UTILITIES & ENERGY SERVICES
TEXAS A&M UNIVERSITY

Design Standard

Thermal Systems (Chilled Water and Hot Water Systems)

This standard was revised on July 1, 2020, and the latest changes are underlined. Please refer to Part 4 of this standard for full revision history.

For campus buildings served by TAMU central thermal distribution systems, supply and return lines typically have piping with identical size and material for each system - chilled water (CHW), heating hot water (HHW), and domestic hot water (DHW). Because these thermal distribution lines are identical in size and appearance for each thermal system, there is the potential for cross-connection between supply and return. To avoid possible cross-connection of supply and return lines, design engineers shall require field verification in construction documents and contractors shall field verify the configuration of supply and return lines, using an appropriate temperature sensing device and adequate system flow, before making building connections. Any discrepancy between construction documents and field verification should be promptly reported to the project A/E and the Owner's representative before completing piping installation, so proper piping configuration can be verified.

Detailed specifications follow.

PART 1 CHW AND HHW SUPPLY TEMPERATURE RESET

1.1 The Utilities & Energy Services Department (UES) at Texas A&M University is actively identifying and implementing strategies to reduce the energy consumption and cost associated with campus heating and cooling requirements while ensuring customer needs are consistently met. Chilled water (CHW) and heating hot water (HHW) supply temperature reset schedules have been in effect on the campus for many years, with supply temperature adjusted based on outside air temperature. The supply temperature for chilled water ranges from 43 to 47 Degrees F [1] and the supply temperature for heating hot water ranges from 130 to 170 Degrees F. The supply temperature reset schedule charts for both CHW and HHW are attached as Appendix A.

PART 2 HVAC COIL DESIGN DELTA T

2.1 All CHW cooling coils in facility air handling units (AHUs) and fan coil units (FCUs) shall have a minimum of 14 Degrees F design delta T based on a CHW supply temperature of 43 Degrees F [1], during peak cooling periods, except for spaces with high internal heat loads, such as server rooms. In spaces with high internal heat load, the system should be designed to meet maximum cooling requirements with a CHW supply temperature of 47 Degrees F [1].

2.2 For HHW, the minimum AHU and FCU design delta T shall be 30 Degrees F based on a design HHW Supply Temperature, during peak heating periods, of 170 Degrees F. The minimum coil design delta T's specified above are contingent upon maintaining proper coil flow tolerance per 2008 ASHRAE Handbook, pg 12.18, Fig. 34. Coil design delta T

(for both CHW and HHW) can be higher than indicated above, but this design requirement must be achieved, unless a modification to this design guideline is approved in advance as indicated at the end of this guideline. Coils shall be designed in accordance with the latest version of ARI Standard 410.

2.3 AHUs having greater than 50 percent outside air supply shall have an energy recovery system incorporated into the design, unless it is proven to not be justifiable based on a life cycle cost analysis. Energy recovery systems shall be designed to operate at a minimum of 70% efficiency and be connected to the Siemens BAS to allow for effective monitoring of the system operation. Pre-filters shall be provided on all energy recovery systems to prevent fouling of the heat transfer element.

2.4 A requirement for testing, balancing and commissioning of both water and air flow shall be included in the specifications for all HVAC systems installed in new buildings and with any significant HVAC system replacement or retrofit.

PART 3 CHW AND HHW DISTRIBUTION SYSTEMS

3.1 CHW and HHW distribution pumps in the buildings shall be equipped with variable speed drives, with pump speed modulated to maintain sufficient differential pressure at desired flow through all HVAC coils in the building. Variable speed drives shall be connected to the Siemens BAS for effective monitoring and control under all flow conditions. The Siemens BAS shall also monitor the status of CHW and HHW control valves and any valve which hasn't opened a minimum of 20% at least once during any 168 hour (one week) period shall be programmed by the BAS to automatically open fully (during unoccupied periods) for a period of 15 minutes, in order to flush the thermal piping and minimize the potential for microbial growth.

3.2 All AHU and FCU fan motors and CHW and HHW pump motors installed in new buildings and with major system replacement or retrofit shall be specified to meet minimum efficiency requirements of National Electrical Manufacturers Association (NEMA) Standards Publication MG1-2006 (or any later edition) Premium Energy Efficiency Motor Standard, if a Premium Energy Efficiency Motor is available in the required size and rating. All new motors shall be sized to operate with a load factor of between 65 and 100 percent.

3.3 Three-way bypass control valves shall not be installed in any new CHW or HHW system. When HVAC systems in existing buildings are upgraded to include direct digital control (DDC), all existing three-way bypass control valves shall be removed and the DDC control system shall be programmed to provide flushing as previously described. Two-way characterized ball-style control valves shall be used for CHW and HHW flow control, rated to handle pressure drop that exceeds the highest differential pressure that the distribution pump(s) can generate, in order to avoid valve seat deterioration and leak-by. Control valve actuators shall have shut-off ratings that exceed the highest potential branch circuit differential pressure to ensure positive valve closure. Electric valve and damper actuators shall be specified for all HVAC systems that have DDC capability.

Notes:

1. See the UES Design Standard titled “Building Automation Systems” for additional requirements.

2. Any deviation from this design standard needs to be reviewed and approved by Utilities & Energy Services (UES).

PART 4 REVISIONS TO DESIGN STANDARD

Revision #	Date	Location	Brief Description
1	9/6/2017	1.1, 2.1	Change in the supply temperature for chilled water
2	7/1/2020	Appendix	HHW Supply Temperature Reset Schedule updated

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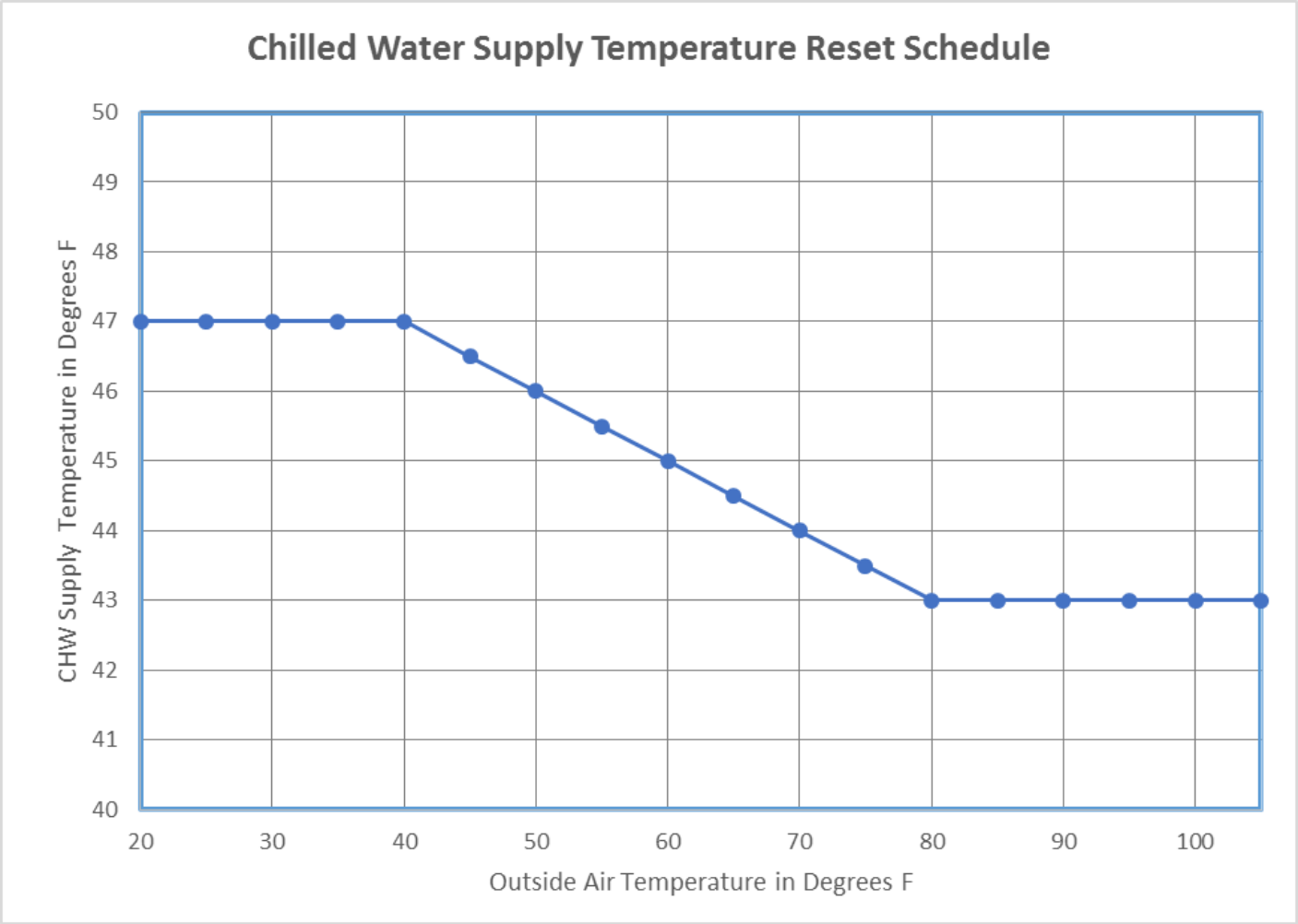
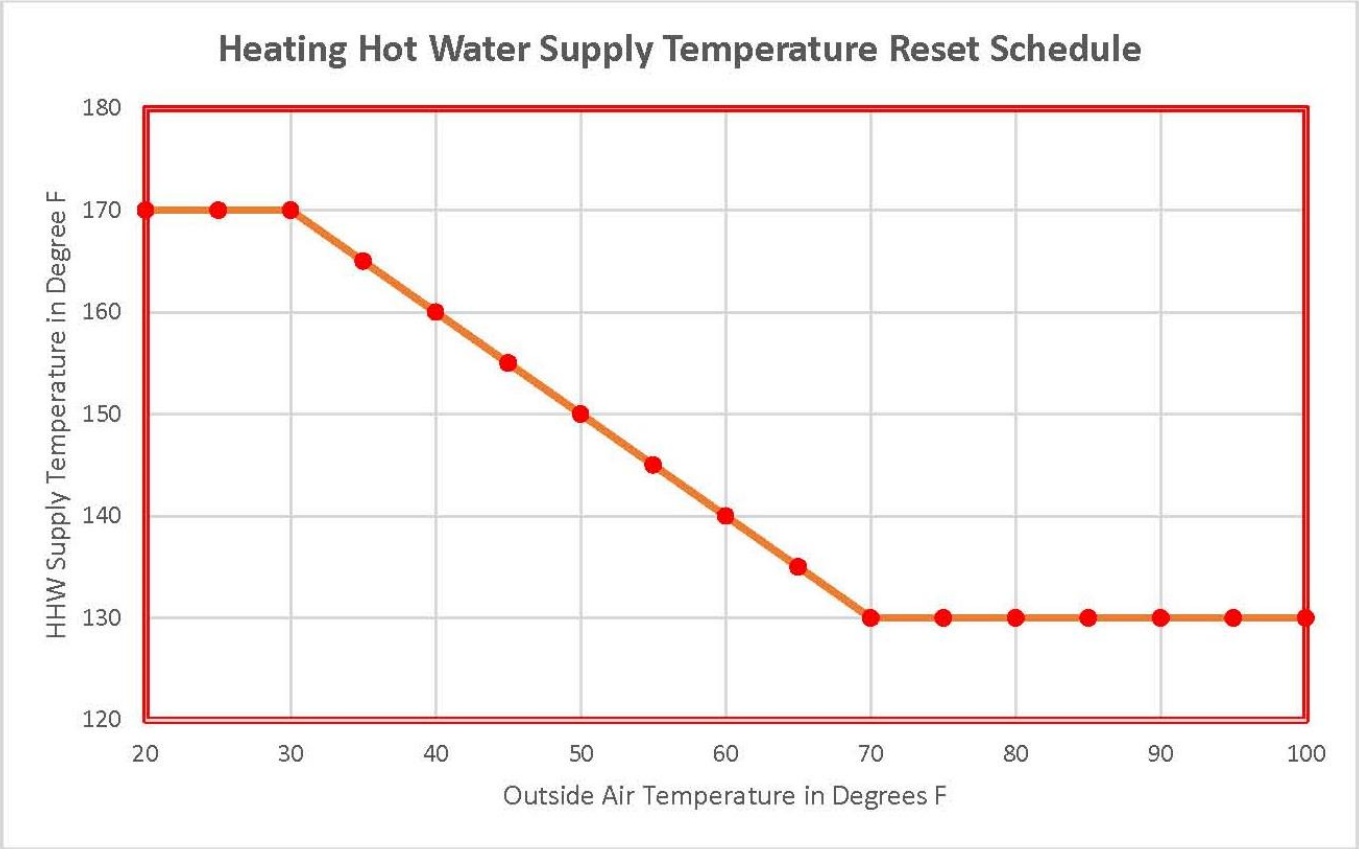
APPENDIX A
CHW & HHW SUPPLY TEMPERATURE RESET SCHEDULES



Note: CHW supply temperature range is 43 to 47 °F with reset based on outside air temperature. Actual loop temperature may vary +/- 1 °F from target.



Note: HHW supply temperature range is 130 to 170 °F with reset based on outside air temperature. Actual loop temperature may vary +/- 5 °F from target.