1.0 GENERAL

1.1 Related UBC Technical Guidelines

.1 10 00 01 Special Room Requirements
.2 20 00 05 Mechanical - General Requirements
.3 20 00 06 Meters
.4 22 00 00 Plumbing (and all subsections)
.5 23 21 05 District Hot Water Heating System
.6 33 10 00 Water Utilities
.7 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 Water entry station shall include, in this order:
  .1 Wye-Strainer c/w blow off valve
  .2 This bullet and all sub-bullets apply to UBC-Vancouver only: Neptune Water meter c/w turbine strainer as per 33 10 00 Water Utilities
  .3 Backflow Preventers each sized at 50% flow for the building. Refer to 22 11 18 Backflow / Cross Connection Control for more details.
  .4 Pressure reducing station after the backflow preventer
    .1 Standard pressure PRV's such as a Watts 223LF have a max pressure of 75PSI but UBC Maintenance experience is that it can be hard to actually achieve that 75PSI especially when you have low flow and high flow PRV's (since the high flow needs to be set at a lower pressure than the low flow). The Watts 223LF-HP has a range of 50PSI – 145PSI (depending on size). The high-pressure model allows us to reliably run the systems at 80PSI (code maximum) when needed to address flow or pressure complaints which are common. High

pressure PRVs should be used as the primary PRV for almost all UBC Buildings.

.2 PRV Types

.1 If the flow can be achieved by a single PRV then a direct acting PRV that can go down to zero flow should be specified c/w a normally closed bypass.

.2 If the flow exceeds what can be achieved by a single direct acting PRV then two PRV's should be specified: low flow to be direct acting, high flow to be externally piloted type c/w normally closed bypass.

.2 This bullet and all sub-bullets apply to UBC-Vancouver only: All new and renewed buildings are to be connected to the district energy system. This system is to be the primary source of heat for hot water systems. Refer to section 23 21 05 for more details including energy transfer station piping arrangement.

.3 Drain valves c/w cap and chain shall be specified at all low system low points.

.4 This bullet and all sub-bullets apply to UBC-Vancouver only: All janitor rooms shall have detergent dispensing systems installed. These require ¾" RPBP's on DCW and DHW. Refer to 10 00 01 – Special Room Requirements for more information on janitor room requirements.

.5 For DHW recirculation systems, on all connection points specify, ¼ turn ball valves, check valves and balancing valves (or auto flow valves) (lead free for all).

.6 In no situation is it acceptable to use a balancing valve as an isolation point (even if it has a memory stop). The reason for this is that when they're used for isolation, they are frequently not returned to the same point and over time, system balancing is thrown off.

.7 Potable hot water tanks shall be maintained at no less than 50°C and no more than 60°C. Where potable water is stored in tanks, it cannot be stored at Legionella growth temperatures (25-45°C).

.8 The use of waste heat to preheat domestic hot water is encouraged where building mechanical designs are well suited to this. However, it's not acceptable to have a pre-heat storage tank due to legionella concerns so this must be done using instantaneous heat on the DCW supply line, using a double wall heat exchanger.

.9 "Alternate water source system" means a system to collect, treat, and use non-potable water from alternate water sources in lieu of potable water.

.1 Experience at UBC indicates that a robust maintenance plan with dedicated funding source be in place to operate and maintain these systems effectively to achieve the benefits and address performance outcomes.

.2 UBC is committed to water conservation and alternative water source systems however these will only be permitted at UBC through variance application to ensure that the necessary stakeholder engagement is in place.

.1 Acceptable alternate water sources and collection systems:

.1 Rainwater collected from roofs or similar above-grade surfaces free from use and storage of vehicles, hazardous materials, fuels and fertilizers.

.2 Clear-water waste such as cooling water or condensate drainage from refrigeration, not including wastewater (greywater or blackwater) or storm water.

.2 Acceptable uses (subject to meeting applicable health and safety requirements and/or Canadian Water Quality Guidelines applicable to the specific use):
  .1 Flushing of water closets, urinals and trap primers.
  .2 Irrigation (non-food plants) using drip rather than spray systems.
  .3 Equipment cooling water such as boiler make-up water or open-loop cooling of equipment.
.3 Systems that are in line with the CSA-B128.1 – Design and Installation of Non-Potable Water Systems, ARCSA Rainwater Harvesting Manual, CoV Building By-law 10908 (note that this is elective compliance as CoV Building Bylaws do not apply at UBC)
.4 As part of the variance process, additional conditions on design, regulatory requirements, testing and commissioning will be developed.

2.2 Construction and Material Requirements

.1 Acceptable piping systems
  .1 Domestic Cold Water
    .1 Type K Copper (solder, grooved, pro-press or flanged)
    .2 Uponor (up to 3")
    .3 Grooved or welded stainless steel (2-1/2" or larger)
  .2 Domestic Hot Water
    .1 Type K Copper (solder, grooved, pro-press or flanged)
    .2 Uponor (up to 3")
      .1 Not acceptable within 20' of district energy heat exchangers.
      .2 BMS to Close the DES primary side valve and throw a latching high temperature alarm if the water temperature leaving the DES heat exchanger exceeds setpoint by more than 10C. This high temperature alarm should be considered a critical alarm due to the damage that overheating water can do to plastic pipe. There must be substantial labelling (on BMS graphics and on site) stating the max temperature and implications of higher temps.
    .3 Grooved or welded stainless steel (2-1/2" or larger)
  .3 Domestic Hot Water Recirc
    .1 Type K Copper (solder, grooved, pro-press or flanged)
    .2 Uponor (up to 3")
    .3 Grooved or welded stainless steel (2-1/2" or larger)

.2 Insulation:
  .1 Chilled water and condenser water piping shall have continuous vapour barrier complete with oversized hangers and 'h-block'
  .2 Indoor piping
    .1 Insulation shall have paper wrap (even in existing mech rooms which have canvas)
    .2 Pre-formed PVC elbows
  .3 Outdoor piping
    .1 Insulation shall have continuous pvc wrap which is UV stable and sealed to prevent water ingress into the insulation.
    .2 Pre-formed, PVC elbows
  .4 Chilled and condenser water pump bodies shall be insulated with pre-formed foam (preferred) or closed cell adhesive foam.
  .5 Thickness and additional specifications by consulting engineer

.3 Wafer style valves are not acceptable. All valves shall be capable of end of line isolation.

.4 Heat tracing is to be monitored by the BMS. Dedicated heat trace controller must include hardwired alarm contact to BMS or bacnet communication interface for monitoring. CT based alarm for BMS is not acceptable as it is considered unreliable for self-regulating heat trace.

.5 Provide isolation valves on DCW, DHW and DHWR recirc lines that provide the ability to perform maintenance and renovation activities without shutting down the entire building. Including but not limited to:

.1 Takeoffs for each floor of a building
.2 Different wings of a building
.3 Different branches leaving a mechanical room
.4 Bathroom groups
.5 Other areas of high fixture volumes

2.3 Testing and Commissioning Requirements

.1 This bullet and all sub-bullets apply to UBC-Vancouver only: UBC Building Official shall be invited to witness all tests that are required by code or the tech guidelines.

.2 This bullet and all sub-bullets apply to UBC-Vancouver only: BCPC 2.3.7.2 requires water pressure tests at the maximum in service pressure. At UBC Vancouver this shall be deemed to be 125PSI (worst case if PRV fails). The system must maintain pressure without leaking for a minimum of 2 hours.

.3 For renovation projects, all new lines shall be flushed and pressure tested prior to connecting to the base building system.

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 Non-potable water system requirements as per CSA B128.1-06 (referenced in BCBC)

.1 All piping shall be marked with warning labels and shall be purple in colour or have a continuous purple stripe.
.2 All water outlets on non-potable systems shall have signage as described in the standard
.3 This may include lab sinks where zone protection is being used

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

1.0 GENERAL

1.1 Related UBC Technical Guidelines

.1 20 00 05 Mechanical - General Requirements
.2 22 00 00 Plumbing (and all subsections)
.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
.4 CSA B64.10-.17 Selection and Installation of Backflow Preventers / Maintenance and Field Testing of Backflow Preventers

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 There is a cross connection control program in effect at the University and all installations shall be in accordance with the recommendations contained in the latest edition of the BC Plumbing Code.

.2 RPBP Special Requirements:
  .1 Provide a drain standpipe or tank below RPBPs relief ports such that discharge does not go onto the floor. The drain must be sized to accommodate the max possible, continuous discharge of the RPBP.
  .2 RPBPs larger than 1” shall not be installed below the sanitary gravity discharge from the building. RPBPs larger than 1” shall not discharge to sump pumps without receiving an approved variance.

.3 RPBPs larger than 3" shall be installed above grade, in rooms that are on building exteriors and their discharge shall daylight.

.3 Water service entry:
- .1 Two Backflow Prevention Assemblies piped in parallel are required at the water service entry to all buildings, to allow for servicing without having to completely isolate the water supply to the building.
- .2 Whether a Reduced Pressure Backflow Assembly (RPBA) or alternate type of assembly is required will depend on the hazard category of the building in question.
- .3 The parallel Backflow Prevention Assemblies must be designed to allow for peak design flow during normal operation and for one unit to be taken off line for servicing while maintaining 50% or greater peak flow.

.4 Fire Protection Service Connection:
- .1 A double check valve assembly, (DCVA), is required at Fire Protection service connections per British Columbia Building Code-Plumbing Services (part 7). An additional parallel DCVA is not required.

.5 Irrigation Systems:
- .1 A DCVA at the service connection is to be provided in accordance with the usage. Note: where a higher hazard exists (due to chemical injection), additional area protection with an RP Assembly is required.

.6 Potable Water Systems:
- .1 Backflow protection is required to be installed in local areas to protect potable water systems in buildings from labs and other hazardous water uses within the building.

.7 Water Filters:
- .1 An RPBA shall be installed immediately upstream of all water filters equal to, or greater than 25mm (1").
- .2 A DCVA shall be installed immediately upstream of all water filters less than 25mm (1").

.8 Chemical or Detergent Mixing Stations:
- .1 An RPBA shall be installed immediately upstream of any chemical or detergent mixing station.
- .2 These are present in most janitor rooms on campus by UBC, post construction. All janitor rooms should have RPBAs (hot and cold piping) as well as other project specific locations.

2.2 Construction and Material Requirements

.1 All backflow prevention assemblies shall comply with the requirements of CSA B64.10-17

2.3 Testing and Commissioning Requirements

.1 Following installation, prior to building turnover - a test report completed by a certified tester shall be submitted to the Owner, indicating satisfactory operation of each device.
- .1 This report shall be included in the O&M manual submitted at the end of each project.
- .2 The report shall be on UBC's standard format, located at https://technicalguidelines.ubc.ca/Division_22/Ref_materials/Backflow_Test_Form.pdf.

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 RPBPs shall only be used where the building risk analysis deems they're required. Where possible use DCVAs as they are easier to maintain and pose less risk to the building (flooding).

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

1.0 GENERAL

1.1 Related UBC Guidelines & Documents

.1 Section 20 00 05 Mechanical - General Requirements
.2 Section 22 00 00 Plumbing (and all subsections)
.3 All other Tech Guidelines as may be applicable to a given project.
.4 UBC Hazardous Waste Disposal Guide

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.

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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 UBC does not support the installation or use of acid neutralization tanks (small under counter, or large centralized) or acid waste piping. Researchers are to collect their acid waste in an appropriate container and follow the procedures outlined on UBC's Hazardous Waste Disposal Guide.
  .1 In buildings with existing central acid waste piping and tank – the system shall be considered de-commissioned. New fixtures/appliances that enable users to put acids down the drains shall not be installed.
  .2 This does not apply condensate neutralization tanks on gas fired HVAC/Plumbing equipment with condensing flue gases. However, care should be taken to ensure that these tanks are installed in a serviceable manner and that they have enough capacity that the lime chips don't have to be replenished very often. They should be the style where the top opens to put more lime chips in, opposed to closed tube style assemblies.

.2 Refer to section 22 30 00 for requirements for sump pumps.

.3 Specify floor drains in all public washrooms.

.4 UBC requirements to avoid clogs in sanitary piping systems:

.1 All consultants should read and be familiar with the article "Dry Drains" by Ron George which was published on the PHCP website on Jan 18, 2019 and shall consider the design guidance provided therein. It is also available here.

.2 Double Wye fittings are not acceptable on horizontal pipe runs. A disproportionate number of our clogs occur at these fittings. Instead, use regular wye fittings and "roll them up" to ensure that no backflow into the fitting occurs.

.1 The design of these fitting necessitate that they are installed flat. As a result, every time the flow passes one, the hydraulic depth is reduced, eventually leading to solids dropping out.

.2 Solids which enter these fittings from the sides have a tendency to hit and become lodged on the opposing corner which eventually leads to build up and forms a clog.

.3 See videos at this link for examples of the above.

.3 All toilets in ICI buildings shall be BCBC maximum flow, 6LPF (see Section 22 40 00 – Plumbing Fixtures for more info). Lower flow toilets are not acceptable except when they are required as a mandatory requirement for LEED.

.4 Avoid long horizontal runs which are common in academic buildings with long hallways and consider increasing pipe slopes (while being aware that too great a pipe slope can result in the liquid portion of waste passing the solid waste and dropping the solids into the pipe).

.5 Grease interceptors – UBC sewage system connects to Metro Vancouver Sewage system. Grease interceptors must be installed to the requirements of Metro Vancouver.

2.2 Construction and Material Requirements

.1 Acceptable piping systems
- .1 Sanitary Above Grade
  - .1 Copper
  - .2 Cast Iron

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 None noted at this time.

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

1.0 GENERAL

1.1 Related UBC Guidelines & Documents

.1 Section 20 00 05 Mechanical - General Requirements
.2 Section 22 00 00 Plumbing (and all subsections)
.3 Section 33 49 00 Storm Drainage
.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 Refer to section 33 49 00 for more information on parkade drainage
.2 Refer to section 22 30 00 for requirements for sump pumps.

2.2 Construction and Material Requirements

.1 Acceptable piping systems
  .1 Storm Above Grade
    .1 Cast Iron
    .2 Copper
  .2 Insulation:
    .1 Storm piping shall be insulated where there is the potential for condensation or freezing to occur. Including:
      .1 Underside of roof drain body

.2 Rainwater piping for 5m from drain
.3 Plumbing vents within 2m of roof/wall penetration
.4 Traps subject to freezing

.3 Perimeter drainage
.1 Perforated PVC Pipe (non-flexible)

.4 All roof drains shall have metal grates or leaf guards; plastic is not acceptable.

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

1.0 GENERAL

1.1 Related UBC Guidelines & Documents

.1 Section 20 00 05 Mechanical - General Requirements
.2 Section 22 00 00 Plumbing (and all subsections)
.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.

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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 Normal Compressed air systems (opposed to oil free, with desiccant dryers) shall avoid the use of proprietary packaged compressors as these can have very high first costs and very high maintenance costs associated with them. If you have questions, please reach out to UBC Building Ops to coordinate. In general, compressors installed at UBC should include:
  .1 Two receiver mounted, air cooled compressors
  .2 Two air dryers piped in parallel c/w auto drain valves
  .3 Two filter packages piped in parallel
  .4 Factor installed controls including
    .1 Adjustable pressure switches
    .2 Low oil level alarm wired to BMS
    .3 Low pressure alarm wired to BMS
  .5 Provide the first service kit for all compressors. Place it beside the compressor in a clearly marked plastic container that includes re-ordering information.

2.2 Construction and Material Requirements

.1 Acceptable Piping Systems
  .1 Compressed Air
    .1 Copper

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 When connecting new compressors to new systems, ensure that adequate provisions are included to purge old piping which may be contaminated with oil.

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

1.0 GENERAL

1.1 Related UBC Guidelines & Documents

.1 Section 20 00 05 Mechanical - General Requirements
.2 Section 22 00 00 Plumbing (and all subsections)
.3 Section 23 21 05 District Hot Water Heating System
.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 Sump Pumps
  .1 All sump pumps are to be selected as duty/standby. Design is not to be for parallel operation in normal operating conditions.
  .2 Controller is to rotate runtime between the two pumps.
  .3 Pumps are to be controlled by three floats. The configuration of the floats at UBC is specific because we want to ensure that we receive an alarm to BMS when one pump has failed. A four-float configuration will not send an alarm until both pumps have failed and the water level overcomes the highest float.
    .1 Stop pumps
    .2 Start lead pump
    .3 Start lag pump and sound alarm
    .4 If a four-float configuration is supplied by accident then adjust the top two floats so that the alarm float is slightly below the lag pump start float.
  .4 All floats are to be mounted near the lid of the sump such that a maintenance worker can reach in to test or replace the floats without their head having to enter the sump.

.2 Water heaters

.1 This bullet and all sub-bullets apply to UBC-Vancouver only: All new and renewed buildings are to be connected to the district energy system. This system is to be the primary source of heat for hot water systems. Refer to section 23 21 05 and 33 61 00 for more details including energy transfer station piping arrangement.
  .1 If a project is not going to connect to DES, they must have a variance in place from UBC Energy and Water Services (Section 33 of the TGs)
  .2 Water heaters with storage capacity of 120 L or less and heating capacities of 3.0 kW or less may be electric.

.2 Where central thermostatic mixing valves are used (common in designs of instantaneous DHW from DES), they shall be purpose built thermostatic mixing valves which comply to ASSE 1017.
  .1 A BMS controlled 3-way mixing valve shall not be acceptable.
  .2 The TMV shall NOT be digital and shall not require a BMS or electrical connection of any kind.
  .3 It shall be of the bi-metallic strip or wax element type at the discretion of the designer.
  .4 Provide temperature sensors in the domestic hot water return and domestic hot water supply line and connect to BMS for monitoring and generating alarms.

.3 UBC's Climate Action Plan (CAP) has set a target of 100% reduction in GHG emissions below 2007 levels by 2050. In support of this plan, natural gas shall not be used as the primary heating source in domestic water heating.
  .1 This bullet applies to UBC-Vancouver only: Natural gas shall also not be used as the backup heating source in domestic water heating.

.4 Where on demand domestic hot water heaters are specified, make provisions for water expansion without relying on pressure relief valve for control of water pressure.

.3 Expansion tanks shall be installed on all domestic hot water systems.
  .1 Specify expansion tanks with the "bladder monitor" feature where available. This is offered by several major manufacturers and provides a pressure gauge and a bladder leak indicator which changes colour from white to red when a leak occurs.
  .2 All expansion tanks shall have an isolation valve from the system. Between the isolation valve and the expansion tank there shall be a drain valve.
    .1 This is necessary to accommodate maintenance of expansion tanks which requires to first isolate, then drain the expansion tank before proceeding with maintenance such as checking the bladder pre-charge.

2.2 Construction and Material Requirements

.1 Housekeeping pads are to be installed under all equipment.

.2 This bullet and all sub-bullets apply to UBC-Vancouver only: All tanks containing hazardous materials must be registered with UBC Risk Management Services. This includes but is not limited to chemical feed tanks, acid neutralization tanks, oil water separators, grease traps, etc. https://srs.ubc.ca/environment/pollution-prevention/storage-tanks/

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 All sanitary sumps shall be vented and have sealed lids as per BC Plumbing Code 2.4.6.3.2.

END OF SECTION

1.0 GENERAL

1.1 Related UBC Guidelines & Documents

.1 Section 10 21 13 Toilet Compartments
.2 Section 20 00 05 Mechanical - General Requirements
.3 Section 22 00 00 Plumbing (and all subsections)
.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
.4 BC Building Access Handbook
.5 ANSI Z358.1 Eyewash Standard

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 Locking Frost proof hose bibs shall be installed. At least one on each major building face.

.2 Washroom fixtures:

.1 All urinals shall be wall-hung. (Refer also to Section 10 21 13 Toilet Compartments, Sentence 2.1.2.)

.2 If ‘No-touch’ motion detector-activated plumbing fixtures and accessories are used for faucets and urinals then they shall be hard-wired.

.3 Waterless urinals are not acceptable

.4 Dual flush toilets may be used for residential installations only, not for institutional or public buildings.

.3 Emergency eye wash stations and showers:

.1 Emergency water at all emergency showers and eyewashes supply shall be tempered to comply with *WSBC* and *ANSI Z358.1*. Recirc lines shall be run as close as practically possible to the thermostatic mixing valve.

.2 Emergency showers/eye wash stations shall have 'stay open', hand controlled valves.

.3 If practical, provide floor drains under all emergency showers and eye wash stations that are prone to spilling on the floor. Alternatively, provide floor drains within the vicinity such that water is unable to build up to a depth which can damage the building and to assist with cleanup. Floor drains should have trap primer.

.4 Eye wash shall be specified as eye wash only not face and eye wash combination.

.5 Emergency shower/eye wash isolating valves shall not be readily accessible to the user.

.6 Shall be compliant with *ANSI Z358.1* Eyewash Standard.

.7 Label fixtures as per below abbreviations:

- EEW Emergency Eye Wash Station
- EFW Emergency Eye / Face Wash Station
- ESH Emergency Shower Station
- ESC Emergency Eye / Face Wash and Shower Combination
- EDH Emergency Drench Hose Unit

.2 All eye wash stations and showers shall be tested be tested by the projects which install them as part of the commissioning process such that they do not require an annual recertification until one year after project completion.

.4 Drinking fountains

.1 All buildings over 600 gross square meters shall have at least one accessible drinking water fountain, located in a public area.

.2 For all new buildings, drinking water fountains shall be located inside buildings at level one entrance lobbies and should be visible from the exterior.

.3 Drinking water fountains to be installed on the shortest dead leg possible off of a line that is flowing regularly. This line would preferably be serving a washroom.

.4 The drinking water fountain shall NOT be cooled.

.5 Drinking water fountains shall NOT have filters and hence no backflow preventers will be required.

.6 Drinking water fountains shall feature a water bottle filler. One way to specify this is for a deck mounted one-hole spigot, installed onto the fountain. An appropriate fountain/spigot combination needs to be specified to avoid splashing.

.1 Touchless bottle filler stations that require electrical connections and have additional service requirements are NOT preferred.

.7 All water fountains must be barrier free and conform to the latest requirements of the Building Access Handbook

.5 Domestic water dispensing and filtration equipment is not preferred by UBC Facilities. However, it is acceptable provided that the below requirements are met. It is the responsibility of designers to ensure that their clients are aware of their responsibilities for damage as per the below.

.1 The installation of water dispensing/filtration equipment for office and kitchenette type areas is acceptable provided that a UBC Plumbing permit is obtained. An approved backflow device must be installed as per Section 22 11 18 Backflow/Cross Connection Control to prevent water from being drawn out of the filter system back into the water supply line.

.2 The installation costs of a domestic water filtration/dispensing device and the associated recurring maintenance such as sanitization and filter changes are the sole responsibility of the client and should be managed with an outside service provider.

.3 Property damage resulting from equipment failure and/or auxiliary supply lines installed by a vendor downstream of a UBC domestic cold water isolation valve will be the sole responsibility of the client and/or service provider.

.4 All water filtration and dispensing devices must be CSA approved and meet all requirements of the BC plumbing Code.

.5 Saddle style valves are not permitted to be installed on UBC water services by outside service providers. On a client funded basis, UBC Building Operations may install a domestic cold water tie in location and isolation valve for the purpose of supplying water to a filtration/dispensing device.

.6 Canister style water filter units must be of metallic constructions and units that consist of multiple filter elements be either homogenous in their design or interconnected with brass NPT pipe nipples (e.g. EverPure). Interconnection of filter housings using plastic tubing and fittings is not acceptable.

.7 Piping downstream of a UBC supplied shutoff valve to a filtration/dispensing device must be connected with FIP or MIP style fittings. Other flexible supply lines may be considered (see Auxiliary Supply Lines).

.8 Auxiliary supply lines connecting a filtration/dispensing to a UBC shut off valve device are to be soldered copper, Uponor or flexible copper furnished with brass compression style fittings. Plastic tubing and plastic quick connect fittings are not acceptable. Auxiliary supply lines should NOT exceed 5 feet in length and routing is not permitted in wall cavities, ceiling spaces or areas susceptible to abrasion and or mechanical damage.

.6 Roof drains

.1 Provide minimum of two (2) roof drains to all major roof areas (>800sqft) as insurance against clogging and flooding (e.g., 2 at 75 m diameter preferred even if 1 at 100 mm diameter will do). This does not negate the BCBC requirement for scuppers.

.7 Mechanical room floor drains

.1 Specify drains large enough to receive indirect equipment drains into their bodies such as “floor sinks” or “hub drains”. In many cases on campus, indirect drains open-end above regular floor drains or simple funnel drains and as a result they splash or discharge over the floor leading to leaking floors and mechanical rooms which are in poor condition.

2.2 Construction and Material Requirements

.1 New or replacement fixtures shall meet water efficiency performance requirements in Table 1.0. The table also shows comparative reference points in other standards and codes.

.2 Flush tank toilets shall have an MaP score >= 350 as tested by IAPMO R&T (map-testing.com).

Table 1.0. Fixture Water Efficiency Requirements

The table below is based on the current National Plumbing Code. In some cases, these flow rates are more stringent than what is in the current BC Plumbing Code. These rates are minimums and higher performance fixtures are acceptable depending on project requirements (i.e. LEED).

Fixture	Requirement (Maximum Volume or Flow Rate)	Notes
Residential toilets	4.8 litres/flush or dual flush at 6.0/4.1 litres/flush	
ICI Toilets	6.0 litres/flush	Lower flush rates will be accepted when they are required by LEED as a mandatory requirement only.
Urinals	1.9 litres/flush	
Shower head	5.7 litres/minute	
Kitchen Faucet (except ICI)	6.8 litres/minute	
Lavatory Faucet – private	1.9 litres/minute	
Lavatory Faucet – public	1.9 litres/minute	Must have auto-shutoff

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

1.0 GENERAL

1.1 Related UBC Guidelines & Documents

.1 Section 20 00 05 Mechanical - General Requirements
.2 Section 22 00 00 Plumbing (and all subsections)
.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
.4 CSA Z -305.1. Non-Flammable Medical Gas Piping Systems.

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 Where specialty piping systems serve specific labs or research groups they shall generally be the lab user's responsibility. It shall be the responsibility of the lab, faculty or department to setup a maintenance contract with the appropriate, qualified contractor or setup a maintenance contract with UBC Facilities. These systems do not fall within the standard scope of UBC Facilities of core building systems. It is the responsibility of the designer to inform their clients of this and coordinate the delineation of scope and demarcation points with UBC Facilities and the clients such that all parties' expectations are in line, prior to construction.

.2 For specialty water systems, local generating systems shall be used. Large central sources shall only be used with an approved variance. This includes but is not limited to distilled water, reverse osmosis, filtered water, de-ionized water, salt water.

2.2 Construction and Material Requirements

.1 Acceptable Piping Systems
  .1 Piping systems shall be selected suitable to the specific application. Care shall be taken to avoid proprietary piping systems wherever possible.

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 Local process loops. Some labs have local process loops separated from the base building system by heat exchangers or chillers. These loops may not be chemically treated and as a result appropriate piping systems need to be selected. This needs to be coordinated with the lab users as this equipment is typically maintained by the users.

.2 In lab buildings it has been observed that appliances such as humidifiers, glass washers and ice makers are commonly connected to RO or DI water. In some cases, this may be appropriate but challenges that have been observed are:

- .1 Sometimes the water is too pure for the appliances connected which can cause damage since ultrapure water is corrosive.
- .2 Connecting to the specialized water systems subjects this equipment to additional shutdowns – RO and DI systems typically will have bi-annual shutdowns that are a few days long for system sanitization.
- .3 Appropriate model of humidifier needs to be selected to match the purity water provided (level control in some devices isn't compatible with pure water… or even Vancouver city water it too pure in some cases).

Please avoid connecting to RO/DI water unless it's required. Also note that 2.1.2 of this guideline prohibits the use of central RO/DI systems so these should not be installed without a variance/consultation with Building Operations.

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