

PART 1: GENERAL

1.01 General:

- A. This standard is intended to provide useful information to the Professional Service Provider (PSP) to establish a basis of design. The responsibility of the engineer is to apply the principles of this section such that the University may achieve a level of quality and consistency in the design and construction of their facilities. Deviations from these guidelines must be justified through LCC analysis and submitted to the University for approval.
- B. SHSU's desire is to ensure that all new refrigeration equipment delivered to campus conforms with EPA guidelines for refrigerants and is serviceable by SHSU Maintenance Department. The goal is to have equipment provided that is designed for and provided with final replacement HFC refrigerants
- C. SHSU's desire is to standardize on refrigerant types as a means for minimizing the number of refrigerants in inventory. To accomplish this only selected refrigerants are acceptable.
- D. Areas where large quantities of refrigeration are to be stored or used shall be provided with local alarm annunciation, ventilation systems and signage in accordance with ASHRAE 15.
- E. It is the intent that all refrigeration equipment be 100% serviceable by SHSU maintenance personnel. Exotic refrigeration systems that require specialty service equipment, refrigeration charges, or other non-standard components are not acceptable without prior approval by SHSU Maintenance Department.

1.02 Design:

- A. For DX Units SHSU's desire is to have condensing equipment located as close as possible to evaporator.
 - 1. Refrigeration piping shall be designed for return of oil to compressor location. Refrigerant piping shall be installed in accordance with manufacturer's guidelines. Exceptions may be approved by owner for large loads on a case-by-case basis. In such cases, owner shall approve locations of condensing compressor.
- B. Where possible water cooled chillers shall be installed or connection to the SHSU chill water distribution system shall be utilized. Where air cooled chillers or DX Units are used a 20 year life cycle analysis shall be provided to justify selection.
- C. Cooling Towers
 - 1. All cooling towers shall be force draft counter flow design
 - 2. All cooling towers shall utilize structural fiberglass with PVC stack fill.
 - 3. Cooling towers shall utilize high efficiency mist eliminators.
 - 4. Cooling towers shall have stainless steel basin and sumps. Basins and sumps shall be designed to be drained 100%. Basins shall be designed such that each cell has an dedicated basin that can be isolated from adjoining basins without draining. Basins shall be designed such that water can freely flow from one basin to the other utilizing pipes or weirs to provide consistent water levels in the towers. Basins shall be one-piece design without

gasketed seams. Welded seams are acceptable provided that basin mater is 316L stainless steel. Concrete basins shall be made of Type II concrete with fly ash as per ACI 310. The mat for the concrete basins shall be a monolithic pour only, NO EXCEPTIONS. Basin walls for Concrete design shall be constructed with minimal control joints.

5. All internal components shall be stainless steel.
6. Force draft fans shall utilize composite shafts.
7. All gear boxes shall have vibration shut down switches with remote oil fill lines.
8. Fan blades shall be designed to adjust pitch and tip clearance
9. Make up water to basin must be installed in such a way to facilitate maintenance of make-up valve without draining basin. All make up valve floats shall be installed in a stilling well.
10. Cooling towers shall be designed to utilize N+1 redundancy for pumps and cells.
11. Condenser water system shall be designed as a header such that any pump can move water to and from any cell. Pumps shall be arranged such that removal and maintenance can be accomplished without draining basin or sump.
12. Condenser water system shall be designed with a by-pass to facilitate cold weather operation. Sump and basin heaters will not be used.
13. Cooling tower system shall be designed to filter 5% of circulating flow. Either sand filters or mechanical vortex filter may be used.
14. Cooling towers shall be designed such that material of construction is suitable for either low pH or high pH water treatment.
15. Cooling tower shall be designed around 98 deg.F ambient temperature with 90 degF wet bulb. Cooling tower cells shall be sized to utilized a minimum 10 deg.F delta temperature.

PART 2: PRODUCTS

2.01 General:

- A. The refrigerants listed in this section comply with EPA guidelines as final HFC refrigerants and conform to SHSU inventory requirements.
- B. Manufacturer specialty refrigerant blends, refrigerant charges available only from the original manufacturer or refrigerant requiring special ordering are not acceptable.
- C. Where air cooled chillers are utilized Carrier Aqua Snap is preferred.

2.02 Acceptable HFC Refrigerant Types and Application:

- A. For DX Units **410A shall be used as SHSU Refrigerant Standard unless written approval received from SHSU HVAC department.**
- B. **R134a** (replaces R12). Medium temperature applications. Packaged refrigeration and air conditioning equipment.
- C. **R404a** (replaces 502). Medium and low temperature applications. Reach-in and walk- in coolers and freezers, environmental chambers.
- D. Not Used

E. Not Used

PART 3: EXECUTION

3.01 Refrigerant Removal:

- A. Open discharge of refrigerants is not acceptable. All refrigerants shall be recovered utilizing appropriate recovery equipment and in accordance with current regulatory guidelines.
- B. Refrigeration equipment scheduled for demolition and removal shall have refrigerant charge removed. Technician performing removal shall be licensed under the State of Texas for such work. Technician shall provide statement indicating that refrigerant has been removed. Statement shall include date of removal, printed and signed name of technician, license number of technician and type of refrigerant removed. Statement shall be affixed to equipment with copy included with final project documents.

END OF STANDARD