

1.0 **GENERAL**

1.1 **Related UBC Guidelines & Documents**

- .1 Section 23 00 00 HVAC (and all subsections)
- .2 Section 20 00 00 Mechanical - General Requirements
- .3 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 All condensate receivers shall have an overflow, piped to drain through a condensate cooler/quench tank.
- .2 All condensate receivers and quench tanks shall be vented outside the building.
- .3 Autoclaves
 - .1 Preference is for autoclaves that have unitary electric steam generators with automatic blow down to quench tanks.
 - .2 Central steam boilers shall only be considered in buildings with a very high density of equipment that requires process steam.
- .4 This point and all sub-bullets for UBC Vancouver Only: Humidification shall only be provided where it has research impacts; for example some labs such as animal care have specific humidity requirements or areas that house art or rare books.
 - .1 In general, humidification shall not be provided for occupant comfort because Vancouver's mild climate does not justify the added cost, complexity and energy.

- .5 Ultrasonic and spray/adiabatic humidifiers are not acceptable because of the risk of bacteria growth / airstream contamination and because of the maintenance requirements of the upstream filtering and deionizing equipment.
 - .1 If there is a strong desire to pursue this technology and a large carbon impact (lab AHU>10,000CFM) then UBC Facilities is open to discussing the use of this technology and whether they are able to support it. A variance would be required.

2.2 Construction and Material Requirements

- .1 Acceptable piping systems
 - .1 Steam (treated with amines)
 - .1 Schedule 80 Carbon Steel
 - .2 Schedule 40 Carbon Steel
 - .2 Condensate Return (treated with amines)
 - .1 Schedule 80 Carbon Steel
 - .3 Steam (untreated)
 - .1 304 Stainless steel
 - .4 Condensate Return (untreated)
 - .1 304 Stainless steel
- .2 Insulation
 - .1 In mech rooms or other exposed installs
 - .1 Insulation shall have canvas jackets
 - .2 In ceiling spaces and other concealed indoor locations
 - .1 Insulation shall have paper wrap (even in existing mech rooms which have canvas)
 - .2 Pre-formed PVC elbows
- .3 No brass or bronze valves shall be used on steam systems.
- .4 All steam systems shall include provisions for “double block and bleed” isolation. UBC Staff are unable to work on steam systems unless a double block and bleed isolation is in place.
- .5 Unions shall be provided at regular spacing throughout steam systems so that any piece of equipment or valve can be replaced without having to substantially dismantle the system.

2.3 Testing and Commissioning Requirements

- .1 This point and all sub-bullets for UBC Vancouver Only: This UBC Building Official shall be invited to witness all tests that are required by code or the tech guidelines.
- .2 Hydraulically test steam and hydronic piping systems at 1-1/2 times system operating pressure.
 - .1 Maintain test pressure without loss for 48hr.

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 Where central steam boilers are installed for process loads, the steam is typically treated with neutralizing amine chemicals to prevent damage to the condensate return lines. However, the use of amines may be un-acceptable in live steam humidification systems. In some cases using chemically treated steam may be unacceptable for sterilizing processes as well. Please consider steam chemical treatment requirements in your design and as a result, consider separate systems for humidification and for process loads. Steam system designs need to indicate which boilers should be treated with amines.
- .2 This bullet and all sub-bullets for UBC-V only: Humidifier selections need to consider the water quality at UBC Vancouver. UBC-V has observed a high failure rate of stand-alone humidifiers.
 - .1 UBC water measures an average of ~50micro-siemens/cm (water is from Metro Vancouver so presumably this is typical for the region).
 - .2 Consult manufacturer specifications for acceptable water conductivity ranges.
 - .3 Electrode humidifiers are not acceptable at UBC-V as they typically require minimum water conductivity of 300 micro-siemens/cm so UBC-V water is too pure for them to operate properly.
 - .4 Some resistive humidifiers use water level probes which rely on conductivity and may not work with Vancouver water.
- .3 Permits for boilers and pressure vessels:
 - .1 Per the BC Power Engineers, Boiler, Pressure Vessel and Refrigeration Safety Regulation – all steam boilers over 20kW (including steam generators integral to autoclaves) require a TSBC installation permit and need to comply with the requirements of CSA-B51.
 - .2 Per the BC Power Engineers, Boiler, Pressure Vessel and Refrigeration Safety Regulation - most pressure vessels do not require a TSBC Installation Permit however they are regulated equipment and they do require a TSBC Operating Permit. While they will not be subject to the installation inspection process that comes with a TSBC Installation Permit, they will be subject to annual inspections that come with a TSBC Operating Permit.
 - .3 Refer to UBC Document, CPG-03 – Regulatory Requirements of Boilers, Pressure Vessels and Refrigeration Systems for more info.
- .4 Per CSA-B51, pressure relief valves off all regulated equipment (this includes steam boilers and pressure vessels) must discharge in a safe location. This is commonly interpreted by TSBC (and supported by UBC) as meaning:
 - .1 Relief valves off steam generators larger than 20kW shall be:
 - .1 Preferred - piped to the outdoors (all new builds should provide a pipe for this purpose)
 - .2 Or, if not practical to go to the outdoors, they may relieve in the room if a mechanism to collapse the steam is provided prior to discharging to drain (this is not necessarily a straight forward option) and the approach used is acceptable to the TSBC Safety Officer
 - .2 Relief valves off pressure vessels (ex. Autoclaves, autoclave jackets) may be either:
 - .1 Piped to the outdoors
 - .2 Relieve inside the room if it is safe to do so in the opinion of the Engineer of Record and the TSBC Safety Officer
 - .1 No risk of scalding room occupants
 - .2 Noise level of discharging PRV is not dangerous

- .3 Potential steam charge doesn't have any contaminants dangerous to human health
- .5 Per ASME CSD-1 (which is referenced in CSA-B51), all steam boilers (including steam generators integral to autoclaves) require an emergency shutoff button near the main exit door.

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