ASME B16.29-2007

(Revision of ASME B16.29-2001)

Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings — DWV

AN AMERICAN NATIONAL STANDARD

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Three Park Avenue • New York, NY 10016

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The next edition of this Standard is scheduled for publication in 2012. There will be no addenda issued to this edition.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the ASME Web site under the Committee Pages at http://cstools.asme.org as they are issued.

The American Society of Mechanical Engineers
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FOREWORD

Standardization of cast and wrought solder-joint fittings was initiated in Subcommittee 11 of American Standards Association (ASA) Sectional Committee A40 on Plumbing Requirements and Equipment. Development work culminated in publication of ASA A40.3-1941.

In 1949, work on these fittings was transferred to Sectional Committee B16 of ASA, which established Subcommittee 9 (now Subcommittee J). The first standard developed was approved as ASA B16.18-1950, Cast Bronze Solder-Joint Fittings. A later joint effort of the Copper and Brass Research Association and the Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) culminated in a standard on wrought fittings, ultimately approved as B16.22-1951.

Concurrently, recognizing the need for drainage fitting standards, an MSS task group developed the standard later approved as ASA B16.23-1953, Cast Bronze Solder-Joint Drainage Fittings, and a standard for wrought fittings was initially published as MSS SP-64-1961. A revision of that standard was submitted to Subcommittee 9 of B16 and was eventually approved as ASA B16.29-1966.

A revision was published [after reorganization of ASA as the American National Standards Institute (ANSI)] as ANSI B16.29-1973. In this edition, shorter solder cups were specified in larger sizes, since strength to contain pressure is not a factor. In 1979, Subcommittee I (formerly 9, now J) added metric dimensional equivalents and made other minor improvements. That revision was approved by ANSI, after approval by the Committee and secretariat organizations, as ANSI B16.29-1980.

In 1982, American National Standards Committee B16 was reorganized as an ASME Committee operating under procedures accredited by ANSI. The 1986 edition of the standard removed metric equivalents (not functionally applicable in the plumbing industry), updated the referenced standards, and incorporated editorial and format revisions. The 1994 edition removed inspection tolerance requirements, established minimum laying lengths, added soil pipe adapters, and incorporated editorial revisions. Following approval by the Standards Committee and ASME, approval as an American National Standard was given by ANSI on October 10, 1994, with the designator ASME B16.29-1994.

The 2001 Edition of this Standard was revised to include Nonmandatory Appendix B, Quality System Program. Editorial revisions were made for the purpose of clarification. Following approval by the B16 Main Committee and ASME Supervisory Board, this Standard was approved as an American National Standard by ANSI on October 11, 2001.

In this 2007 Edition, metric units are the primary reference units while maintaining U.S. Customary Units in either parenthetical or separate forms. In addition, several editorial revisions have been made for clarity. Following approval by the B16 Standards Committee and the ASME Supervisory Board, and after public review, this Standard was approved as an American National Standard by ANSI on August 20, 2007.

Requests for interpretation or suggestions for revision should be sent to the Secretary, B16 Committee, The American Society of Mechanical Engineers, Three Park Avenue, New York, New York 10016-5990.

ASME B16 COMMITTEE
Standardization of Valves, Flanges, Fittings, and Gaskets

(The following is the roster of the Committee at the time of approval of this Standard.)

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General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B16 Standards Committee
The American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990

As an alternative, inquiries may be submitted via e-mail to: SecretaryB16@asme.org.

Proposing Revisions. Revisions are made periodically to the standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Interpretations. Upon request, the B16 Committee will render an interpretation of any requirement of the standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B16 Standards Committee.

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, which 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.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The B16 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B16 Standards Committee.

ASME B16.29-2007
SUMMARY OF CHANGES

Following approval by the ASME B16 Committee and ASME, and after public review, ASME B16.29-2007 was approved by the American National Standards Institute on August 20, 2007.

ASME B16.29-2007 includes the following changes identified by a margin note, **(07)**.

Page	*Location*	*Change*
1, 2	1	(1) Paragraphs 1.1 and 1.2 revised
		(2) Paragraphs 1.3 and 1.4 added
		(3) Former para. 1.3 revised and redesignated as 1.5
	2	Revised
	3	Revised
	5	Subparagraphs (a) and (b) revised
	10.2	Revised
	10.3	Revised
	12	Revised
	13	Revised in its entirety
3	Table 1	Revised
4	Table 2	Revised
6	Table 3	Revised
7	Table 4	Revised
8	Table 5	Revised
9	Table 6	Revised
10	Table 7	Revised
11	Table 8	Revised
	Table 9	Revised
12	Table 10	Revised
13	Table 11	Revised
14	Table 12	Revised
	Table 13	Revised
15	Mandatory Appendix I	Added
27	Mandatory Appendix II	Revised in its entirety
28	Nonmandatory Appendix A	Title revised

WROUGHT COPPER AND WROUGHT COPPER ALLOY SOLDER-JOINT DRAINAGE FITTINGS — DWV

(07) 1 SCOPE

1.1 General

This Standard for wrought copper and wrought copper alloy solder-joint drainage fittings, designed for use with copper drainage tube conforming to ASTM B 306, covers the following:

(a) description
(b) pitch (slope)
(c) abbreviations for end connections
(d) sizes and method of designating openings for reducing fittings
(e) marking
(f) material
(g) dimensions and tolerances

1.2 Convention

For the purpose of determining conformance with this Standard, the convention for fixing significant digits where limits (maximum and minimum values) are specified shall be rounding off as defined in ASTM E 29. This requires that an observed or calculated value shall be rounded off to the nearest unit in the last right-hand digit used for expressing the limit. Decimal values and tolerances do not imply a particular method of measurement.

1.3 Relevant Units

This Standard states values in both metric and U.S. Customary units. These systems of units are to be regarded separately as standard. Within the text, the U.S. Customary units are shown in parentheses or in separate tables. (Tables showing dimensions in equivalent U.S. Customary units are found in Mandatory Appendix I.) The values stated in each system are not exact equivalents; therefore, it is required that each system of units be used independently of the other. Combining values from the two systems constitutes nonconformance with the standard.

1.4 References

Codes, standards, and specifications, containing provisions to the extent referenced herein, constitute requirements of this Standard. These reference documents are listed in Mandatory Appendix II.

1.5 Quality Systems (07)

Guidelines relating to the product manufacturer's quality system programs are described in Nonmandatory Appendix A.

2 DESCRIPTION (07)

These fittings are designed for drainage and vent systems only, using the solder-joint method of connection. The fitting cups (C) are provided with stops so that the ends of the tube, when assembled, meet the stops. Sketches and designs of fittings are illustrative only. The dimensions specified herein shall govern in all cases.

3 PITCH (SLOPE) (07)

All nominal 90-deg fittings shall be pitched to result in a slope of 0.20 mm/m (0.25 in./ft) (2%) of horizontal tube length with reference to a horizontal plane.

4 ABBREVIATIONS

The symbols shown below are used to designate the type of fitting end.

Symbols	Definitions
C	Solder-joint fitting end (female) made to receive copper tube diameter
FTG	Solder-joint fitting end (male) made to copper tube diameter
F	Internal American National Standard taper pipe thread (female) NPTI
M	External American National Standard taper pipe thread (male) NPTE
SJ	End of fitting formed to receive outside diameter tube size
NPSM	American National Standard straight mechanical pipe thread

5 COMPONENT SIZE (07)

5.1 Nominal Size

As applied in this Standard, the use of the phrase "nominal size" followed by a dimensionless number is for the purpose of fitting end connection size identification.

5.1.1 Tube. The size designations for the fitting end configurations defined in Table 1 (Table I-1) correspond to drainage tube sizes defined in ASTM B 306.

5.1.2 Pipe. The size designation of threaded fitting end configurations defined in Table 2 (Table I-2) corresponds to thread sizes defined in ASME B1.20.1.

5.2 Identification

Fittings shall be identified by the nominal size of the openings in the sequence illustrated in Fig. 1.

6 MARKING

Each fitting shall be marked permanently and legibly with the manufacturer's name or trademark and with DWV (to indicate drain-waste-vent).

7 MATERIAL

Fittings shall be made of wrought copper or wrought copper alloy material having not less than 84% of copper content.

8 LAYING LENGTHS

Due to widely varying manufacturing processes, laying length dimensions of fittings are not standardized. Consult the manufacturer for these dimensions. Suggested dimensions, including laying lengths, for various fitting configurations are shown in Tables 3 through 13 (Tables I-3 through I-13).

9 OVALITY

Maximum ovality shall not exceed 1% of the maximum diameter shown in Table 1. The average of the maximum and minimum diameters must be within the dimensions shown in the table.

10 THREADED ENDS

10.1 General

Fitting threads shall be right hand, conforming to ASME B1.20.1-1983 (R2001). They shall be taper threads (NPT), except for slip joint ends, which shall have straight pipe threads (NPSM).

(07) 10.2 Chamfer

All internal threads shall be countersunk a distance not less than one-half the pitch of the thread at an angle of approximately 45 deg with the axis of the thread. All external threads shall be chamfered at an angle of 30 deg to 45 deg from the axis. Countersinking and chamfering shall be concentric with the threads. The length of threads shall be measured to include the countersink or chamfer.

10.3 Threading Tolerances (07)

Tapered pipe threads (NPT) shall be checked by use of plug or ring gauges, in either standard or limit types. When gauging internal taper threads, the plug gauge shall be screwed handtight into the fitting. The reference point for gauging internal product threads depends on the chamfer diameter. When the internal chamfer diameter exceeds the major diameter of the internal thread, the reference point shall be the last thread scratch on the chamfer cone. Otherwise, when the internal chamfer diameter does not exceed the major diameter of the internal thread, the reference point shall be the end of the fitting. In gauging external taper threads, the ring gauge shall be screwed handtight on the internal thread. On the external thread, the ring gauge shall be flush with the end of the thread. Gauging practices shall be as shown in Notes (3) and (4) of Table 2. Straight pipe threads (NPSM) shall be checked by the use of standard GO and NOT GO plug and ring gauges.

11 DESIGN OF THREADED ENDS

External and internal threaded ends of fittings will be furnished with a polygon to facilitate installation.

12 ALIGNMENT (07)

The maximum allowable variation in the angular alignment of all openings shall be 5 mm in 1 m (0.06 in. in 1 ft) (0.5%), other than in the direction of pitch (see section 3).

13 GAUGING (07)

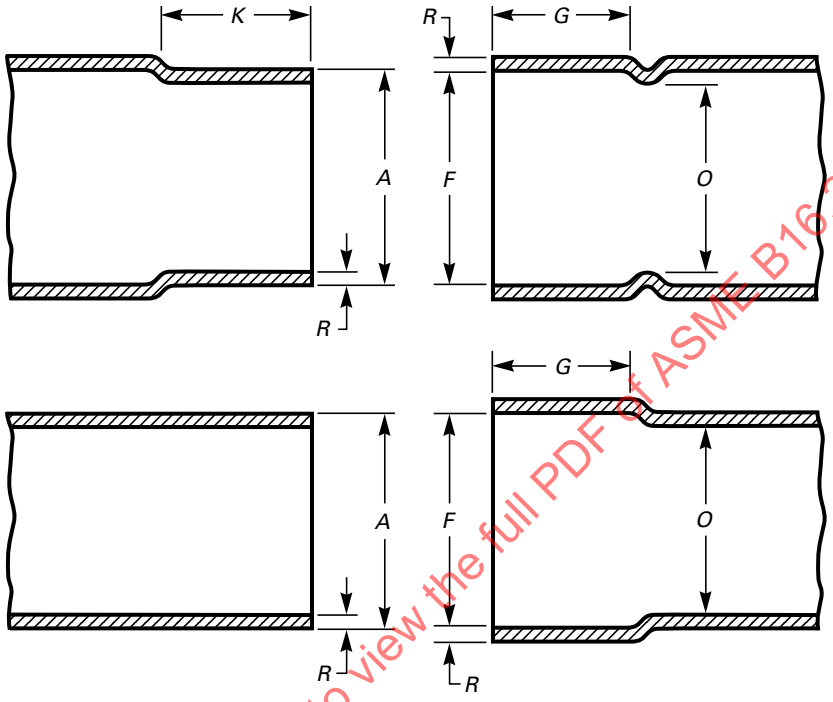
13.1 Standard Gauging Method of Solder-Joint Ends

The standard method of gauging the diameter tolerances for male and female ends shall be by use of plain plug and ring gauges designed to hold the product within the limits established in Table 1.

13.2 Optional Gauging Method of Solder-Joint Ends

For gauging the diameter tolerance of male and female ends, the manufacturer may use direct reading instruments instead of ring and plug gauges as specified in para. 13.1. When gauging the diameters of male and female ends, using direct reading instruments, refer to section 9. In case of a dispute, ring/plug gauges shall be used as the referee method.

Table 1 Dimensions of Solder-Joint Ends (07)



Male End (FTG) Female End (FTG)

Nominal Tube Size [Note (1)]	Male End			Female End			Minimum Metal Thickness, *R* [Note (4)]	Minimum Inside Diameter of Fitting, *O* [Note (5)]
	Outside Diameter, *A* [Note (2)]		Minimum Length, *K* [Note (3)]	Inside Diameter, *F* [Note (2)]		Minimum Depth, *G* [Note (3)]		
	Min.	Max.		Min.	Max.			
1¼	34.85	34.98	14.22	35.00	35.10	12.70	1.02	32.77
1½	41.17	41.33	15.75	41.35	41.48	14.22	1.07	38.86
2	53.87	54.03	17.53	54.05	54.18	15.75	1.07	51.05
3	79.27	79.43	20.57	79.45	79.58	19.05	1.14	75.69
4	104.67	104.83	26.92	104.85	104.98	25.40	1.47	99.82

GENERAL NOTE: Dimensions are in millimeters.

NOTES:

(1) For size designation of fitting, see section 5.

(2) See section 9.

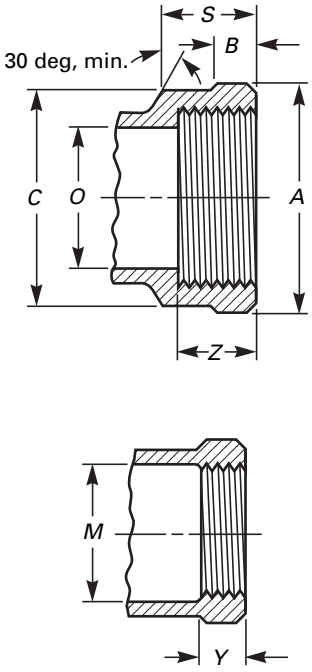
(3) *K* dimensions of 11.2 mm, 12.7 mm, and 14.2 mm and *G* dimensions of 9.7 mm, 11.2 mm, and 12.7 mm, respectively, for sizes 1¼, 1½, and 2 are sound and acceptable from an engineering standpoint. However, the cup depths specified provide greater latitude in making accurate installations.

(4) *R* dimension is based on DWV tubing, which is intended for above-ground use.

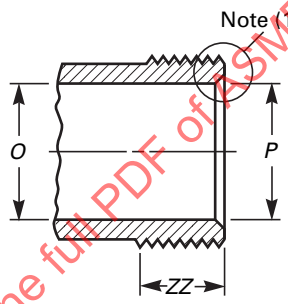
(5) Inside diameter of fitting is based on Type M copper water tube (ASTM B 88).

(07)

Table 2 Dimensions of Threaded Ends — DWV



Internal Threaded End
(F)



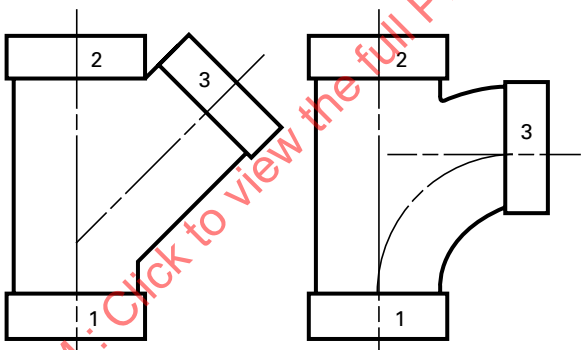
External Threaded End
(M)

Nominal Thread Size [Note (4)]	Internal End [Note (2)]								External End [Note (3)]		
	Minimum Diam. of Band or Across Flats of Polygon, *A*	Minimum Band Length, *B*	Minimum Diam. of Body Over Thread, *C*	Minimum Inside Diam. of Fitting, *O*	*M*, Min.	Minimum Length of Thread, *Y*	*S*, Min.	Minimum Depth of Bore, *Z*	Minimum Inside Diam. of Fitting, *O*	Maximum Thread End Bore, *P*	Minimum Length of Effective Thread, *ZZ*
1¼	45.2	8.6	43.7	32.8	42.2	10.7	18.3	17.5	32.8	34.8	18.0
1½	52.3	9.7	50.3	38.9	48.3	10.7	18.3	17.5	38.9	40.9	18.3
2	64.3	12.7	63.0	51.1	60.5	11.2	20.6	19.1	51.1	52.6	19.3
3	94.5	14.2	93.5	75.7	88.9	19.6	32.5	31.0	75.7	78.2	30.5

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) 1¼, 1½, and 2 male threaded ends may have inside chamfer for slip nut connections.
(2) Internal threads shall be gauged from ½ turn large to 1½ turn small from the gauging notch on the plug when using working gauges.
(3) External threads shall be gauged ½ turn small to 1½ turn large from the face of the ring when using working gauges.
(4) Thread size is as governed by ASME B1.20.1-1983 (R2001).

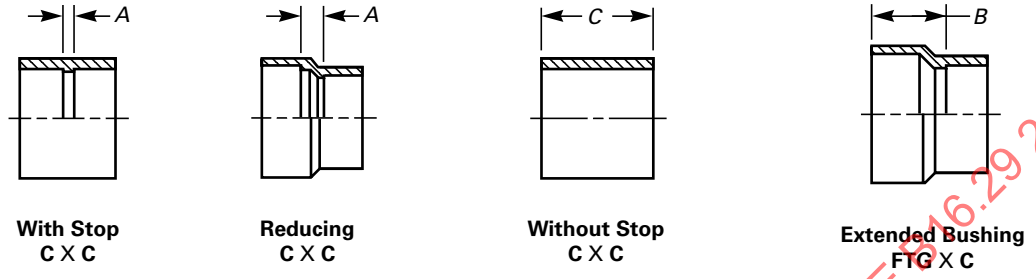
Fig. 1 Size of Fittings



DWV 45 deg Y DWV Tee

(07)

Table 3 Dimensions of DWV Couplings, Extended Bushings, and Adapters



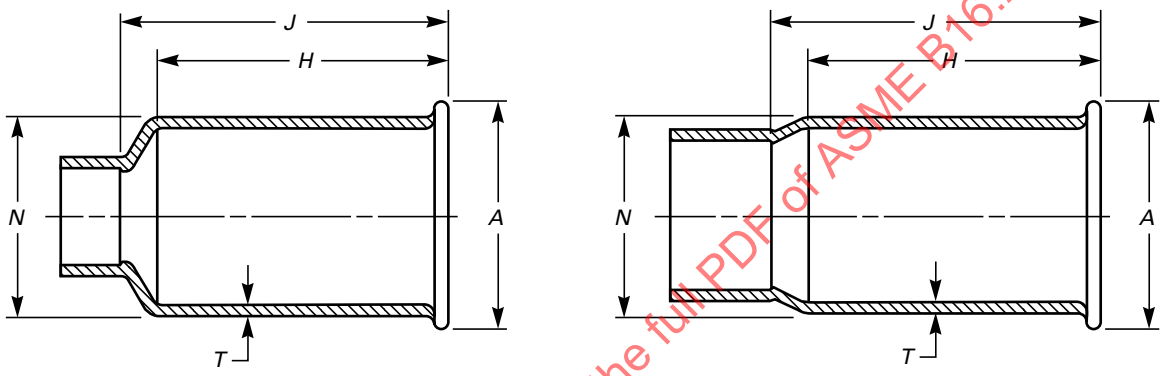
DWV Couplings

DWV Adapters

Nominal Thread or Tube Size	Minimum Couplings C × C, *A*	Minimum Coupling Reducer C × C, *A*	Minimum Couplings Without Stop C × C, *C*	Minimum Bushing Extended FTG × C, *B*	Adapters			
					Minimum C × F, *B*	Minimum C × M, *B*	Minimum FTG × F, *C*	Minimum FTG × M, *C*
1¼	1.5	...	25.4	...	18.5	21.8	34.5	...
1¼ × 1½	...	...	...	...	...	31.2	...	...
1½	1.5	...	28.4	...	18.5	21.8	37.6	42.9
1½ × 1¼	...	4.8	...	20.6	...	24.9	...	...
1½ × 2	...	...	...	...	...	37.6	...	...
2	1.5	...	31.8	...	21.8	21.8	40.9	...
2 × 1½	...	6.4	...	26.9	...	...	...	...
2 × 1¼	...	6.4	...	25.4	...	23.4	...	...
3	1.5	...	38.1	...	33.8	36.8	55.9	...
3 × 2	...	6.4	...	28.4	...	...	...	...
3 × 1½	...	7.9	...	28.4	...	...	...	...
3 × 1¼	...	7.9	...	30.2	...	...	...	...
4	1.5	...	50.8	...	...	...	...	...
4 × 3	...	9.7	...	36.6	...	...	...	...

GENERAL NOTE: Dimensions are in millimeters.

Table 4 Dimensions of DWV Soil Pipe Adapters (07)



Reducing Size
C X Spigot

Straight Size
C X Spigot

DWV Soil Pipe Adapters

Dimension	Nominal Size						
	2 × 2	1½ × 2	1¼ × 2	3 × 3	2 × 3	4 × 4	3 × 4
A, max.	69.9	69.9	69.9	98.6	98.6	124.0	124.0
A, min.	68.3	68.3	68.3	96.8	96.8	122.2	122.2
H, min.	60	81	81	6	86	73	92
J, min.	64	87	87	73	95	83	103
N	62.2	62.2	62.2	88.6	88.6	114.0	114.0
T, min.	1.37	1.37	1.37	1.60	1.60	1.83	1.83

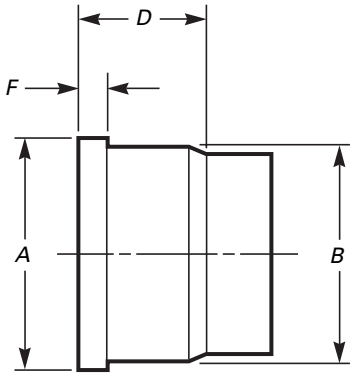
GENERAL NOTES:

(a) Dimensions are in millimeters.

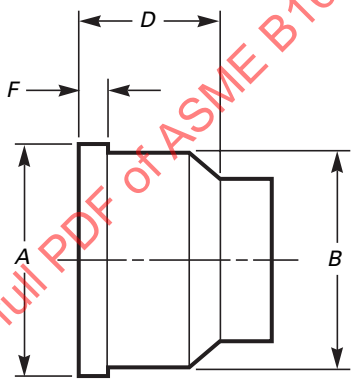
(b) Dimensions are for extra-heavyweight soil pipe (reference ASTM A 74). For service weight soil pipe, *A* and *N* nominal dimensions may be from 3 mm to 8 mm smaller than dimensions shown in table.

(07)

Table 5 Dimensions of DWV C × No-Hub Soil Pipe Adapter



Straight Size



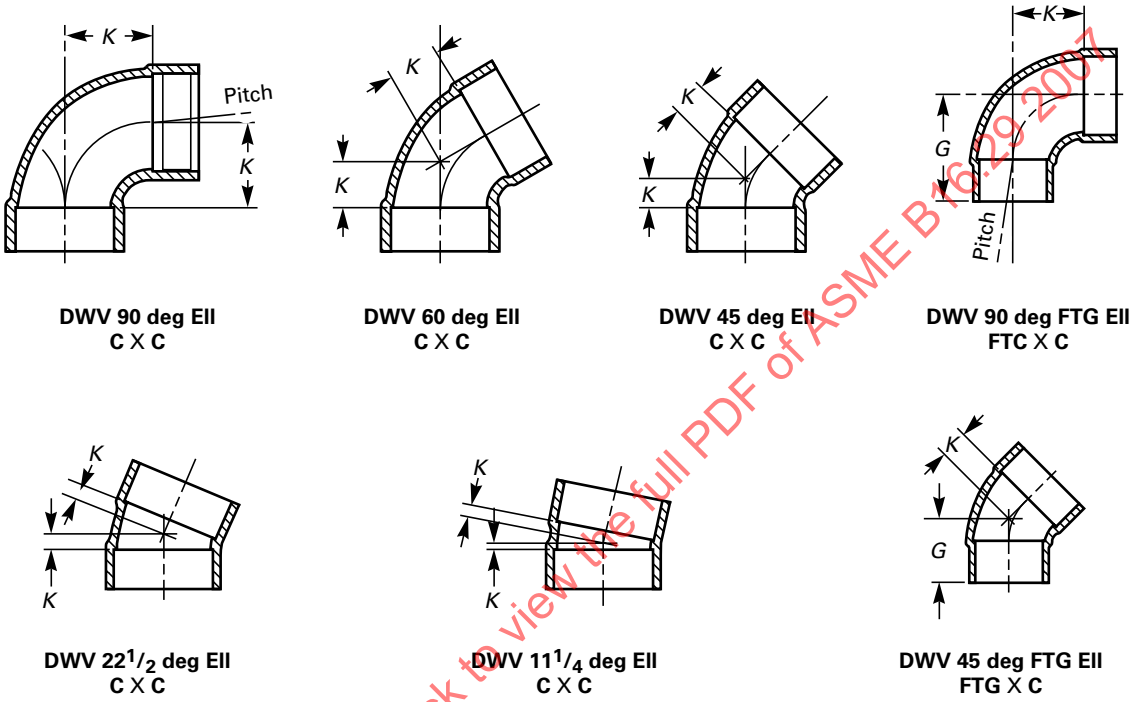
Reducing Size

DWV Soil Pipe Adapter – C X No-Hub for Use With Stainless Steel Clamp and Elastomer Gasket

Nominal Size	*A* ± 1.5	*B* ± 1.5	*D*, Min.	*F* $^{+3.3}_{-0.00}$
2	60.5	58.7	31.0	6.4
1½ × 2	60.5	58.7	31.8	6.4
1¼ × 2	60.5	58.7	32.5	6.4
3	86.6	84.8	31.0	6.4
2 × 3	86.6	84.8	31.8	6.4
1½ × 3	86.6	84.8	32.5	6.4
4	112.8	111.3	31.0	7.9
3 × 4	112.8	111.3	31.8	7.9

GENERAL NOTE: Dimensions are in millimeters.

Table 6 Dimensions of DWV Elbows (07)



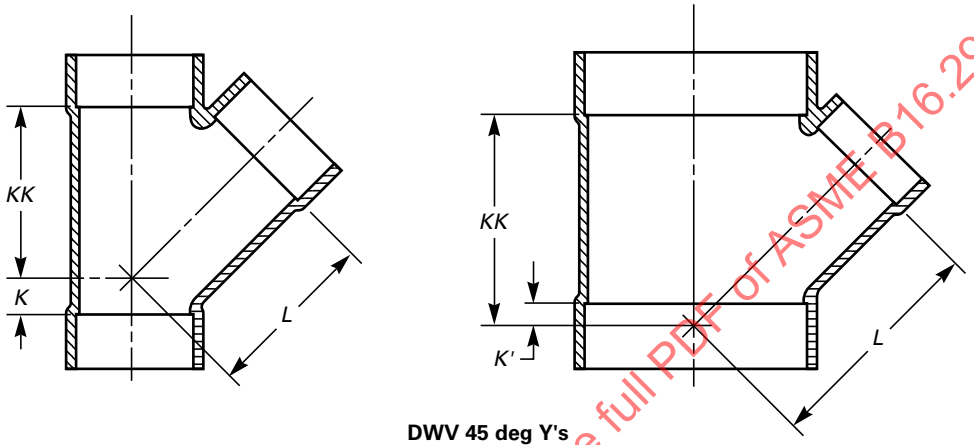
DWV Elbows

Angle	Dimensions	Nominal Tube Size				
		1¼, Min.	1½, Min.	2, Min.	3, Min.	4, Min.
90 deg C × C	*K*	28.2	34.5	47.2	70.4	93.7
60 deg C × C	*K*	15.5	18.5	26.4	40.1	. . .
45 deg C × C	*K*	10.7	12.2	18.5	27.4	36.6
22½ deg C × C	*K*	2.8	4.3	7.6	11.4	15.7
11¼ deg C × C	*K*	1.0	1.0	2.8	3.6	7.9
90 deg FTG × C	*K*	28.2	33.0	47.2	70.4	93.7
	G	42.4	50.3	64.5	90.9	120.9
45 deg FTG × C	*K*	10.7	12.2	18.5	27.4	36.6
	G	24.9	28.2	36.1	48.0	63.5

GENERAL NOTE: Dimensions are in millimeters.

(07)

Table 7 Dimensions of DWV 45 deg Y's



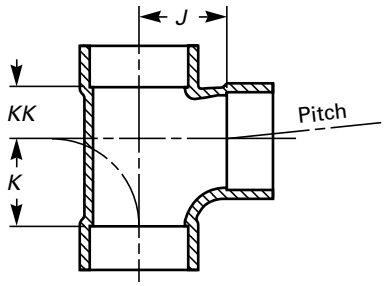
DWV 45 deg Y's
C X C X C

Nominal Tube Size	*K*	*K′*	*KK*, Min.	*L*, Min.
1¼	6	...	49.3	47.2
1½	8	...	58.7	56.6
1½ × 1½ × 1¼	4	...	53.8	51.8
1½ × 1¼ × 1½	8	...	60.5	53.6
1½ × 1¼ × 1¼	4	...	55.6	50.3
2	12	...	71.4	69.3
2 × 2 × 1½	3	...	63.5	64.5
2 × 2 × 1¼	0	...	58.7	59.9
2 × 1½ × 2	12	...	81.0	69.3
2 × 1½ × 1½	3	...	71.4	39.4
3	19	...	104.6	101.9
3 × 3 × 2	0	...	90.4	90.9
3 × 3 × 1½	...	3	81.0	84.6
3 × 3 × 1¼	...	5	71.4	78.2
4	24	...	136.7	133.6

GENERAL NOTE: Dimensions are in millimeters.

(07)

Table 8 Dimensions of DWV Tees

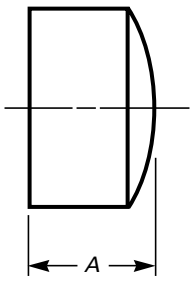


DWV Tees
C X C X C

Nominal Tube Size	*J*, Min.	*K*, Min.	*KK*, Min.
1¼	26.7	26.4	19.1
1½	33.0	33.0	20.6
1½ × 1½ × 1¼	29.7	26.4	20.6
1½ × 1¼ × 1½	34.5	34.5	23.9
1½ × 1¼ × 1¼	31.2	28.2	23.9
2	42.4	45.7	26.9
2 × 2 × 1½	37.6	31.2	22.4
2 × 2 × 1¼	36.1	26.4	19.1
2 × 1½ × 2	42.9	45.7	33.3
2 × 1½ × 1½	37.6	33.0	30.2
3	63.8	70.4	42.9
3 × 3 × 2	54.4	45.0	28.7
3 × 3 × 1½	49.5	32.3	23.9
3 × 3 × 1¼	48.0	25.7	20.6
4	95.5	95.5	52.3

GENERAL NOTE: Dimensions are in millimeters.

Table 9 Dimensions of DWV Caps (07)



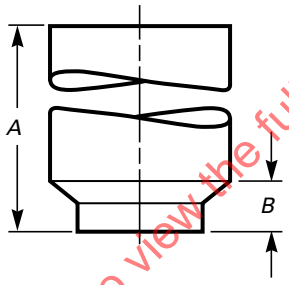
DWV Caps
C

Nominal Tube Size	*A*
1¼	18
1½	19
2	21

GENERAL NOTE: Dimensions are in millimeters.

(07)

Table 10 Dimensions of DWV Vent Increasers

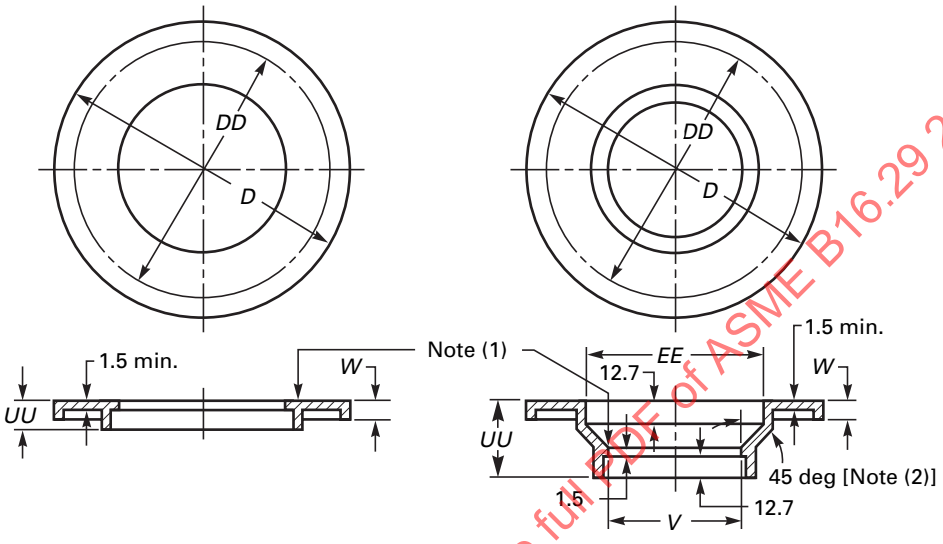


DWV Vent Increasers
C X FTG

Nominal Tube Size	*A*	*B*, Max.
3 × 4 × 18	457	76
3 × 4 × 24	610	76
3 × 4 × 30	762	76

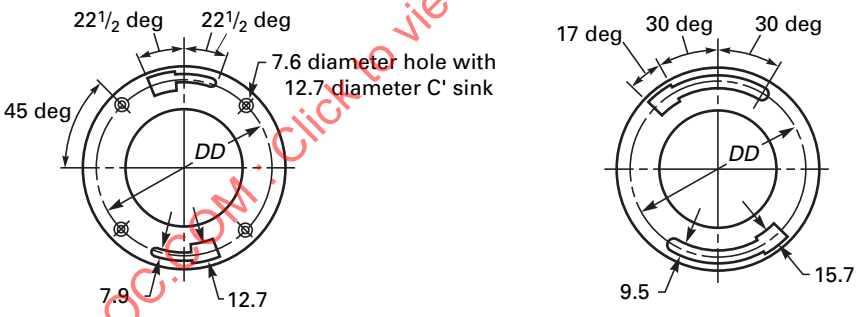
GENERAL NOTE: Dimensions are in millimeters.

Table 11 Dimensions of DWV Closet Flanges (07)



Size 4 Closet Flange

Size 3 Closet Flange



Quarter Slot With Holes

Half Slot

Suggested Slot Arrangements

Nominal Size	*D*, Min.	*DD*	*EE*	*UU*, Min.	*V*, Min. [Note (3)]	*W*
3	171.5	152	105	39.6	74.7	6.4
4	171.5	152	. . .	15.7	. . .	6.4

GENERAL NOTE: Dimensions are in millimeters.

NOTES:

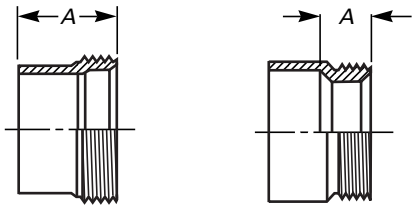
(1) Tube stop optional.

(2) 45-deg angle may be extended to face of flange.

(3) For flange with tube stop.

(07)

Table 12 Dimensions of DWV Trap Adapters



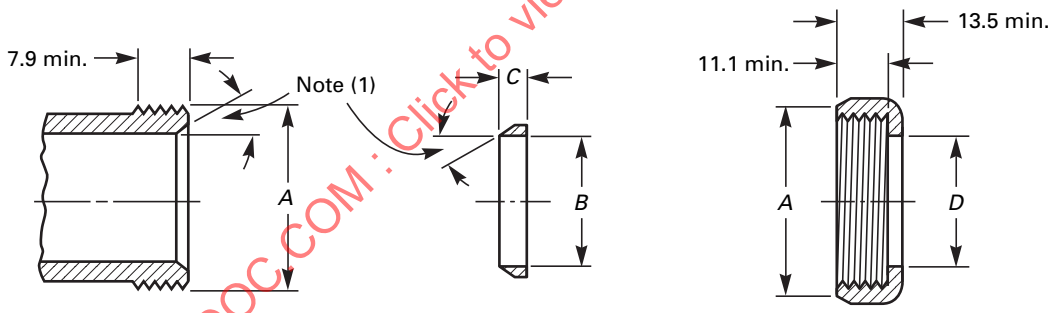
F X SJ C X SJ

Nominal Size	FTG × SJ, *A*	C × SJ, *A*
1¼	27.7	12.7
1½	29.5	12.7
1½ × 1¼	30.2	15.7

GENERAL NOTE: Dimensions are in millimeters.

(07)

Table 13 Dimensions of DWV Slip Joint Ends



Fitting SJ Gasket [Note (2)] Nut [Note (3)]

Nominal Size	Diameter of Thread, *A*	Gasket		Nut
		Nominal Inside Diameter of Gasket, *B*	Minimum Length of Gasket, *C*	Nominal Nut Hole Diameter, *D*
1¼	1¼ NPSM	32.0	4.1	32.5
1½	1½ NPSM	38.4	4.8	38.9

GENERAL NOTE: Dimensions are in millimeters.

NOTES:

(1) Angles must be equal.

(2) Gasket to be pliable, not subject to aging or drying out.

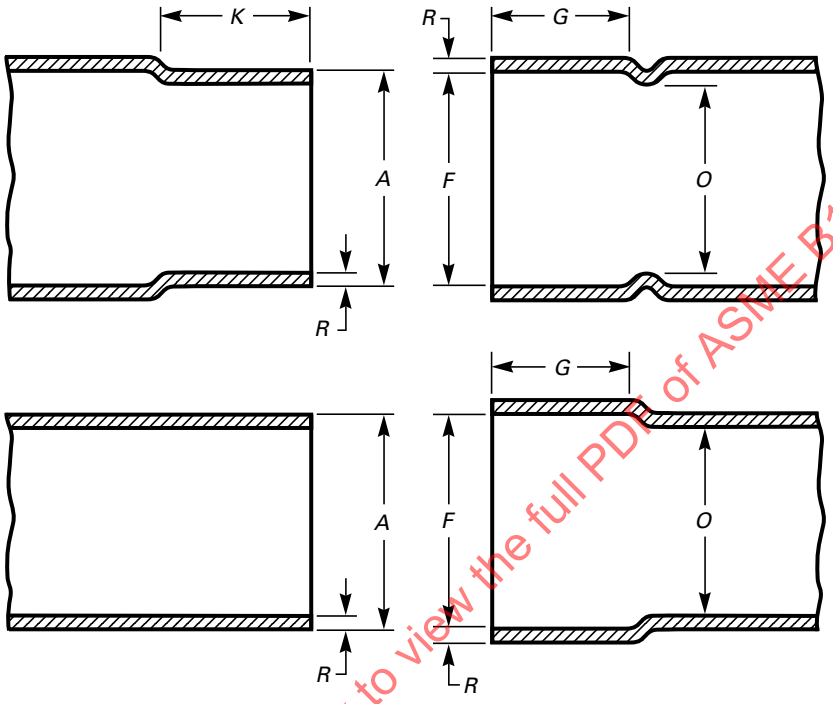
(3) Nut may be any material specified in para. 7 or other suitable nonferrous alloy.

MANDATORY APPENDIX I
U.S. CUSTOMARY DIMENSIONS

(07)

This Appendix provides tables of the standard inch dimensions for fittings (Tables I-1 through I-13).

Table I-1 Dimensions of Solder-Joint Ends



Male End (FTG) **Female End (FTG)**

Nominal Tube Size [Note (1)]	Male End			Female End			Minimum Metal Thickness, *R* [Note (4)]	Minimum Inside Diameter of Fitting, *O* [Note (5)]
	Outside Diameter, *A* [Note (2)]		Minimum Length, *K* [Note (3)]	Inside Diameter, *F* [Note (2)]		Minimum Depth, *G* [Note (3)]		
	Min.	Max.		Min.	Max.			
1¼	1.372	1.377	0.56	1.378	1.382	0.50	0.040	1.29
1½	1.621	1.627	0.62	1.628	1.633	0.56	0.042	1.53
2	2.121	2.127	0.69	2.128	2.133	0.62	0.042	2.01
3	3.121	3.127	0.81	3.128	3.133	0.75	0.045	2.98
4	4.121	4.127	1.06	4.128	4.133	1.00	0.058	3.93

GENERAL NOTE: Dimensions are in inches.

NOTES:

(1) For size designation of fitting, see section 5.

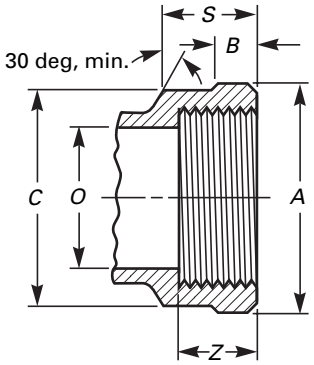
(2) See section 9.

(3) *K* dimensions of 0.44 in., 0.50 in., and 0.56 in. and *G* dimensions of 0.38 in., 0.44 in., and 0.50 in., respectively, for sizes 1¼, 1½, and 2 are sound and acceptable from an engineering standpoint. However, the cup depths specified provide greater latitude in making accurate installations.

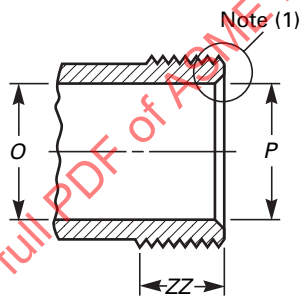
(4) *R* dimension is based on DWV tubing, which is intended for above-ground use.

(5) Inside diameter of fitting is based on Type M copper water tube (ASTM B 88).

Table I-2 Dimensions of Threaded Ends — DWV



Internal Threaded End
(F)



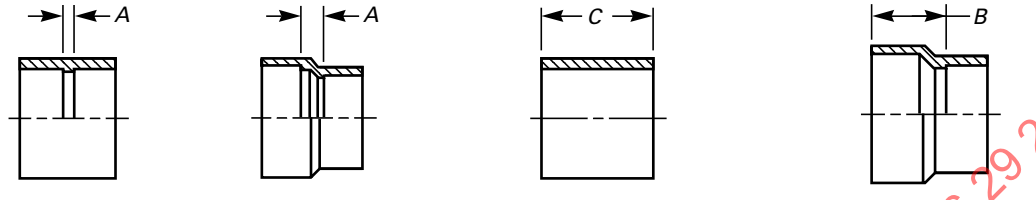
External Threaded End
(M)

Nominal Thread Size [Note (4)]	Internal End [Note (2)]								External End [Note (3)]		
	Minimum Diam. of Band or Across Flats of Polygon, *A*	Minimum Band Length, *B*	Minimum Diam. of Body Over Thread, *C*	Minimum Inside Diam. of Fitting, *O*	*M*, Min.	Minimum Length of Thread, *Y*	*S*, Min.	Minimum Depth of Bore, *Z*	Minimum Inside Diam. of Fitting, *O*	Maximum Thread End Bore, *P*	Minimum Length of Effective Thread, *ZZ*
1¼	1.78	0.34	1.72	1.29	1.66	0.42	0.72	0.69	1.29	1.37	0.71
1½	2.06	0.38	1.98	1.53	1.90	0.42	0.72	0.69	1.53	1.61	0.72
2	2.53	0.50	2.48	2.01	2.38	0.44	0.81	0.75	2.01	2.07	0.76
3	3.72	0.56	3.68	2.98	3.50	0.77	1.28	1.22	2.98	3.08	1.20

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) 1¼, 1½, and 2 male threaded ends may have inside chamfer for slip nut connections.
(2) Internal threads shall be gauged from ½ turn large to 1½ turn small from the gauging notch on the plug when using working gauges.
(3) External threads shall be gauged ½ turn small to 1½ turn large from the face of the ring when using working gauges.
(4) Thread size is as governed by ASME B1.20.1-1983 (R2001).

Table I-3 Dimensions of DWV Couplings, Extended Bushings, and Adapters



With Stop C X C | Reducing C X C | Without Stop C X C | Extended Bushing FTG X C

DWV Couplings

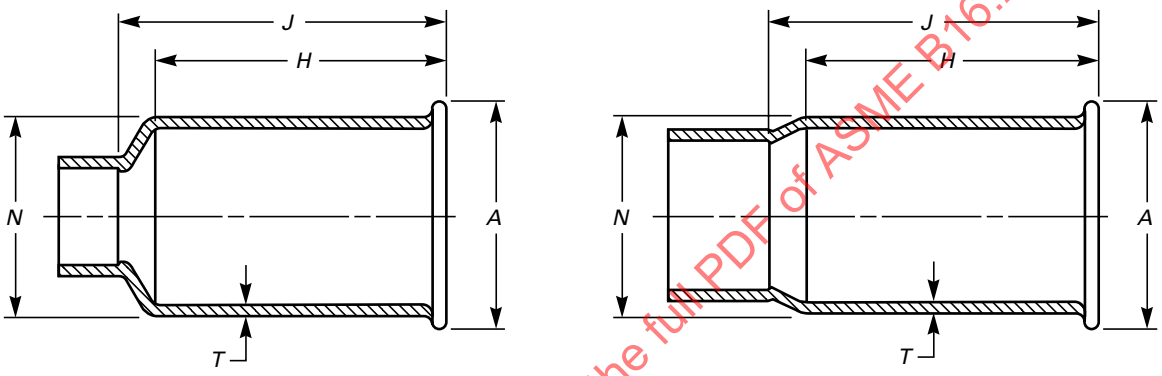
C X F | C X M | FTG X F | FTG X M

DWV Adapters

Nominal Thread or Tube Size	Minimum Couplings C × C, *A*	Minimum Coupling Reducer C × C, *A*	Minimum Couplings Without Stop C × C, *C*	Minimum Bushing Extended FTG × C, *B*	Adapters			
					Minimum C × F, *B*	Minimum C × M, *B*	Minimum FTG × F, *C*	Minimum FTG × M, *C*
1¼	0.06	...	1.00	...	0.73	0.86	1.36	...
1¼ × 1½	...	...	...	...	...	1.23	...	...
1½	0.06	...	1.12	...	0.73	0.86	1.48	1.69
1½ × 1¼	...	0.19	...	0.81	...	0.98	...	...
1½ × 2	...	...	...	...	...	1.48	...	...
2	0.06	...	1.25	...	0.86	0.86	1.61	...
2 × 1½	...	0.25	...	1.06	...	...	...	...
2 × 1¼	...	0.25	...	1.00	...	0.92	...	...
3	0.06	...	1.50	...	1.33	1.45	2.20	...
3 × 2	...	0.25	...	1.12	...	...	...	...
3 × 1½	...	0.31	...	1.12	...	...	...	...
3 × 1¼	...	0.31	...	1.19	...	...	...	...
4	0.06	...	2.00	...	...	...	...	...
4 × 3	...	0.38	...	1.44	...	...	...	...

GENERAL NOTE: Dimensions are in inches.

Table I-4 Dimensions of DWV Soil Pipe Adapters



Reducing Size
C X Spigot

Straight Size
C X Spigot

DWV Soil Pipe Adapters

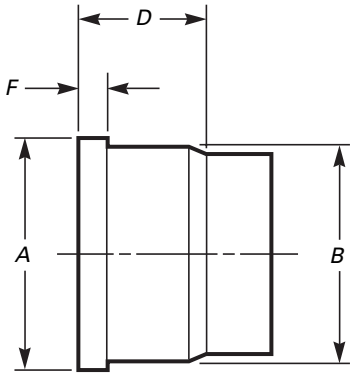
Dimension	Nominal Size						
	2 × 2	1½ × 2	1¼ × 2	3 × 3	2 × 3	4 × 4	3 × 4
A, max.	2.75	2.75	2.75	3.88	3.88	4.88	4.88
A, min.	2.69	2.69	2.69	3.81	3.81	4.81	4.81
H, min.	2.36	3.17	3.17	2.64	3.39	2.88	3.63
J, min.	2.50	3.44	3.44	2.88	3.75	3.25	4.06
N	2.45	2.45	2.45	3.49	3.49	4.49	4.49
T, min.	0.054	0.054	0.054	0.063	0.063	0.072	0.072

GENERAL NOTES:

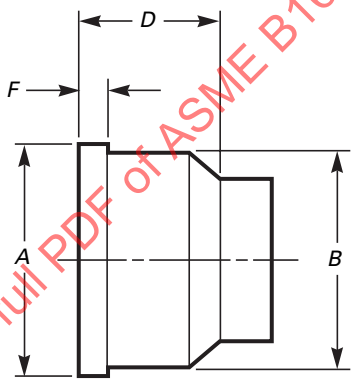
(a) Dimensions are in inches.

(b) Dimensions are for extra-heavyweight soil pipe (reference ASTM A 74). For service weight soil pipe, *A* and *N* nominal dimensions may be from $\frac{1}{8}$ in. to $\frac{5}{16}$ in. smaller than dimensions shown in table.

Table I-5 Dimensions of DWV C × No-Hub Soil Pipe Adapter



Straight Size



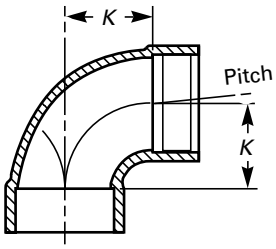
Reducing Size

DWV Soil Pipe Adapter – C X No-Hub for Use With Stainless Steel Clamp and Elastomer Gasket

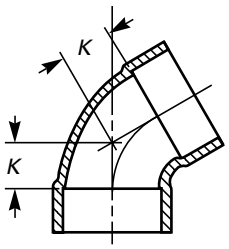
Nominal Size	*A* ± 0.06	*B* ± 0.06	*D*, Min.	*F* $^{+0.13}_{-0.00}$
2	2.38	2.31	1.22	0.25
1½ × 2	2.38	2.31	1.25	0.25
1¼ × 2	2.38	2.31	1.28	0.25
3	3.41	3.34	1.22	0.25
2 × 3	3.41	3.34	1.25	0.25
1½ × 3	3.41	3.34	1.28	0.25
4	4.44	4.38	1.22	0.31
3 × 4	4.44	4.38	1.25	0.31

GENERAL NOTE: Dimensions are in inches.

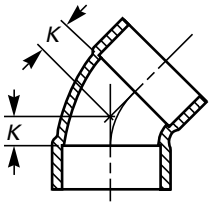
Table I-6 Dimensions of DWV Elbows



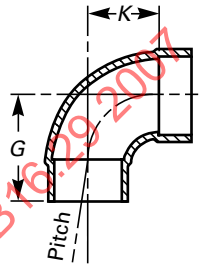
DWV 90 deg Ell
C X C



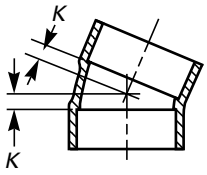
DWV 60 deg Ell
C X C



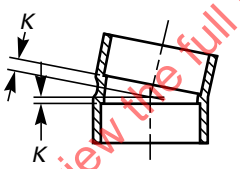
DWV 45 deg Ell
C X C



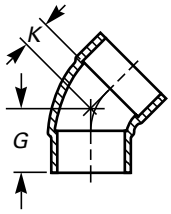
DWV 90 deg FTG Ell
FTC X C



DWV $22^1/_2$ deg Ell
C X C



DWV $11^1/_4$ deg Ell
C X C



DWV 45 deg FTG Ell
FTG X C

DWV Elbows

Angle	Dimensions	Nominal Tube Size				
		$1^1/_4$, Min.	$1^1/_2$, Min.	2, Min.	3, Min.	4, Min.
90 deg C × C	*K*	1.11	1.36	1.86	2.77	3.69
60 deg C × C	*K*	0.61	0.73	1.04	1.58	. . .
45 deg C × C	*K*	0.42	0.48	0.73	1.08	1.44
$22^1/_2$ deg C × C	*K*	0.11	0.17	0.30	0.45	0.62
$11^1/_4$ deg C × C	*K*	0.04	0.04	0.11	0.14	0.31
90 deg FTG × C	*K*	1.11	1.30	1.86	2.77	3.69
	G	1.67	1.98	2.54	3.58	4.76
45 deg FTG × C	*K*	0.42	0.48	0.73	1.08	1.44
	G	0.98	1.11	1.42	1.89	2.50

GENERAL NOTE: Dimensions are in inches.