Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 23 05 00 – Common Work Results for HVAC

.2 Section 23 05 49.01 – Seismic Restraint Systems (SRS) – Type P2 Buildings

1.2 REFERENCES

.1 Definitions:

.1 Catalogued or published ratings: ratings obtained from tests carried out by manufacturer or manufacturer's designated independent testing agency which signify adherence to codes and standards in force.

.2 Reference Standards:

.1 American National Standards Institute/American Society of Heating, Refrigeration and Air Condition Engineers/Illuminating Engineering Society (ANSI/ASHRAE/IES)

.1 ANSI/ASHRAE 52.2, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

.2 ANSI/ASHRAE/IES 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 Green Seal (GS)

.1 GS-11, Standard for Paints and Coatings.

.3 Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual.

.1 MPI #18.

.4 National Fire Protection Association (NFPA)

.1 NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.

.5 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA)

.6 South Coast Air Quality Management District (SCAQMD)

.1 SCAQMD Rule 1113, Architectural Coatings.

1.3 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 refrigerant, insulation, filters, and paints 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 Canada, member of OIQ.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for air handling equipment for incorporation into manual.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Furnish list of individual manufacturer's recommended spare parts for equipment such as bearings and seals, and addresses of suppliers, together with list of specialized tools necessary for adjusting, repairing or replacing, for placement into operating manual.

1.6 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 off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect air handling equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 GENERAL

.1 Field assembled components to form unit supplying air at design conditions as indicated.

.2 Modules or internal components (fans, coils, thermal wheel and others) must pass through a double door 1800 mm wide and 2100 mm height for maintenance or future replacement.

2.2 PACKAGED AIR HANDLING UNITS – SYSTEMS 100 & 200

.1 Factory assembled components, to form units supplying air at designed conditions, as indicated.

.1 Air Handling Unit

.1 Table 1 shows the maximum dimensions specified for each system.

.2 Table 1 : Maximum dimensions specified

System	Length	Width	Height
	mm (po)	mm (po)	mm (po)
100	8500 (334)	3650 (144)	3700 (146)
200	7800 (304)	2000 (76)	3100 (120)

.2 Certify ratings to ARI 430-78. Unit shall bear ARI seal.

.3 Horizontal type having air tight modular components, consisting of casing, fan, motor and drive, filter Section, dampers, bypass Section, heating coil, cooling coil, humidifier.

.4 Acceptable products: Bousquet, Daikin, Ingénia, Rosemex, Ventrol, Venmar or substitute approved by addendum in accordance with the Instructions to tenderers.

.2 Casing

.1 Galvanized steel reinforced gauge 16 inside and gauge 22 outside and braced for rigidity. Inspection doors shall provide access to internal parts. Where not galvanized, steel parts to be painted over with corrosion resistant paint to CGSB 1-GP-181M + Amdt-Mar-78. Finish entire units, inside and out, with rust resistant baked on enamel.

.3 Drip Pans

.1 Stainless steel, to extend under cooling coil Sections for horizontal units, sloped for adequate drainage. Where unit has two or more cooling coils or tiers, provide each coil with drip pan to divert condensate to side of coil for drainage. Provide drip pans with minimum of one drain connection at low point, and access panel located adjacent to drip pan-allowing access for cleaning. Provide deep seal P traps on drip lines. Deep seal P traps must be fitted on the drip lines.

.4 Insulation

.1 Insulate internal surface of all panels with 50 mm (2") neoprene coated rigid duct liner. Apply with 100% coverage of adhesive with clip pins. Cover leading edges with sheet metal angle. Internally insulate drip pan with 12 mm (½") of mastic coating. The insulation must be covered with a sheet metal of 0.8 mm (gauge 22) thick perforated and galvanized. The inside of the drip pans is also coated with a sealant coating 12 mm (½") thick.

.5 High pressure Units

.1 Use double wall casing.

.6 Fans

.1 In accordance with Section 23 34 00 - HVAC Fans.

.2 Plenum type fans with direct drive installed in parallel and having the following characteristics.

.1 Stable pressure line, low noise intensity, ball bearings and designed for heavy service. Protective grille over the fan opening and over the belt wheels.

.2 TEFC motors with premium efficiency. The motor must be in compliance with and include a trapezoidal belt drive.

.3 Fans installed on seismic isolators of 2'' static deflection.

.4 Isolation wall between the two fans installed in parallel.

.3 Acceptable product: Twin City Fan & Blower model EPFN or replacement product approved by addendum in accordance with the Instructions to Bidders.

.7 Bi-Mode Coil

.1 Capacity : ARI approved, according to data on the actual temperatures of the heating and cooling fluid at the inlet and outlet of the coil, and as the air temperature.

.2 Tubular coils, fitted with steel or cast iron manifolds on which are welded straight tubes.

.3 Finned coil's tubes attached to the fins by mechanical means. The spiral tubes must be welded to the fins.

.4 All the tubes and manifolds in non-ferrous metal assembly by bazing.

.5 Maximum tube length 3m (10'), unless otherwise indicated.

.6 Coil Casings

.1 Steel: die formed 1.6 mm thick galvanized steel sheet.

.2 Copper as indicated: 1.6 mm thick tempered copper.

.3 Tube supports: allow for expansion and contraction.

.4 Supports: steel channel or double angle frames or other approved support. Provide brass supports for copper coils.

.5 Blank-off plates: of similar material as casing to prevent air bypass.

.7 Tests : at a pressure of 1700 kPa (250 lb/in)

.8 Rotary heat exchanger air/air

.1 According to section 23 72 00 – Air to Air Energy Recovery Equipment

.9 Filters

.1 According to section 23 44 00 – HVAC Air Filtration

.10 Humidifier

.1 According to section 23 84 13 - Humidifiers

.11 Lower unit sections (supply)

.1 Fresh air plenum

.1 Supplied with access door on one side of a width of 600 mm (24 in) for maintenance purposes.

.2 Draining orifice on the floor.

.2 Pre-filtration section

.1 Frontal loading for pre-filters position in summer season. For 50 mm (2 in) filters. Maximum air speed across filters of 2.0 m/s (400 ft/min).

.3 Access section

.1 Supplied with an access door on each side of a width of 600 mm (24 in) for maintenance purposes.

.4 Thermal wheel section

.1 For mounting of an enthalpy wheel between the supply and exhaust sections.

.5 Access section

.1 Supplied with an access door on each side of a width of 600 mm (24 in) for maintenance purposes.

.6 Filtration section

.1 Frontal loading for pre-filters position in winter season as well as filters. For 50 mm (2 in) pre-filters and 300 mm (12 in) cartridge filters. Maximum air speed across filters of 2.0 m/s (400 ft/min).Maximum air speed across filters of 2.0 m/s (400 pi/min).

.7 Cooling/heating bi-mode coil section

.1 Coil installation with drip pan. The coils drift eliminators on outlet surface. The cabinet must be extended in order to accommodate the piping’s passageway. The drip pan must extend in this section.

.8 Access section

.1 Supplied with an access door on each side of a width of 600 mm (24 in) for maintenance purposes.

.9 Fan section

.1 For three fan in parallel installation, wall plenum type fans. Separating wall between two fans in order to isolate them from one another. Opposed blade isolation register to be mounted at the fan’s outlet.

.10 Humidifier section

.1 Metal housing provided with a sealed inspection door, allowing access to the interior and with an inspection window, drip pan.

.2 Marine Lamp: installed above the boom.

.12 Upper unit sections (evacuation)

.1 Fan section

.1 Front opening

.2 For two fan in parallel installation, wall plenum type fans. Separating wall between the two fans in order to isolate them from one another. Opposed blade isolation register to be mounted at the fan's outlet.

.2 Access section

.1 Supplied with an access door on each side of a width of 600 mm (24 in) for maintenance purposes.

.3 Thermal wheel section

.1 For mounting of an enthalpy wheel between the supply and exhaust sections.

.4 Access section

.1 Supplied with an access door on each side of a width of 600 mm (24 in) for maintenance purposes.

.5 Filtration section

Front loading for 2 in. filters. Air velocity through filters maximum of 2.0 m/s (400 pi/min).

.6 Return air plenum

.1 Front opening

.2 Equipped with an access door to each side with a width of 600mm (24 in.) for maintenance.

2.3 MODULAR AIR HANDLING UNITS

.1 Element mounted in factory and contains all the necessary elements to form an air distribution unit that meets the design criteria and indications.

.1 The following subsystems apply :

.1 Subsystem : 101, 102, 103, 104, 105, 106, 107, 110, 201, 202 et 203

.2 **Subsystem 107 special features**: an 1830mm x 1830mm temporary opening will be made in the masonry wall adjacent to the corridor. The system's mechanical room is found 1200mm below the corridor's level. Internal components (fan, coil, etc.) should be able to go through an 800 mm wide x 2000 mm height door for maintenance or future replacement.

.3 **Subsystem 202 and 203 special features**: these systems are provided with a heating coil section as well as all other components.

.4 Table 2 shows the maximum dimensions for each subsystem.

Table 2 : maximum dimensions

Subsystem	Length	Width	Height
	mm (po)	mm (po)	mm (po)
101	4520 (178)	2745 (108)	1830 (72)
102	4165 (164)	2285 (90)	1830 (72)
103	4370 (172)	3455 (136)	1830 (72)
104	4165 (164)	2285 (90)	1830 (72)
105	3810 (150)	1016 (40)	1680 (66)
106	3810 (150)	1016 (40)	1680 (66)
107	4165 (164)	2135 (84)	1625 (64)
110	4420 (174)	2035 (80)	1830 (72)
201	3560 (140)	2700 (107)	1830 (72)
202	4120 (162)	1475 (58)	1830 (72)
203	4170 (164)	1830 (72)	1830 (72)

.2 Air conditioning subsystem

.3 The device must bear the ARI label and its design features must comply with the AR1430-78 standard requirement.

.4 The horizontal type device consisting of modular elements impervious to air, including the housing, the fan, the motor and drive, the filter, heating coil records, cooling coil and the humidifier.

.5 Acceptable manufacturer: Bousquet, Daikin, Ingénia, Rosemex, Ventrol, Venmar or replacement product approved by addendum in accordance with the Instructions to Bidders.

.2 Casing

.1 Galvanized steel reinforced gauge 16 inside and gauge 22 outside and braced for rigidity. 11 gauge aluminum checkered floor surfaces. Inspection doors shall provide access to internal parts. Where not galvanized, steel parts to be painted over with corrosion resistant paint to CGSB 1-GP-181M + Amdt-Mar-78. Finish entire units, inside and out, with rust resistant baked on enamel.

.3 Drip Pans

.1 Stainless steel, to extend under cooling coil Sections for horizontal units, sloped for adequate drainage. Where unit has two or more cooling coils or tiers, provide each coil with drip pan to divert condensate to side of coil for drainage. Provide drip pans with minimum of one drain connection at low point, and access panel located adjacent to drip pan-allowing access for cleaning. Provide deep seal P traps on drip lines. Deep seal P traps must be fitted on the drip lines.

.4 Insulation

.1 Insulate internal surface of all panels with 50 mm (2") neoprene coated rigid duct liner. Apply with 100% coverage of adhesive with clip pins. Cover leading edges with sheet metal angle. Internally insulate drip pan with 12 mm (½") of mastic coating. The insulation must be covered with a sheet metal of 0.8 mm (gauge 22) thick perforated and galvanized. The inside of the drip pans is also coated with a sealant coating 12 mm (½") thick.

.5 Fans

.1 In accordance with Section 23 34 00 - HVAC Fans.

.2 Plenum type fans with direct drive installed in parallel and having the following characteristics.

.1 Stable pressure line, low noise intensity, ball bearings and designed for heavy service. Protective grille over the fan opening and over the belt wheels.

.2 TEFC motors with premium efficiency. The motor must be in compliance with and include a trapezoidal belt drive.

.3 Fans installed on seismic isolators of 2'' static deflection.

.4 Isolation wall between the two fans installed in parallel.

.3 Acceptable product: Twin City Fan & Blower model EPFN or replacement product approved by addendum in accordance with the Instructions to Bidders.

.6 Cooling coil (and heating coil – 202 et 203 only)

.1 Capacity : ARI approved, according to data on the actual temperatures of the heating and cooling fluid at the inlet and outlet of the coil, and as the air temperature.

.2 Tubular coils, fitted with steel or cast iron manifolds on which are welded straight tubes.

.3 Finned coil's tubes attached to the fins by mechanical means. The spiral tubes must be welded to the fins.

.4 All the tubes and manifolds in non-ferrous metal assembly by bazing.

.5 Maximum tube length 3m (10'), unless otherwise indicated.

.6 Coil Casings

.1 Steel: die formed 1.6 mm thick galvanized steel sheet.

.2 Copper as indicated: 1.6 mm thick tempered copper.

.3 Tube supports: allow for expansion and contraction.

.4 Supports: steel channel or double angle frames or other approved support. Provide brass supports for copper coils.

.5 Blank-off plates: of similar material as casing to prevent air bypass.

.7 Tests : at a pressure of 1700 kPa (250 lb/in)

.7 Filters

.1 According to section 23 44 00 – HVAC Air Filtration

.8 Sections

.1 Mixed air inlet plenum

.1 Supplied with an above access door, except system 107 having a frontal opening.

.2 Supplied with access door on one side of a width of 600 mm (24 in) for maintenance purposes.

.2 Filtration section

.1 Frontal loading for 100 mm (4 in) filters. Maximum air speed across filters of 2.0 m/s (400 pi/min).

.3 Heating coils section (only for system 202 and 203)

.1 For heating coils

.4 Access section

.1 Supplied with an access door on one side with a width of 600 mm (24 in) for maintenance purposes.

.5 Cooling coil section

.1 For cooling coils with drip pan under each coil. Drift eliminators on the output face of the coils. The cabinet must be extended in order to accommodate the piping's passageway. The drip pan must extend in this section.

.6 Access section

.1 Supplied with an access door on one side with a width of 600 mm (24 in) for maintenance purposes.

.7 Fan section

.1 Centrifugal plenum fan installation. Separating wall between the two fans in order to isolate them from one another. Opposed blade isolation register to be mounted at the fan's outlet.

.2 Opening on top, except for the subsystem 110 with a frontal opening.

2.4 DIRECT FIRE MAKE-UP AIR UNIT

.1 English translation to follow. See French version for reference.

2.5 VIBRATION ISOLATION

.1 Flexible connections in accordance with Section 23 33 00 - Air Duct Accessories.

.2 Vibration isolators on each fan section in accordance with Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

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 air handling equipment 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 INSTALLATION

.1 Provide appropriate protection apparatus.

.2 Fabricate to provide smooth air flow through components.

.1 Limit air leakage to 1% of rated air flow at 2.5 kPa suction pressure.

.3 Apply sealer into seams prior to assembly.

.1 Secure toe angles continuous along entire length of assembly on 300 mm centres for full length of casing.

3.3 FANS

.1 Provide sheaves and belts required for final air balance.

.2 Suspension for hung units: install four part hanger type, ceiling flange, top hanger, bottom hanger and vibration isolator with take up for levelling.

.3 Install flexible connections at fan inlets and outlets as indicated.

.1 Ensure metal bands of connectors are parallel and not touching.

.2 Ensure that fan outlet and duct are aligned when fan is running.

3.4 DRIP PAN

.1 Install deep deal trap seal primer on drain lines.

.1 Depth of water seal to be 1.5 minimum times static pressure at this point.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.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.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION