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 A fail safe control valve must be in place to shutoff flow if the water temp approaches Uponr temp limits. This valve should alarm to BMS but must require a manual reset on site. There must be a clear sign at the location of the push button explaining what the valve exists for.
      .3 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*****