted from one but which is mentioned and/or indicated in the other shall be considered as properly and sufficiently specified and shall therefore be provided.
- .2 Should the contractor find discrepancies or omissions in the contract documents, or be in doubt as to the intent thereof, he shall immediately obtain clarification from the Contract Administrator.

1.8 Transportation and Hoisting

- .1 Assume responsibility for hoisting, warehousing, and demurrage for all equipment and materials to be furnished under other supply contracts.
- .2 Assume responsibility for transportation, hoisting, warehousing, and demurrage for all equipment and materials to be furnished and installed under this Division.

1.9 Definitions and Interpretations

- .1 Where the term "Provide" is used herein, it shall be understood to include labour, materials, and services necessary to supply, install and make functional the items or work referenced.
- .2 Where the term "Instructions" or "As Instructed" or "Where Instructed", etc. is used herein, it shall be understood to mean as instructed in writing by the Contract Administrator.
- .3 Where the term "Listed" is used herein, it shall be understood to mean that the materials or equipment have been tested in accordance with applicable standards and methods, have been approved and listed for the intended use by a testing authority which itself has been approved by the authorities having jurisdiction.
- .4 Where the term "Approved", "Approval", etc. is used herein, it shall be understood to mean approved by Authorities having jurisdiction as conforming to Codes, Standards, By-Laws, etc.

- .5 Where the term “Acceptable” or “Acceptance”, etc. is used herein, it shall be understood to mean acceptable to the Contract Administrator as conforming to the requirements of the contract documents.
- .6 Where the term “Submit for Review” is used herein, it shall be understood to mean submit to the Contract Administrator.
- .7 Where the term “Subject to Review” etc. is used herein, it shall be understood to mean work shall be laid out for review by the Contract Administrator. No work shall proceed until written instructions have been obtained from the Contract Administrator. Submit further information, shop drawings, samples, etc. as specified and/or as may be reasonably requested by the Contract Administrator.
- .8 Where the term “Accessible” is used herein, it shall be understood to mean readily approachable by person or tools as required and where obstacles may be removed and replaced without cutting or breaking out materials.
- .9 Where working pressure or pressure ratings are specified or shown on the Drawings for valves, piping, fittings, equipment, etc., these items shall be suitable for operating at specified pressures and corresponding temperature unless noted otherwise.

1.10 Shop Drawings

- .1 Refer to Section 01300 for the general requirements for shop drawings.
- .2 For specific requirements for shop drawings for various pieces of equipment, refer to the relevant specific sections describing the equipment.
- .3 Shop drawings shall be complete; capable of illustrating fully that the product to be supplied is in accordance with the specifications; including design considerations, materials, and accessories and spare parts. Include wiring diagrams for power supply and control schematics for all electrically powered and/or controlled equipment.
- .4 Shop drawings, which are not considered complete, will be returned to the Contractor “Not Reviewed” or “Rejected”. It is the responsibility of the Contractor prior to submittal to ensure that they are in accordance with the requirements of the specifications.
- .5 Submit shop drawings in an expedient fashion.
- .6 Shop drawings of equipment supplied under other contracts will be made available to the Contractor to assist in the installation.

1.11 Coordination

- .1 Coordinate with other Divisions the location of openings, housekeeping pads and anchor bolts.
- .2 Coordinate the connection of the services of other Divisions to the equipment and material supplied under this Division.

- .3 Coordinate the supply of equipment provided by other supply contracts with the supply and installation of materials provided under this Division.

1.12 Minor Changes

- .1 Equipment and materials shall be located and arranged generally as shown on the Drawings. However, minor changes may be required to suit the precise requirements of the actual equipment or materials supplied, or to avoid conflict between services.
- .2 Prior to the installation of the relevant equipment or materials, the Contractor shall advise the Contract Administrator of the requirement for any minor changes and shall undertake such minor changes as instructed by the Contract Administrator. Such changes shall be undertaken at no extra cost except where the connection or arrangement is modified in length, or alignment, or position, by more than one metre; or if the change involves the addition of more than two fittings greater than 150 mm in diameter.

1.13 Housekeeping Pads

- .1 Housekeeping pads are required for all pieces of equipment unless otherwise noted. Dimensions shown on the drawings are for guidance only. Housekeeping pads shall be at least 150 mm larger than the equipment base plate(s) and 350 mm deep, unless greater or lesser depths are required to support the equipment at the proper elevation. The final housekeeping pad dimensions shall be based on the dimensions of the actual equipment to be installed, and the manufacturer's recommendations.
- .2 This division shall coordinate the location and installation of all the housekeeping pads, to be done by other Divisions.

1.14 Metric Conversion

- .1 All units in this division are expressed in SI units.
- .2 Submit all shop drawings and maintenance manuals in SI units.
- .3 On all submittals (shop drawings etc.) use the same SI units as stated in the specification.
- .4 Equivalent Nominal Diameters of Pipes - Metric and Imperial:
 - .1 Where pipes are specified with metric dimensions and Imperial sized pipes are available, provide equivalent nominal Imperial sized pipe as indicated in the table, and provide at no extra cost adapters to ensure compatible connections to all metric sized fittings, equipment and piping.
 - .2 When CSA approved SI Metric pipes are provided, the Contractor shall provide at no extra cost adapters to ensure compatible connections between the SI Metric pipes and all new and existing pipes, fittings, and equipment.

EQUIVALENT NOMINAL DIAMETER OF PIPES

Mm	Inches	mm	Inches	mm	Inches
-----------	---------------	-----------	---------------	-----------	---------------

GENERAL PROCESS PROVISIONS

3	1/8	65	2-1/2	375	15
6	1/4	75	3	450	18
10	3/8	100	4	500	20
15	1/2	125	5	600	24
20	3/4	150	6	750	30
25	1	200	8	900	36
30	1-1/4	250	10	1050	42
40	1-1/2	300	12	1200	48
50	2				

1.15 Cutting and Patching

- .1 Provide holes and sleeves, cutting and fitting required for mechanical work. Relocate improperly located holes and sleeves.
- .2 Drill for expansion bolts, hanger rods, brackets, and supports.
- .3 Obtain written approval from the Contract Administrator before cutting or burning structural members.
- .4 Patch building where damaged from equipment installation, improperly located holes etc. Use matching materials as specified in the respective section.

1.16 Substantial and Total Performance

- .1 Prior to Substantial Performance Inspection, provide complete list of items, which are deficient at the time of the substantial performance inspection.
- .2 Perform the following items prior to Substantial Performance Inspection.
 - .1 Make systems capable of operation with alarm controls functional and automatic controls in operation generally, but not necessarily finally calibrated.
 - .2 Make necessary tests on equipment including those required by authorities. Obtain certificates of approval.
 - .3 Complete valve tagging and identify equipment. Paint equipment, piping and install escutcheons.
 - .4 Lubricate equipment as per manufacturer's data.
 - .5 Mail warranty forms to manufacturer. Provide copy of original warranty for equipment which has warranty period longer than one year.
 - .6 Submit Operating/Maintenance Manuals as per Section 01300.

- .3 Prior to Total Performance Inspection provide declaration in writing that deficiencies noted at time of substantial performance inspection have been corrected and the following items completed prior to the total performance inspection:

- .1 Complete final calibration of controls.

- .4 The Contractor shall provide qualified personnel in appropriate numbers to operate the facility until substantial performance is declared.

1.17 Equipment Protection and Clean-Up

- .1 Protect equipment and materials in storage on site during and after installation until final acceptance. Leave factory covers in place. Take special precautions to prevent entry of foreign material into working parts of piping and duct systems.
- .2 Protect equipment with polyethylene covers and crates.
- .3 Thoroughly clean both existing and new piping, ducts and equipment of dirt, cuttings and other foreign substances.
- .4 Ensure that existing equipment is carefully dismantled and not damaged or lost. Do not reuse existing materials and equipment unless specifically indicated.

1.18 Temporary Usage

- .1 Usage by the City of any process device, apparatus, machinery or equipment prior to Total Performance being issued is not to be construed as acceptance.

1.19 Ductwork Cleaning

- .1 Protect all existing supply, exhaust and return air openings with temporary filters (minimum 20% filters equal to Farr 20/20, 25 mm thick).
- .2 At completion of project, remove all temporary filters and replace all existing air handling unit filters. At the Contract Administrator's discretion, turn the air handling unit filters over to the City, rather than installing in the units.
- .3 If, in the Contract Administrator's opinion, the existing ductwork has been made dirty by completion of the project, vacuum duct systems as indicated by the Contract Administrator.

1.20 Painting and Identification

- .1 Coordinate colour coding of piping and equipment with that of the existing plant. All piping and equipment is to be painted.
- .2 Legend and direction of flow arrows shall consist of adhesive backed labels, yellow colour, with minimum 20 mm high black lettering equal to Brady System B-500, vinyl cloth labels for non-insulated surfaces; and Brady B 946 for insulated surfaces.

- .3 Identify piping with labels, colour bands, and flow arrows. Provide identification at 15 m maximum intervals, before and after pipes pass through walls, at all sides of tees, behind access doors and in equipment rooms as required.

1.21 Acceptable Products and Acceptable Manufacturers

- .1 The first product specified in a product list is considered the “Design Standard” unless noted otherwise. The Design Standard is taken to mean that product has been used as the basis for design. Dimensions, operating protocol, basic materials, etc. have been incorporated in the design.
- .2 Where one or more Acceptable Products or Acceptable Manufacturers have been listed for an item of equipment, these are accepted as equivalent in concept to the Design Standard, if a Design Standard is listed. Incorporation of equipment options to satisfy the intent of the Specifications such that the process system would function as intended with the Design Standard is the responsibility of the Contractor. Modifications to the equipment services, supports, structure, etc., to suit acceptable products shall be the responsibility of the Contractor.
- .3 It remains the responsibility of the Contractor to ensure the products supplied are equal to the specified products in every respect, operate as intended, and meet the performance specifications and physical dimensions of the specified product.
- .4 The Contractor shall be fully responsible for any additional work or materials, to accommodate the use of equipment from the acceptable manufacturers and suppliers’ list.
- .5 Submit within 14 days of contract award a copy of the list underlining the name of the manufacturer whose price was carried in the tender. If no manufacturers names are submitted, it will be assumed that the price carried in the tender was that of the specified manufacturer or where the specified product is generic, the first acceptable manufacturer listed for each item and equipment.

1.22 Delivery Schedule

- .1 The Contractor is to co-ordinate the equipment and material delivery schedule with the suppliers of the equipment and materials supplied under this Contract to suit the construction schedule. The dates for delivery shall be identified within twenty (20) working days of contract award. These delivery dates may be altered by mutual agreement between the Contractor and the Contract Administrator.

1.23 Delivery

- .1 The Contractor shall be responsible for unloading the equipment and materials supplied under this Contract and shall examine all packages on delivery, compare with the shipping list, and inform the supplier, the Contract Administrator and the carrier of any visible damages or defects. The Contractor shall arrange with the supplier to have the supplier replace any damaged or defective items.

1.24 Storage

- .1 The Contractor shall provide temporary buildings and covered space for storage at the site of all equipment prior to installation. The location of such building will be acceptable to the Contract Administrator and the City.
- .2 Pipe and any other materials shall be stored in a manner, which prevents rust, deformation, weathering or any other physical deterioration. Covered space shall be provided if necessary to provide for this protection.
- .3 The Contractor shall adhere to the manufacturers' storage recommendations.
- .4 Heated covered storage space shall be provided for sensitive items of equipment such as motors, pumps, as well as other equipment or supplies specified in this Division or other Divisions.

1.25 Spare Parts and Special Tools

- .1 If spare parts or special tools are to be provided with any equipment specified, the specific parts or tools will be listed in the relevant specification section and are to be supplied with the equipment.
- .2 Where the operation of the equipment for a period of two years would require that some specific spare parts are likely to be required, but are not listed in the Specification, the Contractor shall so inform the Contract Administrator. Costs, delivery periods, and any other information relevant to the procurement of the identified spare parts shall be identified.
- .3 Where some specific special tools are required for the maintenance and/or operation of a specific item of equipment, but are not listed, the Contractor shall so inform the Contract Administrator. Costs, delivery periods, and any other information relevant to the procurement of the identified special tools shall be provided.
- .4 This clause does not relieve the Contractor of the responsibility to provide, at no cost, any spare parts required during the warranty period to repair malfunctioning or failed equipment. At the end of the maintenance period, the spare parts inventory shall be replenished to allow for the above.

1.26 Abbreviations

- .1 The following abbreviations are found in the Process Specifications:

ABFMA	American Bearing Fabrication and Manufacturer Association
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BS	British Standard
CGSB	Canadian Government Standards Board
CSA	Canadian Standards Association.
DIN	Deutsche Industry Norm
MSS	Manufacturer's Standardization Society of the Valve and Fittings Industry

END OF SECTION