Mechanical Equipment Room Requirements 01.86.16

Description:

The purpose of the section is to highlight the current applicable UMD Design Standards for the design and construction of mechanical equipment rooms.

Related Sections:

- TBD

Effective Date:

January 1, 2020

Applicable Standards:

- WSSC Plumbing Code
- ASHRAE Standards 34 and Standard 15
- National Electrical Code
- National Electrical Safety Code
- OSHA

General Requirements:

1. Summary

Mechanical rooms shall be designed with maintenance requirements and adequate safety provisions in mind. Equipment must be fully accessible to allow for proper servicing, including adequate space to disassemble all pumps, motors and chillers. Provide access for all required trap primers. This section addresses minimum requirements for the design of mechanical and electrical rooms. It shall be noted, specific code requirements more stringent shall apply. This section is intended to supplement and clarify the University's requirements, not supersede code requirements.

2. Submittal Requirements:

Product Data: Include detailed manufacturer's specifications for each component specified. Include data sheets reflecting the model numbers, features, ratings, performance, power requirements, and dimensions. The information provided shall be in sufficient detail to confirm compliance with the requirements outlined in this specification.

3. Drawings

- Access requirements for Mechanical Rooms:
  - Main mechanical rooms which house chillers, pumps, steam to water converters, plate and frame chilled water heat exchangers and associated appurtenances should be located at grade level.
    - Should a main mechanical room be located below grade, a vehicular ramp with an appropriately sized door should be provided to facilitate equipment replacement.
    - Where the installation of an exterior mechanical room drive way and loading dock is not possible, a service well including permanent rigging beam with electric hoist shall be provided.
    - Exterior roof top air handlers are to be avoided. For other roof mounted equipment, provide exterior roof walkways to allow servicing of equipment accessible through standard door ways with permanent stairs or built-in ladders.
    - For large equipment, removable louvers or wall panels shall be provided.
  - Air Conditioning
    - Air conditioning condensate lines shall drain to storm drains.
    - Dumping of air conditioning condensate on roofs shall be avoided.
    - Refer to the WSSC Plumbing Code for the proper drainage requirements.

- Drains
  - Provide at least one (1) sanitary floor drain for every 144 square foot in each equipment room.
  - Locate drains away from walking areas and not beneath equipment.
  - Slope floor to drain.
  - Air conditioning condensate lines within mechanical rooms shall be collected and piped to the storm drains systems via open site funnel drains.
- Ventilation - Provide thermostatically controlled mechanical ventilation in all mechanical and electrical equipment rooms.
  - Ventilation shall be provided to insure air exchange, including fresh supply air and exhaust, to atmosphere.
  - Exhaust shall not be re-circulated to building ventilation systems.
  - Mechanical/Electrical equipment rooms (MER) shall be permitted to utilize outside louvered dampers, adequately sized to provide fresh air supply where MER exhaust fan(s) are used.
  - Ventilation quantities shall be, at minimum, equal to 0.5 cfm per square foot of machinery room area. Specific code requirements more stringent shall apply. This section is intended to supplement and clarify the University's requirements, not supersede code requirements.
  - Air quantities shall insure a maximum temperature rise of 18ºF above inlet air temperature or a maximum MER temperature of 104ºF. Where required, MER cooling shall be required to adhere to identified temperature requirement.
  - MER equipment rooms shall be provided, when required, to provide minimum heating of MER to meet a winter heating set point of 65ºF adjustable.
- Refrigeration - Where refrigeration equipment is installed, adherence to all requirements identified in ASHRAE Standard 15 shall be adhered to.
  - The University, Facilities Management, HVAC Systems (authority of jurisdiction) identifies a requirement to provide refrigerant specific alarms.
  - In lieu of SCUBA provision, remote visual/audible alarming at all MER entrances shall be installed. Individual alarms shall be provided with a reset and clear signage identifying to campus community to contact: HVAC Systems, ext. 57052, Work Control, ext. 52222. Signage shall be located outside MER entrance. Reset shall be installed within MER directly behind signage.
  - Refrigerant alarms shall only reset (automatically) when refrigerant concentrations fall below levels identified for each refrigerant as referenced by ASHRAE Standards 34 and Standard 15.
- Equipment rooms shall not be used for outside or return air plenums.
- Air Handling System - Each component of an air handling system shall be spaced so there is ample room on all sides for inspection and maintenance (filter removal, bearing replacement, coil replacement, cleaning, etc.) as defined in the equipment manufacturer's information. At minimum, service clearance around equipment shall be maintained at 42". All air handlers shall provide for clear "coil pull" clearance dimensions as required.
- Mechanical Equipment - Each piece of mechanical equipment shall be provided with equipment service clearance around the equipment as identified by the manufacturer's literature.
  - When service clearances are not available, service clearance around mechanical equipment shall be at minimum 42" (e.g., pumps, strainers, water heaters, heat exchangers).
  - Chillers shall be provided at minimum 6 foot service clearance on all sides for access.
  - Tube pull space shall additionally be provided on at least one side of the evaporator and condenser.
  - Chiller manufacturer clearance data shall be reviewed for maximum service clearance dimensions on all sides and on top of chiller.
  - Mechanical HVAC engineer shall identify on the drawings, with dotted lines or other clearly identifiable method, all service clearance dimensions (e.g., chiller tube pull clear area shown on mechanical plan as an area to be avoided for installation of mechanical equipment).

4. Mechanical Equipment Room Requirements -

- There shall be a minimum of 42" clearance around electrical equipment control points (e.g., breaker panels) and heat-producing equipment (e.g., water heater). Specific code requirements more stringent shall apply. This section is intended to supplement and clarify the University's requirements, not supersede code requirements.
- Suspended equipment shall be provided with permanent platforms for maintenance including appropriate access to platforms.
- M/E room shall have fire suppression systems unless specifically exempted by the code authority having jurisdiction.
- Walls of equipment rooms, when located on occupied floors, shall be sound attenuated (application specific).
- Equipment and piping shall be laid out in a manner that will not require equipment to be removed to get to another piece of failed equipment.
- For below grade mechanical rooms, provide a dual sump pump, set as required. Connect to emergency power system.
- Provide convenience outlet within twenty-five feet of each piece of equipment.
- Provide 40 fc (minimum) of uniform lighting, when measured at a height 5' off the finished floor, throughout room. Provide task lighting at control panels. Specific code requirements more stringent shall apply. This section is intended to supplement and clarify the University's requirements, not supersede code requirements.
- Main MER entrance shall be provided with a card reader access system to be installed, modified, or upgraded in the project, then all mechanical rooms in the project shall have card readers installed at all entrance doors.
- All electrical control systems (breaker panels, switchgear, transformers, etc.) must be labeled with the arc flash analysis rating.

5. Emergency egress requirements

- Shall comply with the State Fire Prevention Code, the current National Electrical Code and the current edition of the National Electrical Safety Code.
- Any door in an M/E room that is not a direct pathway from the building must be prominently labeled "NO EXIT".
- Electrical rooms shall have not less than two (2) doors for egress.
- Emergency lighting will be present in all M/E rooms in compliance with the State Fire Prevention Code, the current National Electrical Code, and the current edition of the National Electrical Safety Code.

6. Mechanical Equipment Rooms with Electrical Equipment

- M/E rooms with electrical equipment operating at or over 600 volts (OSHA High Voltage definition) will incorporate the following additional design specifications.
  - High voltage equipment will be isolated from other areas of the building in separate and secured room(s). No mechanical or electrical control systems, except those directly servicing or serviced by the high voltage equipment, shall be installed in these rooms.
  - Access to and egress from these rooms must be directly to the outdoors or building corridors. Any exception to this must be specifically reviewed and approved by the University, Facilities Management Operations Department and the office of UMD Fire Marshal.
  - Doors to rooms containing high voltage equipment must pride signage per OSHA and National Electrical Code requirements.
  - All Electrical Rooms must incorporate a sufficient number and type of access/egress means to comply with the current editions of the National Electrical Code and the National Electrical Safety Code.
  - Access/egress means must be constructed per the requirements of the current editions of the National Electrical Code and the National Electrical Safety Code for high voltage rooms.
  - No material or storage structures shall be installed in high voltage rooms.

- Electrical systems shall be designed with appropriate isolation devices to permit maintenance in a de-energized state.
- Any equipment additions/modifications or structural alterations in high voltage rooms must be reviewed and approved by the University Engineer and the office of UMD Fire Marshal.

7. M/E rooms with electrical switch gear

- At least six feet in width and with current capacity of at least 1200 amperes will incorporate the following additional design specifications:
  - Rooms will incorporate a sufficient number and type of access/egress means to comply with the current editions of the National Electrical Code and the National Electrical Safety Code and NFPA 70E.
    - Any equipment additions/modifications or structural alterations in these rooms must be reviewed and approved by the Facilities Management Operations and Maintenance and the office of UMD Fire Marshal.