Design and Construction Standards

 Technical Specification

SECTION 22 05 29

Hangers and Supports

All renovation and new construction activities on The University of Texas at Austin campuses are required to meet the UT Austin Design and Construction Standards (DCS). This includes the very first planning and design stages through actual construction and facilities maintenance and management. They reflect the planning, design, construction, maintenance, and other facilities asset expertise of University personnel. These documents are to be used as a guideline on all UT Austin projects, and are not to be used for bidding, permitting, construction or any other purpose. Any deviations must be approved by the respective Division Champion, and will be submitted in writing by the Project Manager. The Design and Construction Standards are controlled by Project Management and Construction Services, The University of Texas at Austin. This document is the property of UT Austin, and use of this document, in part or in whole, for any purpose other than for a UT Austin project may not be done without written permission of the University.

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The issuance and revision history of this Section is tabulated below. Please destroy any previous copy in your possession.

| Rev Date | Pages | Remarks | Documents Referenced |
| --- | --- | --- | --- |
| 7/26/2016 | All | New Technical Specification created. | 22.00.00PlumbingGeneral.docx; 22.05.00CommonWorkResults.docx |
| 6/9/2020 | All | New Technical Specification published. |  |
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SECTION 22 05 29 – HANGERS AND SUPPORTS

1. GENERAL
	1. RELATED DOCUMENTS
		1. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
		2. Please also refer to all other Division 22 specifications included with this project.
		3. For mechanical piping hangers and supports refer to Division 23 Specification 23 05 29.
	2. SUMMARY
		1. Perform all Work required to provide and install supports, hangers, anchors, sleeves and bases for all pipe, duct, equipment, system components and accessories, indicated by the Contract Documents with all supplementary items necessary for complete, code compliant and approved installation
	3. REFERENCE STANDARDS
		1. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
		2. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
		3. All materials, installation and Workmanship shall comply with the applicable requirements and standards addressed within the following references:
			1. International Mechanical Code.
			2. International Plumbing Code.
			3. International Fuel Gas Code.
			4. ASME B31.2 – Fuel Gas Piping.
			5. ASME B31.9 – Building Services Piping.
			6. ASTM F708 – Design and Installation of Rigid Pipe Hangers.
			7. MSS SP58 – Pipe Hangers and Supports ‑ Materials, Design and Manufacturer.
			8. MSS SP69 – Pipe Hangers and Supports ‑ Selection and Application.
			9. MSS SP89 – Pipe Hangers and Supports ‑ Fabrication and Installation Practices.
			10. MSS SP-90 – Guidelines on Terminology for Pipe Hangers and Supports.
			11. NFPA 99 – Standard for Health Care Facilities.
			12. UL 203 – Pipe Hanger Equipment for Fire Protection Service.
			13. Underwriters Laboratories Standards and Listings.
	4. QUALITY ASSURANCE
		1. Materials and application of pipe hangers and supports shall be in accordance with MSS-SP-58 and SP-69 unless noted otherwise.
		2. Support and sleeve materials and installation shall not interfere with the proper functioning of equipment. Provide clearance for the operation and maintenance of equipment, valves, meters, etc.
		3. Contractor shall be responsible for structural integrity of all hangers, supports, anchors, guides, inserts and sleeves.
		4. Installer Qualifications: Utilize an installer experienced in performing Work of this Section who is experienced in installation of Work similar to that required for this Project and per the minimum requirements of MSS SP-89. Field welding of supports shall be by certified welders qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX using welding procedures per the minimum requirements of MSS SP-58.
	5. SUBMITTALS
		1. Product Data: Provide manufacturer’s catalog data including code compliance, load capacity, and intended application.
		2. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.
		3. Shop Drawings: Submit detailed Drawings of all shop or field fabricated supports, anchors and sleeves, signed and sealed by a qualified State of Texas registered professional engineer. Indicate size and characteristics of components and fabrication details and all loads exceeding 250 pounds imposed on the base building structure.
	6. Delivery, Storage and Handling
		1. Comply with manufacturer’s ordering instructions and lead time requirements to avoid construction delays.
		2. Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact. Maintain in place until installation.
		3. Store materials protected from exposure to harmful weather conditions.
2. PRODUCTS
	1. GENERAL
		1. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.
	2. PIPE HANGERS AND SUPPORTS
		1. Manufacturers:
			1. Anvil International.
			2. Kinder.
			3. Unistrut.
		2. Supports, hangers, anchors and guides shall be provided for all horizontal and vertical piping. Shop Drawings shall be provided, indicating locations and details of anchors, guides, expansion loops and joints, hangers, etc. The hanger design shall conform to the ASME Code for Pressure Piping.
		3. All auxiliary steel required for supports, anchors, guides, etc. shall be provided.
		4. Contractor shall review all Drawings, including Structural Drawings, for details regarding pipe supports, anchors, hangers, and guides.
		5. All Supports shall be of type and arrangement to prevent excessive deflection, to avoid excessive bending stresses between supports, and to eliminate transmission of vibration.
		6. All rod sizes indicated in this Specification are minimum sizes only. This trade shall be responsible for structural integrity of all supports, anchors, guides, etc.
		7. Anchor points as indicated on Drawings or as required shall be located and constructed to permit the piping system to take up its expansion and contraction freely in opposite directions away from the anchored points.
		8. Guide points shall be located and constructed wherever required or indicated on Drawings and at each side of an expansion joint or loop, to permit free axial movement only.
		9. Supports, hangers, anchors, and guides shall be fastened to the building structure only at such points where the structure is capable of restraining the forces in the piping system. Do not support pipe from ceilings, ceiling grids, other pipes, equipment, ducts, cable trays, or conduit.
		10. Hangers supporting and contacting brass or copper lines 3" in size and smaller shall be Anvil Fig. CT99c or equal, adjustable, copper plated, tubing ring. Hangers supporting and contacting brass or copper lines 4" and larger shall be Anvil Fig. 260 or equal, adjustable clevis, with a nut above and below the hanger, and approved neoprene isolating material between pipe (or tubing) and hanger on the support rod. For insulated copper or brass domestic water lines, hangers for all sizes of pipe shall be Anvil Fig. 300 or equal, adjustable clevis, with a nut above and below the hanger, and approved neoprene isolating material between pipe (or tubing) and hanger on the support rod. Isolate all copper or brass lines from all ferrous materials with approved dielectric materials. Hangers supporting and contacting plastic or glass piping shall be of equal design, but shall be padded with neoprene material or equal. The padding material and the configuration of its installation shall be submitted for approval.
		11. Hangers supporting insulated lines where the outside diameter of the insulation is the equivalent of 8" diameter pipe or smaller in size and supporting all ferrous lines 6" and smaller in size shall be Anvil Fig. 260 or equal, adjustable clevis, with a nut above and below the hanger on the support rod.
		12. Hangers supporting and contacting ferrous lines larger than 6" in size and outside of insulation on lines with the outside diameter equivalent to 10" diameter pipe shall be Grinnell Fig. 260 or equal, adjustable clevis, with a nut above and below the hanger on the support rod.
		13. Other special type of hangers may be employed where so specified or indicated on the Drawings, or where required by the particular conditions. In any case, all hangers must be acceptable to the owner.
		14. Each hanger shall be properly sized to fit the supported pipe or fit the outside of the insulation. Do not encase hangers or supports inside of the insulation. Hangers or supports for insulated pipes shall bear on the outside of the insulation, which shall be protected by support shields as specified in Section 22 07 00 PLUMBING INSULATION. Protect insulation from crushing by means of a section of rigid insulation or shields installed at hanger or support points.
		15. Supports for vertical piping in concealed areas shall be double bolt riser clamps, Anvil Fig. 261 or equal, with each end having equal bearing on the building structure, and located at each floor. Two-hole rigid pipe clamps at 4 ft. o.c. or steel framing channels and Anvil Fig. 261 or equal riser clamps may be used to support pipe directly from vertical surfaces or members where lines are not subject to expansion and contraction. When piping is subject to expansion and contraction, provide spring isolators. Where brass or copper lines are supported on trapeze hangers or steel framing channels the pipes shall be isolated from these supports with insulators made for that purpose, or strut clamps as manufactured by Specialty Products Company, Stanton, California, or equal.
		16. Supports for vertical piping in exposed areas shall be attached to the underside of the building structure above the top of the riser, and the underside of the penetrated structure. The contractor shall use a drilled anchor as specified above, and use a Anvil No. 595 Socket Clamp with Anvil No. 594 Socket Clamp Washers or equal, as a riser clamp. The top riser hanger shall consist of two (2) hanger rods (sized as specified) anchored to the underside of the building structure, supporting the pipe by means of the material specified. Risers penetrating floors shall be supported from the underside of the penetrated floor as specified for the top of the riser.
		17. Pipe Supports in Chases and Partitions: Horizontal and vertical piping in chases and partitions shall be supported by hangers or other suitable support. Pipes serving plumbing fixtures and equipment shall be securely supported near the point where pipes penetrate the finish wall. Supports shall be steel plate, angles, or special channels such as Unistrut mounted in vertical or horizontal position. Pipe clamps such as Unistrut P2426, P2008, P1109 or equal shall be attached to supports. Supports shall be attached to wall or floor construction with clip angles, brackets, or other approved method. Supports may be attached to cast iron pipe with pipe clamp, or other approved method. All copper or brass lines shall be isolated from ferrous metals with dielectric materials to prevent electrolytic action.
		18. Perforated strap iron or wire will not, under any circumstances, be acceptable as hanger material.
		19. Vibration Isolation: Resilient hangers shall be provided on all piping connected to rotating equipment (pumps, etc.). Piping that may vibrate and create an audible noise shall also be isolated. Spring hangers or supports shall be provided where indicated on the Drawings and/or specified under Section 22 05 48.
		20. Attachment:
			1. The load and spacing on each hanger and/or insert shall not exceed the safe allowable load for any component of the support system, including the concrete which holds the inserts. Reinforcement at inserts shall be provided as required to develop the strength required.
			2. Inserts shall be of a type which will not interfere with reinforcing as shown on the structural Drawings and which will not displace excessive amounts of structural concrete.
			3. All supports shall be designed and installed to avoid interference with other piping, hangers, ducts, electrical conduit, supports, building structures, equipment, etc. All piping shall be installed with due regard to expansion and contraction and the type of hanger method of support, location of support, etc. shall be governed in part by this Specification.
			4. Hangers shall be attached to the structure as follows:
				1. Poured In Place Concrete: Where pipes and equipment are supported under poured in place concrete construction, each hanger rod shall be fitted with a nut at its upper end, which nut shall be set into an Underwriters Laboratories, Inc. listed universal concrete insert placed in the form work before concrete is poured. Where inserts are placed in the bottom faces of concrete joists which are too narrow to provide adequate strength of concrete to hold the insert properly or where a larger insert would require displacement of the bottom joist steel, the hanger rod shall be suspended from the center of a horizontal angle iron, channel iron, I‑beam, etc. spanning across two adjacent joists. The horizontal support shall be bolted to nonadjustable concrete inserts of the "spot" type, of physical size small enough to avoid the bottom joist steel.
				2. Steel Bar Joists: Where pipes and loads are supported under bar joists, hanger rods may be run through the space between the bottom angles and secured with a washer and two nuts. Where larger lines are supported beneath bar joists, hanger rods shall be secured to angle irons of adequate size; each angle shall span across two or more joists as required to distribute the weight properly and shall be welded to the joists or otherwise permanently fixed thereto.
				3. Steel Beams: Where pipes and loads are supported under steel beams, approved type beam clamps shall be used.
				4. Wood Framing: Where pipes and loads are supported from wood framing, hanger rods shall be attached to framing with side beam brackets or angle clips.
				5. Pre‑Cast Tee Structural Concrete: Hanger supports, anchors, etc. required for mechanical systems attached to the precast, double tee, structural concrete system are to be installed in accord with approved shop Drawings only. Holes required for hanger rods shall be core drilled in the "flange" of the double tee only; impact type tools are not allowed under any circumstances. Core drilling in the "stem" portions of the double tee is not allowed. Holes core drilled through the "flange" for hanger rods shall be no greater than 1/4" larger than the diameter of the hanger rod. Hanger rods shall be supported by means of bearing plates of size and shape acceptable to the Architect/Engineer, with welded double nuts on the hanger rod above the bearing plate. Cinch anchors, lead shields, expansion bolts, and studs driven by explosion charges are not allowed under any circumstances in the lower 15" of each stem and in the "shadow" of the stem on the top side of the "double tees.”
				6. If it is necessary to install a method of fastening a hanger after the structure has been installed, then only clamps or drilled anchors shall be used.
				7. Power‑actuated fasteners (shooting) will not be acceptable under any circumstances.
				8. Note: Under no circumstances will the use of plastic anchors or plastic expansion shields be permitted for any purpose whatsoever.
		21. Trapezes: Where multiple lines are run horizontally at the same elevation and grade, they may be supported on trapezes of Cooper B-line, Uni-Strut, Power Strut, or approved equal, channel suspended on rods or pipes. Trapeze members including suspension rods shall each be properly sized for the number, size, and loaded weight of the lines they are to support.
		22. Finishes: All hangers on piping including clevis hangers, rods, inserts, clamps, stanchions, and brackets, shall be dipped in Zinc Chromate Primer before installation. Rods may be galvanized or cadmium plated after threading, in lieu of dipping zinc chromate. Universal concrete inserts shall be cadmium plated. Provide copper clad (plated) Clevis hangers for uninsulated copper piping systems.
		23. Provide hangers fabricated to allow vertical adjustment of 1-1/2” minimum after installation while still supporting the load. The use of pipe hooks, chains or perforated iron piping for support is prohibited.
		24. Miscellaneous: Provide any other special foundations, hangers and supports indicated on the Drawings, specified elsewhere herein; or required by conditions at the site. Hangers and supporting structures for suspended equipment shall be provided as required to support the load from the building structure in a manner acceptable to the Architect/Engineer.
	3. ACCESSORIES
		1. Hanger Rods: Galvanized mild steel threaded both ends, galvanized threaded one end, or galvanized continuous threaded.
		2. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods. Suitable concrete inserts for pipe and equipment hangers shall be set and properly located for all pipe and equipment to be suspended from concrete construction. If the inserts are later found not to be in the proper location for the placement of hangers, then drilled anchors shall be installed. Drilled anchors in concrete or masonry shall be submitted for the approval by the Owner.
	4. FLASHING AND EQUIPMENT CURBS
		1. Metal Flashing: 26 gauge galvanized (stainless steel) steel.
		2. Metal Counterflashing: 22 gauge galvanized (stainless steel) steel.
		3. Roofing Flashing: See specifications for Roofing, elsewhere in these Specifications.
		4. Caps: Steel, 22 gauge minimum; 16 gauge at fire resistant elements.
		5. Curbs: Welded 18-gauge galvanized steel shell and base, mitered 3-inch cant, variable step to match roof insulation, factory installed wood nailer.
	5. CONCRETE FOUNDATIONS ("Housekeeping Pads"):
		1. Concrete foundations for the support of equipment such as floor mounted panels, pumps, fans, air handling units, etc., shall extend 6” on all sides beyond the limits of the mounted equipment unless otherwise noted and shall be poured in forms built of new dressed 6" nominal lumber. All corners of the foundations shall have a ½” chamfer on all exposed edges, placed and finished smooth and level to ensure proper and continuous support for the bearing surfaces of equipment. Foundation bolts shall be placed in the forms when the concrete is poured, the bolts being correctly located by means of templates. Each bolt shall be set in a sleeve of size to provide 1/2" clearance around bolt. Allow 1" below the equipment bases for alignment and grouting. After grouting, the forms shall be removed and the surface of the foundations shall be hand rubbed with Carborundum. Foundations for equipment located on the exterior of the building shall be provided as indicated. Foundations shall be constructed in accordance with Shop Drawings submitted by the Contractor for review by the Architect/Engineer. See also the Cast-in-place Concrete Specification 03 30 00.
	6. WALL, FLOOR AND CEILING PLATES:
		1. Except as otherwise noted, provide one-piece or split hinge stainless steel escutcheons for piping around all pipes passing through walls, floors, or ceilings, in any spaces in finished areas. Plates shall be sized to fit snugly against the outside of the pipe or against the insulation on lines which are insulated and positively secured to such pipe or insulation. Plates will not be required for piping where pipe sleeves extend 3/4" above finished floor. All equipment rooms are classified as finished areas. Floor penetrations in exposed (except in stair wells) areas shall be finished using 'bell' fitting to fit pipe or insulation and sleeve and shall be painted to match the pipe. Penetrations in stairwells shall have flat floor plate painted to match pipe.
	7. SLEEVES
		1. General: All openings through all floors, walls, and roofs, etc., regardless of material for the passage of piping, ductwork, conduit, cable trays, etc., shall be sleeved. All penetrations must pass through sleeves. Sleeves shall be set in new construction before concrete is poured, as cutting holes through any part of the concrete will not be permitted unless acceptable to the Architect/Engineer. If a penetration is cored into an existing vertical solid concrete, masonry or stone structure, then the installation of a sleeve will not be necessary.
			1. Sleeve material for floors, exterior walls and load bearing walls shall be Schedule 40 galvanized steel with welded water stop rings.
			2. Sleeves through interior walls and non-load bearing walls shall be galvanized sheet metal with gauge as required by wall fire rating, 20 gauge minimum.
		2. The minimum clearance between horizontal penetrations including insulation where applicable, and sleeve shall be 1/4", except that the minimum clearance shall accommodate a Thunderline Linkseal or equal closure where piping exits the building, or penetrates a wall below ground level. Contractor shall be responsible for the accurate location of penetrations in the slab for his pipe, duct, etc. All penetrations shall be of ample size to accommodate the pipe plus any specified insulation. The void between the sleeve and pipe in interior penetrations shall be filled with UL listed sealant to equal or exceed to fire rating of construction penetrated.
		3. Floor sleeves shall extend above the finished floor as detailed on the drawings, except that floor sleeves in stairwells shall be flush with the finished floor. Sleeves in walls shall be trimmed flush with wall surface. Refer to the details on the project drawings. Where the details differ from these specifications, the drawings take precedence.
		4. Sleeves for penetrations passing through walls or floors on or below grade shall be removed, if practical, and after the pipes have been installed, the void space around the pipe shall be caulked watertight and airtight with a suitable material to affect a waterproof penetration. Note that the practicality of the removal of the sleeve shall be the decision of the Construction Inspector. The decision of the Inspector shall be final.
		5. Vermin proofing: The open space around all, piping, etc., passing through the ground floor and/or exterior walls shall be vermin proofed in a manner acceptable to the Architect/Engineer.
		6. Waterproofing: The annular space between a pipe and its sleeve in interior floors shall be filled with polyurethane foam rods 50 percent greater in diameter than the space as backing and fill material and made watertight with a permanent elastic polysulfide compound. Seal both surfaces of floor.
		7. Air Plenums: The space around piping, etc., passing through air plenums shall be made airtight in a manner acceptable to the Architect/Engineer.
		8. Sleeves shall not be installed in structural members unless specifically approved by the Owner.
		9. Fireproofing: Seal all, pipe, conduit, etc., penetrations through roof, fire rated walls and floors with a foam or sealant as described below, that will form a watertight, vermin tight barrier that is capable of containing smoke and fire up to 2000 F for two hours. Sealing of cable trays and conduits that extend through rated walls from ends of cable tray shall be done after conductors have been installed. For wet locations, the foam material shall be a silicone RTV foam or an approved equal. For dry locations, a premixed putty equal to Nelson Flameseal Firestop putty or equal may be used.
3. EXECUTION
	1. INSTALLATION
		1. Install hangers and supports in accordance with the manufacturer's instructions.
	2. INSERTS
		1. Provide inserts for placement in concrete formwork.
		2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
		3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
		4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
		5. Where inserts are omitted, drill through concrete slab from below and provide throughbolt with recessed square steel plate and nut recessed into and grouted flush with slab.
	3. PIPE HANGERS AND SUPPORTS
		1. Support horizontal piping as scheduled.
		2. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
		3. Place hangers within 12 inches of each change of direction and provide hangers on both sides of line valves.
		4. Use hangers with 11/2-inch minimum vertical adjustment.
		5. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
		6. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub. Provide vertical piping support at each floor with 2-bolt riser clamps. For pipe risers exceeding three floors, evaluate pipe supports for longitudinal expansion and support requirements. Support riser piping independently of horizontal piping.
		7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
		8. Support riser piping independently of connected horizontal piping.
		9. Provide copper plated hangers and supports for copper piping.
		10. Design hangers for pipe movement without disengagement of supported pipe.
		11. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed, but shall be corrosion protected with galvanized plating. Repair any damaged galvanized plating with a coating of Galvalum or equal.
		12. Hanger Rods: All hanger rods shall be trimmed neatly so that no more than 1 inch of excess hanger rod protrudes beyond the hanger nut. If the bottom of the hanger rod is near a person passage way, cover it with a cushion to prevent injury. If a rod is intentionally but temporarily left long (for sloped or insulated lines for example), the contractor shall take appropriate measures to protect the pipe, other materials, and people from harm.
	4. FLASHING
		1. Provide flexible flashing and metal counterflashing where piping penetrate weather or waterproofed walls, floors, and roofs.
		2. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash, and seal.
		3. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36-inch sheet size. Fasten flashing to drain clamp device.
		4. Seal floor, shower, mop sink, and floor drains watertight to adjacent materials.
		5. Provide acoustical lead flashing around pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control.
		6. Provide curbs for roof installations 14 inches minimum high above roofing surface. Flash and counterflash with sheet metal; seal watertight. Attach counterflashing equipment and lap base flashing on roof curbs. Flatten and solder joints.
		7. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.
	5. SLEEVES
		1. Set sleeves in position in formwork. Provide reinforcing around sleeves.
		2. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
		3. Extend sleeves through floors (except in stairwells) two inches above finished floor level. Sleeves through floors shall have welded waterstop rings. Sleeves shall be sealed watertight to floors and pipe.
		4. Where piping or conduit penetrates floor, ceiling, or wall, close space between pipe and adjacent work with UL listed fire stopping insulation and caulk airtight. Provide close fitting escutcheon covers, as appropriate, at both sides of penetration.
		5. Install stainless steel escutcheons at finished surfaces.
	6. PIPE SUPPORT SCHEDULES

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| PIPE SIZEInches | MAX. HANGER SPACINGFeet | HANGER ROD DIAMETERInches |
| Steel 1/2 to 11/4 | 6.5 | 3/8 |
| Steel 1 1/2 to 2 | 10 | 3/8 |
| Steel 2 1/2 to 3 | 10 | 1/2 |
| Steel 4 to 6 | 10 | 5/8 |
| Steel 8 to 12 | 14 | 7/8 |
| Steel 14 and over | 20 | 1 |
| PP, PVDF, PVC, CPVC (All Sizes) | 4 | 3/8 |
| Cast Iron Bell and Spigot (or NoHub), and at all JointsCopper ½ to ¾Copper 1 to 1 ¼Copper 1 ½ to 2Copper 2 ½ and over | 54568 | 5/83/83/83/85/8 |

END OF SECTION 22 05 29