

ADDENDUM

PROJECT: Government of Canada Multi-Purpose Training Facility Mechanical Renovation Regina, Saskatchewan	ADDENDUM NUMBER: M-3
PROJECT NO : 05.004.F	DATE : February 16th, 2017

The following amendments to the tender documents shall be incorporated in, and form part of, the tender documents the same as if these had been written into the original tender documents.

REFER TO SPECIFICATIONS

1. Refer to specifications section 21 13 00 "Sprinkler Equipment".
 - a. Add paragraphs 3.1.2 and 3.1.3 as follows:
 - "3.1.2 NFPA 13 does not allow the re-use of used sprinkler heads. Once a sprinkler head has been removed from a pipe or a pipe to which a sprinkler head is attached is removed from a piping system, the sprinkler head may not be reused.
 - "3.1.3 Where piping is removed to facilitate the installation of ductwork or other building equipment or systems, the existing piping may be re-installed (new piping is not required)."
2. Add specifications section 23 23 00 "Direct Expansion Refrigeration Systems" as attached to this addendum.

REFER TO DRAWINGS

3. Refer to Drawing M-0
 - a. Refer to Equipment Schedule, items CU-2, CU-3, and CU-4
 - i. Delete requirement for Metraflex "RAF" connectors. Contractor shall connect refrigerant pipe directly to condensing unit.

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- ii. Condensing units are to come equipped with hot gas bypass valves. Contractor is to provide thermal expansion valves and liquid solenoid valves.
- 4. Refer to Drawing M-3
 - a. Refer to Detail 1
 - i. New louvres serving AHU-2 (type L-1) are to be installed in existing building openings. Confirm size of opening on site prior to ordering louvres.
 - ii. New louvre type L-2 serving AHU-4 requires cutting into existing exterior wall. Install as per Detail 3/M-9.
- 5. Refer to Drawing M-8
 - a. Add Detail 11 as shown on drawing Msk-01, dated February 9, 2017, and issued with this addendum.
 - b. Refer to Detail 9: delete references to "footpads". Mount condensing units on concrete pads. Refer to Drawing Msk-01 attached to this addendum.
- 6. Refer to Drawing M-9
 - a. Refer to Detail 3
 - i. Item in Section View labelled "Concrete block" should be labelled "Concrete block or brick".
 - ii. Note in Exterior Elevation View shall read: "Grind, prime, and paint frame to match existing wall."

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-- END OF ADDENDUM --

PART 1.0 GENERAL

1.1 WORK INCLUDED

- .1 Equipment
- .2 Refrigerant Piping
- .3 Refrigeration Specialties
- .4 Controls

1.2 QUALITY ASSURANCE

- .1 Conform to requirements of ARI, CSA, ULC, ASHRAE, Provincial and Municipal Codes.
- .2 System shall be products of manufacturer regularly engaged in production of refrigeration units and who issues complete catalogue data on such products.

1.3 REFERENCE STANDARDS

- .1 Rating and performance test shall conform to:
 - .1 CSA B52
 - .2 ARI
 - .3 ASME
 - .4 ASHRAE

1.4 SUBMITTALS

- .1 System shop drawings including compressor, condenser, piping, valves, control and accessories for complete system.
- .2 Provide maintenance data for incorporation into maintenance manual.

1.5 DESCRIPTION OF SYSTEM

- .1 Provide complete factory prepackaged, pre-wired and field piped indoor and outdoor units.

1.6 QUALIFICATIONS

- .1 Refrigeration manufacturer shall be regularly engaged in production of specified equipment, and one who issues catalogue information with correction factors where published ratings are based on parameters different from those specified.

1.7 DELIVERY AND STORAGE

- .1 Ship equipment factory dehydrated and sealed with full charge of refrigerant and charge of lubricating oil.

PART 2.0 PRODUCTS

2.1 EQUIPMENT

- .1 Refer to drawings.

2.2 REFRIGERANT PIPING

- .1 Refrigerant piping shall be processed for refrigeration installations, deoxidized, dehydrated, and sealed.
 - .1 Hard copper: to ASTM B280, type ACR.
 - .2 Annealed copper: to ASTM B280, with minimum wall thickness as per CSA B52 and ASME B31.5.
- .2 Fittings
 - .1 Service: design pressure to be a minimum of 2070 kPa and temperature 121°C.
 - .2 Brazed:
 - .1 Fittings: wrought copper to ASME B16.22.
 - .2 Joints: silver solder, 45% Ag - 15% Cu or copper-phosphorous, 95% Cu-5%P] and non-corrosive flux.
 - .3 Flanged:
 - .1 Bronze or brass, to ASME B16.24, Class 150 and Class 300.
 - .2 Gaskets: suitable for service.

.3 Bolts, nuts and washers: to ASTM A307, heavy series.

.4 Flared:

.1 Bronze or brass, for refrigeration, to ASME B16.26.

.3 Flexible connections on piping 10 mm nominal or less shall be made using coiled soft copper tubing. For larger sizes, use seamless flexible bronze hose with bronze wire braid covering. Use factory sealed neoprene jacket unit where freezing may occur.

2.3 PIPE SLEEVES

.1 Hard copper or steel, sized to provide 6 mm clearance around between sleeve and un-insulated pipe or between sleeve and insulation.

2.4 REFRIGERATION SPECIALTIES

.1 Service Valves

.1 Forged brass Class 500 up to 3.5 MPa packless and cast bronze Class 375 up to 2.5 MPa.

.2 Moisture proof seal type for below freezing applications.

.3 Back seated for inspection and replacement under pressure.

.4 Removable seal cap and gauge port for control capillary connections for compressors.

.5 Stop valves 22 mm nominal O.D. or less shall be diaphragm packless type with integral mounting bracket, forged brass bodies and bonnets, globe and angle non-directional type.

.6 Stop valves 28 mm nominal O.D. or larger shall be heavy globe or angle body, positive sealing, self-aligning with heavy nylon disc.

.7 Purge, drain or charging valves shall be angle or globe type with flare or brazing type outlet connection and shall have stem for socket wrench and removable seal cap.

.2 Check Valves

.1 Spring operated, guided piston type with forged brass body in flare connection sizes up to 22 mm nominal O.D.

- .2 Guided piston type, spring operated with bolted bonnet or cover plate in sweat connections 28 mm nominal O.D. and above.
- .3 Strainers
 - .1 Provide drawn brass shell and 0.177 mm mesh monel screen up to 28 mm nominal O.D. Provide larger unit with drawn steel shell and 0.297 mm mesh screen. Strainers shall be suitable for field service without removing housing from line.
- .4 Filter-Driers (where not provided by condensing unit manufacturer)
 - .1 Provide liquid line filter-driers to ARI 710 standards, ULC listed, CSA certified and rated to safe working pressure of 3.5 MPa.
 - .2 Size as indicated, but not less than recommended by equipment manufacturer's nominal tonnage rating for type of refrigerant used.
 - .3 Size 16 mm O.D. or larger shall be replaceable cartridge type and installed as indicated. [Provide isolating and relief valves].
 - .4 Provide suction line filter-driers as per liquid line drier and manufacturer's suction line ratings, with pressure drops rated to refrigerant used and operating suction pressure.
- .5 Mufflers
 - .1 Provide as recommended by compressor manufacturer.
- .6 Oil Separators
 - .1 Provide as recommended by compressor manufacturer and for automatic return of trapped oil to the compressor crank case using float valve. Insulate non-heated separator drum.

PART 3.0 EXECUTION

3.1 INSPECTION

- .1 Upon delivery, inspect components for damage or gas loss and report to the Consultant in writing.

3.2 INSTALLATION

- .1 Provide clearance for service and maintenance to all components.
- .2 Evenly distribute the weight of the system by means of [steel channel] [weatherproof pressure treated timber] structure.

3.3 REFRIGERATION SPECIALTIES

- .1 Valves
 - .1 All valves sizes are to meet the capacity, functional and operating requirements of the refrigeration system.
- .2 Strainers
 - .1 Provide full size strainer ahead of each automatic valve. Where multiple expansion valves with integral strainers are used, install single main liquid line strainer.
 - .2 Provide shut-off valve on each side of strainer to facilitate maintenance.

3.4 FIELD INSTALLED PIPING

- .1 Clean and purge refrigerant lines and fittings.
- .2 When multiple runs are installed, spread pipes 150 mm minimum to allow for expansion and contraction.
- .3 Install straight, parallel and close to walls and ceilings.
- .4 Keep elbows and fittings to minimum.
- .5 Grade horizontal pipe carrying gases 1:240 down in direction of flow.
- .6 Locate double risers in hot gas and suction piping as indicated.
- .7 Locate trap every 4.5 m of vertical rise in any suction riser which is 9 m or more in length.
- .8 Install piping to prevent condensate or oil from flowing back into compressor or evaporator. If required, locate suction accumulator in suction line between evaporator and compressor.

- .9 Connect branch suction lines from top of suction main using wye fitting. Install ancillaries and accessories such as back pressure compensating regulators and back pressure regulators horizontal.
- .10 To avoid interference with services to compressor, do not obstruct view of oil level bulls-eye or run piping to obstruct maintenance.
- .11 Enclose tubing exposed to mechanical injury in rigid or flexible conduit.
- .12 Keep piping joints sealed except when fabricating.
- .13 Limit breakable joints to equipment connections not normally brazed. Limit flared joints to 10 mm O.D. for field assembly and 16 mm O.D. for factory assembly.
- .14 Bleed dry nitrogen into piping when sweating connections.
- .15 Directly connect vibration isolators to compressor and firmly anchor other end.

3.5 FACTORY INSTALLED REFRIGERATION SPECIALTIES

- .1 Install refrigeration specialties as required by equipment manufacturer. Field check all the refrigeration specialties are properly installed and operate according to the specification.

3.6 FIELD INSTALLED REFRIGERATION SPECIALTIES

- .1 Install as required or indicated and as specified.
- .2 Standard accessories shall include ball check isolating valves at receiver sight glass, charging valve for high and low side filter-drier, solenoid valve and thermal expansion valve.
- .3 Provide oil separator with automatic oil return through filter to crankcase, automatic stop valve with bypass valve and external float valve.
- .4 Purge valve to be installed at high point of condenser only for units operated at vacuum suction pressure.
- .5 Install dehydrator assemblies with three valves.
- .6 Liquid/suction heat interchangers as indicated shall be shell and finned coiled interchangers pitched at approximately 15° angle with oil returned to suction line through metering needle valve, solenoid valve and liquid indicator.

3.7 FIELD QUALITY CONTROL

- .1 Perform leak test before evacuating system. Meet requirements of CSA B52 but not less than a gauge pressure of 2 MPa high side and 1 MPa low side. Use refrigerant gas as tracer with dry nitrogen to develop pressure. Compressors with refrigerant holding charge shall remain isolated from system. Protect accessories when performing test.
- .2 Build 35 kPa initial refrigerant pressure in high and low side and add dry nitrogen to field test pressure. Test for leaks with electronic halide detector.
- .3 Repair leaks and retest.

3.8 BRAZING PROCEDURES

- .1 Bleed inert gas into pipe during brazing. Remove valve internal parts, solenoid valve coils, sight glass. Do not apply heat near expansion valve and bulb.

3.9 PIPING INSTALLATION

- .1 General:
 - .1 Hard drawn copper tubing: do not bend. Minimize use of fittings.
- .2 Hot gas lines:
 - .1 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.
- .3 Provide trap at base of risers greater than 2400 mm high and at each 7600 mm thereafter.
- .4 Provide inverted deep trap at top of risers.
- .5 Provide double risers for compressors having capacity modulation.
 - .1 Large riser: install traps as specified above.
 - .2 Small riser: size for 5.1 m/s at minimum load. Connect upstream of traps on large riser.

3.10 FACTORY DEHYDRATION AND CHARGING

- .1 Refrigeration system to be completely and properly dehydrated and charged in the factory prior to shipment.
- .2 Field check for dehydration and charging of the system at the site.

3.11 PRESSURE AND LEAK TESTING

- .1 Close valves on factory charged equipment and other equipment not designed for test pressures.
- .2 Leak test to CSA B52 before evacuation to 2MPa and 1MPa on high and low sides respectively.
- .3 Test Procedure: Build pressure up to 35 kPa with refrigerant gas on high and low sides. Supplement with nitrogen to required test pressure. Test for leaks with electronic or halide detector. Repair leaks and repeat tests.

3.12 DEHYDRATION AND CHARGING

- .1 Close service valves on factory charged equipment.
- .2 Ambient temperatures to be at least 13°C for at least 12 hours before and during dehydration.
- .3 Use copper lines of largest practical size to reduce evacuation time.
- .4 Use two-stage vacuum pump with gas ballast on 2nd stage capable of pulling 5Pa absolute and filled with dehydrated oil.
- .5 Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.
- .6 Triple evacuate system components containing gases other than correct refrigerant or having lost holding charge as follows:
 - .1 Twice to 14Pa absolute and hold for 4 h.
 - .2 Break vacuum with refrigerant to 14kPa.
 - .3 Final to 5Pa absolute and hold for at least 12 h.
 - .4 Isolate pump from system, record vacuum and time readings until stabilization of vacuum.
 - .5 Submit test results to Consultant.
- .7 Charging:

- .1 Charge system through filter-drier and charging valve on high side. Low side charging not permitted.
- .2 With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.
- .3 Re-purge charging line if refrigerant container is changed during charging process.
- .8 Checks:
 - .1 Make checks and measurements as per manufacturer's operation and maintenance instructions. Record and report measurements to Consultant.

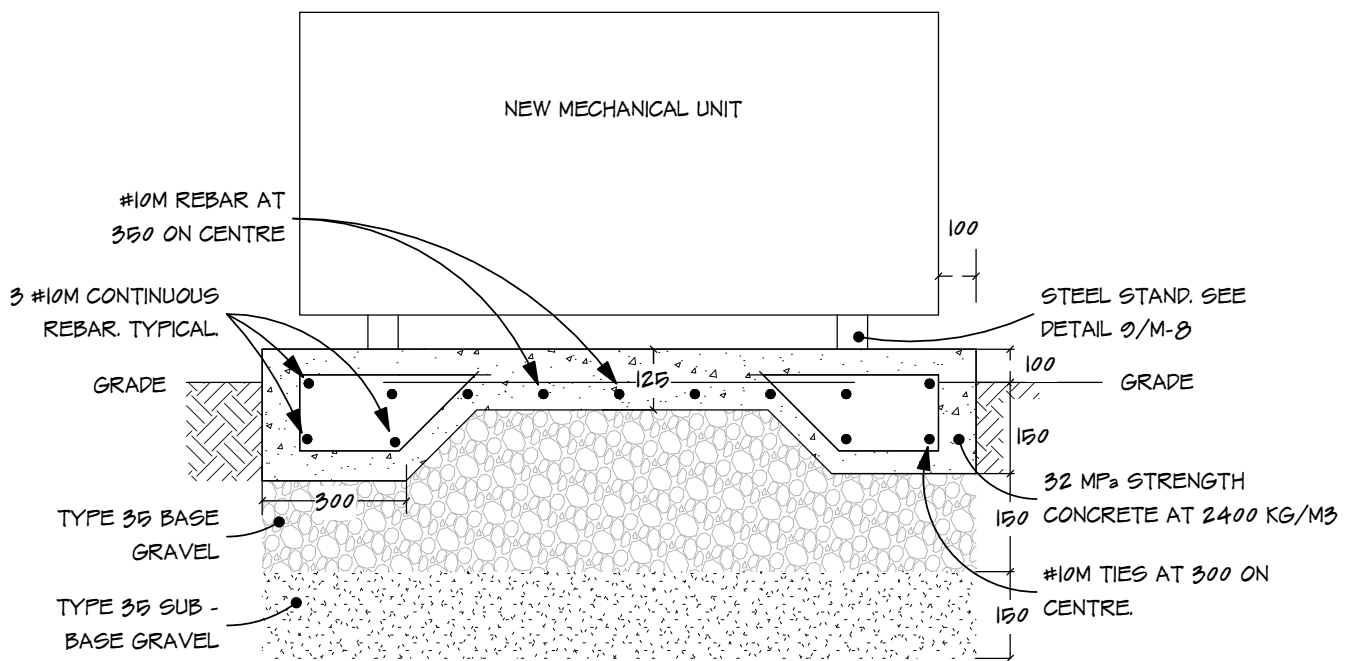
3.13 START-UP AND ADJUSTMENT

- .1 Provide necessary instruments, gauges and testing equipment required. Adjust controls to obtain design requirements and manufacturer's ratings.
- .2 Ensure that insulation of refrigerant piping and accessories is completed.
- .3 Test and record cooling apparatus entering and leaving air temperatures, dry bulb and wet bulb.
- .4 Test and record voltage and running amperes and compare to motor nameplate data, and starter heater rating against design requirements. Check that each phase deviates no more than 100 VA from the others.
- .5 Ensure that refrigerant temperatures are accurate to within 0.5°C of design requirements.
- .6 In cooperation with control manufacturer's representative, set and adjust automatic control system to achieve required sequence of operations.
- .7 Bring equipment into operation, trial run and make up any loss of oil and refrigerant.

- END OF SECTION -

NOTE:

1. MINIMUM LAP FOR REBAR SPLICE TO BE 400mm.
2. CENTRE NEW MECHANICAL UNIT ON PAD.



1
 Msk-1

OUTDOOR MECHANICAL MOUNTING PAD DETAIL

NOT TO SCALE

Project No. : 05.004.F	MPTF BUILDING MECHANICAL UPGRADE	Drawing No.
Drawn By : JDB		Msk-1
Scale : NONE		Rev :
Date : 2017.02.09		MECHANICAL UNIT MOUNTING PAD DETAIL