1.0 GENERAL

.1 Summary

.1 These standards apply to all HVAC sections and all mechanical sections of Divisions 21 Fire Suppression, 22 Plumbing, and 23 Heating, Ventilating and Air Conditioning.

.2 Related BCIT Standards

.1 Section 01 78 39 Project Record Documents.

.2 Section 01 79 00 Demonstration and Training.

.3 Section 01 91 00 Commissioning.

.4 Division 21 - Fire Suppression.

.5 Division 22 - Plumbing.

.6 Division 25 - Building Automation System.

.7 Division 26 - Electrical.

.3 References

.1 ASHRAE 90.1, (Latest Edition).

.2 ASHRAE-55, (Latest Edition).

.3 ASHRAE-62.1 (Latest Edition).

.4 British Columbia Building Code (Latest Edition).

.5 CSA B149.1 Natural Gas and Propane Installation Code (Latest Edition).

.6 WorkSafe BC Standards (Latest Edition).

.4 Coordination Requirements

.1 Coordinate with BCIT Building Operations - Facilities Services and Project Services. BCIT Building Operations will review documents at 50%, 75%, 90% and Pre-Tender stage for all projects, depending on project complexity.

.2 Refer to Division 32 Exterior Improvements for Site Services Materials and Installation Guidelines.

2.0 PRODUCT AND DESIGN REQUIREMENTS

.1 General

.1 BCIT Facilities Services policy generally does not require humidity control for people comfort but only where is necessary for equipment operations.

.2 Design conditions must take into consideration future climate change implications: This includes number of heating/cooling degree days, additional stormwater loads, etc.

.1 For new construction or major renewal projects, future weather files shall be used for equipment sizing.

.2 For replacement of existing equipment, when equipment sizing is required, consider following City of Vancouver design temperature of 28°C/-7°C (Not BCBC Burnaby temperature of 25°C/-7°C).

.3 Indoor Design Conditions: Indoor design temperature for all typical conditioned spaces of 21°C for heating and 25°C for cooling (Not BCBC Burnaby temperature of 22°C). For specialty use areas, consult with BCIT for guidance.

.3 Consider ventilation rates for all projects, including renovations.

.4 BCIT requires LEED Gold (equivalent or higher) Building Design and Operation Standards to be met. Select and specify building HVAC systems to maximize LEED Energy Efficiency Credits, while maintaining low life cycle cost approach to the HVAC systems and components.

.5 HVAC Controls: must be compatible to base building (campus) DDC system.

.6 Power Wiring: defined as any wiring 110V and over, while Low Voltage Wiring is any wiring for less than 110V service.

.7 Interlock wiring: may consist of a combination of low voltage and line voltage power wiring in some cases, and shall be the responsibility of the Mechanical Contractor to provide.

.8 Indoor sound criteria: refer ASHRAE HVAC Applications Handbook: Chapter 48, Design Guidelines for HVAC-Related Background Sound in Rooms. Open plan office with NC 40 and Classroom with NC 30.

.9 Computer server rooms: all require dedicated HVAC system. Consider heat recovery where appropriate.

.2 Preferred Systems

.1 General: Prioritize low-carbon solutions for all Projects and Design Solutions. When working in existing buildings, give consideration to re-use/upgrades to existing system.

.2 Coordinate Air Filters sizes for use in HVAC systems with BCIT. Generally, adhere to the following nominal trade size:

.1 Pre Filters:

.1 2” MERV 8

.2 Standard Cartridge Filters:

.1 2” MERV 13

.3 Box Filters:

.1 12” MREV 13

.4 Bag Filters:

.1 Will not be considered an acceptable system.

.3 Air filters provided for use in Fan Coil Units: Where practical, cartridge filters for use in Fan Coil Units shall be nominal trade size such as 12” x 24” x 1” and have minimum efficiency rating of MERV 8 (coordinate with BCIT).

.4 Laboratory – Exhaust Systems:

.1 Systems shall provide airflows required by the equipment manufacturer and by WorkSafe BC standards for the work area.

.1 Provide exhaust systems for individual equipment and labs where required.

.2 Combine individual room and equipment exhausts into larger systems wherever allowed.

.3 Minimum discharge height of 5.0 M, unless wind studies show otherwise. Shall meet WorkSafe BC Standards and Metro Vancouver Air Pollution Standard. Induced draft fans (Strobic) may use shorter discharge heights with prior acceptance with WorkSafe BC.

.4 Minimum air changes to be reviewed with BCIT on a project basis: Must be in compliance with Worksafe BC and/or controlled and monitored as per ASHRAE 62.1 latest edition.

.2 Evaluate system exhaust volumes in as recommended by applicable standards, required area, room cross pressurization, lab equipment and good engineering practices.

.1 Fan motor sizes up to 0.5HP: Single phase 120V.

.2 Fan motor sizes 0.5HP and bigger: Three phase, voltage as required by Division 26.

.3 Provide separate dedicated point source exhaust to photocopier rooms or areas to meet ASHRAE 62.1 standard.

.4 Where fume hood fans are contained within mechanical penthouses, pressurize penthouse with supply air from the building from a safe outside source.

.5 Mechanical Rooms: Specify separate ventilation system. Do not create negative air pressure in the mechanical room.

.6 Zone within floor space or each floor: Provide CO2 sensors connected to the building DDC. For all major return air AHU, CO2 sensors shall be installed in the return air

duct. Outdoor air damper position shall be maintained at a minimum when CO2 concentration is below setpoint.

.3 Accessories

.1 Air Intake Louvers – Outside:

.1 Locate outside air intake louvers as far away as practical from sources of contamination and as high as possible above grade.

.2 Where below grade intakes are unavoidable install bird/debris screen on outside of louvers.

.2 Air Outlets and Inlets:

.1 Locate balancing dampers at sufficient distance into ductwork to maintain acceptable sound level within the conditioned space. (NC 30-35 or less).

.3 Coupling and Belt Guards:

.1 Provide coupling guards for pumps with exposed couplings.

.4 Firestopping:

.1 Contractor shall include fire-stopping for mechanical systems through rated fire separations.

.1 Acceptable fire-stopping systems and products: Hilti Fire-stop Systems, 3M, Tremco or approved alternatives.

.5 Sleeves:

.1 Seal around pipes passing through sleeves with fire resistive non hardening mastic (concrete not acceptable) to control transmission of sound and noise, and to provide the full fire rating of the wall or floor.

.6 Starters and Controls:

.1 Provide each motor with a starter, specified and required protective devices of suitable type, and rating. Comply with Canadian and BC Electric Codes and Local requirements. Refer also to Division 26 Electrical Specifications and standards.

.2 Equip thermal overload device. Overload device current ratings as recommended by motor manufacturer.

.3 Acceptable manufacturers: Canadian General Electric, Federal Pioneer, Westinghouse.

.4 Where motors are to be controlled by variable frequency drives, equip with load side reactors between the VFD and the motor.

.7 Supports and Bases:

.1 Mechanical Contractor shall coordinate with General Contractor/Construction Manager to provide concrete foundations and bases and steel supports, stands and platforms required for proper installation of equipment such as boilers, heat pumps, fans, tanks, pumps, softeners, heat exchangers, meters, compressors, transformers, switches, panels. Supports and bases shall be as shown on Drawings, as recommended by manufacturer, and as required and accepted by Consultant.

.2 Bases shall be 150 mm above the floor and doweled to the concrete floor.

3.0 EXECUTION

.1 Installation – Starters

.1 Each motor shall have a disconnecting means, consisting of a disconnect switch of suitable rating designed to break all ungrounded conductors of motor under full load. Locate within 5.0 M and within sight of motor and machinery driven by the motor.

.2 Installation – Access Doors

.1 Provide access doors to valves, cleanouts, electrical outlets, dampers, fire dampers, equipment, controls and other apparatus requiring access.

.2 Coordinate with Architectural with Access door location in glazed tile walls.

.3 Tests

.1 Consultant to witness and endorse system testing for all concealed installation prior to cover up and backfill.

.2 Piping:

.1 Maintain test pressure without loss for 48 hours unless otherwise specified.

.2 Hydraulically test hydronic piping systems at 1-1/2 times system operating pressure or minimum 1300 kPa, whichever is greater.

.3 Test natural gas systems to latest edition of CAN-B149.1 and requirements of Authorities Having Jurisdiction.

.3 Ductwork:

.1 Pressure test 60% of the main runs to branches of main ducts from air units with more than 5,000 l/s of total airflow. Duct leakage shall be less than 1.5% of total airflow at 2x the design static pressure of the ducts.

*** END OF **HVAC – GENERAL REQUIREMENTS** SECTION ***