



Thaitube utility®
Butt-Weld Fittings



Material According to: ANSI B 16.9
Welding Bevel According to: ANSI B 16.25
Steels According to: ASTM A 234 WPB
ASTM A 420 WPL6
ASTM A 403 WP 304-304 L-316-316 L-321
ASTM A 335 P1-p5-pg-p11-p22
Special Steels and Alloya on Application

Technical



Thaitube Utility is one the most important factories within the butt welding fittings market and become one of the well known quality mechanized manufacturers for carbon steel pipe Fittings.

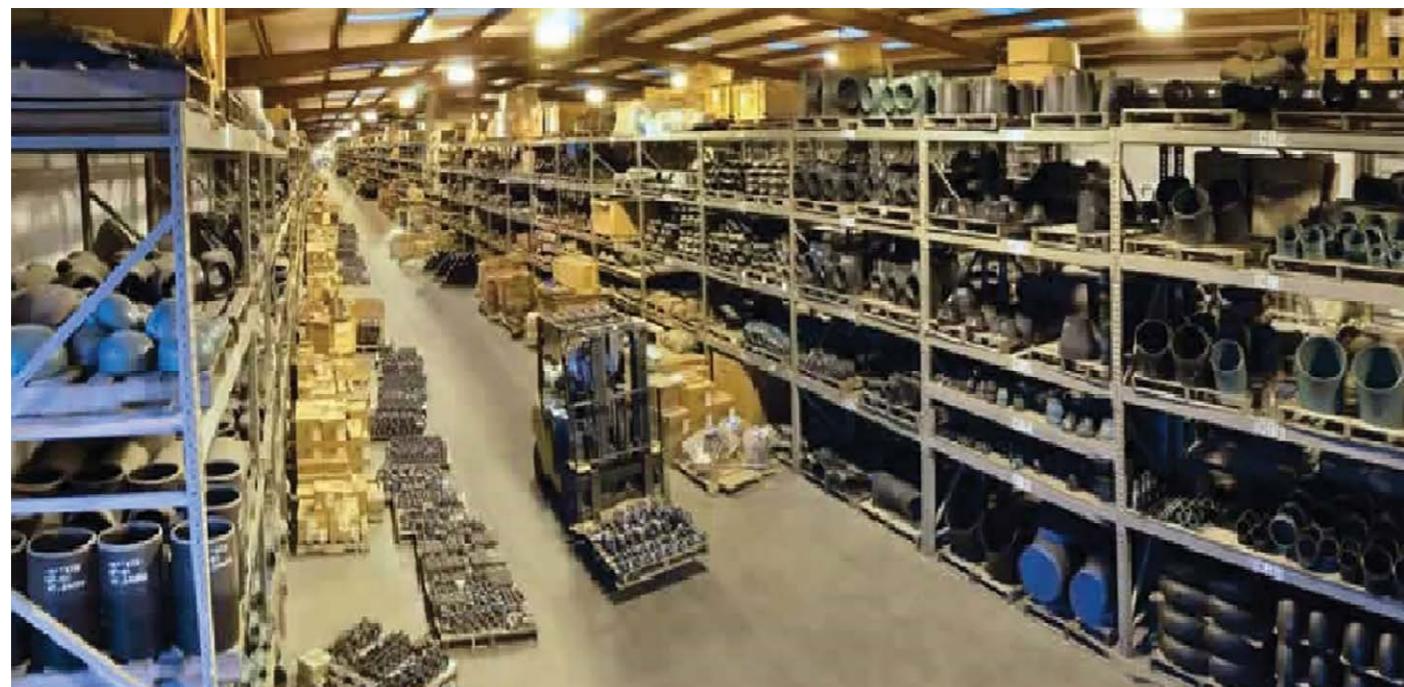
Thaitube Utility has growing up rapidly to be a global fitting supplier based on strong financial and structure large volume of stock, biggest manufacturing facilities, accumulated technologies and experience.

We have supplied our products to the world wide major customers comprehensive industrial area such as Oil and Gas Chemical and Petrochemical and Water treatment, Nuclear and Power Plant, Offshore platform and Shipbuilding.

Our products are applicable for any kinds of severe operating condition such as high pressure and high temperature or cryogenic condition.

Index

Main Manufacturing Process	page 2
Specification	page 5
Equal and Reducing Tees	page 6
Concentric and Eccentric Reducers	page 16
Long Radius (Elbows and Bends)	page 24
Shorts Radius (Elbows and Bends)	page 26
Caps	page 28
Technical Data	page 29
Conversion Factors	page 33



Thaitube Fittings is passionate about metal and Perfectionist in its approach to make safe pipe fittings for Manufacturing according to international standard ASTM, ANSI, ASME, MSS.

Thaitube Fittings responds quickly, flexibly and in accordance with your needs.
No matter what type of request you make.

Input Materials and Sizes :

- Seamless, longitudinally welded pipes/forged tubing
- Manufacturing Special size up to 2000 mm

Materials:

- Unalloyed steel
- Alloyed steel
- Stainless steel
- Duplex steel
- Ni-alloys
- Copper alloys
- Aluminum alloys
- Titanium

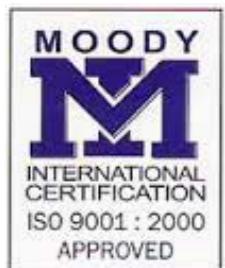
Most important product standards:

- EN 10253
- DIN 2605, 2615, 2616, 2609
- NF A 49-281, A 49-289
- ANSI B 16.9- B16.28 — 816.25
- ASME/ASTM A234, A420, A403, A815
- MSS SP 75, SP 43, SP 25
- CSA Z245.11

Marking and Coation:

- Size
- Rating Designation
- Material Designation
- Heat Number

Carbon steel fitting are painted with black coating.





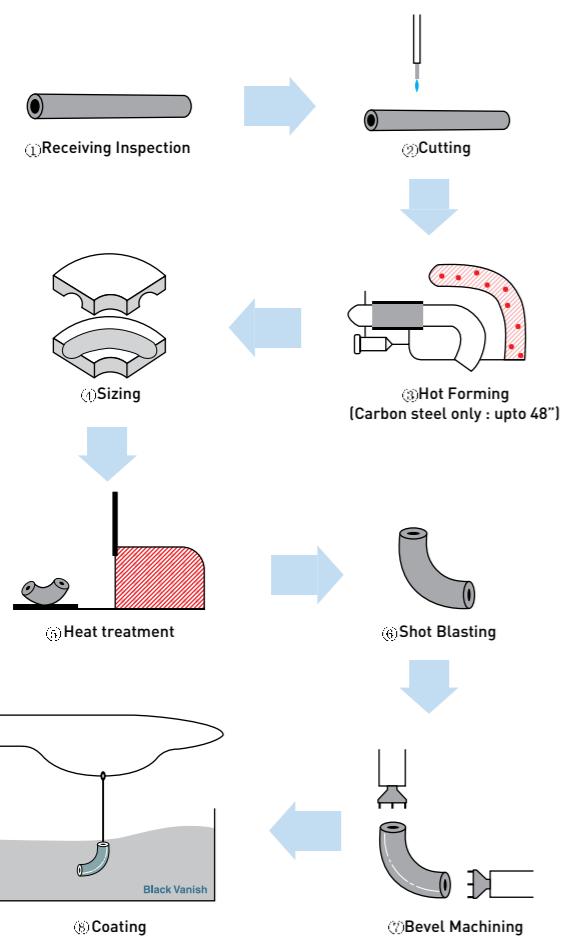
Thaitube utility®
Butt-Weld Fittings



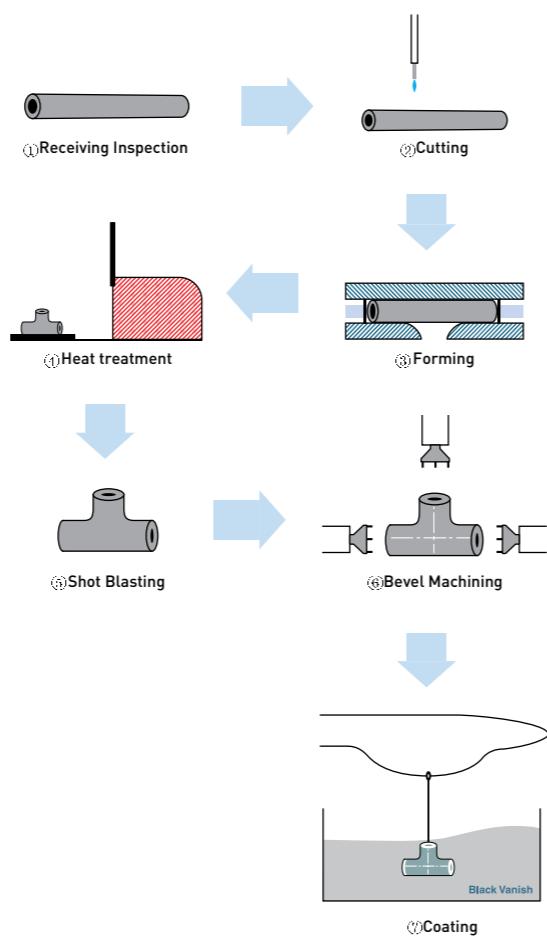
Thaitube utility®
Butt-Weld Fittings

Main Manufacturing Process

Elbow by mandrel



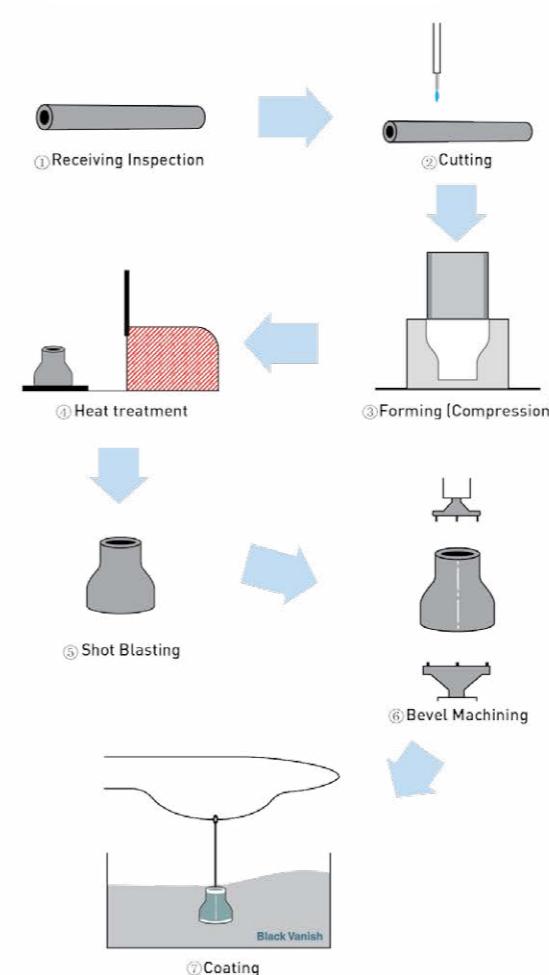
Tee by cold forming



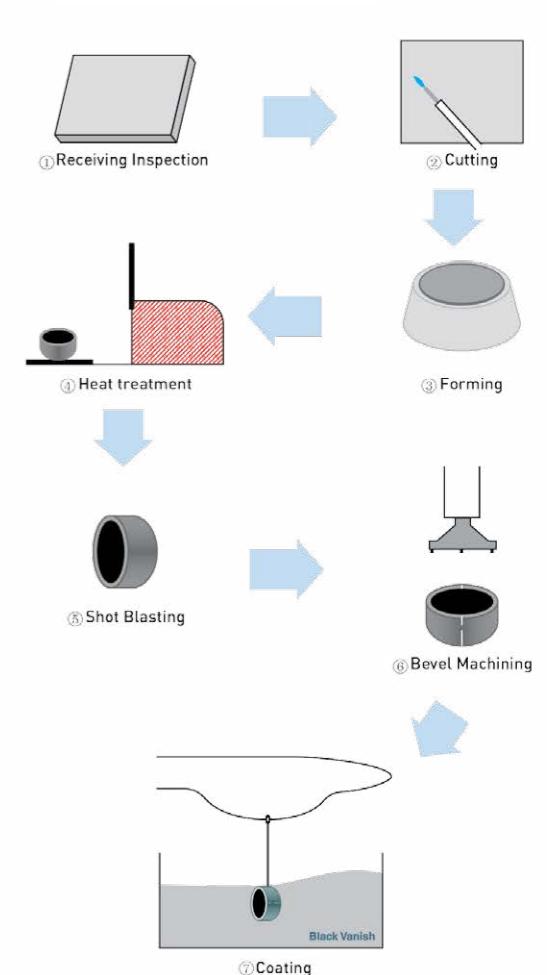
PROCESS

Main Manufacturing Process

Reducer by cold forming



Cap by cold forming



PROCESS

Marking

Size + SCH + B16.9 + A234 WPB + HEAT#

Logo



Thaitube utility
Butt-Weld Fittings



Thaitube utility®
Butt-Weld Fittings



CARBON STEEL ELBOWS FORMING



TEES COLD FORMING



END FACING (NC MACHINE)



SHOT BLASTING



Thaitube utility®
Butt-Weld Fittings

Specification

KS : KOREAN INDUSTRIAL STANDARDS

- KS B 1522** Steel Butt Welding Pipe Fittings for Ordinary use and Fuel Gas.
- KS B 1541** Steel Butt Welding Pipe Fittings.
- KS B 1542** Steel Socket Welding Pipe Fittings.
- KS B 1543** Steel Plate Butt Welding Pipe Fittings.

JIS : JAPANESE INDUSTRIAL STANDARDS

- JIS B 2311** Steel Butt Welding Pipe Fittings for Ordinary use.
- JIS B 2312** Steel Butt Welding Pipe Fittings.
- JIS B 2313** Steel Plate Butt Welding Pipe Fittings.
- JIS B 2316** Steel Socket Welding Pipe Fittings.

ASTM : AMERICAN SOCIETY FOR TESTING AND MATERIALS

- ASTM A 105** Carbon Steel forgings for Piping Applications
- ASTM A 182** Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service
- ASTM A 234** Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
- ASTM A 350** Carbon and Low-Alloy Steel forgings, Requiring Notch Toughness Testing for Piping Components
- ASTM A 403** Wrought Austenitic Stainless Steel Piping Fittings
- ASTM A 420** Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service
- ASTM A 694** Carbon and Alloy Steel forgings for Pipe Flanges, Fittings, Valves, and Parts for High-Pressure Transmission Service
- ASTM A 815** Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings
- ASTM A 860** Wrought High-Strength Low-Alloy Steel Butt-Welding Fittings
- ASTM B 366** Factory-Made Wrought Nickel and Nickel Alloy Fittings

MSS : MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY

- MSS SP-25** Standard Marketing System for Valves, Fittings, Flanges and Unions.
- MSS SP-43** Wrought Stainless Steel Butt Welding Fittings.
- MSS SP-44** Standard for Steel Pipe Line Flanges.
- MSS SP-75** Specification for High Test Wrought Butt Welding Fittings.
- MSS SP-79** Socket Welding Reducer Inserts.
- MSS SP-83** Carbon Steel Pipe Union Socket welding and Threaded.
- MSS SP-87** Factory-Made Butt Welding Fittings for Class 1 Nuclear Piping Applications.
- MSS SP-95** Swage(d) Nipples and Bull Plugs.
- MSS SP-97** Integrally Reinforced Forged Branch Outlet Fittings-socket Welding, Threaded and Butt Welding Ends.

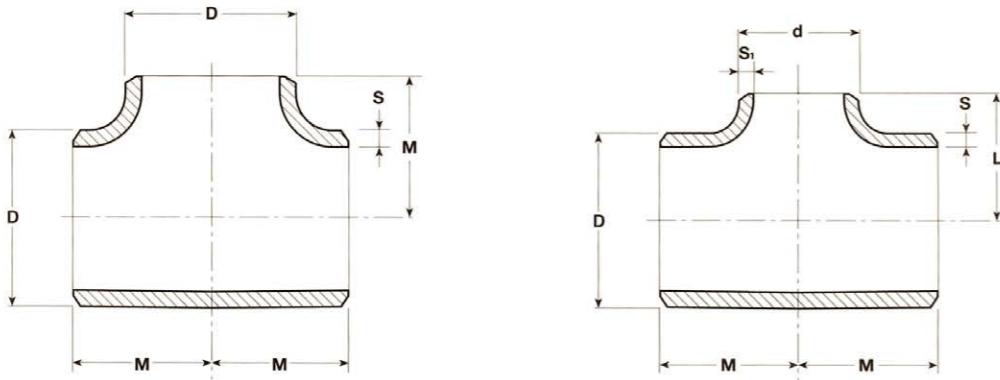
ASME : AMERICAN SOCIETY OF MECHANICAL ENGINEERS ASME : ASME BOILER AND PRESSURE VESSEL CODE AND INTERNATIONAL CODE

- ASME B 16.5** Pipe Flanges and Flanged Fittings.
- ASME B 16.9** Factory Made Wrought Steel Butt Welding Fittings.
- ASME B 16.11** Forged Fittings, Socket welding and Threaded Butt Welding Ends.
- ASME B 16.25** Welded and Seamless Wrought Steel Pipe.
- ASME B 36.10** Stainless Steel Pipe.
- ASME B 36.19** Power piping.
- ASME B31.1** Process piping.
- ASME B31.3** Materials.
- ASME SECTION II** Rules for Construction of Nuclear Facility Components.
- ASME SECTION III** Nondestructive Examination.
- ASME SECTION V** Rule for Construction of Pressure Vessels.
- ASME SECTION IX** Welding and Brazing Qualifications.

API : AMERICAN PETROLEUM INSTITUTE

- API 5L** Line Pipe.

Equal and reducing tees



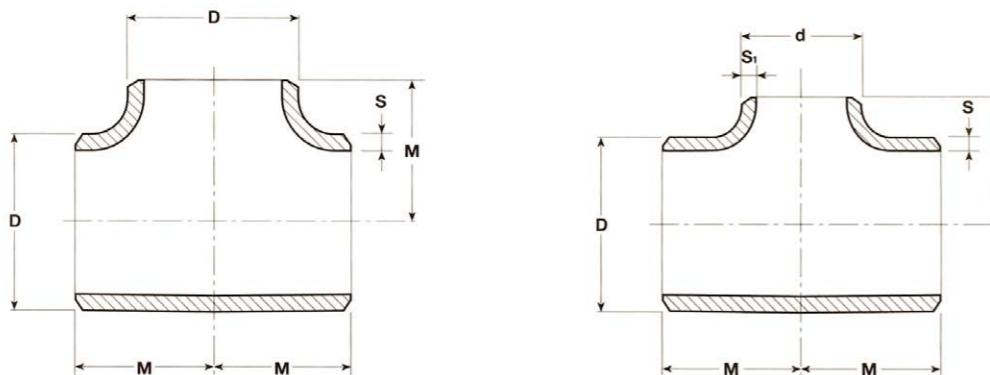
D	d	M	L	Ø-dia.	SCH. STD		SCH. XS		SCH. 10		SCH. 20		SCH. 30		SCH. 40	
					S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁
21,3	—	25,4	25,4	½"	2,77	—	3,73	—	—	—	—	—	—	—	2,77	—
26,7	—	28,5	28,5	¾"	2,87	—	3,91	—	—	—	—	—	—	—	2,87	—
26,7	21,3	—	—	¾" x ½"	2,87	2,77	3,91	3,73	—	—	—	—	—	—	2,87	2,77
33,4	—	—	—	1"	3,38	—	4,55	—	—	—	—	—	—	—	3,38	—
33,4	26,7	38,1	38,1	1" x ¾"	3,38	2,87	4,55	3,91	—	—	—	—	—	—	3,38	2,87
33,4	21,3	—	—	1" x ½"	3,38	2,77	4,55	3,73	—	—	—	—	—	—	3,38	2,77
42,2	—	—	—	1¼"	3,56	—	4,85	—	—	—	—	—	—	—	3,56	—
42,2	33,4	47,6	47,6	1¼" x 1"	3,56	3,38	4,85	4,55	—	—	—	—	—	—	3,56	3,38
42,2	26,7	—	—	1¼" x ¾"	3,56	2,87	4,85	3,91	—	—	—	—	—	—	3,56	2,87
42,2	21,3	—	—	1¼" x ½"	3,56	2,77	4,85	3,73	—	—	—	—	—	—	3,56	2,77
48,3	—	—	—	1½"	3,68	—	5,08	—	—	—	—	—	—	—	3,68	—
48,3	42,2	—	—	1½" x 1¼"	3,68	3,56	5,08	4,85	—	—	—	—	—	—	3,68	3,56
48,3	33,4	57,1	57,1	1½" x 1"	3,68	3,38	5,08	4,55	—	—	—	—	—	—	3,68	3,38
48,3	26,7	—	—	1½" x ¾"	3,68	2,87	5,08	3,91	—	—	—	—	—	—	3,68	2,87
48,3	21,3	—	—	1½" x ½"	3,68	2,77	5,08	3,73	—	—	—	—	—	—	3,68	2,77
60,3	—	—	—	2"	3,91	—	5,54	—	—	—	—	—	—	—	3,91	—
60,3	48,3	—	—	2" x 1½"	3,91	3,68	5,54	5,08	—	—	—	—	—	—	3,91	3,68
60,3	42,4	—	—	2" x 1¼"	3,91	3,56	5,54	4,85	—	—	—	—	—	—	3,91	3,56
60,3	33,4	—	—	2" x 1"	3,91	3,38	5,54	4,55	—	—	—	—	—	—	3,91	3,38
60,3	26,7	—	—	2" x ¾"	3,91	2,87	5,54	3,91	—	—	—	—	—	—	3,91	2,87
60,3	21,3	—	—	2" x ½"	3,91	2,77	5,54	3,73	—	—	—	—	—	—	3,91	2,77
73,0	—	—	—	2½"	5,16	—	7,01	—	—	—	—	—	—	—	5,16	—
73,0	60,3	—	—	2½" x 2"	5,16	3,91	7,01	5,54	—	—	—	—	—	—	5,16	3,91
73,0	48,3	—	—	2½" x 1½"	5,16	3,68	7,01	5,08	—	—	—	—	—	—	5,16	3,68
73,0	42,2	—	—	2½" x 1¼"	5,16	3,56	7,01	4,85	—	—	—	—	—	—	5,16	3,56
73,0	33,4	—	—	2½" x 1"	5,16	3,38	7,01	4,55	—	—	—	—	—	—	5,16	3,38
88,9	—	—	—	3"	5,49	—	7,62	—	—	—	—	—	—	—	5,49	—
88,9	73,0	—	—	3" x 2½"	5,49	5,16	7,62	7,01	—	—	—	—	—	—	5,49	5,16
88,9	60,3	—	—	3" x 2"	5,49	3,91	7,62	5,54	—	—	—	—	—	—	5,49	3,91
88,9	48,3	—	—	3" x 1½"	5,49	3,68	7,62	5,08	—	—	—	—	—	—	5,49	3,68
88,9	42,2	—	—	3" x 1¼"	5,49	3,56	7,62	4,85	—	—	—	—	—	—	5,49	3,56
88,9	33,4	—	—	3" x 1"	5,49	3,38	7,62	4,55	—	—	—	—	—	—	5,49	3,38
101,6	—	95,2	—	3½"	5,74	—	8,08	—	—	—	—	—	—	—	5,74	—
114,3	—	—	—	4"	6,02	—	8,56	—	—	—	—	—	—	—	6,02	—
114,3	101,6	104,8	—	4" x 3½"	6,02	5,74	8,56	8,08	—	—	—	—	—	—	6,02	5,74
114,3	88,9	—	—	4" x 3"	6,02	5,49	8,56	7,62	—	—	—	—	—	—	6,02	5,49

Equal and reducing tees



SCH. 60	SCH. 80	SCH. 100	SCH. 120	SCH. 140	SCH. 160	SCH. XXS	Ø-dia.
S	S ₁	S	S ₁	S	S ₁	S	S ₁
—	—	3,73	—	—	—	—	4,75
—	—	3,91	—	—	—	—	7,82
—	—	3,91	3,73	—	—	—	5,54
—	—	4,55	—	—	—	—	9,09
—	—	4,55	3,91	—	—	—	1"
—	—	4,55	3,73	—	—	—	6,35
—	—	4,85	—	—	—	—	6,35
—	—	4,85	4,55	—	—	—	9,70
—	—	4,85	3,91	—	—	—	6,35
—	—	4,85	3,73	—	—	—	6,35
—	—	5,08	—	—	—	—	7,14
—	—	5,08	4,85	—	—	—	6,35
—	—	5,08	4,55	—	—	—	10,16
—	—	5,08	3,91	—	—	—	9,70
—	—	5,08	3,73	—	—	—	10,16
—	—	5,54	—	—	—	—	11,07
—	—	5,54	5,08	—	—	—	2"
—	—	5,54	4,85	—	—	—	10,06
—	—	5,54	4,55	—	—	—	11,07
—	—	5,54	3,91	—	—	—	9,09
—	—	5,54	3,73	—	—	—	10,16
—	—	7,01	—	—	—	—	14,02
—							

Equal and reducing tees



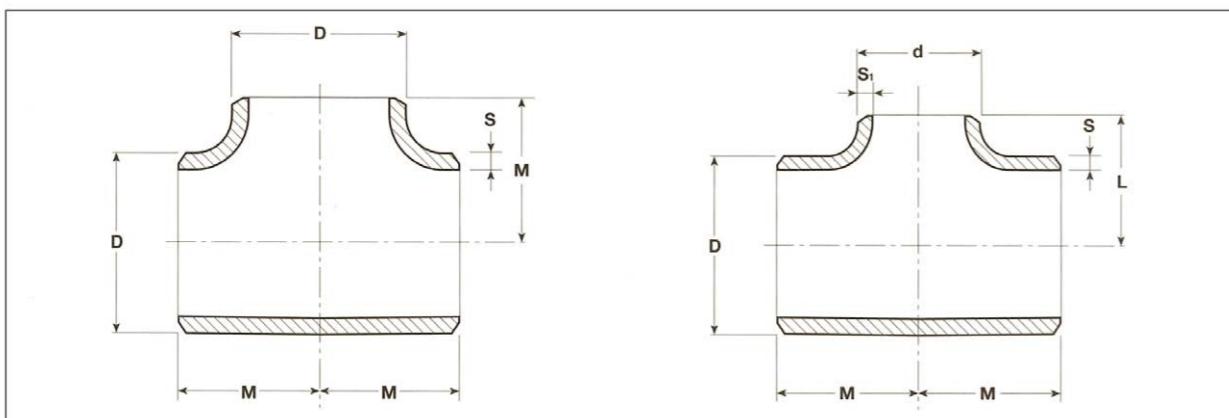
Equal and reducing tees



D	d	M	L	\varnothing -dia.	SCH. STD	SCH. XS	SCH. 10	SCH. 20	SCH. 30	SCH. 40
					S	S ₁	S	S ₁	S	S ₁
21,3	—	25,4	25,4	$\frac{1}{2}$ "	2,77	—	3,73	—	—	—
26,7	—	28,5	28,5	$\frac{3}{4}$ "	2,87	—	3,91	—	—	—
26,7	21,3	—	—	$\frac{3}{4}$ " x $\frac{1}{2}$ "	2,87	2,77	3,91	3,73	—	—
33,4	—	—	—	1"	3,38	—	4,55	—	—	—
33,4	26,7	38,1	38,1	1" x $\frac{3}{4}$ "	3,38	2,87	4,55	3,91	—	—
33,4	21,3	—	—	1" x $\frac{1}{2}$ "	3,38	2,77	4,55	3,73	—	—
42,2	—	—	—	1 $\frac{1}{4}$ "	3,56	—	4,85	—	—	—
42,2	33,4	47,6	47,6	1 $\frac{1}{4}$ " x 1"	3,56	3,38	4,85	4,55	—	—
42,2	26,7	—	—	1 $\frac{1}{4}$ " x $\frac{3}{4}$ "	3,56	2,87	4,85	3,91	—	—
42,2	21,3	—	—	1 $\frac{1}{4}$ " x $\frac{1}{2}$ "	3,56	2,77	4,85	3,73	—	—
48,3	—	—	—	1 $\frac{1}{2}$ "	3,68	—	5,08	—	—	—
48,3	42,2	—	—	1 $\frac{1}{2}$ " x $1\frac{1}{4}$ "	3,68	3,56	5,08	4,85	—	—
48,3	33,4	57,1	57,1	1 $\frac{1}{2}$ " x 1"	3,68	3,38	5,08	4,55	—	—
48,3	26,7	—	—	1 $\frac{1}{2}$ " x $\frac{3}{4}$ "	3,68	2,87	5,08	3,91	—	—
48,3	21,3	—	—	1 $\frac{1}{2}$ " x $\frac{1}{2}$ "	3,68	2,77	5,08	3,73	—	—
60,3	—	63,5	—	2"	3,91	—	5,54	—	—	—
60,3	48,3	60,3	—	2" x $1\frac{1}{2}$ "	3,91	3,68	5,54	5,08	—	—
60,3	42,4	63,5	—	2" x $1\frac{1}{4}$ "	3,91	3,56	5,54	4,85	—	—
60,3	33,4	50,8	—	2" x 1"	3,91	3,38	5,54	4,55	—	—
60,3	26,7	44,5	—	2" x $\frac{3}{4}$ "	3,91	2,87	5,54	3,91	—	—
60,3	21,3	44,5	—	2" x $\frac{1}{2}$ "	3,91	2,77	5,54	3,73	—	—
73,0	—	76,2	—	2 $\frac{1}{2}$ "	5,16	—	7,01	—	—	—
73,0	60,3	69,9	—	2 $\frac{1}{2}$ " x 2"	5,16	3,91	7,01	5,54	—	—
73,0	48,3	76,2	—	2 $\frac{1}{2}$ " x $1\frac{1}{2}$ "	5,16	3,68	7,01	5,08	—	—
73,0	42,2	66,7	—	2 $\frac{1}{2}$ " x $1\frac{1}{4}$ "	5,16	3,56	7,01	4,85	—	—
73,0	33,4	54,2	—	2 $\frac{1}{2}$ " x 1"	5,16	3,38	7,01	4,55	—	—
88,9	—	85,4	—	3"	5,49	—	7,62	—	—	—
88,9	73,0	82,6	—	3" x $2\frac{1}{2}$ "	5,49	5,16	7,62	7,01	—	—
88,9	60,3	76,2	—	3" x 2"	5,49	3,91	7,62	5,54	—	—
88,9	48,3	79,0	—	3" x $1\frac{1}{2}$ "	5,49	3,68	7,62	5,08	—	—
88,9	42,2	69,9	—	3" x $1\frac{1}{4}$ "	5,49	3,56	7,62	4,85	—	—
88,9	33,4	65,9	—	3" x 1"	5,49	3,38	7,62	4,55	—	—
101,6	—	95,2	95,2	3 $\frac{1}{2}$ "	5,74	—	8,08	—	—	—
114,3	—	104,8	4"	6,02	—	8,56	—	—	—	—
114,3	101,6	104,8	101,6	4" x $3\frac{1}{2}$ "	6,02	5,74	8,56	8,08	—	—
114,3	88,9	98,4	4" x 3"	6,02	5,49	8,56	7,62	—	—	—
114,3	88,9	98,4	4" x 3"	6,02	5,49	8,56	7,62	—	—	—

SCH. 60	SCH. 80	SCH. 100	SCH. 120	SCH. 140	SCH. 160	SCH. XXS	\varnothing -dia.
S	S ₁	S	S ₁	S	S ₁	S	S ₁
—	—	8,56	7,01	—	—	—	4" x $2\frac{1}{2}$ "
—	—	8,56	5,54	—	—	—	4" x 2"
—	—	8,56	5,08	—	—	—	4" x $1\frac{1}{2}$ "
—	—	8,56	4,85	—	—	—	4" x $1\frac{1}{4}$ "
—	—	8,56	4,55	—	—	—	4" x 1"
—	—	9,52	—	—	12,70	—	5"
—	—	9,52	8,56	—	12,70	11,12	5" x 4"
—	—	9,52	8,08	—	—	—	5" x $3\frac{1}{2}$ "
—	—	9,52	7,62	—	—	—	5" x 3"
—	—	9,52	7,01	—	—	—	5" x $2\frac{1}{2}$ "
—	—	9,52	5,54	—	—	—	5" x 2"
—	—	10,97	—	—	14,27	—	6"
—	—	10,97	9,52	—	14,27	12,70	6" x 5"
—	—	10,97	8,56	—	14,27	11,12	6" x 4"
—	—	10,97	8,08	—	—	—	6" x $3\frac{1}{2}$ "
—	—	10,97	7,62	—	—	—	6" x 3"
—	—	10,97	7,01	—	—	—	6" x $2\frac{1}{2}$ "
—	—	10,97	5,54	—	—	—	6" x 2"
10,31	—	12,70	—	15,09	—	18,24	—
—	—	12,70	10,97	—	—	23,01	18,24
—	—	12,70	9,52	—	18,24	12,70	22,22
—	—	12,70	8,56	—	18,24	11,12	21,94
—	—	12,70	8,08	—	—	—	21,94
—	—	12,70	7,62	—	—	—	21,94
12,70	—	15,06	—	18,24	—	21,41	—
12,70	10,30	15,06	12,70	18,24	15,06	21,41	18,24
—	—	15,06	10,97	—	21,41	14,27	25,40
—	—	15,06	9,52	—	21,41	12,70	25,40
—	—	15,06	8,56	—	21,41	11,12	25,40
14,30	—	17,45	—	21,41	—	25,40	—
14,30	12,70	17,45	15,06	21,41	18,24	25,40	25,40
14,30	10,30	17,45	12,70	21,41	15,06	25,40	25,40
—	—	17,45	10,97	—	25,40	14,27	25,40
—	—	17,45	9,52	—	25,40	12,70	25,40
—	—	17,45	8,56	—	25,40	11,12	25,40
15,10	—	19,05	—	23,80	—	27,76	—
—	—	33,32	—	31,75	—	35,71	—
—	—	33,32	18				

Equal and reducing tees



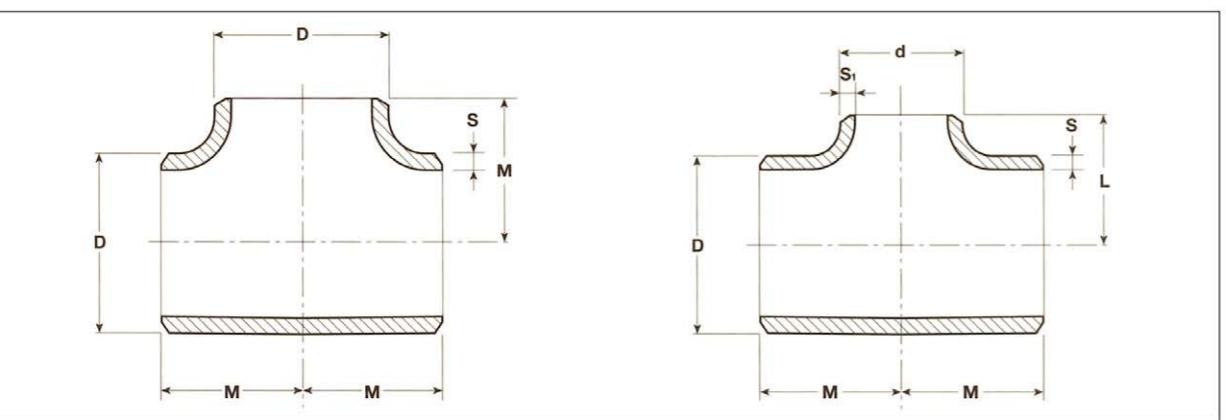
Equal and reducing tees



D	d	M	L	Ø-dia.	SCH. STD	SCH. XS	SCH. 10	SCH. 20	SCH. 30	SCH. 40
					S	S ₁	S	S ₁	S	S ₁
355,6	323,8		269,9	14" x 12"	9,52	9,52	12,70	12,70	—	—
355,6	273,0	279,4	257,2	14" x 10"	9,52	9,27	12,70	12,70	—	—
355,6	219,1		247,7	14" x 8"	9,52	8,18	12,70	12,70	—	—
355,6	168,3		238,1	14" x 6"	9,52	7,11	12,70	10,97	—	—
406,4	—		304,9	16"	9,52	—	12,70	—	6,35	—
406,4	355,6		304,9	16" x 14"	9,52	9,52	12,70	12,70	6,35	6,35
406,4	323,8	304,8	295,6	16" x 12"	9,52	9,52	12,70	12,70	—	—
406,4	273,0		282,6	16" x 10"	9,52	9,27	12,70	12,70	—	—
406,4	219,1		273,1	16" x 8"	9,52	8,18	12,70	12,70	—	—
406,4	168,3		263,5	16" x 6"	9,52	7,11	12,70	10,97	—	—
457,2	—		342,9	18"	9,52	—	12,70	—	6,35	—
457,2	406,4		330,2	18" x 16"	9,52	9,52	12,70	12,70	6,35	6,35
457,2	355,6	342,9	330,2	18" x 14"	9,52	9,52	12,70	12,70	6,35	6,35
457,2	323,8		320,7	18" x 12"	9,52	9,52	12,70	12,70	—	—
457,2	273,0		308,0	18" x 10"	9,52	9,27	12,70	12,70	—	—
457,2	219,1		298,5	18" x 8"	9,52	8,18	12,70	12,70	—	—
508,0	—		381,0	20"	9,52	—	12,70	—	6,35	—
508,0	457,2		368,3	20" x 18"	9,52	9,52	12,70	12,70	6,35	6,35
508,0	406,4		355,6	20" x 16"	9,52	9,52	12,70	12,70	6,35	6,35
508,0	355,6	381,0	355,6	20" x 14"	9,52	9,52	12,70	12,70	6,35	6,35
508,0	323,8		346,1	20" x 12"	9,52	9,52	12,70	12,70	—	—
508,0	273,0		333,4	20" x 10"	9,52	9,27	12,70	12,70	—	—
508,0	219,1		322,3	20" x 8"	9,52	8,18	12,70	12,70	—	—
558,8	—		419,1	22"	9,52	—	12,70	—	6,35	—
558,8	508,0		406,4	22" x 20"	9,52	9,52	12,70	12,70	6,35	6,35
558,8	457,2	419,1	393,7	22" x 18"	9,52	9,52	12,70	12,70	6,35	6,35
558,8	406,4		381,0	22" x 16"	9,52	9,52	12,70	12,70	6,35	6,35
558,8	355,6		381,0	22" x 14"	9,52	9,52	12,70	12,70	6,35	6,35
558,8	323,8		371,5	22" x 12"	9,52	9,52	12,70	12,70	—	—
609,6	—		431,8	24"	9,52	—	12,70	—	6,35	—
609,6	558,8		431,8	24" x 22"	9,52	9,52	12,70	12,70	6,35	6,35
609,6	508,8		431,8	24" x 20"	9,52	9,52	12,70	12,70	6,35	6,35
609,6	457,2	431,8	419,1	24" x 18"	9,52	9,52	12,70	12,70	6,35	6,35
609,6	406,4		406,4	24" x 16"	9,52	9,52	12,70	12,70	6,35	6,35
609,6	355,6		406,4	24" x 14"	9,52	9,52	12,70	12,70	6,35	6,35
609,6	323,8		396,9	24" x 12"	9,52	9,52	12,70	12,70	6,35	6,35

SCH. 60	S	S ₁	SCH. 80	S	S ₁	SCH. 100	S	S ₁	SCH. 120	S	S ₁	SCH. 140	S	S ₁	SCH. 160	S	S ₁	SCH. XXS	Ø-dia.
15,10	14,30	19,05	17,45	23,80	21,41	27,76	25,40	31,75	28,57	35,71	33,32	—	—	14" x 12"	—	—	—	—	
15,10	12,70	19,05	15,06	23,80	18,24	27,76	21,41	31,75	25,40	35,71	28,57	—	—	14" x 10"	—	—	—	—	
15,10	10,30	19,05	12,70	23,80	15,06	27,76	18,24	31,75	20,62	35,71	23,01	—	—	14" x 8"	—	—	—	—	
—	—	19,05	10,97	—	—	27,76	14,27	—	—	35,71	18,24	—	—	14" x 6"	—	—	—	—	
16,70	—	21,41	—	26,19	—	30,94	—	36,52	—	40,46	—	—	—	16"	—	—	—	—	
16,70	15,10	21,41	19,05	26,19	23,80	30,94	27,76	36,52	31,75	40,46	35,71	—	—	16" x 14"	—	—	—	—	
16,70	14,30	21,41	17,45	26,19	21,41	30,94	25,40	36,52	28,57	40,46	33,36	—	—	16" x 12"	—	—	—	—	
16,70	12,70	21,41	15,06	26,19	18,24	30,94	21,41	36,52	25,40	40,46	28,57	—	—	16" x 10"	—	—	—	—	
16,70	10,30	21,41	12,70	26,19	15,06	30,94	18,24	36,52	20,62	40,46	23,01	—	—	16" x 8"	—	—	—	—	
—	—	21,41	10,97	—	—	30,94	14,27	—	—	40,46	18,24	—	—	16" x 6"	—	—	—	—	
19,05	—	23,80	—	29,36	—	34,92	—	39,67	—	45,24	—	—	—	18"	—	—	—	—	
19,05	16,70	23,80	21,41	29,36	26,19	34,92	30,94	39,67	36,52	45,24	40,46	—	—	18" x 16"	—	—	—	—	
19,05	15,10	23,80	19,05	29,36	23,80	34,9													

Equal and reducing tees



D	d	M	L	\varnothing -dia.	SCH. STD		SCH. XS		SCH. 10		SCH. 20		SCH. 30		SCH. 40	
					S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁
660,4	—	495,3	26"	9,52	—	12,70	—	7,92	—	12,70	—	—	—	—	—	—
660,4	609,6	482,6	26" x 24"	9,52	9,52	12,70	12,70	7,92	6,35	12,70	9,52	—	—	—	—	—
660,4	558,8	469,9	26" x 22"	9,52	9,52	12,70	12,70	7,92	6,35	12,70	9,52	—	—	—	—	—
660,4	508,0	457,2	26" x 20"	9,52	9,52	12,70	12,70	7,92	6,35	12,70	9,52	—	—	—	—	—
660,4	457,2	444,5	26" x 18"	9,52	9,52	12,70	12,70	7,92	6,35	12,70	7,92	—	—	—	—	—
660,4	406,4	431,8	26" x 16"	9,52	9,52	12,70	12,70	7,92	6,35	12,70	7,92	—	—	—	—	—
660,4	355,6	431,8	26" x 14"	9,52	9,52	12,70	12,70	7,92	6,35	12,70	7,92	—	—	—	—	—
711,2	—	520,7	28"	9,52	—	12,70	—	7,92	—	12,70	—	15,88	—	—	—	—
711,2	660,4	520,7	28" x 26"	9,52	9,52	12,70	12,70	7,92	7,92	12,70	12,70	15,88	15,88	—	—	—
711,2	609,6	508,0	28" x 24"	9,52	9,52	12,70	12,70	7,92	6,35	12,70	9,52	15,88	14,25	—	—	—
711,2	558,8	520,7	28" x 22"	9,52	9,52	12,70	12,70	7,92	6,35	12,70	9,52	15,88	12,70	—	—	—
711,2	508,0	482,6	28" x 20"	9,52	9,52	12,70	12,70	7,92	6,35	12,70	9,52	15,88	12,70	—	—	—
711,2	457,2	469,9	28" x 18"	9,52	9,52	12,70	12,70	7,92	6,35	12,70	7,92	15,88	11,12	—	—	—
711,2	406,4	457,2	28" x 16"	9,52	9,52	12,70	12,70	7,92	6,35	12,70	7,92	15,88	9,52	—	—	—
762,0	—	559	30"	9,52	—	12,70	—	—	—	—	—	—	—	—	—	—
762,0	711,2	546	30" x 28"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
762,0	609,6	533	30" x 24"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
762,0	508,0	508	30" x 20"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
762,0	457,2	495	30" x 18"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
762,0	406,4	483	30" x 16"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
762,0	355,6	—	30" x 14"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
812,8	—	597	32"	9,52	—	12,70	—	—	—	—	—	—	—	—	—	—
812,8	762,0	584	32" x 30"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
812,8	711,2	572	32" x 28"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
812,8	609,6	597	32" x 24"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
812,8	508,0	533	32" x 20"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
812,8	457,2	521	32" x 18"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
812,8	406,4	508	32" x 16"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
914,4	—	673	36"	9,52	—	12,70	—	—	—	—	—	—	—	—	—	—
914,4	812,8	648	36" x 32"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
914,4	762,0	635	36" x 30"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
914,4	711,2	622	36" x 28"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
914,4	609,6	610	36" x 24"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
914,4	508,0	584	36" x 20"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
914,4	457,2	572	36" x 18"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
914,4	406,4	559	36" x 16"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—

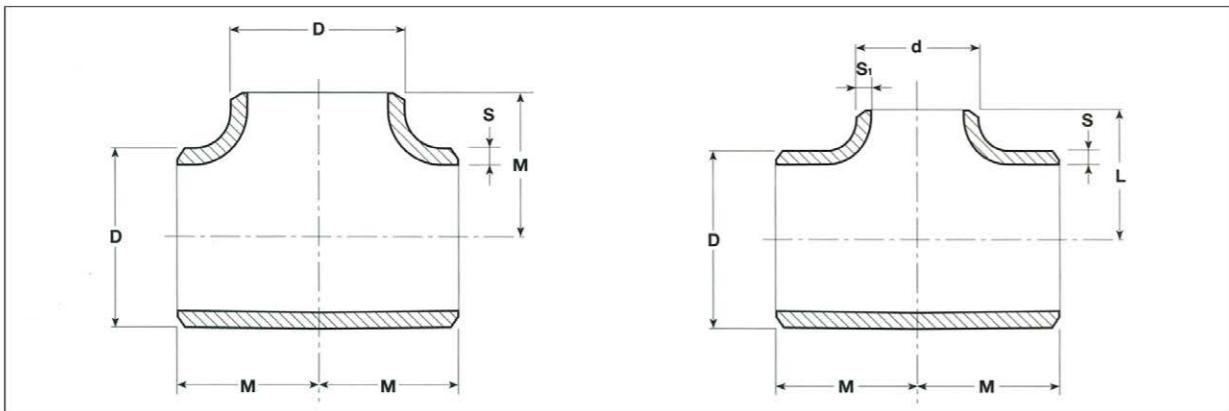
Equal and reducing tees



SCH. 60	SCH. 80	SCH. 100	SCH. 120	SCH. 140	SCH. 160	SCH. XXS	\varnothing -dia.
S	S ₁	S	S ₁	S	S ₁	S	S ₁
—	—	—	—	—	—	—	26"
—	—	—	—	—	—	—	26" x 24"
—	—	—	—	—	—	—	26" x 22"
—	—	—	—	—	—	—	26" x 20"
—	—	—	—	—	—	—	26" x 18"
—	—	—	—	—	—	—	26" x 16"
—	—	—	—	—	—	—	26" x 14"
—	—	—	—	—	—	—	28"
—	—	—	—	—	—	—	28" x 26"
—	—	—	—	—	—	—	28" x 24"
—	—	—	—	—	—	—	28" x 22"
—	—	—	—	—	—	—	28" x 20"
—	—	—	—	—	—	—	28" x 18"
—	—	—	—	—	—	—	28" x 16"
—	—	—	—	—	—	—	30"
—	—	—	—				

Equal and reducing tees

Equal and reducing tees

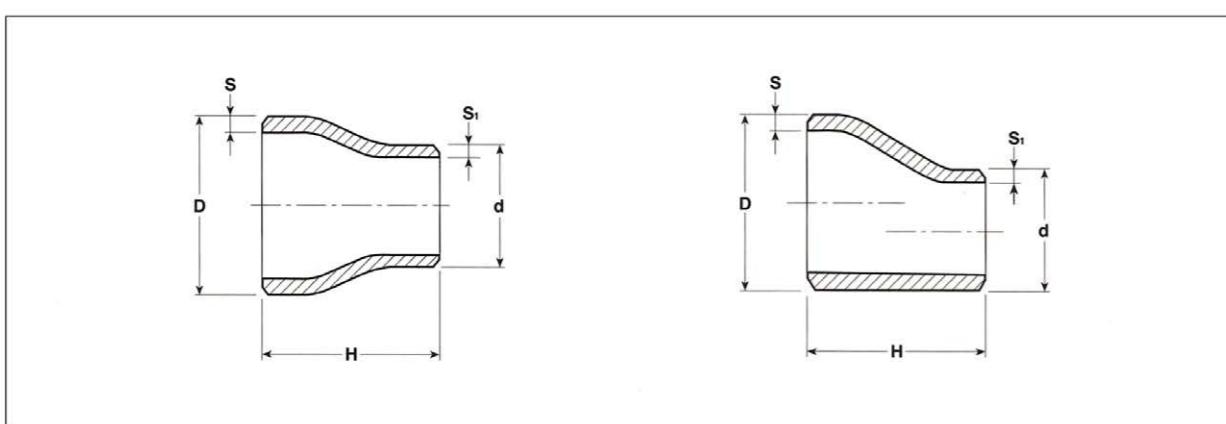


D	d	M	L	Ø-dia.	SCH. STD	SCH. XS	SCH. 10	SCH. 20	SCH. 30	SCH. 40
					S	S ₁	S	S ₁	S	S ₁
1016,0	—	749	749	40"	9,52	—	12,70	—	—	—
1016,0	914,4		737	40" x 36"	9,52	9,52	12,70	12,70	—	—
1016,0	812,8		711	40" x 32"	9,52	9,52	12,70	12,70	—	—
1016,0	762,0		698	40" x 30"	9,52	9,52	12,70	12,70	—	—
1016,0	711,2		673	40" x 28"	9,52	9,52	12,70	12,70	—	—
1016,0	609,6		660	40" x 24"	9,52	9,52	12,70	12,70	—	—
1016,0	508,0		635	40" x 20"	9,52	9,52	12,70	12,70	—	—
1066,8	—	762	762	42"	9,52	—	12,70	—	—	—
1066,8	1016,0		711	42" x 40"	9,52	9,52	12,70	12,70	—	—
1066,8	914,4		711	42" x 36"	9,52	9,52	12,70	12,70	—	—
1066,8	812,8		711	42" x 32"	9,52	9,52	12,70	12,70	—	—
1066,8	762,0		711	42" x 30"	9,52	9,52	12,70	12,70	—	—
1066,8	711,2		698	42" x 28"	9,52	9,52	12,70	12,70	—	—
1066,8	609,6		660	42" x 24"	9,52	9,52	12,70	12,70	—	—
1066,8	508,0		—	42" x 20"	9,52	9,52	12,70	12,70	—	—



SCH. 60	SCH. 80	SCH. 100	SCH. 120	SCH. 140	SCH. 160	SCH. XXS	Ø-dia.
S	S ₁	S	S ₁	S	S ₁	S	S ₁
—	—	—	—	—	—	—	40"
—	—	—	—	—	—	—	40" x 36"
—	—	—	—	—	—	—	40" x 32"
—	—	—	—	—	—	—	40" x 30"
—	—	—	—	—	—	—	40" x 28"
—	—	—	—	—	—	—	40" x 24"
—	—	—	—	—	—	—	40" x 20"
—	—	—	—	—	—	—	42"
—	—	—	—	—	—	—	42" x 40"
—	—	—	—	—	—	—	42" x 36"
—	—	—	—	—	—	—	42" x 32"
—	—	—	—	—	—	—	42" x 30"
—	—	—	—	—	—	—	42" x 28"
—	—	—	—	—	—	—	42" x 24"
—	—	—	—	—	—	—	42" x 20"

Concentric and eccentric reducers



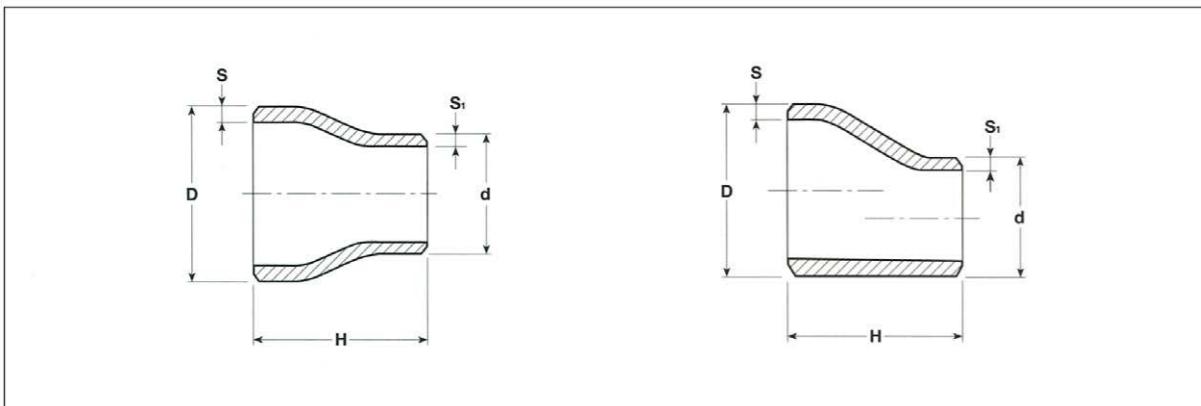
D	d	H	Ø-dia.	SCH. STD		SCH. XS		SCH. 10		SCH. 20		SCH. 30		SCH. 40	
				S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁
26,7	21,3	38	3/4" x 1/2"	2,87	2,77	3,91	3,73	—	—	—	—	—	—	2,87	2,77
33,4	26,7	51	1" x 3/4"	3,38	2,87	4,55	3,91	—	—	—	—	—	—	3,38	2,87
33,4	21,3		1" x 1/2"	3,38	2,77	4,55	3,73	—	—	—	—	—	—	3,38	2,77
42,2	33,4		1 1/4" x 1"	3,56	3,38	4,85	4,55	—	—	—	—	—	—	3,56	3,38
42,2	26,7	51	1 1/4" x 3/4"	3,56	2,87	4,85	3,91	—	—	—	—	—	—	3,56	2,87
42,2	21,3		1 1/4" x 1/2"	3,56	2,77	4,85	3,73	—	—	—	—	—	—	3,56	2,77
48,3	42,2	64	1 1/2" x 1 1/4"	3,68	3,56	5,08	4,85	—	—	—	—	—	—	3,68	3,56
48,3	33,4		1 1/2" x 1"	3,68	3,38	5,08	4,55	—	—	—	—	—	—	3,68	3,38
48,3	26,7		1 1/2" x 3/4"	3,68	2,87	5,08	3,91	—	—	—	—	—	—	3,68	2,87
48,3	21,3		1 1/2" x 1/2"	3,68	2,77	5,08	3,73	—	—	—	—	—	—	3,68	2,77
60,3	48,3	76	2" x 1 1/2"	3,91	3,68	5,54	5,08	—	—	—	—	—	—	3,91	3,68
60,3	42,2		2" x 1 1/4"	3,91	3,56	5,54	4,85	—	—	—	—	—	—	3,91	3,56
60,3	33,4		2" x 1"	3,91	3,38	5,54	4,55	—	—	—	—	—	—	3,91	3,38
60,3	26,7		2" x 3/4"	3,91	2,87	5,54	3,91	—	—	—	—	—	—	3,91	2,87
60,3	21,3		2" x 1/2"	3,91	2,77	5,54	3,73	—	—	—	—	—	—	3,91	2,77
73,0	60,3	89	2 1/2" x 2"	5,16	3,91	7,01	5,54	—	—	—	—	—	—	5,16	3,91
73,0	48,3		2 1/2" x 1 1/2"	5,16	3,68	7,01	5,08	—	—	—	—	—	—	5,16	3,68
73,0	42,2		2 1/2" x 1 1/4"	5,16	3,56	7,01	4,85	—	—	—	—	—	—	5,16	3,56
73,0	33,4		2 1/2" x 1"	5,16	3,38	7,01	4,55	—	—	—	—	—	—	5,16	3,38
88,9	73,0	89	3" x 2 1/2"	5,49	5,16	7,62	7,01	—	—	—	—	—	—	5,49	5,16
88,9	60,3		3" x 2"	5,49	3,91	7,62	5,54	—	—	—	—	—	—	5,49	3,91
88,9	48,3		3" x 1 1/2"	5,49	3,68	7,62	5,08	—	—	—	—	—	—	5,49	3,68
88,9	42,2		3" x 1 1/4"	5,49	3,56	7,62	4,85	—	—	—	—	—	—	5,49	3,56
88,9	33,4		3" x 1"	5,49	3,38	7,62	4,55	—	—	—	—	—	—	5,49	3,38
101,6	88,9	102	3 1/2" x 3"	5,74	5,49	8,08	7,62	—	—	—	—	—	—	5,74	5,49
101,6	73,0		3 1/2" x 2 1/2"	5,74	5,16	8,08	7,01	—	—	—	—	—	—	5,74	5,16
101,6	60,3		3 1/2" x 2"	5,74	3,91	8,08	5,54	—	—	—	—	—	—	5,74	3,91
101,6	48,3		3 1/2" x 1 1/2"	5,74	3,68	8,08	5,08	—	—	—	—	—	—	5,74	3,68
101,6	42,2		3 1/2" x 1 1/4"	5,74	3,56	8,08	4,85	—	—	—	—	—	—	5,74	3,56
114,3	101,6	102	4" x 3 1/2"	6,02	5,74	8,56	8,08	—	—	—	—	—	—	6,02	5,74
114,3	88,9		4" x 3"	6,02	5,49	8,56	7,62	—	—	—	—	—	—	6,02	5,49
114,3	73,0		4" x 2 1/2"	6,02	5,16	8,56	7,01	—	—	—	—	—	—	6,02	5,16
114,3	60,3		4" x 2"	6,02	3,91	8,56	5,54	—	—	—	—	—	—	6,02	3,91
114,3	48,3		4" x 1 1/2"	6,02	3,68	8,56	5,08	—	—	—	—	—	—	6,02	3,68
114,3	42,2		4" x 1 1/4"	6,02	3,56	8,56	4,85	—	—	—	—	—	—	6,02	3,56
114,3	33,4		4" x 1"	6,02	3,38	8,56	4,55	—	—	—	—	—	—	6,02	3,38

Concentric and eccentric reducers



SCH. 60		SCH. 80		SCH. 100		SCH. 120		SCH. 140		SCH. 160		SCH. XXS		Ø-dia.
S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	
—	—	3,91	3,73	—	—	—	—	—	—	5,54	4,75	7,82	7,47	3/4" x 1/2"
—	—	4,55	3,91	—	—	—	—	—	—	6,35	5,54	9,09	7,82	1" x 3/4"
—	—	4,55	3,73	—	—	—	—	—	—	6,35	4,75	9,09	7,47	1" x 1/2"
—	—	4,85	4,55	—	—	—	—	—	—	6,35	6,35	9,70	9,09	1 1/4" x 1"
—	—	4,85	3,91	—	—	—	—	—	—	6,35	5,54	9,70	7,82	1 1/4" x 3/4"
—	—	4,85	3,73	—	—	—	—	—	—	6,35	4,75	9,70	7,47	1 1/4" x 1/2"
—	—	5,08	4,85	—	—	—	—	—	—	7,14	6,35	10,16	9,70	1 1/2" x 1 1/4"
—	—	5,08	4,55	—	—	—	—	—	—	7,14	6,35	10,16	9,09	1 1/2" x 1"
—	—	5,08	3,91	—	—	—	—	—	—	7,14	5,54	10,16	7,82	1 1/2" x 3/4"
—	—	5,08	3,73	—	—	—	—	—	—	7,14	4,75	10,16	7,47	1 1/2" x 1/2"
—	—	5,54	5,08	—	—	—	—	—	—	8,74	7,14	11,07	10,16	2" x 1 1/2"
—	—	5,54	4,85	—	—	—	—	—	—	8,74	6,35	11,07	9,70	2" x 1 1/4"
—	—	5,54	4,55	—	—	—	—	—	—	8,74	6,35	11,07	9,09	2" x 1"
—	—	5,54	3,91	—	—	—	—	—	—	8,74	5,54	11,07	7,82	2" x 3/4"
—	—	5,54	3,73	—	—	—	—	—	—	8,74	4,75	11,07	7,47	2" x 1/2"
—	—	7,01	5,54	—	—	—	—	—	—	9,52	8,74	14,02	11,07	2 1/2" x 2"
—	—	7,01	5,08	—	—	—	—	—	—	9,52	7,14	14,02	10,16	2 1/2" x 1 1/2"
—	—	7,01	4,85	—	—	—	—	—	—	9,52	6,35	14,02	9,70	2 1/2" x 1 1/4"
—	—	7,01	4,55	—	—	—	—	—	—	9,52	6,35	14,02	9,70	2 1/2" x 1"
—	—	7,62	7,01	—	—	—	—	—	—	11,12	9,52	15,24	14,02	3" x 2 1/2"
—	—	7,62	5,54	—	—	—	—	—	—	11,12	8,74	15,24	11,07	3" x 2"
—	—	7,62	5,08	—	—	—	—	—	—	11,12	7,14	15,24	10,16	3" x 1 1/2"
—	—	7,62	4,85	—	—	—	—	—	—	11,12	6,35	15,24	9,70	3" x 1 1/4"
—	—	7,62	4,55	—	—	—	—	—	—	11,12	6,35	15,24	9,09	3" x 1"
—	—	8,08	7,62	—	—	—	—	—	—	—	—	—	—	3 1/2" x 3"
—	—	8,08	7,01	—	—	—	—	—	—	—	—	—	—	3 1/2" x 2 1/2"
—	—	8,08	5,54	—	—	—	—	—	—	—	—	—	—	3 1/2" x 2"
—	—	8,08	5,08	—	—	—	—	—	—	—	—	—	—	3 1/2" x 1 1/2"
—	—	8,08	4,85	—	—	—	—	—	—	—	—	—	—	3 1/2" x 1 1/4"
—	—	8,56	8,08	—	—	—	—	—	—	—	—	—	—	4" x 3 1/2"
—	—	8,56	7,62	—	—	—	—	—	—	13,49	11,12	17,12	15,24	4" x 3"
—	—	8,56	7,01	—	—	—	—	—	—	13,49	9,54	17,12	14,02	4" x 2 1/2"
—	—	8,56	5,54	—	—	—	—	—	—	13,49	8,74	17,12	11,07	4" x 2"
—	—	8,56	5,08	—	—	—	—	—	—	13,49	7,14	17,12	10,16	4" x 1 1/2"
—	—	8,56	4,85	—	—	—	—	—	—	13,49	6,35	17,12	9,70	4" x 1 1/4"
—	—	8,56	4,55	—	—	—	—	—	—	13,49	6,35	17,12	9,09	4" x 1"

Concentric and eccentric reducers



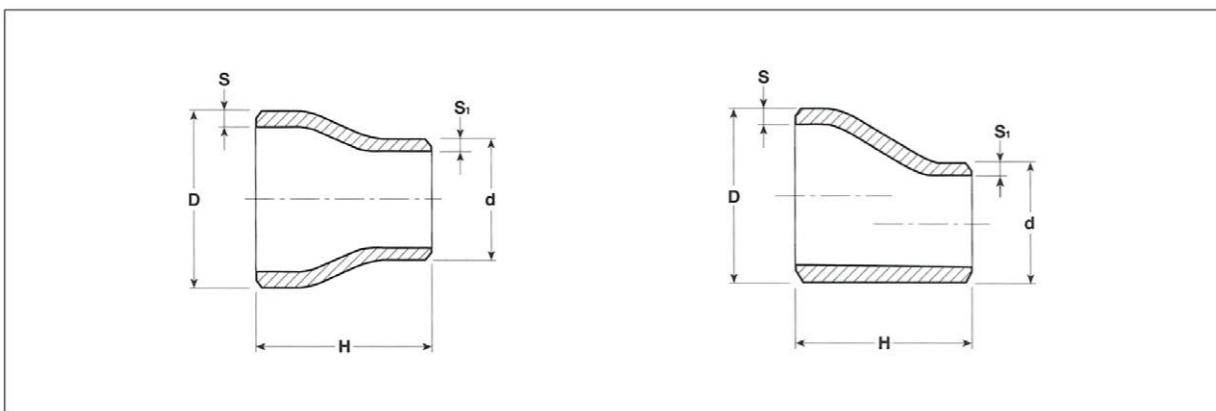
D	d	H	Ø-dia.	SCH.STD		SCH.XS		SCH. 10		SCH.20		SCH.30		SCH.40	
				S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁
141,3	114,3	127	5" x 4"	6,55	6,02	9,52	8,56	—	—	—	—	—	—	6,55	6,02
	101,6		5" x 3½"	6,55	5,74	9,52	8,08	—	—	—	—	—	—	6,55	5,74
	88,9		5" x 3"	6,55	5,49	9,52	7,62	—	—	—	—	—	—	6,55	5,49
	73,0		5" x 2½"	6,55	5,16	9,52	7,01	—	—	—	—	—	—	6,55	5,16
	60,3		5" x 2"	6,55	3,91	9,52	5,54	—	—	—	—	—	—	6,55	3,91
168,3	141,3	140	6" x 5"	7,11	6,55	10,97	9,52	—	—	—	—	—	—	7,11	6,55
	114,3		6" x 4"	7,11	6,02	10,97	8,56	—	—	—	—	—	—	7,11	6,02
	101,6		6" x 3½"	7,11	5,74	10,97	8,08	—	—	—	—	—	—	7,11	5,74
	88,9		6" x 3"	7,11	5,49	10,97	7,62	—	—	—	—	—	—	7,11	5,49
	73,0		6" x 2½"	7,11	5,16	10,97	7,01	—	—	—	—	—	—	7,11	5,16
168,3	60,3	140	6" x 2"	7,11	3,91	10,97	5,54	—	—	—	—	—	—	7,11	3,91
	219,1	152	8" x 6"	8,18	7,11	12,70	10,97	—	—	—	—	—	—	8,18	7,11
	141,3		8" x 5"	8,18	6,55	12,70	9,52	—	—	—	—	—	—	8,18	6,55
	114,3		8" x 4"	8,18	6,02	12,70	8,56	—	—	—	—	—	—	8,18	6,02
	101,6		8" x 3½"	8,18	5,74	12,70	8,08	—	—	—	—	—	—	8,18	5,74
219,1	88,9	152	8" x 3"	8,18	5,49	12,70	7,62	—	—	—	—	—	—	8,18	5,49
	273,0	178	10" x 8"	9,27	8,18	12,70	12,70	—	—	6,35	6,35	7,80	7,04	9,27	8,18
	168,3		10" x 6"	9,27	7,11	12,70	10,97	—	—	—	—	—	—	9,27	7,11
	141,3		10" x 5"	9,27	6,55	12,70	9,52	—	—	—	—	—	—	9,27	6,55
	114,3		10" x 4"	9,27	6,02	12,70	8,56	—	—	—	—	—	—	9,27	6,02
323,8	273,0	203	12" x 10"	9,52	9,27	12,70	12,70	—	—	6,35	6,35	8,38	7,80	10,31	9,27
	219,1		12" x 8"	9,52	8,18	12,70	12,70	—	—	6,35	6,35	8,38	7,04	10,31	8,18
	168,3		12" x 6"	9,52	7,11	12,70	10,97	—	—	—	—	—	—	10,31	7,11
	141,3		12" x 5"	9,52	6,55	12,70	9,52	—	—	—	—	—	—	10,31	6,55
	114,3		12" x 4"	9,52	6,02	12,70	8,56	—	—	—	—	—	—	10,31	6,02
355,6	323,0	330	14" x 12"	9,52	9,52	12,70	12,70	—	—	7,92	6,35	9,52	8,38	11,12	10,31
	273,0		14" x 10"	9,52	9,27	12,70	12,70	—	—	7,92	6,35	9,52	7,80	11,12	9,27
	219,1		14" x 8"	9,52	8,18	12,70	12,70	—	—	7,92	6,35	9,52	7,04	11,12	8,18
	168,3		14" x 6"	9,52	7,11	12,70	10,97	—	—	—	—	—	—	11,12	7,11
	406,4		16" x 14"	9,52	9,52	12,70	12,70	6,35	6,35	7,92	7,92	9,52	9,52	12,70	11,12
406,4	323,8	356	16" x 12"	9,52	9,52	12,70	12,70	—	—	7,92	6,35	9,52	8,38	12,70	10,31
	273,0		16" x 10"	9,52	9,27	12,70	12,70	—	—	7,92	6,35	9,52	7,80	12,70	9,27
	219,1		16" x 8"	9,52	8,18	12,70	12,70	—	—	7,92	6,35	9,52	7,04	12,70	8,18
	168,3		16" x 6"	9,52	7,11	12,70	10,97	—	—	—	—	—	—	11,12	7,11
	406,4		16" x 4"	9,52	7,11	12,70	10,97	—	—	—	—	—	—	12,70	7,11
457,2	406,4	381	18" x 16"	9,52	9,52	12,70	12,70	6,35	6,35	7,92	7,92	11,12	9,52	14,27	12,70
	355,6		18" x 14"	9,52	9,52	12,70	12,70	6,35	6,35	7,92	7,92	11,12	9,52	14,27	11,12

Concentric and eccentric reducers



SCH. 60		SCH. 80		SCH. 100		SCH. 120		SCH. 140		SCH. 160		SCH. XXS		Ø-dia.
S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	Ø-dia.
—	—	9,52	8,56	—	—	12,70	11,12	—	—	15,87	13,49	19,05	17,12	5" x 4"
—	—	9,52	8,08	—	—	—	—	—	—	—	—	—	—	5" x 3½"
—	—	9,52	7,62	—	—	—	—	—	—	15,87	11,12	19,05	15,24	5" x 3"
—	—	9,52	7,01	—	—	—	—	—	—	15,87	9,52	19,05	14,02	5" x 2½"
—	—	9,52	5,54	—	—	—	—	—	—	1				

Concentric and eccentric reducers



D	d	H	Ø-dia.	SCH.STD		SCH.XS		SCH. 10		SCH.20		SCH.30		SCH.40	
				S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁
457,2	323,8	381	18" x 12"	9,52	9,52	12,70	12,70	—	—	7,92	6,35	11,12	8,38	14,27	10,31
457,2	273,0		18" x 10"	9,52	9,27	12,70	12,70	—	—	7,92	6,35	11,12	7,80	14,27	9,27
457,2	219,1		18" x 8"	9,52	8,18	12,70	12,70	—	—	7,92	6,35	11,12	7,04	14,27	8,18
508,0	457,2	508	20" x 18"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	7,92	12,70	11,12	15,06	14,27
508,0	406,4		20" x 16"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	7,92	12,70	9,52	15,06	12,70
508,0	355,6		20" x 14"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	7,92	12,70	9,52	15,06	11,12
508,0	323,8		20" x 12"	9,52	9,52	12,70	12,70	—	—	9,52	6,35	12,70	8,38	15,06	10,31
508,0	273,0		20" x 10"	9,52	9,27	12,70	12,70	—	—	9,52	6,35	12,70	7,80	15,06	9,27
508,0	219,1		20" x 8"	9,52	8,18	12,70	12,70	—	—	9,52	6,35	12,70	7,04	15,06	8,18
558,8	508,0	508	22" x 20"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	9,52	12,70	12,70	—	—
558,8	457,2		22" x 18"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	7,92	12,70	11,12	—	—
558,8	406,4		22" x 16"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	7,92	12,70	9,52	—	—
558,8	355,6		22" x 14"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	7,92	12,70	9,52	—	—
609,6	558,8	508	24" x 22"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	9,52	14,25	12,70	—	—
609,6	508,0		24" x 20"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	9,52	14,25	12,70	17,45	15,06
609,6	457,2		24" x 18"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	7,92	14,25	11,12	17,45	14,27
609,6	406,4		24" x 16"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	7,92	14,25	9,52	17,45	12,70
609,6	355,6		24" x 14"	9,52	9,52	12,70	12,70	6,35	6,35	9,52	7,92	14,25	9,52	17,45	11,12
711,2	609,6	610	28" x 24"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
711,2	508,0		28" x 20"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
711,2	457,2		28" x 18"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
711,2	406,4		28" x 16"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
711,2	355,6		28" x 14"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
762,0	711,2	610	30" x 28"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
762,0	609,6		30" x 24"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
762,0	508,0		30" x 20"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
762,0	457,2		30" x 18"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
762,0	406,4		30" x 16"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
762,0	355,6		30" x 14"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
812,8	762,0	610	32" x 30"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
812,8	711,2		32" x 28"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
812,8	609,6		32" x 24"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
812,8	508,0		32" x 20"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
812,8	457,2		32" x 18"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
812,8	406,4		32" x 16"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—
914,4	812,8	610	36" x 32"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—

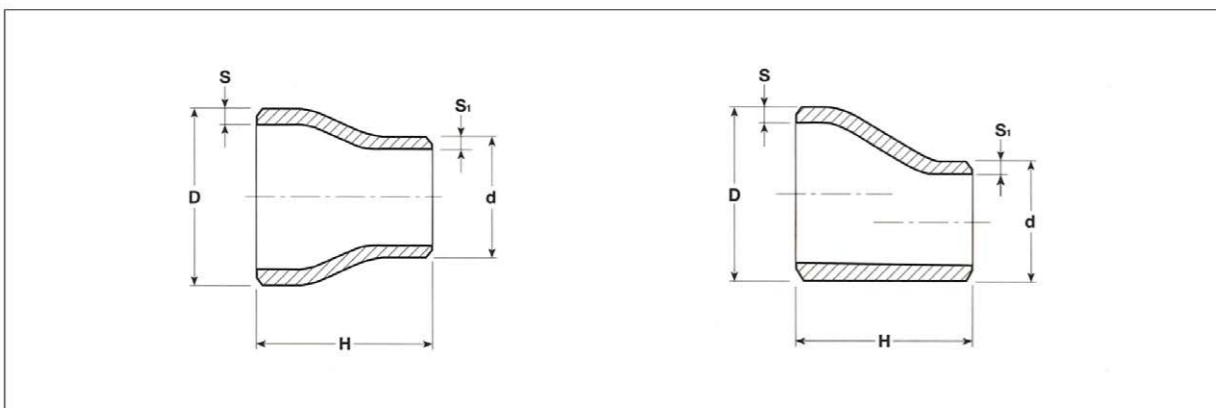


Concentric and eccentric reducers



SCH. 60	S	S ₁	SCH. 80		SCH. 100		SCH. 120		SCH. 140		SCH. 160		SCH. XXS		Ø-dia.
			S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	
19,05	14,30	23,80	17,45	—	29,36	21,41	34,92	25,40	39,67	28,57	45,24	33,32	—	—	18" x 12"
19,05	12,70	23,80	15,06	—	29,36	18,24	34,92	21,41	39,67	25,40	45,24	28,57	—	—	18" x 10"
19,05	10,30	23,80	12,70	—	29,36	15,06	34,92	18,24	39,67	20,62	45,24	23,01	—	—	18" x 8"
20,60	19,05	26,19	23,80	—	32,54	29,36	38,10	34,92	44,45	39,67	49,99	45,24	—	—	20" x 18"
20,60															

Concentric and eccentric reducers



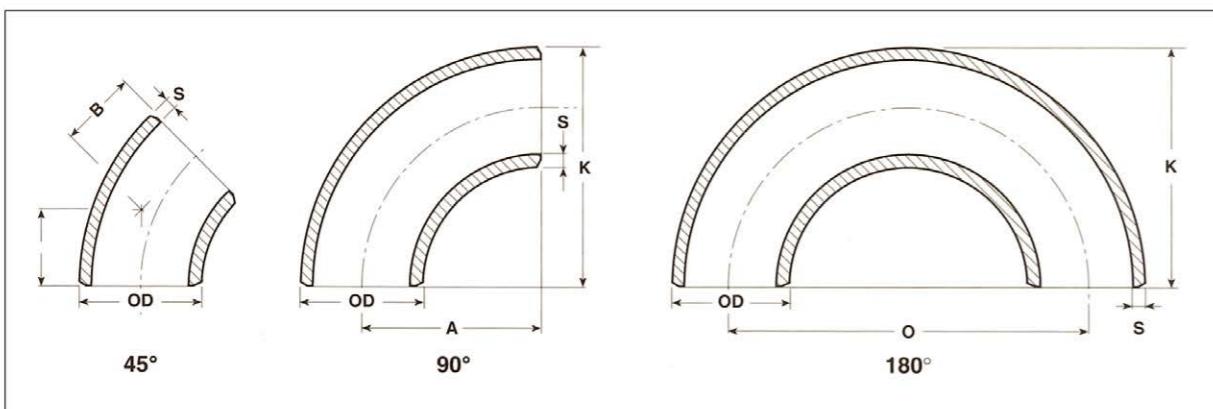
D	d	H	Ø-dia.	SCH.STD		SCH.XS		SCH. 10		SCH.20		SCH.30		SCH.40		
				S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	S	S ₁	
914,4	762,0	610	36" x 30"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	—
914,4	711,2		36" x 28"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	36" x 28"
914,4	609,6		36" x 24"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	36" x 24"
914,4	508,0		36" x 20"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	36" x 20"
914,4	457,2		36" x 18"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	36" x 18"
914,4	406,4		36" x 16"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	36" x 16"
1016,0	914,4	610	40" x 36"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	40" x 36"
1016,0	812,8		40" x 32"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	40" x 32"
1016,0	762,0		40" x 30"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	40" x 30"
1016,0	711,2		40" x 28"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	40" x 28"
1016,0	609,6		40" x 24"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	40" x 24"
1016,0	508,0		40" x 20"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	40" x 20"
1066,8	1016,0	610	42" x 40"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	42" x 40"
1066,8	914,4		42" x 36"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	42" x 36"
1066,8	812,8		42" x 32"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	42" x 32"
1066,8	762,0		42" x 30"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	42" x 30"
1066,8	711,2		42" x 28"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	42" x 28"
1066,8	609,6		42" x 24"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	42" x 24"
1168,4	1066,8	711	46" x 42"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	46" x 42"
1168,4	1016,0		46" x 40"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	46" x 40"
1168,4	914,4		46" x 36"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	46" x 36"
1168,4	812,8		46" x 32"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	46" x 32"
1168,4	762,0		46" x 30"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	46" x 30"
1219,2	1168,4	711	48" x 46"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	48" x 46"
1219,2	1066,8		48" x 42"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	48" x 42"
1219,2	1016,0		48" x 40"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	48" x 40"
1219,2	914,4		48" x 36"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	48" x 36"
1219,2	812,8		48" x 32"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	48" x 32"
1219,2	762,0		48" x 30"	9,52	9,52	12,70	12,70	—	—	—	—	—	—	—	—	48" x 30"

Concentric and eccentric reducers



SCH. 60	SCH. 80	SCH. 100	SCH. 120	SCH. 140	SCH. 160	SCH. XXS	Ø-dia.
S	S ₁	S	S ₁	S	S ₁	S	S ₁
—	—	—	—	—	—	—	36" x 30"
—	—	—	—	—	—	—	36" x 28"
—	—	—	—	—	—	—	36" x 24"
—	—	—	—	—	—	—	36" x 20"
—	—	—	—	—	—	—	36" x 18"
—	—	—	—	—	—	—	36" x 16"
—	—	—	—	—	—	—	40" x 36"
—	—	—	—	—	—	—	40" x 32"
—	—	—	—	—	—	—	40" x 30"
—	—	—	—	—	—	—	40" x 28"
—	—	—	—	—	—	—	40" x 24"
—	—	—	—	—	—	—	40" x 20"
—	—	—	—	—	—	—	42" x 40"
—	—	—	—	—	—	—	42" x 36"
—	—	—	—	—	—	—	42" x 32"
—	—	—	—	—	—	—	42" x 30"
—	—	—	—	—	—	—	42" x 28"
—	—	—	—	—	—	—	42" x 24"
—	—	—	—	—	—	—	46" x 42"
—	—	—	—	—	—	—	46" x 40"
—	—	—	—	—	—	—	46" x 36"
—	—	—	—	—	—	—	46" x 32"
—	—	—	—	—	—	—	46" x 30"
—	—	—	—	—	—	—	48" x 46"
—	—	—	—	—	—	—	48" x 42"
—	—	—	—	—	—	—	48" x 40"
—	—	—	—	—	—	—	48" x 36"
—	—	—	—	—	—	—	48" x 32"
—	—	—	—	—	—	—	48" x 30"

Long Radius (Elbows and Bends)



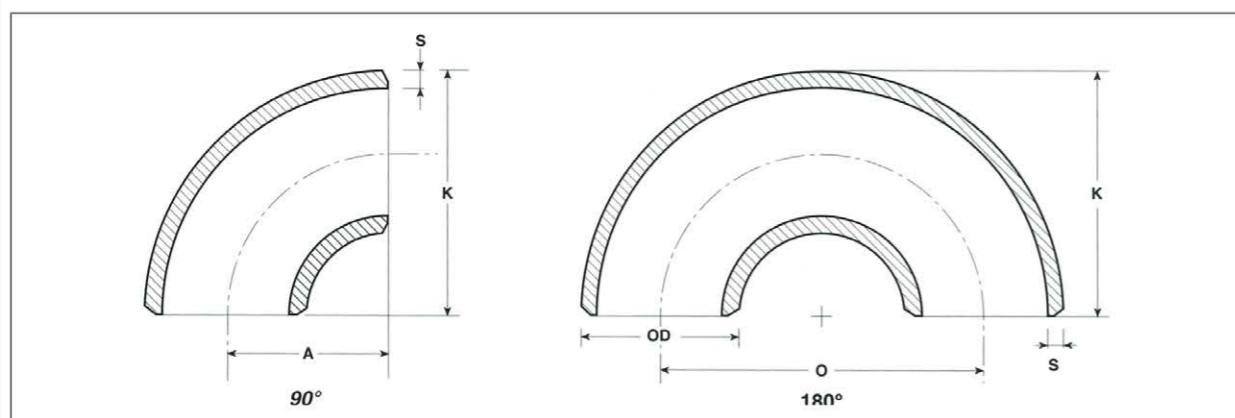
A	B	O	K	\varnothing -dia.	OD	S=SCHEDULE					\varnothing -dia.
						SCH. STD	SCH. XS	SCH. 10	SCH. 20	SCH. 30	
38,1	15,9	76,2	47,6	1/2"	21,3	2,77	3,73	—	—	—	1/2"
28,6	11,1	57,2	42,9	3/4"	26,7	2,87	3,91	—	—	—	3/4"
38,1	22,2	76,2	55,6	1"	33,4	3,38	4,55	—	—	—	1"
47,6	25,4	95,2	69,8	1 1/4"	42,2	3,56	4,85	—	—	—	1 1/4"
57,2	28,6	114,3	82,5	1 1/2"	48,3	3,68	5,08	—	—	—	1 1/2"
76,2	34,9	152,4	106,4	2"	60,3	3,91	5,54	—	—	—	2"
95,2	44,4	190,5	131,8	2 1/2"	73,0	5,16	7,01	—	—	—	2 1/2"
114,3	50,8	228,6	158,8	3"	88,9	5,49	7,62	—	—	—	3"
133,4	57,2	266,7	184,2	3 1/2"	101,6	5,74	8,08	—	—	—	3 1/2"
152,4	63,5	304,8	209,6	4"	114,3	6,02	8,56	—	—	—	4"
190,5	79,4	381,0	261,9	5"	141,3	6,55	9,52	—	—	—	5"
228,6	95,2	457,2	312,7	6"	168,3	7,11	10,97	—	—	—	6"
304,8	127,0	609,6	414,3	8"	219,1	8,18	12,70	—	6,35	7,04	8"
381,0	158,8	762,0	517,5	10"	273,0	9,27	12,70	—	6,35	7,80	10"
457,2	190,5	914,4	619,1	12"	323,8	9,52	12,70	—	6,35	8,38	12"
533,4	222,2	1066,8	711,2	14"	355,6	9,52	12,70	6,35	7,92	9,52	14"
609,6	254,0	1219,2	812,8	16"	406,4	9,52	12,70	6,35	7,92	9,52	16"
685,8	285,8	1371,6	914,4	18"	457,2	9,52	12,70	6,35	7,92	11,12	18"
762,0	317,5	1524,0	1016,0	20"	508,0	9,52	12,70	6,35	9,52	12,70	20"
838,2	342,9	1676,4	1117,6	22"	558,8	9,52	12,70	6,35	9,52	12,70	22"
914,4	381,0	1828,8	1219,2	24"	609,6	9,52	12,70	6,35	9,52	14,25	24"
990,6	—	—	1320,8	26"	660,4	9,52	12,70	7,92	12,70	—	26"
1066,8	—	—	1422,4	28"	711,2	9,52	12,70	7,92	12,70	15,88	28"
1143,0	—	—	1524,0	30"	762,0	9,52	12,70	7,92	12,70	15,88	30"
1219,2	—	—	1625,6	32"	812,8	9,52	12,70	7,92	12,70	15,88	32"
1295,4	—	—	1727,2	34"	863,6	9,52	12,70	7,92	12,70	15,88	34"
1371,6	—	—	1828,8	36"	914,4	9,52	12,70	7,92	12,70	15,88	36"
1524	—	—	2032	40"	1016,0	9,52	12,70	—	—	—	40"
1600	—	—	2134	42"	1066,8	9,52	12,70	—	—	—	42"
1753	—	—	2336	46"	1168,4	9,52	12,70	—	—	—	46"
1829	—	—	2438	48"	1219,2	9,52	12,70	—	—	—	48"

Long Radius (Elbows and Bends)



SCH. 40	SCH. 60	SCH. 80	SCH. 100	SCH. 120	SCH. 140	SCH. 160	SCH. XXS	\varnothing -dia.
2,77	—	3,73	—	—	—	4,75	7,47	1/2"
2,87	—	3,91	—	—	—	5,54	7,82	3/4"
3,38	—	4,55	—	—	—	6,35	9,09	1"
3,56	—	4,85	—	—	—	6,35	9,70	1 1/4"
3,68	—	5,08	—	—	—	7,14	10,16	1 1/2"
3,91	—	5,54	—	—	—	8,74	11,07	2"
5,16	—	7,01	—	—	—	9,52	14,02	2 1/2"
5,49	—	7,62	—	—	—	11,12	15,24	3"
5,74	—	8,08	—	—	—	—	—	3 1/2"
6,02	—	8,56	—	11,12	—	13,49	17,12	4"
6,55	—	9,52	—	12,70	—	15,87	19,05	5"
7,11	—	10,97	—	14,27	—	18,24	21,94	6"
8,18	10,30	12,70	15,06	18,24	20,62	23,01	22,22	8"
9,27	12,70	15,06	18,24	21,41	25,40	28,57	25,40	10"
10,31	14,30	17,45	21,41	25,40	28,57	33,32	25,40	12"
11,12	15,10	19,05	23,80	27,76	31,75	35,71	—	14"
12,70	16,70	21,41	26,19	30,94	36,52	40,46	—	16"
14,27	19,05	23,80	29,36	34,92	39,67	45,24	—	18"
15,06	20,60	26,19	32,54	38,10	44,45	49,99	—	20"
—	—	—	—	—	—	—	—	22"
17,45	24,60	30,94	38,89	46,02	52,37	59,51	—	24"
17,45	—	—	—	—	—	—	—	26"
17,45	—	—	—	—	—	—	—	28"
17,45	—	—	—	—	—	—	—	30"
17,45	—	—	—	—	—	—	—	32"
17,45	—	—	—	—	—	—	—	34"
19,05	—	—	—	—	—	—	—	36"
—	—	—	—	—	—	—	—	40"
—	—	—	—	—	—	—	—	42"
—	—	—	—	—	—	—	—	46"
—	—	—	—	—	—	—	—	48"

Shorts Radius (Elbows and Bends)



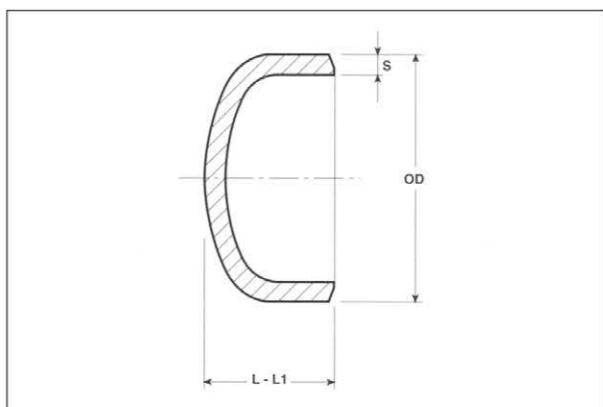
A	O	K	\varnothing -dia.	OD	S=SCHEDULE				
					SCH. STD	SCH. XS	SCH. 10	SCH. 20	SCH. 30
25,4	50,6	41,3	1"	33,4	3,38	4,55	—	—	—
31,8	63,5	52,4	1 1/4"	42,2	3,56	4,85	—	—	—
38,1	76,2	61,9	1 1/2"	48,3	3,68	5,08	—	—	—
50,8	101,6	81,0	2"	60,3	3,91	5,54	—	—	—
63,5	127,0	100,0	2 1/2"	73,0	5,16	7,01	—	—	—
76,2	152,4	120,6	3"	88,9	5,49	7,62	—	—	—
88,9	177,8	139,7	3 1/2"	101,6	5,74	8,08	—	—	—
101,6	203,2	158,8	4"	114,3	6,02	8,56	—	—	—
127,0	254,0	196,8	5"	141,3	6,55	9,52	—	—	—
152,4	304,8	235,5	6"	168,3	7,11	10,97	—	—	—
203,2	406,4	312,7	8"	219,1	8,18	12,70	—	6,35	7,04
254,0	508,0	390,5	10"	273,0	9,27	12,70	—	6,35	7,80
304,8	609,6	466,7	12"	323,8	9,52	12,70	—	6,35	8,38
355,6	711,2	533,4	14"	355,6	9,52	12,70	6,35	7,92	9,52
406,4	812,8	609,6	16"	406,4	9,52	12,70	6,35	7,92	9,52
457,2	914,4	685,8	18"	457,2	9,52	12,70	6,35	7,92	11,12
508,0	1016,0	762,0	20"	508,0	9,52	12,70	6,35	9,52	12,70
558,8	1117,6	838,2	22"	558,8	9,52	12,70	6,35	9,52	12,70
609,6	1219,0	914,0	24"	609,6	9,52	12,70	6,35	9,52	14,25
660,4	—	990,6	26"	660,4	9,52	12,70	7,92	12,70	—
711,2	—	1066,8	28"	711,2	9,52	12,70	7,92	12,70	15,88
762,0	—	1143,0	30"	762,0	9,52	12,70	7,92	12,70	15,88
812,8	—	1219,2	32"	812,8	9,52	12,70	7,92	12,70	15,88
863,8	—	1295,4	34"	863,6	9,52	12,70	7,92	12,70	15,88
914,4	—	1371,6	36"	914,4	9,52	12,70	7,92	12,70	15,88
1016,0	—	1524	40"	1016,0	9,52	12,70	—	—	—
1066,8	—	1600	42"	1066,8	9,52	12,70	—	—	—
1168,4	—	1753	46"	1168,4	9,52	12,70	—	—	—
1219,2	—	1829	48"	1219,2	9,52	12,70	—	—	—

Shorts Radius (Elbows and Bends)



SCH. 40	SCH. 60	SCH. 80	SCH. 100	SCH. 120	SCH. 140	SCH. 160	SCH. XXS	\varnothing -dia.
3,38	—	4,55	—	—	—	6,35	9,09	1"
3,56	—	4,85	—	—	—	6,35	9,70	1 1/4"
3,68	—	5,08	—	—	—	7,14	10,16	1 1/2"
3,91	—	5,54	—	—	—	8,74	11,07	2"
5,16	—	7,01	—	—	—	9,52	14,02	2 1/2"
5,49	—	7,62	—	—	—	11,12	15,24	3"
5,74	—	8,08	—	—	—	—	—	3 1/2"
6,02	—	8,56	—	11,12	—	13,49	17,12	4"
6,55	—	9,52	—	12,70	—	15,87	19,05	5"
7,11	—	10,97	—	14,27	—	18,24	21,94	6"
8,18	10,30	12,70	15,06	18,24	20,62	23,01	22,22	8"
9,27	12,70	15,06	18,24	21,41	25,40	28,57	25,40	10"
10,31	14,30	17,45	21,41	25,40	28,57	33,32	25,40	12"
11,12	15,10	19,05	23,80	27,76	31,75	35,71	—	14"
12,70	16,70	21,41	26,19	30,94	36,52	40,46	—	16"
14,27	19,05	23,80	29,36	34,92	39,67	45,24	—	18"
15,06	20,60	26,19	32,54	38,10	44,45	49,99	—	20"
—	—	—	—	—	—	—	—	22"
17,45	24,60	30,94	38,89	46,02	52,37	59,51	—	24"
17,45	—	—	—	—	—	—	—	26"
17,45	—	—	—	—	—	—	—	28"
17,45	—	—	—	—	—	—	—	30"
17,45	—	—	—	—	—	—	—	32"
17,45	—	—	—	—	—	—	—	34"
19,05	—	—	—	—	—	—	—	36"
—	—	—	—	—	—	—	—	40"
—	—	—	—	—	—	—	—	42"
—	—	—	—	—	—	—	—	46"
—	—	—	—	—	—	—	—	48"

Ansi caps



OD	L	L ₁	Ø-dia.	S = SCHEDULE												
				STD	XS	10	20	30	40	60	80	100	120	140	160	XXS
21,3	25,9	25,9	½"	2,77	3,73	—	—	—	2,77	—	3,73	—	—	—	4,75	7,47
26,7	31,7	31,7	¾"	2,87	3,91	—	—	—	2,87	—	3,91	—	—	—	5,54	7,82
33,4	38,1	38,1	1"	3,38	4,55	—	—	—	3,38	—	4,55	—	—	—	6,35	9,09
42,4	38,1	38,1	1¼"	3,56	4,85	—	—	—	3,56	—	4,85	—	—	—	6,35	9,70
48,3	38,1	38,1	1½"	3,68	5,08	—	—	—	3,68	—	5,08	—	—	—	7,14	10,16
60,3	38,1	44,4	2"	3,91	5,54	—	—	—	3,91	—	5,54	—	—	—	8,74	11,07
73,0	38,1	50,8	2½"	5,16	7,01	—	—	—	5,16	—	7,01	—	—	—	9,52	14,02
88,9	50,8	63,5	3"	5,49	7,62	—	—	—	5,49	—	7,62	—	—	—	11,12	15,24
101,6	63,5	76,2	3½"	5,74	8,08	—	—	—	5,74	—	8,08	—	—	—	—	—
114,3	63,5	76,2	4"	6,02	8,56	—	—	—	6,02	—	8,56	—	11,12	—	13,49	17,12
141,3	76,2	88,9	5"	6,55	9,52	—	—	—	6,55	—	9,52	—	12,70	—	15,87	19,05
168,3	88,9	101,6	6"	7,11	10,97	—	—	—	7,11	—	10,97	—	14,27	—	18,24	21,94
219,1	101,6	127,0	8"	8,18	12,70	—	6,35	7,04	8,18	10,30	12,70	15,06	18,24	20,62	23,01	22,22
273,0	127,0	152,4	10"	9,27	12,70	—	6,35	7,80	9,27	12,70	15,06	18,24	21,41	25,40	28,57	25,40
323,8	152,4	177,8	12"	9,52	12,70	—	6,35	8,38	10,31	14,30	17,45	21,41	25,40	28,57	33,32	25,40
355,6	165,1	190,5	14"	9,52	12,70	6,35	7,92	9,52	11,12	15,10	19,05	23,80	27,76	31,75	35,71	—
406,4	177,8	203,2	16"	9,52	12,70	6,35	7,92	9,52	12,70	16,70	21,41	26,19	30,94	36,52	40,46	—
457,2	203,2	228,6	18"	9,52	12,70	6,35	7,92	11,12	14,27	19,05	23,80	29,36	34,92	39,67	45,24	—
508,0	228,6	254,0	20"	9,52	12,70	6,35	9,52	12,70	15,06	20,60	26,19	32,54	38,10	44,45	49,99	—
558,8	254,0	279,4	22"	9,52	12,70	6,35	9,52	12,70	—	—	—	—	—	—	—	—
609,6	266,7	304,8	24"	9,52	12,70	6,35	9,52	14,25	17,45	24,60	30,94	38,89	46,02	52,37	59,51	—
660,4	266,7	—	26"	9,52	12,70	7,92	12,70	—	—	—	—	—	—	—	—	—
711,2	266,7	—	28"	9,52	12,70	7,92	12,70	15,88	—	—	—	—	—	—	—	—
762,0	266,7	—	30"	9,52	12,70	7,92	12,70	15,88	—	—	—	—	—	—	—	—
812,8	266,7	—	32"	9,52	12,70	7,92	12,70	15,88	17,45	—	—	—	—	—	—	—
863,6	266,7	—	34"	9,52	12,70	7,92	12,70	15,88	17,45	—	—	—	—	—	—	—
914,4	266,7	—	36"	9,52	12,70	7,92	12,70	15,88	19,05	—	—	—	—	—	—	—
965,2	305	—	38"	9,52	12,70	—	—	—	—	—	—	—	—	—	—	—
1016,0	305	—	40"	9,52	12,70	—	—	—	—	—	—	—	—	—	—	—
1066,8	305	—	42"	9,52	12,70	—	—	—	—	—	—	—	—	—	—	—
1168,4	343	—	46"	9,52	12,70	—	—	—	—	—	—	—	—	—	—	—
1219,2	343	—	48"	9,52	12,70	—	—	—	—	—	—	—	—	—	—	—



Thaitube utility
Butt-Weld Fittings

Material

Ferrous Material				
Material Classification			Comparison as nations	
Large	Middle	Small	ASTM (U.S.A)	
Ferrous (Base Mat'l:Fe)	Carbon Steel	Ambient and Higher Temperature Service	A234	WPB WPC
		Low Temperature Service	A420	WPL3 WPL6 WPL9
		Low Alloy (1% ≤ Cr ≤ 9%)	A234	WP1 WP12 WP11 WP22 WP5
				WP23 WP9 WP91 WP92
				WP410 WP430
	Alloy Steel (Cr ≥ 1%)	High Alloy (Cr ≥ 12%) :Stainless Steel	A403	WP304/L WP316/L WP317/L WP321/H WP347/H
				Super Austenitic Stainless Steel
				A403 S31254 904L
				Ferritic / Austenitic (Duplex / Super Duplex)
				A815 S31803 S32750 S32760

Non-Ferrous Material Comparison		
Material Classification	Trade Mark	UNS NO.
Inconel 600		N06600
Inconel 690		N06690
Inconel 800H / 800HT		N08810 / N08811
Inconel 625		N06625
Incoloy 825		N08825
Hastelloy B2		N10665
Hastelloy C276		N10276
Hastelloy C22		N06022
Incoloy 020		N08020
Monel 400		N04400
Monel K500		N05500
Cu-Ni 70/30		C71500
Cu-Ni 90/10		C70600

* Applicable Code/Standard : ASTM Part B, Latest Edition.





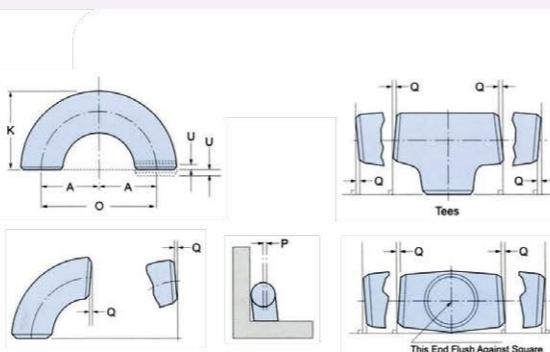
Dimensional Tolerances

ASME B16.9

1. Wrought Steel Butt Welding Fittings

All Fittings				90° and 45° Elbows
Nominal Pipe Size	Outside Diameter at Bevel OD	Inside Diameter at End ID	Wall Thickness	Center-to-End Dimension A, B
1/2~2 1/2	+ 0.06 - 0.03			± 0.03
3~4	± 0.06			± 0.06
5~8	+ 0.09 - 0.06			± 0.06
10~18	+ 0.16 - 0.12		± 0.12	Not less than 87 1/2% of nominal thickness
20~24				± 0.09
26~30	+ 0.25 - 0.19		± 0.19	± 0.12
32~48				± 0.19

* Dimensions are in inches.



REFERENCES

180° Returns					
Tees	Reducers	Caps	Center-to-Center Dimension O	Back-to-Face Dimension K	Alignment of Ends U
Center-to-End Dimension C, M	End to End H	Back to Face E	Center-to-Center Dimension O	Back-to-Face Dimension K	Alignment of Ends U
± 0.06	± 0.06	± 0.12	± 0.25	± 0.03	
			± 0.25		
	± 0.09	± 0.09	± 0.38	± 0.06	
± 0.12		± 0.19	± 0.38	—	—
± 0.19					



About Weld Fittings and Flanges

90° and 45° Elbows

Since elbows are very commonly used fittings, they will be considered first.

Generally, their size designations are either **long radius** or **short radius**. The long radius elbow is usually adequate for standard service conditions. The center-to-end dimension is always 1-1/2 times the nominal size of the elbow. Short radius elbows have a center-to-end measurement equal to pipe diameter.



90° Long Radius Elbow



90° Short Radius Elbow

For a particular job, the type of elbow selected is usually a compromise based on three considerations, namely, the material flow rate, space available and initial cost.

For service where the flow rate is critical and space is available, the user may select the long radius fittings. This gives him the least reduction in flow and pressure drop from internal frictional resistance and stream turbulence.

When space is limited and the flow rate is non-critical, a short radius elbow is often selected.

When fluids are moved long distances or must encounter many directional changes, short radius elbows are not recommended because of their greater friction loss, which may require installation of larger pumping equipment.

A long radius elbow costs less than a short radius fitting. Long radius elbows offer minimum resistance to flow consistent with space savings and presently account for more than 90 percent of all elbows in use.

Because of the countless variations occurring in piping systems, fitting manufacturers produce a number of fittings with special shapes and parts as standard items. Some of the major welding fittings and flanges currently available are described below.



90° Reducing Elbow

The 90° reducing elbow is designed to change direction as well as reduce the length of flow within a piping system. Using both a standard 90° elbow and reducer could do this or a 90° long radius-reducing elbow could do this. The latter is normally preferred because it eliminates one fitting and reduces the necessary welding by more than one-third. Also, the gradual reduction in diameter throughout the arc of the reducing elbow provides lower resistance to flow and reduces the effect of stream turbulence and potential internal erosion. These features prevent sizeable pressure drops in the line.

Because this fitting takes up less space than the straight elbow and reducer combination, the application of piping insulation is simplified.

The reducing elbow is more difficult to make and costs more than the elbow and reducer combination. However, since less welding is required and installation is faster, the actual cast differential may be very little.



45° Long Radius Elbow

The 45° long reducing elbow has all the flow advantages of the 90° long radius elbow. It is generally used when a partial or gradual change in direction is desired. The demand for 45° long radius elbow is somewhat limited and they constitute a very small segment of the market.



180° Long Radius Return



180° Short Radius Return

180° Returns

The recommended procedure for a 180° change in direction is to use a formed 180° return fitting rather than combine two 90° elbows or field fabricate a 180° pipe bend from a straight pipe piece. Returns are used primarily in heater coils and heat exchangers. The number of coils the space has available determines whether a **short** or **long** radius return is desirable. All long and short 180° radius returns have center-to-center dimensions that are double those of matching 90° elbows.



Tees

A tee is a branched, reinforced outlet fitting that permits flow at 90° to the main flow. The main flow passes through the "run" of the tee. The 90° outlet is called the "branch" of the tee. A **straight** tee is manufactured with all three outlets, the run as well as the branchm the same size. A **reducing** tee is made with the branch outlet smaller than the run to accomodate the design flow rate.



Thaitube utility®
Butt-Weld Fittings

About Weld Fittings and Flanges



Lap Joint Stub Ends

These fittings are used in lines that might require a quick-disconnect system. They are also used to facilitate lining up the bolt holes of flanges when there flanges are now welded or fastened to the pipe. Normally, **stub ends** are installed in pairs, the paired fittings mating with two lap joint flanges. This allows easy opening of the line for future cleaning and inspection and if the line requires replacement, the flanges can be reused because they are not fastened to the system. They ride freely in the outside of the pipe. Lap joint stub ends are made with serrated gasket surfaces for improved sealing of the connection and prevention of leakage at the joint. This surface has replaced the raised gasket surface of a flange.



Reducers

All reducers, either **eccentric** or **concentric**, decrease the effective size of the pipe. With smaller cross-sectional area there is increased frictional resistance to the flowing material and an increase system pressure.



The eccentric reducer has the reducing outlet end off center. It will line up straight with one side of the inlet but not with the other outlet. This reducer is harder to manufacture than the concentric reducer and costs more. One advantage over the concentric reducer is that can be hung or suspended flush against a flat ceiling or wall. This lends greater support to the piping system and many reduces the required space. When used in horizontal piping systems with the straight side up, it acts as a trap for foreign material. When installed straight side down, it prevents trapping of foreign material.



Caps

The function of a **cap** is to block off the end of a line. The cap is placed over the open end and welded around the joint.

Cap

Flanges

A flange is forged or cast ring of metal designed to join two sections of a piping system or originate a piping system at a pressure vessel outlet, valve, or any other integral flanged assembly. Flanges are joined to the piping system by threading or welding and are joined to each other with bolts. For example, every pressure vessel made has at least one flanged outlet. This outlet has a predetermined bolt circle and number of holes. Flanges are designed and made to match the bolt circle and bolt holes so the two can be mated together. From this flange the piping system is started. Normally, the thickness and O.D (Outside Diameter) of the flange increase as the pressure rating of the piping system increases. The most important part of a flange is its face. Flange faces are machined to provide adequate surface contact area for a gasket. Flange classifications are:

Raised-Face : The contact area is raised 0.0625 inches for classes 150 and 300. For classed above 300, the contact area is raised 0.25 inches.

Flat-Face : When bolting class 150 or 300 flanges to cast iron flanges, flat-face should be used.

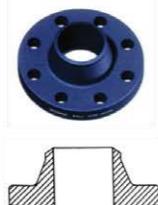
Ring Type Joint : Normal use is with flanges in classes 400 and over but can be designed for lower classes if desired.

Flanges are designed specifically for classes 150, 300, 400, 600, 900, 1500 and 2500. Common types of flanges are "high-hub" weld neck, "low-hub" slip-on, lap joint, threaded, socket and blind.

Weld Neck Flanges

The weld neck flange is normally referred to as the "high-hub" flanges. It is designed to transfer and equally distribute stresses to the pipe, thereby reducing any concentration of high stress at the bottom of the flange after connections are made. The weld neck flange is the best-designed flange for butt-welding because of its inherent strength. A long tapered hub and gradual transition of thickness in the region of the butt-weld joint adds reinforcement from the standpoint of strength and resistance to dishing.

The smooth transition from the flange thickness to the pipe wall thickness effected by the taper is extremely beneficial under conditions of repeated bending caused by line expansion or other variable forces.



Weld neck flanges are used in serve services generally involving high pressure and sub-zero or high temperatures. Weld neck flanges are bored to match the I.D.(Inside Diameter) of the matching pipe. Therefore, the lighter(lower schedule) the pipe, the larger is the bore of the flanges.



Thaitube utility®
Butt-Weld Fittings

Conversion Factors

CONVERSION CONSTANTS		
To Change	To	Multiply By
Inches	Feet	0.0833
Inches	Millimeters	25.4
Feet	Inches	12
Feet	Yards	0.3333
Yards	Feet	3
Square inches	Square feet	0.00694
Square feet	Square inches	144
Square feet	Square yards	0.11111
Square yards	Square feet	9
Cubic inches	Cubic feet	0.00058
Cubic feet	Cubic inches	1728
Cubic feet	Cubic yards	0.303703
Cubic yards	Cubic feet	27
Cubic inches	Gallons	0.00433
Cubic feet	Gallons	7.48
Gallons	Cubic inches	231
Gallons	Cubic feet	0.1337
Gallons	Pounds of water	8.33
Pounds of Water	Gallons	0.12004
Ounces	Pounds	0.0625
Pounds	Ounces	16
Inches of Water	Pounds per square inch	0.0361
Inches of Water	Inches of mercury	0.0735
Inches of Water	Ounces per square inch	0.578
Inches of Water	Pounds per square inch	5.2
Inches of mercury	Inches of Water	13.6
Inches of mercury	Feet of water	1.1333
Inches of mercury	Pounds per square inch	0.4914
Ounces per square inch	Inches of mercury	0.127
Ounces per square inch	Inches of Water	1.733
Pounds per square inch	Inches of Water	27.72
Pounds per square inch	Feet of water	2.310
Pounds per square inch	Inches of mercury	2.04
Pounds per square inch	Atmospheres	0.0681
Feet of water	Pounds per square inch	0.434
Feet of water	Pounds per square foot	62.5
Feet of water	Inches of mercury	0.8824
Atmospheres	Pounds per square inch	14.696
Atmospheres	Inches of mercury	29.92
Atmospheres	Feet of water	34
Long tons	Pounds	2240
Short tons	Pounds	2000
Short tons	Long tons	0.89285

ENGLISH-METRIC CONVERSION FACTORS		
Multiply	By	To Obtain
Millimeters	0.03937	Inches
Inches	25.4	Millimeters
Centimeters	0.3937	Inches
Inches	2.54	Centimeters
Meters	39.37	Inches
Inches	0.0254	Meters
Millimeters²	0.00155	Inches²
Inches²	654.16	Millimeters²
Millimeters²	0.0000107639	Foot²
Foot²	92903.04	Millimeters²
Kilograms	2.204624	Pounds
Pounds	0.453592	Kilograms
Kilograms/Centimeters²	14.223	Pounds/Inches²
Pounds/Inches²	0.070307	Kilograms/Centimeters²
Bars	14.504	Pounds/Inches²
Pounds/Inches²	0.0689	Bars
Millimeters of mercury	0.03937	Inches of mercury
Inches of mercury	25.4	Millimeters of mercury
Liters per minute	0.26417	Gallons per minute
Gallons per minute	3.785	Liters per minute
Liters	0.26414	Gallons
Gallons	3.785	Liters
Meters per second	3.281	Feet per second
Feet per second	0.3048	Meters per second
Cubic meters	35.3144	Cubic feet
Cubic feet	0.028317	Cubic meters



6/10-9 Moo 4 Ramintra 15, Ramintra Road Anusaowaree,

Bangkhen Bangkok 10220, Thailand

export@ttutube-th.com

Tel./Fax : 66-2-2466679 (12 Lines)

Middle East Office: mena@ttutube-th.com

www.ttutube-th.com