DESIGN GUIDELINE 230000
BASIC MECHANICAL REQUIREMENTS

General

Within the scope defined by the Program Documents, perform the project mechanical design work and produce the project mechanical construction documents in accordance with these Design Guidelines.

Related Sections

Codes and Regulatory Agencies

Design Requirements - Codes and Standards

In addition to the **Codes** listed in section "Codes and Regulatory Agencies", the following **Standards** apply to mechanical projects. Use most current update. Where these **Standards** conflict with related **Codes, Code** shall take precedence.

- State of Michigan Fire Marshal Division, "Fire Damper Clarification".
- NFPA 101, "Safety to Life from Fire in Buildings and Structures".
- NFPA 90A, Installation of Air Conditioning and Ventilating Systems.
- SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- Factory Mutual loss prevention data sheets.
- NFPA 13 "Installation of Sprinkler Systems".
- ANSI/ASHRAE/IES 90A Energy Standard.
- ANSI/ASHRAE/IES 100.5 Energy Standard.
- AABC National Standards for Total System Balance.
- ACGIH Industrial Ventilation.
- ASHRAE Handbook - Fundamentals, Equipment, HVAC Systems and Applications, Refrigeration.
- ASHRAE 62 Ventilation for Acceptable Indoor Air Quality.
- SMACNA - HVAC Testing, Adjusting and Balancing.
- NEBB - Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems.
- AWS D 9.1 - Welding of Sheet Metal.
- AMCA - Standards, Definitions, Terms and Test Codes for Louvers, Dampers and Shutters.
- NFPA 14 - Standpipe and Hose Systems.
- Michigan Occupational Safety and Health Act.

The enforcing authority is the University of Michigan.

Design Requirements - Future Growth, Spare Capacity, Existing Conditions

When designing new installations, consider providing spare capacity for future growth. When designing renovations to existing installations, verify the existence of spare capacity before utilizing it for the new loads. Also field verify existing conditions - do not assume that existing design drawings are complete or accurate.

Design Requirements - Maintenance Accessibility

Locate equipment requiring maintenance so that it is easily accessible. Avoid installations that require the use of lifts or scaffolding, or the removal of other equipment for routine maintenance. Provide access doors to all maintainable equipment located behind walls or above permanent ceilings.

Preferred Manufacturers List

The University (Facilities Planning and Design) maintains a "Mechanical Trades Preferred Manufacturers List" (PML). This list is updated regularly, generally in February and August. The A/E shall use this list in developing construction document specifications. Obtain a current copy from the University Project Coordinator. This list is also available through this website.

Where specific manufacturers are specified in U-M AEC specifications other manufacturers listed in the PML may be added provided a model with similar quality exists, subject to the approval of the U-M Design Manager.

Demolition Requirements

To maximum extent feasible, remove abandoned branch piping and ductwork back to risers/mains. Remove abandoned conduit and equipment.

The A/E must caution the Contractor that all shutdowns of systems serving occupied spaces outside the area of this project shall be absolutely minimized. This will require that, for example, branch duct runs shall be capped and sealed at the time of partial duct removal to allow use of the remaining duct system until the new ducts are installed. Temporarily rebalance if pressure relationships are critical. Ducts cannot be left open unless the entire system can be taken out of service throughout the full construction period.

Other systems which are presently operating that are to be abandoned, as well as those previously abandoned should be removed.

Operating and Maintenance Instruction Manuals

Four sets of **job specific** operating and maintenance (O&M) manuals shall be provided for each project. These manuals shall be collected in indexed three ring binders and contain manufacturer's operating and maintenance literature for every equipment item furnished for

the project. Typical wiring or piping schematics are NOT acceptable; they must reflect the actual furnished equipment, including all options and interfaces with other equipment or systems. O&M manuals shall include a steam trap inventory with individual trap identification, service, manufacturer and model.

A single copy of each **job specific** O&M manual shall be submitted immediately after all shop drawings have been approved. This copy will be reviewed by the A/E and University personnel, then sent back to the contractor for corrections. All four corrected copies must be received by the University two weeks prior to any scheduled training.

Drawing Requirements

The amount of outdoor air for each air handling system must be shown on the equipment schedules.

Prepare the following mechanical drawings (as applicable to the project) for use during construction:

- Demolition plans and details
- Plumbing plans, including underground (within 5 feet of the building)
- Piping plans and details, including all utility meter locations
- HVAC plans and details
- Mechanical room layouts showing free space required for maintenance
- Plumbing, piping (including specialty gases) and HVAC (SA, RA, EA) risers

The drawing shall be of high quality in accordance with the Construction Documents Section of the Special Instructions to Designers.

Shop Drawings and Air/Water Test and Balance Reports

The University will retain three copies of all such submittals and the A/E will retain one copy. Therefore, the Contractor will be required to submit four copies of all such submittals plus however many copies he wishes to retain.

Access for Maintenance Operations

Add access hatches as required to service valves, dampers, coils, VAV boxes and mechanical equipment.

Structural Supports

All supports for piping and equipment shall be selected so that deflection caused by the load does not exceed 1/240th of the span.

Dust Protection

All mechanical and electrical equipment shall be protected from construction dust. Before start-up, motors must be covered or enclosed in a dust free manner. After start-up the surrounding area must be kept as dust free as possible by regular and frequent cleaning, dust control compound etc.