

DIVISION 15 - MECHANICAL

Section 15540 - Heat Transfer Equipment

Introduction

Equipment associated with:

HVAC HEAT TRANSFER SYSTEMS INCLUDING: WATER COILS, PLATE AND FRAME HEAT EXCHANGERS, COOLING TOWERS, AND AIR WASHERS.

Pumping equipment including the following types: vertical in-line circulating pumps, base mounted pumps.

Part 1 - General

- Building Chilled Water (CHW) System Design

Building CHW loops connected to the campus CHW system shall be designed as follows:

- No booster or secondary pumps are to be installed.
- Size building piping based on the summertime CHW temperature differential described below.
- The building CHW piping loop pressure drop shall not exceed 12 psig
- System minimum static is 70 psig
- Calculations demonstrating compliance shall be included as part of the construction document submittal
- Heat Exchanger (HX) Selections – Air-to-water (coils) and water-to-water HXs shall be selected to comply with both the summertime and wintertime chilled water temperatures as indicated below.

Condition	CHWS (°F)	CHWR (°F)	Outdoor Air Temperatures (°F)
Summer Sensible	44	62	1% or 0.4% Annual Cooling Design Temperatures per ASHRAE Fundamentals
Summer Latent	44	62	1% or 0.4% Annual Dehumidification Design Temperatures per ASHRAE Fundamentals
Winter	47	61	0.4% Monthly Design Dry Bulb and Mean Coincident Wet Bulb for November through February per ASHRAE Fundamentals.

- Equipment Schedules – All HX selections (e.g. coils, water-to-water) shall consider both summertime and wintertime ambient conditions and utility temperatures. For systems under 10 tons of cooling, equipment schedules shall, at a minimum, list the most stringent summertime condition. For systems with 10 tons of cooling and above, the equipment schedules shall include all 3 performance conditions listed in the table above.
 - Maximum face air velocity 400 fpm.
 - Maximum coil air pressure drop 0.5" WC.
 - CHW coils on systems receiving any percent outdoor air shall be selected with a leaving air temperature of no more than 52 F to support space dehumidification. This temperature shall be met during both the sensible and latent outdoor conditions referenced above.
- Building Heating Hot Water (HHW) System Design

Building HHW loops shall be designed as follows to support future decarbonization efforts:

- Size building piping with a 40 °F differential.
- The building heating water piping loop pressure drop shall not exceed 12 psig. Building pumps, heat exchangers, and associated appurtenances (e.g. strainers) may be excluded from this calculation.
- Calculations demonstrating compliance shall be included as part of the construction document submittal.
- HX Selections – Coils and water-to-water HXs shall be selected to comply with both the project design conditions and future decarbonization design temperatures.

Condition	HHWS (°F)	HHWR (°F)	Outdoor Air Temperature (°F)
Project Design Conditions	dT = 40 °F		99% or 99.6% Annual Heating Design Temperature per ASHRAE Fundamentals
Decarbonization Targets	135	95	

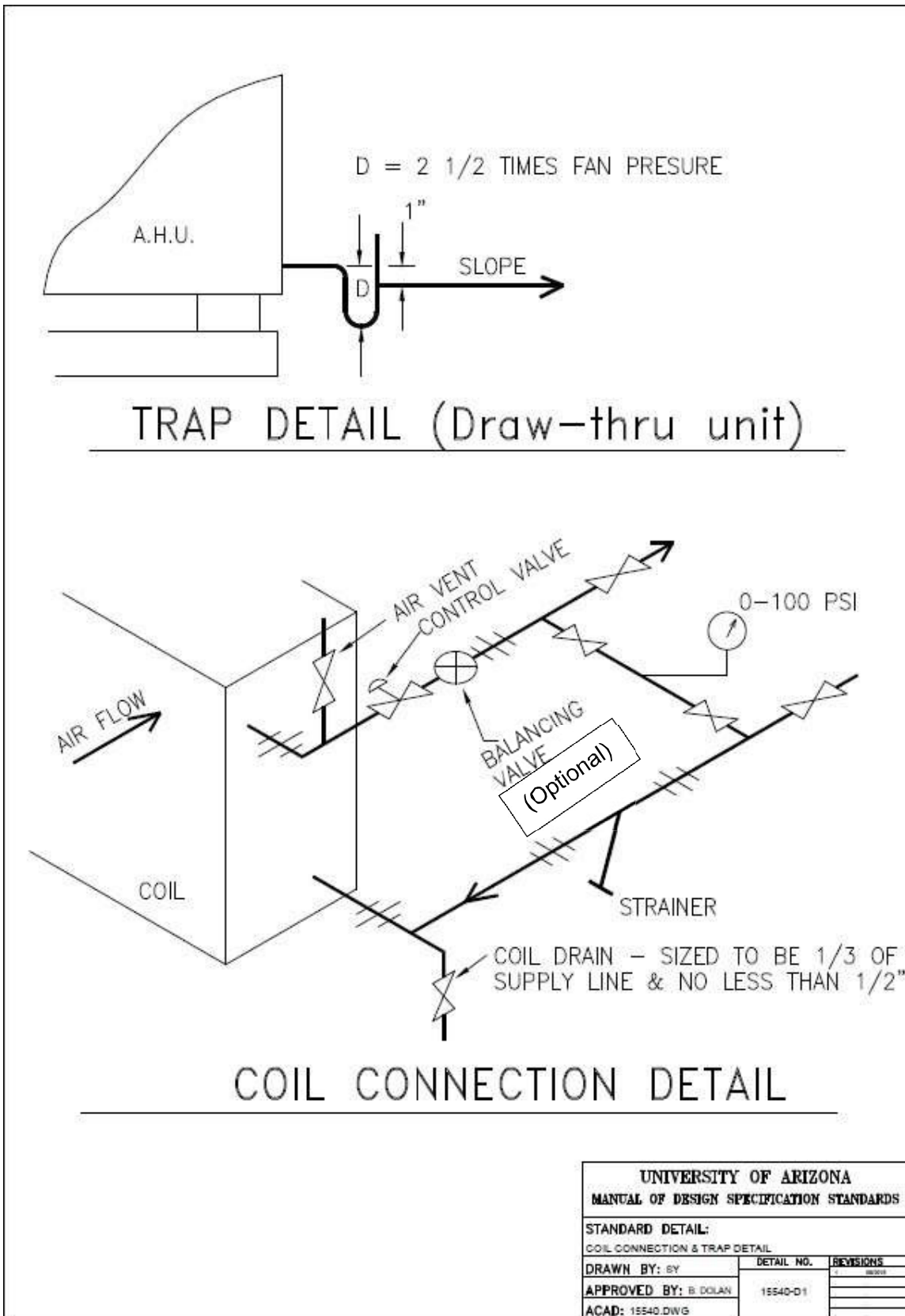
- Note: Decarbonization targets assume 2x5 °F tunnel losses such that plant operation temperatures are 140-90 °F.
- Reset Schedules – the Heating Water supply temperature set point shall be reset based on outdoor temperature, building coil demand, or other approved parameter. Discuss reset schedule approaches with UFS Mechanical Engineer and Energy Manager.
- Equipment Schedules – The equipment schedules shall demonstrate performance at both the Project Design and decarbonization temperatures.
- Steam coils for the purpose of space heating shall not be used. Their inclusion could impact future decarbonization efforts.
- Water-to-Water and Steam-to-Water Heat Exchangers
 - Discuss heat exchanger type selection with UFS PM. Plate frame heat exchangers are **not** to be used for steam / water applications.
 - Shell & Tube type heat exchangers shall include removable, replaceable tube bundles.
- Design to account for water fouling factor in equipment selections.
- Cooling Towers – Select cooling towers at 76 °F wetbulb ambient
- Vertical in-line pumps are preferred with one pump as standby for building systems. Avoid base mounted pumps when possible.
- Use premium efficiency motors. See Section 15050.
- Evaporative cooling in AHUs shall be accomplished by fixed cell Munters Fill GLASdek. Do not use water wheels.
- Adequate space and provisions shall be left for removal of coils and servicing of equipment, with minimum inconvenience to the operation of systems.

Part 2 - Products

- Hydronic coils
 - To have bottom water supply and top return.
 - Use 5/8" minimum coil tube size.
- Vertical In-Line Pumps:
 - Preferred manufacturers; Grundfos, Bell & Gossett, Armstrong, Taco, Paco, Scott.

Part 3 - Execution

- Provide isolation valves close to equipment.
- Provide single pressure gauge indication with pressure snubber for each system component.
- Provide thermometer temperature indication for each line of each heat transfer device.
- Provide Weld-o-lets installed for future monitoring on each line.
- Provide system strainers on inlet water side(s) of all coils and heat exchangers.
- Coils shall be piped with water counterflow to coils. See coil detail.
- Comply with manufacturer's recommended free air space for cooling towers and chillers.
- Provide manufacturer recommended clearances for maintainability.
- Provide coil and heat exchanger blowdown sized at 1/3 of pipe size but not less than 1/2" on all sides of heat exchangers with full port ball valve. Arrays of multiple coils shall have independent blowdown, drain assemblies on each coil. (See attached diagram)
- Provide air vent on return pipe near high point with manual air vent (1/2" ball valve minimum) for all coils and heat exchangers. Arrays of multiple coils shall have independent air vents on each coil.



End of Section 15540