

DFD PLUMBING AND FIRE PROTECTION DESIGN GUIDELINES

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1. INTRODUCTION

The purpose of DFD Plumbing and Fire Protection design guidelines is to publish consistent guidelines for design issues encountered on state owned buildings. This document is intended to be used in conjunction with master specification commentary to guide consultants with design practice and decision making that is consistent with DFD policy.

The consultant should be routinely reviewing these documents as they apply to each particular project prior to the preliminary design. The documents will be updated as necessary to reflect additional information or changes. The consultant is required to use the latest edition available on the DFD Internet homepage at the beginning of their design.

Comments on the design criteria are welcome from those who use the document. As technology and building practices change, DFD wants to insure that good information is shared to continually improve the quality of design and construction.

Questions and comments may be directed to the following DFD mechanical section personnel:

Paul Lippitt	(608)267-3388	Fax (608)267-2710	email Paul.Lippitt@wisconsin.gov
Jim Schey	(608)266-2276	Fax (608)267-2710	email Jim.Schey@wisconsin.gov

2. GENERAL DESIGN

Make inquiries of the Agency/User regarding any potential for future changes or expansion and plan the system design to allow provision for these changes.

All of the required elements for DSPS Safety and Buildings plan review are also required for DFD plans including water calculation worksheets, isometrics, notation of drainage and water fixture unit counts, storm and clear water waste sizing information, calculations for the sizing of equipment, drawing details of equipment, water service entries, hangers and supports, safing, etc.

Do not place piping in exterior walls or within ceiling/roof insulation space. Confine piping to interior walls and to open areas below ceiling/roof insulation. The only exception to this is plumbing vents.

If possible the saw cutting of concrete floors, heavy cutting and patching of walls and ceilings, and pouring concrete equipment pads should be performed by the General Contractor on multi-discipline projects. Coordinate with the Architect to show this work on the Architectural plans.

Plan for and provide sufficient access for the future removal and replacement of equipment when selecting, sizing and locating equipment.

On remodeling projects where piping is being capped, remove abandoned piping back to active mains wherever possible. Piping that is accessible should be removed and not abandoned in place, piping that is to be left in masonry walls or below floors should be capped and marked as abandoned. Potable water distribution piping shall be capped as close as possible to active main or branch piping, no dead legs of stagnant water piping are allowed.

Where exterior underground site piping is being abandoned, disconnect from main, cap main tee and abandoned piping.

Minimize the length of pipe and stagnant water between mains and seldom used fixtures such as a tempering valve that serves an emergency eyewash/shower.

The minimum size used for roof drains and roof conductor piping should be 4".
The minimum size used for water closet drain lines is 3" with the use of a 4"x 3" closet bend. The minimum size for wall outlet/carrier fitting type water closets is 4".

Venting systems for plumbing fixtures should be designed to meet the code minimum. Common vents, circuit vents and all other means of eliminating unnecessary piping should be used where possible. The minimum size for vent terminals through the roof is 3"

The base of all drain stacks and storm conductors must have accessible cleanouts.

Wall cleanouts serving fixture batteries must be extended to an accessible location above the flood rim level of the fixtures that they serve.

Wall cleanouts should be provided in lieu of floor cleanouts. Do not provide a floor cleanout when an adjacent stack cleanout will serve the same piping.

Provide floor drains and/or hub drains as follows:

- Include a floor drain in toilet rooms containing more than one toilet/urinal fixture.
- Include a floor drain at air compressor locations.
- A floor drain or hub drain is required for the relief port of an RP valve.
- Include a hub drain for water softener discharge.
- Include a hub drain for the packing gland drain cups of fire pumps.
- A floor drain should be provided at sprinkler riser locations and a hub drain should also be provided if the riser is located below outside grade.
- A floor drain should be provided for water heater rooms/areas. The discharge from T&P relief valves should not be piped directly to hub drains as this makes it too easy to ignore potential problems that are causing the valve to lift.
- Coordinate the layout of drains with the appropriate Consultants for kitchen equipment and mechanical rooms.

Locate floor and hub drains at equipment drain discharge points to avoid drainage across the floor. Avoid the use of local waste piping across the floor as this could be a safety/trip hazard.

Include a Trapguard, Sureseal or equal trap seal protector for seldom used floor and hub drains. Trap primers may be used if necessary.

Coordinate with the project Architect to confirm that the floors are pitched to floor drains and insure that the requirements for safing are being met.

Use wall mount urinals except for locations requiring ADA floor mount urinals. Floor mount urinals are the preferred method for the discharge of leg bag waste for handicapped use. The further use of the flushing floor drain which has been used in the past for this function should be reviewed on a case by case basis and confirmed with the Agency. Private or family unisex toilet rooms would meet the location requirement for the use of floor mount urinals. In public toilet rooms if the flushing floor drain is used, it should be located within the handicap stall.

Battery powered sensor operated urinal flush valves are recommended. Urinal flush valve flow rates of .25 to .5 GPM per flush are recommended.

1.28 GPF toilets may be used if they are the flush valve type.

1.28 GPF tank type toilets may be used if they are the power flush type.

Sensor operated faucets and toilet flush valves are not recommended due to high initial cost and ongoing maintenance issues.

Fixture stops for lavatories, sinks and similar fixtures must have ½" threaded or sweat inlet fitting. Compression inlet fittings are not acceptable. Outlets should be 3/8" OD risers of soft copper tube construction, braided or plastic supply tubes are not acceptable.

Avoid the use of check valves and backflow preventers upstream of water heaters. Where required, include a small expansion tank to accept thermal expansion from the water heater. For most applications this will not be necessary as a thermal piping loop can be utilized instead.

Avoid the use of large (over 200 gallon) storage type gas/oil fired hot water heaters. Use a separate storage tank with a low volume high efficiency type water heater. The preferred material for hot water heaters and storage tanks is stainless steel. High efficiency modulating/condensing technology heaters should be used.

Point of use water heaters should generally not be used due to high initial cost and ongoing maintenance issues except where long runs of pipe are required for lightly used fixtures.

Use regenerative media filters for swimming pools and diving wells to provide 1-5 micron filtration, enhanced microorganism removal and lowered chemical oxidation demand. When access is insufficient for new filter vessels, site constructed concrete or factory fabricated fiberglass vacuum diatomaceous earth filters may be used for comparable filtration efficiency. Use ceramic tile pool surface finish and concrete (not stainless steel) gutters for swimming pools and diving wells.

Where a cold water connection is provided for HVAC equipment, call for a Reduced Pressure Zone Backflow Preventer installation in lieu of any other type allowed by code. These water feeds should normally be soft water, coordinate this with the Mechanical Consultant.

3. DRAWING REQUIREMENTS

Include a graphic scale, north arrow, grid lines, room numbers and/or names and continuation of plan references on all plans.

Sewer invert elevations must be shown on drawings where sewers leave buildings, where they connect to manholes and other locations significant to coordination of building and utility construction.

Indicate locations of piping on plans: i.e. above ceiling, close to ceiling, under floor, to floor above, close to wall, etc.

Specifically call out on the plans that kitchen waste runs from dishwashers, scullery sinks, kettles, etc. shall be cast iron piping or high temperature rated chemical waste grade CPVC. This requirement also applies to mechanical equipment room drains that could be subjected to high temperature waste. PVC piping does not stand up to high temperature discharges experienced in these areas.

Areas of the building that are plenum ceilings must be shown specifically on the drawings and material that is plenum rated must be used.

If access panels are required they need to be shown on the plans so that the Plumbing Contractor can include the cost in their bid and this needs to be coordinated with the Architect so that they can be shown on the Architectural drawings to be installed by the GC.

Fire and smoke walls and floors that will require fire stopping of penetrations should be shown on the plans so that the cost is included in the bid and the work is incorporated into the project.

The use of flow direction arrows on the piping is encouraged.

On Site Plans that show multiple installations by separate trades, all installations shall be labeled as to which Contractor provides the installation, i.e. "by Plumbing Contractor", "by HVAC Contractor", by General Contractor", etc.

4. SPECIFICATION REQUIREMENTS

Specifications must list multiple manufacturers, preferably three minimum. In order to establish a level of quality, the designer can list three comparable manufacturers and model numbers. Substitutions must still be reviewed, but this will limit acceptance of substitutions of a lesser quality.

Confirm and describe all areas of the project that will require "wet area" sleeving per the specification.

Confirm and describe all areas of the project that will require "corrosive atmosphere" hangers and supports per the specification.

When designing sanitary and storm stacks to serve multi-story buildings, the pressure at the base of stacks should be considered when selecting pipe and joint materials. Heavy duty No Hub couplings should be used for these locations but should not be used throughout the project if not necessary.

Water heaters using central plant steam as a heating source must be specified with a double wall heat exchanger and the steam must be low pressure (15 psig or less). The heat exchanger must be constructed of cupronickel or stainless steel, copper heat exchangers are not allowed.

When selecting pumps, 1750 RPM is preferred over 3500 RPM for reduced maintenance and longevity of equipment.

Water pressure booster pump systems should be duplex or triplex depending on the size and scope of the project. The pumps should be provided with VFD's and pressure reducing valves should not be required.

5. FIRE PROTECTION REQUIREMENTS

Fire protection drawings must include:

1. A sprinkler head layout or some other means of clearly identifying the specific types of sprinkler heads that are to be installed at all locations throughout the project.
2. Whether or not center of tile sprinkler head placement is required. If center of tile is not required then include specific information such as heads in line in corridors and large rooms and a minimum of 6" from ceiling grid lines.
3. The size and location of fire mains and risers.
4. Fire pump and controller location and details.
5. Details and location of the water service entrance and main system riser(s).
6. Locations of system zone control assemblies.
7. Location of hose valves, valve cabinets, standpipes, fire department connections, fire pump and backflow valve test connections, inspector test connections, auxiliary drains, main system drains.
8. Details and location of drypipe valves, preaction valves, compressors, or any other special systems or equipment.

Drawings do not require sprinkler branch piping which is typically designed by the installing contractor, although adequate space and clearance for the piping must be confirmed.

System drains should be piped to an outdoor location that will not create a nuisance if possible. Riser main drains must be piped outdoors so that a main drain test can be conducted. If the main drain is

below grade it can be piped outdoors and an auxiliary drain can be installed to drain out the remaining water.

Both the drawings and the specification must include current water supply information. This must be obtained as early on in the process as possible so that it can be confirmed whether or not a fire pump is required.

Both the drawings and specification must include project specific design criteria and hazard classification information.

If a fire pump is required, the need for reduced voltage/soft start and emergency power/automatic transfer switch must be confirmed and coordinated with the Electrical Consultant.

All power and alarm requirements must be coordinated with the Electrical Consultant.

The local Fire Department must be contacted early in the design process so that their requirements are met. This may include special needs for location of fire department connections, fire hydrants, vehicle access, special fire department connections types like storz adapters, locations for standpipes and hose valves, type or location of outside alarms and local Knox box requirements.

(End)