

1.0 **GENERAL**

1.1 **Related UBC Guidelines & Documents**

- .1 Section 23 00 00 HVAC (and all subsections)
- .2 Section 23 38 00 Fume hood and Lab Exhaust
- .3 Section 20 00 00 Mechanical - General Requirements
- .4 All other Tech Guidelines as may be applicable to a given project.

1.2 **Related Documents External to UBC**

- .1 BC Plumbing Code and all references contained there within
- .2 BC Building Code and all references contained there within
- .3 Work Safe BC Occupational Health and Safety Regulation

1.3 **Description**

- .1 The Guidelines apply to all work completed within buildings on both UBC Vancouver and UBC Okanagan campuses unless stated otherwise.
- .2 In instances where conflicts are found between these guidelines and provincial regulations or codes, please notify UBC Mechanical Engineer.
- .3 These guidelines are intended to be read by designers and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
- .4 It is the requirement of the mechanical designer to coordinate these requirements with other disciplines.

2.0 **MATERIAL AND DESIGN REQUIREMENTS**

These are requirements specific to UBC that may not exist in code or other jurisdictions. Any deviation from these guidelines requires a variance be granted.

2.1 **Design Requirements**

- .1 Underground HVAC Ducts are not acceptable.
- .2 For all heating/cooling coils, ensure that access is provided to replace the coils without necessity to dismantle adjacent equipment or building components.
- .3 Variable pitch fans are not acceptable.
- .4 Fan Array Requirements:
 - .1 All fan arrays shall have back draft dampers associated with each fan. Such that if any one fan fails, the others can continue to run without short circuiting through the failed fan ([this includes air handlers where parallel fans are used](#)).
 - .2 BMS shall receive status on each individual fan within a fan array and this shall be displayed on the graphics.

- .3 Preference is that BMS has direct control over each fan in the array (enable, status, speed, alarm, BACnet). If this is not possible, the controller must connect to BMS with enable, status, speed, alarm and BACnet.
- .5 VAV Diffusers are not acceptable at UBC. Small VAV's are similar in cost and a better fit for the institutional environment.
 - .1 This technology is, in our opinion not suitable for integration into large VAV air-handling systems. It hinders and limits system operation because they do not integrate well with BMS systems and they do not have reheat coils.
- .6 Provide heat trace & insulation on all exterior drain pipes including but not limited to:
 - .1 Cooling tower overflow drains
 - .2 Condensate drains (including air handling unit p-traps and heat recovery unit p-traps). The purpose of this is to ensure that equipment can drain during cold weather and to mitigate the risk of damage from a burst coil.

2.2 Construction and Material Requirements

- .1 Filters
 - .1 Air filters provided for use in primary air handling equipment must adhere to the following nominal trade sizes:
 - .1 24" x 24" x 2"
 - .2 12" x 24" x 2"
 - .2 This bullet and all sub-bullets apply to UBC Vancouver only: Filters in primary air handling equipment for standard academic buildings shall filter to MERV 13.
 - .1 Filters in special applications such as lab buildings shall have MERV ratings as determined by the consulting engineer.
 - .3 This bullet and all sub-bullets apply to UBC Okanagan only: Filters in primary air handling equipment shall filter to MERV 15
 - .1 Use micropleat filters with a frame depth of 12" (300mm)
 - .2 Filters shall not support microbial growth
 - .3 Filter frames shall be ABS construction with header complete with neoprene gasket seal to prevent any air bypass and allow filters to be incinerable.
 - .4 Air systems shall be designed to handle a final pressure drop across filters of at least 375Pa WC (1.5"WC) at a flow rate of 2.5m/s (500ft/min)
 - .5 Confirm with UBCO Operations that equipment is compatible with standard UBCO filter supply and operation.
- .2 Flex connectors shall be supplied on the inlet and outlet of all ducted fan equipment (fancoils, fans, air handlers, etc.)
- .3 Flex connectors shall not be used to connect ducts of different size/shape
- .4 Direct drive fans are preferred.
- .5 When belt drives are required, the following applies:
 - .1 Multiple belts must be matched sets
 - .2 Cast iron or steel sheaves secured to shafts with removable keys shall be used

- .3 Adjustable pitch sheaves are commonly supplied on fans and while useful for balancing, they shall not be left in place at project completion as they lead to increased belt wear. It is suggested that consultants include in their spec that the balancer should be responsible for changing the sheaves.
- .4 For motors 7.5 kW and over sheave with split tapered bushing and keyway having fixed pitch.

2.3 Testing and Commissioning Requirements

- .1 Mechanical Designer is responsible for specifying cleaning requirements and ensuring that the HVAC system is turned over clean of construction dust/debris and ready for use.
 - .1 Projects modifying existing ducts systems shall clean all existing ductwork within their project boundaries.
- .2 Filter access demonstration.
 - .1 During the project demonstration UBC Facilities reserves the right to ask the contractor to demonstrate the removal and replacement of 5% or Q=5 (whichever is greater) filters at the UBC Facilities representatives choosing.
 - .2 If the filters are not reasonably accessible, the contractor shall make modifications and demonstrate to UBC Facilities at which time UBC Facilities may ask for a further 5% or Q=5 to be demonstrated.

3.0 LESSONS LEARNED & COMMON MISSES ON UBC PROJECTS

Items in this section are not specific requirements of UBC but are code or industry best practices which have been missed on past jobs. These items should be considered in mechanical designs at UBC. However, if they're not applicable then a variance is not required.

- .1 Avoid putting air moving equipment such as fancoils above classrooms as they lead to acoustic issues.
- .2 It is common that acoustic return air boots are not installed or are incorrectly installed (line of sight to the fan section is not completely obscured). Please see that this item is addressed during design and construction.

*****END OF SECTION*****