

## 23 00 00.10 – Mechanical Equipment Room Design

### 1. Introduction

- A. Mechanical equipment rooms (MERs) shall be designed to achieve:
  - a. Equipment, piping, and ductwork layout which allow proper operation of the systems, including straight runs required upstream or downstream of meters and control elements.
  - b. Safe access to all equipment maintenance points without undue contortions, and with space to use the proper tools
  - c. Provide access to all piping and conduit runs so that repair may be done if needed. Typical layout in order of installation would be: electrical close to ceiling with access to J-boxes and equipment, HVAC ductwork, and then piping routed below.
  - d. Containment of equipment and system noise within the mechanical space so as not to produce objectionable noise levels in occupied areas.
  - e. A travel path for the single largest component of the equipment so that it may be replaced without major alterations to walls or structure.
- B. Mechanical equipment room layouts shall be reviewed with Duke FMD during the design development stage of the design process and again at the construction documents phase.

### 2. References

- A. North Carolina State Building Codes (Latest Edition)

### 3. Design Standards

- A. Access to MER
  - a. Locate MERs so that they can be accessed without passing through the occupied areas of the building.
    - i. Exception: MERs located in a penthouse or mezzanine level
  - b. Where MERs are located on the roof, at least one elevator and one stairwell shall serve the roof level. Locate the MER so that workmen may reach it without climbing ladders or other means.
  - c. Where MERs are located within attic spaces, appropriate means of egress shall be provided to prevent the space from being classified as a confined space. Example: Staircase being used as opposed to dropdown or ship's ladder as means of egress.
  - d. There shall be a path from the outside of the building into the MER with clearances so that the single largest component of any of the equipment in the MER may be removed without taking it apart. This includes doorways, stairwells, and elevator cars. Paths which require demolition or alteration of the structure or permanent partitions are unacceptable (Intake or exhaust louvers for future AHU access are acceptable paths).

- e. Condition all Mechanical and Penthouse equipment rooms where practical (lower limits than typical design: 65°F winter, 80°F summer).
- f. Any MEP equipment required to be located on roof shall be provided with dedicated walk pads. Walk pads shall be provided to each piece of equipment and to provide pads around equipment for adequate access as well as protect roof surface/membrane.

#### B. Location

- a. Mechanical rooms with vibrating equipment may not be located adjacent (either horizontally or vertically) to occupied spaces where the noise from the equipment will be objectionable.
- b. Mechanical rooms containing air handling units with outside air requirements will be located on an exterior wall or under a roof which allows for intake of outside air.
- c. Do not locate MERs adjacent to electrical rooms or telecom rooms, to avoid interference between duct mains and distribution conduits and cable trays.
- d. Equipment on the roof shall be in an MER, not exposed on the roof. Where MER is located above occupied space, floor shall be epoxy coated and all penetrations shall be curbed/sealed. Mechanical room shall be treated as one large auxiliary drain pan to prevent fluids from dripping to the floors below.

#### C. Separation of services

- a. **The high pressure steam (HPS) building entry and pressure reducing valves shall be in a separate room from other mechanical equipment and equipped with two means of egress from the room.**

#### D. Locations of equipment etc.

- a. Floor drains shall be located where they may be seen. They shall not be located below large equipment or between equipment and wall or between pieces of equipment where they cannot be easily accessed.
- b. Floor drains shall be routed to sanitary system.
- c. In general, equipment serving one system should be located together to simplify maintenance, TAB, and routings.
- d. Group pipes running in the same direction at the same elevation.
- e. Assign elevations to each direction for pipes and for duct. In general, ductwork shall be above pipes.
- f. Pipe and duct elevations shall be high enough so that additional pipes may be added in the future.
- g. Do not locate pipes close together such that there is no room for installation and maintenance of valves and take-offs.
- h. Show required maintenance clearances for all equipment on drawings.
- i. In steam rooms, in case there is a rupture of any of the components, provide a clear path of egress from all points in the room. Path of egress shall be outlined in safety yellow marking tape or paint.

- j. Leave a clear walkway around equipment, with a minimum 7'-0" head height. This path shall be identified on the floor by tape or paint.
  - k. MERs floors shall be painted or epoxy coated. Coordinate with Duke FMD.
  - l. All major MER equipment located on floor shall be located on curbs. Curb edges shall be painted yellow.
4. Documentation and Review Requirements
- A. Mechanical room floor plans shall be drawn at  $\frac{1}{4}'' = 1'-0''$  scale or larger.
  - B. Elevations/sections are required for all MERs unless otherwise specified by Duke FMD.
  - C. Piping larger than 2" shall be drawn double line.
  - D. All ductwork shall be drawn double line.
  - E. Indicate all equipment maintenance access clearances on the drawings, including coil pull and pump, fan, or motor removal.
  - F. Indicate on drawings walkways to be kept clear.
  - G. At least one section shall be drawn of each MER, at  $\frac{1}{4}'' = 1'-0''$  scale or larger, showing structure, equipment, pipes and ductwork, large valves, piping and conduit of other trades. In complex spaces, draw section for each area where several services are crossing or where ductwork or piping must cross tall equipment.
  - H. MER drawings shall be submitted to Duke FMD for review not later than 50% CDs, with sufficient detail to establish safe travel paths, equipment access areas and elevations for main pipe and duct runs.
  - I. For larger projects, SD submittal shall include all major equipment, to scale, and main duct and pipe routings. DD submittal shall include all equipment, at  $\frac{1}{4}'' = 1'-0''$  scale, and all pipe and ductwork. A preliminary section shall be submitted at DD. The designer shall establish with Duke FMD, at the beginning of the design phase, which MER drawings will be submitted.