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| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | September 30, 2009 | Review/update of the document “Related Sections” |
| 3 | January 13, 2010 | Suppliers’ updates and minor editing |
| 4 | June 14, 2011 | Formatting change at 2.1 |
| 5 | May 10, 2013 | First Draft – Consolidated Comments Spec Update Project |
| 6 | June 17, 2013 | Finalized for Legal Review. Incorporation of new Commissioning and Computerized Maintenance Management System Data Requirements Specification cross references. |
| 7 | April 1, 2014 | Revised to incorporate Legal Services’ comments |
| 8 | May 28, 2014 | Final revision (AV) |
| 9 | July 15, 2014 | Amended to reflect changes related to commissioning specification and name change (AV) |
| 10 | September 24, 2014 | Updated, Finalized Specification – Reference eDOCS #1029456-v8 (AV) |
| **11** | **March 2, 2015** | **Updated, Finalized Specification – Legal Reference eDOCS #5043362 v13 (AV)** |
| 12 | January 12, 2016 | Updated with standard reference for ASTM D2996-15 (AV) |
| 13 | January 15, 2017 | Updated standards references. Updated the Acceptable Manufacturers list to include Unisorb. Deleted minor component references. (CPD PMO, OMM) (AV) |
| 14 | November 9, 2017 | Refined Approved Equipment List (AAM) |
| 15 | March 12, 2019 | 1.3.1.2 Added wind load  1.5.2 Added submittal requirements  2.1.1 Revised list  2.2.1 Revised list  2.2.2 Removed Carbon Filter Manufacturers  2.4 Added performance requirements  2.5 Added and removed requirements  2.9 Added requirements  (BM) |

NOTE:

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**The on-line copy is the current version of the document.**

# GEneral

## Scope of Work

### This work of this Section includes the work necessary to furnish and install, complete, the activated carbon odor control systems shown on the Contract Drawings. The systems consist of adsorber vessels, activated carbon, carbon support, air inlet nozzles with blind flanges, air exit nozzles with attached vent hood, caustic fill and drain nozzles, manometers, and necessary accessories.

## Related Sections

### *[Under "Related Sections", identify other Sections that are related to, and/or dependent on, the work results or information specified elsewhere. The list should be limited to Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance Section, a cross-reference would be appropriate in the finish hardware Section. The purpose of this cross-referencing is for information only, to aid in finding those other requirements—not to define the scope of the Section.*

### *Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple Sections and which must meet certain performance requirements as an assembly or system.*

### *This Section is to be completed/updated during the design development by the Consultant. If it is not applicable to the section for the specific project it may be deleted.]*

### *[List Sections specifying installation of products supplied but not installed under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Execution requirements for ...[item]... specified under this Section.

### *[List Sections specifying products installed but not supplied under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Product requirements for ...[item]... for installation under this Section.

### [List Sections specifying related requirements.]

#### Section 01250 – Substitutions

#### Section 01300 – Submittals

#### Section 01425 – Computerized Maintenance Management System Data Requirements

#### Section 01430 – Operation and Maintenance Data

#### Section 01640 – Manufacturer’s Services

#### Section 01810 – Equipment Testing and Facility Commissioning

#### Section 01820 – Demonstration and Training

#### Section 01600 – Material and Equipment

#### Section 09900 – Painting and Protective Coatings

#### Section 11010 – Equipment General Requirements

#### [Division 13 SCADA and Instrumentation – insert applicable specifications]

## References

### Comply with the latest edition of the following statutes, codes, standards, and all amendments thereto:

#### American Society for Testing and Materials (ASTM):

##### ASTM D2563-08 ((2015), Standard Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts.

##### ASTM D2584-11, Standard Test Method for Ignition Loss of Cured Reinforced Resins.

##### ASTM D2854-09(2014), Standard Test Method for Apparent Density of Activated Carbon.

##### ASTM D2867-09(2014), Standard Test Methods for Moisture in Activated Carbon.

##### ASTM D2996-15, Standard Specification for Filament-Wound “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.

##### ASTM D3299-10, Standard Specification for Filament-Wound Glass–Fiber-Reinforced Thermoset Resin Corrosion- Resistant Tanks.

##### ASTM D3467-04(2014), Standard Test Method for Carbon Tetrachloride Activity of Activated Carbon.

##### ASTM D3802-16, Standard Test Method for Ball-Pan Hardness of Activated Carbon.

##### ASTM D4097-01(2010), Standard Specification for Contact-Molded, Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.

#### National Building Code – Zone 2 *[Consultant to confirm zone]* for seismic hazard calculations and wind load calculations for outdoor installations.

## Definitions

### *[Consultant to specify relevant definitions]*

## Submittals

### General

#### Like items of equipment specified in this Section shall be the end products of one manufacturer in order to achieve standardization of appearance, operation, maintenance (which includes job plans and frequencies of all types of maintenance), spare parts, and manufacturer's services. All other required information as detailed in the equipment information template shall be submitted in an electronic format suitable for upload to the Region’s CMMS (Maximo) as defined by Section 01430 – Operation and Maintenance Data. Refer to Section 01425 - Computerized Maintenance Management System Data Requirements.

#### Refer to the General Conditions and Supplementary Condition of the Contract and Division 1 - General Requirements for additional information and requirements that apply to the work specified in this Section and are mandatory for this Contract.

### Action Submittals

#### Submittals during construction shall be made in accordance with Section 01300 - Submittals. In addition, the following information shall be provided:

##### Resin manufacturer's certificate.

##### Seismic and structural calculations, including material property test data.

##### Activated carbon manufacturer's certificate.

##### Carbon samples and specifications.

##### Design air flow, design EBCT and all specific components on carbon design life and limiting factors.

##### Warranty information.

##### Delivered carbon specification sheets.

##### Factory Acceptance Test certification.

##### Catalogue information, descriptions, specifications, layouts, sketches and other information sufficient to clearly and readily demonstrate compliance with all parts of the Specifications and Contract Drawings; include bird screen/rain hood sketch, and similar accessories.

##### Dimensional and weight information on separate components and assemblies.

##### A list of the three most recent installations where similar equipment by the manufacturer is currently in service; include copies of the shop drawings, contact name, telephone number, mailing address, and the names of the Consultant, municipality or region, and installation contractor; if three installations do not exist, the list shall include all that do exist, if any.

##### The Contractor shall provide test results, by an independent laboratory acceptable to the Consultant, completed within the last 6 months, that indicate that the carbon that is intended to be supplied shall meet all the specifications of this Section and the performance requirements for odour control as stated in the Contract Documents. The Contractor shall bear all associated costs of testing by an independent laboratory acceptable to the Consultant and replacement of the carbon in the event the media fails to meet odour removal performance requirements.

##### Chemical regeneration procedure.

##### A copy of the fibreglass fabrication Quality Assurance procedures intended to be used. Protective coating required for outdoor installations.

##### Manufacturers submitting proposals for equipment that would require changes in the design shall also include detailed information on structural, electrical, mechanical, and other miscellaneous modifications necessary to adapt their equipment to the arrangement shown on the Contract Documents.

### Information Submittals

#### Preparation for Shipping

##### Valves and manometers specified in this Section shall be shipped separately from the vessels to be installed at the Site.

##### The manufacturer's recommendations on shipping and handling shall be followed. The shipping and handling procedures, as recommended by the society of the plastics industry's Recommended Practice for Shipping and Installation of Reinforced Plastic Tanks as described in ASTM D2996, D3299 and D4097, shall also be followed.

#### A manufacturer's certificate of proper installation.

#### Operation and Maintenance Manual and Maintenance Summary: Provide an Operation and Maintenance Manual and Maintenance Summary in conformance with the requirements of Section 01430 - Operation and Maintenance Data. Refer to Section 01425 - Computerized Maintenance Management System Data Requirements.

#### *[Include any quality control or information submittals in this Section]*

## Extra Materials

### *[Include any addition materials required in this Section (Special maintenance equipment, etc.)]*

## Special Guarantee

### *Warranty should not be contingent on using manufacturer’s proprietary media.*

### *[Include information of special guarantees if difference from the client’s standard warranty.]*

## Measurement and Payment

*[Choose one of the following payment language provisions that best suits the individual project.*

*If this Section is not specifically referenced by an item in the Bid Form, please use the following language:*

.1 The work of this Section will not be measured separately for payment. All costs associated with the work of this Section shall be included in the Contract Price.

*OR If this Section is specifically referenced in the Bid Form, use the following language and identify the relevant item in the Bid Form:*

.1 All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in the Bid Form.

### *If the work of this Section is to be measured and paid for by several different methods, please amend the standard wording given above to reflect the different methods of measurement and payment.]*

# PRODUCTS

## General

### The equipment furnished (exclusive of carbon) shall be the product of one of the following manufacturers:

#### Continental Carbon Group.

#### Unisorb Canada Ltd.

#### Circul-Aire Inc.

#### TIGG Corporation.

#### PureAir Filtration.

#### AAF Flanders.

#### Approved Equivalent.

### The use of these manufacturer's names is for the purpose of establishing the standard of quality and general configuration desired. Products of other manufacturers will be considered in accordance with the General Conditions of the Contract.

## Acceptable Manufacturers

### Carbon Media Manufacturers

#### The carbon media shall be manufactured by one of the following manufacturers:

##### Continental Carbon Group.

##### Unisorb Canada Ltd.

##### Circul-Aire Inc.

##### TIGG Corporation.

##### PureAir Filtration.

##### AAF Flanders.

##### Approved Equivalent.

## Service Conditions

### *[Include service conditions in this subsection.]*

## Performance Requirements

### *[Consultant to provide odour removal performance criteria under design operating range of conditions.]*

### Vessel, Carbon System Performance

#### Shall consist of virgin carbon and impregnated carbon.

#### The maximum head loss, including carbon, from vessel entry to exit shall be:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Vessel Size (meter diameter) | No. of Beds | Flow Rate (L/sec) | Bed Depth | Max Head Loss (mm WC) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## Equipment Description

### Adsorber Vessels

#### The adsorber vessel shall be of rectangular configuration, with multiple media beds, allowing for media beds to be replaced independently.

#### The adsorber vessels shall be filament wound, manufactured in accordance with ASTM D3299. The visual defects, in accordance with ASTM D2563, shall not exceed Level II on the vessel interior and Level III on the vessel exterior. The resin used shall be Hetron 922, Atlac 580, or an approved equivalent suitable for continuous exposure to saturated water vapor, hydrogen sulfide gas, and their associated acidic products. The resin must also be suitable for conditions encountered during regeneration with 50 percent sodium hydroxide at 200 degrees Fahrenheit. A permanent wax containing resin coating, formulated according to the resin manufacturer's most recent recommendations (or other Consultant approved method) shall be used for surface protection and to prevent air inhibition of resin curing. Contact molded accessories shall be manufactured in accordance with ASTM D2996, D3299 and D4097.

#### The completed vessel shall be translucent and shall match the color indicated [on the Finish Schedule.] Provide a sample for Consultant approval prior to fabrication of the vessels. Ultraviolet adsorbers shall be added for outdoor weather protection. No thixotropic additives are to be used. The vessel shall be suitable for withstanding the temperature experienced during regeneration. A certificate from the resin manufacturer listing the nomenclature, composition, and characteristics of the resin shall be furnished with the vessel.

#### In addition, an inner corrosion barrier shall be provided consisting of a minimum of three laminated layers. The inner corrosion layer shall be resin rich, not to exceed 20 percent plus or minus 5 percent glass by weight, and a minimum thickness of 0.250 to 0.375 mm. The inner corrosion layer shall be followed by a minimum of two layers of chopped strand mat or two passes of chopped roving with a total of 915 grams per square metre. Should the chopped roving technique be employed, the chopped fibres shall be 13 mm to 50 mm in length. The total corrosion barrier shall total 2.5 mm minimum thickness and be 27 percent plus or minus 5 percent glass by weight.

#### The structural aspects of the vessel shall be sufficient to meet relevant national and/or provincial building code recommended requirements, including seismic requirements for Zone [2] for all conditions during the design life. The manufacturer shall include with the shop drawings, detailed calculations illustrating the seismic characteristics of the proposed vessels. Calculations shall be signed and stamped by a registered engineer licensed to practice in the Province of Ontario.

#### All material property values used for structural calculations shall be verified by actual physical tests on similar type laminates. Submit test data with all structural calculations.

#### In addition to the above requirements, the adsorber vessel shall have an average glass content of 55 percent plus or minus 5 percent by weight in accordance with ASTM D2584.

#### Tie down lugs and lifting lugs shall be integrally molded into the walls of the vessels.

#### The adsorber vessel shall be complete with integral carbon screen and support ledge, tie down arrangement, access man-ways, air inlet connection, air outlet, manometer assembly, a fill connection, a drain connection, sample port nozzles, and all necessary accessories [as shown on the Contract Drawings.] All exhaust air shall leave the vessel at the top. Provide sufficient access man-ways so that all internal parts can be easily removed from the vessel at ground level. All metal parts shall be Type 316 stainless steel with no metallic parts contacting the carbon except for grounding purposes.

#### Access man-way covers shall be airtight at the pressure equal to or higher than the corresponding fan static pressure and water tight under regeneration conditions. [The size and configuration of the vessel shall be as shown on the Contract Drawings.] The fabrication details and materials of the components shall be included in shop drawings, and submitted for approval before fabrication.

#### Each adsorber vessel shall be furnished to accommodate activated carbon beds [as shown on the Contract Drawings.] The beds shall be supported on a polypropylene screen and fibreglass grating. Screen and grating must be removable through access man-ways. The grating and its support ledge shall be capable of supporting the load imposed by 1 metre of activated carbon as specified in the Contract Documents, saturated with sodium hydroxide having a specific gravity of 1.5, plus a person load of 91 kilograms located anywhere on the grating. Each activated carbon bed shall be grounded with a 316 stainless steel rod to prevent static electricity from accumulating. A pre-drilled and tapped copper grounding pad shall be located on external vessel walls [as shown on the Contract Drawings.] Connection to the grounding system shall be performed by a competent Subcontractor experienced in such work and approved by the Consultant. *[Calculations or data shall be submitted with the shop drawings demonstrating that the manufacturer's proposed grounding scheme is adequate.]*

#### The manufacturer, after fabrication is complete, shall submit to the Consultant all tank wall nozzle cutouts. These cutouts shall be labeled in accordance with the submittal drawings. All cut walls shall be reinforced as required by service conditions. Press molded or compression molded flanged nozzles are not acceptable.

#### Health and safety aspects of the equipment are to be documented and provided to the Consultant with respect to maintenance, media change-out and other critical activities. Such documentation shall be uploaded to the Region’s CMMS (Maximo). Refer to Section 01425 - Computerized Maintenance Management System Data Requirements.

### Regeneration Provisions

#### FRP blind flanges, with gaskets, constructed to the same standards as the vessels shall be provided for use on all flanged openings. Gasket material shall be suitable for use in a caustic environment.

### Activated Carbon

#### Activated carbon shall be virgin, granular, derived from bituminous coal, vapor phase type impregnated with sodium hydroxide, suitable for control of sewage treatment plant odors. The carbon may be impregnated with a chemical different than sodium hydroxide. If the chemical is different than sodium hydroxide, all vessel materials shall be compatible with sodium hydroxide and the recommended regeneration chemical. The carbon shall have the following performance specifications:

|  |  |
| --- | --- |
| Total quantity, kg 1. |  |
| CCl4 number, percent by weight, minimum (in accordance with ASTM D3467) as performed on substrate carbon |  |
| Hardness number, minimum (in accordance with ASTM D3802) |  |
| Maximum moisture content, percent by weight (in accordance with ASTM D2867) |  |
| Apparent density, minimum (in accordance with ASTM D2854) |  |
| Maximum head loss through bed at 15 metres per minute linear velocity, mm. water/m bed depth 2. |  |
| H2S breakthrough capacity, minimum 2. 3. |  |
| 1. Based on the maximum density of **[540]** kg/m3 (in accordance with ASTM D2854). The quantity in pounds shown is only approximate. The carbon manufacturer shall provide sufficient carbon to fill the carbon vessels to the levels shown on the Contract Drawings.  2. Pressure drop shall be determined by passing dry air at 21 degrees Celsius and 1 atmosphere pressure through a 50 mm diameter by 300 mm deep bed of carbon placed in a dense packed arrangement in accordance with ASTM D2854.  3. The determination of H2S breakthrough capacity shall be made by passing a moist (85 percent relative humidity) airstream containing 0.1 percent H2S at a rate of 1,450 cc/min through a 19 mm diameter by 225 mm deep bed of uniformly packed activated carbon and monitored to 50 ppm breakthrough. Results are expressed in grams H2S removed per cubic centimetre of carbon. | |

#### The system manufacturer shall be responsible for any infringement of any claim of any patent due to the supply, manufacture, use, or regeneration of any carbons, equipment items, technologies, etc., in this Section.

## Electrical Components

### *[Include electrical components in this Section, if applicable.]*

## Motors

### *[Include motor data in this Section if applicable. Reference data sheets if applicable.]*

## Controls

### *[Include control information in this Section, if applicable.]*

## Accessories

### Absorber Vessel Accessories

#### Equipment Identification Plates: A 16 gauge stainless steel identification plate shall be securely mounted on the equipment in a readily visible location. The plate shall bear the 1/4 inch die stamped equipment number indicated in this Specification.

#### Lifting Lugs: Equipment over 45 kg in weight shall be provided with lifting lugs.

#### Anchor Bolts and Tie down Lugs: All anchor bolts shall be provided. Anchor bolts and tie down lugs shall be Type 316 stainless steel. Coordinate required size with final shop drawings.

### Instrumentation and Control Fixtures

#### Manometers: Manometer shall be well type with colored light weight oil (that is compatible with hydrogen sulphide), for stationary use suitable for outdoor location, wall mount hardware. The range shall be 0 mm to 400 mm of water. Scale shall have 2.5 mm water column divisions. Tubing shall be bonded to a solid acrylic plastic block that contains safety traps. Provide two 3 mm pipe thread to tube adapters, and 6 mm stainless steel ball valves. Manometer shall provide 3% accuracy of full scale as a minimum.*[Consultant to amend performance requirements]*. Ball valves shall be two way, 6 mm orifice *[Consultant to amend performance requirements]*.

#### Sampling Ports: Each adsorption unit shall have three 25 mm diameter sample ports which extend into the carbon bed 1 foot minimum, suitable for extracting carbon samples. Provide one grain thief that is capable of extracting a core sample of the in place carbon through the sample ports. Ports shall be adequate to provide suitable extraction of air samples from the carbon bed and be non-blinding. Each port nozzle shall extend outside the vessel wall and be blocked off with a 25 mm ball valve. Ball valve shall be CPVC as manufactured and resistant to corrosion and attack from known substances affecting the odour control system*[Consultant to amend performance requirements]*.

#### Two additional ports required, one for the inlet to the vessel and one for the exhaust stack.

## Shop Fabrication

### Painting

#### Shop painting shall be the manufacturer's standard shop paint.

### *[Include any additional requirements for shop fabrication in this Section.]*

## Source Quality Control

### Factory Acceptance Testing

#### All equipment shall be factory tested for compliance with the requirements specified in this Section, and a certification of the results of these tests shall be submitted to the Consultant upon delivery. In addition, the following tests shall be performed:

##### At least two burn tests (from nozzle cutouts) shall be performed on each vessel to verify glass/resin ratio.

##### The first vessel of each size shall have a full hydrostatic atmospheric leak test (zero leakage allowed).

##### Design strain shall be verified by strain gauge testing during the hydrostatic test.

##### Testing for active compound designed for removal at design conditions.

### Equipment Inspection

#### The [manufacturer of the equipment specified in this section] [Contractor] shall retain and pay for the services of an independent FRP inspector (the “Inspector”), or shall designate at least one employee as inspector, for the purpose of on Site inspections during fabrication of the absorber vessels. The firm-retained or employee, hereinafter called the Inspector, shall witness every step of equipment fabrication. The Inspector shall have at least 10 years of FRP fabrication experience.

#### The [Contractor] [vessel manufacturer] shall prepare a schedule stating the manufacturing location, starting times, completion times, and intermediate milestones for each vessel. The schedule shall be submitted to the Consultant 28 calendar Days before the start of manufacturing any equipment. The Inspector shall keep a daily log of all activities performed and the progress of each vessel. The Inspector shall submit to the Consultant a weekly report summarizing the weekly activities, including an updated schedule of the next three weeks' activities, plus a copy of the daily log for each day of the week. If the Inspector does not witness any step of the fabrication process, the equipment in question shall be rejected. The Inspector shall be supervised by a registered professional engineer licensed to practice in the Province of Ontario. The Inspector shall submit to the Consultant stamped reports of the manufacturing progress every three weeks. The Inspector shall remain on Site and be present at each fabrication step between the time of the day before the first equipment is started until the day after the last equipment is shipped to the Site.

#### Each piece of equipment delivered shall have a transmittal letter, signed by the Inspector, that notes that the equipment has met the specifications of this Section. The transmittal letter shall contain copies of all test results performed on the vessel and shall be accompanied by all vessel cutouts. Any equipment shipped to the Site not accompanied by such a letter will not be accepted.

#### The manufacturer shall allow the Consultant complete access at all times to the parts of its facility that contain equipment to be supplied under this Specification.

#### If the Inspector is more than five Working Days late with the weekly report or found not to be keeping current records, all equipment in progress will be rejected. The Contractor shall submit, with the Construction Schedule, the following information for each person who will be used as an Inspector:

##### The Inspector's resume.

##### A signed statement that the Inspector will have no other duties than inspecting the equipment specified under this Section.

##### A signed statement that the Inspector does not report to or is not supervised by any personnel involved in the production of the equipment specified under this Section.

# EXECUTION

## General

### *[Include general execution information in this section if required.]*

## Installation

### *[Include any special installation requirements or directions in this Section.]*

## Painting

### Shop painting (prior to equipment delivery to the Work Site) shall be in accordance with the manufacturer's standard. Final field painting (when on the Work Site) shall be in accordance with and as specified in Section 09900 - Painting and Protective Coatings.

## Field Quality Control

### Carbon Performance Verification Procedure

#### Carbon Testing: All carbon testing shall be done by a laboratory approved by the Consultant. If a tested carbon sample fails to meet the specifications, all subsequent testing shall be paid for by the Contractor. The carbon testing report shall be approved by the Consultant and signed off by the Region and shall be in a format suitable for upload into the latest Region of York Environmental, Health and Safety and Quality Management system (Intelex).

#### Preliminary Performance Verification: The Contractor shall furnish within 60 days after Contract execution, a certificate from the carbon manufacturer certifying that its proposed activated carbon will meet the above specifications. In addition, separate 20 litre representative samples and specification sheets of both the carbon substrate and the impregnated carbon to be supplied shall be submitted at the same time to verify the performance specifications of the proposed carbon.

#### Testing of Delivered Carbon:

##### Each lot of activated carbon delivered to the Site shall be accompanied by an analysis sheet of the measured characteristics of the carbon in that lot. Random samples of the delivered carbon will be selected by the Consultant for testing to ensure product quality and performance.

##### If a random sample fails to meet the specifications of this Section, the Contractor shall have the option of removing the lot of carbon off the Site within 48 hours of notification or retesting another random sample at its sole expense. If the retest fails, the lot of carbon shall be removed within 48 hours of notification. Under no circumstances will more than one retest be allowed. *[If any random sample fails to meet the specifications, each delivered lot will be tested at the Contractor's expense.]*

#### Refer to Section 01810 – Equipment Testing and Facility Commissioning for details on all commissioning requirements.

## Manufacturer’s Services

### The Contractor shall ensure that a manufacturer's representative for the equipment specified in this Section will be present at the Site or the classroom designated by the Region for the minimum number of Person-days listed for the services below, travel time excluded:

#### 10 Person-days during construction for installation assistance, inspection, and certification of the installation.

#### 1 Person-day for classroom or Site training.

#### 2 Person-days for functional testing and plant startup.

### Services shall be at such times as requested by the Region.

### The Contractor shall ensure that the training will be performed by a technically competent person who may be videotaped by the Region’s staff during the session. Taped sessions will be used for refresher training or for training Region staff absent from the original training session.

### See Section 01820 – Demonstration and Training

### See Section 01640 - Manufacturers' Services in Division 1, General Requirements.

## Supplements

### The supplement(s) listed below, attached following End of Section, forms part of this Section:

#### *[List the applicable supplements and data sheets to be attached to this Section.]*

**END OF SECTION**