

STANDARD SPECIFICATION FOR HUBLESS CAST IRON SOIL PIPE AND FITTINGS FOR SANITARY AND STORM DRAIN, WASTE, AND VENT PIPING APPLICATIONS

This Standard is issued under the fixed designation 301; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of the last revision. A number in parentheses indicates the year of last reapproval without change. Originally published as 301-64T. Last previous printing 301-17. This current edition was last revised on March 26, 2018.

1. PURPOSE AND SCOPE

1.1. Purpose. The purpose of this standard is to establish standards covering material, manufacture, mechanical, physical, and chemical properties, coating, test methods, inspection, certification, markings, principal dimensions and dimensional tolerances for pipe and fittings for hubless cast iron sanitary and storm drain, sanitary waste, and vent piping applications in accordance with general needs of producers, distributors, and users. These pipe and fittings are intended for gravity flow non-pressure applications.

1.2 Scope. This standard covers the pipe and fittings, as listed in the following tables. Please take note that Electronic Data Processing numbers have been added. The EDP numbers indicated in this section represent a new Uniform Industry Code adopted by the Cast Iron Soil Pipe Institute (CISPI) and the American Supply Association (ASA). A group designation prefix -022- is assigned to hubless products, followed by the four digit identification assigned to individual items and a check digit. This system has been instituted to facilitate EDP control through distribution channels, and be used universally in ordering and specifying product items. Those items with no EDP numbers are either new, special or transitory and will be assigned numbers on subsequent revisions of this specification.



CAST IRON SOIL PIPE INSTITUTE
2401 Fieldcrest Dr
Mundelein, IL 60060
Phone: 224.864.2910

1.3 This specification covers pipe and fittings of the following patterns and applies to any other patterns that conform with the applicable requirements given in this standard.

1.4 The committee with jurisdiction over this standard is aware of another comparable standard published by the American Society for Testing Material, ASTM A888. The CISPI 301 standard is intended to include the requirements of the ASTM A888 standard and includes pipe or fittings not found in ASTM A888.

PIPE:		TABLES
Five(5) Foot and		
Ten (10) Foot Lengths		
Sizes 1-1/2", 2", 3", 4", 5"		
6", 8", 10", 12" and 15"	1,2	(revised 4/20/05)

EDP Identification Numbers		
For Hubless Pipe	3	(revised 7/9/97)
Method of Specifying Fittings	4	

FITTINGS:		TABLES
1/4 Bend	5	
1/4 Bend, Reducing	6,7	
1/4 Bend, with Side Opening	8	
1/4 Bend, with Heel Opening	9	(revise 7/27/04)
1/4 Bend, with Heel Inlet (Ext.)	10	(deleted 7/13/95)
1/4 Bend, Tapped	11	(revised 11/9/99)
1/4 Bend, Tapped Long Radius	12	(deleted 7/13/95)
1/4 Bend, Double	13	
1/4 Bend, Long	14	(revised 11/9/99)
Short Sweep and Extended	15	(revised 11/9/99)
Sweep, Short, Double	16	(deleted 7/13/95)
Long Sweep	17	
Long Sweep, Reducing	18	(revised 4/20/05)
1/5 Bend	19	
1/6 Bend	20	
1/8 Bend	21	(revised 7/9/97)
1/8 Bend, Long	22	(revised 11/9/99)
1/16 Bend	23	
Sanitary Tee	24	
Sanitary Tee with Hi Vent	25	(deleted 7/13/95)
Sanitary Tee, Increasing	26	(deleted 7/13/95)
Sanitary Tee, Increasing with Side Opening	27	(deleted 7/13/95)
Sanitary Tee with Side Opening	28	
Sanitary Tee with 2" Side Side Opening R or L/R &L	29	
Sanitary Tee, New Orleans Special, with Side Opening	30	

Sanitary Tee with 45° Side Openings & New Orleans	31	
Sanitary Special Tee Tapped and Extended	32	(revised 4/20/05)
Sanitary Tee with Tap on Top	33	(deleted 7/13/95)
Sanitary Tee with Hi-Vent Tap	34	(deleted 7/13/95)
Sanitary Tapped Tee with Tap OnTop	35	(deleted 7/13/95)
Sanitary Tapped Tee, Side Opening	36	(deleted 7/13/95)
Sanitary Tapped Tee, Horizontal Twin	37	
Sanitary Tapped Tee, Double Vertical	38	(revised 4/20/05)
Y Branch	39	(revised 4/20/09)
Y Branch, Side Opening	40	(deleted 7/13/95)
Y Branch, Tapped, Single or Double	41	(revised 11/9/99)
Y Branch, Double	42	
Y Branch 60°	43	(deleted 7/13/95)
Y Branch, Double 60°	44	(deleted 7/13/95)
Y Branch, Upright	45	(revised 11/9/99)
Upright Y Wide Center Florida Special	46	(revised 7/27/04)
Y Branch, Combination 1/8 Bend and Extended	47	(revised 4/20/05)
Y Branch Reducing Combination 1/8 Bend	48	(deleted 7/13/95)
Y Branch, Combination 1/8 Bend with cleanout	49	(deleted 7/13/95)
Y Branch, Combination 1/8 Bend, Double	50	
Sanitary Cross	51	(revised 4/20/05)
Sanitary Cross with Side Opening	52	
Sanitary Cross, Increasing	53	(deleted 7/13/95)
Sanitary Cross, Increasing with Side opening	54	(deleted 7/13/95)
Sanitary Cross, New Orleans, With Side Openings	55	
Sanitary Cross, New Orleans With 45° Special & Regular Side Openings	56	
Sanitary Cross, Tapped and Extended	57	(revised 4/20/05)
Test TEE	58	(revised 7/9/99)
Test TEE Extended	59	(deleted 7/13/95)
Test TEE, Extended Reducing	60	(deleted 7/13/95)
Test TEE, Reducing (line cleanout)	61	(deleted 7/13/95)
♦Tapped, Extension Piece	62	(revised 3/26/18)
Increaser-Reducer	63	(revised 4/20/05)
Increaser-Reducer, Short	64	(revised 11/3/98)

Tapped Adapter	65 (revised 4/20/05)
Blind Plug	66 (revised 7/9/97)
Iron Body Cleanout-Tapped	67 (revised 4/20/05)
P Trap	68
P Trap, Long	69 (revised 4/20/05)
P Trap, Long, Tapped	70 (deleted 4/20/05)
P Trap, Deep Seal	71
P Trap, Reducing	72 (deleted 4/20/05)
P Trap, with Primer	73
P Trap, with tapped inlet	74 (revised 4/20/05)
Hub Adapter	75
Figure 1A	76
Figure 1 B	77 (deleted 7/13/95)
Figure 2 (Single) L or R	78 (deleted 7/13/95)
Figure 2 (Double)	79 (deleted 7/13/95)
Figure 5	80 (revised 4/20/05)
Figure 5 Extended	80 (revised 4/20/05)
Figure 6 Regular or Extended L or R, Regular or Extended Double	82 (revised 4/20/05)
Figure 8 Regular or Extended L or R, Regular or Extended Double	83 (revised 4/20/05)
Partition, Combination, Long Carlson Fitting with Hubless Or Tapped Vent	84 (deleted 7/13/95)
Stack Wye	85 (deleted 7/13/95)
Two-Way Cleanout	86 (deleted 7/13/95)
Twin Cleanout	87 (added 7/9/97)
Closet Bend, Regular & Reducing	88
Closet Flange Riser	89 (revised 4/20/05)
Tapping Bosses	90 (revised 4/20/05)
Stack Fitting	91 (revised 7/9/97)
Closet Flanges	92 (deleted 7/13/95)
Double Sweep Sanitary Tee (Extended)	93 (revised 4/20/05)
Running Trap with Double Vents	94 (revised 11/9/99)
P Trap with 1 1/2 or 2 inch Tapped Or Hubless Side Inlets (R or L) And Extended	95 (revised 11/9/99)
Vented Tub Wye Extended (Double)	96 (revised 4/20/05)
Vented Tub Wye Extended (L or R)	97 (revised 11/9/99)
Vented Tub Wye (Double)	98 (revised 11/9/99)
Double Two Way Cleanout	99 (revised 4/20/05)
Vented Sanitary Cross with 3 inch Vent and Two 2 inch 45° Inlets	100 (revised 4/20/05)
	101 (revised 11/9/99)

Vented Closet Tee or Cross (R or L) with 2 inch Vent and with Or without 2 inch side Inlet	102 (revised 11/9/99)
Vent Bypass with or without Inlets R or L or Double	103 (revised 11/9/99)
Vertical Stack fittings with 2 inch Inlets RH, LH or Double with or without 2 inch 45° Inlets and 90° sanitary inlets with 4 inch Threaded or Hubless Inlets	104 (revised 11/9/99)
Double Vertical 90° stack fitting With 2 inch vent and with or Without 2 inch side inlet	105 (revised 11/9/99)

2. Referenced Documents¹

2.1 ASTM Standards:

- A 48 Specification for Gray Iron Castings
- A 644 Terminology Relating to Iron Castings
- C 564 Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- E 8 Test Methods for Tension Testing of Metallic Materials
- E 1645 Practice for Preparation of Dried Paint Samples by Hotplate or Microwave Digestion for Subsequent Lead Analysis
- E 2349 Practice for Safety Requirements in Metal Castings Operations: Sand Preparation, Molding, and Core Making; Melting and Pouring; and Cleaning and Finishing

2.2 Federal Standard:

- Fed. Std. No. 123 Marking for Shipment (Civil Agencies)²

2.3 Military Standard:

- MIL-STD-129 Marking for Shipment and Storage⁴

◆ 2.4 ANSI/ASME Standard:

- B 1.20 Pipe Threads³

2.5

Other Documents:

- Uniform Freight Classification Rules⁵

- National Motor Freight Classification Rules⁶

¹For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

²Available from Standardization Documents, Order Desk, Building 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

³Available from the American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁴Available from National Institute of Standards and Technology, U.S. Department of Commerce, Gaithersburg, MD 20899.

⁵Available from the Uniform Classification Commission, Room 1106, 222 S. Riverside Plaza, Chicago, IL 60606.

⁶Available from National Motor Freight Inc., 1616 P. St., N. W., Washington, DC 20036.

3. Terminology

3.1 Abbreviations or Terms

AC—above center
ADAPTR—adapter
&—and
ASA—American Supply Association
ASSY—assembly
BD—bend
CARL—Carlson
CF—Carlson fitting
CLO—closet
CO—cleanout
COMB—combination
CRS—cross
DB—double
DBL—double
EDP—electronic data processing
EXT—extended, extension
F—figure
FER—ferrule
FLNG—flange
FT—foot
FTG—fitting
HI—high
HOR—horizontal
INC—increaser, increasing
L—left hand
L/—less
LG—long
LH—left hand
LNG—long
/MAIN—on main
MN—on main
NO—New Orleans
R—right hand
RAD—radius
RED—reducer, reducing
REV—revent
RH—right hand
SAN—sanitary
SD—side
SL & NOTCH—slotted and notched
SO—side openings
ST—sanitary tap
T—tee
TAP—tap, tapped
TOT—tap on top
TP—tap, tapped
V—vent
VERT—vertical
W/—with
Y—wye

3.3 Definitions of Terms Specific to This Standard:

3.3.1 *manufacturer (n)*—the entity that casts the pipe and fittings covered by this standard.

4. Materials & Manufacture

4.1 The pipe and fittings shall be iron castings suitable for installation and service for sanitary drain, waste, and vent piping applications. The pipe and fittings shall meet all applicable requirements and tests given herein.

4.2 The castings shall be made of cast iron, produced by an established commercial method that provides control over chemical and mechanical properties.

4.3 Cast iron is a generic term for a series of alloys as defined in Terminology A 644, and includes gray iron as well as ductile iron. The castings shall be sound, true to pattern, and of compact close grain that permits drilling and cutting by ordinary methods. The interior surface shall be reasonably smooth and free from defects that would make the castings unfit for the use for which they are intended.

4.4 To minimize the possibility of introducing radioactive material to a melting operation, ferrous scrap pig iron, and any recycled ferrous material shall be screened, by the manufacturer, for radioactivity with detection devices operated in accordance with the device manufacturer's instructions. Written operating, calibration, and maintenance procedures for the detection equipment shall be provided to the purchaser for review when requested. Records shall be maintained for these tests by load for a period of seven years.

4.4.1 Only radiation devices designed specifically for the purpose of screening ferrous material shipments shall be used for the purpose of conforming to this requirement. Hand held radiation detectors (Geiger counters) are not appropriate and shall not be used for the purpose of conforming to this requirement.

4.5 Material which is found contaminated with radioactivity shall not be used to produce products covered by this Standard.

4.6 Analysis of castings after the time of production shall not be used to determine compliance to this standard.

4.7 Foundries manufacturing products to this standard shall comply with all local, provincial, state, and national safety laws and regulations and with the requirements of Practice E 2349.

4.8 Foundries manufacturing products to this standard outside the United States shall comply with all safety laws and regulations existing in the country where the products are being produced

4.9 Pipe and fittings shall not be patched, filled, or welded by the manufacturer to repair cosmetic or material defects that occur during the course of manufacturing.

5. Product Marking

5.1 Each length of pipe and each fitting shall be plainly marked with the country of origin, and the manufacturer's name or manufacturer's registered trade-mark by which the manufacturer can be readily identified after installation and any appropriate collective mark (optional). The marking shall be adequate identification of the manufacturer of the pipe and fittings if it readily identifies the manufacturer to the end user of the product. Markings shall be cast on fittings. Other markings on pipes and fittings shall be permitted provided such markings are not misleading with respect to the identification of the manufacturer by the end user.

5.2 *Pipe Markings*—The pipe shall be marked continuously on the barrel with a minimum of 0.75 inches lettering starting within 3 inches of each end of the pipe. Each pipe shall be marked with the date of manufacture. The marking shall be stenciled on the pipe or otherwise applied so as to be clear and legible.

5.3 On fittings, the marking shall be cast with raised letters that are not to be located within the "W" dimension, as shown in Table 1 and Table 2. Cast markings shall be raised from the wall of the fitting unless otherwise noted in Tables 4 - 105.

6. Coating

6.1 The pipe and fittings shall be uniformly coated with a material suitable for the purpose that is adherent, not brittle, and without a tendency to scale. The coating shall not contain asbestos above current MSDS reportable levels. Material safety data sheets shall be furnished by the coating manufacturer when requested. The coating shall be smooth and evenly applied to all surfaces, except in threaded openings.

6.2 Pipe and fittings shall not be coated with paint containing lead which exceeds levels above 0.06% (600 ppm).

6.3 The manufacturer shall annually prepare and submit samples to a qualified laboratory for test in accordance with Practice E 1645.

♦ **6.4** Pipe and fittings shall not be coated with paint containing levels of volatile organic hazardous air pollutants (VOHAPs) which exceed levels of 2.6 pounds (0.31 kilograms per liter) of VOHAPs per gallon of solids. Reference ASTM D3960.

♦ **6.4.1** The manufacturer shall annually certify that the coating meets the VOHAP requirement. It is permissible for the coating manufacturer to provide the certification.

6.5 The manufacturer shall prepare and submit samples when changing sources of supply or the coating manufacturer changes formulations for the coating.

6.6 Records shall be maintained for a period of seven years.

6.7 Copies of the coating test shall be furnished when requested.

7. Dimensions and Permissible Variations

7.1 *Pipe:*

7.1.1 *Ends of Pipe*—The end of pipe shall be cast with or without a spigot bead. The pipe shall be cast in one piece.

7.1.2 *Dimensions of Pipe*—Pipe shall be 10 ft long or 5 ft long with the dimensions and tolerances specified in Table 1 and Table 2. (The laying length of the pipe is the same as the actual length.)

7.1.3 *Straightness of Pipe*—Pipe shall be straight to the extent that for 10 ft lengths, deflections in the barrel shall not exceed 5/8 inch. For 5 ft lengths, deflections in the barrel shall not exceed 5/16 inch.

7.2 *Fittings:*

7.2.1 *Dimensions of Fittings*—All fittings shall conform to the dimensions and tolerances specified in Table 1 and Table 2 as applicable. Fittings of the patterns specified within this standard shall conform to the applicable dimensions in Tables 5-105, inclusive. Fittings not listed shall conform to Table 1 for wall thickness and dimension R for the minimum radius of any drain inlets that any such fittings provide.

♦ **7.2.2** *Ends of Fittings*—Ends of fittings shall have spigot beads as shown in Table 1 and Table 2. Positioning lugs are optional on all fittings. Positioning lugs when used by the manufacturer shall be cast as described in Table 2 or continuous around circumference of the fitting. It is permissible to increase the wall thickness on the inside surface of fitting ends. The increased thickness shall not reduce the minimum B dimension in Table 1 in excess of 0.06 inches and shall not extend more than 4 1/4 inches from the plain end.

The increased thickness shall be tapered and shall offer no obstruction to flow

7.2.3 Pipe Thread s—Screw plugs and tapped openings in fittings shall have taper pipe threads in accordance with ANSI/ASME Standard B1.20

7.2.4 Internal threads shall be chamfered at the entering end approximately to the major diameter of the thread, at an angle of approximately 45° with the axis of the thread for easy entrance in making a joint and for protection of the thread. The chamfer shall be concentric with the thread and shall be included in the measurement of the thread length.

8. Sampling

8.1 Chemical and mechanical test shall be made regularly in accordance with ASTM A48 and at sufficiently close intervals for adequate determinations of the significant chemical constituents and properties of the cast iron. A specimen taken from a finished product often does not produce the same results as a specimen formed by the method used for sample preparation and is not acceptable for the purposes of testing to this standard. Records of chemical analysis shall be maintained by the manufacturer. Copies of these analyses shall be furnished to the purchaser when requested.

8.2 A lot shall consist of one of the following:

8.2.1 All the metal poured from a single heating in a batch type furnace.

8.2.2 All the metal from two or more batch type melting furnaces poured into a single ladle or a single casting.

8.2.3 All the metal poured from a continuous melting furnace for a given period of time between changes in charge, processing conditions, or aim-for chemistry or 4 hours, whichever is the shorter period.

9 Method of Specifying Fittings.

9.1 Method of Specifying Sizes of Fittings of More Than One Size. The sizes are designated by the order of listing as follows:

(a) Branch and tapped fittings: (1) Size of run. The run being that portion of the fitting which forms part of the main pipe line. (2) Size of branch.

9.2 Method of Specifying Hand of Fittings with Side Inlets. When placed in the position described below, if the side inlet appears on the right, it is a righthand fitting; if on the left, it is a lefthand fitting.

(a) Branch fittings: Place the branch toward the observer and the outlet end of the run lower than

the branch.

9.2.1 The fitting illustrated in Table 4 has a right-hand inlet. Lefthand fittings have these openings on the side opposite to the shown. Inlets on fittings shall be made with or without spigot bead and positioning lug.

10. The Couplings for Hubless Pipe and Fittings.

10.1 Description. All coupling assemblies currently used in connection with hubless pipe and fittings are of a sleeve type. Each coupling shall consist of a sealing sleeve, and a shield and clamp assembly and joins two spigot ends of pipe or fittings.

10.2 Specifications. Specifications for other proprietary couplings used in connection with hubless pipe and fittings are available from those manufacturers who have proprietary interests in such couplings.

11. Mechanical and Chemical Test Methods

11.1 For Gray Iron Mechanical

11.1.1 Tensile Strength Test—Test bars shall be cast in accordance with the requirements of Specification A 48. The machine test bar dimensions and drawing and dimensions of a cast test bars are found in Table 2a. The tensile strength shall be determined in accordance with Test Method E 8. Tensile strength shall not be less than 21,000 psi.

11.1.2 Tension test reports shall include breaking load of test bars, machined diameter of test bar, and calculated tensile strength.

11.1.3 Records of tests shall be maintained by the manufacturer for seven years.

11.1.4 Analysis of castings or test bars after the time of production shall not be used as evidence of compliance to this standard.

11.2 Chemical Test Methods For Gray Iron

11.2.1 The manufacturer shall perform tests to determine the significant chemical constituents of the gray iron used in the manufacture of gray iron soil pipe and fittings. Analysis shall be performed at the minimum of once per lot as defined in this standard. The manufacturer shall maintain a record of chemical tests performed for a minimum of 7 years. The test results shall conform to the following requirements as to chemical composition.

Phosphorous (P)	0.38% Maximum
Sulfur (S)	0.15% Maximum
Chromium (Cr)	0.50% Maximum
Titanium (Ti)	0.10% Maximum

Aluminum (Al)	0.50% Maximum
Lead (Pb)	0.015% Maximum
Carbon Equivalent	4.10% Minimum by mass
Note: Carbon equivalent for gray iron= $\%C + \%\text{Si}/3 + \%\text{P}/3$	

11.2.2 Chemical tests shall be performed at the time of production of the castings covered by this standard.

11.2.3 Analysis of castings after the time of production shall not be used as evidence of compliance to this standard.

12. Inspection

12.1 *Inspection and Test by the Manufacturer*—Pipe and fittings shall be inspected to verify compliance with this standard. The manufacturer shall maintain a record of all inspections.

12.2 *Pipe Inspection*—At regular intervals (not to exceed 12 hours) during the course of production, sample pieces of each size of pipe or pipes being produced shall be selected randomly for inspection. Each pipe selected shall be measured by suitable gauges and all dimensions detailed in Table 1 of this standard verified to comply with the requirements of this standard. The inspection records shall be maintained by the manufacturer for a period of seven years.

12.3 *Fitting Inspection*—At regular intervals (not to exceed 12 hours) during the course of production, sample pieces of each size and configuration of fitting being produced shall be selected randomly for inspection. Each fitting selected shall be measured by suitable gauges to verify that the laying length (as detailed in Tables 5-105), and all applicable dimensions detailed in Table 1 and Table 2 of this standard comply with the requirements of this standard. The inspection records shall be maintained by the manufacturer for a period of seven years.

12.4 *Marking Inspection*—Inspection shall include verification that the markings on pipe and fittings comply with Section 5 of this standard.

13. Certification

13.1 Upon request the purchaser, design professional, or the administrative authority having jurisdiction where the products are being installed shall be furnished certification, by the manufacturer, stating samples representing each lot have been tested and inspected as indicated in this specification and the requirements have been met. If required by the purchaser, design professional, or the administrative authority having jurisdiction where the products are being installed, certification shall be accompanied

by test reports as prepared in accordance with Sections 11 and 12 of this specification. Tensile strength test reports shall include breaking load, machined diameters of test bars, and calculated tensile strength. Certification shall include legal name and address of the manufacturer.

13.2 Third Party certifiers or inspectors shall utilize the procedures detailed in the Annex A1 when conducting inspections at the manufacturing locations.

14. Packaging and Package Marking

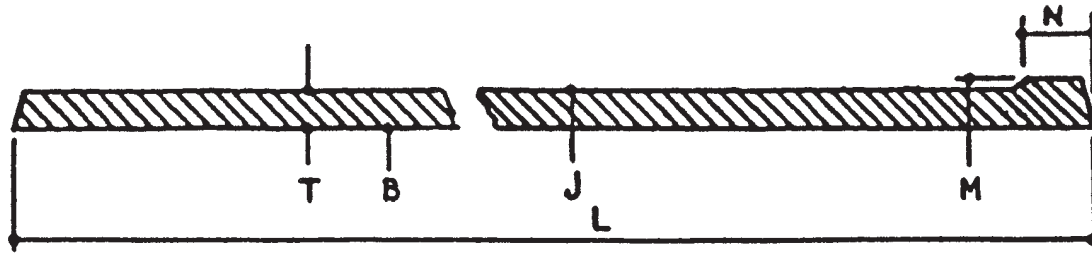
14.1 *Government Procurement*—Unless otherwise specified in the contract, the material shall be packaged in accordance with the supplier's standard practice, which will be acceptable to the carrier at lowest rates. Containers and packing shall comply with Uniform Freight Classification Rules or National Motor Freight Classification Rules. Marking for shipment of such material shall be in accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies.

¹ASTM specifications are issued by the American Society for Testing Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428

**CURRENT DICTIONARY
CAST IRON HUBLESS FITTINGS**

ABBREVIATION	TERMINOLOGY	ABBREVIATION	TERMINOLOGY
A		M	
AC	Above Center	/MAIN	On Main
ADAPTR	Adapter	MN	On Main
&	And		
ASSY	Assembly	N	
		NOM	Nominal
B		NO	New Orleans
BD	Bend		
		R	
C		R	Right Hand
CARL	Carlson	RAD	Radius
CF	Carlson Fitting	RED	Reducer, Reducing
CLO	Closet	REV	Revent
CO	Cleanout	RH	Right Hand
COMB	Combination		
CRS	Cross	S	
		SAN	Sanitary
D		SD	Side
DB	Double	SL & NOTCH	Slotted & Notched
DBL	Double	SO	Side Openings
		ST	Sanitary Trap
E			
EXT	Extended, Extension	T	
		T	Tee
F		TAP	Tap, Tapped
F	Figure	TOT	Tap on Top
FER	Ferrule	TP	Tap, Tapped
FIG	Figure		
FLNG	Flange	V	
FTG	Fitting	V	Vent
		VERT	Vertical
H			
HI	High	W	
HOR	Horizontal	W/	With
I		Y	
IN	Inch	Y	Wye
INC	Increaser, Increasing		
L			
L	Left Hand		
L/	Less		
LG	Long		
LH	Left Hand		
LNG	Long		

TABLE 1
DIMENSIONS AND TOLERANCES (IN INCHES) OF SPIGOTS
AND BARRELS FOR HUBLESS PIPE AND FITTINGS



*Pipe may be with or without a spigot head.

Size	Inside Diameter Barrel	Outside Diameter Barrel ³	Outside Diameter Spigot	Width Spigot Bead ²	Thickness of Barrel		Gasket Positioning Lug ²	Laying Length L ¹	
	B	J	M	N (± .13)	T-Nom.	T-Min.	W	5 Foot (± .25)	10 Foot (± .50)
1 1/2	1.50 ± .09	1.90 ± .06	1.96 ± .06	.25	.16	.13	1.13	60	120
2	1.96 ± .09	2.35 ± .09	2.41 ± .09	.25	.16	.13	1.13	60	120
3	2.96 ± .09	3.35 ± .09	3.41 ± .09	.25	.16	.13	1.13	60	120
4	3.94 ± .09	4.38 ± .09	4.44 ± .09	.31	.19	.15	1.13	60	120
		— .05							
5	4.94 ± .09	5.30 ± .09	5.36 ± .09	.31	.19	.15	1.50	60	120
		— .05							
6	5.94 ± .09	6.30 ± .09	6.36 ± .09	.31	.19	.15	1.50	60	120
		— .05							
◆ 8	7.94 ± .13	8.38 ± .09	8.44 ± .09	.31	.23	.17	2.00	60	120
10 ³	10.00 ± .13	10.56 ± .09	10.62 ± .09	.31	.28	.22	2.00	60	120
12 ³	11.94 ± .13	12.50 ± .13	12.62 ± .13	.31	.28	.22	2.75	60	120
15 ³	15.11 ± .13	15.83 ± .13	16.12 ± .13	.31	.36	.30	2.75	60	120

¹ Laying lengths as listed in Table 1 are for pipe only, such pipe shall be either 5'-0" long or 10'-0" long. Laying length for fittings are listed in the following tables.

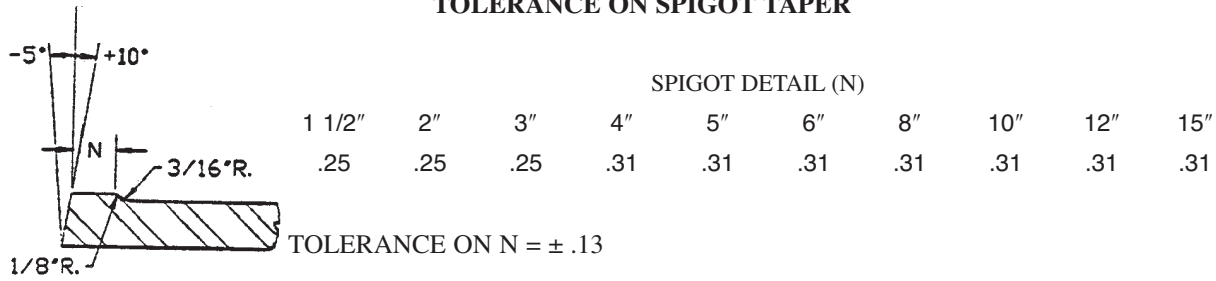
² See Table 2 for details of spigot and gasket positioning lug.

◆ ³ O.D. Barrel: an out of round tolerance of ± .04 is permitted for 1-1/2 through 5 inch. For 6 inch and larger an out of round tolerance of ± .07 is permitted.

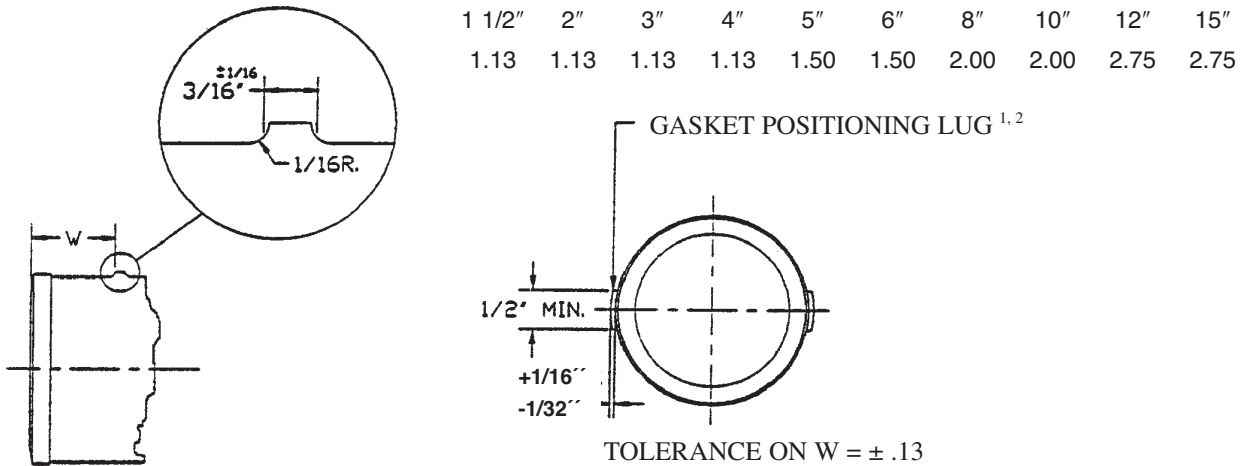
NOTE: Pipe shall be cast with or without a spigot bead or gasket positioning lugs.

TABLE 2.
DETAILS OF SPIGOT BEAD AND GASKET POSITION LUG

TOLERANCE ON SPIGOT TAPER



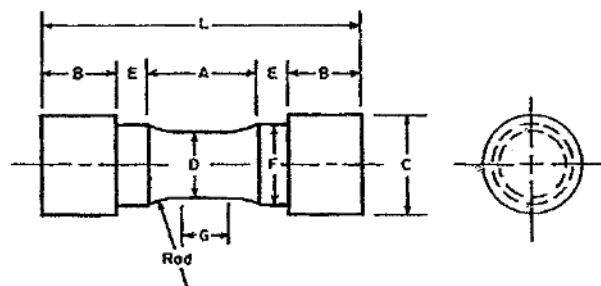
GASKET LUG LOCATION (W)



¹ Pipe shall be cast with or without the gasket positioning lug. These lugs, as illustrated above, are also permitted to be continuous around the entire circumference.

² Gasket positioning lugs shall be cast on all fittings except as otherwise noted. These lugs, as illustrated above, are also permitted to be continuous around the entire circumference.

TABLE 2.a



Dimensions, in (mm)
 G—Length of parallel, min
 D—Diameter
 R—Radius of fillet, min
 A—Length of reduced section, min
 L—Overall length, min
 C—Diameter of end section, approx
 E—Length of shoulder, min
 F—Diameter of shoulder
 B—Length of end section

Tension Test Specimen B
 0.75 (19)
 0.750 ± 0.015 (19.0 ± 0.38)
 1 (25)
 1½ (38)
 4 (100)
 1¼ (32)
 ¼ (6)
 1⅝ ± ⅛ (25 ± 0.4)
 A

Test Bar	As-Cast Diameter, in. (mm)			Length, in. (mm)	
	Nominal (Mid-Length)	Minimum (Bottom)	Maximum (Top)	Minimum (Specified)	Maximum (Recommended)
B	1.20 (30.5)	1.14 (29.0)	1.32 (33.5)	6.0 (150)	9.0 (230)

^A Optional to fit holders on testing machine. If threaded, root diameter shall not be less than dimension F.

FIG. 4 Sample Test Bar

TABLE 3.
EDP IDENTIFICATION NUMBERS FOR HUBLESS PIPE

Manufacturer's Item	Code			Description ¹	
	Group	Item #	√		
HUBLESS PIPE					
TABLE 1	022	0126	7	1-1/2 x 5	HUBLESS PIPE
		0128	3	2 x 5	HUBLESS PIPE
		0130	9	3 x 5	HUBLESS PIPE
		0132	5	4 x 5	HUBLESS PIPE
		0134	1	5 x 5	HUBLESS PIPE
		0136	6	6 x 5	HUBLESS PIPE
		0138	2	8 x 5	HUBLESS PIPE
		0139	0	10 x 5	HUBLESS PIPE
		0140	4	12 x 5	HUBLESS PIPE
		0141	8	15 x 5	HUBLESS PIPE
HUBLESS PIPE					
TABLE 1	022	0156	4	1-1/2 x 10	HUBLESS PIPE
		0158	0	2 x 10	HUBLESS PIPE
		0160	6	3 x 10	HUBLESS PIPE
		0162	2	4 x 10	HUBLESS PIPE
		0164	8	5 x 10	HUBLESS PIPE
		0168	9	6 x 10	HUBLESS PIPE
		0170	5	8 x 10	HUBLESS PIPE
		0171	3	10 x 10	HUBLESS PIPE
		0172	7	12 x 10	HUBLESS PIPE
		0173	1	15 x 10	HUBLESS PIPE

¹ EDP numbers for fittings appear in each of the respective tables.

NOTE: When ordering by these EDP numbers, be sure to include the check (√) digit following the item number (022 0126 7). This check digit is verification of the group and item number you select.

TABLE 4.
SPECIFYING HAND OF FITTINGS WITH SIDE INLETS OR OUTLETS

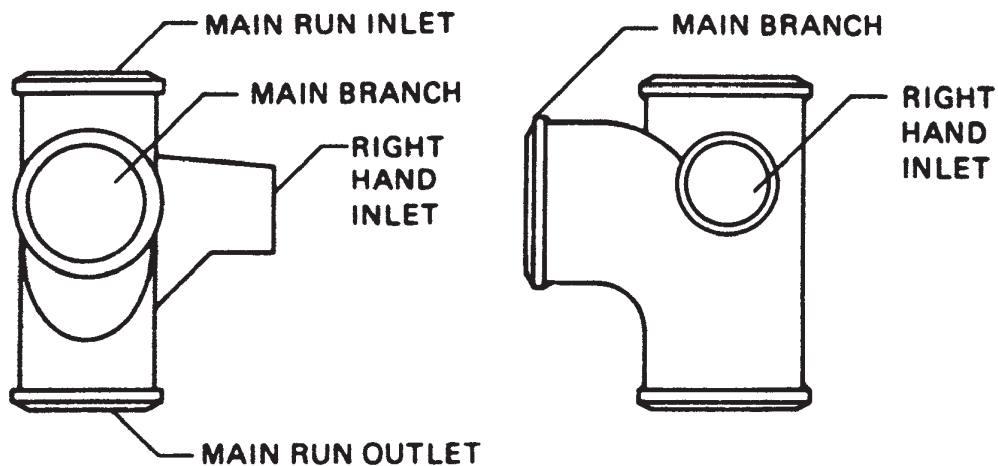
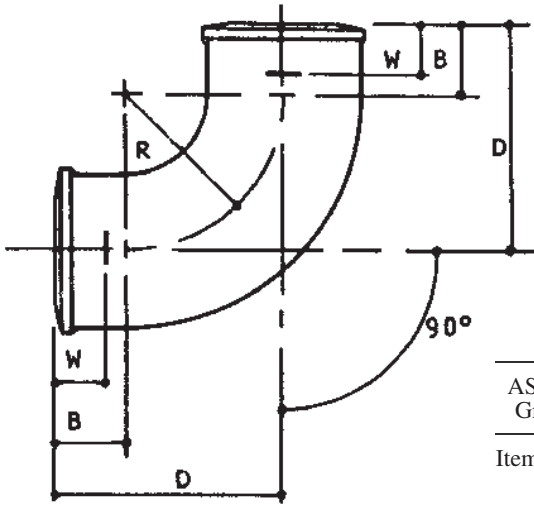


TABLE 5.
1/4 BEND

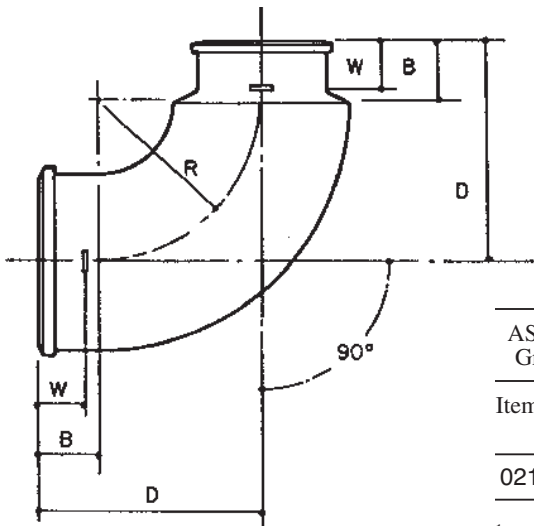


ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹			
Item #	√		B	D ² (± 1/8)	R	W
0188	7	1-1/2	1-1/2	4-1/4	2-3/4	1-1/8
0190	3	2	1-1/2	4-1/2	3	1-1/8
0192	9	3	1-1/2	5	3-1/2	1-1/8
0194	5	4	1-1/2	5-1/2	4	1-1/8
0196	0	5	2	6-1/2	4-1/2	1-1/2
0198	6	6	2	7	5	1-1/2
0200	0	8	2-1/2	8-1/2	6	2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

TABLE 6.
REDUCING 1/4 BEND



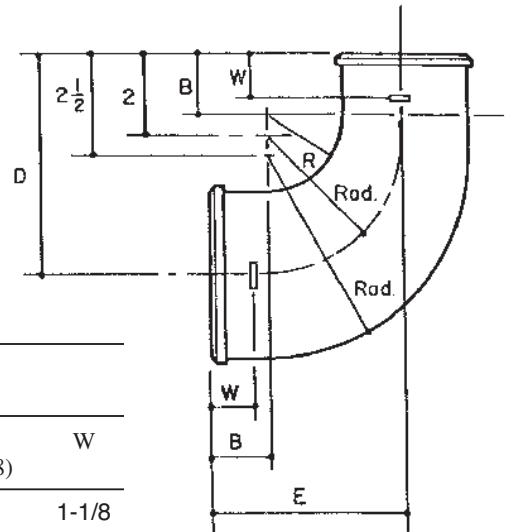
ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹			
Item #	√		B	D ² (± 1/8)	R	W
0218	2	4 x 3	1-1/2	5-1/2	4	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

TABLE 7.
REDUCING 1/4 BEND

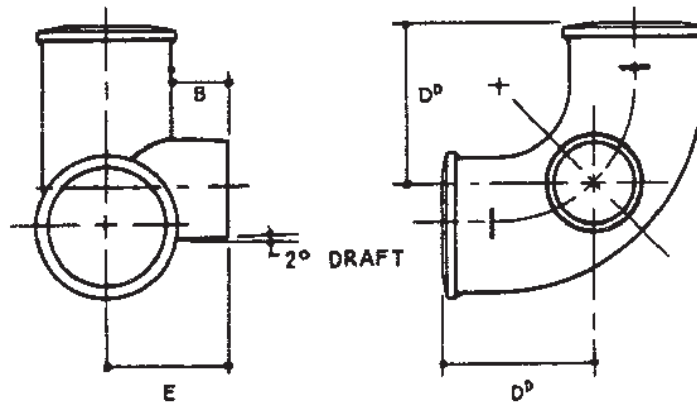
ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹				
Item #	✓		B	R	D ² (± 1/8)	E ² (± 1/8)	W
0218	2	4 x 3	1-1/2	3-1/2	5-1/2	5	1-1/8



¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions D and E are laying lengths.

TABLE 8.
1/4 BEND ³ WITH SIDE OPENING ⁴



ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹		
Item #	✓		B	E ² (± 1/8)	D ^D
0236	4	3 x 2	1-1/2	3-1/4	4
0238	0	4 x 2	1-1/2	3-3/4	4-5/16

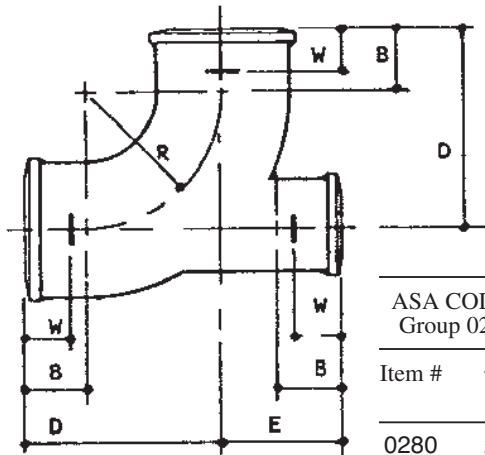
¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension E is laying length.

³ For details of 1/4 Bend see Table 5.

⁴ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting method used.

TABLE 9.
1/4 BEND WITH HEEL OPENING

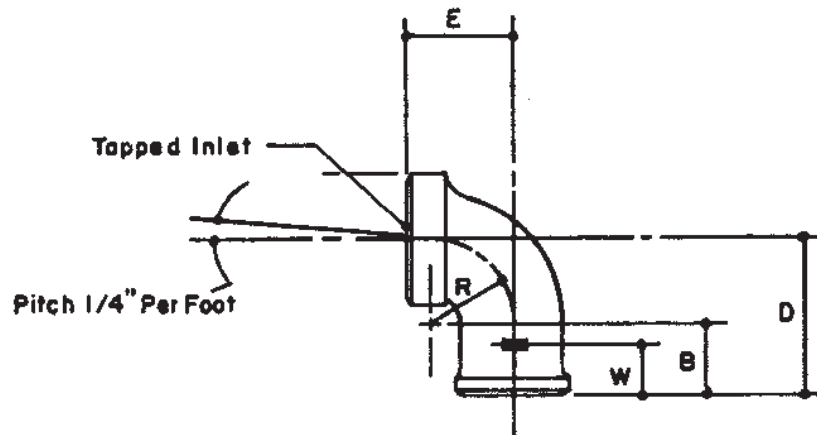


ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹				
Item #	√		B	D ² (± 1/8)	E ² (± 1/8)	R	W
0280	2	3 x 2	1-1/2	5	2-7/8	3-1/2	1-1/8
0282	8	4 x 2	1-1/2	5-1/2	3-1/4	4	1-1/8
0275	2	3 x 2	1-1/2	5	10-1/4	3-1/2	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions D and E are laying lengths.

TABLE 11.
TAPPED 1/4 BEND



ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹					
Item #	√		B	E	D ² (± 1/8)	R	IPS TAPPING ²	W
0324	8	1-1/2 x 1-1/4	1-1/2	2	3	1-3/4	1-1/4	1-1/8
0326	3	1-1/2 x 1-1/2	1-1/2	2	3	1-3/4	1-1/2	1-1/8
0328	9	2 x 1-1/4	1-1/2	2-1/4	3-1/4	1-3/4	1-1/4	1-1/8
0330	5	2 x 1-1/2	1-1/2	2-1/4	3-1/4	1-3/4	1-1/2	1-1/8
0332	7	2 x 2	1-1/2	2-1/4	3-1/4	1-3/4	2	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

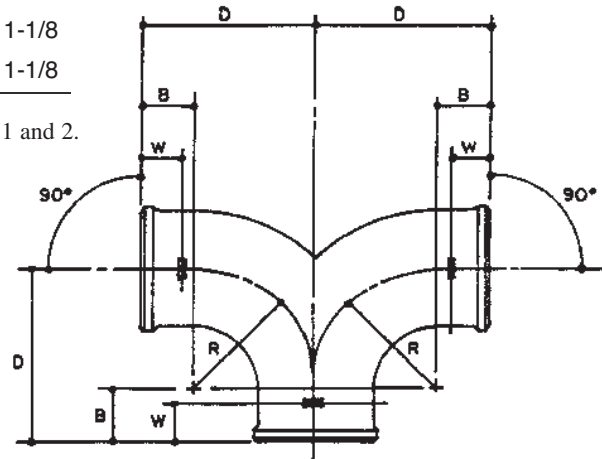
³ For details of tapping bosses see Table 91.

**TABLE 13.
DOUBLE 1/4 BEND**

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹			
Item #	✓		D ² (± 1/8)	R	B	W
0402	2	2	4-1/2	3	1-1/2	1-1/8
0404	8	3	5	3-1/2	1-1/2	1-1/8
0406	3	4	5-1/2	4	1-1/2	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.



**TABLE 14.
LONG 1/4 BEND**

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹				
Item #	✓		B	E ² (± 1/8)	D ² (± 1/8)	R	W
0424	6	2 x 12	1-1/2	4-1/2	12	3	1-1/8
0432	4	2 x 14	1-1/2	4-1/2	14	3	1-1/8
0423	8	2 x 16	1-1/2	4-1/2	16	3	1-1/8
0425	3	2 x 18	1-1/2	4-1/2	18	3	1-1/8
0433	5	2 x 24	1-1/2	4-1/2	24	3	1-1/8
0426	1	3 x 12	1-1/2	5	12	3-1/2	1-1/8
0427	9	3 x 18	1-1/2	5	18	3-1/2	1-1/8
0428	7	4 x 12	1-1/2	5-1/2	12	4	1-1/8
0431	1	4 x 18	1-1/2	5-1/2	18	4	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions D and E are laying Lengths

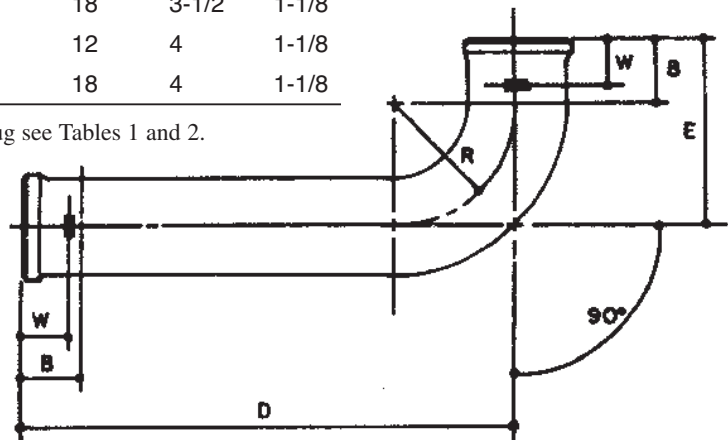
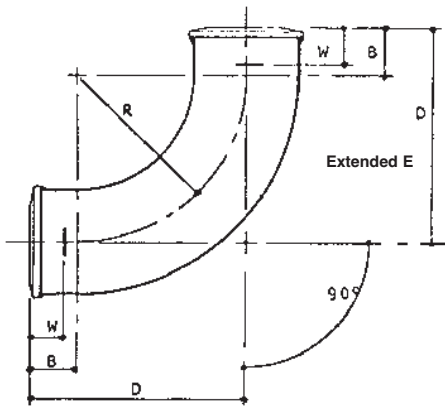


TABLE 15.
SHORT SWEEP (AND EXTENDED PATTERN)



ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹			
Item #	√		B	D ² (± 1/8)	R	W
0462	6	2	1-1/2	6-1/2	5	1-1/8
0464	2	3	1-1/2	7	5-1/2	1-1/8
0468	3	4	1-1/2	7-1/2	6	1-1/8
0470	9	5	2	8-1/2	6-1/2	1-1/2
0472	5	6	2	9	7	1-1/2
0474	1	8	2-1/2	10-1/2	8	2
0475	8	10	3	12	9	2
0476	8	12	3-1/4	13-1/4	10	2-3/4
0477	8	15	3-1/4	14-3/4	11-1/2	2-3/4

EXTENDED PATTERN

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹				
Item #	√		B	D ² (± 1/8)	E ² (± 1/8)	R	W
0478	7	2 x 12	1-1/2	12	6-1/2	5	1-1/8
0479	7	2 x 14	1-1/2	14	6-1/2	5	1-1/8
0480	7	2 x 16	1-1/2	16	6-1/2	5	1-1/8
0481	7	2 x 18	1-1/2	18	6-1/2	5	1-1/8
0482	7	2 x 24	1-1/2	24	6-1/2	5	1-1/8
0483	7	2 x 34	1-1/2	34	6-1/2	5	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D and E are laying lengths.

TABLE 17.
LONG SWEEP

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹			
Item #	√		B	D ² (± 1/8)	R	W
0492	3	1-1/2	1-1/2	9-1/4	7-3/4	1-1/8
0494	9	2	1-1/2	9-1/2	8	1-1/8
0496	4	3	1-1/2	10	8-1/2	1-1/8
0498	0	4	1-1/2	10-1/2	9	1-1/8
0500	3	5	2	11-1/2	9-1/2	1-1/2
0502	9	6	2	12	10	1-1/2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

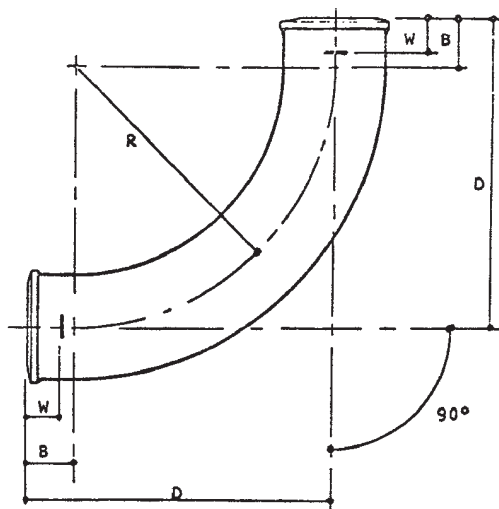
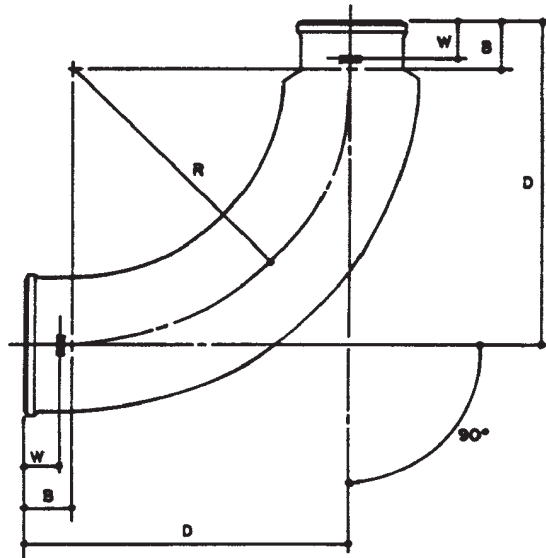


TABLE 18.
REDUCING LONG SWEEP



ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹			
Item #	✓		B	D ² (± 1/8)	R	W
0518	5	4 x 3	1-1/2	10-1/2	9	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

TABLE 19.
1/5 BEND

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹			
Item #	✓		B	D ² (± 1/8)	R	W
0536	7	2	1-1/2	3-11/16	3	1-1/8
0538	3	3	1-1/2	4-1/16	3-1/2	1-1/8
0540	9	4	1-1/2	4-7/16	4	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

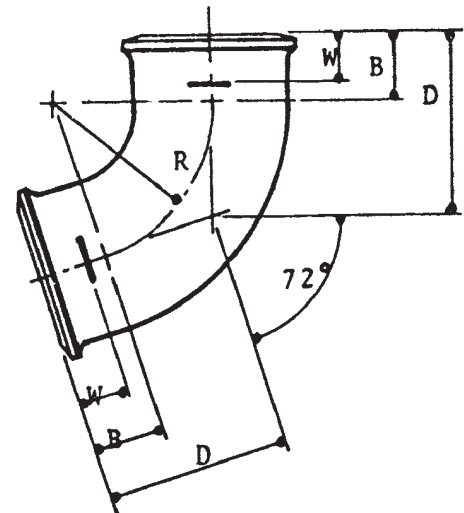
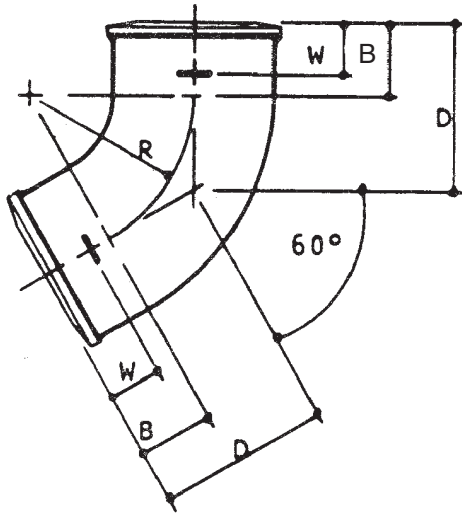


TABLE 20.
1/6 BEND



ASA CODE Group 022		Dimensions in Inches ¹				
Item #	√	Size (Inches)	B	D ² (± 1/8)	R	W
0570	6	2	1-1/2	3-1/4	3	1-1/8
0572	2	3	1-1/2	3-1/2	3-1/2	1-1/8
0574	8	4	1-1/2	3-13/16	4	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

TABLE 21.
1/8 BEND

ASA CODE Group 022		Dimensions in Inches ¹				
Item #	√	Size (Inches)	B	D ² (± 1/8)	R	W
0604	3	1-1/2	1-1/2	2-5/8	2-3/4	1-1/8
0606	8	2	1-1/2	2-3/4	3	1-1/8
0608	4	3	1-1/2	3	3-1/2	1-1/8
0610	0	4	1-1/2	3-1/8	4	1-1/8
0612	6	5	2	3-7/8	4-1/2	1-1/2
0614	2	6	2	4-1/16	5	1-1/2
0616	7	8	2-1/2	5	6	2
0617	5	10	3	5-15/16	7	2
0618	5	12	3-1/4	6-9/16	8	2-3/4
0619	5	15	3-1/4	7-13/16	9-1/2	2-3/4

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

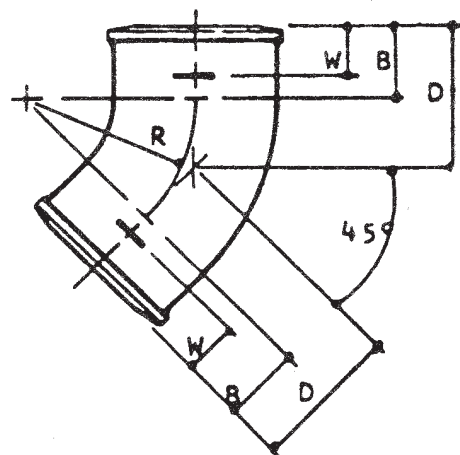
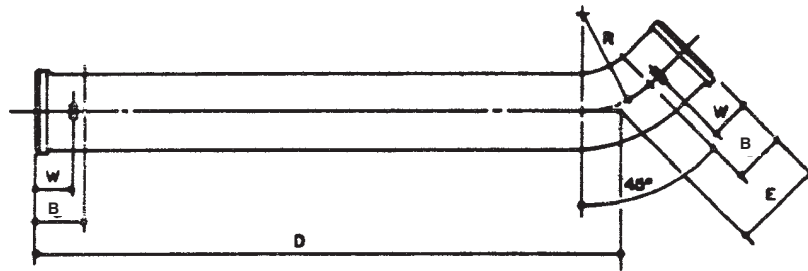


TABLE 22
LONG 1/8 BEND

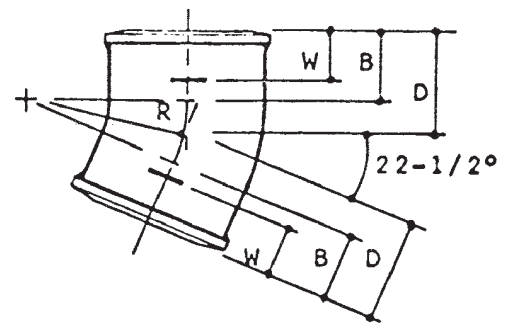


ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹				
Item #	√		B	E ² (± 1/8)	D ² (± 1/8)	R	W
0645	8	2 x 6	1-1/2	2-3/4	6	3	1-1/8
0638	1	2 x 12	1-1/2	2-3/4	12	3	1-1/8
0646	6	2 x 14	1-1/2	2-3/4	14	3	1-1/8
0641	5	2 x 16	1-1/2	2-3/4	16	3	1-1/8
0643	1	2 x 18	1-1/2	2-3/4	18	3	1-1/8
0640	7	3 x 12	1-1/2	3	12	3-1/2	1-1/8
0644	9	3 x 18	1-1/2	3	18	3-1/2	1-1/8
0642	3	4 x 12	1-1/2	3-1/8	12	4	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions D and E are laying lengths.

TABLE 23
1/16 BEND

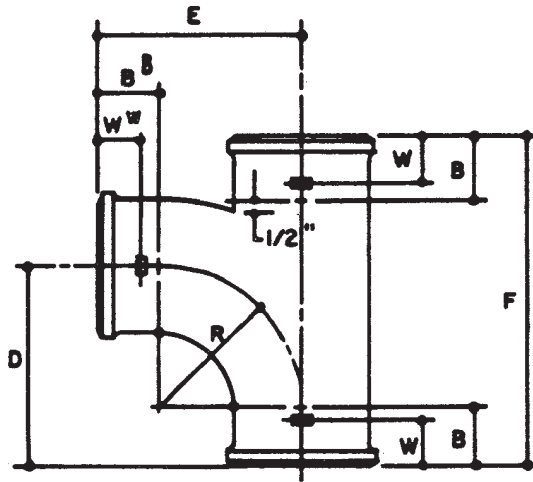


ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹			
Item #	√		B	D ² (± 1/8)	R	W
0676	1	1-1/2	1-1/2	2-1/8	2-3/4	1-1/8
0678	7	2	1-1/2	2-1/8	3	1-1/8
0680	3	3	1-1/2	2-1/4	3-1/2	1-1/8
0682	9	4	1-1/2	2-5/16	4	1-1/8
0684	5	5	2	2-7/8	4-1/2	1-1/2
0686	0	6	2	3	5	1-1/2
0688	6	8	2-1/2	3-3/4	6	2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

TABLE 24.
SANITARY TEE BRANCH



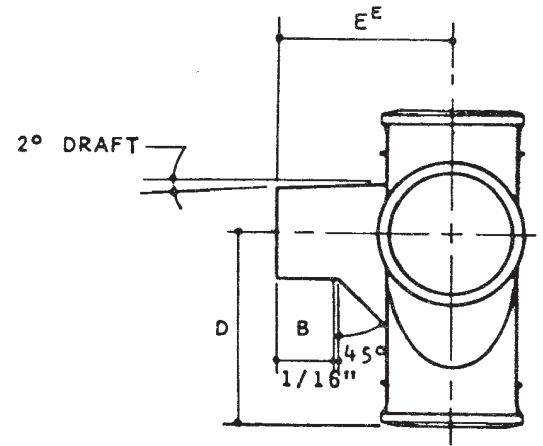
ASA CODE Group 022		Dimensions in Inches ¹								
Item #	√	Size (Inches)	B	E ² (± 1/8)	F ² (± 1/8)	D	R	W	W ^W	B ^B
0806	4	1-1/2	1-1/2	4-1/4	6-1/2	4-1/4	2-3/4	1-1/8	1-1/8	1-1/2
0808	0	2 x 1-1/2	1-1/2	4-1/2	6-5/8	4-1/4	2-3/4	1-1/8	1-1/8	1-1/2
0810	6	2	1-1/2	4-1/2	6-7/8	4-1/2	3	1-1/8	1-1/8	1-1/2
0812	2	3 x 1-1/2	1-1/2	5	6-1/2	4-1/4	2-3/4	1-1/8	1-1/8	1-1/2
0814	8	3 x 2	1-1/2	5	6-7/8	4-1/2	3	1-1/8	1-1/8	1-1/2
0816	3	3	1-1/2	5	8	5	3-1/2	1-1/8	1-1/8	1-1/2
0818	9	4 x 2	1-1/2	5-1/2	6-7/8	4-1/2	3	1-1/8	1-1/8	1-1/2
0820	5	4 x 3	1-1/2	5-1/2	8	5	3-1/2	1-1/8	1-1/8	1-1/2
0822	1	4	1-1/2	5-1/2	9-1/8	5-1/2	4	1-1/8	1-1/8	1-1/2
0824	7	5 x 2	2	6	8-1/2	5	3	1-1/2	1-1/8	1-1/2
0826	2	5 x 3	2	6	9-5/16	5-1/2	3-1/2	1-1/2	1-1/8	1-1/2
0828	8	5 x 4	2	6	10-13/32	6	4	1-1/2	1-1/8	1-1/2
0830	4	5	2	6-1/2	11-7/16	6-1/2	4-1/2	1-1/2	1-1/2	2
0832	0	6 x 2	2	6-1/2	8-3/16	5	3	1-1/2	1-1/8	1-1/2
0838	0	6 x 3	2	6-1/2	9-3/16	5-1/2	3-1/2	1-1/2	1-1/8	1-1/2
0834	6	6 x 4	2	6-1/2	10-1/16	6	4	1-1/2	1-1/8	1-1/2
0835	3	6 x 5	2	7	11-1/2	6-1/2	4-1/2	1-1/2	1-1/2	2
0836	1	6	2	7	12-1/2	7	5	1-1/2	1-1/2	2
0848	3	8 x 3	2-1/2	7-1/2	10-3/8	6	3-1/2	2	1-1/8	1-1/2
0846	4	8 x 4	2-1/2	7-1/2	11-1/2	6-1/2	4	2	1-1/8	1-1/2
0844	5	8 x 5	2-1/2	8	12-1/2	7	4-1/2	2	1-1/2	2
0842	6	8 x 6	2-1/2	8	13-1/2	7-1/2	5	2	1-1/2	2
0840	1	8	2-1/2	8-1/2	15-1/2	8-1/2	6	2	2	2-1/2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions E and F are laying lengths.

TABLE 28.
SANITARY TEE, WITH R OR L SIDE OPENING ^{3, 5}

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ^{1, 4}		
Item #	✓		B	E ^{E 2} (± 1/8)	D
0976	5	3 x 3 x 2 LH	1-1/2	4-7/16	5
0986	4	3 x 3 x 2 RH	1-1/2	4-7/16	5
0978	1	4 x 2 x 2 LH	1-1/2	3-1/4	4-1/2
0988	0	4 x 2 x 2 RH	1-1/2	3-1/4	4-1/2
0980	7	4 x 3 x 2 LH	1-1/2	4-15/16	5
0990	6	4 x 3 x 2 RH	1-1/2	4-15/16	5
0982	3	4 x 4 x 2 LH	1-1/2	4-15/16	5-1/2
0992	2	4 x 4 x 2 RH	1-1/2	4-15/16	5-1/2



¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension E ^E is laying length.

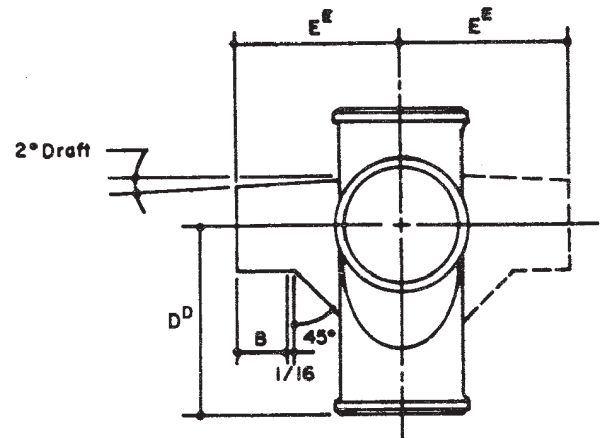
³ Sanitary Tee Branch with side inlet: illustration shows left hand. Can be furnished left or right hand.

⁴ For details of Sanitary Tee Branch see Table 24.

⁵ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting method used.

TABLE 29.
SANITARY TEE W/2" SIDE OPENING R OR L/R & L ^{3, 5}

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ^{1, 4}		
Item #	✓		B	E ^{E 2} (± 1/8)	D ^D
1030	0	3 x 3 x 2 LH	1-1/2	4-7/16	5
1034	2	3 x 3 x 2 RH	1-1/2	4-7/16	5
1037	5	3 x 3 x 2 R&L	1-1/2	4-7/16	5
1032	6	4 x 2 x 2 LH	1-1/2	4-15/16	5-1/2
1036	7	4 x 2 x 2 RH	1-1/2	4-15/16	5-1/2
1038	3	4 x 4 x 2 R&L	1-1/2	4-15/16	5-1/2



¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

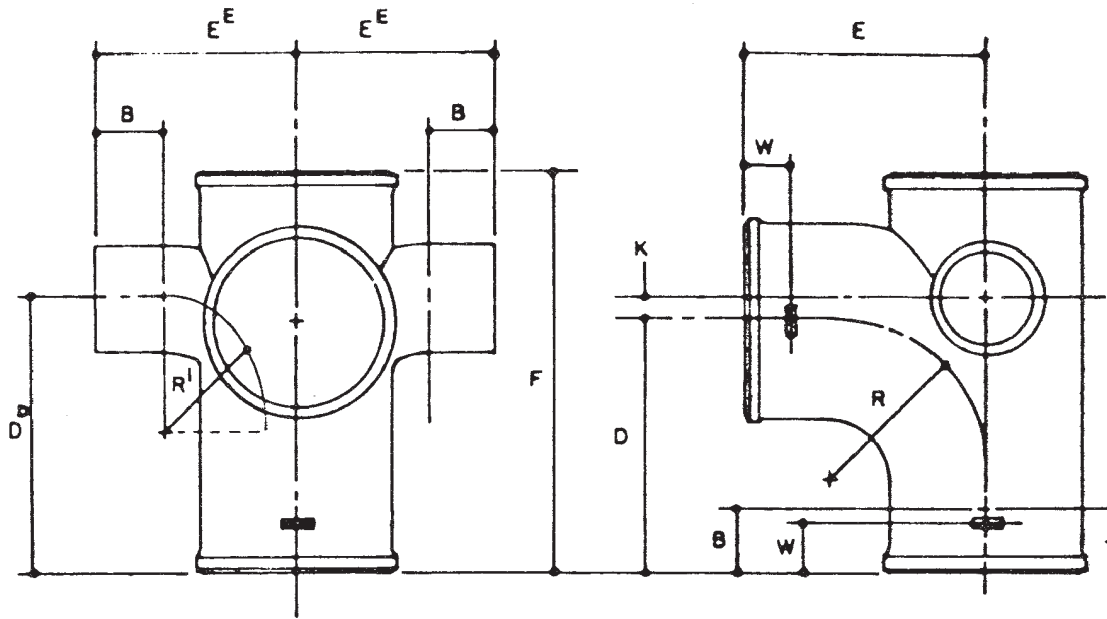
² Dimension E ^E is laying length.

³ Sanitary Tee Branch with side inlet: illustration shows left hand. Can be furnished left or right hand.

⁴ For details of Sanitary Tee Branch see Table 24.

⁵ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting method

TABLE 30.
SANITARY TEE WITH SIDE OPENING ³ ABOVE CENTER
R & L — R OR L (NEW ORLEANS SPECIAL)



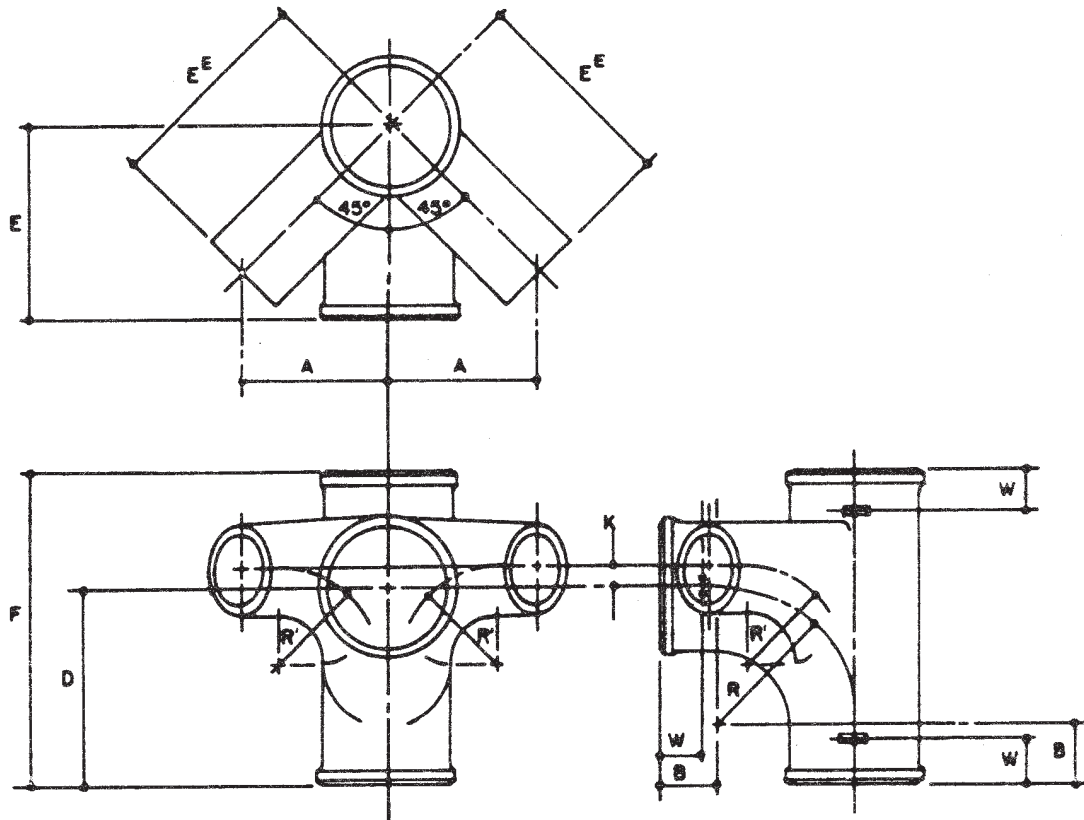
ASA CODE Group 022			Dimensions in Inches ¹									
Item #	✓	Size (Inches)	B	E ^{E 2} (± 1/8)	E ² (± 1/8)	F ² (± 1/8)	D	D ^D	K	R ¹	R	W
1058	1	3 x 3 x 2 LH	1-1/2	4-1/2	5	8-1/2	5	6	1	3	3-1/2	1-1/8
1062	3	3 x 3 x 2 RH	1-1/2	4-1/2	5	8-1/2	5	6	1	3	3-1/2	1-1/8
1066	4	3 x 3 x 2 R&L	1-1/2	4-1/2	5	8-1/2	5	6	1	3	3-1/2	1-1/8
1060	7	4 x 4 x 2 LH	1-1/2	5	5-1/2	9-1/8	5-1/2	6-1/2	1	3	4	1-1/8
1064	9	4 x 4 x 2 RH	1-1/2	5	5-1/2	9-1/8	5-1/2	6-1/2	1	3	4	1-1/8
1068	0	4 x 4 x 2 R&L	1-1/2	5	5-1/2	9-1/8	5-1/2	6-1/2	1	3	4	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions E, F and E ^E are laying lengths.

³ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting methods used.

TABLE 31.
SANITARY TEE WITH 45° SIDE OPENINGS ⁴
ABOVE CENTER R OR L OR R & L ³ & NEW ORLEANS SPECIALS



ASA CODE Group 022			Dimensions in Inches ¹									
Item #	✓	Size (Inches)	A	B	E ^{E 2} (± 1/8)	E ² (± 1/8)	F ² (± 1/8)	D	K	R	R	W
1086	2	3 x 3 x 2 LH	3-3/4	1-1/2	5-3/8	5	8	5	1/2	3-1/2	3	1-1/8
1090	4	3 x 3 x 2 RH	3-3/4	1-1/2	5-3/8	5	8	5	1/2	3-1/2	3	1-1/8
1094	6	3 x 3 x 2 x 2 R&L	3-3/4	1-1/2	5-3/8	5	8	5	1/2	3-1/2	3	1-1/8
							F ² N.O. (± 1/8)	KNO				
1122	5	3 x 3 x 2 LH	3-3/4	1-1/2	5-3/8	5	8-1/2	5	1	3-1/2	3	1-1/8
1126	6	3 x 3 x 2 RH	3-3/4	1-1/2	5-3/8	5	8-1/2	5	1	3-1/2	3	1-1/8
1130	8	3 x 3 x 2 R&L	3-3/4	1-1/2	5-3/8	5	8-1/2	5	1	3-1/2	3	1-1/8
1124	1	4 x 4 x 2 LH	4-5/16	1-1/2	6-1/8	5-1/2	9-1/8	5-1/2	1	4	3	1-1/8
1128	2	4 x 4 x 2 RH	4-5/16	1-1/2	6-1/8	5-1/2	9-1/8	5-1/2	1	4	3	1-1/8
1132	4	4 x 4 x 2 R&L	4-5/16	1-1/2	6-1/8	5-1/2	9-1/8	5-1/2	1	4	3	1-1/8

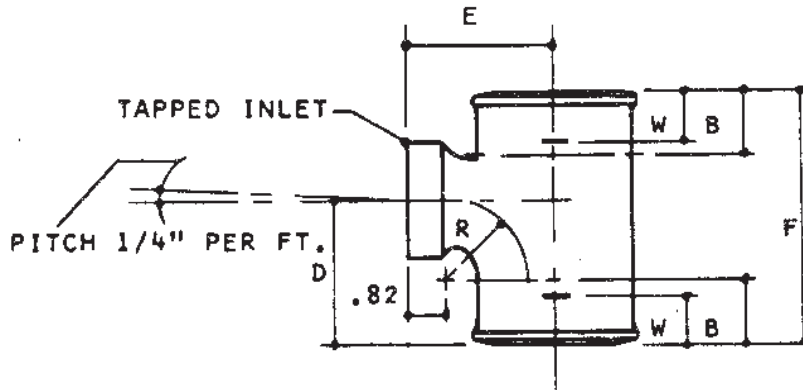
¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions E, F and E^E are laying lengths.

³ For details of Sanitary Tee Branch see Table 24.

⁴ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting methods used.

TABLE 32.
SANITARY TAPPED TEE (AND EXTENDED PATTERN)



ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹						
Item #	√		B	E	F ² (± 1/8)	D	R	IPS TAPPING ³	W
1208	2	1-1/2 x 1-1/4	1-1/2	2-9/16	5-11/16	3-1/4	1-3/4	1-1/4	1-1/8
1210	8	1-1/2 x 1-1/2	1-1/2	2-9/16	5-11/16	3-1/4	1-3/4	1-1/2	1-1/8
1212	4	2 x 1-1/4	1-1/2	2-13/16	5-11/16	3-1/4	1-3/4	1-1/4	1-1/8
1214	0	2 x 1-1/2	1-1/2	2-13/16	5-11/16	3-1/4	1-3/4	1-1/2	1-1/8
1216	5	2 x 2	1-1/2	3-1/16	6-3/8	3-3/4	2-1/4	2	1-1/8
1218	1	3 x 1-1/4	1-1/2	3-5/16	5-11/16	3-1/4	1-3/4	1-1/4	1-1/8
1220	7	3 x 1-1/2	1-1/2	3-5/16	5-11/16	3-1/4	1-3/4	1-1/2	1-1/8
1222	3	3 x 2	1-1/2	3-9/16	6-3/8	3-3/4	2-1/4	2	1-1/8
1223	1	3 x 3	1-1/2	4-3/16	8	4-7/8	3-1/2	3	1-1/8
1224	9	4 x 1-1/4	1-1/2	3-13/16	5-11/16	3-1/4	1-3/4	1-1/4	1-1/8
1226	4	4 x 1-1/2	1-1/2	3-13/16	5-11/16	3-1/4	1-3/4	1-1/2	1-1/8
1228	0	4 x 2	1-1/2	4-1/16	6-3/8	3-3/4	2-1/4	2	1-1/8
1230	3	4 x 3	1-1/2	4-3/8	8	4-1/2	2-1/4	3	1-1/8
1232	2	5 x 1-1/2	2	4-5/16	6-11/16	3-3/4	1-3/4	1-1/2	1-1/2
1233	0	5 x 2	2	4-9/16	7-15/16	4-1/4	2-1/4	2	1-1/2
1234	5	6 x 1-1/2	2	4-13/16	6-3/4	3-3/4	2-1/4	1-1/2	1-1/2
1235	5	6 x 2	2	5-1/16	7-7/16	4-1/4	2-1/4	2	1-1/2

EXTENDED PATTERN

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹						
Item #	√		B	E	F ² (± 1/8)	D	R	IPS TAPPING ³	W
1236	0	2 x 1-1/2	1-1/2	2-13/16	22-7/8	20-15/16	1-3/4	1-1/2	1-1/8
1237	0	2 x 1-1/2	1-1/2	2-13/16	31	29-1/16	1-3/4	1-1/2	1-1/8
1238	0	2 x 2	1-1/2	3-1/16	31	28-3/8	2-1/4	2	1-1/8
◆ 1239	0	2 x 2	1-1/2	3-1/16	22-7/8	28-3/8	2-1/4	2	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

³ For details of tapping bosses see Table 91.

TABLE 37.
HORIZONTAL TWIN SANITARY TAPPED TEE

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹								
Item #	√		B	H	E	F ² (± 1/8)	D	A	R	W	IPS TAPPING ³
1290	0	2 x 1-1/2	1-1/2	3	2-1/2	7	4	1-3/8	2-1/4	1-1/8	1-1/2
1292	6	3 x 1-1/2	1-1/2	3	3	7	4	1-3/8	2-1/4	1-1/8	1-1/2
1294	2	4 x 1-1/2	1-1/2	3	3-1/2	7	4	1-3/8	2-1/4	1-1/8	1-1/2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

³ For details of tapping bosses see Table 91.

NOTE: Horizontal inlet waste bosses to be tapped at an angle of 1/4 inch per foot to provide flow.

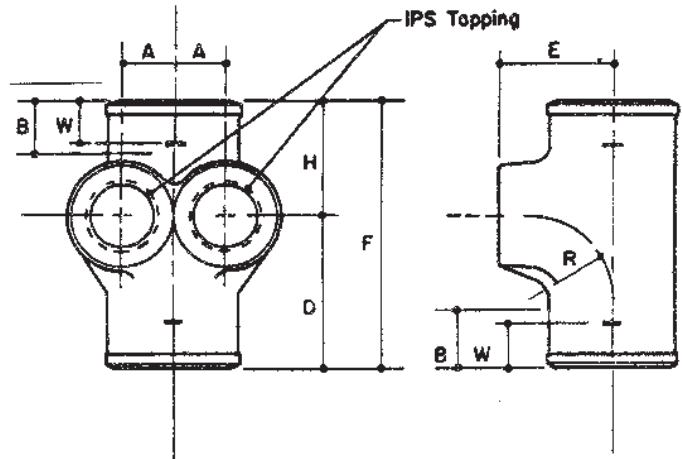


TABLE 38.
DOUBLE VERTICAL SANITARY TAPPED TEE

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹						
Item #	√		B	E	F ² (± 1/8)	D	D ^D	R	IPS TAPPING ³
1304	9	2 x 1-1/2	1-1/2	2-13/16	9-3/4	3-1/4	4-1/2	1-3/4	1-1/2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

³ For details of tapping bosses see Table 91.

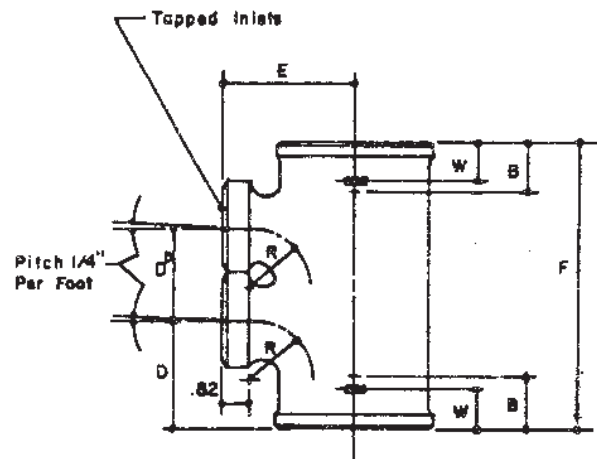
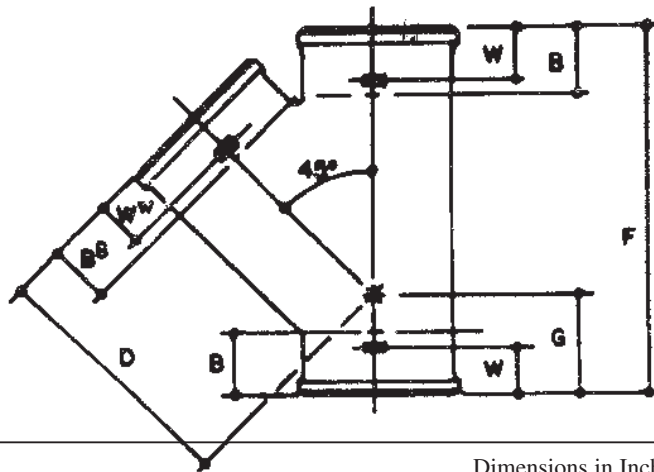


TABLE 39.
WYE

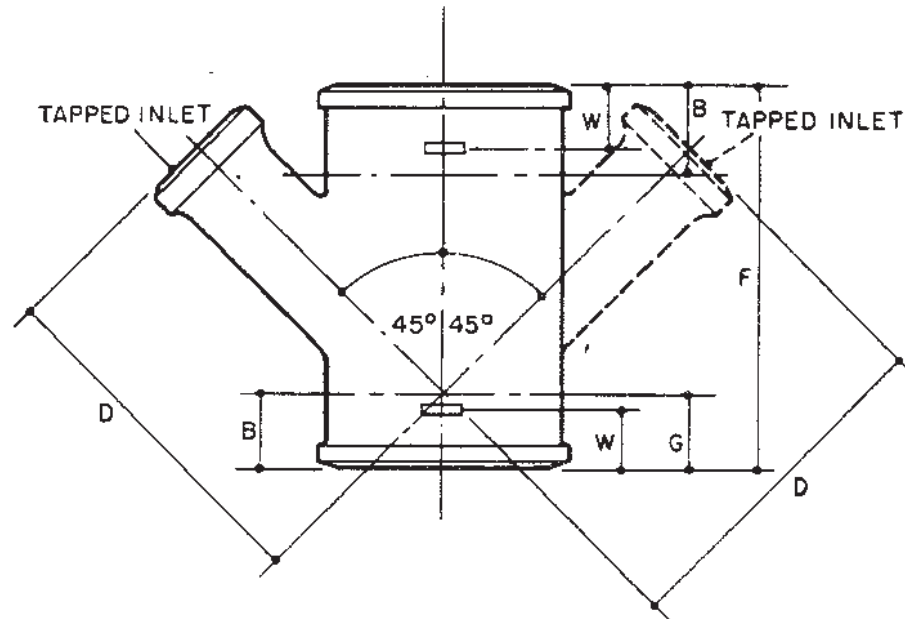


ASA CODE Group 022		Dimensions in Inches ¹							
Item #	√	Size (Inches)	B	B ^B	D ² (± 1/8)	F ² (± 1/8)	G	W	W ^W
1312	2	1-1/2	1-1/2	1-1/2	4	6	2	1-1/8	1-1/8
1314	8	2	1-1/2	1-1/2	4-5/8	6-5/8	2	1-1/8	1-1/8
1315	3	3 x 1-1/2	1-1/2	1-1/2	4-5/8	6-3/16		1-1/8	1-1/8
1316	3	3 x 2	1-1/2	1-1/2	5-5/16	6-5/8	1-1/2	1-1/8	1-1/8
1318	9	3	1-1/2	1-1/2	5-3/4	8	2-1/4	1-1/8	1-1/8
1320	5	4 x 2	1-1/2	1-1/2	6	6-5/8	1	1-1/8	1-1/8
1322	1	4 x 3	1-1/2	1-1/2	6-1/2	8	1-11/16	1-1/8	1-1/8
1324	7	4	1-1/2	1-1/2	7-1/16	9-1/2	2-7/16	1-1/8	1-1/8
1326	2	5 x 2	2	1-1/2	7-1/2	8-1/16	15/16	1-1/2	1-1/8
1328	8	5 x 3	2	1-1/2	8	9-11/16	1-11/16	1-1/2	1-1/8
1330	4	5 x 4	2	1-1/2	8-1/2	11-3/16	2-7/16	1-1/2	1-1/8
1332	0	5	2	2	9-1/2	12-5/8	3-1/8	1-1/2	1-1/2
1334	6	6 x 2	2	1-1/2	8-1/4	8-5/16	1/2	1-1/2	1-1/8
1336	1	6 x 3	2	1-1/2	8-3/4	9-3/4	1-1/4	1-1/2	1-1/8
1338	7	6 x 4	2	1-1/2	9-1/4	11-3/16	1-15/16	1-1/2	1-1/8
1340	3	6 x 5	2	2	10-1/4	12-1/2	2-9/16	1-1/2	1-1/2
1342	9	6	2	2	10-3/4	14-1/16	3-5/16	1-1/2	1-1/2
1344	5	8 x 2	2-1/2	2-1/4	9-3/8	8-1/2	9/16	2	1-1/8
1346	0	8 x 3	2-1/2	2-1/4	9-13/16	9-15/16	1/8	2	1-1/8
1348	6	8 x 4	2-1/2	2-1/4	10-3/8	11-7/16	15/16	2	1-1/8
1350	2	8 x 5	2-1/2	2-3/4	11-3/8	12-13/16	1-5/8	2	1-1/2
1352	8	8 x 6	2-1/2	2-3/4	11-13/16	14-3/16	2-5/16	2	1-1/2
1354	4	8	2-1/2	3-1/4	13-3/8	17-1/8	3-3/4	2	2
1357	7	10 x 4	3	1-1/2	11-11/16	12-5/8	3/4	2	1-1/8
1359	3	10 x 6	3	2	13-1/8	15-7/16	2-3/16	2	1-1/2
1360	0	10 x 8	3	2-1/2	14-11/16	18-3/8	3-5/8	2	2
1361	9	10	3	3-3/4	16-1/2	21-1/2	5-1/16	2	2
1362	9	12	3-1/4	3-1/4	19-3/4	25-1/2	5-3/4	2-3/4	2-3/4
1363	9	15	3-1/4	3-1/4	23-1/4	30	6-3/4	2-3/4	2-3/4

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D and F are laying lengths.

TABLE 41.
WYE, TAPPED (SINGLE OR DOUBLE)



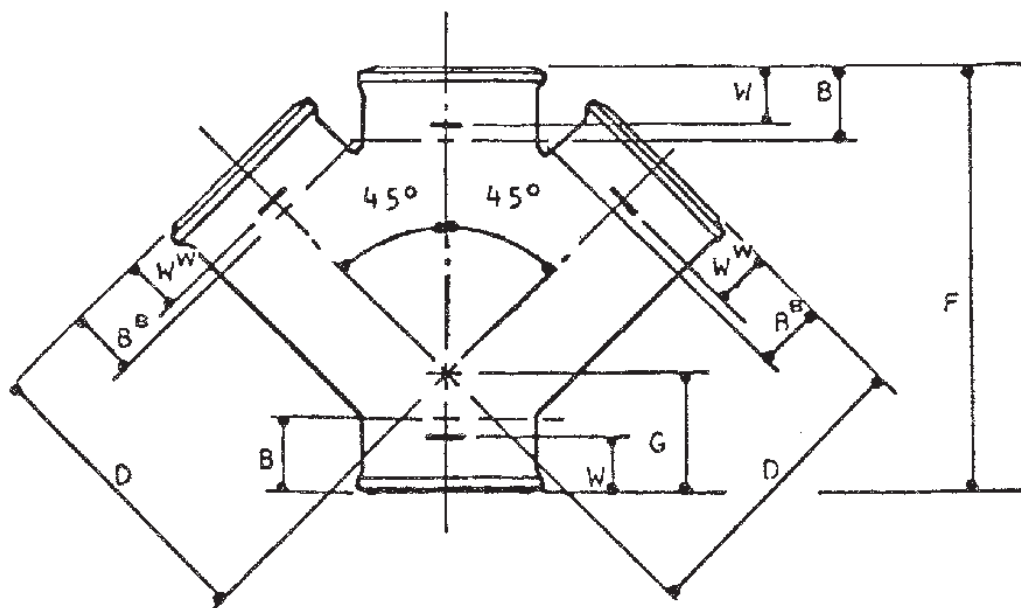
ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹					
Item #	√		B	D	F ² (± 1/8)	G	IPS TAPPING ³	W
SINGLE								
1498	9	2 x 1-1/2	1-1/2	5-1/16	6-5/8	1-5/8	1-1/2	1-1/8
1497	8	2 x 2	1-1/2	5-1/16	6-5/8	2	2	1-1/8
1496	7	3 x 1-1/2	1-1/2	5-3/4	6-5/8	1-1/2	1-1/2	1-1/8
1495	6	3 x 2	1-1/2	5-13/16	6-5/8	1-1/2	2	1-1/8
1494	5	4 x 1-1/2	1-1/2	6-7/16	6-5/8	1-1/2	1-1/2	1-1/8
1493	4	4 x 2	1-1/2	6-1/2	6-5/8	1-1/2	2	1-1/8
DOUBLE								
1618	2	2 x 1-1/2	1-1/2	5-1/16	6-5/8	1-5/8	1-1/2	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

³ For details of tapping boss see Table 91.

TABLE 42.
DOUBLE WYE

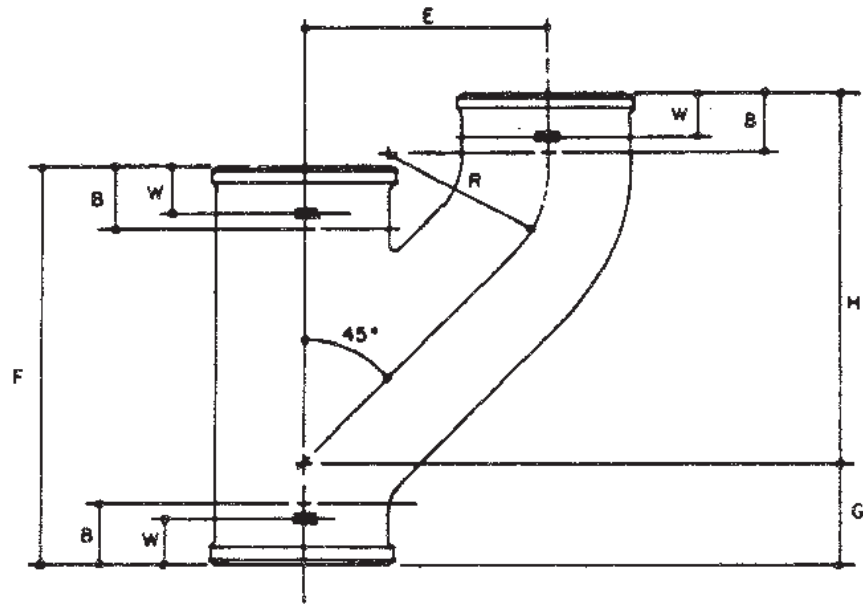


ASA CODE Group 022		Dimensions in Inches ¹							
Item #	√	Size (Inches)	B	B ^B	D ² (± 1/8)	F ² (± 1/8)	G	W	W ^W
1538	2	2	1-1/2	1-1/2	4-5/8	6-5/8	2	1-1/8	1-1/8
1540	8	3 x 2	1-1/2	1-1/2	5-5/16	6-5/8	1-1/2	1-1/8	1-1/8
1542	4	3	1-1/2	1-1/2	5-3/4	8	2-1/4	1-1/8	1-1/8
1544	0	4 x 2	1-1/2	1-1/2	6	6-5/8	1-1/2	1-1/8	1-1/8
1546	5	4 x 3	1-1/2	1-1/2	6-1/2	8	1-11/16	1-1/8	1-1/8
1548	1	4	1-1/4	1-1/2	7-1/16	9-1/2	2-7/16	1-1/8	1-1/8
1550	7	5 x 4	2	1-1/2	8-1/2	11-3/16	2-7/16	1-1/2	1-1/8
1552	3	6 x 4	2	1-1/2	9-1/4	11-3/16	1-15/16	1-1/2	1-1/8
1554	9	6	2	2	10-3/4	14-1/16	3-5/16	1-1/2	1-1/2
1556	3	8 x 4	2-1/2	2-1/4	10-3/8	11-7/16	15/16	2	1-1/8
1557	1	8 x 6	2-1/2	2-3/4	11-13/16	14-3/16	2-5/16	2	1-1/2
1558	0	8	2-1/2	3-1/4	13-3/8	17-1/8	3-3/4	2	2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D and F are laying lengths.

TABLE 45.
UPRIGHT WYE

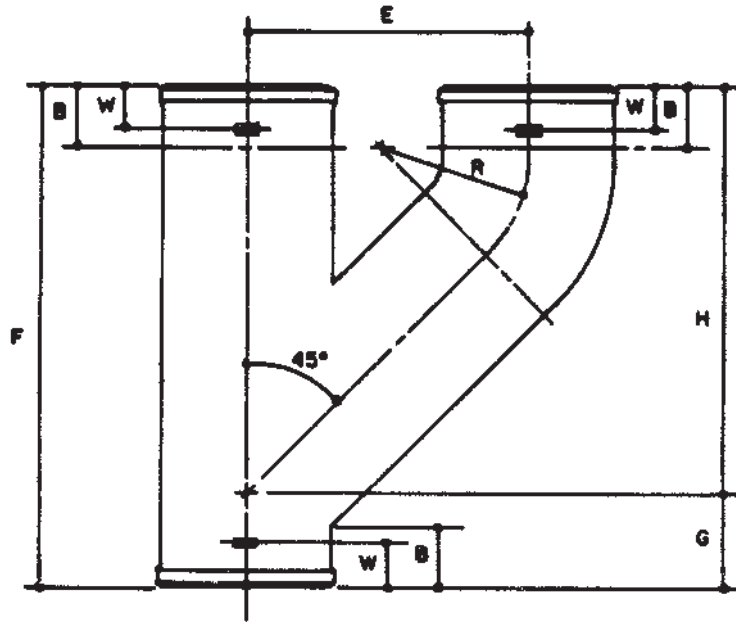


ASA CODE Group 022		Dimensions in Inches ¹							
Item #	√	Size (Inches)	B	H	E	F ² (± 1/8)	G	R	W
1646	3	2	1-1/2	8-1/4	5-1/2	7	2	3	1-1/8
1648	9	3 x 2	1-1/2	8-3/16	5-1/2	7	1-1/2	3	1-1/8
1650	5	3	1-1/2	8-7/16	5-1/2	8-3/8	2-3/16	3-1/2	1-1/8
1652	1	4 x 2	1-1/2	8-1/4	5-1/2	7	1	3	1-1/8
1654	7	4 x 3	1-1/2	8-7/16	5-1/2	8-3/8	1-11/16	3-1/2	1-1/8
1656	2	4	1-1/2	9-1/8	6	9-3/4	2-7/16	4	1-1/8
1658	4	5 x 2	1-1/2	9	6-3/4	8	2	3	1-1/2
1660	8	5 x 3	1-1/2	8-1/4	6-1/4	9-5/8	2-3/8	3-1/2	1-1/2
1662	6	5	1-1/2	11-7/16	7-1/8	12-11/16	2-3/4	4-1/2	1-1/2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

TABLE 46.
UPRIGHT WYE WIDE CENTER – FLORIDA SPECIAL

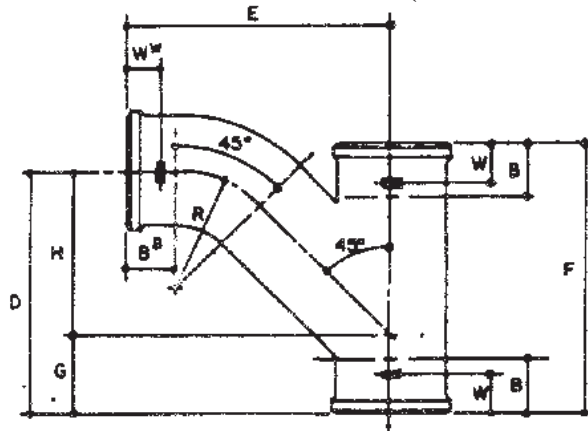


ASA CODE Group 022			Dimensions in Inches ¹							
Item	#	√	Size (Inches)	B	H	E	F ² (± 1/8)	G	R	W
022	9000	5	3 x 3	1-1/2	10	7	12-1/4	2-1/4	3-1/2	1-1/8
022	9001	3	4 x 3	1-1/2	10	7	11-11/16	1-11/16	3-1/2	1-1/8
022	9002	1	4 x 4	1-1/2	10-1/8	7	12-9/16	2-7/16	4	1-1/8
022	9003	4	3 x 2	1-1/2	10	7	12-1/4	2-1/4	3-1/2	1-1/8
022	9004	6	4 x 2	1-1/2	10	7	11-11/16	1-11/16	3-1/2	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

TABLE 47.
COMBINATION WYE AND 1/8 BEND (AND EXTENDED)



ASA CODE Group 022		Dimensions in Inches ¹										
Item #	√	Size (Inches)	B	B ^B	D	E ² (± 1/8)	F ² (± 1/8)	G	H	R	W	W ^W
1694	3	1-1/2	1-1/2	1-1/2	4-3/4	5-3/8	6	2	2-3/4	2-3/4	1-1/8	1-1/8
1696	8	2 x 1-1/2	1-1/2	1-1/2	5	5-7/8	6	2	3	2-3/4	1-1/8	1-1/8
1698	4	2	1-1/2	1-1/2	5-3/8	6-5/8	6-5/8	2	3-3/8	3	1-1/8	1-1/8
1736	0	3 x 1-1/2	1-1/2	1-1/2	5-1/2	6-3/4	6-5/8	1-1/2	4	3	1-1/8	1-1/8
1700	8	3 x 2	1-1/2	1-1/2	5-1/2	6-3/4	6-5/8	1-1/2	4	3	1-1/8	1-1/8
1702	4	3	1-1/2	1-1/2	7-5/16	8	8	2-1/4	5-1/16	3-1/2	1-1/8	1-1/8
1704	0	4 x 2	1-1/2	1-1/2	5-1/2	7-1/4	6-5/8	1-5/8	4-1/2	3	1-1/8	1-1/8
1706	5	4 x 3	1-1/2	1-1/2	7-1/4	8-1/2	8	1-11/16	5-9/16	3-1/2	1-1/8	1-1/8
1708	1	4	1-1/2	1-1/2	9-1/4	10	9-1/2	2-7/16	6-13/16	4	1-1/8	1-1/8
1710	7	5 x 2	2	1-1/2	5-15/16	7-3/4	8-1/16	15/16	5	3	1-1/2	1-1/8
1712	3	5 x 3	2	1-1/2	7-3/4	9	9-11/16	1-11/16	6-1/16	3-1/2	1-1/2	1-1/8
1714	9	5 x 4	2	1-1/2	9-3/4	10-1/2	11-3/16	2-7/16	7-5/16	4	1-1/2	1-1/8
1716	4	5	2	2	11-3/4	12-1/2	12-5/8	3-1/8	8-5/8	4-1/2	1-1/2	1-1/2
1718	0	6 x 2	2	1/2	6	8-1/4	8-5/16	1/2	5-1/2	3	1-1/2	1-1/8
1720	6	6 x 3	2	1-1/2	7-13/16	9-1/2	9-3/4	1-1/4	6-9/16	3-1/2	1-1/2	1-1/8
1722	2	6 x 4	2	1-1/2	9-3/4	11	11-3/16	1-15/16	7-13/16	4	1-1/2	1-1/8
1724	8	6 x 5	2	2	11-11/16	13	12-1/2	2-9/16	9-1/8	4-1/2	1-1/2	1-1/2
1726	3	6	2	2	13-5/8	14-3/8	14-1/16	3-5/16	10-5/16	5	1-1/2	1-1/2
1728	9	8 x 4	2-1/2	1-1/2	9-7/16	11-5/16	11-3/16	7/8	8-9/16	4	2	1-1/8
1730	5	8 x 5	2-1/2	2	10-15/16	12-13/16	12-11/16	1-5/8	9-5/16	4-1/2	2	1-1/2
1732	1	8 x 6	2-1/2	2	12	13-3/8	13-15/16	2-1/4	9-3/4	5	2	1-1/2
1734	7	8	2-1/2	2-1/2	14-3/4	15-9/16	16-15/16	3-3/4	11	6	2	2

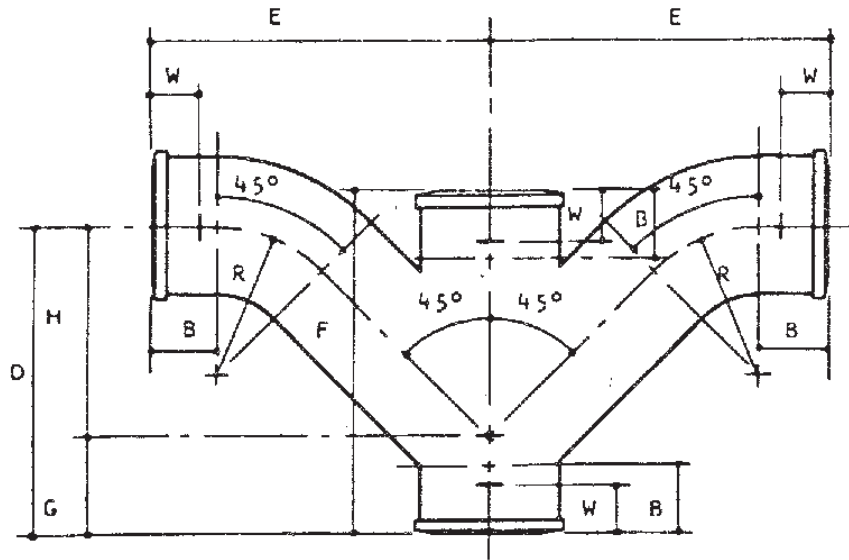
EXTENDED PATTERN

ASA CODE Group 022		Dimensions in Inches ¹										
Item #	√	Size (Inches)	B	B ^B	D	E ² (± 1/8)	F ² (± 1/8)	G	H	R	W	W ^W
1738	1	2	1-1/2	1-1/2	16-3/4	6-1/8	18	13-3/8	3-3/8	3	1-1/8	1-1/8
1740	3	2	1-1/2	1-1/2	22-3/4	6-1/8	24	19-3/8	3-3/8	3	1-1/8	1-1/8
1742	5	2	1-1/2	1-1/2	34-3/4	6-1/8	36	26-3/4	3-3/8	3	1-1/8	1-1/8
1744	7	3 x 2	1-1/2	1-1/2	34	6-3/4	36	30	4	3	1-1/8	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions E and F are laying lengths.

TABLE 50.
COMBINATION WYE AND 1/8 BEND, DOUBLE

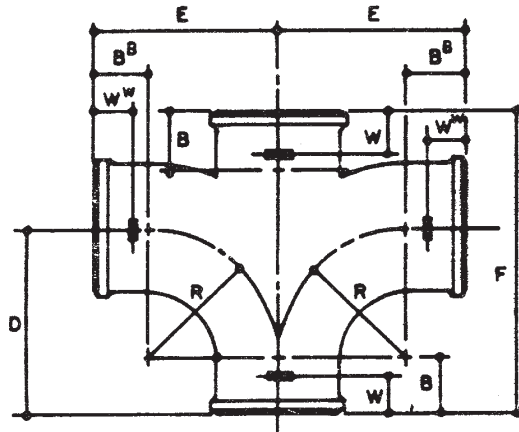


ASA CODE Group 022		Dimensions in Inches ¹								
Item #	√	Size (Inches)	B	D	E ² (± 1/8)	F ² (± 1/8)	G	H	R	W
1802	2	2	1-1/2	5-3/8	6-1/8	6-5/8	2	3-3/8	3	1-1/8
1804	8	3 x 2	1-1/2	5-1/2	6-3/4	6-5/8	1-1/2	4	3	1-1/8
1806	3	3	1-1/2	7-5/16	8	8	2-1/4	5-1/16	3-1/2	1-1/8
1808	9	4 x 2	1-1/2	5-1/2	7-1/4	6-5/8	1-5/8	4-1/2	3	1-1/8
1810	5	4 x 3	1-1/2	7-1/4	8-1/2	8	1-11/16	5-9/16	3-1/2	1-1/8
1812	1	4	1-1/2	9-1/4	10	9-1/2	2-7/16	6-13/16	4	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions E and F are laying lengths.

TABLE 51.
SANITARY CROSS



ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹							
Item #	✓		B	E ² (± 1/8)	F ² (± 1/8)	D	R	W	W ^W	B ^B
1850	1	1-1/2	1-1/2	4-1/4	6-1/2	4-1/4	2-3/4	1-1/8	1-1/8	1-1/2
1852	7	2	1-1/2	4-1/2	6-7/8	4-1/2	3	1-1/8	1-1/8	1-1/2
1854	3	3 x 2	1-1/2	5	6-7/8	4-1/2	3	1-1/8	1-1/8	1-1/2
1856	8	3	1-1/2	5	8	5	3-1/2	1-1/8	1-1/8	1-1/2
1858	4	4 x 2	1-1/2	5-1/2	6-7/8	4-1/2	3	1-1/8	1-1/8	1-1/2
1860	0	4 x 3	1-1/2	5-1/2	8	5	3-1/2	1-1/8	1-1/8	1-1/2
1862	6	4	1-1/2	5-1/2	9-1/8	5-1/2	4	1-1/8	1-1/8	1-1/2
1868	3	6 x 2	2	6-1/2	8-3/16	5	3	1-1/2	1-1/8	1-1/2
1864	2	6 x 4	2	6-1/2	10-1/16	6	4	1-1/2	1-1/8	1-1/2
1867	5	6	2	7	12-1/2	7	5	1-1/2	1-1/2	2
1874	1	8 x 4	2-1/2	7-1/2	11-1/2	6-1/2	4	2	1-1/8	1-1/2
1878	2	8	2-1/2	8-1/2	15-1/2	8-1/2	6	2	2	2-1/2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions E and F are laying lengths.

TABLE 52.
SANITARY CROSS, WITH SIDE OPENING ⁴

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ^{1, 3}		
Item #	✓		B	E ^{E 2} (± 1/8)	D ^D
1898	0	3 x 3 x 2	1-1/2	4-7/16	5
1900	4	4 x 4 x 2	1-1/2	4-15/16	5-1/2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension E ^E is laying length.

³ For details of Sanitary Cross see Table 51.

⁴ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting method used.

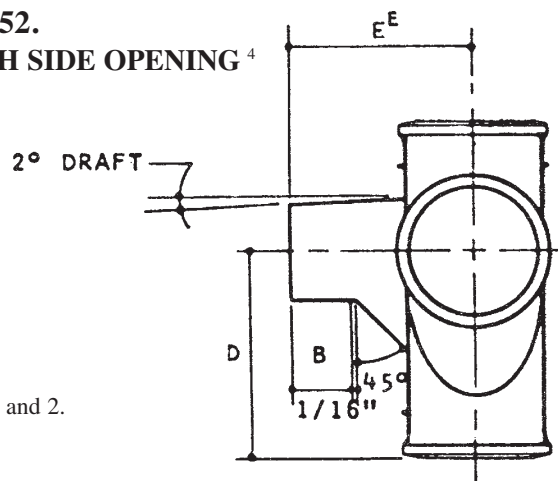
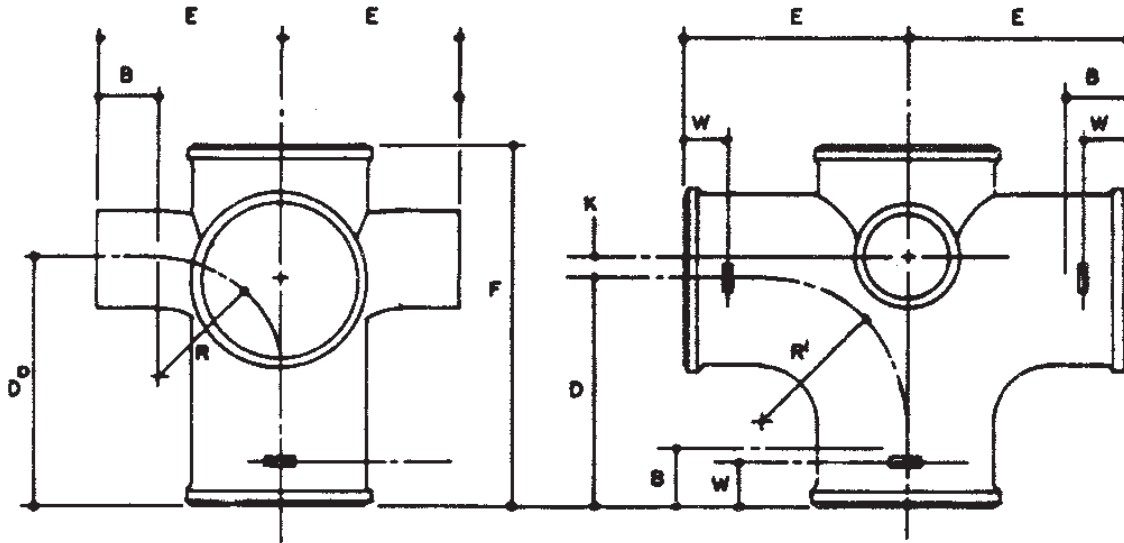


TABLE 55.
SANITARY CROSS WITH SIDE-OPENINGS³
ABOVE CENTER (NEW ORLEANS)



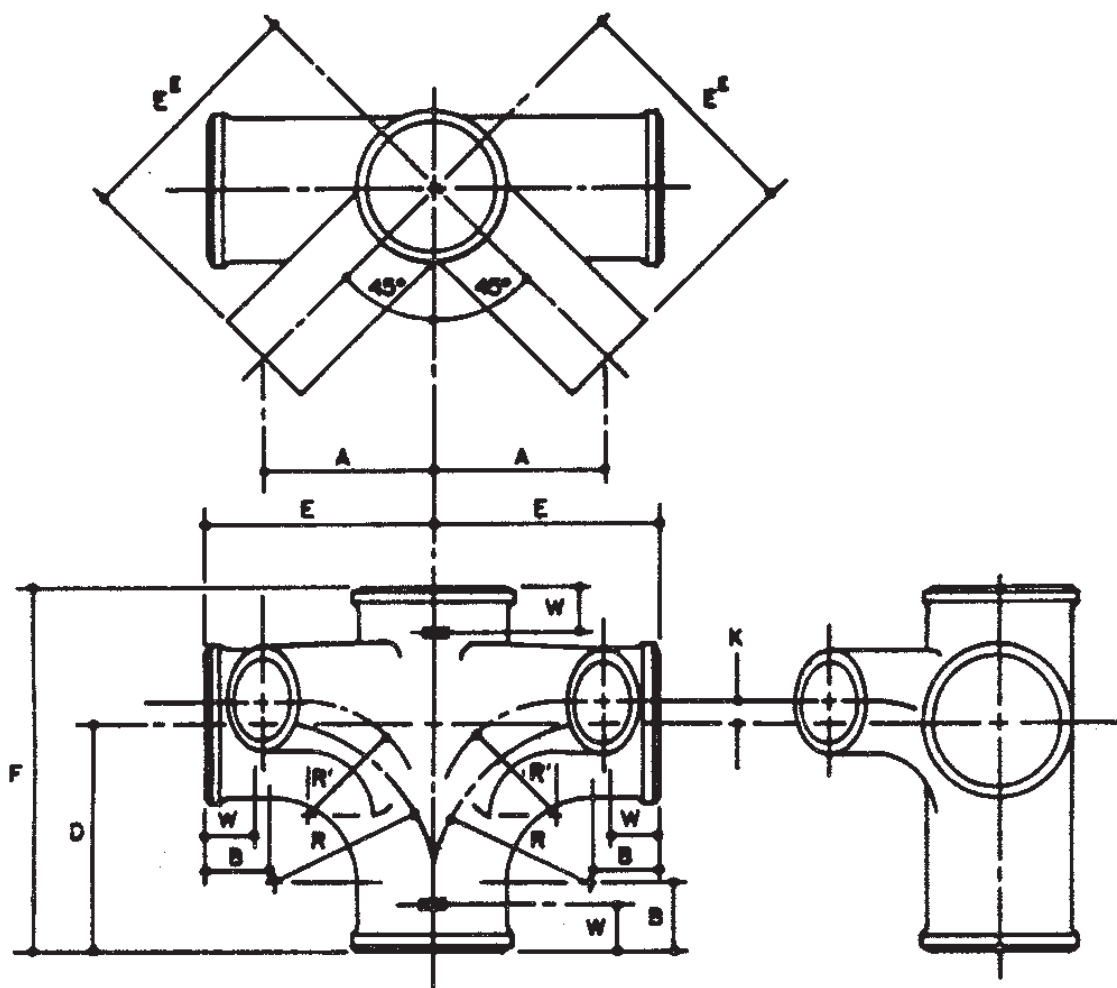
ASA CODE Group 022		Dimensions in Inches ¹										
Item #	✓	Size (Inches)	B	E ^{E 2} (± 1/8)	E ² (± 1/8)	F ² (± 1/8)	D	D ^D	K	R	R ¹	W
1982	2	3 x 3 x 2	1-1/2	4-1/2	5	8-1/2	5	6	1	3	3-1/2	1-1/8
1984	8	4 x 4 x 2	1-1/2	5	5-1/2	9-1/8	5-1/2	6-1/2	1	3	4	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions E, F and E^E are laying lengths.

³ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting methods used.

TABLE 56.
SANITARY CROSS WITH TWO – 45° SIDE-OPENINGS ⁴
ON SAME SIDE ³ (NEW ORLEANS SPECIAL)



ASA CODE Group 022		Dimensions in Inches ¹												
Item #	√	Size (Inches)	A	B	E ^{E 2} (± 1/8)	E ² (± 1/8)	F ² (± 1/8)	F ² N.O.	D	K	KN.O.	R	R	W
1994	7	3 x 3 x 2	3-3/4	1-1/2	5-3/8	5	8	8-1/2	5	1	1	3-1/2	3	1-1/8
2000	2	4 x 4 x 2	4-5/16	1-1/2	6-1/8	5-1/2	9-1/8	9-1/8	5-1/2	1/2	1	4	3	1-1/8

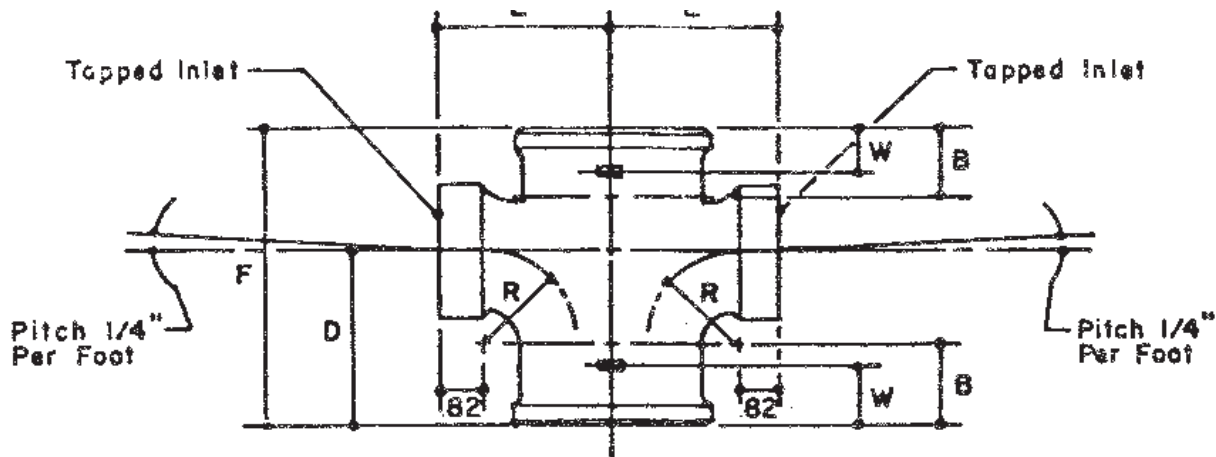
¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimensions E, F and E ^E are laying lengths.

³ For details of Sanitary Cross see Table 51.

⁴ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting methods used.

TABLE 57.
SANITARY CROSS, TAPPED (AND EXTENDED)



ASA CODE Group 022		Dimensions in Inches ¹							
Item #	√	Size (Inches)	B	E	F ² (± 1/8)	D	R	IPS TAPPING ³	W
2012	7	1-1/2 x 1-1/2	1-1/2	2-9/16	5-11/16	3-1/4	1-3/4	1-1/2	1-1/8
2014	3	2 x 1-1/4	1-1/2	2-13/16	5-11/16	3-1/4	1-3/4	1-1/4	1-1/8
2016	8	2 x 1-1/2	1-1/2	2-13/16	5-11/16	3-1/4	1-3/4	1-1/2	1-1/8
2018	4	2 x 2	1-1/2	3-1/16	6-3/8	3-3/4	2-1/4	2	1-1/8
2020	0	3 x 1-1/4	1-1/2	3-5/16	5-11/16	3-1/4	1-3/4	1-1/4	1-1/8
2022	6	3 x 1-1/2	1-1/2	3-5/16	5-11/16	3-1/4	1-3/4	1-1/2	1-1/8
2024	2	3 x 2	1-1/2	3-9/16	6-3/8	3-3/4	2-1/4	2	1-1/8
2026	7	4 x 1-1/4	1-1/2	3-13/16	5-11/16	3-1/4	1-3/4	1-1/4	1-1/8
2028	3	4 x 1-1/2	1-1/2	3-13/16	5-11/16	3-1/4	1-3/4	1-1/2	1-1/8
2030	9	4 x 2	1-1/2	4-1/16	6-3/8	3-3/4	2-1/4	2	1-1/8
2032	7	5 x 1-1/2	2	4-5/8	6-5/8	3-3/4	1-3/4	1-1/2	1-1/2
2034	1	6 x 1-1/2	2	4-13/16	6-11/16	3-3/4	1-3/4	1-1/2	1-1/2
2036	6	6 x 2	2	5-1/16	7-7/16	4-1/4	2-1/4	2	1-1/2

EXTENDED PATTERN

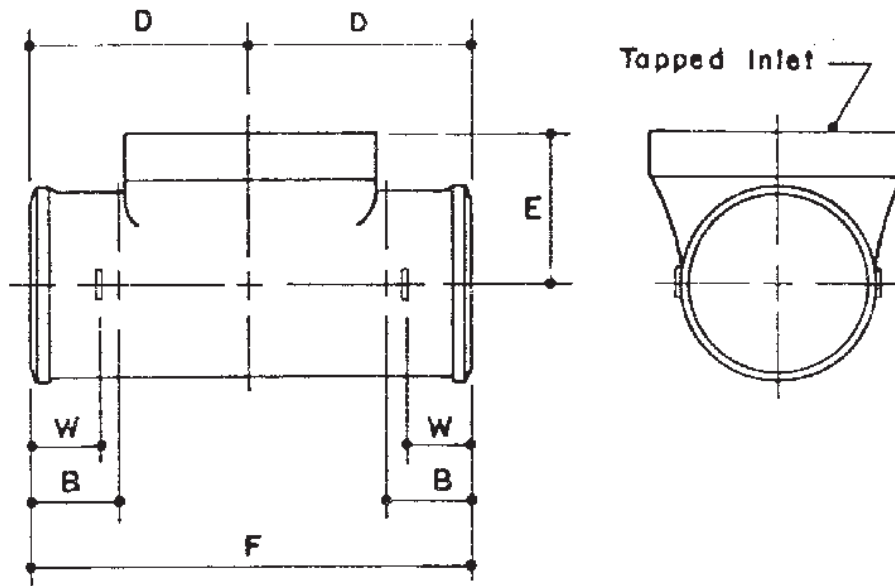
ASA CODE Group 022		Dimensions in Inches ¹							
Item #	√	Size (Inches)	B	E	F ² (± 1/8)	D	R	IPS TAPPING ³	W
2038	9	2 x 1-1/2 x 22-7/8	1-1/2	2-13/16	22-7/8		1-3/4	1-1/2	1-1/8
2040	3	2 x 1-1/2 x 31	1-1/2	2-13/16	31		1-3/4	1-1/2	1-1/8
2042	5	2 x 2 x 31	1-1/2	3-1/16	31		2-1/4	2	1-1/8
◆ 2041	4	2 x 2 x 22-7/8	1-1/2	3-1/16	22-7/8		2-1/4	2	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

³ For details of tapping bosses see Table 91.

TABLE 58.
TEST TEE

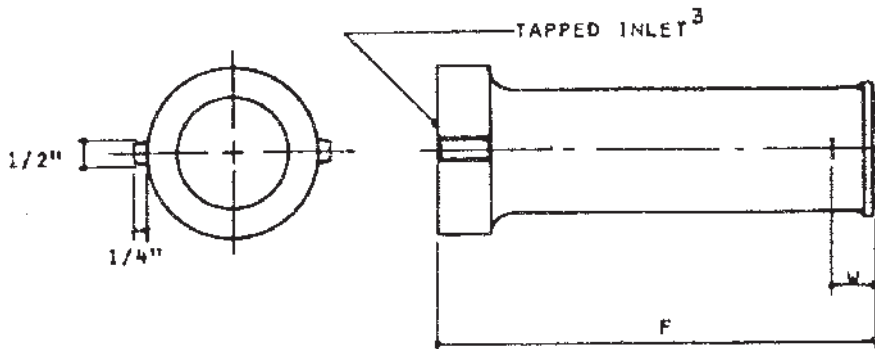


ASA CODE Group 022		Dimensions in Inches ¹						
Item #	√	Size (Inches)	B	E	F ² (± 1/8)	D	IPS TAPPING ³	W
2046	5	2	1-1/2	2	6-3/8	3-3/16	2	1-1/8
2048	1	3	1-1/2	2-11/16	7-3/4	3-7/8	3	1-1/8
8278	8	4	1-1/2	3	8-7/8	4-7/16	3-1/2	1-1/8
2050	7	4	1-1/2	3	8-7/8	4-7/16	4	1-1/8
2052	3	5	2	4-1/2	11-1/2	5-3/4	5	1-1/2
2054	9	6	2	5	12-1/2	6-1/4	6	1-1/2
2056	4	8	2	6	15-1/4	7-5/8	8	2
2058	0	10	4	6-1/2	20	10	10	2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

TABLE 62.
TAPPED EXTENSION PIECE



ASA CODE Group 022		Dimensions in Inches ¹			
Item #	√	Size (Inches)	F ²	IPS TAPPING ³	W
			(± 1/8)		
2100	0	3	12	3	1-1/8

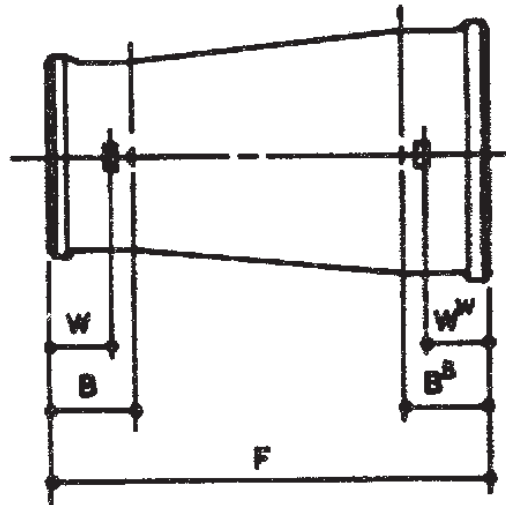
¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

³ For details of tapping bosses see Table 91.

⁴ Recessed markings are permitted depending on manufacturing used

TABLE 63.
INCREASER-REDUCER

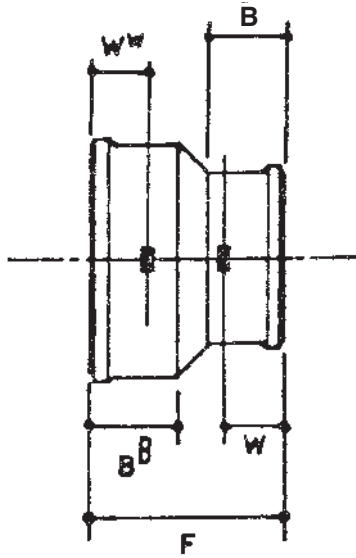


ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹				
Item #	√		B	B ^B	F ²	W	W ^W
					(± 1/8)		
2124	0	2 x 3	1-1/2	1-1/2	8	1-1/8	1-1/8
2126	5	2 x 4	1-1/2	1-1/2	8	1-1/8	1-1/8
2127		3 x 1-1/2				1-1/8	1-1/8
2128	1	3 x 4	1-1/2	1-1/2	8	1-1/8	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

TABLE 64
SHORT, INCREASER, REDUCER



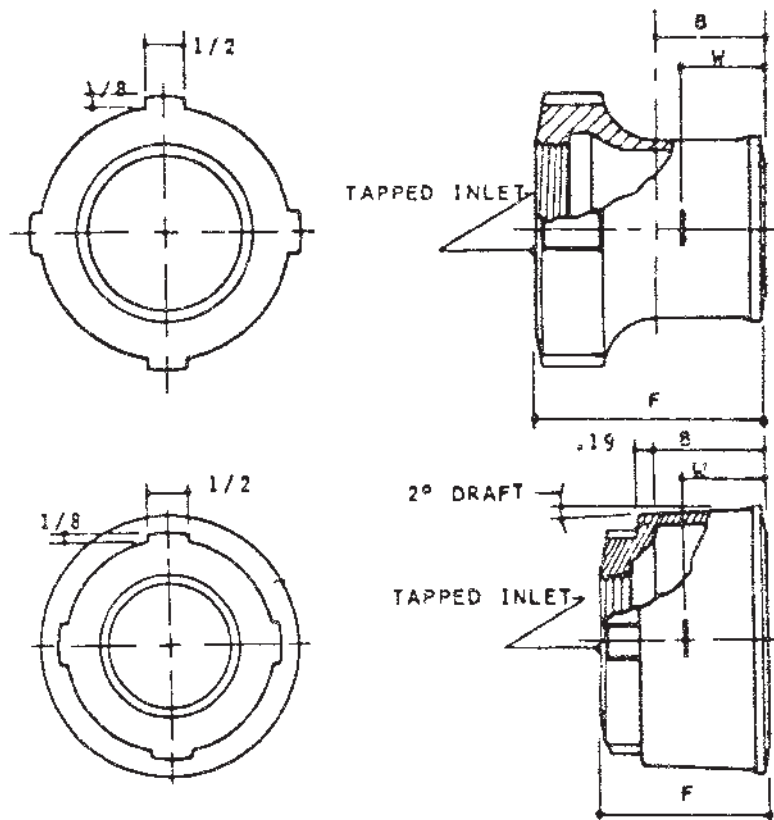
ASA CODE Group 022		Dimensions in Inches ¹					
Item #	√	Size (Inches)	B (Min.)	B ^B (Min.)	F ² (± 1/8)	W	W ^W
2138	0	2 x 1-1/2	1-1/2	1-1/2	3-5/8	1-1/8	1-1/8
2140	6	3 x 2	1-1/2	1-1/2	3-5/8	1-1/8	1-1/8
2142	2	4 x 2	1-1/2	1-1/2	3-5/8	1-1/8	1-1/8
2144	8	4 x 3	1-1/2	1-1/2	3-5/8	1-1/8	1-1/8
2146	3	5 x 2	1-1/2	2	4	1-1/8	1-1/2
2148	9	5 x 3	1-1/2	2	4	1-1/8	1-1/2
2150	5	5 x 4	1-1/2	2	4	1-1/8	1-1/2
2152	1	6 x 2	1-1/2	2	4	1-1/8	1-1/2
2154	7	6 x 3	1-1/2	2	4	1-1/8	1-1/2
2156	2	6 x 4	1-1/2	2	4	1-1/8	1-1/2
2158	8	6 x 5	2	2	4-1/2	1-1/2	1-1/2
2160	4	8 x 2	1-1/2	2	4-1/2	1-1/8	2
2162	0	8 x 3	1-1/2	2	4-1/2	1-1/8	2
2164	6	8 x 4	1-1/2	2	4-1/2	1-1/8	2
2166	1	8 x 5	2	2	5	1-1/2	2
2168	7	8 x 6	2	2	5	1-1/2	2
2172	9	10 x 4	1-1/2	3	5-1/2	1-1/8	2
2174	5	10 x 6	2	3	6	1-1/2	2
2175	2	10 x 8	2	3	6	2	2
2176	0	12 x 4	1-1/2	3-1/4	6-1/2	1-1/8	2-3/4
2177	3	12 x 6	2	3-1/4	6-1/2	1-1/2	2-3/4
2178	9	12 x 8	2-1/2	3-1/4	7	2	2-3/4
2179	6	12 x 10	3	3-1/4	7-1/2	2	2-3/4
2180	8	15 x 4	2-1/2	3-1/4	7	1-1/8	2-3/4
2181	4	15 x 6	2	3-1/4	7	1-1/2	2-3/4
2182	7	15 x 8	2-1/2	3-1/4	7	2	2-3/4
2183	1	15 x 10	3	3-1/4	7-1/2	2	2-3/4
2184	2	15 x 12	3-1/4	3-1/4	7-3/4	2-3/4	2-3/4

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

³ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting method used.

TABLE 65
TAPPED ADAPTERS



ASA CODE Group 022		Dimensions in Inches ¹				
Item #	√	Size (Inches)	B	F	IPS TAPPING ²	W ³
2236	2	1-1/2 x 1-1/4	1-1/2	2-5/8	1-1/4	1-1/8
2238	8	1-1/2 x 1-1/2	1-1/2	2-5/8	1-1/2	1-1/8
2240	4	2 x 1-1/4	1-1/2	2-3/16	1-1/4	1-1/8
2242	0	2 x 1-1/2	1-1/2	2-3/16	1-1/2	1-1/8
2244	6	2 x 2	1-1/2	2-5/8	2	1-1/8
2246	1	3 x 1-1/4	1-1/2	2-3/16	1-1/4	1-1/8
2248	7	3 x 1-1/2	1-1/2	2-3/16	1-1/2	1-1/8
2250	3	3 x 2	1-1/2	2-3/16	2	1-1/8
2252	9	3 x 2-1/2	1-1/2	2-3/16	2-1/2	1-1/8
2254	5	4 x 3-1/2	1-1/2	2-3/16	3-1/2	1-1/8
2259	4	5 x 4	2	4-1/2	4	1-1/2
2262	8	6 x 5	2	4-1/2	5	1-1/2
2274	3	8 x 6	2	4-1/2	6	2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

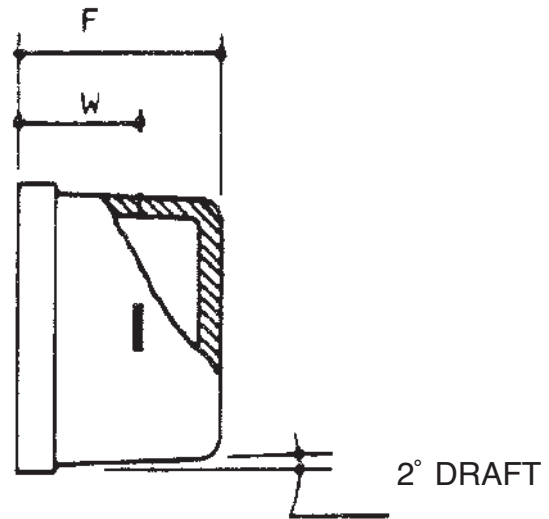
² For details of tapping bosses see Table 91.

³ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting method used.

◆ ⁴ Markings shall be permitted to be recessed depending on casting method used

TABLE 66.
BLIND PLUG

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹	
Item #	✓		F ² (± 1/8)	W ³
2480	6	1-1/2	1-3/4	1-1/8
2482	2	2	1-3/4	1-1/8
2484	8	3	1-3/4	1-1/8
2486	3	4	1-3/4	1-1/8
2488	9	5	1-3/4	1-1/2
2490	5	6	1-3/4	1-1/2
2492	1	8	2-1/4	2
2494	7	10	3	2
2495	7	12	3-1/2	2-3/4
2496	7	15	3-1/2	2-3/4

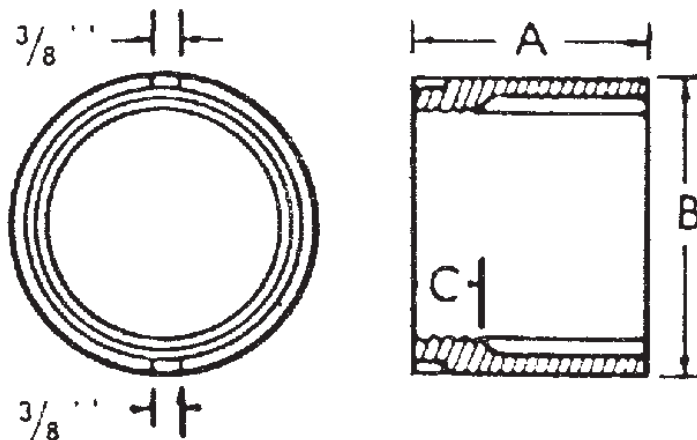


¹ For details of barrel and spigot see Tables 1 and 2.

² Dimension F is laying length.

³ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting method used.

TABLE 67
IRON BODY CLEANOUT-TAPPED



ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹			
Item #	✓		A	B	C	IPS TAPPING ²
8562	3	2	2-3/16	2-3/8	3/4	1-1/2
8564	1	3	2-3/16	3-3/8	3/4	2-1/2
8566	6	4	2-3/16	4-7/16	3/4	3-1/2
8568	2	5	4-1/2	5-5/16	1	4
8570	8	6	4-1/2	6-5/16	1	5
8572	4	8	4-5/8	8-3/8	1	6

¹ For details of barrel and spigot see Tables 1 and 2.

² Inclusion of spigot bead and positioning lug optional with manufacturer based on casting method used.

◆ ³ Markings shall be permitted to be recessed depending on casting method used

TABLE 68.
P TRAP

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹							
Item #	√		A	B	C	D ² (± 1/8)	J	K	R	W
2506	8	1-1/2	2	1-1/2	3-1/2	6-3/4	3-1/2	—	1-3/4	1-1/8
2508	4	2	2	1-1/2	4	7-1/2	4	—	2	1-1/8
2510	0	3	3-1/4	1-1/2	5	9	5-1/2	1/2	2-1/2	1-1/8
2512	6	4	4	1-1/2	6	10-1/2	6-1/2	1/2	3	1-1/8
2514	2	6	6	2	8	14	7-1/2	1/2	4	1-1/2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

NOTE: A minimum water seal of 2 inches is provided for 2 inch size and smaller; 2-1/2 inches for sizes 3 to 6 inches inclusive.

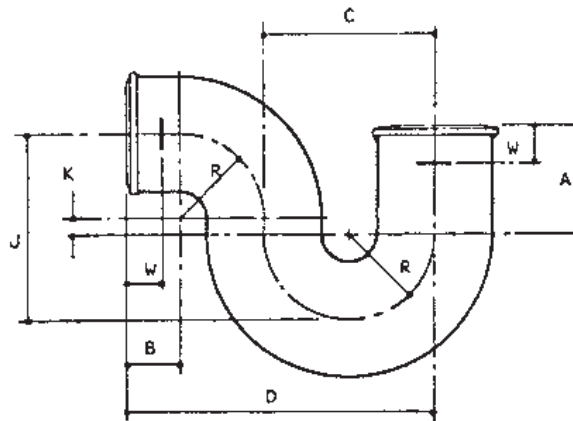
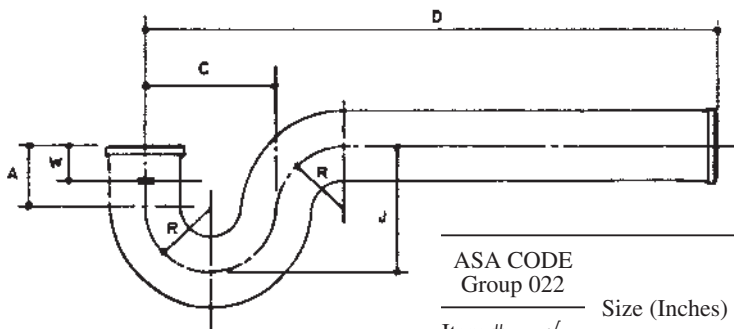


TABLE 69.
LONG P TRAP



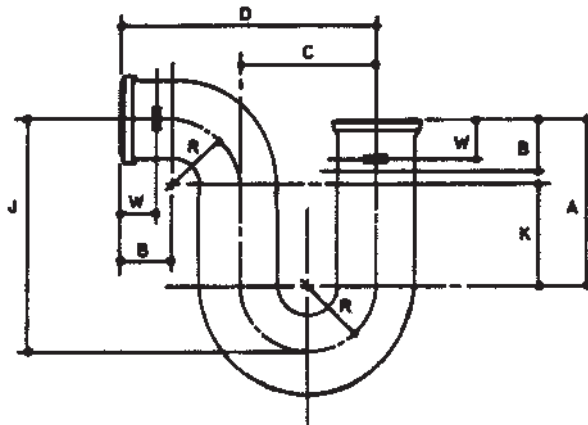
ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹						
Item #	√		A	C	D ² (± 1/8)	J	R	W	
2527	4	2 x 12	2	4	12	4	2	1-1/8	
2528	2	2 x 14	2	4	14	4	2	1-1/8	
2529	0	2 x 16	2	4	16	4	2	1-1/8	
2530	8	2 x 18	2	4	18	4	2	1-1/8	

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

NOTE: A minimum water seal of 2 inches is provided for 2 inch size and smaller.

**TABLE 71.
DEEP SEAL P TRAP**



ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹								
Item #	✓		A	B	C	D ² (± 1/8)	K	J	R	W	Seal
2564	7	2	5	1-1/2	4	7-1/2	3	7	2	1-1/8	5
2566	2	3	4-1/2	1-1/2	5	9	2	7	2-1/2	1-1/8	4
2567	0	4	5	1-1/2	6	10-1/2	2	8	3	1-1/8	4

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

**TABLE 73.
P TRAP WITH PRIMER**

ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹									
Item #	✓		A	B	C	D ² (± 1/8)	J	K	R	W	M	IPS TAPPING ³
8530	2	2	2	1-1/2	4	7-1/2	4	0	2	1-1/8	2	1/2
8532	8	3	3-1/4	1-1/2	5	9	5-1/2	1/2	2-1/2	1-1/8	2	1/2
8534	4	4	4	1-1/2	6	10-1/2	6-1/2	1/2	3	1-1/8	2	1/2

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

³ For details of tapping bosses see Table 91.
Minimum thickness of threaded sections of primer tap is .21 in.

NOTE: A minimum water seal of 2 inches is provided for 2 inch size and smaller; 2-1/2 inches for sizes 3 to 4 inches inclusive.

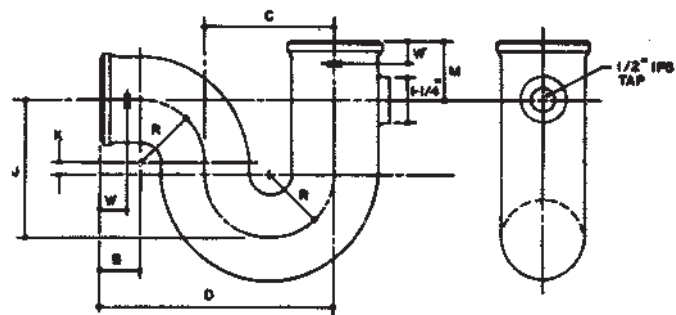
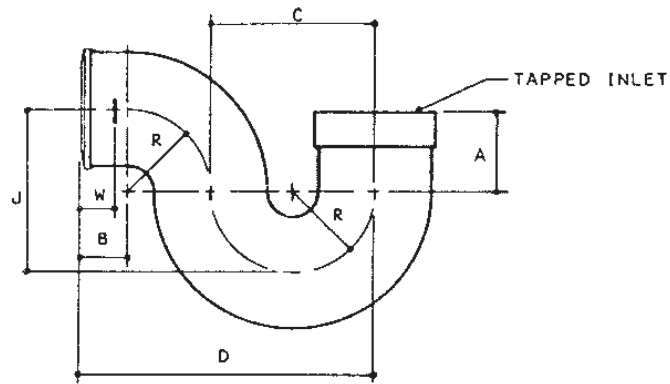


TABLE 74.
P TRAP WITH TAPPED INLET



ASA CODE Group 022		Dimensions in Inches ¹								
Item #	√	Size (Inches)	A	B	C	D ² (± 1/8)	J	R	IPS TAPPING ³	W
2582	9	1 1/2 x 1-1/2	2	1-1/2	3-1/2	6-3/4	3-1/2	1-3/4	1-1/2	1-1/8
2586	0	2 x 1-1/2	2	1-1/2	4	7-1/2	4	2	1-1/2	1-1/8
2588	6	2 x 2	2	1-1/2	4	7-1/2	4	2	2	1-1/8

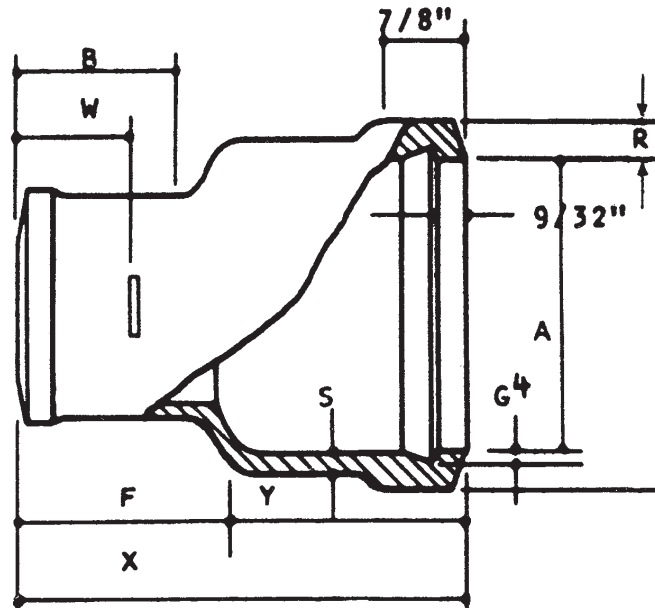
¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

³ For details of tapping bosses see Table 91.

NOTE: A minimum water seal of 2 inches is provided for 2 inch size and smaller.

**TABLE 75.
HUB ADAPTER**



ASA CODE Group 022		Dimensions in Inches ¹						
Item #	√	Size (Inches)	A			B	X (± 1/8)	R
			SV	XH	Tolerance			
2222	2	2	2.94	3.06	± .06	1-1/2	4-1/2	.34
2224	8	3	3.94	4.19	-.06 +.09	1-1/2	4-3/4	.37
2226	3	4	4.94	5.19	-.06 +.09	1-1/2	5-1/4	.37

Dimensions in Inches ¹				
Size (Inches)				
	S	W ⁵	F ² (± 1/8)	Y ³ (± 1/16)
2	.13	1-1/8	2	2-1/2
3	.16	1-1/8	2	2-3/4
4	.16	1-1/8	2-1/4	3

¹ For details of barrel and spigot see Tables 1 and 2.

² Dimension F is laying length.

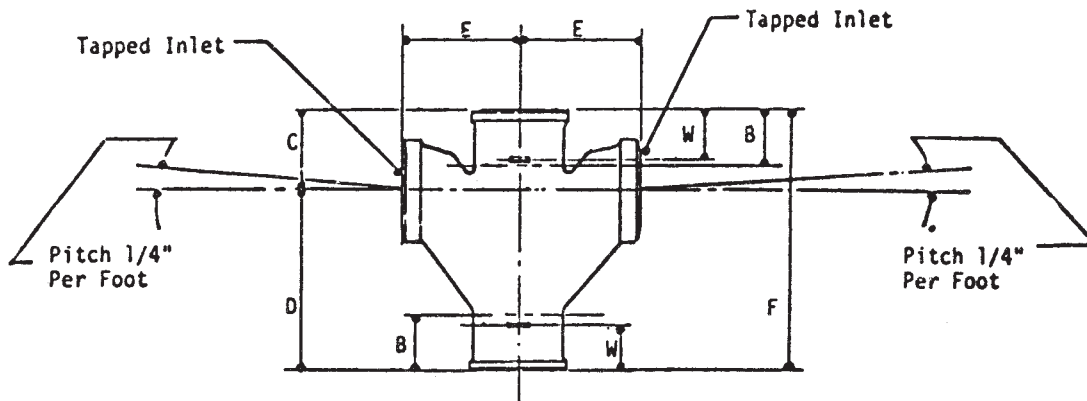
³ Dimension Y is telescoping length.

⁴ G Maximum .13, Minimum .10.

⁵ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting method used.

TABLE 76.

FIGURE 1A



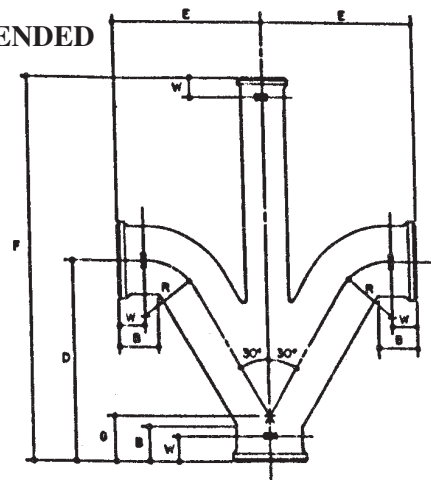
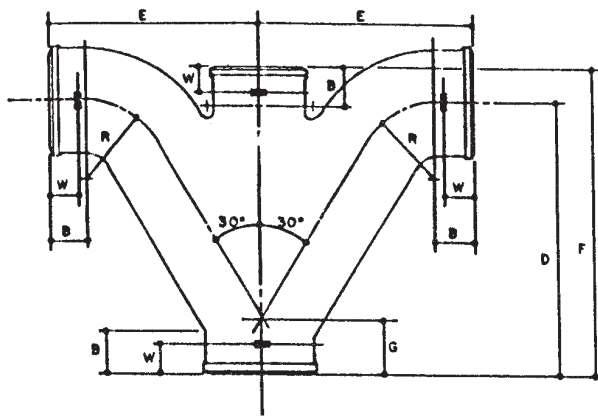
ASA CODE Group 022		Size (Inches)	Dimensions in Inches ¹						
Item #	✓		B	C	D	F ² (± 1/8)	E	IPS TAPPING ³	W
8002	2	2 x 2 x 1-1/2 x 1-1/2	1-1/2	2-1/8	4-7/8	7	3-3/16	1-1/2	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension F is laying length.

³ For details of tapping bosses see Table 91.

TABLE 80.
FIGURES 5 & FIGURES 5 EXTENDED

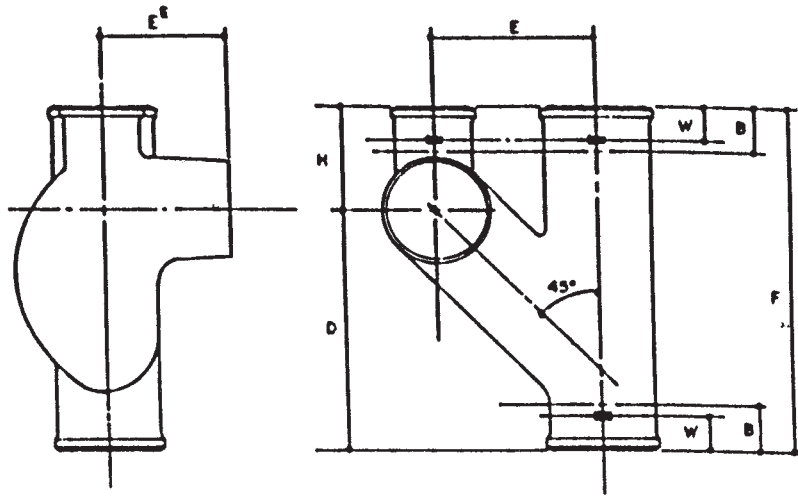


ASA CODE Group 022		Dimensions in Inches ¹							
Item #	✓	Size (Inches)	B	D	E ² (± 1/8)	F ² (± 1/8)	G	R	W
8052	7	2	1-1/2	6-1/2	5	8	1-13/16	1-3/8	1-1/8
8054	3	3 x 2 x 3	1-1/2	8-7/8	6-9/16	9-1/4	2	2-1/2	1-1/8
8058	4	4 x 2 x 4	1-1/2	10-1/4	7-3/4	11-1/2	1-15/16	3	1-1/8
◆ 8060	0	4 x 3 x 4	1-1/2	10-1/4	7-3/4	11-1/2	2-1/16	3	1-1/8
8062	6	4	1-1/2	10-1/4	7-3/4	12	1-15/16	3	1-1/8
— FIGURE 5 EXTENDED —									
8088	1	3 x 2 x 3	1-1/2	8-7/8	6-9/16	16-7/8	2	2-1/2	1-1/8
◆ 8090	7	4 x 2 x 4	1-1/2	10-1/4	7-5/8	18-3/4	1-15/16	3	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension E and F is laying length.

TABLE 82.
FIGURE 6 REGULAR OR EXTENDED LEFT OR RIGHT
REGULAR OR EXTENDED DOUBLE⁵



ASA CODE Group 022			Dimensions in Inches ¹							
Item #	√	Size (Inches)	E	B	H	H Extended	D	E ^E	F ² (± 1/8)	W
8100	4	3 x 2 RH	5-1/16	1-1/2	3-7/16		7-9/16	4-1/8	11	1-1/8
8102	0	3 x 2 LH	5-1/16	1-1/2	3-7/16		7-9/16	4-1/8	11	1-1/8
◆ 8108	7	3 x 2 PBL	5-1/16	1-1/2	3-7/16		7-9/16	4-1/8	11	1-1/8
8106	1	4 x 2 RH	6-1/2	1-1/2	4		9	4-1/2	13	1-1/8
8104	6	4 x 2 LH	6-1/2	1-1/2	4		9	4-1/2	13	1-1/8
◆ 8105		4 x 2 DBL	6-1/2	1-1/2	4		9		13	1-1/8
— EXTENDED —										
8122	8	3 x 2 RH	5-1/16	1-1/2		9-7/16	7-9/16	4-1/8	17	1-1/8
8120	2	3 x 2 LH	5-1/16	1-1/2		9-7/16	7-9/16	4-1/8	17	1-1/8
8126	9	4 x 2 RH	6-1/2	1-1/2		8	9	4-1/2	17	1-1/8
8124	4	4 x 2 LH	6-1/2	1-1/2		8	9	4-1/2	17	1-1/8
8130	1	4 x 2 DBL	6-1/2	1-1/2		8	9	4-1/2	17	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

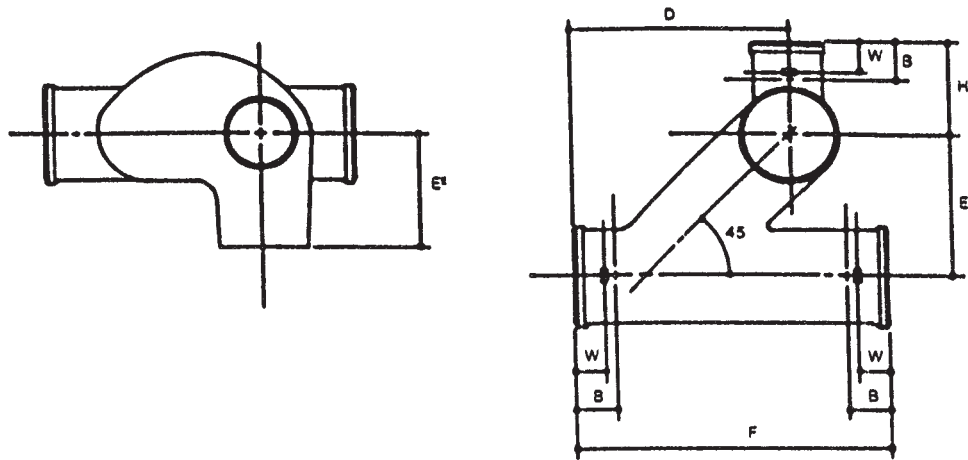
² Dimension E and F Extended are laying length.

³ Positioning lug to be omitted on 2" Extensions.

⁴ On side opening, inclusion of spigot bead and position lug optional with manufacturer based on casting method used.

⁵ Double fittings shall include baffles.

TABLE 83.
FIGURE 8 REGULAR OR EXTENDED LEFT OR RIGHT
REGULAR OR EXTENDED DOUBLE^{4,5}



ASA CODE Group 022		Dimensions in Inches ¹								
Item #	√	Size (Inches)	E	B	H	H Extended	D	E ^E	F ² (± 1/8)	W
8136	8	3 x 2 RH	5-1/16	1-1/2	3-7/16		7-9/16	4-1/8	11	1-1/8
8138	4	3 x 2 LH	5-1/16	1-1/2	3-7/16		7-9/16	4-1/8	11	1-1/8
8144	2	3 x 2 DBL	5-1/16	1-1/2	3-7/16		7-9/16	4-1/8	11	1-1/8
8140	0	4 x 2 RH	6-1/2	1-1/2	4		9	4-1/2	13	1-1/8
8142	6	4 x 2 LH	6-1/2	1-1/2	4		9	4-1/2	13	1-1/8
————— EXTENDED —————										
◆ 8156	6	3 x 2 RH	5-1/16	1-1/2		9-7/16	7-9/16	4-1/8	11	1-1/8
◆ 8158	2	3 x 2 LH	5-1/16	1-1/2		9-7/16	7-9/16	4-1/8	11	1-1/8
8160	8	4 x 2 RH	6-1/2	1-1/2		8	9	4-1/2	13	1-1/8
8162	4	4 x 2 LH	6-1/2	1-1/2		8	9	4-1/2	13	1-1/8
8166	5	4 x 2 DBL	6-1/2	1-1/2		8	9	4-1/2	13	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

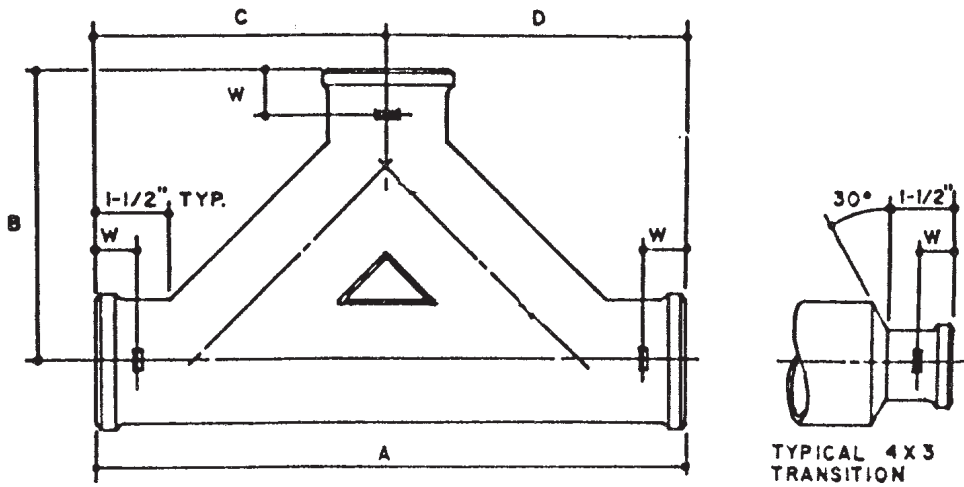
² Dimension E and F Extended are laying length.

³ Positioning lug to be omitted on 2" Extensions.

⁴ On side opening, inclusion of spigot bead and position lug optional with manufacturer based on casting method used.

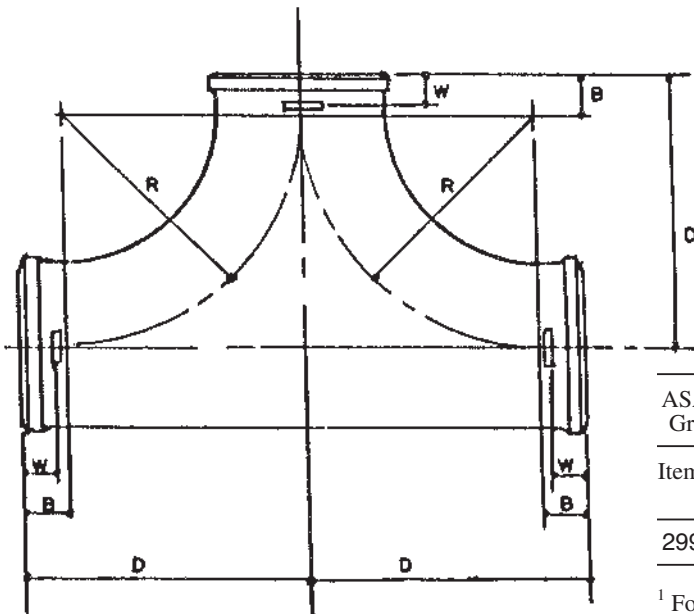
⁵ Double fittings shall include baffles.

TABLE 87.
TWO-WAY CLEANOUT



ASA CODE Group 022			Dimensions in Inches ¹				
Item #	√	Size (Inches)	A	B	C	D	W
8442	0	3 x 3 x 4	15	9	7-1/2	7-1/2	1-1/8
8444	6	4 x 3 x 4	19-1/2	9-1/2	9-3/16	10-1/4	1-1/8
8446	1	4 x 4 x 4	18-3/8	9-1/2	9-3/16	9-3/16	1-1/8

TABLE 88.
TWIN CLEANOUT

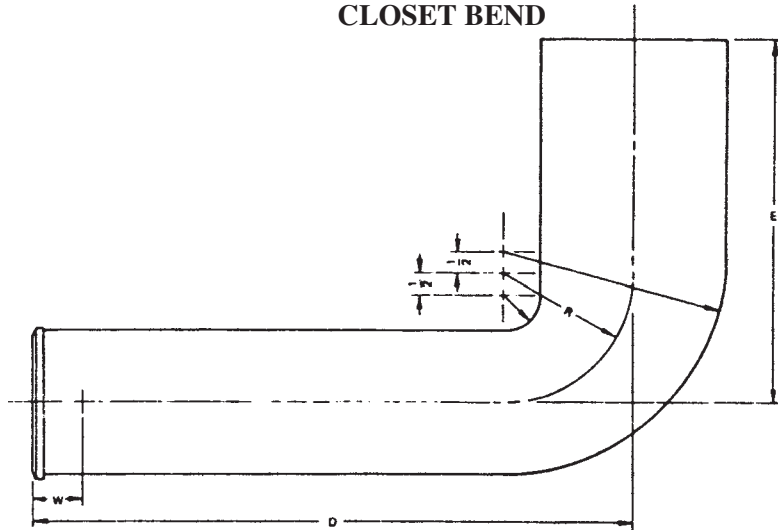


ASA CODE Group 022			Dimensions in Inches ¹			
Item #	√	Size (Inches)	D ² (± 1/8)	R	B	W
2990	2	4	7-1/2	6	1-1/2	1-1/8

¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

² Dimension D is laying length.

**TABLE 89.
CLOSET BEND**



¹ For details of barrel, spigot and gasket positioning lug see Tables 1 and 2.

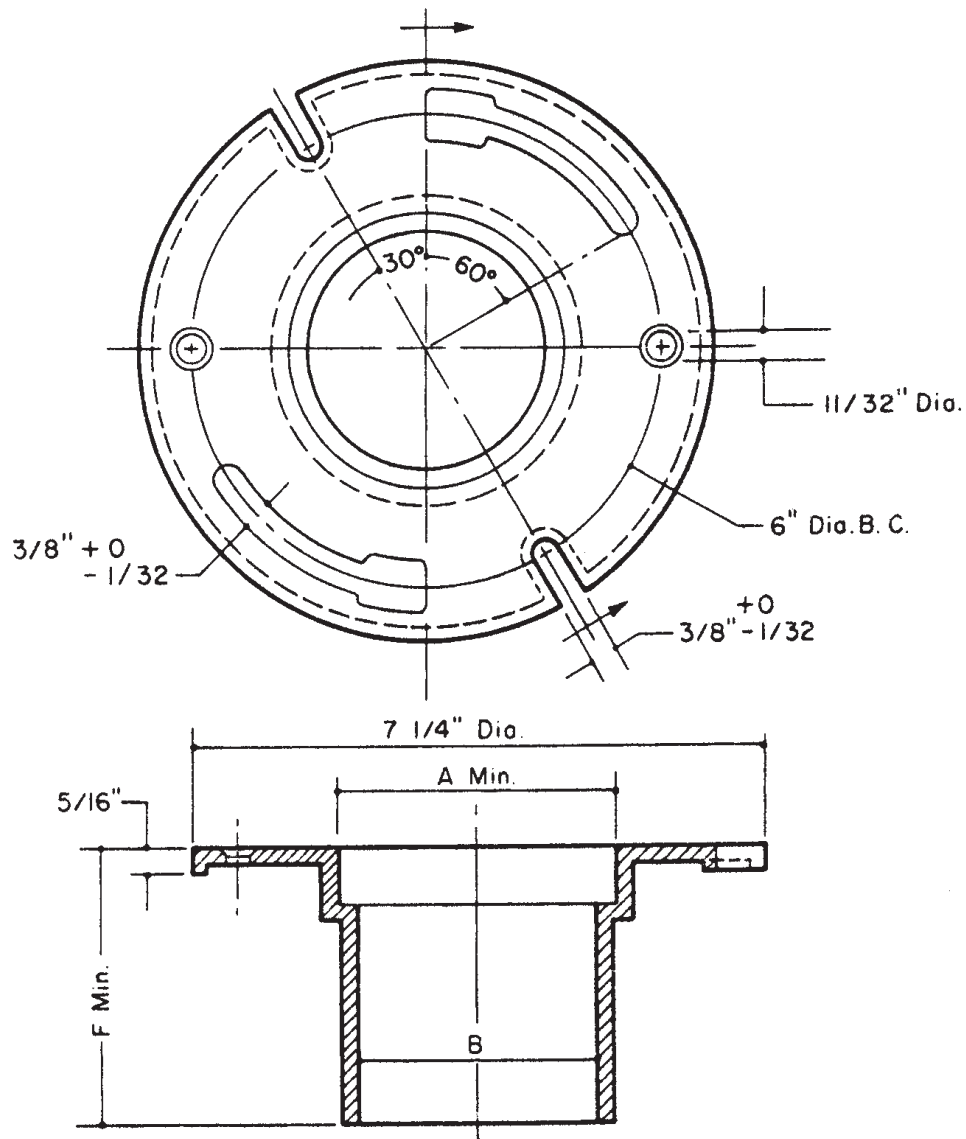
² Dimension D and E are laying lengths.

NOTE 1: Inclusion of spigot bead and positioning lug optional with manufacturer based on casting method used.

NOTE 2: Inclusion of breaking rings on the inlet end optional.

◆ ASA CODE Group 022	Size (Inches)	D	E	R	Description
Item # √					
2840	0 3 x 4	6	15	3	Reducing Closet Bend
2822	9 3 x 4	4	16	3	Reducing Closet Bend
2832	8 3 x 4	6	12	3	Reducing Closet Bend
2842	7 3 x 4	6	16	3	Reducing Closet Bend
2844	5 3 x 4	6	18	3	Reducing Closet Bend
2852	6 3 x 4	10	12	3	Reducing Closet Bend
2854	7 3 x 4	10	15	3	Reducing Closet Bend
2862	5 3 x 4	10	16	3	Reducing Closet Bend
2872	4 3 x 4	12	16	3	Reducing Closet Bend
2874	9 3 x 4	16	16	3	Reducing Closet Bend
2894	8 4 x 4	4	16	3	Closet Bend
2906	3 4 x 4	6	15	3	Closet Bend
2904	5 4 x 4	6	12	3	Closet Bend
2914	4 4 x 4	6	16	3	Closet Bend
2916	2 4 x 4	6	18	3	Closet Bend
2924	3 4 x 4	10	12	3	Closet Bend
2926	7 4 x 4	10	15	3	Closet Bend
2934	2 4 x 4	10	16	3	Closet Bend
2944	1 4 x 4	12	16	3	Closet Bend
2946	1 4 x 4	12	18	3	Closet Bend
2948	1 4 x 4	16	16	3	Closet Bend
Hubbed					
	4 x 3	5-3/4	16	3	Reducing Closet Bend
	4 x 4	5-3/4	12	3	Closet Bend
	4 x 4	5-3/4	14	3	Closet Bend
	4 x 4	5-3/4	16	3	Closet Bend
	4 x 4	5-3/4	18	3	Closet Bend

TABLE 90.
CLOSET FLANGE RISER

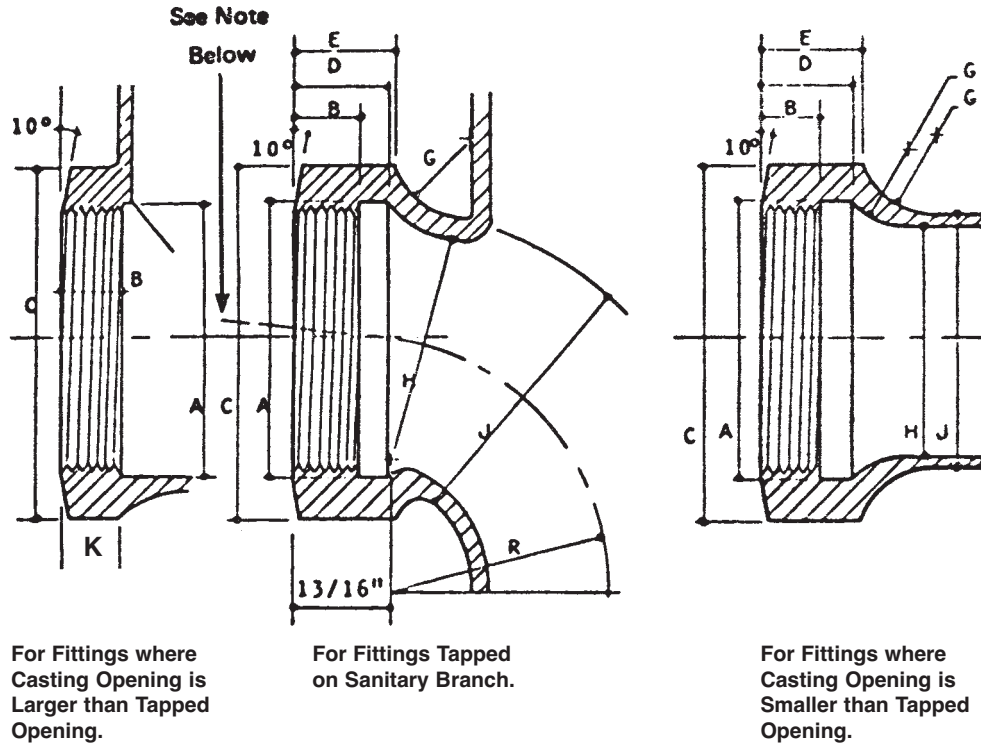


ASA CODE Group 022		Dimensions in Inches ¹			
Item #	√	Size (Inches)	A (Min.)	B	F (Min.)
2966	4	4 x 3 x 3-1/2	4	3	3-1/2
◆		4 x 3 x 8	4	3	8
◆		4 x 3 x 10	4	3	10
2970	6	4 x 4 x 4	4	4	4
◆		4 x 4 x 8	4	4	8

¹ For details of barrel and spigot see Tables 1 and 2.

² Inclusion of spigot bead and positioning lug optional with manufacturer based on casting method used.

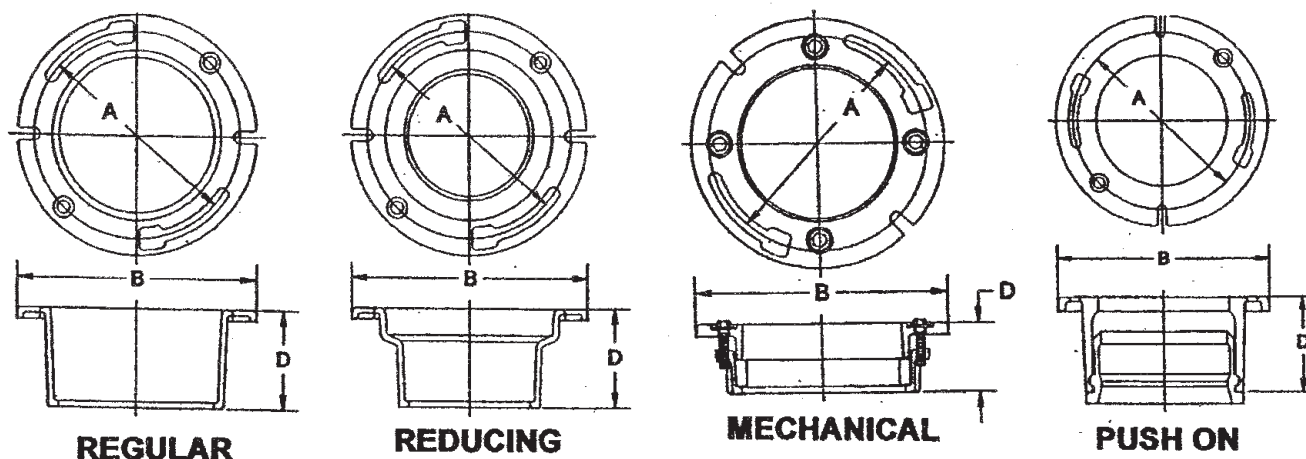
TABLE 91.
DIMENSIONS FOR TAPPING BOSSES



Dimensions in Inches										
Size (Inches)	A	B	C	D	E	G	H	J	K	R
1-1/4	1-15/16	7/16	2-11/16	3/4	7/8	1/2	1-1/2	1-13/16	1/2	1-3/4
1-1/2	1-15/16	7/16	2-11/16	3/4	7/8	1/2	1-1/2	1-13/16	1/2	1-3/4
2	2-7/16	7/16	3-1/4	3/4	15/16	5/8	2	2-5/16	1/2	2-1/4
2-1/2	3	5/8	3-15/16	1	1-1/8	3/4	2-1/2	2-13/16	5/8	2-3/4
3	3-9/16	3/4	4-5/8	1-13/16	1-5/16	1	3	3-5/16	3/4	2-3/4
3-1/2	4-1/16	3/4	5-1/8	1-1/4	1-3/8	1	2-1/2	3-13/16	3/4	3
4	4-9/16	13/16	5-3/4	1-1/4	1-7/16	1-1/8	4	4-1/2	1-3/16	3-1/2
5	5-5/8	15/16	7-1/16						1-3/8	
6	6-11/16	1	8-5/16						1-7/16	
8	8-7/8	1	10-1/4						1-13/16	
10	11	1-1/4	12						1-15/16	

NOTE: Horizontal inlet waste bosses to be tapped at an angle of 1/4 inch per foot to provide flow.

**TABLE 93.
CLOSET FLANGES**



ASA CODE Group 022		Item	Size (Inches)	Dimensions in Inches ¹		
Item #	√			A	B	D
2971	8	Regular	4	6-1/4	7-1/4	1
2972	0	Regular	4	6-1/4	7-1/4	1-1/2
2973	6	Regular	4	6-1/4	7-1/4	2
2974	4	Regular	4	6-1/4	7-1/4	2-1/2
2975	2	Regular	4	6-1/4	7-1/4	3
2976	4	Regular	4	6-1/4	7-1/4	4
2977	0	Regular	4	6-1/4	7-1/4	5
2978	6	Regular	4	6-1/4	7-1/4	6
2979	8	Reducing	4 x 3	6-1/4	7-1/4	3
2980	4	Mechanical	4 x 2	6-1/4	7-3/8	2
2983	0	Mechanical ¹	4 x 3	6-1/4	7-3/8	2
2984	0	Push On ¹	4 x 3	6-1/4	7-3/8	3-5/16
◆		Mechanical	4 x 4	6-1/4	7-3/8	4
◆		Threaded	4 x 3	6-1/4	7-3/8	3

Note 1: Tolerance $\pm 1/8$

Note 2: Flange thickness shall be the minimum found in table 1.

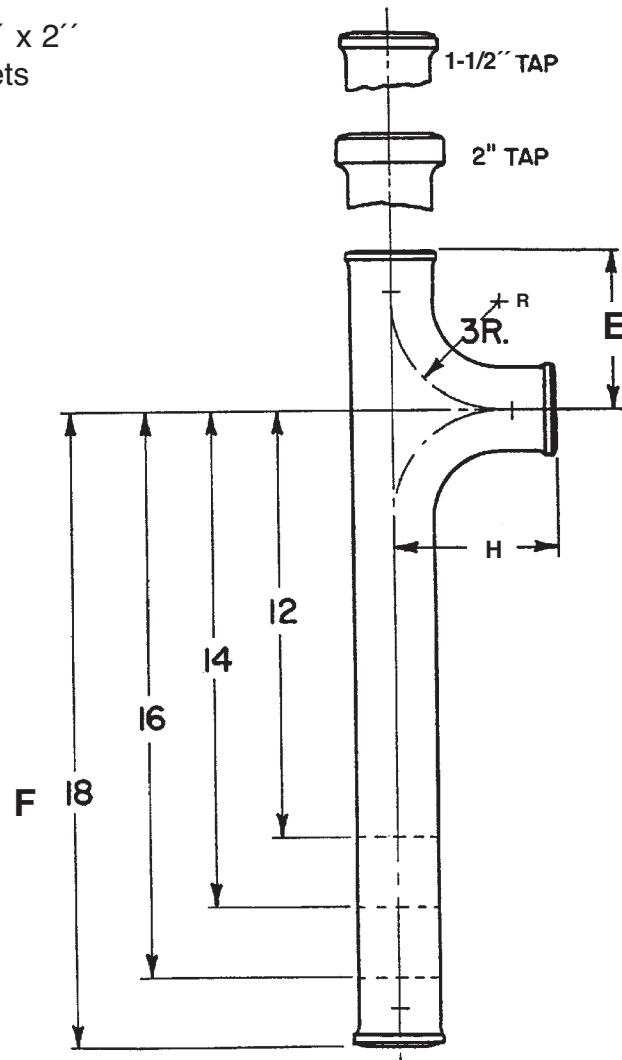
Note 3: Gasket materials for mechanical closet flanges shall meet the requirements in ASTM C564.

Note 4: Bolts for mechanical closet flanges shall be series 300 stainless steel.

Note 5: Flanges shall be permitted to be slotted, notched or combination of slotted and notched.

TABLE 94.
DOUBLE SWEEP SANITARY TEE (EXTENDED)

Hubless 1-1/2" x 2"
Tapped Inlets

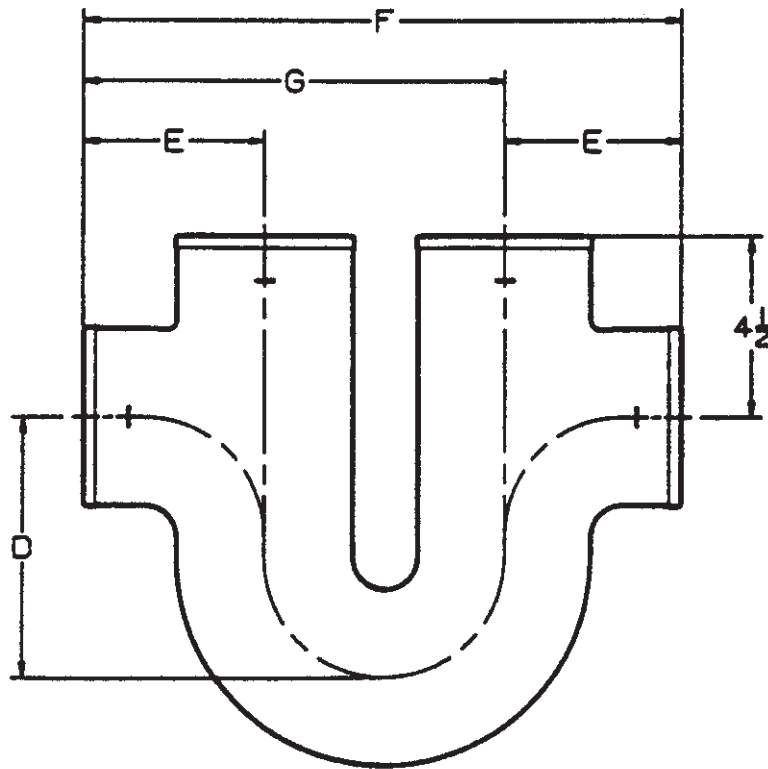


ASA CODE Group 022		Dimensions in Inches ¹				
Item #	√	Size (Inches)	E ²	H	R	F ²
0842		2 x 12	4-1/2	4-1/2	3	12
0843		2 x 14	4-1/2	4-1/2	3	14
0844		2 x 16	4-1/2	4-1/2	3	16
0846		2 x 18	4-1/2	4-1/2	3	18
0848		2 x 24	4-1/2	4-1/2	3	24

¹ For details of barrel, spigot and gasket positioning lug see tables 1 and 2.

² Dimensions E and F are laying lengths.

TABLE 95.
RUNNING TRAP WITH DOUBLE VENTS

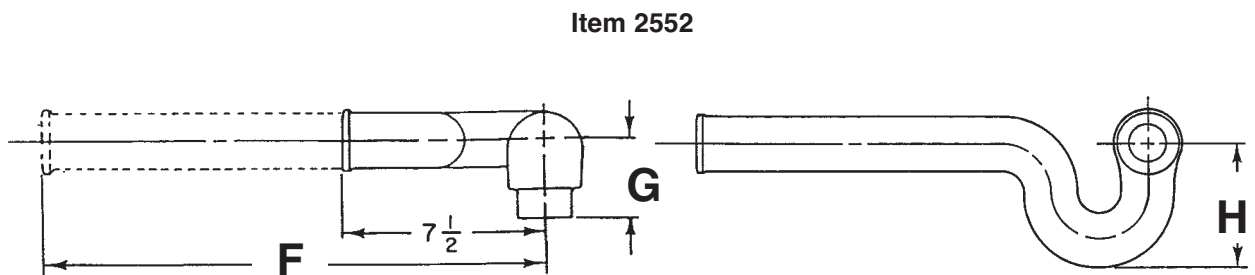
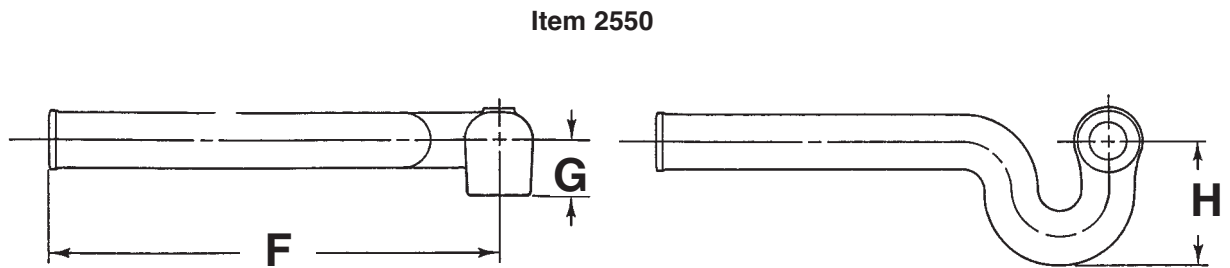
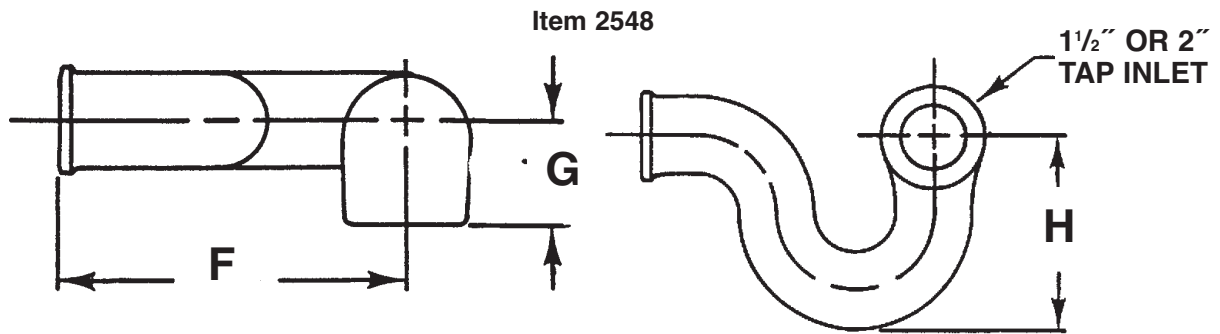


ASA CODE Group 022		Dimensions in Inches ¹				
Item #	√	Size (Inches)	D	E	F ²	G
2524		4	6-1/2	4-1/2	15	10-1/2

¹ For details of barrel and spigot see tables 1 and 2.

² Dimension F is laying length.

TABLE 96.
P TRAP WITH 1-1/2 OR 2 INCH TAPPED OR HUBLESS SIDE
INLET³ RIGHT OR LEFT & EXTENDED



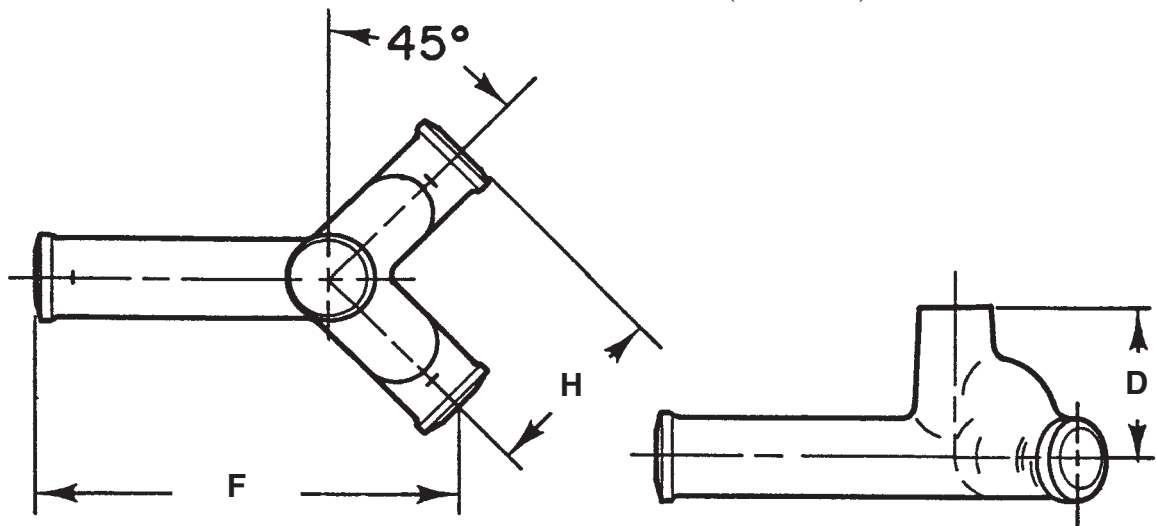
ASA CODE Group 022		Dimensions in Inches ¹			
Item #	√	Size (Inches)	G	H	F ² IPS
2548		2	2-1/4	5-3/16	7-1/2 1-1/2
2550		2	2-1/4	5-3/16	18 1-1/2
2552		2	3	5-3/16	18 1-1/2

¹ For details of barrel and spigot see tables 1 and 2.

² Dimension F is laying length.

³ Inclusion of spigot bead and positioning lug optional with manufacturer based on casting methods used.

TABLE 97.
VENTED TUB WYE EXTENDED (DOUBLE)

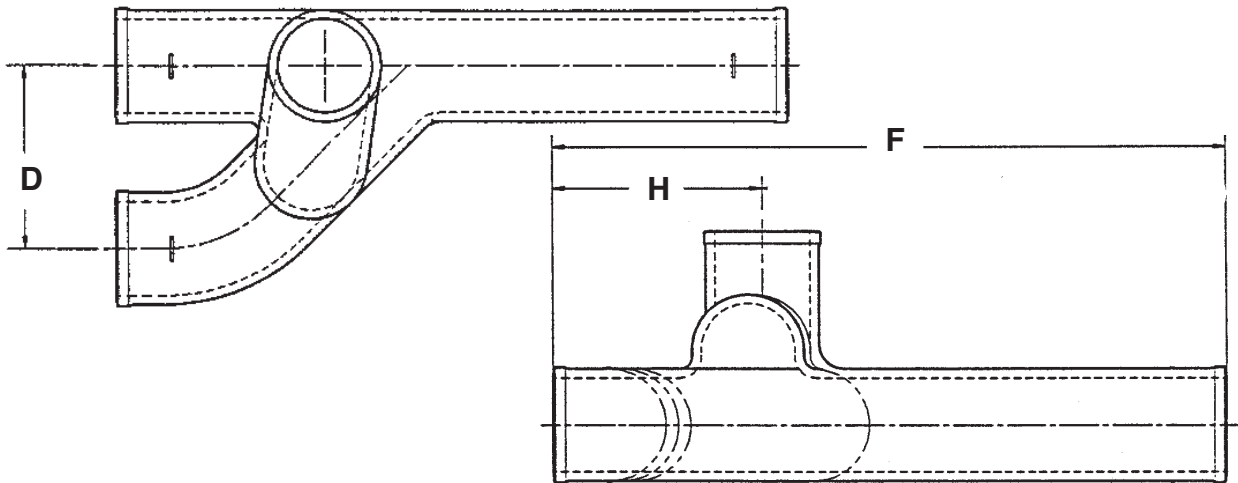


ASA CODE Group 022		Dimensions in Inches ¹		
Item #	√	Size (Inches)	D	H F ²
1374		2	4-1/4	5-1/4 15-3/4

¹ For details of barrel and spigot see tables 1 and 2.

² Dimension F is laying length.

TABLE 98.
VENTED TUB WYE EXTENDED OFFSET
(LEFT OR RIGHT)

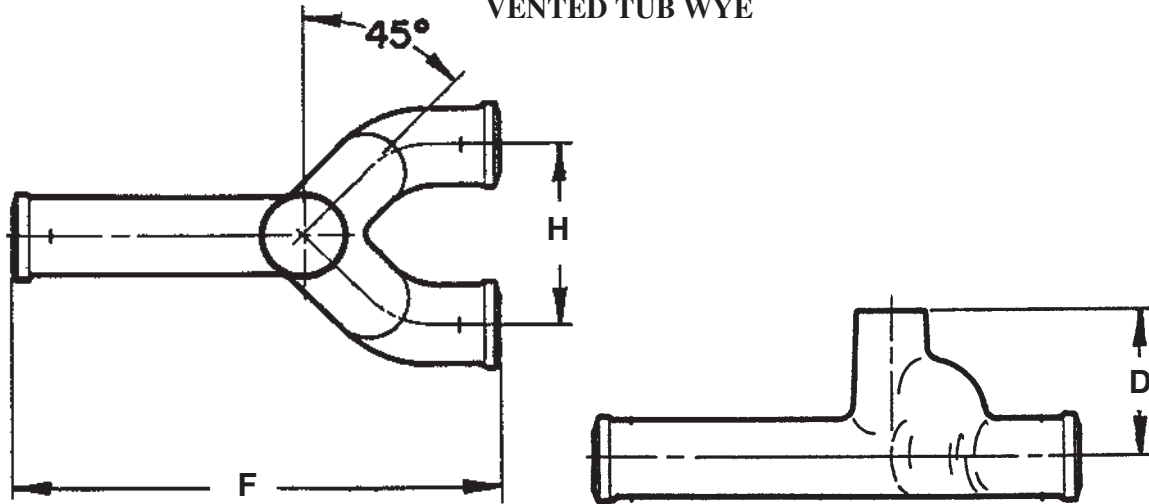


ASA CODE Group 022		Dimensions in Inches ¹		
Item #	√	Size (Inches)	D	H F ²
1376		2	3-3/4	4-1/4 13-3/4
1377		2	3-3/4	4-1/4 16

¹ For details of barrel and spigot see tables 1 and 2.

² Dimension F is laying lengths.

TABLE 99.
VENTED TUB WYE

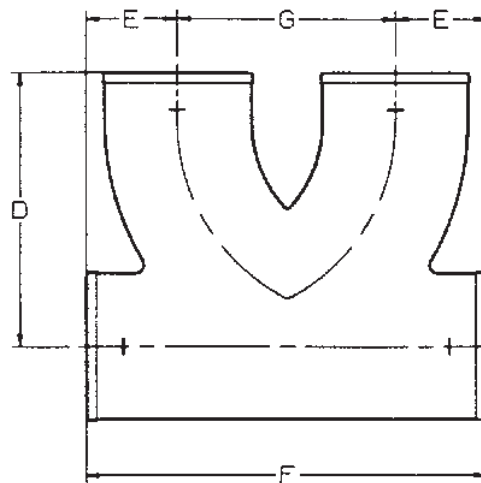


ASA CODE Group 022		Dimensions in Inches ¹		
Item #	Size (Inches)	D	H	F ²
1378	2	4-1/4	5-1/4	15
1380	2	4-1/4	5-1/4	29-1/2

¹ For details of barrel and spigot see tables 1 and 2.

² Dimension F is laying length.

TABLE 100.
DOUBLE TWO WAY CLEANOUT

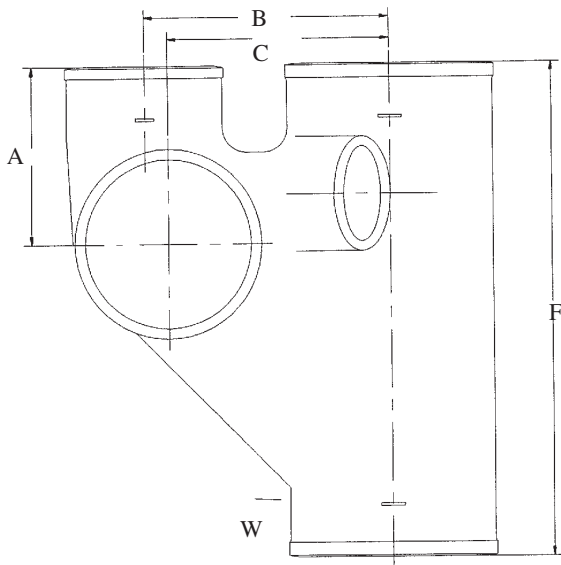


ASA CODE Group 022		Dimensions in Inches ¹			
Item #	Size (Inches)	D	E	F ²	G
♦	3	7-1/4	2-1/4	10	5-1/4
8452	4	8-1/4	2-3/4	12	6-1/2

¹ For details of barrel and spigot see tables 1 and 2.

² Dimensions F is laying lengths.

TABLE 101.
SANITARY CROSS WITH 3 INCH VENT AND
TWO 2 INCH 45° INLETS

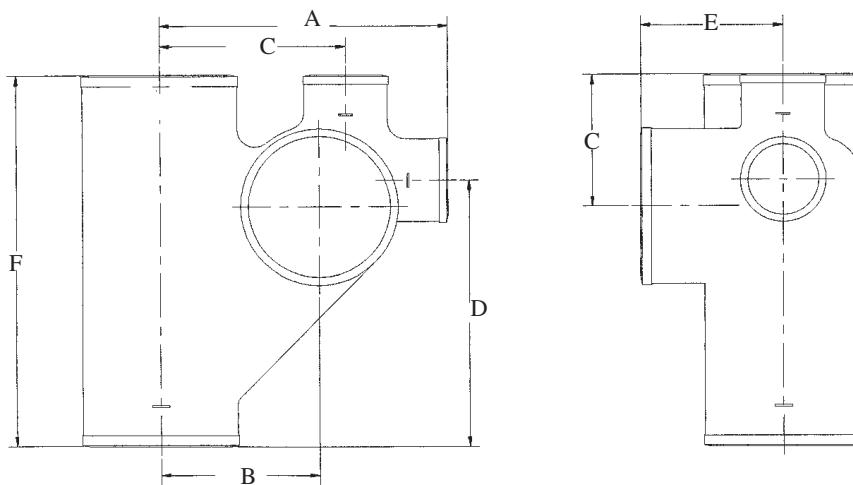


ASA CODE Group 022		Dimensions in Inches ¹				
Item #	√	Size (Inches)	A	B	C	F ² W
2004		4 x 3 x 4 x 2 x 2	3-3/4	5-1/4	4-3/4	10-1/2 1-1/8

¹ For details of barrel and spigot see tables 1 and 2.

² Dimension F is laying length.

TABLE 102.
VENTED CLOSET TEE OR CROSS (RIGHT OR LEFT)
WITH 2 INCH VENT AND WITH OR WITHOUT 2 INCH SIDE INLET

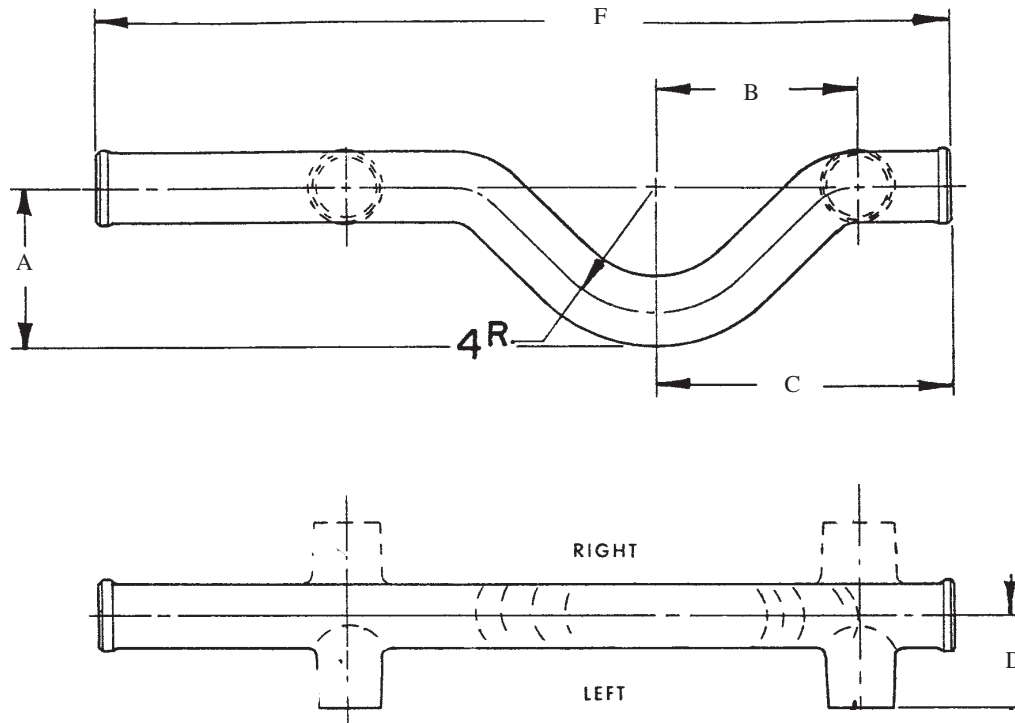


ASA CODE Group 022		Dimensions in Inches ¹					
Ite	√	Size (Inches)	A	B	C	D	E F ²
m #							
9500		4 x 4 x 2 x 4 R or L	8-1/8	4-1/4	5-1/4	7-1/2	4 10-1/2
9502		4 x 4 x 2 x 2 x 4 R or L	8-1/2	4-1/4	5-1/4	7-1/2	4 10-1/2
9504		4 x 4 x 2 x 4 x 4	8-1/8	4-1/4	5-1/4	7-1/2	4 10-1/2
9505		4 x 4 x 2 x 2 x 4 x 4	8-1/2	4-1/4	5-1/4	7-1/2	4 10-1/2

¹ For details of barrel and spigot see tables 1 and 2.

² Dimension F is laying length.

TABLE 103.
VENT BYPASS WITH OR WITHOUT INLETS
RIGHT OR LEFT HAND OR DOUBLE

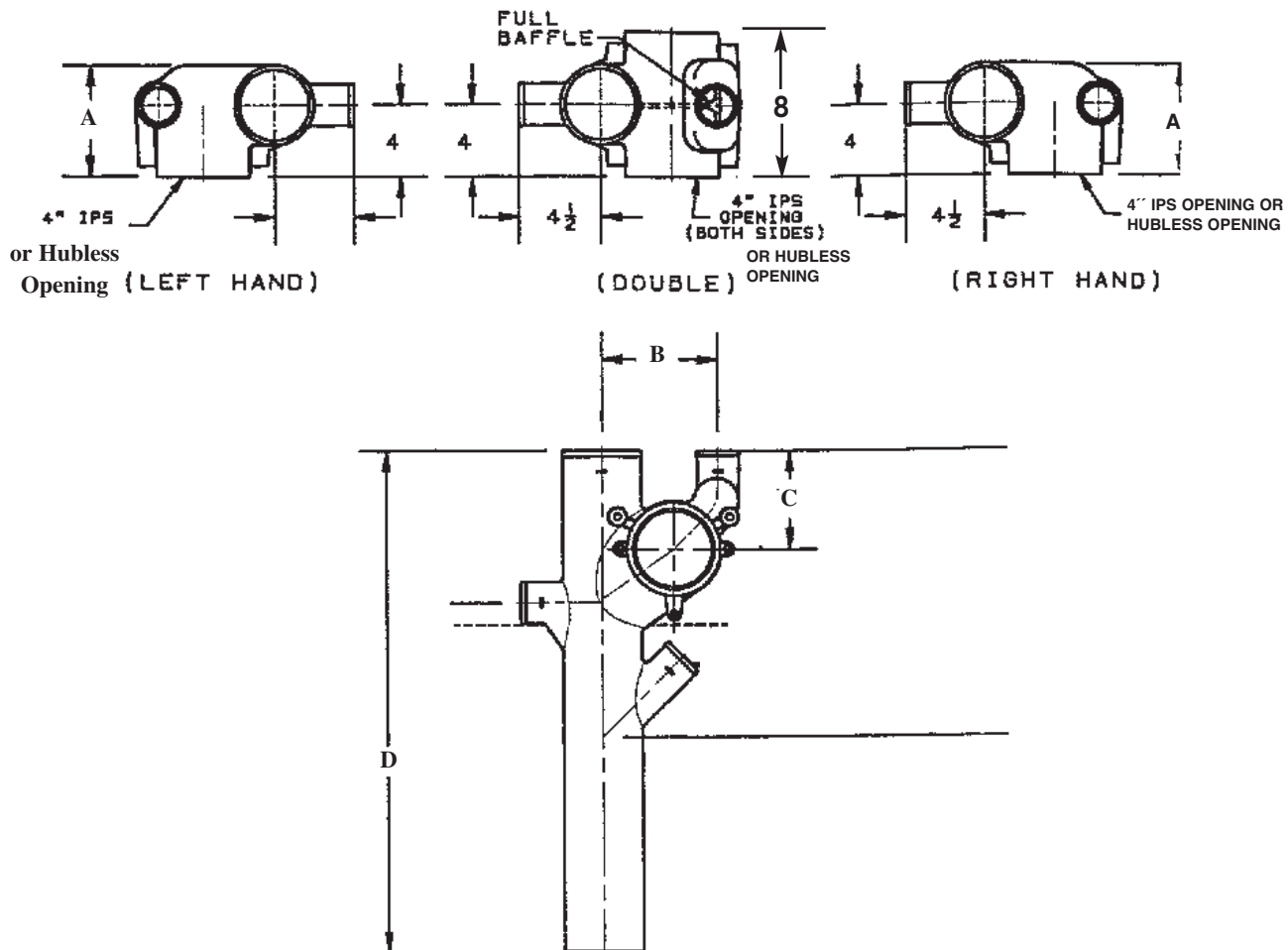


ASA CODE Group 022		Dimensions in Inches ¹						
Item #	√	Size	Design	A	B	C	D	F ²
8500		2 x 18-3/8	C	4-7/8	6-1/2	9-3/16	2-1/2	18-3/8
8502		2 x 18-3/8	T	5-1/4	6-1/2	9-1/2	2-1/2	18-3/8
8504		2 x 27-5/8	C	4-7/8	6-1/2	9-3/16	2-1/2	27-5/8
8506		2 x 27-5/8	T	5-1/4	6-1/2	9-1/2	2-1/2	27-5/8

¹ For details of barrel and spigot see tables 1 and 2.

² Dimension F is laying length.

TABLE 104.
VERTICAL STACK FITTING WITH 2 INCH INLETS LEFT AND RIGHT HAND
OR DOUBLE WITH OR WITHOUT 2 INCH 45° INLETS & 90° SANITARY
INLETS, WITH THREADED OR HUBLESS 4 INCH INLETS



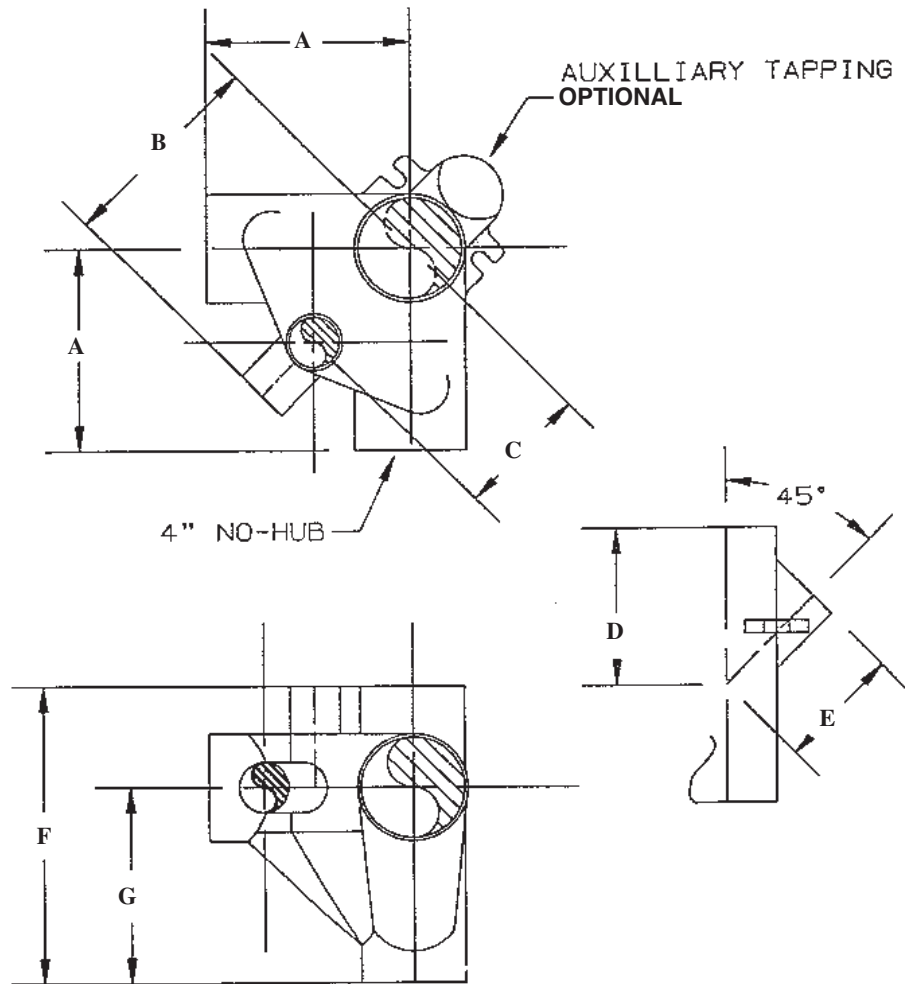
ASA CODE Group 022		Size	Dimensions in Inches ¹			
Item #	√		A	B	C	D ²
8600		4 X 28 RH OR LH OR DBL	6-1/4	6-1/2	5-1/2	28

¹ For details of barrel and spigot see tables 1 and 2.

² Dimension D is laying length.

³ Baffles are optional.

TABLE 105.
DOUBLE VERTICAL 90° STACK FITTING WITH
2 INCH VENT AND WITH OR WITHOUT 2 INCH SIDE INLET



ASA CODE Group 022		Dimensions in Inches ¹								
Item #	Size	Design	A	B	C	D	E	F ²	G	
8606	4 x 3	T	8	8-1/4	5-1/4	6-3/16	4-7/8	11-3/4	7-3/4	
	4	T	8	8-1/4	5-1/4	6-3/16	4-7/8	11-3/4	7-3/4	
	4 x 3	C	8	8-1/4	5-1/4	6-3/16	4-7/8	12	8	
	4	C	8	8-1/4	5-1/4	6-3/16	4-7/8	12	8	

¹ For details of barrel and spigot see tables 1 and 2.

² Dimension F is laying length.

³ Baffles are optional.

ANNEX

(MANDATORY INFORMATION)

A1. THIRD PARTY CERTIFICATION OR INSPECTION

INTRODUCTION

The following supplementary requirements shall be applied when the manufacturer or seller of the products covered by this specification utilizes third party certification agencies as part of their certifications as detailed in Section 13 of this specification.

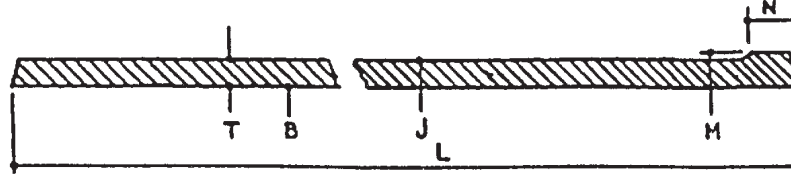
A1.1 Third Party certifiers or inspectors conducting regular inspections at the manufacturer's production facility shall include, but not limited to, the following during each inspection.

A1.1.1 A review of the manufacturer's records to verify compliance with 4.4, 6.2, 11.1, 11.2, 12.2, and 12.3 of this specification. Copies of the manufacturer's test reports shall be added to the third party certifiers inspection report.

A1.1.2 Random inspections of the manufacturer's finished goods inventory shall be conducted during each inspection. These inspections shall include a dimensional and marking inspection of not less than ten of these pieces of different size pipe produced during each inspection. Each pipe shall be measured with suitable instruments or gauges and all dimensions in Table 1 and Table 2 of this specification shall be measured and recorded. This inspection report shall be furnished as part of the certification report in 13.1. Inspection of the manufacturer's finished goods inventory of fittings shall be made. Fittings shall be selected randomly and include a minimum of ten fittings during each inspection. These fittings selected shall be of different patterns or sizes or both. These fittings shall be measured with suitable gauges or instruments and all dimensions in Table 1, Table 2, and the appropriate laying length dimensions found in Tables 5-105 shall be recorded. This inspection report shall be furnished as a part of the certification report in 13.1.

NON-MANDATORY APPENDIX METRIC CONVERSIONS

Dimensions and tolerances in inches (Millimeters rounded to two decimal places) of Spigots and Barrels for Hubless Pipe and Fittings.



*Pipe may be with or without a spigot bead

Size	Barrell		Spigot		Barrel Thickness, T		Gasket Positioning Lug	Laying Length, L	
	Inside Diameter	Outside Diameter	Outside Diameter	Bead Width					
	B	J	M	N ± 0.13 (3.3)	Nominal	Minimum	W	5 ft ± 0.25 in. (1,524 mm ± 6 mm)	10 ft ± 0.50 in. (3,048 mm ± 13 mm)
1-1/2	1.50 ± 0.09 (38.1 ± 2.29)	1.90 ± 0.06 (48.26 ± 1.52)	1.96 ± 0.06 (49.78 ± 1.52)	0.25 (6.35)	0.16	0.13 (3.3)	1.13 (28.7)	60 (1524)	120 (3048)
2	1.96 ± 0.09 (49.8 ± 2.29)	2.35 ± 0.09 (59.69 ± 2.29)	2.41 ± 0.09 (61.21 ± 2.29)	0.25 (6.35)	0.16	0.13 (3.3)	1.13 (28.7)	60 (1524)	120 (3048)
3	2.96 ± 0.09 (75.2 ± 2.29)	3.35 ± 0.09 (85.09 ± 2.29)	3.41 ± 0.09 (86.61 ± 2.29)	0.25 (6.35)	0.16	0.13 (3.3)	1.13 (28.7)	60 (1524)	120 (3048)
4	3.94 ± 0.09 (100.08 ± 2.29)	4.38 ± 0.09 (111.25 ± 2.29)	4.44 ± 0.09 (112.78 ± 2.29)	0.31 (7.87)	0.19	0.15 (3.81)	1.13 (28.7)	60 (1524)	120 (3048)
5	4.94 ± 0.09 (125.48 ± 2.29)	5.30 ± 0.09 (134.62 ± 2.29)	5.36 ± 0.09 (136.14 ± 2.29)	0.31 (7.87)	0.19	0.15 (3.81)	1.50 (38.1)	60 (1524)	120 (3048)
6	5.94 ± 0.09 (150.88 ± 2.29)	6.30 ± 0.09 (160.02 ± 2.29)	6.36 ± 0.09 (161.54 ± 2.29)	0.31 (7.87)	0.19	0.15 (3.81)	1.50 (38.1)	60 (1524)	120 (3048)
8	7.94 ± 0.13 (201.68 ± 3.3)	8.38 ± 0.09 (212.85 ± 2.29)	8.44 ± 0.09 (214.38 ± 2.29)	0.31 (7.87)	0.23	0.17 (4.32)	2.00 (50.8)	60 (1524)	120 (3048)
10	10.00 ± 0.13 (254 ± 3.3)	10.56 ± 0.09 (268.22 ± 2.29)	10.62 ± 0.09 (269.75 ± 2.29)	0.31 (7.87)	0.28	0.22 (5.59)	2.00 (50.8)	60 (1524)	120 (3048)
12	11.94 ± .13 (303.28 ± 3.3)	12.50 ± .13 (317.5 ± 3.3)	12.62 ± .13 (320.55 ± 3.3)	0.31 (7.87)	0.28	.22 (5.59)	2.75 (69.85)	60 (1524)	120 (3048)
15	15.11 ± .13 (383.79 ± 3.3)	15.83 ± .13 (402.08 ± 3.3)	16.12 ± .13 (409.45 ± 3.3)	0.31 (7.87)	0.36	.30 (7.62)	2.75 (69.85)	60 (1524)	120 (3048)

Pipe Diameters – B Dimension (rounded to nearest millimeters)

1-1/2	38	2	50
3	75	4	100
5	125	6	150
8	200	10	255
12	305	15	380

INSTALLATION PROCEDURES FOR HUBLESS CAST IRON SOIL PIPE AND FITTINGS FOR SANITARY AND STORM DRAIN, WASTE AND VENT PIPING APPLICATIONS

1. INTRODUCTION

1.1. Several different types of hubless couplings are available for use in hubless cast iron sanitary and storm drain, waste, and vent piping applications to connect hubless cast iron soil pipe and fittings by using a sleeve-type, or some other type coupling device. It is the purpose of this portion of designation CISPI 301-12 to furnish procedures as to the installation of couplings which are manufactured in accordance with CISPI Designation 310-12 when applied to cast iron soil pipe and fittings manufactured in accordance with CISPI Standard 301, latest revision.

It must be noted that these installation procedures are not intended to be applicable for couplings not made in accordance with CISPI 310-12.

THE INSTALLATION PROCEDURES STATED BELOW ARE ILLUSTRATIVE ONLY AND ARE NOT A MANDATORY PORTION OF CISPI DESIGNATION 301-12.

2. PURPOSES

2.1 These installation procedures provide guidelines for installation, use and inspection of hubless cast iron soil pipe and fittings for sanitary and storm drain, waste, and vent piping applications when the coupling device described in Designation 310-12 is used.

2.2 All construction projects involve many variables, hence it is not possible to state in advance every installation consideration which may apply in the field. In the end the final and controlling judgment decisions concerning installation questions that arise must be made in the design and “on the job” taking into account prevailing circumstances or conditions. The Institute cannot assume such responsibilities. These procedures are not a substitute for such informed judgements and for manufacturer-provided installation instructions but it is hoped they will be helpful.

2.3 Complete stability of all components of hubless cast iron soil pipe and fittings for sanitary and storm drain, waste, and vent piping applications should be given prime consideration.

3. METHODS OF CUTTING CAST IRON SOIL PIPE

There are several methods of successfully cutting cast iron soil pipe. These methods may be placed into two basic categories; those that require external power for their operation and those methods that require only hand operation. Methods that require external power are usually used for prefabrication work or high volume cutting operations. Examples of this type of equipment would be (1) the abrasive saw (chop saw) (2) power hack saw and (3) an electrically actuated hydraulic snap cutter. Before using electrical equipment of this nature, the manufacturer's operating instructions should be carefully reviewed for safe use of the equipment.

There are two hand operated cutting tools that are used in the industry today (1) The standard steel pipe cutter using cutting wheels specifically designed to cut cast iron soil pipe and (2) the snap cutter. The snap cutter accounts for the majority of all cuts made on cast iron soil pipe in the field.

There are several types of snap cutter available, the following procedure has been found to produce consistently good cuts:

- (1) After marking the pipe length to be cut,

CUTTING HUBLESS PIPE WITH SNAP CUTTERS



(FOR 8 INCH AND LARGER PIPE AN ABRASIVE SAW HAS BEEN FOUND TO BE THE MOST EFFECTIVE METHOD OF CUTTING.)

position the chain cutter squarely around the pipe to assure a straight cut. The maximum number of wheels possible should be in contact with the pipe.

- (2) Score the pipe by applying pressure on the handles to make the cutter wheels indent the pipe.
- (3) Rotate the pipe a few degrees and then apply quick final pressure to complete the cut. If a piece of pipe is unusually tough, score the pipe several times before making your final cut. Scoring the pipe before the actual cut is the key to a clean straight cut.

Cast iron soil pipe may also be cut with a hammer and a cold chisel. This method of cutting is very time consuming and should only be used if snap cutters are not available. Again, protective equipment, such as safety goggles, should be used. The procedure for cutting soil pipe with a hammer and chisel are as follows:

- (1) Measure the length to be cut and mark the cut line completely around the circumference of the pipe.
- (2) Place the mark to be cut on a 2 x 4 so the edge of the 2 x 4 is directly under the mark.
- (3) By striking the chisel with the hammer, cut a groove following your mark all the way around the circumference of the pipe.
- (4) Continue cutting as outlined above in (3) until the pipe is cut. This procedure may take several revolutions of the pipe before it is cut.

Installers should be aware of safety considerations, including the need to use protective equipment, such as safety goggles, when cutting cast iron soil pipe.

4. DEFINITIONS

4.1 Joint — A place where two ends of pipe or fittings are connected.

4.2 Coupling — A mechanical device by which the ends of pipe or fittings are connected.

4.3 Hanger — A device by which or to which something is hung or hangs.

4.4 Support — To hold up or to serve as a foundation or prop.

4.5 Restrain — To limit restrict or keep under control. **Restraint** — A device that restricts movement.

4.6 Seismic — Shock, earthquake, to shake.

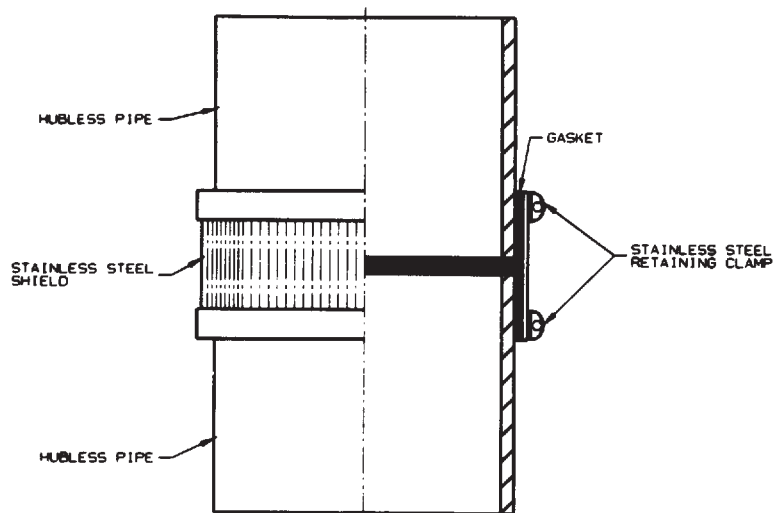
4.7 Torque — A force that produces or tends to produce rotation or torsion: A turning or twisting force.

4.8 Alternately — A change from one to another repeatedly.

5. CLAMP AND GASKET INSTALLATION

Hubless cast iron soil pipe is joined by using the hubless coupling. Several different types of hubless couplings are available. The following will outline the installation procedures of hubless couplings that meet the requirements of CISPI 310-12. It must be noted that these installation procedures are not intended to be applicable for couplings other than those manufactured in accordance with CISPI 310-12. These couplings are manufactured using a stainless steel shield and clamp

(A) TYPICAL HUBLESS COUPLING



assembly and an elastomeric sealing sleeve conforming to the requirements of ASTM C-564. The following steps should be taken to ensure a proper joint.

- (1) Place the gasket on the end of one pipe or fitting and the stainless steel clamp and shield assembly on the end of the other pipe or fitting.¹
- (2) Firmly seat the pipe or fitting ends against the integrally molded center stop inside the elastomeric sealing sleeve.
- (3) Slide the stainless steel shield and clamp assembly into position over the gasket and tighten the bands. The bands should be tightened using a calibrated torque wrench set at 60 in./lbs. or the specific torque required by the manufacturer of couplings which require a higher torque. For larger diameter couplings that have four bands, the inner bands should be tightened first and then the outer bands tightened. In all cases, when tightening bands they should be tightened alternately to ensure that the coupling shield is drawn up uniformly.

6. SUGGESTED INSTALLATION INSTRUCTIONS

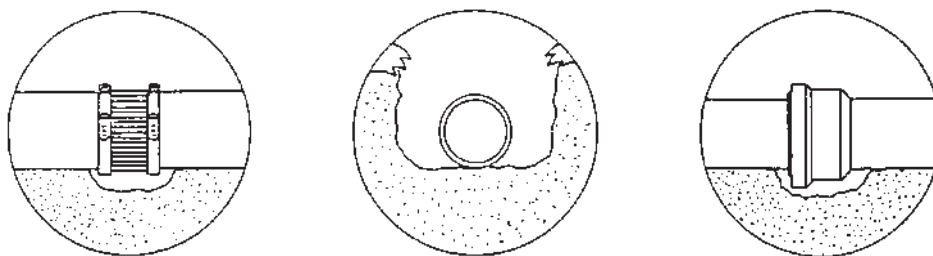
UNDERGROUND INSTALLATION PROCEDURES

The physical properties of cast iron soil pipe make it the best DWV (Drain, Waste and Vent) material for underground installation. The two keys for proper underground installation are trench preparation and backfilling

The trench should be wide enough to assemble the joints. Total load on the pipe includes both earth load and the truck load. For additional information refer to CISPI's *"Trenching Recommendations for Cast Iron Soil Pipe"* brochure or the CISPI handbook. **Safety procedures in trenching should be observed, including provisions to avoid collapse of the trench wall.**

The trench bottom should be stable enough to support the complete barrel of the pipe. If possible the barrel should rest on even and undisturbed soil. In certain conditions, ie rocky, it becomes necessary to excavate deeper than needed, place and tamp back fill material to provide an appropriate bed. Holes should be provided at each joint for the hub or couplings to allow for continuous support of the barrel along the trench bottom. If the ditch must be excavated deeper than the depth of the drainage pipe, place and tamp backfill material to provide uniform support for the pipe barrel.

Many times in the installation of underground soil pipe it is necessary to change the direction of the line. Cast iron soil pipe will allow this through deflection in the joints. Installation should initially be completed in a straight line and then deflected to the appropriate amount. Maximum deflections should not exceed 1/2 inch per foot of pipe. This would allow 5 inches of deflection for a 10 foot piece of soil pipe and 2 1/2 inches for 5 foot pipe. For changes in direction greater than these deflections an appropriate fitting should be used.



TYPE 1 TRENCH CONDITION

No Pipe Bedding, Hard Trench Bottom, Continuous Line Support with Hub or Coupling Holes

¹ The use of adhesive lubricants is permissible as recommended by the manufacturer. When adhesive lubricants are used wait 24 hours before testing. The use of the adhesive lubricant does not take the place of proper joint restraint.

Once installation (For joining methods refer to Part 5) is completed, the underground section is ready for test. Because this portion of the system is usually the largest diameter pipe it may be necessary to restrain the system or joints from movement prior to testing. This may be done by partially backfilling and leaving the joints exposed for inspection, or rodding and or bracing.

After testing is completed, the trench can be properly backfilled. When backfilling care should be taken to protect the pipe from large rocks, stones, or frozen fill material etc., that could damage the pipe. Cast iron soil pipe laid on a solid trench bottom requires no tedious placement of selected backfill materials.

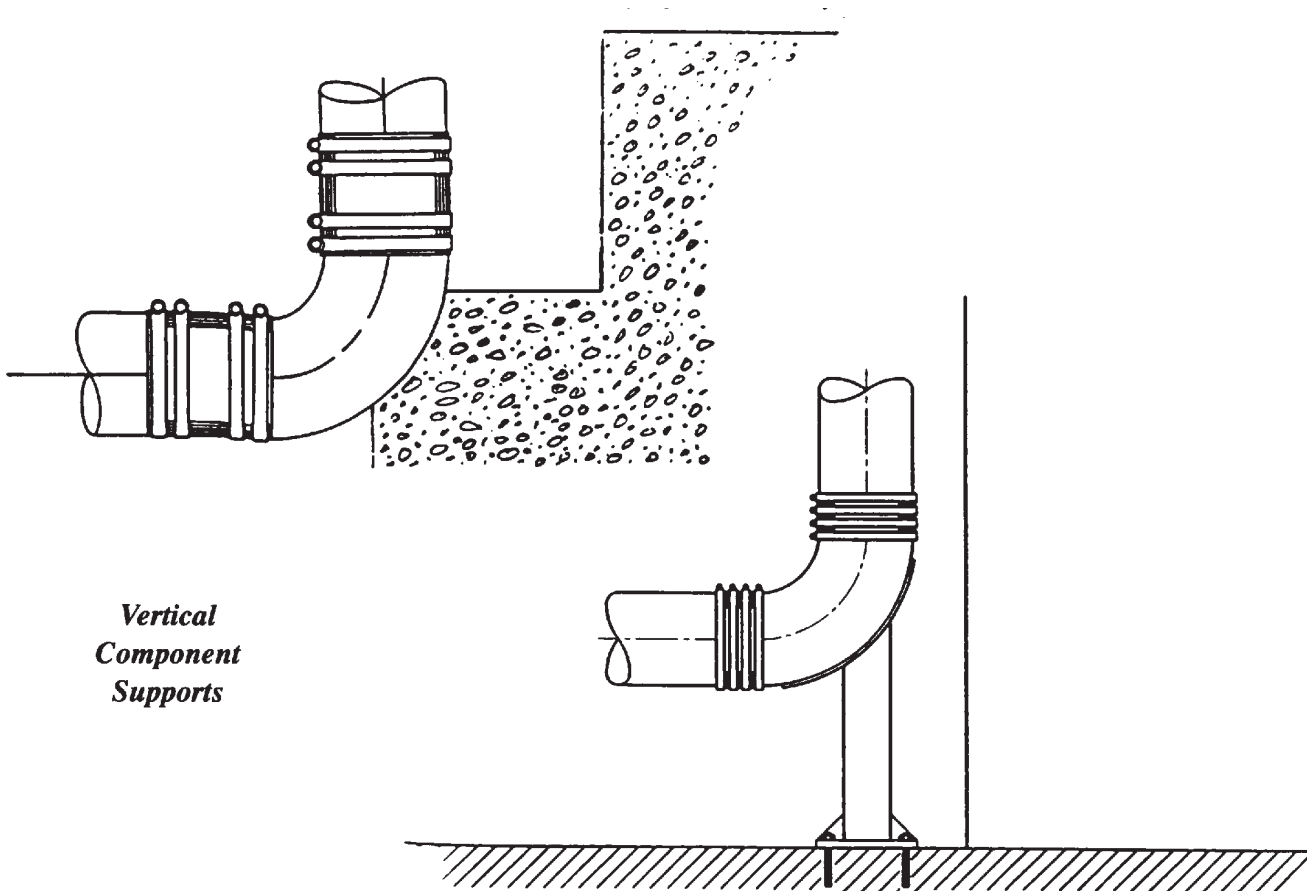
Installers should always consider local conditions, codes, manufacturer instructions, and architect/engineer instructions in any installation.

ABOVEGROUND INSTALLATION PROCEDURES

With attention to a few basic rules the installation of cast iron soil pipe and fittings is easily accomplished.

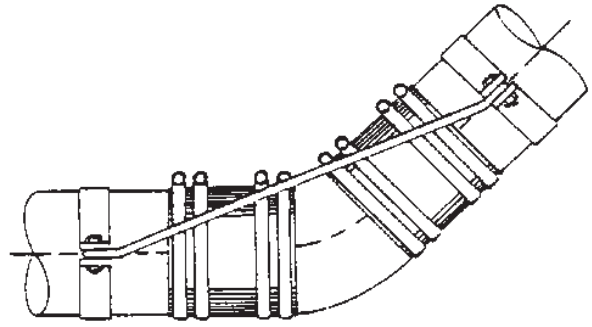
- (1) Cast iron soil pipe installed in the horizontal position shall be supported at every hub (Hub & Spigot) or coupling (Hubless). The hanger shall be placed within 18" of the hub or coupling. Joints used for connecting cast iron soil pipe possess sufficient shear strength to require one hanger per joint or hub. For 12" and 15" hubless pipe hangers shall be placed on both sides of the coupling when installing full 10 foot lengths.
- (2) Installations requiring multiple joints within a four foot developed length shall be supported at every other or alternating hubs or couplings.

Vertical components shall be supported at each stack base and secured at each floor and at sufficiently close intervals to keep the system in alignment and to adequately support the pipe and its contents. Riser clamps, sometimes called floor or friction clamps are required for vertical piping in multi-story structures in order for each floor not to exceed 15'0".

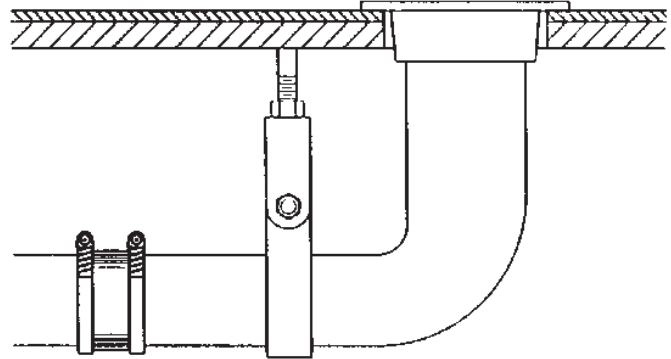


Large Diameter Fittings

Horizontal pipe and fittings five (5) inches and larger shall be suitably restrained to prevent horizontal movement. This shall be done at every branch opening or change of direction by the use of braces, blocks, rodding or other suitable method, to prevent movement.



Closet bends, traps, trap-arms and similar branches must be secured against movement in any direction. Closet bends installed above ground shall be stabilized by firmly strapping and blocking. Where vertical closet stubs are used they must be stabilized against horizontal or vertical movements.



GENERAL INSTALLATION INSTRUCTIONS

A. Vertical Piping:

- (1) Secure vertical piping at sufficiently close intervals to keep the pipe in alignment and to support the weight of the pipe and its contents. Support stacks at their bases and at sufficient floor intervals to meet the requirements of local codes. Approved metal clamps or hangers should be used for this purpose.
- (2) If vertical piping is to stand free of any support or if no structural element is available for support and stability during construction, secure the piping in its proper position by means of adequate stakes or braces fastened to the pipe.

B. Horizontal Piping, Suspended:

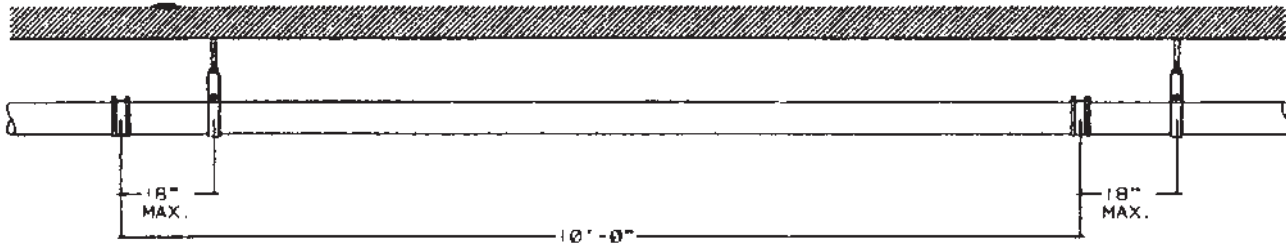
- (1) Support horizontal piping and fittings at sufficiently close intervals to maintain alignment and prevent sagging or grade reversal. Support each length of pipe by an approved hanger located not more than 18 inches from the joint. For 12" and 15" hubless pipe hangers shall be placed on both sides of the coupling when installing full 10 foot lengths.
- (2) Support terminal ends of all horizontal runs or branches and each change of direction or alignment with an approved hanger.
- (3) Closet bends installed above ground should be firmly secured.

C. Horizontal Piping, Underground:

- (1) To maintain proper alignment during backfilling, stabilize the pipe in proper position by partial backfilling and cradling.
- (2) Piping laid on grade should be adequately secured to prevent misalignment when the slab is poured.
- (3) Closet bends installed under slabs should be adequately secured.

D. Installation Inside the Building:

- (1) Installation suggestions. According to most authorities and plumbing codes, it is sufficient to support horizontal pipe at each joint, i.e. 5' pipe should be supported at five foot intervals, 10' in length may be supported at ten foot intervals. Supports should be adequate to maintain alignment and prevent sagging and should be placed within eighteen inches of the joint.



Note: For 12" and 15" hubless pipe hangers shall be placed on both sides of the coupling when installing full 10 foot lengths.

When the system is filled with water, sufficient beam strength is provided by cast iron soil pipe to carry the load with hangers every ten feet. Any of the horizontal supports or clamps illustrated in Figures 1 and 2 may be used, depending on conditions or what is regarded as essential by the contractor, architect or engineer. Whatever method of support or clamp is used for the horizontal line, care should be exercised to make certain that the line has a proper grade (1/4 inch or more per foot).

Hangers may be fastened to wood members or beams with wood screws, lag screws or large nails. For fastening to "I" beams, bar joists, junior beams or other structural members, beam clamps or "C" clamps may be used. Fasteners for masonry walls may be expansion bolts or screws, or where a void is present, the toggle bolt may be used. Studs shot into the masonry by the explosion method may also be used. Along a wall, a bracket made of structural members or a cast bracket may be used.

Adequate provision should be made to prevent "shear." Where components are suspended in excess of eighteen (18) inches by means of non-rigid hangers they should be suitably braced against movement horizontally, often called sway bracing. Examples of sway bracing are illustrated in Figures 3 and 4.

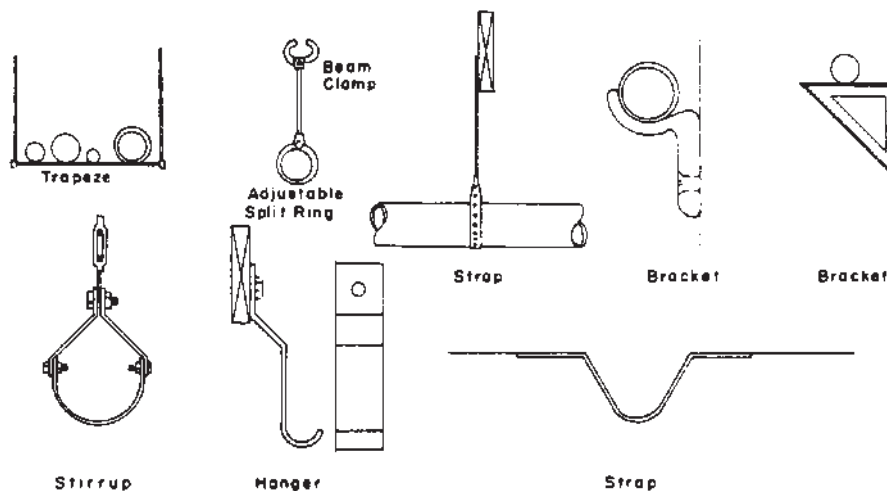


FIGURE 1 – HORIZONTAL PIPE SUPPORTS

Horizontal Installation of Large Diameter Pipe.

Horizontal pipe and fittings five (5) inches and larger must be suitably restrained to prevent horizontal movement. This must be done at every branch opening or change of direction by the use of braces, blocks, rodding or other suitable method, to prevent movement or joint separation. Figure 5 illustrates several methods of bracing.

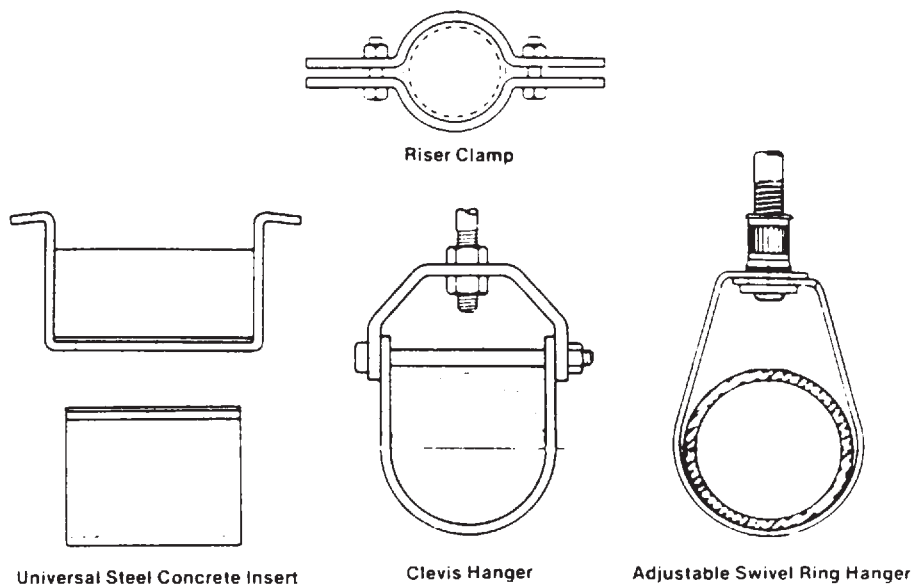


FIGURE 2 – HORIZONTAL PIPE SUPPORTS (Continued)

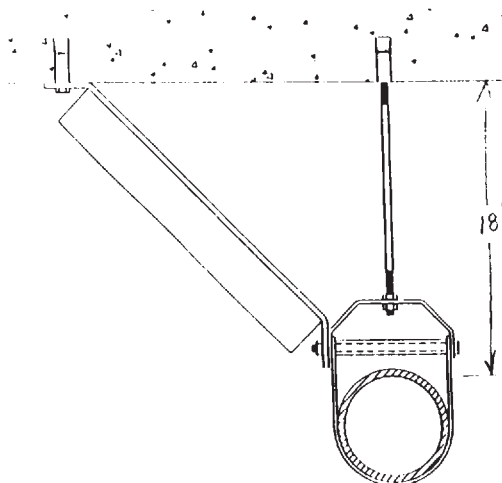


FIGURE 3 – HORIZONTAL PIPE WITH SWAY BRACE

Suggested Installation of Horizontal Fittings.

- (a) Hangers should be provided as necessary to provide alignment and grade. Hangers should be provided at each horizontal branch connection. Hangers should be adequate to maintain alignment and prevent sagging and should be placed adjacent to the coupling. By placing the hangers properly, the proper grade will be maintained. Adequate provision should be made to prevent shear. Where pipe and fittings are suspended in excess of eighteen inches by means of non-rigid hangers they should be suitably braced against movement horizontally, often called sway bracing. Refer to Figures 3 and 4 for illustrations.
- (b) Closet bends, traps, trap-arms and similar branches must be firmly secured against movement in any direction. Closet bends installed above ground should be stabilized. Where vertical closet studs are used they must be stabilized against horizontal or vertical movement. In Figures 6 and 7 see illustration for strapping a closet bend under a sub-floor and how a clevis type hanger has been used to an advantage.
- (c) When a hubless blind plug is used for a required cleanout, the complete coupling and plug must be accessible for removal and replacement.

- (d) The connection of closet rings, floor and shower drains and similar “slip-over” fittings and the connection of hubless pipe and fittings to soil pipe hubs may be accomplished by the use of caulked lead and oakum or compression joints.

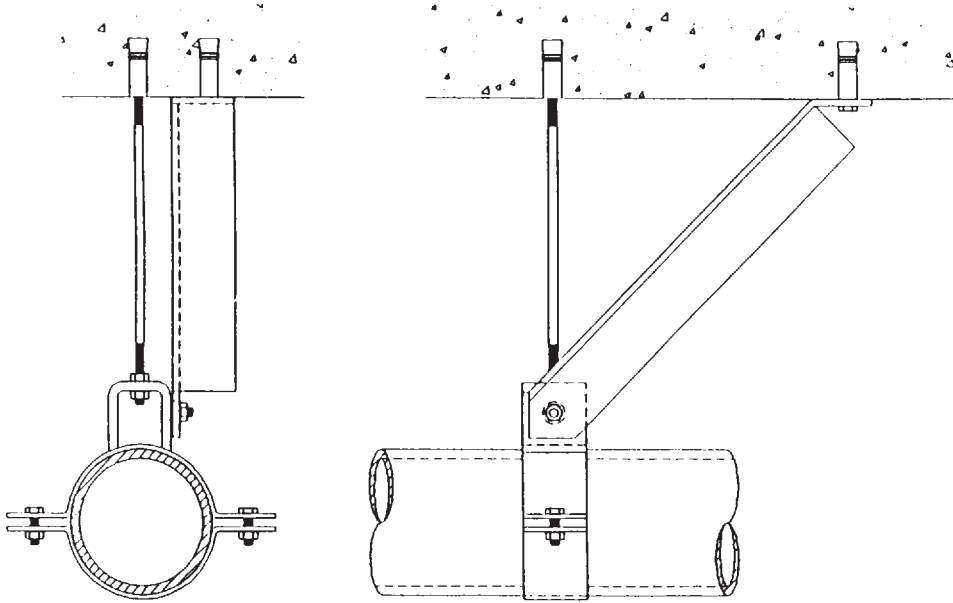


FIGURE 4 – SWAY BRACE

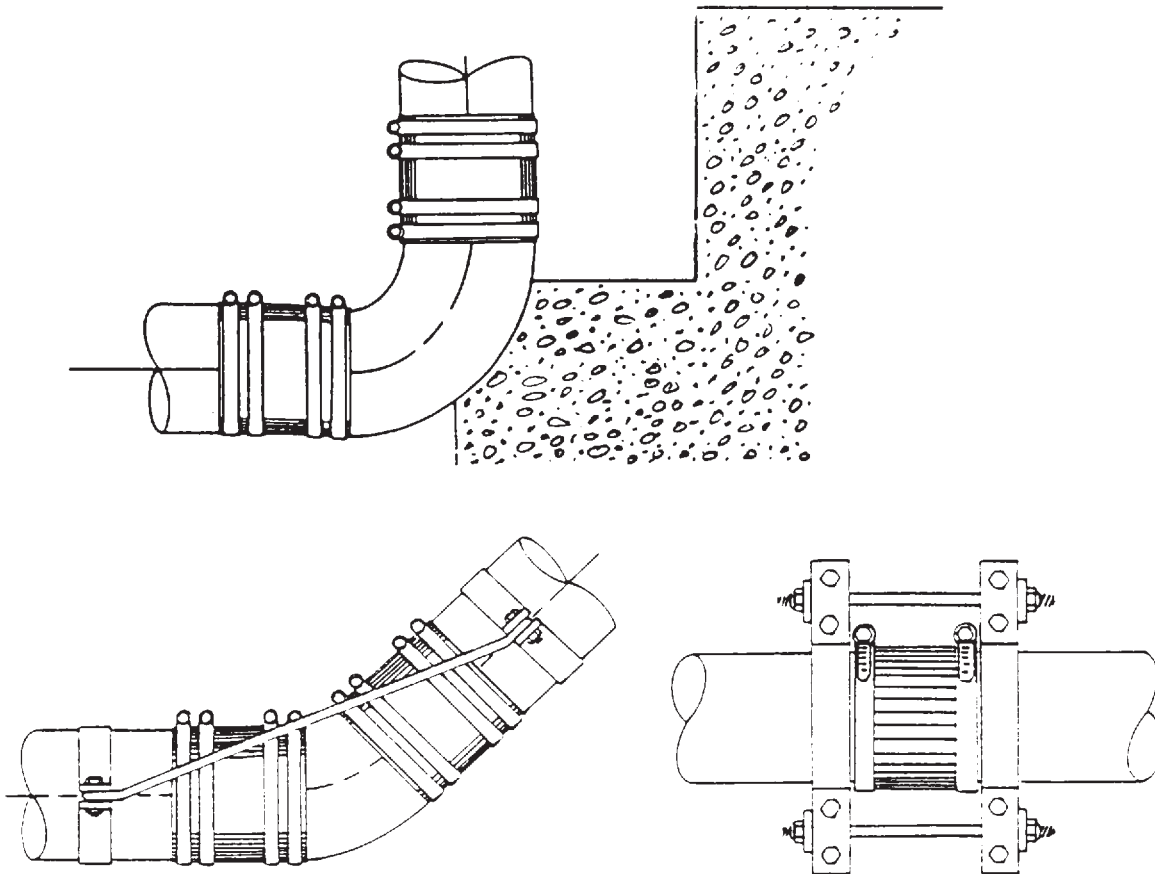


FIGURE 5 – LARGE DIAMETER PIPE

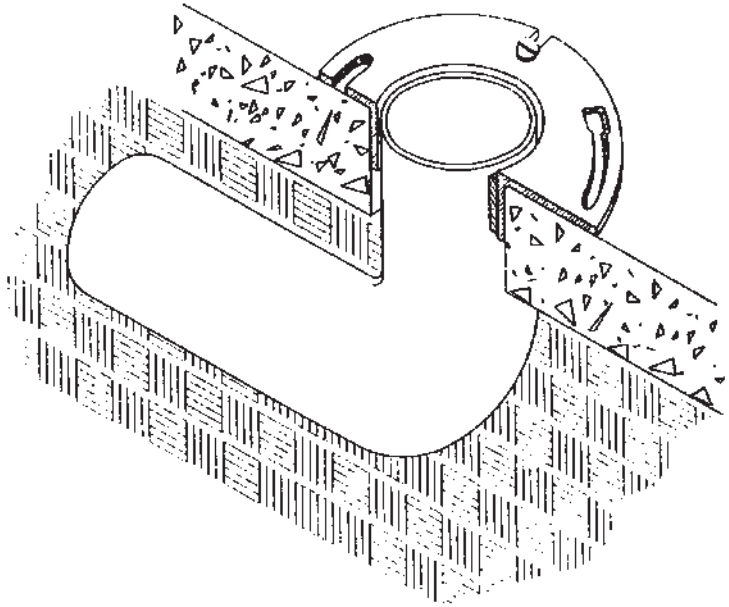


FIGURE 6 – CROSS SECTION VIEW OF CLOSET BEND SHOWING FLANGE PROPERLY SECURED

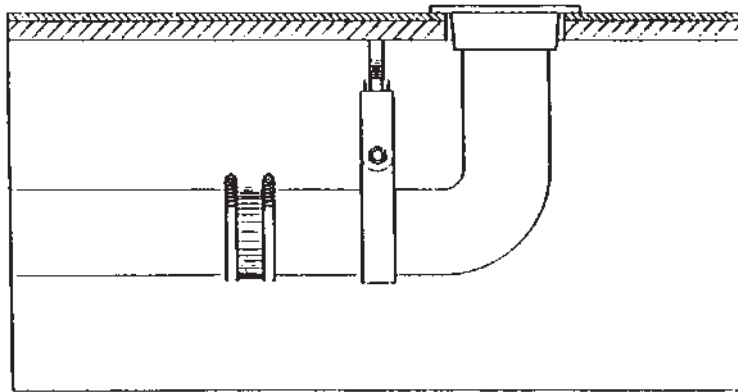


FIGURE 7 – METHOD OF USING HANGER FOR CLOSET BEND

Seismic Restraints

The following recommendations are some of the factors to consider when installing cast iron pipe in seismically active areas. All installations must comply with local codes and instructions of architects or engineers who are responsible for the piping design.

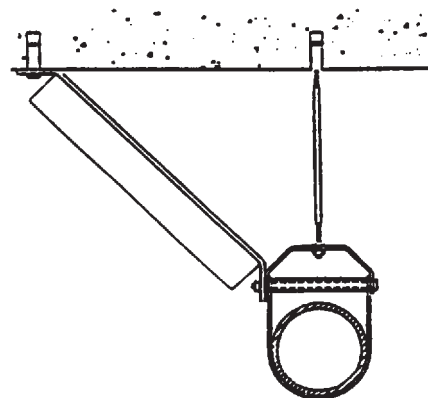
- A) Brace all pipe 2" and larger.

Exceptions:

Seismic braces may be omitted when the top of the pipe is suspended 12" or less from the supporting structure member and the pipe is suspended by an individual hanger.

- B) Vertical Piping Attachment –

Vertical piping shall be secured at sufficiently close intervals to keep the pipe in alignment and carry the weight of the



pipe and contents. Stacks shall be supported at their bases and if over two stories in height at each floor by approved floor clamps. At vertical pipe risers, whenever possible, support the weight of the riser at a point or points above the center of gravity of the riser. Provide lateral guides at the top and bottom of the riser, and at intermediate points not to exceed 30'-0" on center.

C) Horizontal Piping Supports –

Horizontal piping shall be supported at sufficiently close intervals to prevent sagging. Trapeze hangers may be used. Pipe, where top of the pipe is 12" or more from supporting structure shall be braced on each side of a change of direction of 90 degrees or more.

D) Traverse bracing

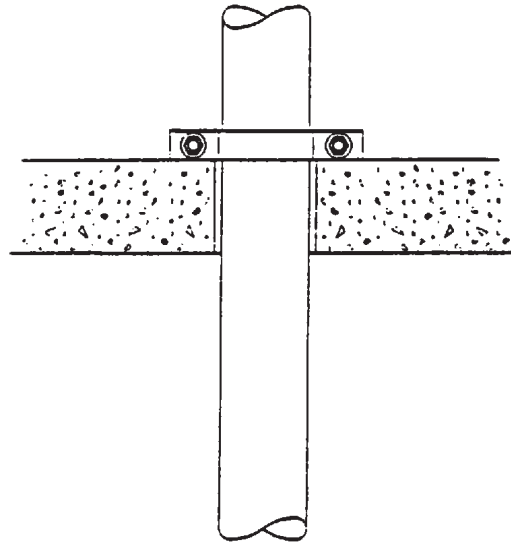
40'-0" o.c. maximum spacing unless otherwise noted. One pipe section may act as longitudinal bracing for the pipe section connected perpendicular to it, if the bracing is installed with 24" of the elbow or tee of similar size.

E) Longitudinal bracing

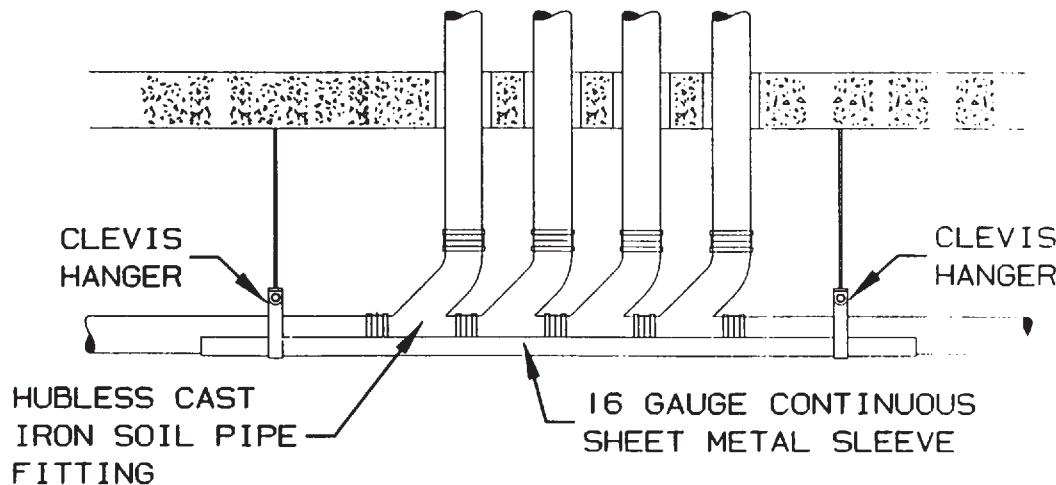
80'-0" o.c. maximum spacing unless otherwise noted.

F) Miscellaneous

- a) Provide large enough pipe sleeves through walls or floors to allow for anticipated differential movements.



WHERE MULTIPLE SHIELD AND CLAMP JOINTS OCCUR IN A CLOSELY SPACED ASSEMBLY (I.E. FITTING-FITTING-FITTING, ETC.) A 16 GAUGE HALF SLEEVE MAY BE INSTALLED UNDER THE ASSEMBLY WITH A PIPE HANGER AT EACH END OF THE SLEEVE.¹



METHOD OF SUPPORTING "MULTI-FITTING" INSTALLATIONS
(HANGER SPACING 10 ft. MAX.)

FIGURE 8 – FOR SEISMIC BRACING ONLY

NOTE: SEISMIC BRACES MAY BE INSTALLED AT EITHER HANGER, BRACES AT BOTH HANGERS ARE NOT REQUIRED.

¹ Reprinted with permission of the Plumbing & Piping Industry Council, Inc.

Vertical Piping.

Vertical components should be secured at each stack base and at sufficiently close intervals to keep the system in alignment and to adequately support the weight of the pipe and its contents. Floor clamps, sometimes called friction clamps, are required for vertical piping in multi-story structures in order for each floor to carry its share of the load. Figures 9 and 10 show some typical brackets or braces for vertical piping. Figure 11 shows a method of clamping the pipe at each floor, using a friction or floor clamp.

If vertical piping is to stand free of any support or if no structural element is available for support and stability during construction, secure the piping in its proper position by means of adequate metal stakes or braces fastened to the pipe.

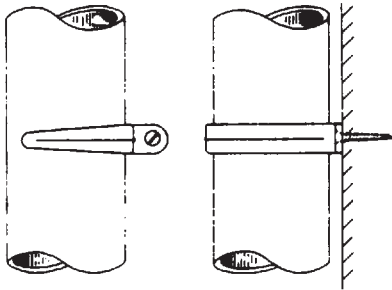


FIGURE 9 — BRACKET FOR VERTICAL PIPE

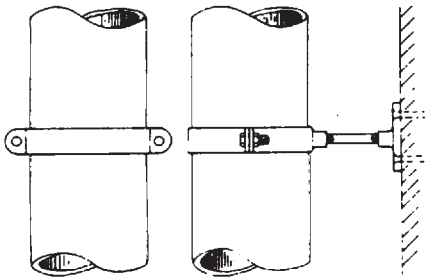


FIGURE 10 — ONE HOLE STRAP FOR VERTICAL PIPE

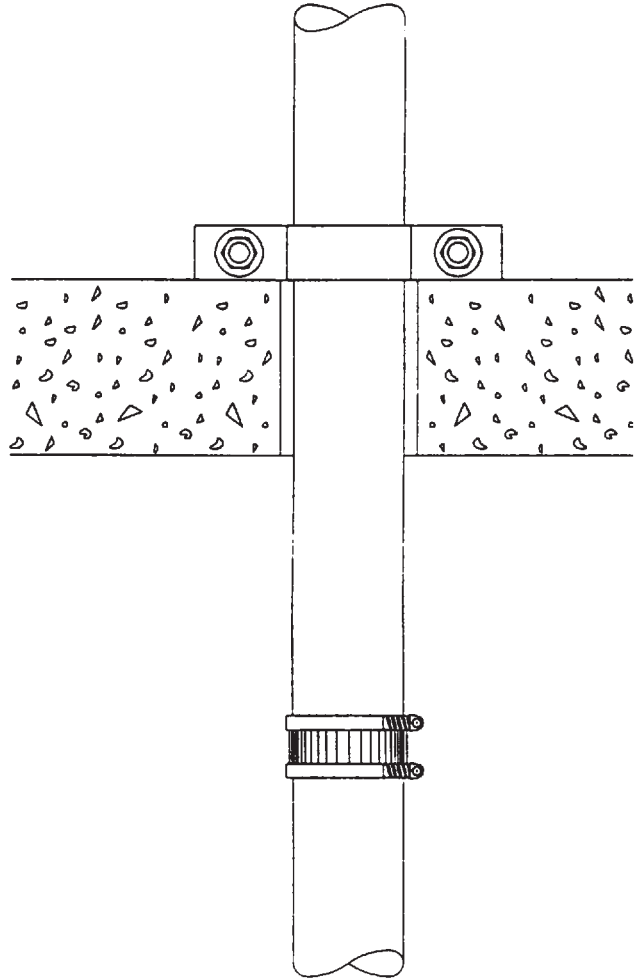


FIGURE 11 — METHOD OF CLAMPING THE PIPE AT EACH FLOOR, USING A FRICTION CLAMP OR FLOOR CLAMP

TESTING AND INSPECTION

Once the roughing-in is completed on a cast iron piping project, it is important to test and inspect all piping for leaks. The installer usually is required to notify the plumbing inspector of the administrative authority having jurisdiction over plumbing work before the tests are made. Concealed work should remain uncovered until the required tests are made and approved. When testing, the system should be properly restrained at all bends, changes of direction, and ends of runs.

There are various types of tests used for the installed cast iron soil pipe and fittings. These are *water or hydrostatic, air, smoke and peppermint*. Proper safety procedures and protective equipment should be employed during all testing procedures. Installers should always consider local conditions, codes, manufacturer installation instructions, and architect/engineer instructions in any installation.

A *water test*, also called a *hydrostatic test* is made of all parts of the drainage system before the pipe is concealed or fixtures are in place. This test is the most representative of operating conditions of the system. Tests of this type may be made in sections on large projects. After all air is expelled, all parts of the system are subjected to 10 feet of hydrostatic pressure (4.3 PSI) and checked for leaks.

Test Procedures:

Water Test – A water or hydrostatic test is the most common of all tests used to inspect a completed cast iron soil pipe installation. The purpose of the test is to locate any leaks at the joints and correct these prior to putting the system in service. Since it is important to be able to visually inspect the joints, water tests should be conducted prior to the “closing in” of the piping or back fill of the underground piping.

As water fills a vertical cylinder or vertical pipe it creates hydrostatic pressure. The pressure increases as the height of water in the vertical pipe increases. The Cast Iron Soil Pipe Institute recommends 10 feet of hydrostatic pressure (4.3 pounds per square inch). This is the recommended test by most plumbing codes. To isolate each floor or section being tested, test plugs are inserted through test tees installed in the stacks. All other openings should be plugged or capped with test plugs or test caps (see Figure 12).

Prior to the beginning of the test, all bends, changes of direction and ends of runs should be properly restrained. During the test, thrust forces are exerted at these locations. Thrust is equal to the hydrostatic pressure multiplied by area. Thrust pressures, if not restrained, will result in joint movement or separation causing failure of the test. All air entrapped in the system should be expelled prior to beginning the tests.

Once the stack is filled to ten feet, an inspector makes a visual inspection of the section being tested to check for joint leaks. In most cases, where these leaks are found, hubless couplings have not been torqued to the recommended 60 in. pounds or for couplings requiring higher torque improper torquing occurred. Proper torquing will correct the problem. If leaks occur during testing of hub and spigot materials the joint should be disassembled and checked for proper installation.

Fifteen minutes is a suitable time for the water test. Once the system has been successfully tested it should be drained and the next section should be prepared for test.

Thrust Forces:

Thrust or displacement forces are encountered as the pipe or cylinder is filled with water. The higher the fill the greater the force acting to separate a joint. The Thrust Table shows the pounds of force tending to cause joint separation when using pipe from 1 1/2" to 15" and a head of water from 10' to 120'.

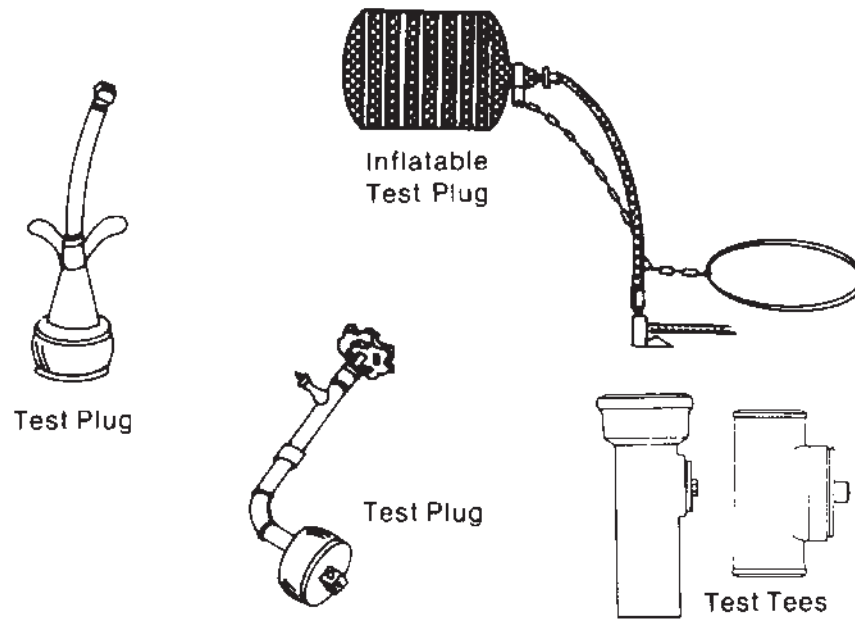
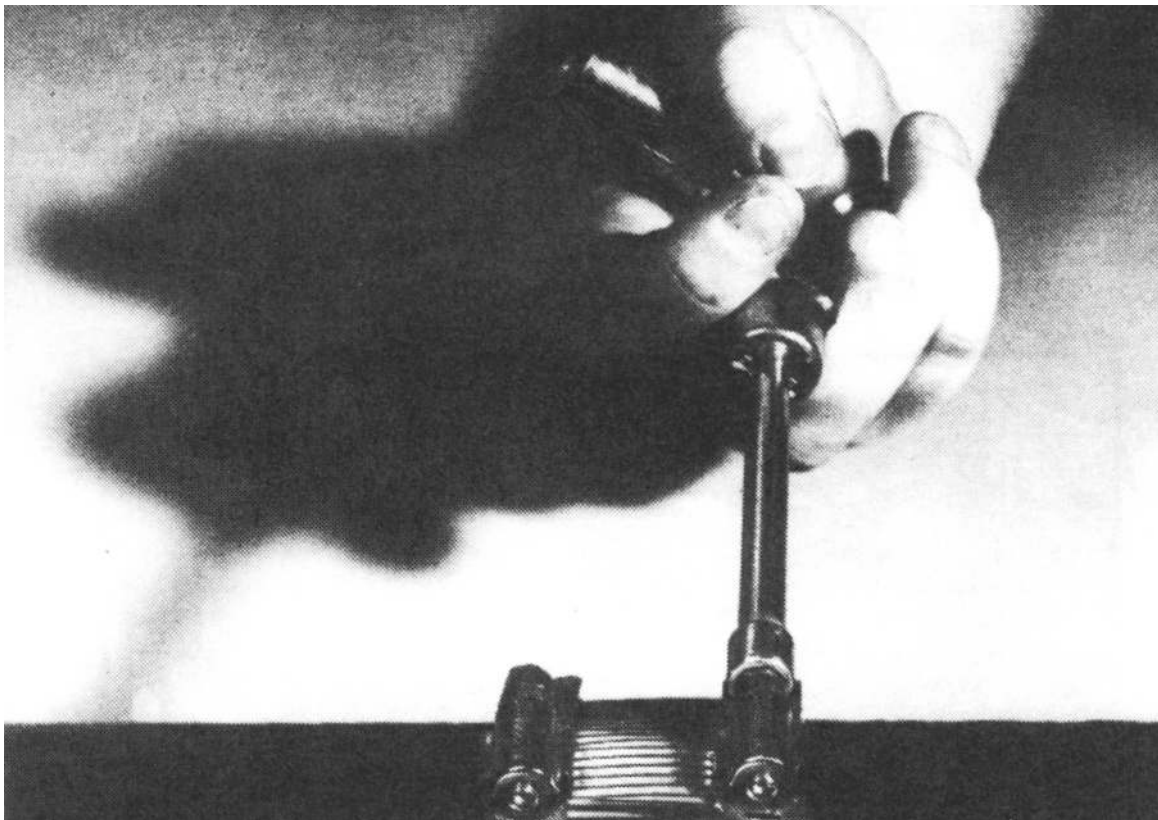
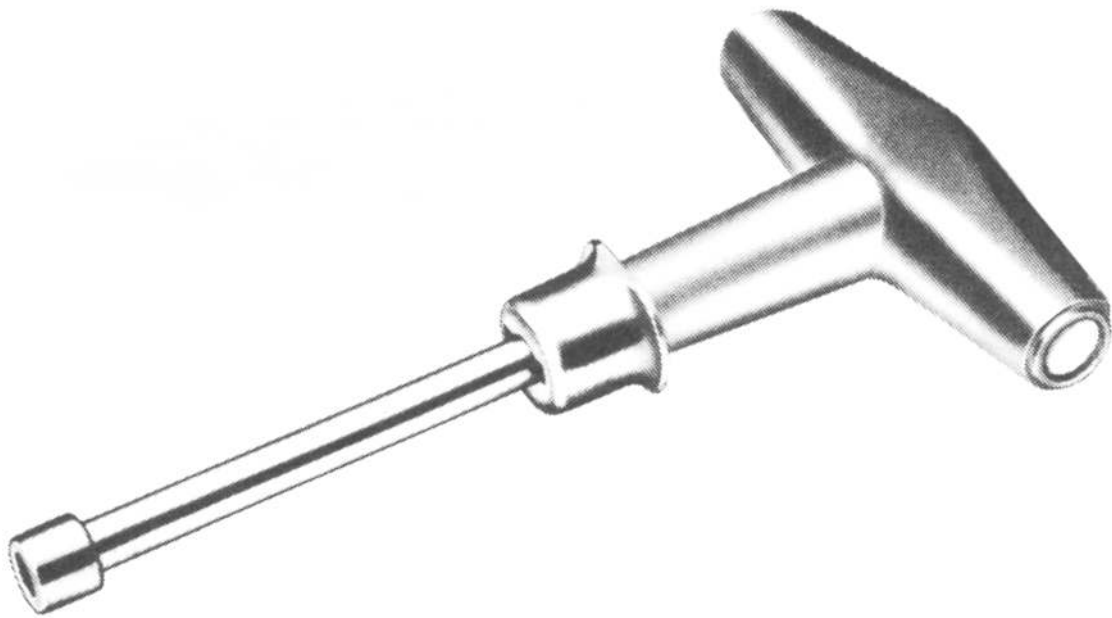


FIGURE. 12 –ILLUSTRATION OF TEST PLUGS AND TEST TEES

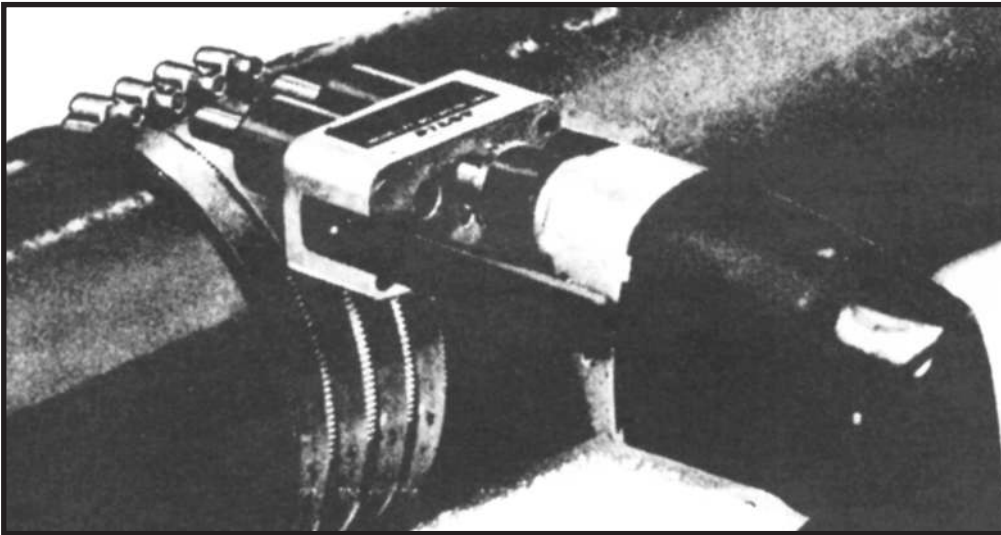
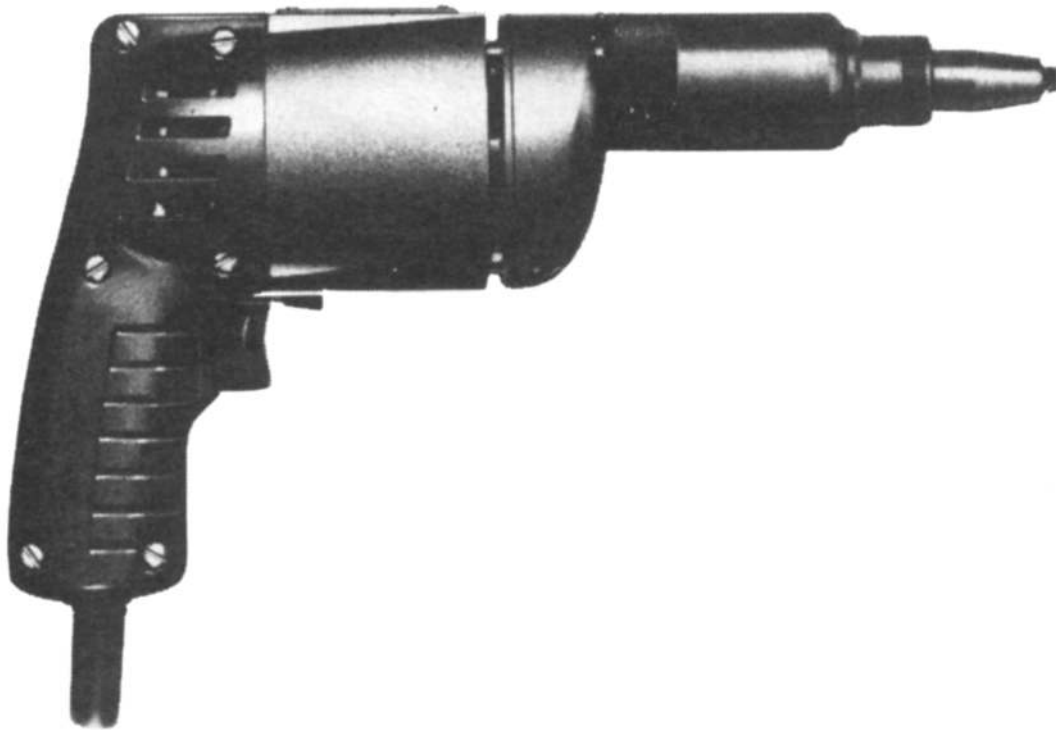
THRUST TABLE
*Thrust or Displacement Forces Encountered in
Hydrostatic Testing of Hubless Cast Iron Soil Pipe*

PIPE SIZE		1½"	2"	3"	4"	5"	6"	8"	10"	12"	15"
HEAD, Feet of Water	PSI	THRUST lb.	THRUST lb.	THRUST lb.	THRUST lb.	THRUST lb.	THRUST lb.	THRUST lb.	THRUST lb.	THRUST lb.	THRUST lb.
10	4.3	12	19	38	65	95	134	237	377	538	847
20	8.7	25	38	77	131	192	271	480	762	1088	1714
30	13.0	37	56	115	196	287	405	717	1139	1626	2562
40	17.3	49	75	152	261	382	539	954	1515	2164	3409
50	21.7	62	94	191	327	479	676	1197	1900	2714	4276
60	26.0	74	113	229	392	574	810	1434	2277	3252	5124
70	30.3	86	132	267	457	668	944	1671	2654	3790	5971
80	34.7	99	151	306	523	765	1082	1914	3039	4340	6838
90	39.0	111	169	344	588	860	1216	2151	3416	4878	7685
100	43.4	123	188	382	654	957	1353	2394	3801	5429	8552
110	47.7	135	208	420	719	1052	1487	2631	4178	5967	9400
120	52.0	147	226	458	784	1147	1621	2868	4554	6505	10247
AREA, OD. in. ²		2.84	4.34	8.81	15.07	22.06	31.17	55.15	87.58	125.09	197.06

Thrust = Pressure x Area



Typical manually operated 60 inch pound torque wrenches used for coupling assembly.



Typical power operated torque tools used for coupling assembly.

NOTES