

PART 1 - GENERAL

- 1.1 REFERENCES .1 Canada Green Building Council (CaGBC)
.1 LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for equipment and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Newfoundland and Labrador, Canada.
.2 Indicate on drawings:
.1 Mounting arrangements.
.2 Operating and maintenance clearances.
.3 Shop drawings and product data accompanied by:
.1 Detailed drawings of bases, supports, and anchor bolts.
.2 Acoustical sound power data, where applicable.
.3 Points of operation on performance curves.
.4 Manufacturer to certify current model production.
.5 Certification of compliance to applicable codes.
.4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

- .4 Sustainable Design Submittals:
 - .1 LEED Canada submittals: in accordance with Section 01 35 21 - LEED Requirements.
 - .2 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.
 - .3 Building Energy and Water Consumption: submit Measurement and Verification Plan following IPMVP for monitoring end-uses as follows (but not limited to):
 - .1 Lighting systems and controls.
 - .2 Constant and variable motor loads.
 - .3 Variable frequency drive (VFD) operation.
 - .4 Condenser efficiency at variable loads (kW/ton).
 - .5 Cooling load.
 - .6 Air and heat recovery cycle.
 - .7 Air distribution static pressures and ventilation air volumes.
 - .8 Building-related process energy systems and equipment.
 - .9 As indicated.
 - .4 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.
 - .5 Regional Materials: submit evidence that project incorporates required percentage 30% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.3 CLOSEOUT
SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for HVAC Equipment for incorporation into manual.
 - .1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
 - .2 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.
 - .3 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
 - .4 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.
 - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
 - .5 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.

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- 1.3 CLOSEOUT SUBMITTALS (Cont'd)
- .2 Operation and Maintenance Data:(Cont'd)
- .5 Approvals:(Cont'd)
- .2 Make changes as required and re-submit as directed by Departmental Representative.
- .6 Additional data:
- .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .7 Site records:
- .1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
- .2 Transfer information daily to reproducibles, revising reproducibles to show work as actually installed.
- .3 Use different colour waterproof ink for each service.
- .4 Make available for reference purposes and inspection.
- .8 As-built drawings:
- .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
- .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
- .3 Submit to Departmental Representative for approval and make corrections as directed.
- .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
- .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .9 Submit copies of as-built drawings for inclusion in final TAB report.
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- 1.4 MAINTENANCE
MATERIAL SUBMITTALS
- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Furnish spare parts as follows:
 - .1 One set of packing for each pump.
 - .2 One casing joint gasket for each size pump.
 - .3 One glass for each gauge glass.
 - .4 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.
 - .3 Provide one set of special tools required to service equipment as recommended by manufacturers.
 - .4 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.
- 1.5 DELIVERY,
STORAGE AND
HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
 - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect equipment from nicks,
 - .3 Replace defective or damaged materials with new.
 - .4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 35 21 - LEED Requirements.
 - .5 Packaging Waste Management: remove for reuse or return of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in
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1.5 DELIVERY,
STORAGE AND
HANDLING
(Cont'd) .5 Packaging Waste Management: (Cont'd)
accordance with Section 01 74 21 -
Construction/Demolition Waste Management and
Disposal and Section 01 35 21 - LEED
Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS .1 HVAC and R Equipment:
.1 Refrigerant:
.1 HFC based refrigerant.
.2 Metering Equipment
.1 As indicated on mechanical and
electrical drawings and as required for
measurement and verification LEED Credit
EAc5.

PART 3 - EXECUTION

3.1 EXAMINATION .1 Verification of Conditions: verify that
conditions of substrate previously installed
under other Sections or Contracts are
acceptable for installation in accordance with
manufacturer's written instructions.
.1 Visually inspect substrate in presence
of Departmental Representative.
.2 Inform Departmental Representative of
unacceptable conditions immediately upon
discovery.
.3 Proceed with installation only after
unacceptable conditions have been remedied and
after receipt of written approval to proceed
from Departmental Representative.

3.2 PAINTING
REPAIRS AND
RESTORATION .1 Do painting in accordance with Section
09 91 00 - Painting.
.2 Prime and touch up marred finished paintwork
to match original.
.3 Restore to new condition, finishes which have
been damaged.

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- 3.3 SYSTEM CLEANING .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.
- 3.4 FIELD QUALITY CONTROL .1 Manufacturer's Field Services:
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
.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.
- 3.5 DEMONSTRATION .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
.2 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.
.3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
.4 Instruction duration time requirements as specified in appropriate sections.
.5 Departmental Representative may record these demonstrations on video tape for future reference.
- 3.6 CLEANING .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
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- 3.6 CLEANING
(Cont'd)
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and Section [01 35 21 - LEED Requirements.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- 3.7 PROTECTION
- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.