

ASME A112.3.1-2007
(Revision of ASME A112.3.1-1993)

Stainless Steel Drainage Systems for Sanitary DWV, Storm, and Vacuum Applications, Above- and Below-Ground

AN AMERICAN NATIONAL STANDARD



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Mechanical Engineers**

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Three Park Avenue • New York, NY 10016

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FOREWORD

In the fall of 1990, The American Society of Mechanical Engineers was solicited by Blücher-Josam to develop a standard for stainless steel pipe, fittings, and drains. Additional modifications were made based upon solicited comments and the evaluation of test results.

The first edition of this Standard was approved by the American National Standards Institute (ANSI) in 1993. Comments that were received in the public review process and not addressed in the original edition form the basis of this revision.

Suggestions for improvement of this Standard will be welcomed. They should be sent to The American Society of Mechanical Engineers, Attn: Secretary, A112 Standards Committee, Three Park Avenue, New York, NY 10016-5990.

This revision was approved by the American National Standards Institute on July 11, 2007.

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Standardization of Plumbing Materials and Equipment

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Secretary, A112 Standards Committee
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Three Park Avenue
New York, NY 10016-5990

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The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the edition, the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal including any pertinent documentation. When appropriate, proposals should be submitted using the A112 Project Initiation Request Form.

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The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format will be rewritten in this format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

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STAINLESS STEEL DRAINAGE SYSTEMS FOR SANITARY DWV, STORM, AND VACUUM APPLICATIONS, ABOVE- AND BELOW-GROUND

1 GENERAL

1.1 Scope

This Standard establishes material, dimensions, mechanical, and physical (including marking) requirements for socket-type, seam-welded, stainless steel pipe, fittings, joints, and drains for use in plumbing sanitary and storm, drain, waste, and vent (DWV), and vacuum systems. It includes minimum requirements for workmanship, dimensions, weld strength, pressure testing, and marking that incorporates a push-fit joining method.

NOTE: Material suitability for specific chemical applications shall be determined by a qualified engineer or ascertained from the manufacturer.

1.2 Units of Measurement

Values are stated in the International System of units (SI) and in U.S. Customary (Inch) units. The SI units shall be considered as the standard.

1.3 Reference Standards

The following is a list of publications referenced in this Standard. The latest edition shall apply.

ASME B1.20.1, Pipe Threads, General Purpose (Inch)

ASME B16.5, Pipe Flanges and Flange Fittings

Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990; ASME Order Department: 22 Law Drive, P.O. Box 2300, Fairfield, NJ 07007-2300

ASTM D 412, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers — Tension

ASTM D 471, Test Methods for Rubber Property — Effect of Liquids

ASTM D 573, Test Method for Rubber Deterioration in an Air Oven

ASTM D 624, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

ASTM D 1149, Test Method for Rubber Deterioration — Surface Ozone Cracking in a Chamber

ASTM D 2240, Test Method for Rubber Property — Durometer Hardness

ASTM E 8, Standard Test Methods for Tension Testing of Metallic Materials

ASTM E 10, Standard Test Method for Brinell Hardness of Metallic Materials

ASTM E 527, Standard Practice for Numbering Metals and Alloys (UNS)

Publisher: ASTM International (ASTM), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959

(ISS) UNS S30400, Type 304 Stainless Steel

(ISS) UNS S31603, Type 316L Stainless Steel

Publisher: The Iron and Steel Society (ISS), 186 Thorn Hill Road, Warrendale, PA 15086-7528

1.4 Definitions

adjustable floor drain: a floor drain designed for use in finished floor area, including showers, with an adjustable strainer and a seepage flange on the body.

anchor flange: a horizontal flange extending from the side of the drain body, which anchors the drain to a surface or subsurface.

area drain: a manufactured receptacle designed to receive and convey runoff water or other liquid from the area immediately adjacent to the building structure to the drainage system.

auxiliary inlet: a connection inside of a drain body sump, which receives discharge from another fixture, appliance, or drain.

backwater valve: a device that is used to prevent backflow of waste or storm water from a building drainage piping system into the building.

below-ground: direct burial of the drainage system under soil or concrete.

clamping device: a device to secure a waterproof membrane. Where a metallic or composition flashing is attached, the clamping device shall be secured with a ring or collar to the drain.

DWV: drain, waste, and vent.

EPDM: ethylene propylene diene monomer.

extension: a device used to raise a grate to floor level where necessary.

filter basket: a perforated device inserted in a drain body to minimize debris before it enters the drain line.

floor cleanout: a pipe fitting with a cover, which permits access to a drain line from a finished floor level.

floor drain: a manufactured receptacle designed to receive and convey drainage runoff from finished or unfinished floor areas, including showers.

FPM: fluorine rubber.

hinged grate: used where access to a drain is required without completely removing a secured grate.

joint component: any gasket, collar, clamp, or other device used to connect pipe to pipe or pipe to fitting, in the form of a mechanical joint.

mill certificate: a certificate certifying a specific quality.

NBR: nitrile rubber.

nominal: for identification only, not the measurement of size of pipe.

open area: total area of the drainage openings in the grate.

passivate: to treat or coat (a metal), in order to reduce the chemical reactivity of its surface.

pickle: a chemical solution, such as an acid, that is used to remove scale and oxides from the surface(s) of metals.

push-fit joint: a method of manually joining a spigot and socket.

removable trap: a trap assembly that is made of Type 316L that shall be equipped with a removable water seal element to facilitate cleaning of the drain.

secondary strainer: an additional strainer set in the base of the drain body sump that minimizes debris that might pass through grate openings.

sediment bucket: a device used to minimize debris before it enters the drain lines.

socket: the female end of a piece of pipe, fitting or drain.

spigot: the male end of a piece of pipe, fitting or drain.

trap primer connection: a tapped boss on drain body used to receive discharge from a trap primer valve or other priming device.

trench drain: a long, narrow, manufactured receptor designed to receive and convey to the drainage system, runoff water, or other liquids from the area immediately adjacent to the building structure.

1.5 Nonmandatory Appendix A

Nonmandatory Appendix A provides the requirements for the handling and installation of the stainless steel DWV pipe, fittings, and drain systems for sanitary, storm, and vacuum use.

2 REQUIREMENTS

2.1 Dimensions

All dimensions for stainless steel pipe, fittings, drains, and adapters are found in Tables 1 through 47. All threaded inch values shall comply to ASME B1.20.1. Threaded dimensions shall be identified as either “inch dimensions” according to ASME B1.20.1 or “standard metric thread” depending on which thread is used for the particular threaded connection.

2.2 Tolerances, Dimensions, Other Patterns, and Interchangeability

Other patterns of pipe and fittings not specifically found within this Standard shall meet the dimensional requirements of Table 1.

2.3 Alloys

The pipe shall be produced by the welding of sheet steel produced in accordance with the grading of alloy as described by the Iron and Steel Society UNS S30400, Type 304 and UNS S31603, Type 316L. The chemical composition of which is in accordance with the applicable standard. Type 304 shall be used for above-ground applications. Only Type 316L shall be allowed above ground, used for below-ground applications, or where the discharge effluent requires Type 316L. See the manufacturers’ recommendations for application. When requested by the purchaser, the fabricator of the pipe and fittings shall furnish certifications from the steel manufacturer that the pipe and fittings were manufactured from Type 304 and Type 316L stainless steel alloy as required by this Standard.

2.4 Welded Fabrication

After fabrication, welded components shall be treated to remove discoloration and contaminants by being pickled and passivated or by other means such as grinding and polishing so that the discoloration and contaminations from welding are removed. Burrs, edges, and irregularities in the welding seam area shall not exceed 0.3 mm (0.012 in.). Pipes and fittings shall be tested in accordance with performance tests found in para. 3.4.

2.5 Straightness of Pipe

Pipes shall be straight. Measured along the pipe barrel, the deflection over the length of the 1-m (39.4-in.) section shall not deflect more than 1.5 mm (0.06 in.) in the middle.

2.6 Ends of Pipe and Fittings (Spigot)

The pipe and fitting ends shall be perpendicular to the pipe wall. Pipe ends shall be smooth and free of irregularities so as not to interfere with the normal joining of the product.

2.7 Cutting and Deburring

Pipe shall be field-cut with a combination factory tool that results in a cut that is square, clean, and free of burrs. An approved manufacturer's cutting fluid shall be used during the cutting and beveling process. The manufacturer's cutting fluid shall be wiped off so that it shall not come in contact with the O-ring (internal sealing ring). The installer shall follow the manufacturer's installation recommendations.

2.8 Sockets

Pipe shall be plain-end, single-socket, or double-socket. Pipe fittings shall have one socket for each inlet or branch connection designed to join directly to the spigot end of a pipe or pipe fitting made to this Standard. An accessory fitting such as a floor flanges, trench drains, cleanouts, and plugs shall have only one spigot for connection to a socket or spigot.

2.9 Adapters for Transition to Other Piping Materials

Joints between dissimilar piping materials shall be made using applicable mechanical joint couplings that meet their applicable materials standard for that material.

2.10 Drain Requirements

Drain outlet dimensions shall comply with the dimensional requirements in Table 1.

2.11 Outlets Types and Connections

2.11.1 Outlet Types. Drains shall be manufactured with a horizontal or vertical outlet.

2.11.2 Outlet Connections. Connections shall be of the spigot, optional threaded, or caulk type.

2.12 Drain Top Configuration

The open area of the drain top shall be at the option of the manufacturer provided it meets the open area requirements of Table 48.

2.13 Grate Openings

The openings in the grate shall be any geometric shape. The open area shall be in accordance with Table 48.

2.14 Variations in Drains

The optional features listed are stated to identify the variations available for different applications. Variations shall be included, but not limited to

- (a) extensions
- (b) anchor flanges
- (c) backwater valves
- (d) auxiliary inlets
- (e) clamping devices
- (f) special grates

- (g) cleanouts
- (h) secondary strainers
- (i) sediment buckets
- (j) trap primer connections
- (k) removable trap seals

2.15 Applicability

Components made of other materials shall be in accordance with their applicable product standards, codes, or listing (where available), and the joint shall be in accordance with the requirements of this Standard.

2.16 Joints

The joints shall be of a smooth and clean surface. Surfaces shall not have any defects or irregularities, which could affect the functioning or which would interfere with normal joining of the product.

2.17 Internal Sealing Ring (O-Ring)

Different sealing ring materials shall be permitted to accommodate various applications in accordance with the manufacturer's instructions. Material shall be marked or color-coded by the manufacturer as acceptable to identify.

2.18 Other Gravity and Vacuum Fittings

Custom-fabricated fittings, to transport sanitary waste and various other fluids and effluents, shall meet the dimensional requirements of this Standard when required.

2.19 Other Floor Drain Dimensions

Floor drain dimensions shall comply with Tables 39 through 44.

2.20 Cleanout Fitting

Stainless steel, gas-tight covers shall comply with Table 45.

2.21 Stainless Steel, Floor Drain Water Trap

Stainless steel, floor drain water traps shall comply with Table 46.

2.22 Other Trench Drain Dimensions

Trench drain dimensions shall comply with Table 47.

3 TEST METHODS AND PERFORMANCE REQUIREMENTS

3.1 Tensile Strength

Mill certificates shall be furnished upon request to verify tensile strength in compliance with the minimum requirements. The pipe and fittings for Type 304 stainless steel shall have a minimum tensile strength of 500 MPa (73,000 psi). The pipe and fittings for Type 316L stainless

steel shall have a minimum tensile strength of 485 MPa (71,000 psi).

3.2 Hardness Pipe and Fittings

3.2.1 Type 304. The Brinell Hardness for Type 304 stainless steel shall be between 130 and 180.

3.2.2 Type 316L. The Brinell Hardness for Type 316L stainless steel shall be between 120 and 180.

3.3 Water Tightness of Welds and Pipe Joints

3.3.1 All pipe fittings and joints shall be watertight from 0 kPa to 50 kPa (0 psi to 7.25 psi). Testing shall be performed in accordance with para. 3.4.1.

3.3.2 For use in areas subject to elevated pressure (e.g., lift stations and rainwater leaders subject to back-ups) the manufacturer shall establish maximum pressure rating according to the test described in para. 3.4.2.

3.4 Weld and Joint Test

3.4.1 Test Method. A representative assembly of the fittings being listed that includes the pipe and joints shall be restrained per the manufacturer's final installation guidelines at ambient temperature under hydrostatic pressure 50 kPa (7.25 psi) for 20 min. There shall be no leaks.

3.4.2 If the manufacturer's pressure rating is higher than 50 kPa (7.25 psi) and after a successful test per para. 3.4.1, the hydrostatic pressure shall be increased in increments of 50 kPa (7.25 psi) up to 300 kPa (43.51 psi) and observed for 5 min at each increment. Any leaking shall be considered a failure. The last successful test increment shall be recorded as maximum pressure rating for intermittent, elevated pressures.

3.5 Internal Sealing Ring (O-Ring)

3.5.1 Test Methods and Performance Requirements. Elastomeric sealing rings shall comply with the following:

(a) Elongation shall be a minimum of 250% when tested in accordance with ASTM D 412.

(b) Tear resistance shall be a minimum of 150 lb/in. when tested in accordance with ASTM D 624 using Die c.

(c) Resistance to heat aging shall be determined as follows when conditioned in accordance with ASTM D 573 at $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for $96 \text{ H} \pm 0.5 \text{ H}$:

(1) maximum increase in hardness of 10 points when tested in accordance with ASTM D 2240 (Shore A durometer)

(2) maximum loss in tensile strength of 15% when tested in accordance with ASTM D 412

(3) maximum loss in elongation of 20% when tested in accordance with ASTM D 412

(d) Water absorption (as measured by the change in mass of the specimen) shall not exceed 20% when tested in accordance with ASTM D 471 at $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for $116 \text{ H} \pm 1.5 \text{ H}$ using distilled water as a standard test liquid.

(e) The elastomer shall exhibit no cracking at 2X magnification when tested in accordance with ASTM D 1149 (Specimen A) at $40^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for $100 \text{ H} \pm 1 \text{ H}$ in an ozone concentration of 0.5 ppm (volume \pm ratio).

(f) The volume increase of the specimen due to immersion in ASTM oil IMR 903 shall not be more than 80% when tested in accordance with ASTM D 471 at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for $70 \text{ hr} \pm 0.5 \text{ hr}$.

3.6 Vacuum Test

A vacuum test shall be performed to establish suitability for use of the pipe system in land-based vacuum service, transportation-based vacuum service, and siphonic roof drainage systems. A test specimen shall be fabricated consisting of a minimum of three fitting joints. The pipes shall be restrained to the test apparatus. The test specimen shall be subjected to a vacuum of $-82.7 \text{ kPa} \pm 1.7 \text{ kPa}$ ($-24.5 \text{ in. Hg} \pm 0.5 \text{ in. Hg}$) at a temperature of $20^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ($68^{\circ}\text{F} \pm 5^{\circ}\text{F}$). Once the required vacuum is established, isolate the test assembly and monitor vacuum for 1 hr. Test shall be performed subsequent to any change in design or material applicable to the pipe joint.

3.6.1 Acceptance Criteria. The maximum allowable drop in vacuum is 7 kPa (2 in. of mercury).

4 MARKINGS

Pipe, fittings, and drains shall be permanently marked with the following:

(a) manufacturer's name or registered trademark.

(b) SI or customary nominal size.

(c) date of manufacture (year, month, and day) on all pipe and fittings.

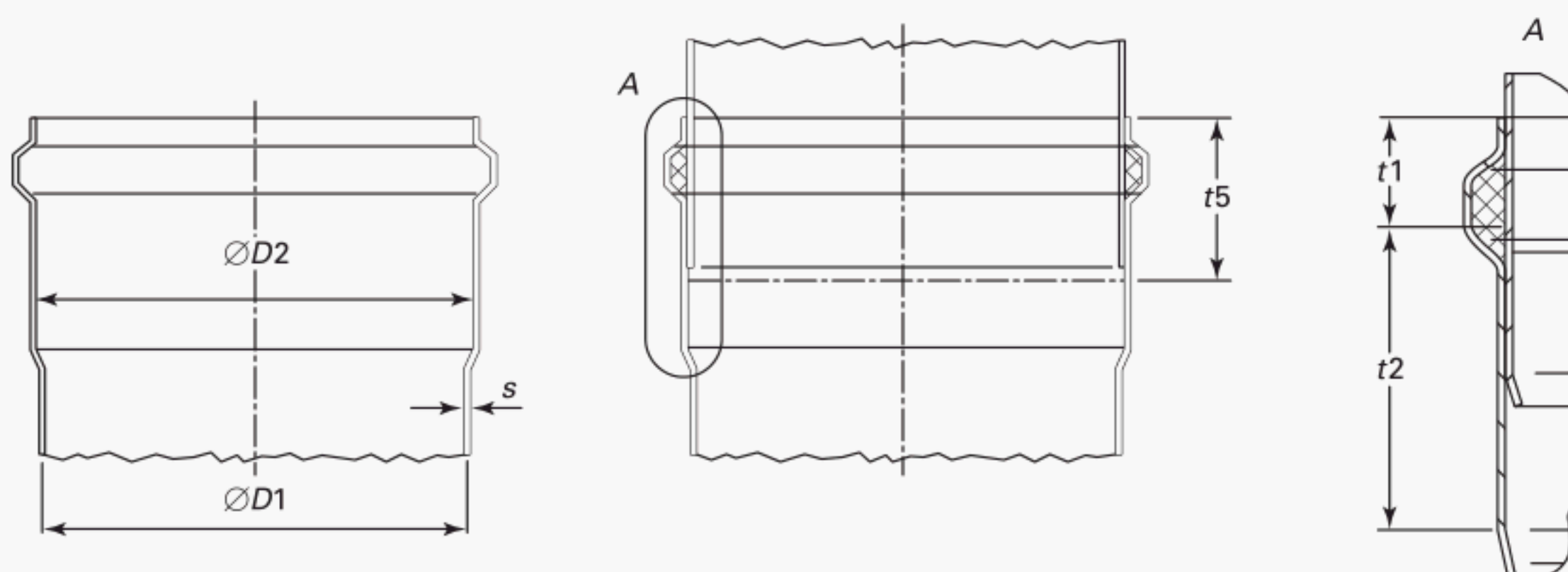
(d) Type of alloy pipe, Type 304 and Type 316L shall be marked along the continuous length of pipe. Type 304 shall be marked to read "above-ground only."

5 FLOOR DRAIN DIMENSIONS

Floor drain dimensions shall be as shown in Tables 39 through 44.

6 TRENCH DRAIN DIMENSIONS

Trench drain dimensions shall be as shown in Table 47.

Table 1 Dimensions

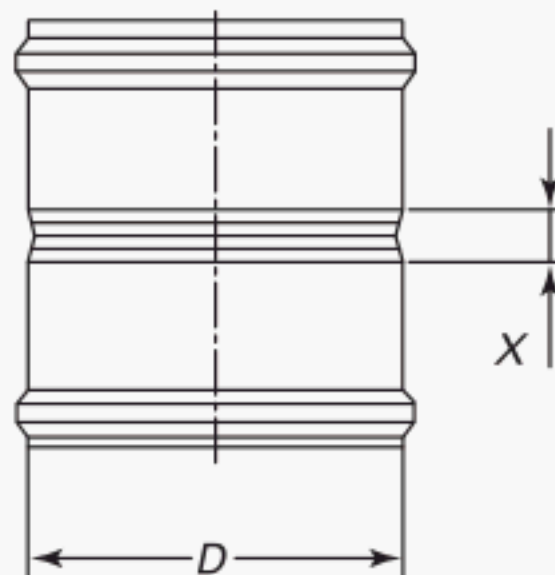
NPS	Outside Diameter, $D1$	Socket Inside Diameter, $D2$	Wall Thickness, s	Maximum Effective Sealing Point, $t1$	Minimum Insertion Depth Beyond Sealing Point, $t2$	Minimum Insertion Depth 1, $t5$
40 mm 1½ in.	40 (+0.2/-0) mm 1.57 (+0.008/-0) in.	40.7 (+0.5/-0) mm 1.60 (+0.02/-0) in.	1.00 (±0.2) mm 0.039 (±0.008) in.	18 mm 0.71 in.	18 mm 0.71 in.	30 mm 1.18 in.
50 mm 2 in.	50 (+0.2/-0) mm 1.97 (+0.008/-0) in.	50.5 (+0.6/-0) mm 1.99 (+0.024/-0) in.	1.00 (±0.2) mm 0.039 (±0.008) in.	18 mm 0.71 in.	20 mm 0.787 in.	30 mm 1.18 in.
75 mm 3 in.	75 (+0.3/-0) mm 2.95 (+0.012/-0) in.	75.6 (+0.6/-0) mm 2.98 (+0.024/-0) in.	1.00 (±0.2) mm 0.039 (±0.008) in.	20 mm 0.787 in.	25 mm 0.98 in.	35 mm 1.38 in.
82 mm 3¼ in.	82.4 (+0.3/-0) mm 3.24 (+0.012/-0) in.	83.2 (+0.4/-0) mm 3.28 (+0.016/-0) in.	1.00 (±0.2) mm 0.039 (±0.008) in.	20 mm 0.787 in.	30 mm 1.18 in.	35 mm 1.38 in.
90 mm 3½ in.	90 (+0.3/-0) mm 3.54 (+0.012/-0) in.	90.8 (+0.5/-0) mm 3.57 (+0.02/-0) in.	1.00 (±0.2) mm 0.039 (±0.008) in.	24 mm 0.94 in.	30 mm 1.18 in.	40 mm 1.57 in.
110 mm 4 in.	110 (+0.3/-0) mm 4.33 (+0.012/-0) in.	110.6 (+0.7/-0) mm 4.35 (+0.028/-0) in.	1.00 (±0.2) mm 0.039 (±0.008) in.	26 mm 1.02 in.	32 mm 1.26 in.	40 mm 1.57 in.
125 mm 5 in.	125 (+0.3/-0) mm 4.92 (+0.012/-0) in.	125.8 (+0.6/-0) mm 4.95 (+0.024/-0) in.	1.00 (±0.2) mm 0.039 (±0.008) in.	26 mm 1.02 in.	35 mm 1.38 in.	45 mm 1.77 in.
160 mm 6 in.	160 (+0.4/-0) mm 6.30 (+0.016/0) in.	160.7 (+0.8/-0) mm 6.33 (+0.03/-0) in.	1.25 (±0.2) mm 0.049 (±0.008) in.	32 mm 1.26 in.	42 mm 1.62 in.	50 mm 1.97 in.
200 mm 8 in.	200 (+0.4/-0) mm 7.87 (+0.016/0) in.	200.8 (+0.8/-0) mm 7.91 (+0.03/-0) in.	1.50 (±0.3) mm 0.059 (±0.012) in.	40 mm 1.57 in.	50 mm 1.97 in.	55 mm 2.17 in.
250 mm 10 in.	250 (+0.5/-0) mm 9.84 (+0.02/-0) in.	251.0 (+0.8/-0) mm 9.88 (+0.03/-0) in.	1.50 (±0.3) mm 0.059 (±0.012) in.	45 mm 1.77 in.	55 mm 2.17 in.	65 mm 2.56 in.
315 mm 12 in.	315 (+0.6/-0) mm 12.4 (+0.024/-0) in.	316.2 (+0.8/-0) mm 12.45 (+0.03/-0) in.	1.50 (±0.3) mm 0.059 (±0.012) in.	45 mm 1.77 in.	62 mm 2.44 in.	65 mm 2.56 in.

Table 2 Pipe-Laying Lengths Dimensions

<i>L</i> (mm)	<i>L</i> (ft-in.) (± in.)
6 000 (±5)	19–8.22 (±0.197)
5 000 (±5)	16–4.85 (±0.197)
4 000 (±5)	13–1.48 (±0.197)
3 000 (±5)	9–10.11 (±0.197)
2 000 (±5)	6–6.74 (±0.197)
1 500 (±5)	4–11.06 (±0.197)
1 000 (±5)	3–3.73 (±0.197)
750 (±5)	2–5.53 (±0.197)
500 (±5)	1–7.69 (±0.197)
250 (±5)	0–9.84 (±0.197)
150 (±5)	0–5.91 (±0.197)

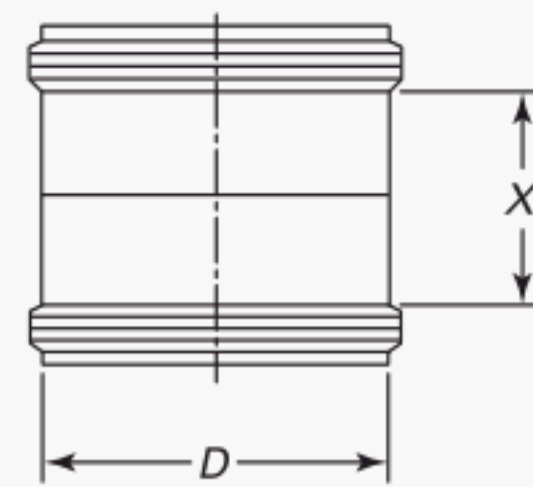
GENERAL NOTES:

- (a) Refer to Table 1 for socket and spigot dimensions.
 (b) Additional lengths may be offered and must meet the 5 mm (0.197 in.) tolerance on length. Alternate lengths may be offered provided that the maximum increment between pipe lengths is 1 m (39.4 in.).

Table 3 Stainless Steel, Double Ringseal Socket

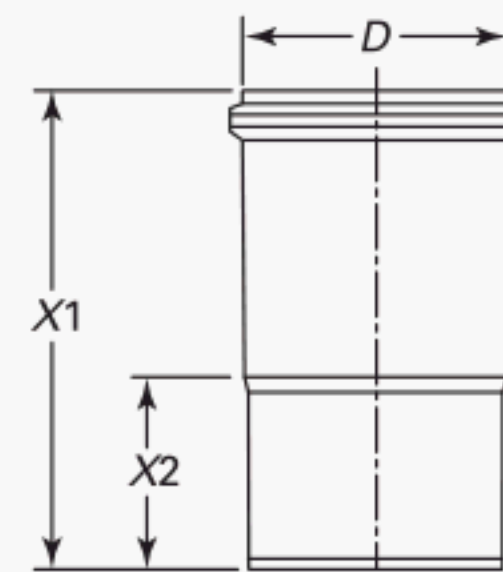
<i>D</i> (Nominal)	<i>X</i>
200 mm 8 in.	20 mm 0.79 in.
160 mm 6 in.	35 mm 1.38 in.
125 mm 5 in.	20 mm 0.79 in.
110 mm 4 in.	16 mm 0.63 in.
75 mm 3 in.	19 mm 0.75 in.
50 mm 2 in.	14 mm 0.55 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 4 Stainless Steel, Sliding Ringseal Socket

<i>D</i> (Nominal)	<i>X</i>
200 mm 8 in.	147 mm 5.79 in.
160 mm 6 in.	81 mm 3.19 in.
125 mm 5 in.	78 mm 3.07 in.
110 mm 4 in.	67 mm 2.64 in.
75 mm 3 in.	50 mm 1.97 in.
50 mm 2 in.	37 mm 1.46 in.

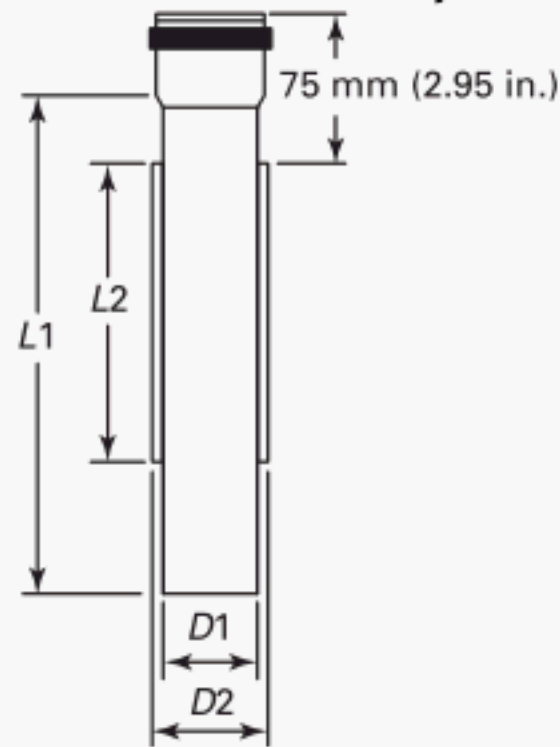
GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 5 Stainless Steel Expansion Socket

<i>D</i> (Nominal)	<i>X1</i>	<i>X2</i>
160 mm 6 in.	292 mm 11.50 in.	122 mm 4.80 in.
110 mm 4 in.	200 mm 7.87 in.	79 mm 3.11 in.
75 mm 3 in.	175 mm 6.89 in.	62 mm 2.44 in.
50 mm 2 in.	159 mm 6.26 in.	57 mm 2.24 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

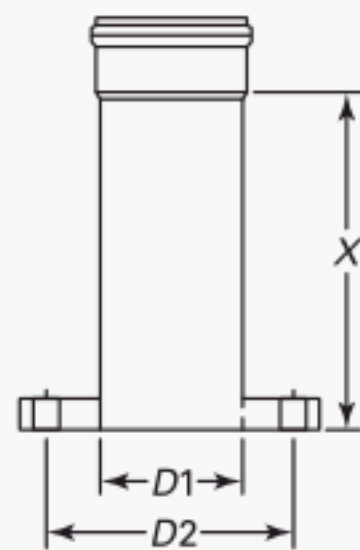
Table 6 Stainless Steel, Bulkhead Penetration Pipe



D1 (Nominal)	D2	L1	L2
50 mm 2 in.	60 mm 2.36 in.	150 mm 5.90 in.	50 mm 1.97 in.
50 mm 2 in.	60 mm 2.36 in.	250 mm 9.84 in.	100 mm 3.94 in.
50 mm 2 in.	60 mm 2.36 in.	500 mm 19.67 in.	100 mm 3.94 in.
75 mm 3 in.	85 mm 3.35 in.	150 mm 5.90 in.	50 mm 1.97 in.
75 mm 3 in.	85 mm 3.35 in.	250 mm 9.84 in.	100 mm 3.94 in.
75 mm 3 in.	85 mm 3.35 in.	500 mm 19.87 in.	100 mm 3.94 in.
110 mm 4 in.	120 mm 4.72 in.	150 mm 5.90 in.	50 mm 1.97 in.
110 mm 4 in.	120 mm 4.72 in.	250 mm 9.84 in.	100 mm 3.94 in.
110 mm 4 in.	120 mm 4.72 in.	500 mm 19.87 in.	100 mm 3.94 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 7 Stainless Steel Pipe With 150-lb Flange Adapter

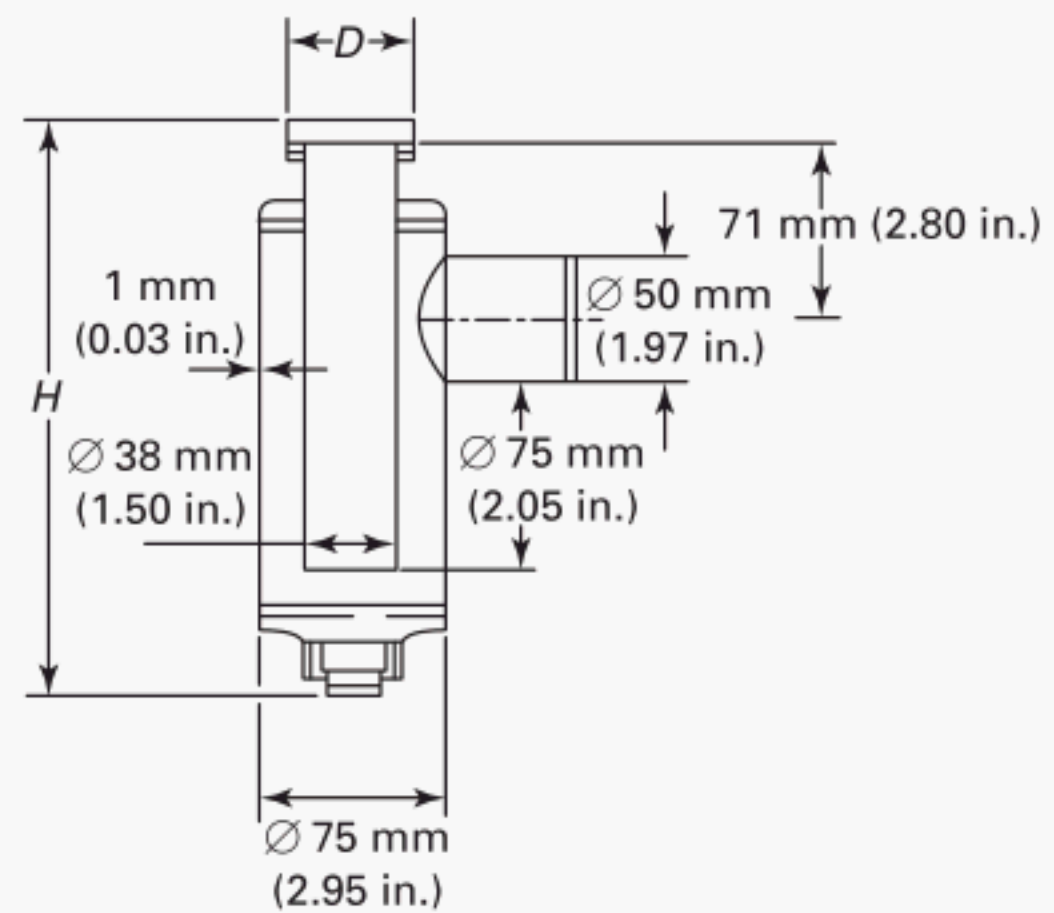


<i>D1 (Nominal)</i>	<i>D2</i>	<i>X</i>
160 mm 6 in.	242 mm 9.53 in.	254 mm 10.00 in.
110 mm 4 in.	191 mm 7.52 in.	254 mm 10.00 in.
75 mm 3 in.	152 mm 5.98 in.	254 mm 10.00 in.
50 mm 2 in.	121 mm 4.76 in.	254 mm 10.00 in.

GENERAL NOTES:

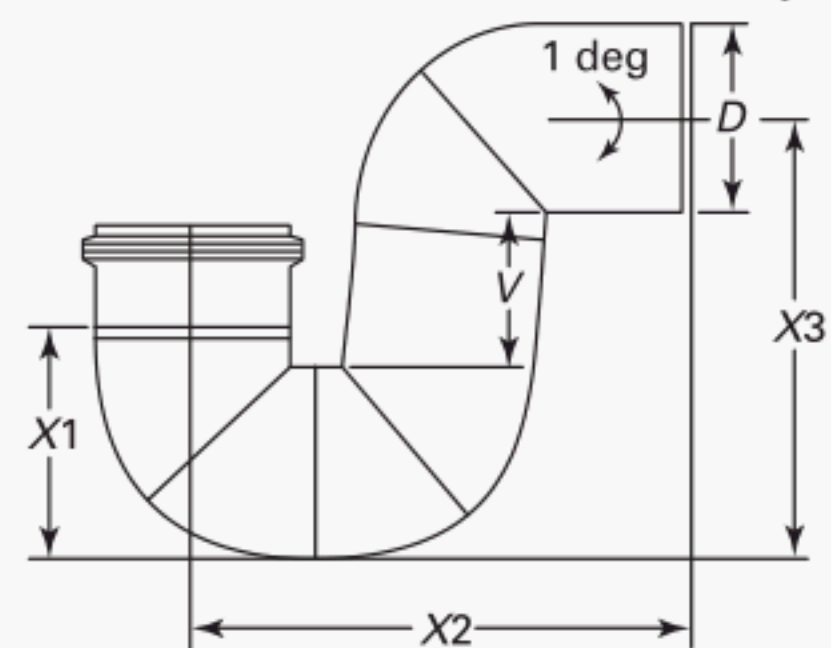
- (a) Refer to Table 1 for socket and spigot dimensions.
(b) Flange to meet ASME B16.5.

Table 8 Stainless Steel Bottle Trap



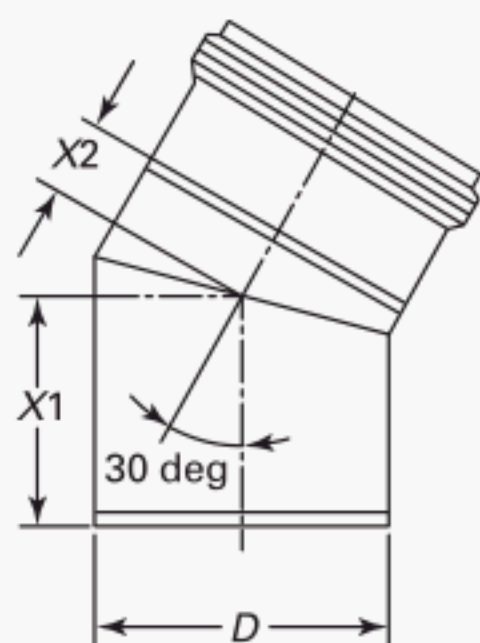
<i>D</i> (Nominal)	<i>H</i>
32 mm 1.25 in.	250 mm 9.84 in.
40 mm 1.50 in.	231 mm 9.09 in.

Table 9 Stainless Steel P-Trap



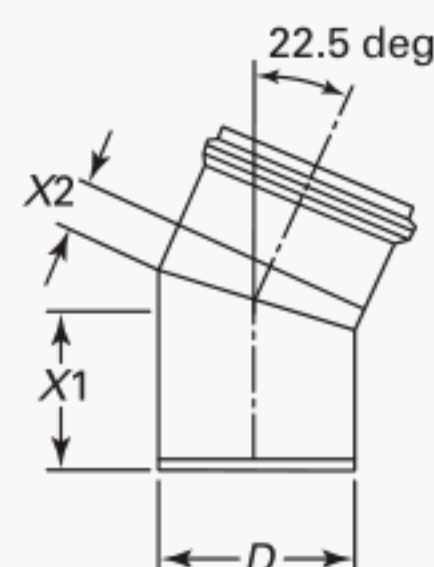
<i>D</i> (Nominal)	<i>X</i> 1	<i>X</i> 2	<i>X</i> 3	<i>V</i>
160 mm 6 in.	184 mm 7.24 in.	386 mm 15.20 in.	341 mm 13.43 in.	105 mm 4.13 in.
125 mm 5 in.	151 mm 5.94 in.	314 mm 12.36 in.	277 mm 10.91 in.	95 mm 3.74 in.
110 mm 4 in.	132 mm 5.20 in.	288 mm 11.34 in.	250 mm 9.84 in.	89 mm 3.50 in.
75 mm 3 in.	93 mm 3.66 in.	222 mm 8.74 in.	190 mm 7.48 in.	81 mm 3.19 in.
50 mm 2 in.	67 mm 2.64 in.	174 mm 6.85 in.	146 mm 5.75 in.	74 mm 2.91 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 10 Stainless Steel, 30-deg Bend

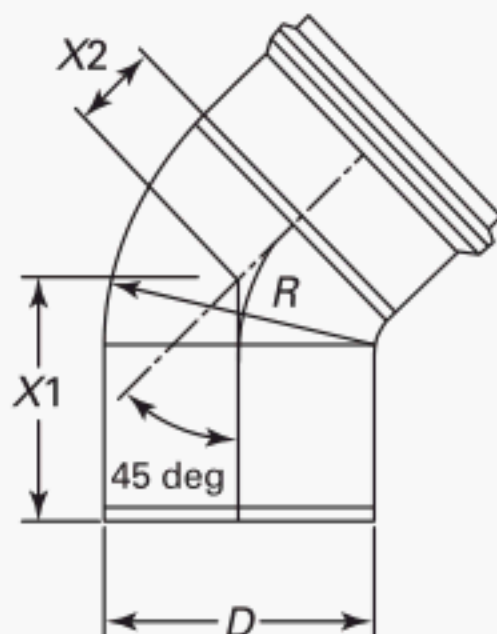
D (Nominal)	X1	X2
200 mm 8 in.	137 mm 5.93 in.	45 mm 1.77 in.
160 mm 6 in.	110 mm 4.33 in.	40 mm 1.57 in.
125 mm 5 in.	98 mm 3.86 in.	28 mm 1.10 in.
110 mm 4 in.	71 mm 3.35 in.	28 mm 1.10 in.
75 mm 3 in.	71 mm 2.80 in.	21 mm 0.83 in.
50 mm 2 in.	57 mm 2.24 in.	16 mm 0.63 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 12 Stainless Steel, 22.5-deg Bend

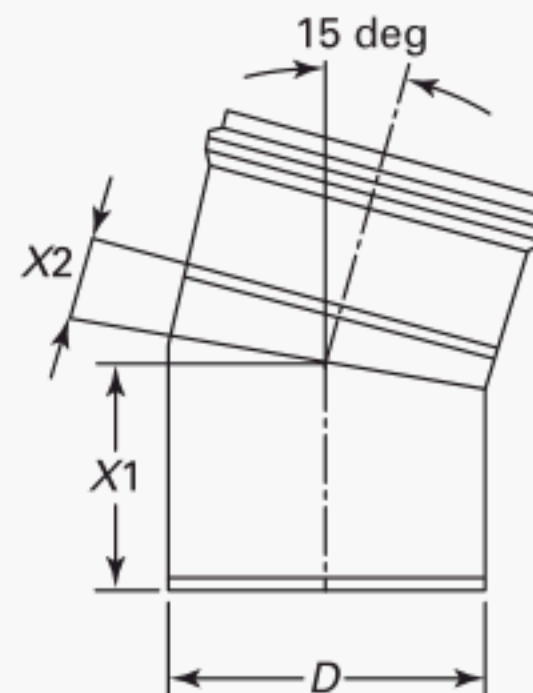
D (Nominal)	X1	X2
160 mm 6 in.	109 mm 4.29 in.	39 mm 1.54 in.
110 mm 4 in.	85 mm 3.35 in.	28 mm 1.10 in.
75 mm 3 in.	71 mm 2.80 in.	21 mm 0.83 in.
50 mm 2 in.	57 mm 2.24 in.	15 mm 0.59 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 11 Stainless Steel, 45-deg Bend

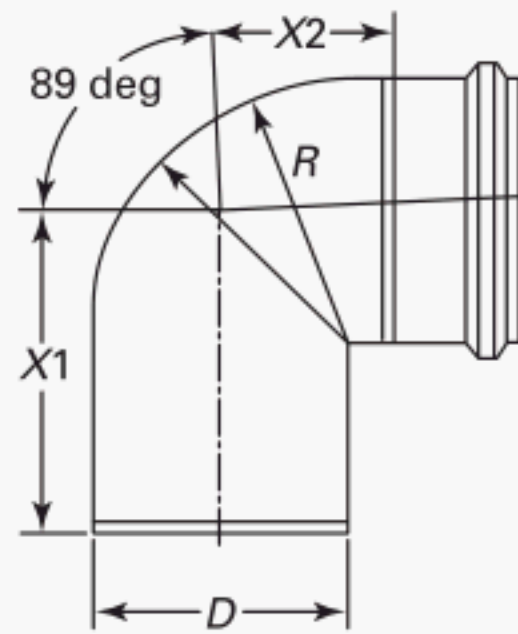
D (Nominal)	X1	X2	R
200 mm 8 in.	234 mm 9.21 in.	144 mm 5.67 in.	400 mm 15.75 in.
160 mm 6 in.	131 mm 5.16 in.	55 mm 2.17 in.	172 mm 6.77 in.
125 mm 5 in.	113 mm 4.45 in.	39 mm 1.54 in.	125 mm 4.92 in.
110 mm 4 in.	93 mm 3.66 in.	43 mm 1.69 in.	110 mm 4.33 in.
75 mm 3 in.	76 mm 2.99 in.	33 mm 1.30 in.	75 mm 2.95 in.
50 mm 1.97 in.	60 mm 2.36 in.	26 mm 1.02 in.	50 mm 1.97 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 13 Stainless Steel, 15-deg Bend

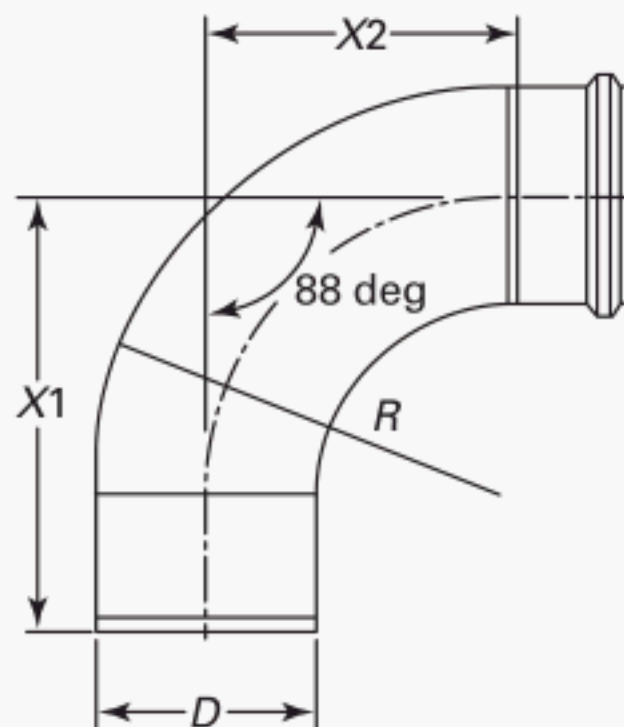
D (Nominal)	X1	X2
200 mm 8 in.	123 mm 4.84 in.	31 mm 1.22 in.
160 mm 6 in.	99 mm 3.90 in.	29 mm 1.14 in.
125 mm 5 in.	84 mm 3.31 in.	19 mm 0.75 in.
110 mm 4 in.	78 mm 3.07 in.	21 mm 0.83 in.
75 mm 3 in.	66 mm 2.60 in.	16 mm 0.63 in.
50 mm 2 in.	54 mm 2.13 in.	12 mm 0.47 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 14 Stainless Steel, 89-deg Bend

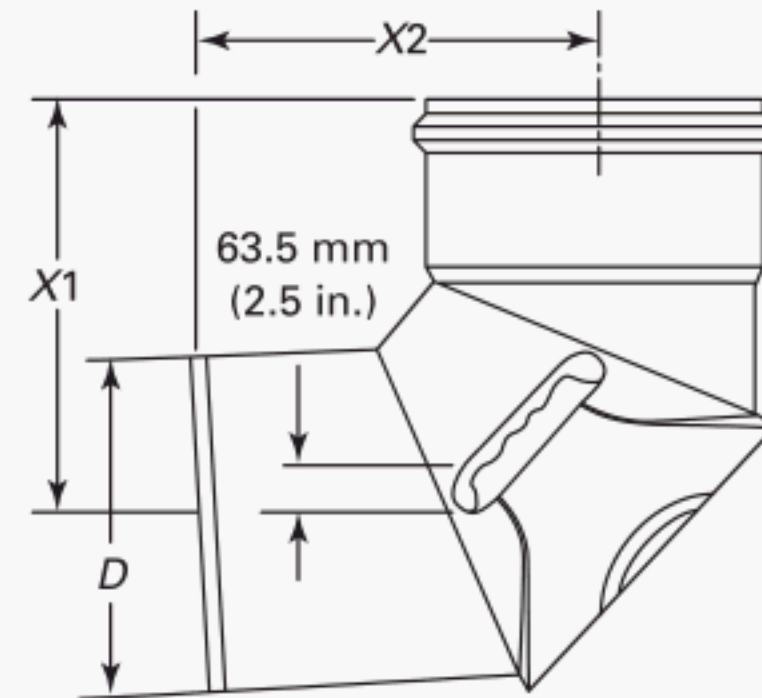
D (Nominal)	X1	X2	R
200 mm 8 in.	234 mm 9.21 in.	144 mm 5.67 in.	400 mm 15.75 in.
160 mm 6 in.	185 mm 7.28 in.	105 mm 4.13 in.	172 mm 6.77 in.
125 mm 5 in.	161 mm 6.34 in.	93 mm 3.66 in.	125 mm 4.92 in.
110 mm 4 in.	133 mm 5.24 in.	72 mm 2.83 in.	110 mm 4.33 in.
75 mm 3 in.	107 mm 4.21 in.	53 mm 2.09 in.	75 mm 3.95 in.
50 mm 2 in.	86 mm 3.39 in.	40 mm 1.57 in.	50 mm 2.97 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 15 Stainless Steel, 90-deg-Long Radius Bend

D (Nominal)	X1	X2	R
160 mm 6 in.	322 mm 12.68 in.	247 mm 9.72 in.	313 mm 7.7 in.
110 mm 4 in.	222 mm 8.74 in.	160 mm 6.30 in.	209 mm 8.22 in.
75 mm 3 in.	155 mm 6.10 in.	105 mm 4.13 in.	133 mm 5.23 in.
50 mm 2 in.	125 mm 4.92 in.	77 mm 3.03 in.	97 mm 3.82 in.

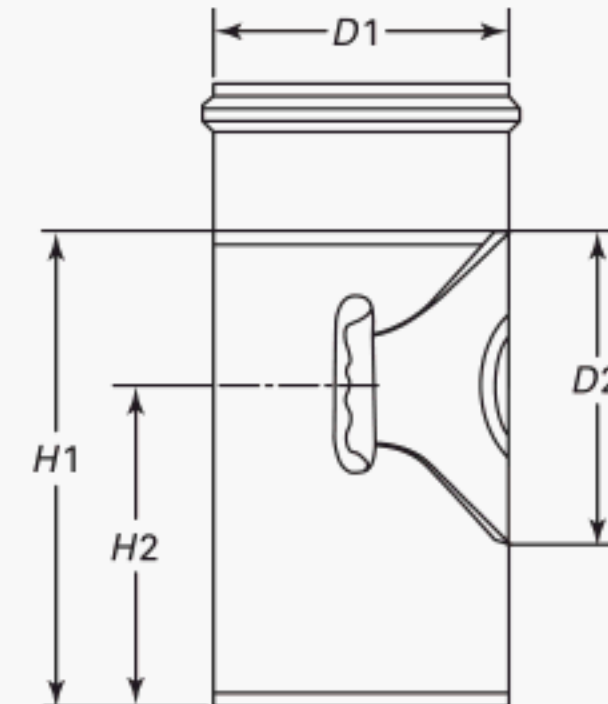
GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 16 Stainless Steel, 89-deg Bend With Cleanout

D (Nominal)	X1	X2
160 mm 6 in.	208 mm 8.19 in.	200 mm 7.87 in.
110 mm 4 in.	132 mm 5.20 in.	143 mm 5.62 in.
75 mm 3 in.	102 mm 4.02 in.	112 mm 4.41 in.

GENERAL NOTES:

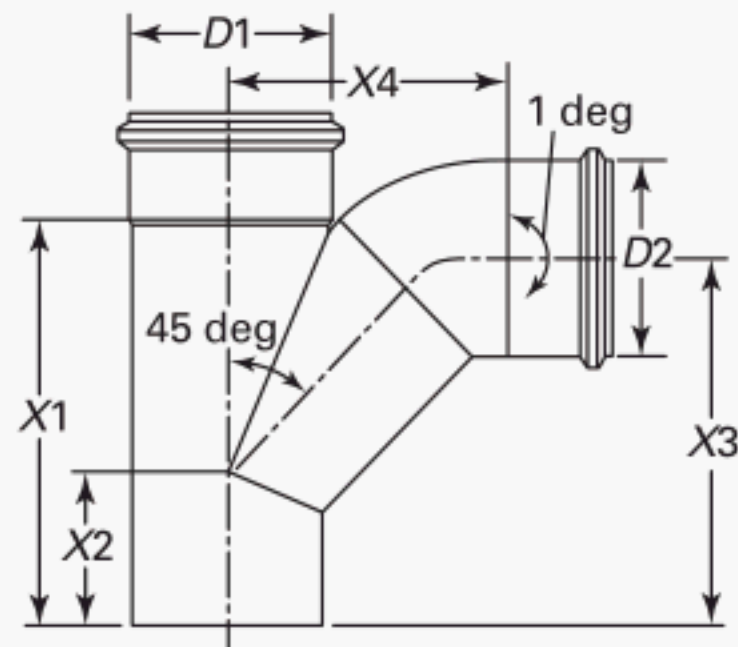
- (a) With exterior access cover with seal.
- (b) Refer to Table 1 for socket and spigot dimensions.

Table 17 Stainless Steel Cleanout Tee

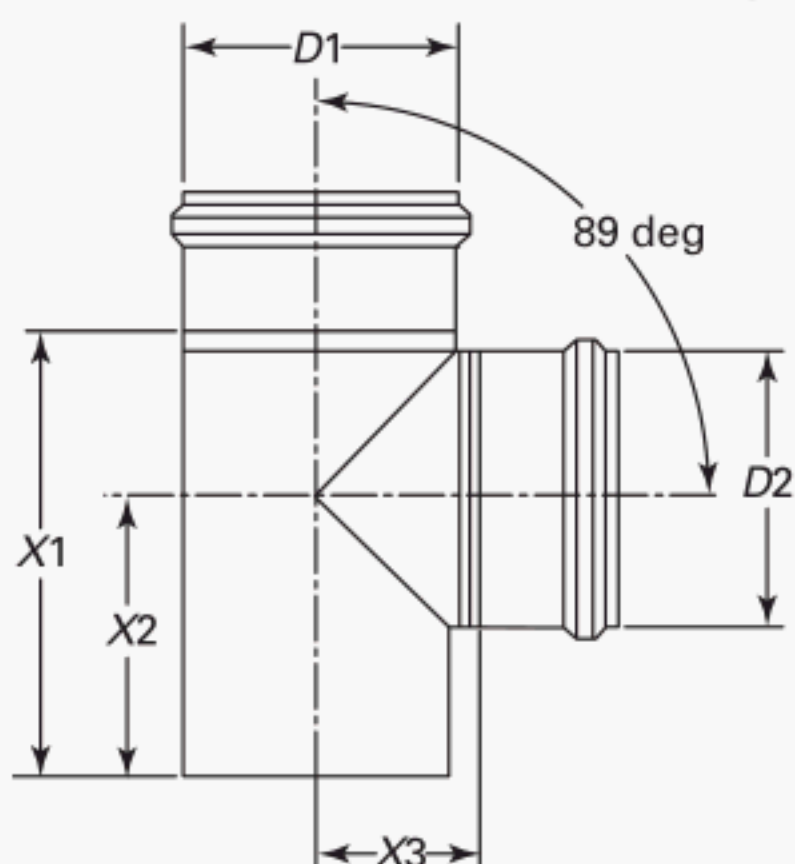
D1 (Nominal)	D2	X1	X2
200 mm 8 in.	120 mm 4.72 in.	289 mm 11.38 in.	208 mm 8.19 in.
160 mm 6 in.	120 mm 4.72 in.	277 mm 10.91 in.	208 mm 8.19 in.
125 mm 5 in.	120 mm 4.72 in.	195 mm 7.68 in.	128 mm 5.04 in.
110 mm 4 in.	120 mm 4.72 in.	183 mm 7.20 in.	123 mm 4.84 in.
110 mm 4 in.	120 mm 4.72 in.	253 mm 9.96 in.	193 mm 7.60 in.
75 mm 3 in.	80 mm 3.15 in.	139 mm 5.47 in.	92 mm 3.62 in.

GENERAL NOTES:

- (a) With exterior access cover with seal.
- (b) Refer to Table 1 for socket and spigot dimensions.

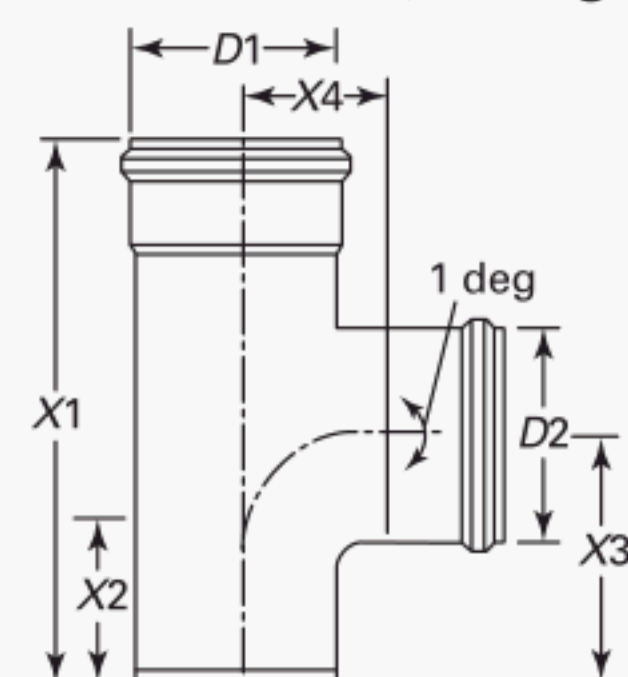
Table 18 Stainless Steel, Sanitary Combination Wye and $\frac{1}{8}$ Bend

<i>D1</i> (Nominal)	<i>D2</i> (Nominal)	<i>X1</i>	<i>X2</i>	<i>X3</i>	<i>X4</i>	<i>R</i>
160 mm 6 in.	160 mm 6 in.	328 mm 12.91 in.	115 mm 4.53 in.	222 mm 8.74 in.	231 mm 9.09 in.	91 mm 3.58 in.
160 mm 6 in.	110 mm 4 in.	258 mm 10.16 in.	80 mm 3.15 in.	186 mm 7.32 in.	188 mm 7.40 in.	55 mm 2.17 in.
125 mm 5 in.	125 mm 5 in.	273 mm 10.75 in.	103 mm 4.06 in.	170 mm 6.69 in.	181 mm 7.13 in.	62.5 mm 2.46 in.
125 mm 5 in.	110 mm 4 in.	250 mm 9.84 in.	90 mm 3.54 in.	154 mm 6.06 in.	153 mm 6.02 in.	55 mm 2.17 in.
110 mm 4 in.	110 mm 4 in.	233 mm 9.17 in.	88 mm 3.46 in.	149 mm 5.87 in.	162 mm 6.38 in.	55 mm 2.17 in.
110 mm 4 in.	75 mm 3 in.	182 mm 7.17 in.	60 mm 2.36 in.	135 mm 5.31 in.	131 mm 5.16 in.	37.5 mm 1.48 in.
110 mm 4 in.	50 mm 2 in.	147 mm 5.79 in.	42 mm 1.65 in.	119 mm 4.69 in.	115 mm 4.53 in.	25 mm 0.98 in.
75 mm 3 in.	75 mm 3 in.	179 mm 7.05 in.	74 mm 2.91 in.	110 mm 4.33 in.	114 mm 4.49 in.	37.5 mm 1.48 in.
75 mm 3 in.	50 mm 2 in.	144 mm 5.67 in.	56 mm 2.20 in.	94 mm 3.70 in.	98 mm 3.86 in.	25 mm 0.98 in.
50 mm 2 in.	50 mm 2 in.	128 mm 5.04 in.	57 mm 2.24 in.	76 mm 2.99 in.	85 mm 3.35 in.	25 mm 0.98 in.

Table 19 Stainless Steel, 89-deg Tee

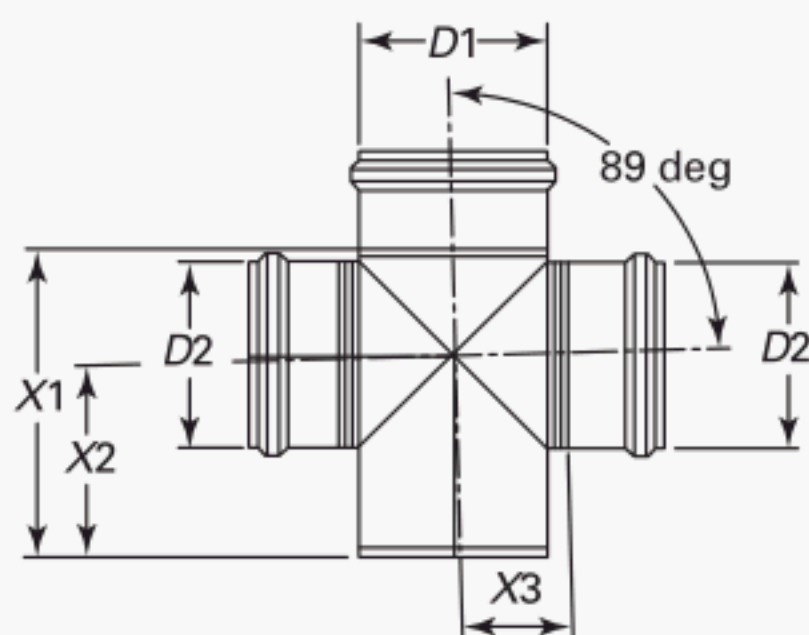
D1 (Nominal)	D2 (Nominal)	X1	X2	X3
200 mm 8 in.	200 mm 8 in.	333 mm 13.11 in.	206 mm 8.11 in.	128 mm 5.04 in.
200 mm 8 in.	160 mm 6 in.	293 mm 11.54 in.	186 mm 7.32 in.	125 mm 4.92 in.
160 mm 6 in.	160 mm 6 in.	288 mm 11.34 in.	186 mm 7.32 in.	102 mm 4.02 in.
160 mm 6 in.	110 mm 4 in.	236 mm 9.29 in.	154 mm 6.06 in.	92 mm 3.62 in.
125 mm 5 in.	125 mm 5 in.	220 mm 8.66 in.	135 mm 5.31 in.	72 mm 2.83 in.
125 mm 5 in.	110 mm 4 in.	205 mm 8.07 in.	127 mm 5.00 in.	76 mm 2.99 in.
125 mm 5 in.	75 mm 3 in.	187 mm 7.36 in.	110 mm 4.33 in.	77 mm 3.03 in.
110 mm 4 in.	110 mm 4 in.	183 mm 7.20 in.	118 mm 4.65 in.	67 mm 2.64 in.
110 mm 4 in.	75 mm 3 in.	152 mm 5.98 in.	106 mm 4.17 in.	68 mm 2.68 in.
110 mm 4 in.	50 mm 2 in.	132 mm 5.20 in.	94 mm 3.70 in.	65 mm 2.56 in.
75 mm 3 in.	75 mm 3 in.	139 mm 5.47 in.	91 mm 3.58 in.	50 mm 1.97 in.
75 mm 3 in.	50 mm 2 in.	139 mm 5.47 in.	99 mm 3.90 in.	48 mm 1.89 in.
50 mm 2 in.	50 mm 2 in.	106 mm 4.17 in.	71 mm 2.80 in.	35 mm 1.38 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 20 Stainless Steel, 89-deg Sweep Tee

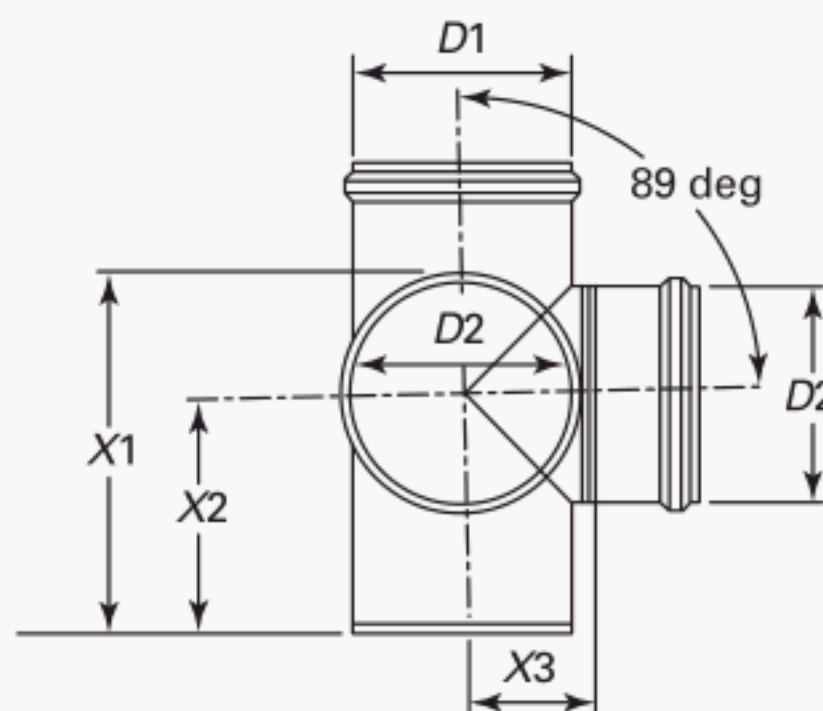
D1 (Nominal)	(Nominal) D2	X1	X2	X3	X4
160 mm 6 in.	160 mm 6 in.	358 mm 14.10 in.	115 mm 4.53 in.	184 mm 7.24 in.	122 mm 4.80 in.
160 mm 6 in.	110 mm 4 in.	306 mm 12.05 in.	84 mm 3.31 in.	164 mm 6.45 in.	114 mm 4.49 in.
110 mm 4 in.	110 mm 4 in.	290 mm 11.42 in.	88 mm 3.46 in.	138 mm 5.43 in.	86 mm 3.39 in.
110 mm 4 in.	75 mm 3 in.	239 mm 9.40 in.	58 mm 2.28 in.	114 mm 4.49 in.	86 mm 3.39 in.
110 mm 4 in.	50 mm 2 in.	209 mm 8.22 in.	47 mm 1.85 in.	103 mm 4.05 in.	80 mm 3.14 in.
75 mm 3 in.	75 mm 3 in.	229 mm 9.02 in.	75 mm 2.95 in.	127 mm 5.00 in.	86 mm 3.39 in.
75 mm 3 in.	50 mm 2 in.	194 mm 7.64 in.	57 mm 2.24 in.	94 mm 3.70 in.	62 mm 2.44 in.
50 mm 2 in.	50 mm 2 in.	170 mm 6.69 in.	60 mm 2.36 in.	81 mm 3.19 in.	46 mm 1.81 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 21 Stainless Steel Cross

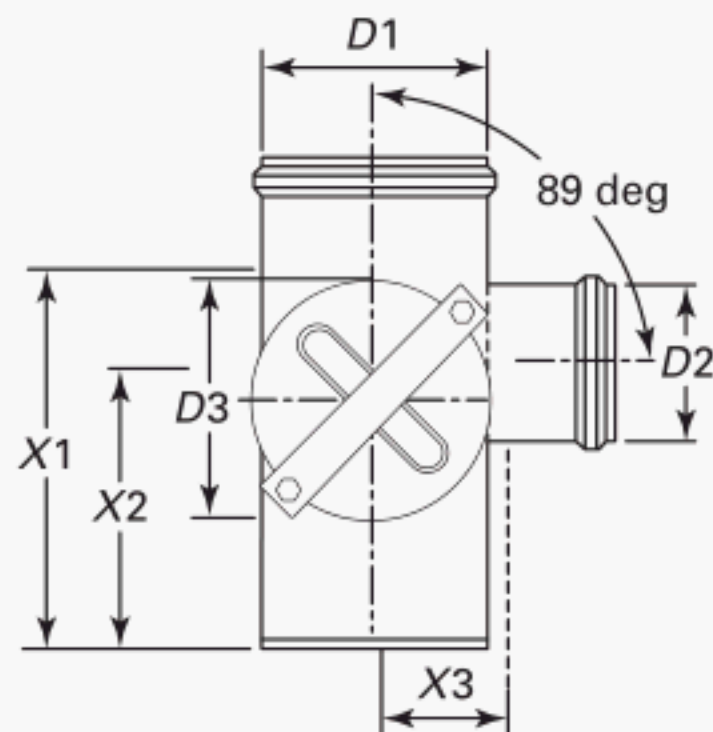
D1 (Nominal)	D2 (Nominal)	X1	X2	X3
160 mm 6 in.	160 mm 6 in.	288 mm 11.34 in.	166 mm 6.54 in.	102 mm 4.02 in.
160 mm 6 in.	110 mm 4 in.	236 mm 9.29 in.	154 mm 6.06 in.	92 mm 3.62 in.
110 mm 4 in.	110 mm 4 in.	183 mm 7.20 in.	118 mm 4.65 in.	67 mm 2.64 in.
110 mm 4 in.	75 mm 3 in.	152 mm 5.98 in.	106 mm 4.17 in.	68 mm 2.68 in.
110 mm 4 in.	50 mm 2 in.	132 mm 5.20 in.	94 mm 3.70 in.	65 mm 2.56 in.
75 mm 3 in.	75 mm 3 in.	139 mm 5.47 in.	91 mm 3.58 in.	59 mm 1.97 in.
75 mm 3 in.	50 mm 2 in.	139 mm 5.47 in.	99 mm 3.90 in.	48 mm 1.89 in.
50 mm 2 in.	50 mm 2 in.	106 mm 4.17 in.	71 mm 2.80 in.	35 mm 1.38 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 22 Stainless Steel Tee With Side Inlet

D1 (Nominal)	D2 (Nominal)	X1	X2	X3
160 mm 6 in.	160 mm 6 in.	288 mm 11.34 in.	184 mm 7.24 in.	104 mm 4.09 in.
160 mm 6 in.	110 mm 4 in.	236 mm 9.29 in.	154 mm 6.06 in.	92 mm 3.62 in.
110 mm 4 in.	110 mm 4 in.	183 mm 7.20 in.	118 mm 4.65 in.	67 mm 2.64 in.
110 mm 4 in.	75 mm 3 in.	152 mm 5.98 in.	105 mm 4.13 in.	68 mm 2.68 in.
110 mm 4 in.	50 mm 2 in.	132 mm 5.20 in.	94 mm 3.70 in.	65 mm 2.56 in.
75 mm 3 in.	75 mm 3 in.	139 mm 5.47 in.	91 mm 3.58 in.	51 mm 2.01 in.
75 mm 3 in.	50 mm 2 in.	139 mm 5.47 in.	99 mm 3.90 in.	48 mm 1.89 in.
50 mm 2 in.	50 mm 2 in.	106 mm 4.17 in.	71 mm 2.80 in.	35 mm 1.38 in.

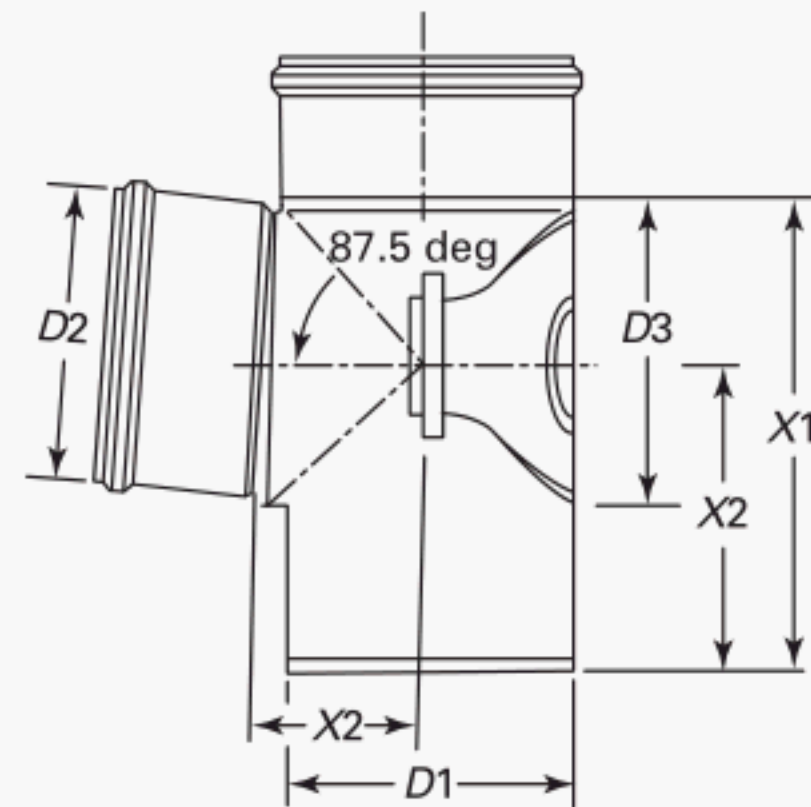
GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 23 Stainless Steel Tee With Side Cleanout

D1 (Nominal)	D2 (Nominal)	X1	X2	X3
160 mm 6 in.	160 mm 6 in.	288 mm 11.34 in.	184 mm 7.24 in.	104 mm 4.09 in.
160 mm 6 in.	110 mm 4 in.	236 mm 9.29 in.	154 mm 6.06 in.	92 mm 3.62 in.
110 mm 4 in.	110 mm 4 in.	183 mm 7.20 in.	118 mm 4.65 in.	67 mm 2.64 in.
110 mm 4 in.	75 mm 3 in.	152 mm 5.98 in.	105 mm 4.13 in.	68 mm 2.68 in.
110 mm 4 in.	50 mm 2 in.	132 mm 5.20 in.	94 mm 3.70 in.	65 mm 2.56 in.
75 mm 3 in.	75 mm 3 in.	139 mm 5.47 in.	91 mm 3.58 in.	51 mm 2.01 in.
75 mm 3 in.	50 mm 2 in.	139 mm 5.47 in.	99 mm 3.90 in.	48 mm 1.89 in.
50 mm 2 in.	50 mm 2 in.	106 mm 4.17 in.	71 mm 2.80 in.	35 mm 1.38 in.

GENERAL NOTES:

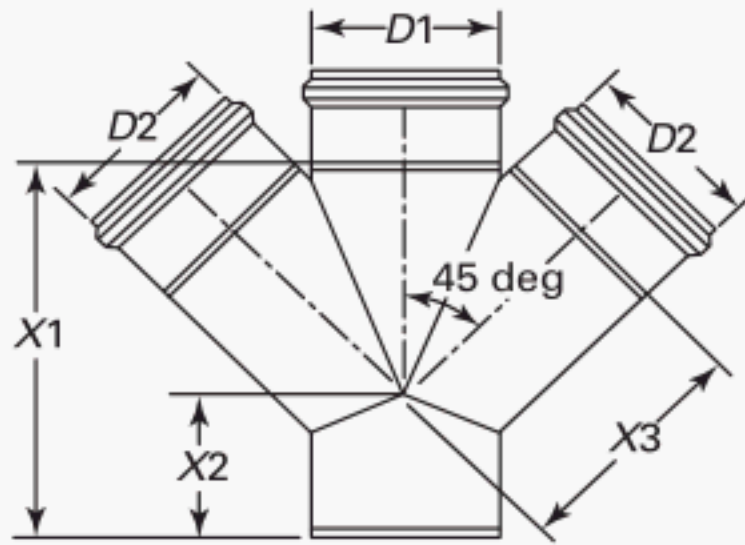
- (a) With exterior access cover with seal.
 (b) Refer to Table 1 for socket and spigot dimensions.

Table 24 Stainless Steel Tee With Rear Cleanout

D1 (Nominal)	D2 (Nominal)	X1	X2	X3
160 mm 6 in.	160 mm 6 in.	288 mm 11.34 in.	184 mm 7.24 in.	104 mm 4.09 in.
160 mm 6 in.	110 mm 4 in.	236 mm 9.29 in.	154 mm 6.06 in.	92 mm 3.62 in.
110 mm 4 in.	110 mm 4 in.	183 mm 7.20 in.	118 mm 4.65 in.	67 mm 2.64 in.
110 mm 4 in.	75 mm 3 in.	152 mm 5.98 in.	105 mm 4.13 in.	68 mm 2.68 in.
110 mm 4 in.	50 mm 2 in.	132 mm 5.20 in.	94 mm 3.70 in.	65 mm 2.56 in.
75 mm 3 in.	75 mm 3 in.	139 mm 5.47 in.	91 mm 3.58 in.	51 mm 2.01 in.
75 mm 3 in.	50 mm 2 in.	139 mm 5.47 in.	99 mm 3.90 in.	48 mm 1.89 in.
50 mm 2 in.	50 mm 2 in.	106 mm 4.17 in.	71 mm 2.80 in.	35 mm 1.38 in.

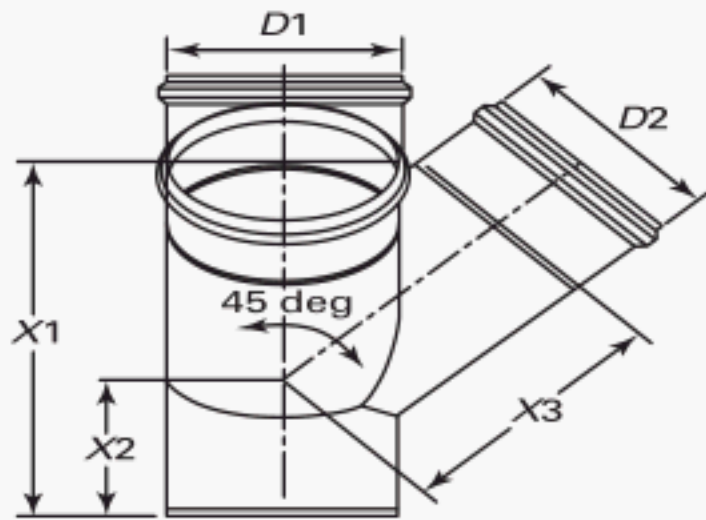
GENERAL NOTES:

- (a) With exterior access cover with seal.
 (b) Refer to Table 1 for socket and spigot dimensions.

Table 25 Stainless Steel Double Wye

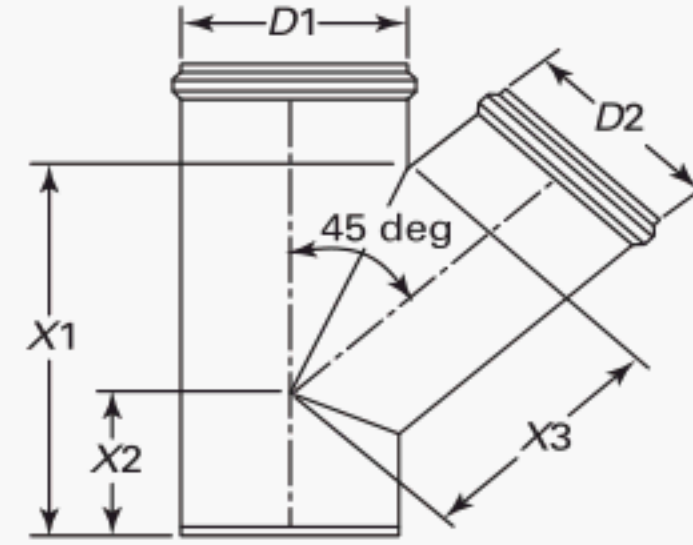
D1 (Nominal)	D2 (Nominal)	X1	X2	X3
160 mm 6 in.	160 mm 6 in.	328 mm 12.91 in.	115 mm 4.53 in.	222 mm 8.74 in.
160 mm 6 in.	110 mm 4 in.	258 mm 10.16 in.	80 mm 3.15 in.	186 mm 7.32 in.
110 mm 4 in.	110 mm 4 in.	233 mm 9.17 in.	88 mm 3.46 in.	149 mm 5.87 in.
110 mm 4 in.	75 mm 3 in.	182 mm 7.17 in.	60 mm 2.36 in.	135 mm 5.31 in.
110 mm 4 in.	50 mm 2 in.	147 mm 5.79 in.	42 mm 1.65 in.	119 mm 4.69 in.
75 mm 3 in.	75 mm 3 in.	179 mm 7.05 in.	74 mm 2.91 in.	110 mm 4.33 in.
75 mm 3 in.	50 mm 2 in.	144 mm 5.67 in.	56 mm 2.20 in.	94 mm 3.70 in.
50 mm 2 in.	50 mm 2 in.	128 mm 5.04 in.	57 mm 2.24 in.	76 mm 2.99 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 26 Stainless Steel, 90-deg, Offset Double Wye

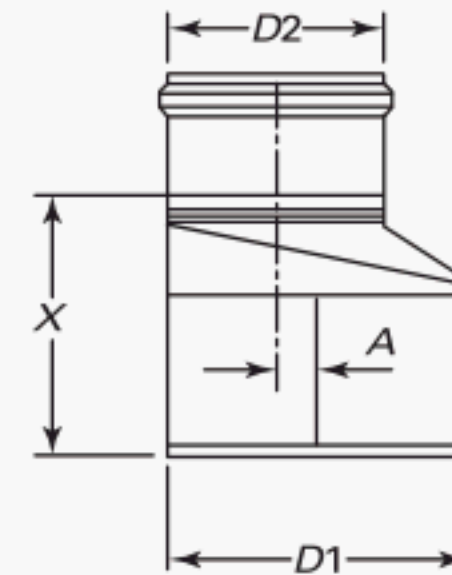
D1 (Nominal)	D2 (Nominal)	X1	X2	X3
160 mm 6 in.	160 mm 6 in.	328 mm 12.91 in.	115 mm 4.53 in.	222 mm 8.74 in.
160 mm 6 in.	110 mm 4 in.	258 mm 10.16 in.	80 mm 3.15 in.	186 mm 7.32 in.
110 mm 4 in.	110 mm 4 in.	233 mm 9.17 in.	88 mm 3.46 in.	149 mm 5.87 in.
110 mm 4 in.	75 mm 3 in.	182 mm 7.17 in.	60 mm 2.36 in.	135 mm 5.31 in.
110 mm 4 in.	50 mm 2 in.	147 mm 5.79 in.	42 mm 1.65 in.	119 mm 4.69 in.
75 mm 3 in.	75 mm 3 in.	179 mm 7.05 in.	74 mm 2.91 in.	110 mm 4.33 in.
75 mm 3 in.	50 mm 2 in.	144 mm 5.67 in.	56 mm 2.20 in.	94 mm 3.70 in.
50 mm 2 in.	50 mm 2 in.	128 mm 5.04 in.	57 mm 2.24 in.	76 mm 2.99 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 27 Stainless Steel Wye

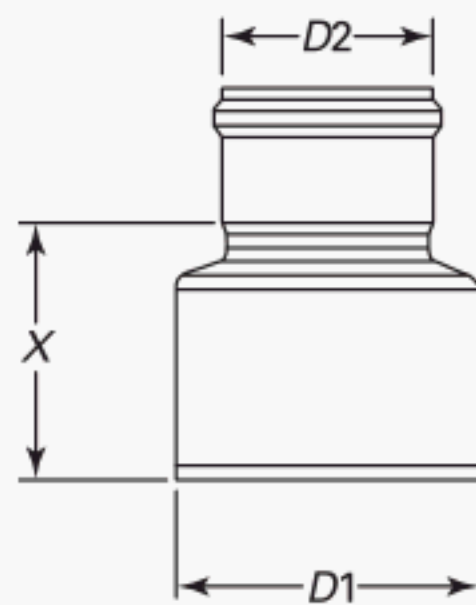
D1 (Nominal)	D2 (Nominal)	X1	X2	X3
200 mm 8 in.	200 mm 8 in.	415 mm 16.34 in.	151 mm 5.94 in.	274 mm 10.79 in.
200 mm 8 in.	160 mm 6 in.	359 mm 14.13 in.	123 mm 4.84 in.	250 mm 9.84 in.
160 mm 6 in.	160 mm 6 in.	328 mm 12.91 in.	115 mm 4.53 in.	222 mm 8.74 in.
160 mm 6 in.	110 mm 4 in.	258 mm 10.16 in.	80 mm 3.15 in.	186 mm 7.32 in.
110 mm 4 in.	110 mm 4 in.	233 mm 9.17 in.	88 mm 3.46 in.	149 mm 5.87 in.
110 mm 4 in.	75 mm 3 in.	182 mm 7.17 in.	60 mm 2.36 in.	135 mm 5.31 in.
110 mm 4 in.	50 mm 2 in.	147 mm 5.79 in.	42 mm 1.65 in.	119 mm 4.69 in.
75 mm 3 in.	75 mm 3 in.	179 mm 7.05 in.	74 mm 2.91 in.	110 mm 4.33 in.
75 mm 3 in.	50 mm 2 in.	144 mm 5.67 in.	56 mm 2.20 in.	94 mm 3.70 in.
50 mm 2 in.	50 mm 2 in.	128 mm 5.04 in.	57 mm 2.24 in.	76 mm 2.99 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 28 Stainless Steel Eccentric Reducer

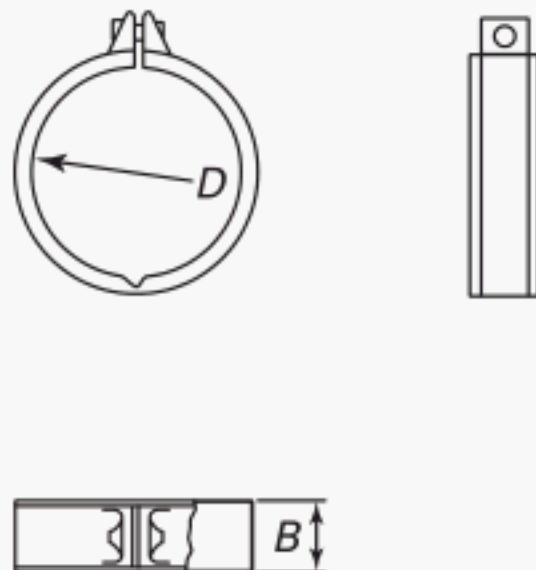
D1 (Nominal)	D2 (Nominal)	X	A (Offset)
160 mm 6 in.	110 mm 4 in.	136 mm 5.35 in.	22 mm 0.87 in.
110 mm 4 in.	75 mm 3 in.	116 mm 4.57 in.	15 mm 0.59 in.
110 mm 4 in.	50 mm 2 in.	113 mm 4.45 in.	25 mm 0.98 in.
75 mm 3 in.	50 mm 2 in.	87 mm 3.43 in.	7 mm 0.28 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 29 Stainless Steel Concentric Reducer

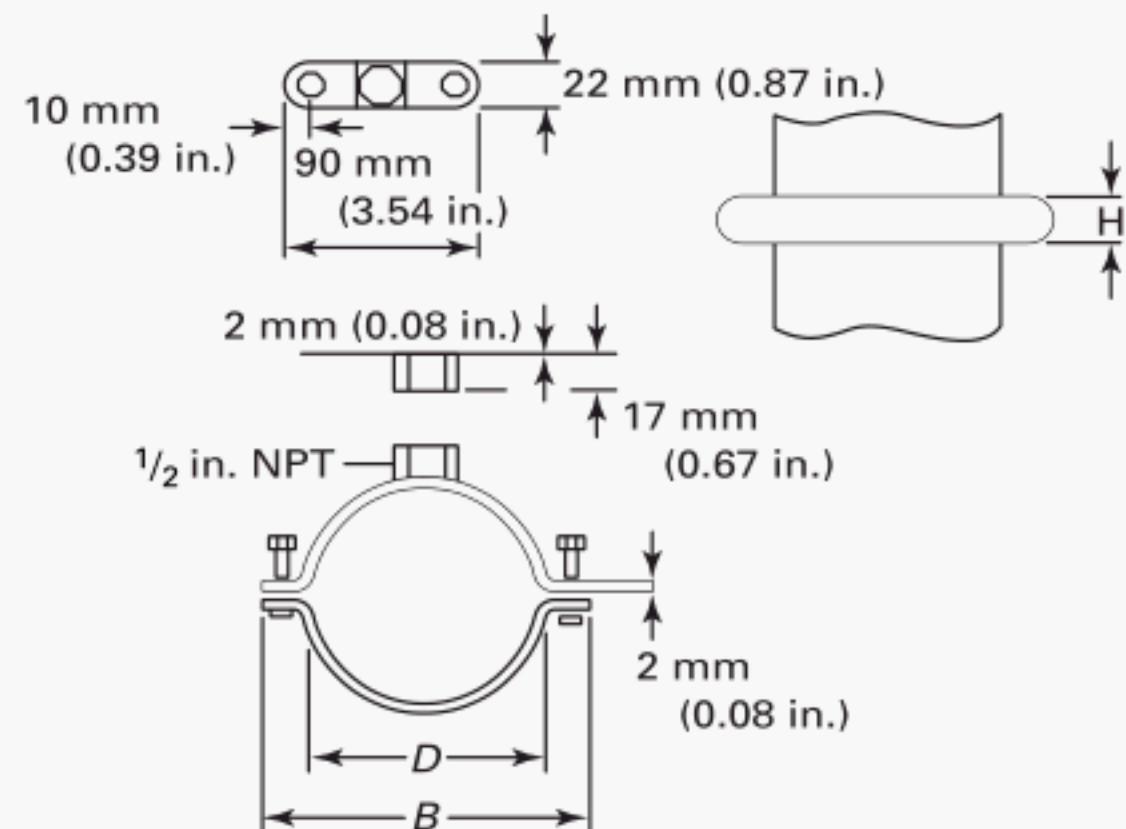
D1 (Nominal)	D2 (Nominal)	X
200 mm 8 in.	160 mm 6 in.	170 mm 6.69 in.
160 mm 6 in.	125 mm 5 in.	145 mm 5.71 in.
160 mm 6 in.	110 mm 4 in.	136 mm 5.35 in.
125 mm 5 in.	110 mm 4 in.	105 mm 4.13 in.
110 mm 4 in.	75 mm 3 in.	94 mm 3.70 in.
110 mm 4 in.	50 mm 2 in.	94 mm 3.70 in.
75 mm 3 in.	50 mm 2 in.	78.5 mm 3.09 in.

GENERAL NOTE: Refer to Table 1 for socket and spigot dimensions.

Table 30 Stainless Steel Locking Clamp

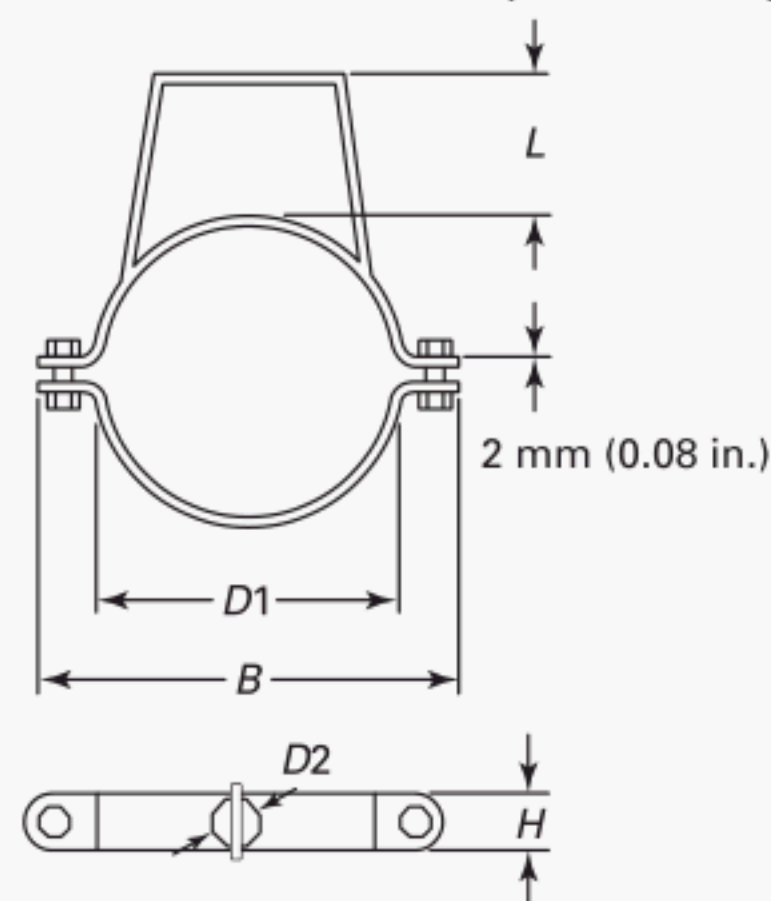
D (Nominal)	B
160 mm 6 in.	46 mm 1.81 in.
110 mm 4 in.	36 mm 1.42 in.
75 mm 3 in.	34 mm 1.34 in.
50 mm 2 in.	34 mm 1.34 in.

GENERAL NOTE: Hardware is M8-sized hex cap bolt (included).

Table 31 Stainless Steel, Nonadjustable Pipe Hanger

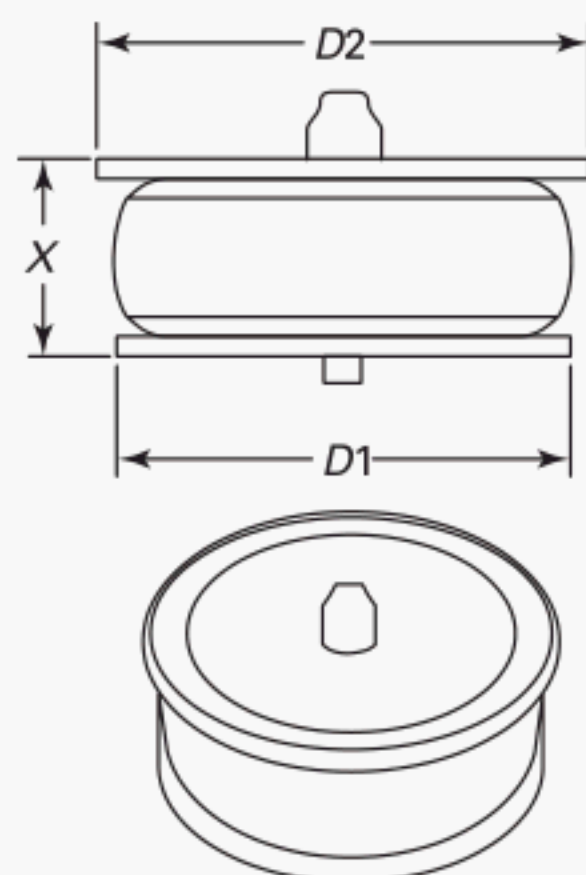
D (Nominal) Pipe Size	D Actual	H	B
160 mm 6 in.	164 mm 6.46 in.	22 mm 0.87 in.	214 mm 8.43 in.
110 mm 4 in.	112.6 mm 4.43 in.	22 mm 0.87 in.	157 mm 6.18 in.
75 mm 3 in.	78.2 mm 3.08 in.	20 mm 0.79 in.	120 mm 4.72 in.
50 mm 2 in.	54 mm 2.13 in.	18 mm 0.71 in.	88 mm 3.46 in.

GENERAL NOTE: Hardware is M6-sized hex head bolts (included).

Table 32 Stainless Steel, Adjustable Pipe Hanger

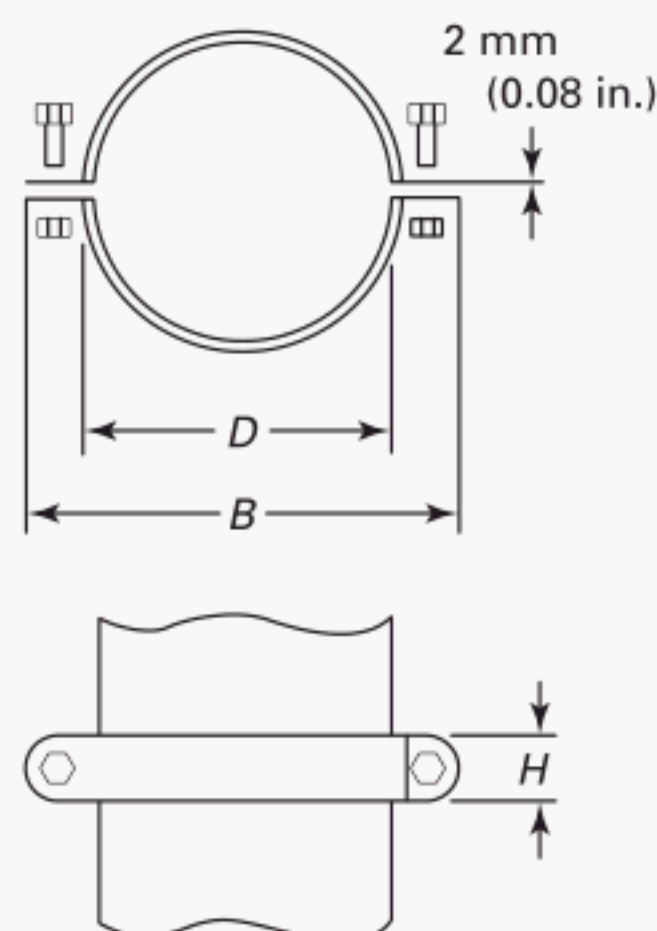
D1 (Nominal)	D1 Actual	D2	H	L	B
160 mm 6 in.	164 mm 6.46 in.	17 mm 0.67 in.	22 mm 0.87 in.	214 mm 8.43 in.	71 mm 2.80 in.
110 mm 4 in.	112.6 mm 4.43 in.	14 mm 0.55 in.	22 mm 0.87 in.	157 mm 6.18 in.	52 mm 2.05 in.
75 mm 3 in.	78.2 mm 3.08 in.	14 mm 0.55 in.	20 mm 0.79 in.	120 mm 4.72 in.	54 mm 2.13 in.
50 mm 2 in.	54 mm 2.13 in.	11 mm 0.43 in.	18 mm 0.71 in.	88 mm 3.46 in.	38 mm 1.50 in.

GENERAL NOTE: Hardware is M6-sized hex head bolts (included).

Table 33 Stainless Steel Socket Plug Clamp

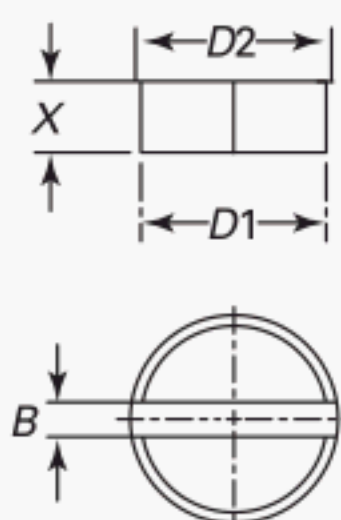
<i>D1</i> (Nominal)	<i>D2</i>	<i>X</i>
160 mm 6 in.	170 mm 6.69 in.	45 mm 1.77 in.
110 mm 4 in.	118 mm 4.65 in.	46 mm 1.81 in.
75 mm 3 in.	83 mm 3.27 in.	36 mm 1.42 in.
50 mm 2 in.	59 mm 2.32 in.	31 mm 1.22 in.

GENERAL NOTE: Hardware is M6-sized hex head bolts (included).

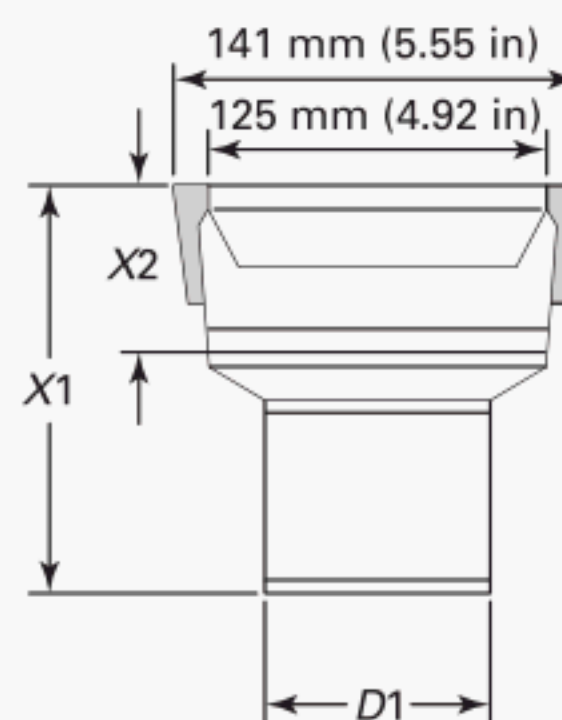
Table 35 Stainless Steel Riser Clamp

<i>D</i> (Nominal)	<i>D</i> , Actual	<i>H</i>	<i>B</i>
160 mm 6 in.	164 mm 6.46 in.	22 mm 0.87 in.	214 mm 8.43 in.
110 mm 4 in.	112.6 mm 4.43 in.	22 mm 0.87 in.	157 mm 6.18 in.
75 mm 3 in.	78.2 mm 3.08 in.	20 mm 0.79 in.	120 mm 4.72 in.
50 mm 2 in.	54 mm 2.13 in.	18 mm 0.71 in.	88 mm 3.46 in.

GENERAL NOTE: Hardware is M6-sized hex head bolts (included).

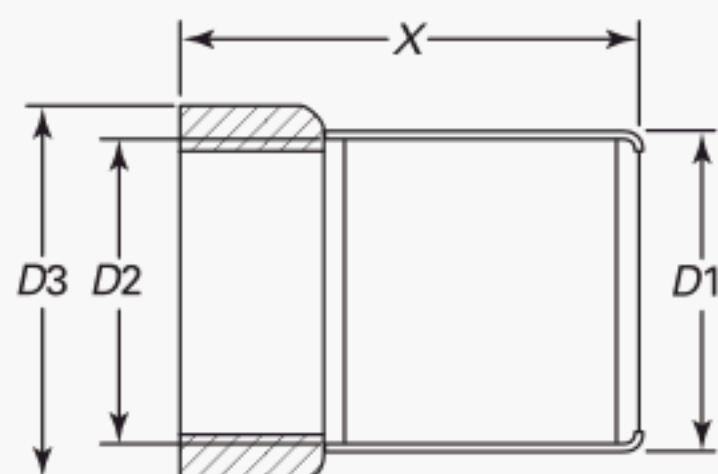
Table 34 Stainless Steel Socket Plug

<i>D1</i> (Nominal)	<i>D2</i>	<i>X</i>	<i>B</i>
160 mm 6 in.	170 mm 6.69 in.	45 mm 1.77 in.	25 mm 0.98 in.
110 mm 4 in.	120 mm 4.72 in.	45 mm 1.77 in.	20 mm 0.79 in.
75 mm 3 in.	85 mm 3.35 in.	45 mm 1.77 in.	20 mm 0.79 in.
50 mm 2 in.	58 mm 2.28 in.	50 mm 1.97 in.	15 mm 0.59 in.

Table 36 Stainless Steel Water Closet Connector

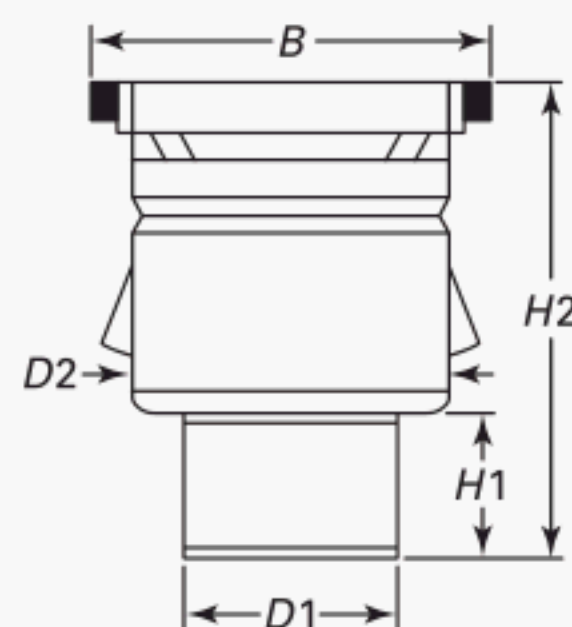
<i>D1</i> (Nominal) Pipe Size	<i>X1</i>	<i>X2</i>
75 mm 3 in.	135 mm 5.31 in.	54 mm 2.13 in.
110 mm 4 in.	139 mm 5.47 in.	54 mm 2.13 in.

GENERAL NOTE: Refer to Table 1 for spigot dimensions.

Table 37 Stainless Steel Female Adapter (Spigot X.F.P.T.)

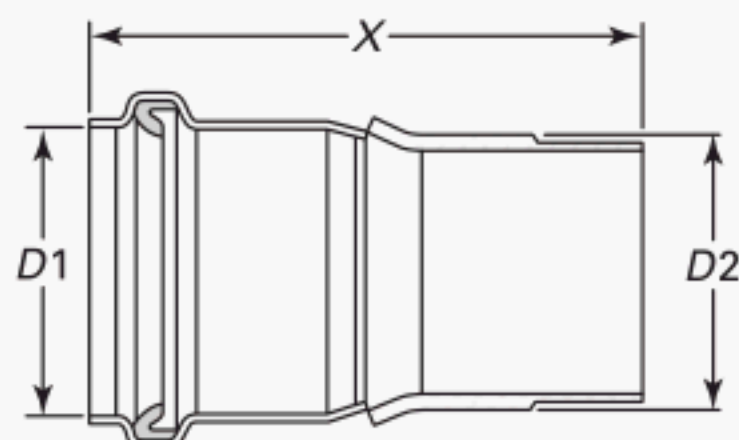
D1 (Nominal)	D2 (Nominal)	D3	X
50 mm 2 in.	25 mm 1.00 in.	40 mm 1.57 in.	93 mm 3.66 in.
50 mm 2 in.	32 mm 1.25 in.	45 mm 1.77 in.	72 mm 2.83 in.
50 mm 2 in.	40 mm 1.50 in.	58 mm 2.28 in.	72 mm 2.83 in.
50 mm 2 in.	50 mm 1.97 in.	50 mm 2.00 in.	77 mm 3.03 in.

GENERAL NOTE: Refer to Table 1 for spigot dimensions.

Table 39 Stainless Steel, Floor Drain Square Profile

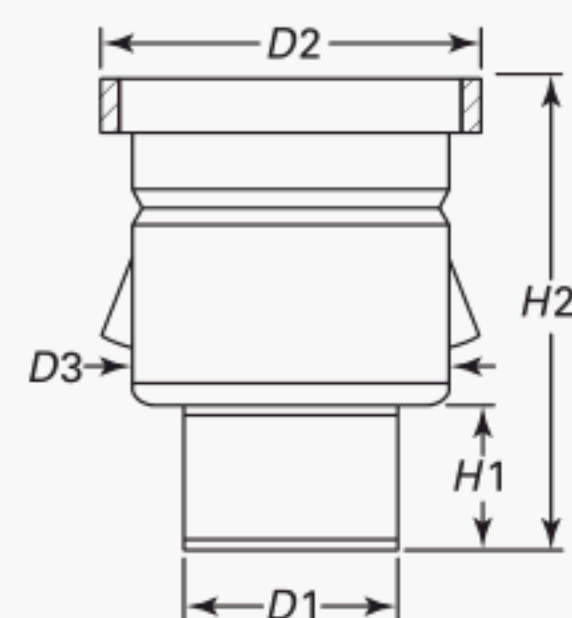
D1 (Nominal)	D2	H1	H2	B
160 mm 6 in.	260 mm 10.24 in.	95 mm 3.74 in.	303 mm 11.93 in.	300 mm 11.81 in.
110 mm 4 in.	260 mm 10.24 in.	75 mm 2.95 in.	283 mm 11.14 in.	300 mm 11.81 in.
110 mm 4 in.	160 mm 6.30 in.	75 mm 2.95 in.	244 mm 9.61 in.	200 mm 7.87 in.
75 mm 3 in.	260 mm 10.24 in.	65 mm 2.56 in.	273 mm 10.75 in.	300 mm 11.81 in.
75 mm 3 in.	160 mm 6.30 in.	65 mm 2.56 in.	234 mm 9.21 in.	200 mm 7.87 in.

GENERAL NOTE: Refer to Table 1 for outlet dimensions.

Table 38 Stainless Steel Male Adapter (Hub X.M.P.T.)

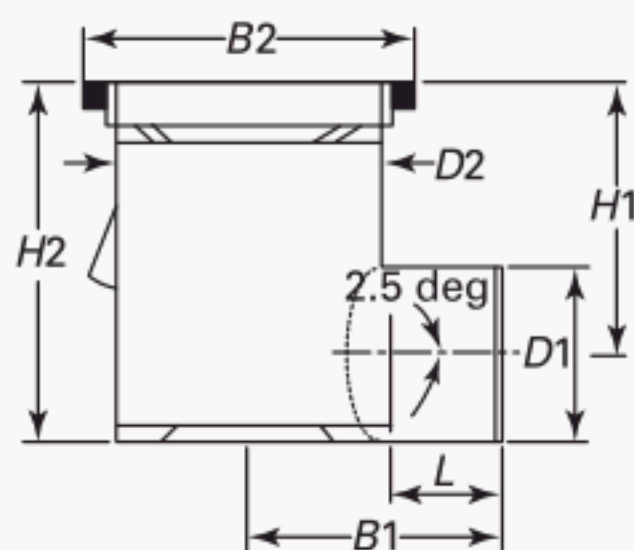
D1 (Nominal)	D2 (Nominal)	X
50 mm 2 in.	50 mm 2 in.	98 mm 3.86 in.
50 mm 2 in.	40 mm 1.50 in.	98 mm 3.86 in.
50 mm 2 in.	32 mm 1.25 in.	99 mm 3.90 in.

GENERAL NOTE: Refer to Table 1 for socket dimensions.

Table 40 Stainless Steel, Adjustable Floor Drain Round Profile

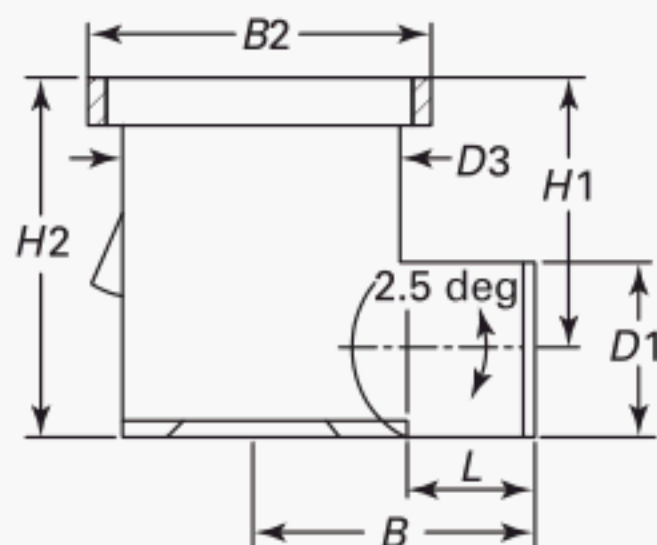
D1 (Nominal)	D2	D3	H1	H2
160 mm 6 in.	295 mm 11.61 in.	260 mm 10.24 in.	95 mm 3.74 in.	298 mm 11.73 in.
110 mm 4 in.	295 mm 11.61 in.	260 mm 10.24 in.	75 mm 2.95 in.	278 mm 10.95 in.
110 mm 4 in.	195 mm 7.68 in.	160 mm 6.30 in.	75 mm 2.95 in.	240 mm 9.45 in.
75 mm 3 in.	295 mm 11.61 in.	260 mm 10.24 in.	65 mm 2.56 in.	268 mm 10.55 in.
75 mm 3 in.	195 mm 7.68 in.	160 mm 6.30 in.	65 mm 2.56 in.	230 mm 9.06 in.

GENERAL NOTE: Refer to Table 1 for outlet dimensions.

Table 41 Stainless Steel, Side-Outlet, Floor Drain Square Profile

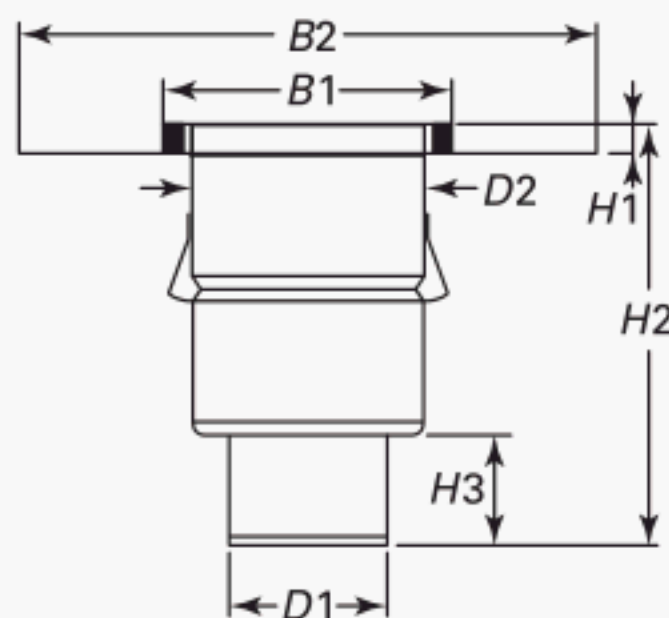
<i>D1 (Nominal)</i>	<i>D2</i>	<i>H1</i>	<i>H2</i>	<i>B1</i>	<i>B2</i>	<i>L</i>
160 mm 6 in.	260 mm 10.24 in.	177 mm 6.97 in.	245 mm 9.65 in.	336 mm 13.23 in.	300 mm 11.81 in.	93 mm 3.66 in.
110 mm 4 in.	260 mm 10.24 in.	193 mm 7.60 in.	245 mm 9.65 in.	205 mm 8.07 in.	300 mm 11.81 in.	70 mm 2.76 in.
110 mm 4 in.	160 mm 6.30 in.	167 mm 6.58 in.	219 mm 8.62 in.	155 mm 6.10 in.	200 mm 7.87 in.	70 mm 2.76 in.
75 mm 3 in.	160 mm 6.30 in.	186 mm 7.32 in.	219 mm 8.62 in.	253 mm 9.96 in.	200 mm 7.87 in.	60 mm 2.36 in.

GENERAL NOTE: Refer to Table 1 for outlet dimensions.

Table 42 Stainless Steel, Side-Outlet, Floor Drain Round Profile

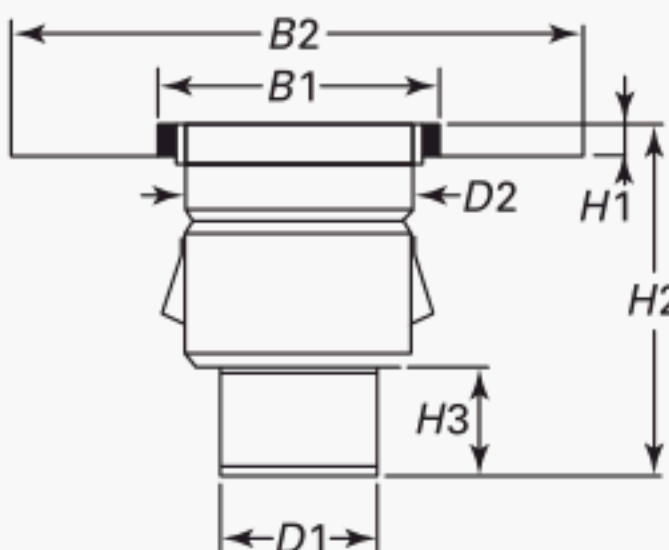
<i>D1 (Nominal)</i>	<i>D2</i>	<i>D3</i>	<i>H1</i>	<i>H2</i>	<i>B</i>	<i>L</i>
160 mm 6 in.	295 mm 11.61 in.	260 mm 10.24 in.	160 mm 6.30 in.	228 mm 8.98 in.	336 mm 13.23 in.	93 mm 3.66 in.
110 mm 4 in.	295 mm 11.61 in.	260 mm 10.24 in.	176 mm 6.93 in.	228 mm 8.98 in.	205 mm 8.07 in.	70 mm 2.76 in.
110 mm 4 in.	195 mm 7.68 in.	160 mm 6.30 in.	157 mm 6.18 in.	209 mm 8.23 in.	155 mm 6.10 in.	70 mm 2.76 in.
75 mm 3 in.	195 mm 7.68 in.	160 mm 6.30 in.	176 mm 6.93 in.	209 mm 8.23 in.	253 mm 9.96 in.	60 mm 2.36 in.

GENERAL NOTE: Refer to Table 1 for outlet dimensions.

Table 43 Stainless Steel Floor Drain With Membrane Flange Square Profile

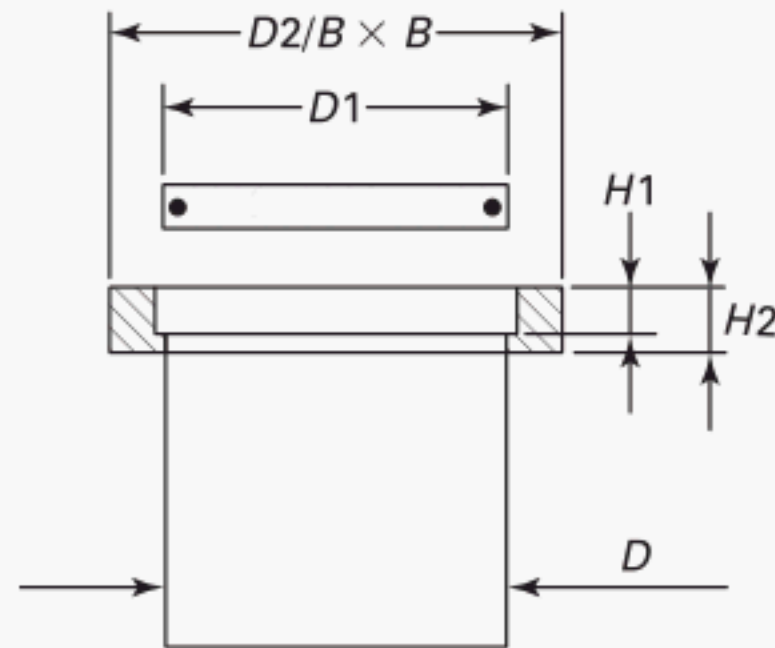
<i>D1</i> (Nominal)	<i>D2</i>	<i>H1</i>	<i>H2</i>	<i>H3</i>	<i>B1</i>	<i>B2</i>
160 mm 6 in.	260 mm 10.24 in.	20 mm 0.79 in.	303 mm 11.93 in.	95 mm 3.74 in.	300 mm 11.81 in.	500 mm 19.69 in.
110 mm 4 in.	260 mm 10.24 in.	20 mm 0.79 in.	340 mm 13.39 in.	75 mm 2.95 in.	300 mm 11.81 in.	500 mm 19.69 in.
110 mm 4 in.	160 mm 4.33 in.	20 mm 0.79 in.	294 mm 11.58 in.	75 mm 2.95 in.	200 mm 7.87 in.	400 mm 15.75 in.
75 mm 3 in.	160 mm 4.33 in.	20 mm 0.79 in.	284 mm 11.18 in.	65 mm 2.56 in.	200 mm 7.78 in.	400 mm 15.75 in.

GENERAL NOTE: Refer to Table 1 for outlet dimensions.

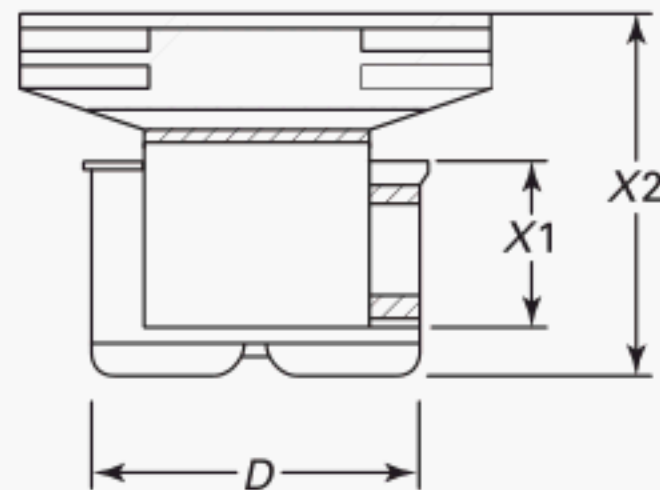
Table 44 Stainless Steel Floor Drain With Membrane Flange Square Profile

<i>D1</i> (Nominal)	<i>D2</i>	<i>H1</i>	<i>H2</i>	<i>H3</i>	<i>B1</i>	<i>B2</i>
160 mm 6 in.	260 mm 10.24 in.	20 mm 0.79 in.	303 mm 11.93 in.	95 mm 3.74 in.	300 mm 11.81 in.	500 mm 19.69 in.
110 mm 4 in.	260 mm 10.24 in.	20 mm 0.79 in.	283 mm 11.41 in.	75 mm 2.95 in.	300 mm 11.81 in.	500 mm 19.69 in.
75 mm 3 in.	260 mm 10.24 in.	20 mm 0.79 in.	273 mm 10.75 in.	65 mm 2.56 in.	300 mm 11.81 in.	500 mm 19.69 in.
110 mm 4 in.	160 mm 6.30 in.	20 mm 0.79 in.	244 mm 9.61 in.	75 mm 2.95 in.	200 mm 7.87 in.	400 mm 15.75 in.
75 mm 3 in.	160 mm 6.30 in.	20 mm 0.79 in.	234 mm 9.21 in.	65 mm 2.56 in.	200 mm 7.87 in.	400 mm 15.75 in.

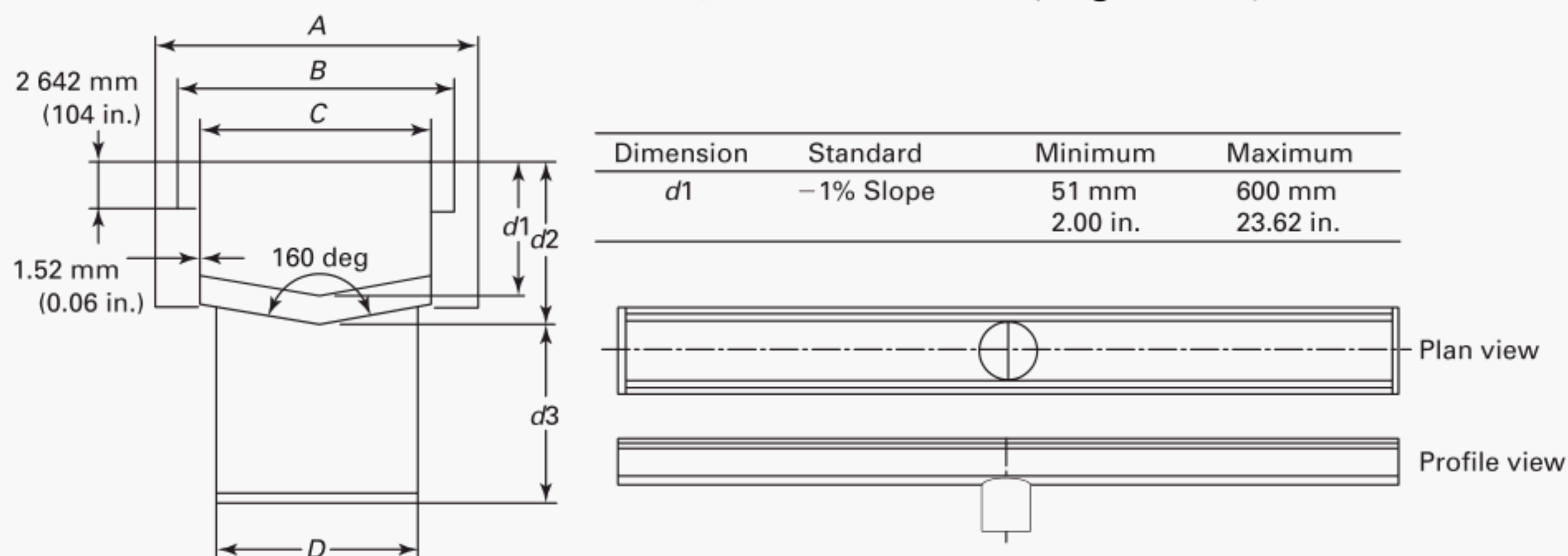
GENERAL NOTE: Refer to Table 1 for outlet dimensions.

Table 45 Stainless Steel, Gas-Tight Cover

Top Shape	<i>D</i>	<i>D1</i>	<i>D2</i> , Diameter	<i>B</i>	<i>H1</i>	<i>H2</i>
Round	110 mm 4.33 in.	115 mm 4.53 in.	150 mm 5.91 in.	...	14 mm 0.55 in.	20 mm 0.79 in.
Round	160 mm 6.30 in.	166 mm 6.54 in.	200 mm 7.87 in.	...	14 mm 0.55 in.	20 mm 0.79 in.
Square	110 mm 4.33 in.	115 mm 4.53 in.	...	150 mm 5.91 in.	14 mm 0.55 in.	20 mm 0.79 in.
Square	160 mm 6.30 in.	166 mm 6.54 in.	...	200 mm 7.87 in.	14 mm 0.55 in.	20 mm 0.79 in.

Table 46 316L Stainless Steel, Floor Drain Water Trap

Drain I.D.	<i>D</i>	<i>X1</i>	<i>X2</i>	Flow Capacity
108 mm 4.25 in.	75 mm 2.95 in.	52 mm 2.05 in.	93 mm 3.69 in.	0.9–1.3 L/s 14.3–18.5 gpm
156 mm 6.14 in.	107 mm 4.21 in.	52 mm 2.05 in.	115 mm 4.53 in.	2.7–3.4 L/s 42.8–53.9 gpm
256 mm 10.08 in.	197 mm 7.76 in.	52 mm 2.05 in.	128 mm 5.04 in.	6.0–7.3 L/s 95.1–115.7 gpm

Table 47 Stainless Steel, Trench Drain Profile (Length to Suit)

d1 = starting depth

d2 = ending depth on channels with built-in slope on length

GENERAL NOTE:

Standard built-in slope is 1%. Standard slope on width is 15 deg to 20 deg on each side.

A	B (Nominal)	B (Actual)	C	D Nominal Standard	D2 Varies by Length	D3 Standard Pipe Size
117 mm 4.61 in.	77 mm 3 in.	77 mm 3.03 in.	47 mm 1.85 in.	160 mm 6 in.	63/78/93 mm 2.48/3.07/3.66 in.	184 mm 7.24 in.
187 mm 7.36 in.	150 mm 6 in.	147 mm 5.79 in.	117 mm 4.61 in.	110 mm 4 in.	90/120 mm 3.54/4.72 in.	98 mm 3.86 in.
226 mm 8.90 in.	200 mm 8 in.	200 mm 7.87 in.	227 mm 8.94 in.	110 mm 4 in.	90/120 mm 3.54/4.72 in.	98 mm 3.86 in.
276 mm 10.87 in.	250 mm 10 in.	250 mm 9.84 in.	227 mm 8.94 in.	160 mm 6 in.	90/120 mm 3.54/4.72 in.	184 mm 7.24 in.
326 mm 12.83 in.	300 mm 12 in.	300 mm 11.81 in.	277 mm 10.90 in.	160 mm 6 in.	90/120 mm 3.54/4.72 in.	184 mm 7.24 in.
376 mm 14.80 in.	350 mm 14 in.	350 mm 13.78 in.	327 mm 12.88 in.	160 mm 6 in.	90/120 mm 3.54/4.72 in.	184 mm 7.24 in.
426 mm 16.77 in.	400 mm 16 in.	400 mm 15.75 in.	377 mm 14.84 in.	160 mm 6 in.	90/120 mm 3.54/4.72 in.	184 mm 7.24 in.
476 mm 18.74 in.	450 mm 18 in.	450 mm 17.72 in.	427 mm 16.81 in.	160 mm 6 in.	90/120 mm 3.54/4.72 in.	184 mm 7.24 in.
526 mm 20.71 in.	500 mm 20 in.	500 mm 19.69 in.	477 mm 18.78 in.	160 mm 6 in.	90/120 mm 3.54/4.72 in.	184 mm 7.24 in.
576 mm 22.68 in.	550 mm 22 in.	550 mm 21.65 in.	527 mm 20.75 in.	160 mm 6 in.	90/120 mm 3.54/4.72 in.	184 mm 7.24 in.
626 mm 24.65 in.	600 mm 24 in.	600 mm 23.62 in.	577 mm 22.72 in.	160 mm 6 in.	90/120 mm 3.54/4.72 in.	184 mm 7.24 in.

GENERAL NOTE: Refer to Table 1 for outlet dimensions.

**Table 48 Open-Area Requirement
for Floor Drains**

Nominal Outlet Connection (Nominal Size)		Traverse (Flow) Area of Connecting Pipe		Minimum Grate Free Area	
mm	in.	cm ²	in. ²	cm ²	in. ²
50	2	18.1	2.80	27.1	4.2
75	3	41.9	6.49	62.6	9.7
110	4	91.6	14.20	137.4	21.3
160	6	194.8	30.20	292.3	45.3

NONMANDATORY APPENDIX A

HANDLING, INSPECTION, AND INSTALLATION PRACTICES FOR STAINLESS STEEL DRAINAGE AND VACUUM SYSTEMS

A-1 GENERAL

The installation and handling of Types 304 and 316L stainless steel DWV pipe and fittings for sanitary, storm, and vacuum use shall be in accordance with the manufacturer's installation recommendations.

A-2 HANDLING

A-2.1 General

Handling shall be in accordance with the manufacturer's installation recommendations.

A-2.2 Safe Handling

Strict attention shall be paid to all safety regulations for handling and storage of pipe, fittings, and accessories.

A-3 INSPECTION OF SHIPMENT

The receiving party shall make an inspection of the load. This includes checking received invoices to shipment. The receiving party shall make a visual observation for signs of damage.

A-3.1 Intact Loads

If the load is intact, inspection by the installer while unloading shall be adequate to ensure that pipe, fittings, and accessories have arrived in good condition. The markings of the pipe shall be verified to be in accordance with para. 4 of this Standard.

A-4 INSTALLATION

A-4.1 Visual Inspection

Prior to starting the installation, all pipe, fittings, and joint components shall be examined. Any materials that are bent, crushed, dented, or otherwise damaged shall not be used.

A-4.2 Preparation

The installer shall check that all pipe, joint components, fittings, hangers, and tools are on hand to permit an orderly completion of the system.

A-4.3 Local Code Provisions

Stainless steel DWV systems shall be installed in accordance with the manufacturer's instructions.

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