

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

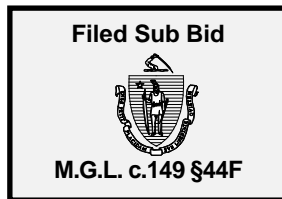
22 00 00 • PLUMBING

SECTION INCLUDES;

Toilet
Lavatory
Tub and Shower Surround
Faucets and Fittings
Kitchen Sinks and Fittings
Washing Machine Hookups
Domestic Water Heaters
Piping
Pipe Insulation
Meters

RELATED SECTIONS;

06 10 00 Rough Carpentry
07 90 00 Sealants
09 30 00 Tile
09 65 00 Resilient Flooring
12 30 00 Casework
21.00.00 Fire Suppression Sprinkler
23 00 00 Heating, Ventilation & Air Conditioning
26 00 00 Electrical
33 00 00 Site Utilities



Plumbing is a stipulated filed sub-bid category under M.G.L. Chapter 149, §44F. For projects with a total estimated cost over \$100,000 and a cumulative estimated cost for the plumbing (in all sections) **over \$20,000**, the filed sub-bid requirements must be followed.

In addition, if **pipe Insulation** is estimated to cost **over \$10,000**, the filed sub-bidders for this trade shall be explicitly instructed to list sub-subs on their Form for Sub-bid.

FOREWORD



The intent of the plumbing system design should be to provide systems that conserve water, are energy efficient, are durable, have quality components from proven and reliable manufacturers, and the LHA can operate and maintain them.

These are residential properties that are occupied most of the time. Please consider this throughout the design process.

Please do not provide an all-inclusive comprehensive specification that is not applicable and specific to the project.

All specifications must identify codes, regulations, and industry standards that must be followed. The design should be in accordance with the applicable codes and regulations.

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

22 00 00 • PLUMBING

Dependent upon the complexity of the project it may suffice to provide notes & specifications on drawings without providing a separate specification section. For large projects both drawings and specifications will be required.

Drawings should include as a minimum; plan view with lines & symbols representing all new piping, connection points to existing piping, valving, all pipes should be sized, symbol legends, notes, fixture schedules identifying make & model of each, provide details of water heater venting and water piping, mixing valves piping, pipe hanging, with insulation and shields, pump arrangements, etc.

For all plumbing-related items, consult the LHA to determine if they have preferences for specific manufacturers so that they can standardize maintenance across their building stock. If there are specific manufacturer's preferences, a proprietary specification will be required. It is the designer's responsibility to prepare a resolution specifically for this project itemizing the proprietary items for a Housing Authority's Board vote before the bid documents are published. **This proprietary specification still does not preclude the specifying of "or equals" in the specification.**

Colors, styles and finishes that are specified for fixtures should be readily available ("off the shelf") and not special order.

TOILETS

Gravity or siphon jet flush fixtures are preferred to pressure assisted fixtures. Pressure assist (noise factor) is not excluded but should have the proper application, and suitable for the LHA to maintain and repair. The LHA shouldn't have to call a plumber to fix a toilet. Toilets are usually made of vitreous china.

Existing flushometer valve fixtures should remain, unless extensive modernization work is undertaken.

In general, water closets within the dwelling units should be two piece close coupled elongated bowl tank-type fixtures to keep with the residential nature of the facilities. A seat should be specified with the toilet. The cold water supply line should have ball valve control and not gate valves that can be difficult to operate over time. The supply line should be acceptable to the LHA –e.g. flex lines may be requested.

The Dual flush toilets are a good idea for saving water, but they should not be specified (unless the LHA requests them) because these models are generally more costly and unique to maintain. If installed, the tenants need to be educated as to the operation and water-saving benefits of proper use.

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

22 00 00 • PLUMBING

Flushometer valves should be limited to public and office facilities.



The low-flow, 1.28 gallon per flush (gpf) toilets should be used at this time. If lower flow toilets are proposed, it should be discussed with the LHA and they should approve of its use. If a development is served by a septic system requires more water flow, the 1.6 gpf models can be specified.

In elderly and special needs housing (Chapters 667, 167 and 689) a comfort height toilet >16 inches bowl height is required.

LAVATORY

If the sink is to be integral with the countertop, it should be specified under Cabinets and installed by the General Contractor; with the plumber supplying and installing fittings and hook-up.

Both vitreous china and cast iron wall-hung lavatories are acceptable. Pedestal type lavatories are not specified because of cost of materials and installation, maintenance, and its suitability for public housing. Avoid enameled steel and PVC because they are not sufficiently durable.

PVC laundry trays are suitable to replace existing fixtures in the basements if required.

In special needs (Chapters 167 and 689) integral sink and countertops are preferred.

TUB AND SHOWER SURROUND

**REFER TO ARCHITECTURAL STANDARDS FOR TUB AND SHOWER SURROUNDS
06 64 00 PLASTIC TUB & SHOWER PANELS AND 09 30 00 TILE.**

A window located in the tub surround area will require architectural considerations.

TUBS

New or replacement:

In family housing, (Chapters 200 and 705) a durable product is required such as enameled cast iron tubs, in elderly housing Americast type materials can be used. The size and colors chosen should be standard. The tub should have slip-resistant features if available.

In special needs (Chapters 167 and 689) a composite tub is acceptable.

One piece composite showers are preferred in bathrooms with no tub.

Never relin existing tubs. Refinishing and reglazing has been successful under certain circumstances

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

22 00 00 • PLUMBING

Provide access to bath tub traps if possible.

In elderly housing (Chapter 667), if replacing the tub, evaluate and discuss with the housing authority the use of a composite shower designed to replace a tub.

Install floor drains in wheel in showers, these floor drains will require trap primers. If code approved devices that eliminate the need for a trap primer (Sure Seal Trap Primer replacement) consider its use. Please review the application of this product.

FAUCETS AND FITTINGS

Provide mechanically fastened (adjustable or swing) traps with clean out for ease of maintenance. Plumbing traps may be chrome-plated or PVC; PVC traps should be concealed from view.

The faucets specified should be a quality product from a reliable manufacturer, suitable for public housing i.e. cost and durability must be considered, it should be easily maintained replaced, and the LHA should approve of its choice. It should also have water saving features.

Quality flex connectors to fixtures if permitted by code and suitable for the LHA can be specified and used.

Showers should have flow rate limiting features. Use dependable, pressure balancing, anti-scald shower valves with integral service stops.

In barrier free units: provide a removable panel for access to pipes

KITCHEN SINK AND FITTINGS

Select a sink with an offset drain to provide additional clearance, offset should go to end of kitchen circle and coordinate the location of the drain for ease of access to appliance and work counters

Insulate all piping under barrier free sinks

Sinks should be high quality, sound-deadened stainless steel; minimum 18 gauge. It is preferred to have a single bowl with a deep sink; 8-10 inches.

Select high quality, easy maintenance, single-lever faucets for elderly. The flow rate must meet current code standards. Flex water supply connectors if acceptable to the LHA are permitted. The types of faucets should be discussed with the LHA and what they want should be specified. A spray feature is recommended.

Garbage disposals are usually not provided. However, some LHA's have them already and want to replace them with new. A quality product that is readily available should be specified so the LHA can replace in the future. This component installation needs to be coordinated between trades; plumbing, electrical, & GC.

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

22 00 00 • PLUMBING

LAUNDRY -WASHING MACHINE/DRYERS

Dishwashers are usually not provided.

Most elderly resident developments have a common laundry usually located in the community building. The number of hook-ups is provided in accordance with the plumbing code for the number of units. Some LHAs lease the laundry equipment.

Provide one hookup in each family unit usually in the basement. If there is no basement provide hook-up in the kitchen area. Locate washing machine hookups in close proximity to dryer hookups. Do not locate laundry equipment in boiler rooms.

Clothes washer piping should be arranged to prevent back-ups in kitchen drainage systems. Provide water hammer arrestors for clothes washers and other quick closing appliance/devices that could result in water hammer.

Provide a pan under the washing machine if located other than in basement if this pan is to have a drain then it needs to be suitably trapped and vented.

Verify if LHA has a preference for gas or electric dryers.

Always vent dryers to the outside. Locate dryers on an exterior wall to keep vent/exhaust runs as short as possible. Lengthy runs tend to contribute to interior moisture problems. Avoid common dryer ducts and do not combine dryer ducts with other exhaust systems.

Keep dryer exhausts away from kitchen exhausts and avoid long runs of concealed ducts. Do not locate dryer exhausts near makeup air for heating and hot water equipment, lint and other laundry agents (chlorine fumes) affect burners.

DOMESTIC WATER HEATERS

The replacement of an existing system or provision of a new system should have the same design intent; to provide a quality product that will provide long reliable service. The system must have the capacity to meet the demand. The system should be efficient and not be oversized so that it uses more energy than necessary and wastes energy during off-peak times.

There are many quality products available. Some of the applications will require residential grade products (200's & 705's, small 667); others may require a commercial grade system e.g. (a large 667) with some redundancy included with the design. An existing system that works now should be improved upon by providing current quality products. Options that will provide a longer service life should be considered.



Energy Star certified products should be specified if possible. Utility rebates may be available for these models.

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

22 00 00 • PLUMBING

Consider specifying extended warranties if cost implications are favorable.

If water heaters are failing prematurely, a water test and analysis should be done to determine if there are corrosive constituents in the water that might be contributing to this premature failure. A water treatment system may be required to eliminate or mitigate this condition as part of the design of the water heating system.

Some of these water treatment systems are maintenance intensive which the LHA may not be able to provide; therefore a service contract may need to be specified.

Size the domestic hot water systems according to a realistic scenario about the peak time demand. For special needs and elderly congregate units, heat and domestic hot water may be separate systems. Domestic hot water use in these locations is more than average.

Design to 140°F storage and provide mixing valves that will supply water at code required temperatures (currently 112°F at the tap); take into account line loss when designing the system.

For all large multi-unit water systems provide domestic hot water load calculations used in determining the size of equipment.

Existing boiler capacity must be evaluated and DHW priority control should be provided for indirect HW tank installation systems.

The preferred arrangement for individual residential apartments is an indirect (preferable stainless steel) tank supplied from the heating boiler because of improved service life expectancy over direct fired storage tanks life expectancy. However the LHA preference should take precedence.

If replacing a direct fired water heater with its own venting arrangement with an indirect system off the boiler, the existing venting arrangement (chimney) must be evaluated in accordance with the current code.

Tankless heaters in hydronic boilers should be replaced with an indirect tank if the LHA agrees. Steam boilers will have to maintain the tankless arrangement.

Instantaneous condensing type water heaters should be evaluated for application if suitable. If the installation will have a higher cost than a conventional direct fired replacement then a cost benefit analysis should be provided to justify additional costs vs. the conventional residential approach.

For gas and oil-fired equipment, provide adequate combustion and ventilation air, It is preferred that combustion air be supplied directly from

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

22 00 00 • PLUMBING

DOMESTIC WATER HEATERS, CONT.

outdoors where practical and not from within the apartment. Venting of combustion gas products should be in accordance with the applicable code. The existing venting arrangement should be reused to reduce the costs. This arrangement has to be evaluated for compliance with current code and modifications needed should be included in the design.

Keep water heaters on the first floor or in basement, avoid upper level installations. When unavoidable install a metal drain pan under equipment with a drain and trap suitably piped and vented with a trap primer.

Natural Gas-fired direct vent equipment is preferred and should have a quality liner and other options that will provide longevity to the equipment.

Electrically heated or oil-fired equipment should have similar performance features of materials.

Local water conditions will affect the longevity of domestic water heaters. If the equipment will require frequent servicing or replacement, specify simple systems that will be easy to access.

Mixing Valves (MV) – these can be problematic, if there is an existing one and it is working and the LHA can operate and maintain it, then there is no compelling need to replace it if it interfaces with the new water heating equipment.

However, if a new MV is required to replace an existing MV or a new MV is required, please specify a quality product that has proven operating experience and is backed by a reliable manufacturer. Provide an MV that is suitable for the application and flow rate ranges anticipated. Provide a detail on the drawing of how this device is to be piped and include all valves and thermometers needed to adequately maintain, operate and adjust the device.

Include in the specification or in a note at this detail that the valve must be piped in accordance with the manufacturer's recommended piping scheme (i.e. the existing piping may have to be modified).

Include in the specification that the manufacturers rep must make all initial adjustments and settings to the mixing valve and provide training in operation and maintenance of this valve to the LHA's designated representative. Include temperature/flow settings in record drawings or in O & M's.

The preferred arrangement for provision of domestic hot water is to provide an indirect stainless steel water heater supplied from the boiler. If there is a potential for this arrangement in the replacement or modernization of an existing water heater system then it should be

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

22 00 00 • PLUMBING

evaluated as an option. If ASME is a code requirement please specify the Plumbing code “equivalent ASME equipment” as listed.

If there are existing tanks (indirect or storage types) that are in good condition and have useful life remaining, it should be determined if these tanks are ASME stamped if ASME tanks are required by code.

If the system requires (code) a recirculation loop please pipe this in concert with the mixing valve. Include properly sized circulators and provide energy conservation control features, i.e. during anticipated low demand periods the system has simple controls that conserve energy usage. Problems have occurred with these recirculation systems that during the night when there is low usage the cold water somehow becomes hot at the faucets. This could cause scalding of elderly residents. Please avoid any design that may result in this operation.

PIPING

The design must clearly delineate between new and existing piping and different types of piping with suitable legend designations provided.

Do not install water piping or fixture traps in exterior walls, in overhangs or unheated spaces, or close to outdoor air openings.

Piping installed in unheated attic spaces and covered with fiberglass or blown in insulation will not be approved. This arrangement has resulted in freeze-ups, pipe breakage and subsequent water damage, because loose or fiberglass insulation can get moved or displaced over time. A well-insulated chase that is exposed to heated areas **may be considered**, e.g. an insulated box that runs close to the ceiling below and is exposed to the heated ceiling below. Prefabricated and pre-painted metal soffits if suitable for installation in the finished heated space will be accepted.

Locate frost proof wall hydrants with keyed faucet handles in accordance with Plumbing Code requirements.

Piping that runs thru below grade foundation walls should be provided with a quality seal product to assure that a watertight penetration is provided, e.g. similar to or equivalent to a Link-Seal product.

Backwater valves should be provided for all waste lines that are subject to sewer back-up, e.g. underground sewer lines with fixtures below grade that have in the past been subjected to sewer back-ups.

In general, type “L” copper, PEX or CPVC shall be used for domestic cold and hot water. (Use of PEX is limited to 3 stories).

Propress fittings can be specified, however, at this time the preference is to allow it for piping that is not enclosed in walls or hidden and would require demolition to reveal should a problem arise.

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

22 00 00 • PLUMBING

The plumbing specification should indicate access panels required for all hidden valves, etc. that require access, maintenance, etc. and access panels should be specified as being provided by the plumbing contractor to the GC for him/her to install.

Gas piping can be carbon steel with CSST piping for appliances.

Consider the corrosive quality of the water when designing the system. If there is a problem, consider Type "K" copper, PEX or CPVC for domestic water piping.

In general, exterior water piping up to 3 inches in diameter should be type "K" copper tube. Larger pipe should be CPVC or cement-lined ductile iron. Check with the local water department for their requirements.

Pressure Testing and Sterilization of new plumbing systems must be done in accordance with the code. Please keep in mind that many of these units will be occupied and disruption of services should be minimized, i.e. don't specify 24 hour tests if not required by the AHJ or code and if shorter duration tests are allowable.

Backflow Prevention – provide a suitable type BFD in accordance with the plumbing/DEP code, include these codes required testing in specification.

Seismic Restraints –please do not include a general requirement for this without determining if this is actually required. You cannot require that the contractor determine this and provide what is needed. Based on limited review of available information in the industry it appears that the Commonwealth of Massachusetts for residential properties does not require seismic restraint. If the Consultant feels this evaluation is beyond the scope of the project and a sub-consultant is required please discuss this with DHCD/LHA.

Pipe Hangers –specify hangers to support concentrated loads such as pumps, valves, etc. Provide a pipe hanger support schedule that defines pipe sizes, support sizes, and hanger spacing. Provide a detail of the type of hanger being specified. Do not reference a piping support hanger manual type of hanger. Some of these manuals may not be available to everyone. Keep it simple and definitive so contractor knows exactly what is being specified. Specify sheet metal pipe saddles for insulated piping. Include gage of metal and dimensions of saddle.

Specify dissimilar metal protection where needed for all components of the piping systems.

Piping and Equipment Identification – please do not provide this in residential units, if boiler rooms that residents have no access to are provided this identification can be specified but please be specific as to what is required and where it is to be installed. Snap on pipe markers are acceptable in areas where residents have no access.

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

22 00 00 • PLUMBING

Pumps should be specified as to material and size (GPM, TDH), if replacing existing pumps, the existing pumps should be evaluated for previous satisfactory operation prior to replacing in kind. There is no compelling reason to replace a good pump that is working with a new pump. Provide a standard pump schedule on drawings or in specifications. Provide pump curves in the O & M's. Sizing methodology for new pumps may be required to be submitted for review.

Specify **thermometers and pressure gages** where needed (i.e. hot water supply temperatures, temperatures @ mixing valves, pump suction and discharge pressures). These should be provided with pulsation dampeners and petcocks to facilitate replacement by LHA maintenance. These should be specified with gage ranges and graduations so they are suitable for the application and can easily be read. It is desirable to know what supply temperatures are and what pump pressures are

Storm Water Systems – the general contractor will be responsible for the installation of gutters and downspouts. These are generally the purview of the architect and not the plumbing designer. The design of an interior rainwater storm piping system with rooftop drainage will be the plumbing designer's responsibility. This should be done in accordance with the most current and code compliant accepted practice. When roofing replacement is done, coordination is needed for the replacement of roof drains and roofing installations, especially if there are filed sub-bids for both of these trades. Replacement or repair of these systems should be done with economical and durable materials e.g. PVC piping replacing cast iron piping.

Soil, Waste and Vent Piping, use PVC wherever possible. Where PVC is not allowed by code, use service weight cast iron with clamp fittings above grade and gasket joints below grade. Keep waste and vent piping out of exterior walls whenever possible.

Waste traps should be adjustable (i.e., threaded, not soldered); one-piece traps are not acceptable. If PVC waste traps are used, specify threaded joints instead of solvent joints to allow for easy removal. Traps should have clean outs.

Valves: for ease of servicing, provide separate ball valves for: the kitchen, each bathroom, washer hook-up, domestic hot water inlet, and domestic hot water outlet.

Provide valves for pipe risers and individual apartments supply lines in multi-family installations.

Do not use gate valves for shut-offs (use ball valves) because they tend to become maintenance problems.

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

22 00 00 • PLUMBING

Provide access to all valves and other equipment requiring operation and control that may be installed behind walls, above ceilings, etc. **Provide access panels** suitable for the surface they will be installed in and sized to permit access. Coordinate who will furnish and who will install these access panels. If there is a GC the PC usually furnishes this to the GC who will install.

Although it may be difficult at times to quantify the number of access panels, consider how you think the Contractor will allow for this component. If you can estimate the number of access panels, provide an allowance and include this quantity in the specification.

Provide a complete specification for access panels including fire resistance, operating features, materials, minimum sizes, etc.

Provide high quality, keyed, frost-proof exterior wall hydrants. Some lower grade frost proof wall hydrants tend to fail prematurely. Valve off wall hydrants from inside units.

Floor Drains -- provide if required by code provide Minimize use if possible; trap primers are required for all floor drains

Escutcheons -- Specify for all exposed piping that passes through finished floor, wall, ceiling, or cabinets. These should be heavy cast brass chromium plated.

PIPE INSULATION



All piping insulation thicknesses and thermal properties should be in compliance with current Energy code requirements. Piping insulation should be jacketed with a vapor retarder to prevent condensation. All joints, exposed ends, etc. shall be sealed with vapor barrier cement. Provide a pipe insulation table (in specification or on drawing) describing thicknesses of insulation with pipe sizes and service duty.

Provide high density rigid fiberglass insulation for pipes. Foam rubber is not acceptable for water piping. It can be used for refrigeration piping.

Use metal-fastened, pre-formed PVC insulation covers with fiberglass inserts on elbows and tees.

Provide pipe saddle at all hangers.

METERS

Avoid locating meters in locations such as at the approach to the front entry; and avoid placing meters where pipe runs will be unnecessarily long. A useful strategy is to locate meters near utility rooms on the sides of the buildings. Determine if water pressures will require a properly piped pressure relief valve.

The local water department should be consulted to determine the type of water meter that is required and where it should be located. Avoid, if possible, locating a water meter in the same room as an electric meter.

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION • 22 PLUMBING

22 00 00 • PLUMBING



Make-up water systems for large central boilers and/or systems having a lot of underground piping should be provided with a water meter that the LHA can read and determine if there is a lot of make-up water being used. This may be helpful in trouble shooting and determining underground piping system leakage.