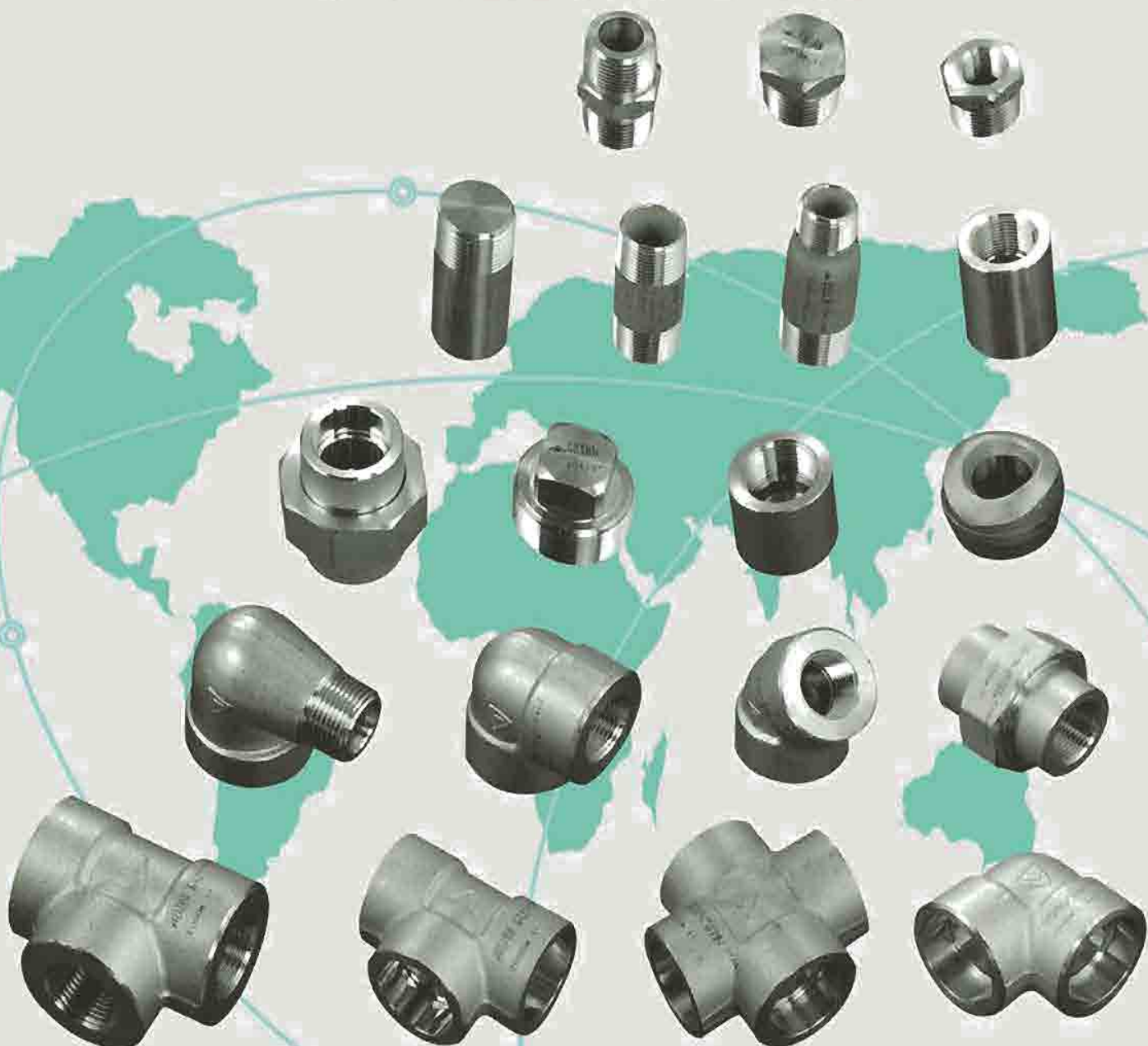


BOTH - WELL

HIGH PRESSURE FITTINGS

**FORGED
CARBON ALLOY
STAINLESS STEEL
THREADED SOCKETWELD**



BOTH-WELL STEEL FITTINGS CO., LTD.

NO.303 JEN-HSIN ROAD, JEN-WU HSIANG,
KAOHSIUNG HSIEN, TAIWAN, R.O.C. (81460)

TEL : 886-7-371-1536 ● 371-0497 ● 372-0260

FAX : 886-7-371-3864 ● 371-3882





INTRODUCTION

BOTH-WELL is equivalent to Win-Win, existing in between both consumers and manufacturer, both devoted employers and valued employees, a bilateral satisfaction.

Ever since its establishment in 1985, with the spirit of pursuing most advanced technology and striving for the ultimate quality-oriented products, the company is continuously utilizing the most up-to-date hi-tech facilities and most sophisticated manufacturing techniques, on the basis of skilled manpower and accumulated experiences, BOTH-WELL has been well-recognized among customers worldwide for the excellence of Quality and Services which has enabled us to win the unrivalled reputation in our industries.

QUALITY ASSURANCE

It is our indelible belief in Quality First.

BOTH-WELL's Quality Management System has been certified with ISO 9001:2000, PED, together with all major international-recognized certificates and being granted as an approval vendor for ARAMCO, also being listed on the Approval Supplier List of major domestic refineries, petro-chemical factories in Taiwan.

BOTH-WELL prides itself in having the best service performance in our industries which can only attribute it to the quality of people we employ and the amicable relationship and close partnership we have built-up with all our customers, and the company will continue its ultimate efforts to satisfy all its customers' demands by providing top quality products and high efficient services by anticipating the continued encouragement and supports from all its customers in the years ahead.

PRODUCTION RANGE AND SPECIFICATION :

TYPE : A. ELBOW, TEE, COUPLING, HALF COUPLING, CAP, PLUG, BUSHING, UNION, OUTLET, SWAGE NIPPLE, BULL PLUG, REDUCER INSERT AND HEX. NIPPLE, STREET ELBOWS, BOSS,...ETC.
B. SOCKET-WELD, THREADED (NPT or PT TYPE), BUTT-WELDING.

SIZE : NPS 1/8" ~ 4",
DN 6~100

RATING : PRESSURE : THREADED END - 2000 / 3000 / 6000 LBS.
SOCKET-WELD END - 3000 / 6000 / 9000 LBS.
BUTT WELD END - SCH40 / SCH80 / SCH160 / XXS.

SPECIFICATIONS : A. DIM. SPEC. : ASME B16.11-2009 (REVISION of ASME B 16.11-2005)
MSS SP - 79, 83, 95, 97 and BS3799.
B. MATERIAL SPEC : ASTM A105, A350 LF2, A106, A312, A234, A403,
ASTM A182 (F304, F304L, F316, F316L, F304H,
F316H, F317L, F321, F11, F22, F91).
C. SIZE of RAW MATERIAL : DIA. 19~85MM ROUND BAR.

MARKING : A. CARBON and ALLOY STEEL : MARKED BY STAMPING.
B. STAINLESS STEEL : MARKED BY ELECTRO-ETCHED, JET PRINTED or STAMPING.
C. 3/8" UNDER : BRAND ONLY.
D. 1/2" to 4" : MARKED WITH BRAND, MATERIAL, HEAT CODE, B16 (FOR ASME B16.11 PRODUCT), RATING and SIZE.

FINISHING : CARBON STEEL - GALVANIZED or BLACK.
LOW ALLOY STEEL - BLACK.
STAINLESS STEEL - PICKLED.

PACKING : CARTON / WOODEN CASE.
PLYWOODEN CASE



PRODUCTION PROCESS CHART

(1) FORGING



(2) MACHINING - SOCKET WELD



(3) MACHINING - THREADED



(4) DELIVERY



簡要作業流程圖

一、鍛造



二、套焊加工



三、牙口加工



四、交貨處理





THE EQUIPMENT



沖床及感應加熱設備鍛造設備操作現場

HIGH SPEED PNEUMATIC PRESS EQUIPPED WITH INDUCTION HEATER

熱處理設備

FURNACE FOR HEAT TREATMENT





THE EQUIPMENT

CNC車床加工操作現場▶
CNC MACHINES



◀ 鑽孔機設備操作現場
▼ SPECIALIZED DRILLING MACHINES





INSPECTION APPARATUS



▲ 萬能試驗機
UNIVERSAL TESTING MACHINE



▲ 硬度計
HARDNESS TESTER



▲ 精密光學投影機
PRECISION PROJECTOR

▲ 分光分析儀
OPTICAL EMISSION SPECTROMETER ▼





CERTIFICATION

**We Have Obtained The Following Internationally
Recognized Approvals with Certificates :**



N°TW08091Q

An ISO 9001 Registered Manufacturer

Certificate No. TW08091Q



Lloyd's Register of Shipping

Certificate No. MD00/0208/0005/3



AMERICAN BUREAU OF SHIPPING

Certificate No. KS1019178-X



中國驗船中心
China Corporation Register of Shipping

Certificate No. 467-05-21



BUREAU VERITAS INTERNATIONAL REGISTER

Pressure Equipment Directive 97/23/EC

Certificate No. CE-PED-PMA-BWF002-08-TWN



BUREAU VERITAS OF MARINE DIVISION

Certificate No. SMS.W.II/51004/B.0



PRODUCT LIST

FORGED HIGH PRESSURE PIPE FITTINGS SOCKET WELD 3000-6000-9000 Lbs

ELBOW
90°



HALF
COUPLING



ELBOW
45°



CAP



TEE



BOSS



CROSS



OUTLET



UNION



WELDING
OUTLET



COUPLING



INSERT



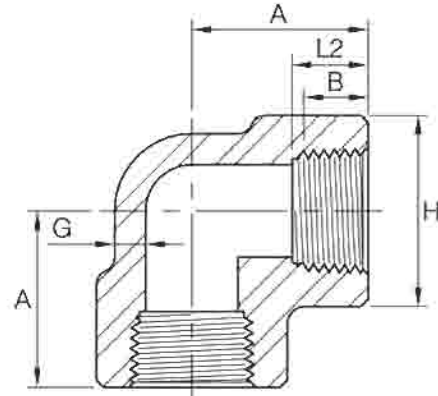
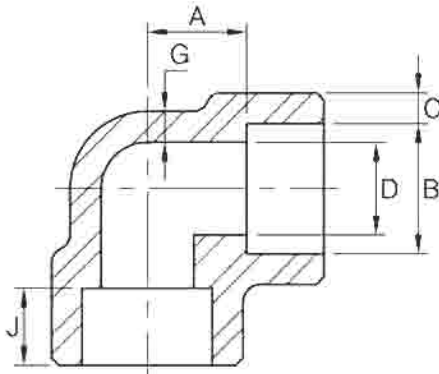
FORGED HIGH PRESSURE PIPE FITTINGS THREADED 2000-3000-6000 Lbs





90° ELBOW

ASME B16.11-2009(Revision of ASME B16.11-2005)



Dimensions in Millimeters.

Dimensions in Millimeters.

Socket Welding								
DN	Nom. Pipe Size	B ⁽²⁾	C ⁽¹⁾		D ⁽²⁾	A ⁽²⁾	G (Min)	J (Min)
			(Avg)	(Min)				

3000Lb								
6	1/8	10.8	3.18	3.18	6.9	11.0	2.41	9.5
8	1/4	14.2	3.78	3.30	9.3	11.0	3.02	9.5
10	3/8	17.6	4.01	3.50	12.6	13.5	3.20	9.5
15	1/2	21.8	4.67	4.09	15.8	15.5	3.73	9.5
20	3/4	27.2	4.90	4.27	21.0	19.0	3.91	12.5
25	1	33.9	5.69	4.98	26.7	22.5	4.55	12.5
32	1-1/4	42.7	6.07	5.28	35.1	27.0	4.85	12.5
40	1-1/2	48.8	6.35	5.54	40.9	32.0	5.08	12.5
50	2	61.2	6.93	6.04	52.5	38.0	5.54	16.0
65	2-1/2	73.9	8.76	7.67	62.7	41.0	7.01	16.0
80	3	89.8	9.52	8.30	78.0	57.0	7.62	16.0
100	4	115.2	10.69	9.35	102.3	66.5	8.56	19.0

6000Lb								
6	1/8	10.8	3.96	3.43	4.0	11.0	3.15	9.5
8	1/4	14.2	4.60	4.01	6.4	13.5	3.68	9.5
10	3/8	17.6	5.03	4.37	9.2	15.5	4.01	9.5
15	1/2	21.8	5.97	5.18	11.8	19.0	4.78	9.5
20	3/4	27.2	6.96	6.04	15.6	22.5	5.56	12.5
25	1	33.9	7.92	6.93	20.7	27.0	6.35	12.5
32	1-1/4	42.7	7.92	6.93	29.5	32.0	6.35	12.5
40	1-1/2	48.8	8.92	7.80	34.0	38.0	7.14	12.5
50	2	61.2	10.92	9.50	42.9	41.0	8.74	16.0

9000Lb								
15	1/2	21.8	9.35	8.18	6.4	25.5	7.47	9.5
20	3/4	27.2	9.78	8.56	11.1	28.5	7.82	12.5
25	1	33.9	11.38	9.96	15.2	32.0	9.09	12.5
32	1-1/4	42.7	12.14	10.62	22.8	35.0	9.70	12.5
40	1-1/2	48.8	12.70	11.12	28.0	38.0	10.15	12.5
50	2	61.2	13.84	12.12	38.2	54.0	11.07	16.0

- (1) Average of socket Wall Thickness around periphery shall be no less than listed values. The minimum values are permitted in localized areas.
- (2) Tolerance see page 16.

Threaded						
DN	Nom. Pipe Size	Length of Thread. (Min)		A	G (Min)	H
		B ^(*)	L2 ^(*)			

2000Lb						
6	1/8	6.4	6.7	21	3.18	22
8	1/4	8.1	10.2	21	3.18	22
10	3/8	9.1	10.4	25	3.18	25
15	1/2	10.9	13.6	28	3.18	33
20	3/4	12.7	13.9	33	3.18	38
25	1	14.7	17.3	38	3.68	46
32	1-1/4	17.0	18.0	44	3.89	56
40	1-1/2	17.8	18.4	51	4.01	62
50	2	19.0	19.2	60	4.27	75
65	2-1/2	23.6	28.9	76	5.61	92
80	3	25.9	30.5	86	5.99	109
100	4	27.7	33.0	106	6.55	146

3000Lb						
6	1/8	6.4	6.7	21	3.18	22
8	1/4	8.1	10.2	25	3.30	25
10	3/8	9.1	10.4	28	3.51	33
15	1/2	10.9	13.6	33	4.09	38
20	3/4	12.7	13.9	38	4.32	46
25	1	14.7	17.3	44	4.98	56
32	1-1/4	17.0	18.0	51	5.28	62
40	1-1/2	17.8	18.4	60	5.56	75
50	2	19.0	19.2	64	7.14	84
65	2-1/2	23.6	28.9	83	7.65	102
80	3	25.9	30.5	95	8.84	121
100	4	27.7	33.0	114	11.18	152

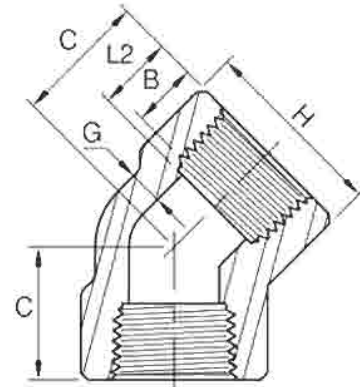
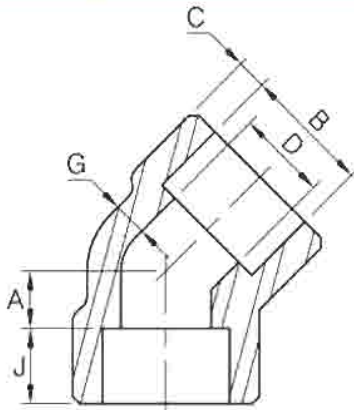
6000Lb						
6	1/8	6.4	6.7	25	6.35	25
8	1/4	8.1	10.2	28	6.60	33
10	3/8	9.1	10.4	33	6.98	38
15	1/2	10.9	13.6	38	8.15	46
20	3/4	12.7	13.9	44	8.53	56
25	1	14.7	17.3	51	9.93	62
32	1-1/4	17.0	18.0	60	10.59	75
40	1-1/2	17.8	18.4	64	11.07	84
50	2	19.0	19.2	83	12.09	102
65	2-1/2	23.6	28.9	95	15.29	121
80	3	25.9	30.5	106	16.64	146
100	4	27.7	33.0	114	18.67	152

- (*) Dimension B is minimum length of perfect thread. The length of useful thread (B plus threads with fully formed roots and flat crests) shall not be less than L2 (effective length of external thread) required by American National Standard for pipe threads (ANSI / ASME B1.20.1).



45° ELBOW

ASME B16.11-2009(Revision of ASME B16.11-2005)



Dimensions in Millimeters.

Socket Welding								
DN	Nom. Pipe Size	B ⁽²⁾	C ⁽¹⁾		D ⁽²⁾	A ⁽²⁾	G (Min)	J (Min)
			(Avg)	(Min)				

3000Lb								
6	1/8	10.8	3.18	3.18	6.9	8.0	2.41	9.5
8	1/4	14.2	3.78	3.30	9.3	8.0	3.02	9.5
10	3/8	17.6	4.01	3.50	12.6	8.0	3.20	9.5
15	1/2	21.8	4.67	4.09	15.8	11.0	3.73	9.5
20	3/4	27.2	4.90	4.27	21.0	13.0	3.91	12.5
25	1	33.9	5.69	4.98	26.7	14.0	4.55	12.5
32	1-1/4	42.7	6.07	5.28	35.1	17.5	4.85	12.5
40	1-1/2	48.8	6.35	5.54	40.9	20.5	5.08	12.5
50	2	61.2	6.93	6.04	52.5	25.5	5.54	16.0
65	2-1/2	73.9	8.76	7.67	62.7	28.5	7.01	16.0
80	3	89.8	9.52	8.30	78.0	32.0	7.62	16.0
100	4	115.2	10.69	9.35	102.3	41.0	8.56	19.0

6000Lb								
6	1/8	10.8	3.96	3.43	4.0	8.0	3.15	9.5
8	1/4	14.2	4.60	4.01	6.4	8.0	3.68	9.5
10	3/8	17.6	5.03	4.37	9.2	11.0	4.01	9.5
15	1/2	21.8	5.97	5.18	11.8	12.5	4.78	9.5
20	3/4	27.2	6.96	6.04	15.6	14.0	5.56	12.5
25	1	33.9	7.92	6.93	20.7	17.5	6.35	12.5
32	1-1/4	42.7	7.92	6.93	29.5	20.5	6.35	12.5
40	1-1/2	48.8	8.92	7.80	34.0	25.5	7.14	12.5
50	2	61.2	10.92	9.50	42.9	28.5	8.74	16.0

9000Lb								
15	1/2	21.8	9.35	8.18	6.4	15.5	7.47	9.5
20	3/4	27.2	9.78	8.56	11.1	19.0	7.82	12.5
25	1	33.9	11.38	9.96	15.2	20.5	9.09	12.5
32	1-1/4	42.7	12.14	10.62	22.8	22.5	9.70	12.5
40	1-1/2	48.8	12.70	11.12	28.0	25.5	10.15	12.5
50	2	61.2	13.84	12.12	38.2	28.5	11.07	16.0

Dimensions in Millimeters.

Threaded						
DN	Nom. Pipe Size	Length of Thread (Min)		C	G (Min)	H
		B ^(*)	L2 ^(*)			

2000Lb						
6	1/8	6.4	6.7	17	3.18	22
8	1/4	8.1	10.2	17	3.18	22
10	3/8	9.1	10.4	19	3.18	25
15	1/2	10.9	13.6	22	3.18	33
20	3/4	12.7	13.9	25	3.18	38
25	1	14.7	17.3	28	3.68	46
32	1-1/4	17.0	18.0	33	3.89	56
40	1-1/2	17.8	18.4	35	4.01	62
50	2	19.0	19.2	43	4.27	75
65	2-1/2	23.6	28.9	52	5.61	92
80	3	25.9	30.5	64	5.99	109
100	4	27.7	33.0	79	6.55	146

3000Lb						
6	1/8	6.4	6.7	17	3.18	22
8	1/4	8.1	10.2	19	3.30	25
10	3/8	9.1	10.4	22	3.51	33
15	1/2	10.9	13.6	25	4.09	38
20	3/4	12.7	13.9	28	4.32	46
25	1	14.7	17.3	33	4.98	56
32	1-1/4	17.0	18.0	35	5.28	62
40	1-1/2	17.8	18.4	43	5.56	75
50	2	19.0	19.2	44	7.14	84
65	2-1/2	23.6	28.9	52	7.65	102
80	3	25.9	30.5	64	8.84	121
100	4	27.7	33.0	79	11.18	152

6000Lb						
6	1/8	6.4	6.7	19	6.35	25
8	1/4	8.1	10.2	22	6.60	33
10	3/8	9.1	10.4	25	6.98	38
15	1/2	10.9	13.6	28	8.15	46
20	3/4	12.7	13.9	33	8.53	56
25	1	14.7	17.3	35	9.93	62
32	1-1/4	17.0	18.0	43	10.59	75
40	1-1/2	17.8	18.4	44	11.07	84
50	2	19.0	19.2	52	12.09	102
65	2-1/2	23.6	28.9	64	15.29	121
80	3	25.9	30.5	79	18.64	146
100	4	27.7	33.0	79	18.67	152

(1) Average of socket Wall Thickness around periphery shall be no less than listed values. The minimum values are permitted in localized areas.

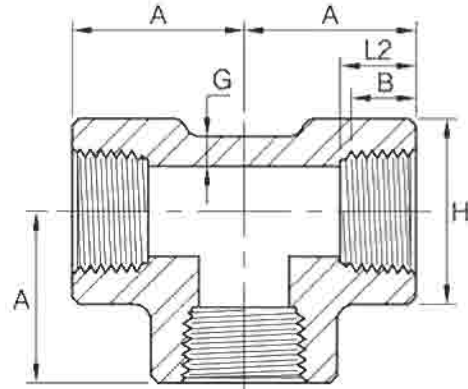
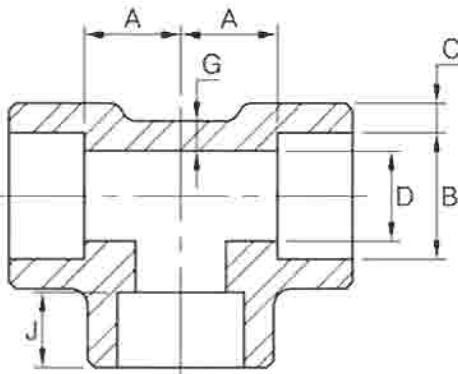
(2) Tolerance see page 16.

(*) Dimension B is minimum length of perfect thread. The length of useful thread (B plus threads with fully formed roots and flat crests) shall not be less than L2 (effective length of external thread) required by American National Standard for pipe threads (ANSI / ASME B1.20.1).



TEE

ASME B16.11-2009 (Revision of ASME B16.11-2005)



Dimensions in Millimeters.

Dimensions in Millimeters.

Socket Welding								
DN	Nom. Pipe Size	B ⁽²⁾	C ⁽¹⁾		D ⁽²⁾	A ⁽²⁾	G (Min)	J (Min)
			(Avg)	(Min)				

Threaded						
DN	Nom. Pipe Size	Length of Thread. (Min)		A	G (Min)	H
		B ^(*)	L2 ^(*)			

3000Lb

6	1/8	10.8	3.18	3.18	6.9	11.0	2.41	9.5
8	1/4	14.2	3.78	3.30	9.3	11.0	3.02	9.5
10	3/8	17.6	4.01	3.50	12.6	13.5	3.20	9.5
15	1/2	21.8	4.67	4.09	15.8	15.5	3.73	9.5
20	3/4	27.2	4.90	4.27	21.0	19.0	3.91	12.5
25	1	33.9	5.69	4.98	26.7	22.5	4.55	12.5
32	1-1/4	42.7	6.07	5.28	35.1	27.0	4.85	12.5
40	1-1/2	48.8	6.35	5.54	40.9	32.0	5.08	12.5
50	2	61.2	6.93	6.04	52.5	38.0	5.54	16.0
65	2-1/2	73.9	8.76	7.67	62.7	41.0	7.01	16.0
80	3	89.8	9.52	8.30	78.0	57.0	7.62	16.0
100	4	115.2	10.69	9.35	102.3	66.5	8.56	19.0

2000Lb

6	1/8	6.4	6.7	21	3.18	22
8	1/4	8.1	10.2	21	3.18	22
10	3/8	9.1	10.4	25	3.18	25
15	1/2	10.9	13.6	28	3.18	33
20	3/4	12.7	13.9	33	3.18	38
25	1	14.7	17.3	38	3.68	46
32	1-1/4	17.0	18.0	44	3.89	56
40	1-1/2	17.8	18.4	51	4.01	62
50	2	19.0	19.2	60	4.27	75
65	2-1/2	23.6	28.9	76	5.61	92
80	3	25.9	30.5	86	5.99	109
100	4	27.7	33.0	106	6.55	146

6000Lb

6	1/8	10.8	3.96	3.43	4.0	11.0	3.15	9.5
8	1/4	14.2	4.60	4.01	6.4	13.5	3.68	9.5
10	3/8	17.6	5.03	4.37	9.2	15.5	4.01	9.5
15	1/2	21.8	5.97	5.18	11.8	19.0	4.78	9.5
20	3/4	27.2	6.96	6.04	15.6	22.5	5.56	12.5
25	1	33.9	7.92	6.93	20.7	27.0	6.35	12.5
32	1-1/4	42.7	7.92	6.93	29.5	32.0	6.35	12.5
40	1-1/2	48.8	8.92	7.80	34.0	38.0	7.14	12.5
50	2	61.2	10.92	9.50	42.9	41.0	8.74	16.0

3000Lb

6	1/8	6.4	6.7	21	3.18	22
8	1/4	8.1	10.2	25	3.30	25
10	3/8	9.1	10.4	28	3.51	33
15	1/2	10.9	13.6	33	4.09	38
20	3/4	12.7	13.9	38	4.32	46
25	1	14.7	17.3	44	4.98	56
32	1-1/4	17.0	18.0	51	5.28	62
40	1-1/2	17.8	18.4	60	5.56	75
50	2	19.0	19.2	64	7.14	84
65	2-1/2	23.6	28.9	83	7.65	102
80	3	25.9	30.5	95	8.84	121
100	4	27.7	33.0	114	11.18	152

9000Lb

15	1/2	21.8	9.35	8.18	6.4	25.5	7.47	9.5
20	3/4	27.2	9.78	8.56	11.1	28.5	7.82	12.5
25	1	33.9	11.38	9.96	15.2	32.0	9.09	12.5
32	1-1/4	42.7	12.14	10.62	22.8	35.0	9.70	12.5
40	1-1/2	48.8	12.70	11.12	28.0	38.0	10.15	12.5
50	2	61.2	13.84	12.12	38.2	54.0	11.07	16.0

6000Lb

6	1/8	6.4	6.7	25	6.35	25
8	1/4	8.1	10.2	28	6.60	33
10	3/8	9.1	10.4	33	6.98	38
15	1/2	10.9	13.6	38	8.15	46
20	3/4	12.7	13.9	44	8.53	56
25	1	14.7	17.3	51	9.93	62
32	1-1/4	17.0	18.0	60	10.59	75
40	1-1/2	17.8	18.4	64	11.07	84
50	2	19.0	19.2	83	12.09	102
65	2-1/2	23.6	28.9	95	15.29	121
80	3	25.9	30.5	106	16.64	146
100	4	27.7	33.0	114	18.67	152

(1) Average of socket wall thickness around periphery shall be no less than listed values. The minimum values are permitted in localized areas.

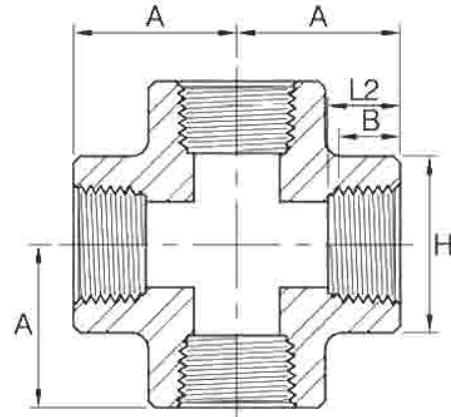
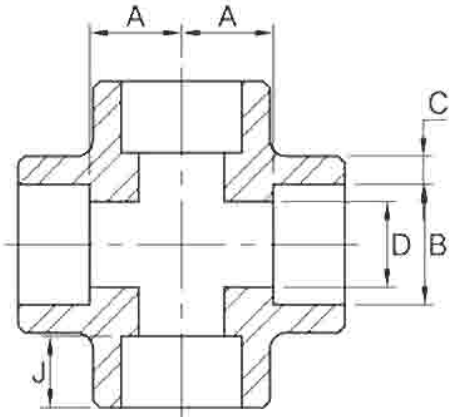
(2) Tolerance see page 16.

(*) Dimension B is minimum length of perfect thread. The length of useful thread (B plus threads with fully formed roots and flat crests) shall not be less than L2 (effective length of external thread) required by American National Standard for pipe threads (ANSI / ASME B1.20.1).



CROSS

ASME B16.11-2009(Revision of ASME B16.11-2005)



Dimensions in Millimeters.

Dimensions in Millimeters.

Socket Welding							
DN	Nom. Pipe Size	B ⁽²⁾	C ⁽¹⁾		D ⁽²⁾	A ⁽²⁾	J (Min)
			(Avg)	(Min)			

Threaded					
DN	Nom. Pipe Size	Length of Thread. (Min)		A	H
		B ⁽²⁾	L2 ⁽²⁾		

3000Lb

6	1/8	10.8	3.18	3.18	6.9	11.0	9.5
8	1/4	14.2	3.78	3.30	9.3	11.0	9.5
10	3/8	17.6	4.01	3.50	12.6	13.5	9.5
15	1/2	21.8	4.67	4.09	15.8	15.5	9.5
20	3/4	27.2	4.90	4.27	21.0	19.0	12.5
25	1	33.9	5.69	4.98	26.7	22.5	12.5
32	1-1/4	42.7	6.07	5.28	35.1	27.0	12.5
40	1-1/2	48.8	6.35	5.54	40.9	32.0	12.5
50	2	61.2	6.93	6.04	52.5	38.0	16.0
65	2-1/2	73.9	8.76	7.67	62.7	41.0	16.0
80	3	89.8	9.52	8.30	78.0	57.0	16.0
100	4	115.2	10.69	9.35	102.3	66.5	19.0

2000Lb

6	1/8	6.4	6.7	21	22
8	1/4	8.1	10.2	21	22
10	3/8	9.1	10.4	25	25
15	1/2	10.9	13.6	28	33
20	3/4	12.7	13.9	33	38
25	1	14.7	17.3	38	46
32	1-1/4	17.0	18.0	44	56
40	1-1/2	17.8	18.4	51	62
50	2	19.0	19.2	60	75
65	2-1/2	23.6	28.9	76	92
80	3	25.9	30.5	86	109
100	4	27.7	33.0	106	146

6000Lb

6	1/8	10.8	3.96	3.43	4.0	11.0	9.5
8	1/4	14.2	4.60	4.01	6.4	13.5	9.5
10	3/8	17.6	5.03	4.37	9.2	15.5	9.5
15	1/2	21.8	5.97	5.18	11.8	19.0	9.5
20	3/4	27.2	6.96	6.04	15.6	22.5	12.5
25	1	33.9	7.92	6.93	20.7	27.0	12.5
32	1-1/4	42.7	7.92	6.93	29.5	32.0	12.5
40	1-1/2	48.8	8.92	7.80	34.0	38.0	12.5
50	2	61.2	10.92	9.50	42.9	41.0	16.0

3000Lb

6	1/8	6.4	6.7	21	22
8	1/4	8.1	10.2	25	25
10	3/8	9.1	10.4	28	33
15	1/2	10.9	13.6	33	38
20	3/4	12.7	13.9	38	46
25	1	14.7	17.3	44	56
32	1-1/4	17.0	18.0	51	62
40	1-1/2	17.8	18.4	60	75
50	2	19.0	19.2	64	84
65	2-1/2	23.6	28.9	83	102
80	3	25.9	30.5	95	121
100	4	27.7	33.0	114	152

9000Lb

15	1/2	21.8	9.35	8.18	6.4	25.5	9.5
20	3/4	27.2	9.78	8.56	11.1	28.5	12.5
25	1	33.9	11.38	9.96	15.2	32.0	12.5
32	1-1/4	42.7	12.14	10.62	22.8	35.0	12.5
40	1-1/2	48.8	12.70	11.12	28.0	38.0	12.5
50	2	61.2	13.84	12.12	38.2	54.0	16.0

6000Lb

6	1/8	6.4	6.7	25	25
8	1/4	8.1	10.2	28	33
10	3/8	9.1	10.4	33	38
15	1/2	10.9	13.6	38	46
20	3/4	12.7	13.9	44	56
25	1	14.7	17.3	51	62
32	1-1/4	17.0	18.0	60	75
40	1-1/2	17.8	18.4	64	84
50	2	19.0	19.2	83	102
65	2-1/2	23.6	28.9	95	121
80	3	25.9	30.5	106	146
100	4	27.7	33.0	114	152

(1) Average of socket Wall Thickness around periphery shall be no less than listed values. The minimum values are permitted in localized areas.

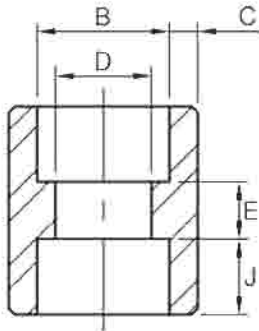
(2) Tolerance see page 16.

(2) Dimension B is minimum length of perfect thread. The length of useful thread (B plus threads with fully formed roots and flat crests) shall not be less than L2 (effective length of external thread) required by American National Standard for pipe threads (ANSI / ASME B1.20.1).



FULL COUPLING

ASME B16.11-2009 (Revision of ASME B16.11-2005)



Dimensions in Millimeters.

Socket Welding							
DN	Nom. Pipe Size	B ⁽²⁾	C ⁽¹⁾		D ⁽²⁾	E ⁽²⁾	J (Min)
			(Avg)	(Min)			

3000Lb

6	1/8	10.8	3.18	3.18	6.9	6.5	9.5
8	1/4	14.2	3.78	3.30	9.3	6.5	9.5
10	3/8	17.6	4.01	3.50	12.8	6.5	9.5
15	1/2	21.8	4.67	4.09	15.8	9.5	9.5
20	3/4	27.2	4.90	4.27	21.0	9.5	12.5
25	1	33.9	5.69	4.98	26.7	12.5	12.5
32	1-1/4	42.7	6.07	5.28	35.1	12.5	12.5
40	1-1/2	48.8	6.35	5.54	40.9	12.5	12.5
50	2	61.2	6.93	6.04	52.5	19.0	16.0
65	2-1/2	73.9	8.76	7.67	62.7	19.0	16.0
80	3	89.8	9.52	8.30	78.0	19.0	16.0
100	4	115.2	10.69	9.35	102.3	19.0	19.0

6000Lb

6	1/8	10.8	3.96	3.43	4.0	6.5	9.5
8	1/4	14.2	4.60	4.01	6.4	6.5	9.5
10	3/8	17.6	5.03	4.37	9.2	6.5	9.5
15	1/2	21.8	5.97	5.18	11.8	9.5	9.5
20	3/4	27.2	6.96	6.04	15.6	9.5	12.5
25	1	33.9	7.92	6.93	20.7	12.5	12.5
32	1-1/4	42.7	7.92	6.93	29.5	12.5	12.5
40	1-1/2	48.8	8.92	7.80	34.0	12.5	12.5
50	2	61.2	10.92	9.50	42.9	19.0	16.0

9000Lb

15	1/2	21.8	9.35	8.18	6.4	9.5	9.5
20	3/4	27.2	9.78	8.56	11.1	9.5	12.5
25	1	33.9	11.38	9.96	15.2	12.5	12.5
32	1-1/4	42.7	12.14	10.62	22.8	12.5	12.5
40	1-1/2	48.8	12.70	11.12	28.0	12.5	12.5
50	2	61.2	13.84	12.12	38.2	19.0	16.0

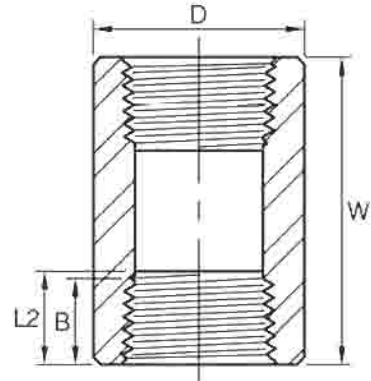
(1) Average of socket Wall Thickness around periphery shall be no less than listed values. The minimum values are permitted in localized areas.

(2) Tolerance see page 16.

(3) Reducer : "C, J, E" in accordance with large size.

"D" in accordance with small size.

The others in accordance with each size.



Dimensions in Millimeters.

Threaded					
DN	Nom. Pipe Size	Length of Thread. (Min)		W	D
		B ^(*)	L2 ^(*)		

3000Lb

6	1/8	6.4	6.7	32	16
8	1/4	8.1	10.2	35	19
10	3/8	9.1	10.4	38	22
15	1/2	10.9	13.6	48	28
20	3/4	12.7	13.9	51	35
25	1	14.7	17.3	60	44
32	1-1/4	17.0	18.0	67	57
40	1-1/2	17.8	18.4	79	64
50	2	19.0	19.2	86	76
65	2-1/2	23.6	28.9	92	92
80	3	25.9	30.5	108	108
100	4	27.7	33.0	121	140

6000Lb

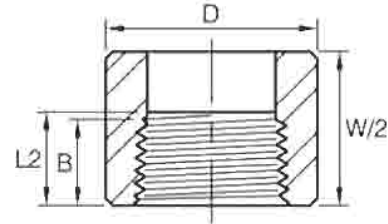
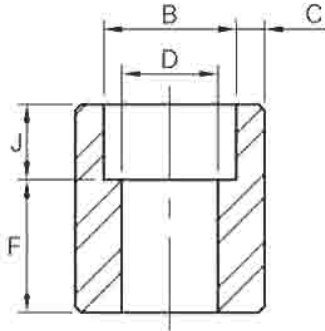
6	1/8	6.4	6.7	32	22
8	1/4	8.1	10.2	35	25
10	3/8	9.1	10.4	38	32
15	1/2	10.9	13.6	48	38
20	3/4	12.7	13.9	51	44
25	1	14.7	17.3	60	57
32	1-1/4	17.0	18.0	67	64
40	1-1/2	17.8	18.4	79	76
50	2	19.0	19.2	86	92
65	2-1/2	23.6	28.9	92	108
80	3	25.9	30.5	108	127
100	4	27.7	33.0	121	159

(*) Dimension B is minimum length of perfect thread. The length of useful thread (B plus threads with fully formed roots and flat crests) shall not be less than L2 (effective length of external thread) required by American National Standard for pipe threads (ANSI / ASME B1.20.1).



HALF COUPLING

ASME B16.11-2009(Revision of ASME B16.11-2005)



Dimensions in Millimeters.

DN	Nom. Pipe Size	Socket Welding					
		B ⁽²⁾	C ⁽¹⁾		D ⁽²⁾	F ⁽²⁾	J (Min)
			(Avg)	(Min)			

3000Lb							
6	1/8	10.8	3.18	3.18	6.9	16.0	9.5
8	1/4	14.2	3.78	3.30	9.3	16.0	9.5
10	3/8	17.6	4.01	3.50	12.6	17.5	9.5
15	1/2	21.8	4.67	4.09	15.8	22.5	9.5
20	3/4	27.2	4.90	4.27	21.0	24.0	12.5
25	1	33.9	5.69	4.98	26.7	28.5	12.5
32	1-1/4	42.7	6.07	5.28	35.1	30.0	12.5
40	1-1/2	48.8	6.35	5.54	40.9	32.0	12.5
50	2	61.2	6.93	6.04	52.5	41.0	16.0
65	2-1/2	73.9	8.76	7.67	62.7	43.0	16.0
80	3	89.8	9.52	8.30	78.0	44.5	16.0
100	4	115.2	10.69	9.35	102.3	48.0	19.0

6000Lb							
6	1/8	10.8	3.96	3.43	4.0	16.0	9.5
8	1/4	14.2	4.60	4.01	6.4	16.0	9.5
10	3/8	17.6	5.03	4.37	9.2	17.5	9.5
15	1/2	21.8	5.97	5.18	11.8	22.5	9.5
20	3/4	27.2	6.96	6.04	15.6	24.0	12.5
25	1	33.9	7.92	6.93	20.7	28.5	12.5
32	1-1/4	42.7	7.92	6.93	29.5	30.0	12.5
40	1-1/2	48.8	8.92	7.80	34.0	32.0	12.5
50	2	61.2	10.92	9.50	42.9	41.0	16.0

9000Lb							
15	1/2	21.8	9.35	8.18	6.4	22.5	9.5
20	3/4	27.2	9.78	8.56	11.1	24.0	12.5
25	1	33.9	11.38	9.96	15.2	28.5	12.5
32	1-1/4	42.7	12.14	10.62	22.8	30.0	12.5
40	1-1/2	48.8	12.70	11.12	28.0	32.0	12.5
50	2	61.2	13.84	12.12	38.2	41.0	16.0

- (1) Average of socket Wall Thickness around periphery shall be no less than listed values. The minimum values are permitted in localized areas.
- (2) Tolerance see page 16.

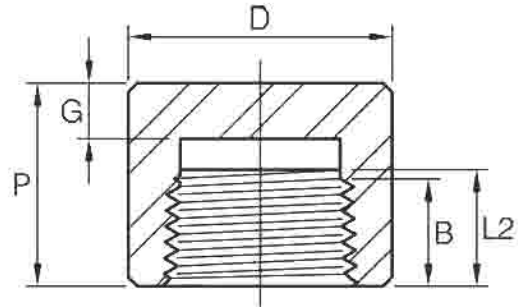
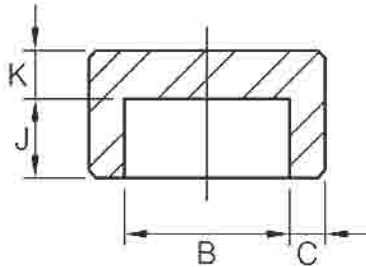
Dimensions in Millimeters.

DN	Nom. Pipe Size	Threaded			
		Length of Thread. (Min)		W	D
		B ^(*)	L2 ^(*)		

3000Lb					
6	1/8	6.4	6.7	32	16
8	1/4	8.1	10.2	35	19
10	3/8	9.1	10.4	38	22
15	1/2	10.9	13.6	48	28
20	3/4	12.7	13.9	51	35
25	1	14.7	17.3	60	44
32	1-1/4	17.0	18.0	67	57
40	1-1/2	17.8	18.4	79	64
50	2	19.0	19.2	86	76
65	2-1/2	23.6	28.9	92	92
80	3	25.9	30.5	108	108
100	4	27.7	33.0	121	140

6000Lb					
6	1/8	6.4	6.7	32	22
8	1/4	8.1	10.2	35	25
10	3/8	9.1	10.4	38	32
15	1/2	10.9	13.6	48	38
20	3/4	12.7	13.9	51	44
25	1	14.7	17.3	60	57
32	1-1/4	17.0	18.0	67	64
40	1-1/2	17.8	18.4	79	76
50	2	19.0	19.2	86	92
65	2-1/2	23.6	28.9	92	108
80	3	25.9	30.5	108	127
100	4	27.7	33.0	121	159

- (*) Dimension B is minimum length of perfect thread. The length of useful thread (B plus threads with fully formed roots and flat crests) shall not be less than L2 (effective length of external thread) required by American National Standard for pipe threads (ANSI / ASME B1.20.1).



Dimensions in Millimeters.

Dimensions in Millimeters.

Socket Welding						
DN	Nom. Pipe Size	B ⁽²⁾	C ⁽¹⁾		K (Min)	J (Min)
			(Avg)	(Min)		

Threaded						
DN	Nom. Pipe Size	Length of Thread. (Min)		P	D	G (Min)
		B ^(*)	L2 ^(*)			

3000Lb

6	1/8	10.8	3.18	3.18	4.8	9.5
8	1/4	14.2	3.78	3.30	4.8	9.5
10	3/8	17.6	4.01	3.50	4.8	9.5
15	1/2	21.8	4.67	4.09	6.4	9.5
20	3/4	27.2	4.90	4.27	6.4	12.5
25	1	33.9	5.69	4.98	9.6	12.5
32	1-1/4	42.7	6.07	5.28	9.6	12.5
40	1-1/2	48.8	6.35	5.54	11.2	12.5
50	2	61.2	6.93	6.04	12.7	16.0
65	2-1/2	73.9	8.76	7.67	15.7	16.0
80	3	89.8	9.52	8.30	19.0	16.0
100	4	115.2	10.69	9.35	22.4	19.0

3000Lb

6	1/8	6.4	6.7	19	16	4.8
8	1/4	8.1	10.2	25	19	4.8
10	3/8	9.1	10.4	25	22	4.8
15	1/2	10.9	13.6	32	28	6.4
20	3/4	12.7	13.9	37	35	6.4
25	1	14.7	17.3	41	44	9.7
32	1-1/4	17.0	18.0	44	57	9.7
40	1-1/2	17.8	18.4	44	64	11.2
50	2	19.0	19.2	48	76	12.7
65	2-1/2	23.6	28.9	60	92	15.7
80	3	25.9	30.5	65	108	19.0
100	4	27.7	33.0	68	140	22.4

6000Lb

6	1/8	10.8	3.96	3.43	6.4	9.5
8	1/4	14.2	4.60	4.01	6.4	9.5
10	3/8	17.6	5.03	4.37	6.4	9.5
15	1/2	21.8	5.97	5.18	7.9	9.5
20	3/4	27.2	6.96	6.04	7.9	12.5
25	1	33.9	7.92	6.93	11.2	12.5
32	1-1/4	42.7	7.92	6.93	11.2	12.5
40	1-1/2	48.8	8.92	7.80	12.7	12.5
50	2	61.2	10.92	9.50	15.7	16.0

6000Lb

8	1/4	8.1	10.2	27	25	6.4
10	3/8	9.1	10.4	27	32	6.4
15	1/2	10.9	13.6	33	38	7.9
20	3/4	12.7	13.9	38	44	7.9
25	1	14.7	17.3	43	57	11.2
32	1-1/4	17.0	18.0	46	64	11.2
40	1-1/2	17.8	18.4	48	76	12.7
50	2	19.0	19.2	51	92	15.7
65	2-1/2	23.6	28.9	64	108	19.0
80	3	25.9	30.5	68	127	22.4
100	4	27.7	33.0	75	159	28.4

9000Lb

15	1/2	21.8	9.35	8.18	11.2	9.5
20	3/4	27.2	9.78	8.56	12.7	12.5
25	1	33.9	11.38	9.96	14.2	12.5
32	1-1/4	42.7	12.14	10.62	14.2	12.5
40	1-1/2	48.8	12.70	11.12	15.7	12.5
50	2	61.2	13.84	12.12	19.0	16.0

(1) Average of socket Wall Thickness around periphery shall be no less than listed values. The minimum values are permitted in localized areas.

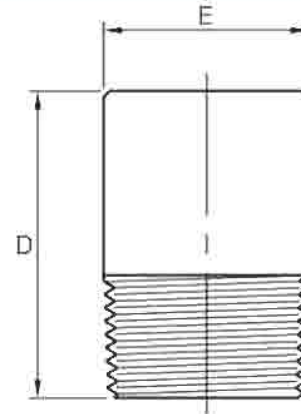
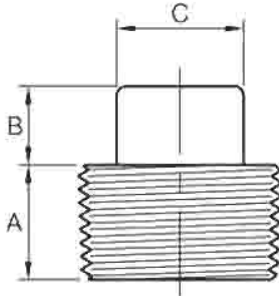
(2) Tolerance see page 16

(*) Dimension B is minimum length of perfect thread. The length of useful thread (B plus threads with fully formed roots and flat crests) shall not be less than L2 (effective length of external thread) required by American National Standard for pipe threads (ANSI / ASME B1.20.1).



SQUARE HEAD & ROUND HEAD PLUG

ASME B16.11-2009(Revision of ASME B16.11-2005)



Dimensions in Millimeters.

Dimensions in Millimeters.

Square Head Plug				
DN	Nom. Pipe Size	A (Min)	B (Min)	C (Min)
6	1/8	10	6	7
8	1/4	11	6	10
10	3/8	13	8	11
15	1/2	14	10	14
20	3/4	16	11	16
25	1	19	13	21
32	1-1/4	21	14	24
40	1-1/2	21	16	28
50	2	22	18	32
65	2-1/2	27	19	36
80	3	28	21	41
100	4	32	25	65

Round Head Plug			
DN	Nom. Pipe Size	E (Nom.)	D (Min)
6	1/8	10	35
8	1/4	14	41
10	3/8	18	41
15	1/2	21	44
20	3/4	27	44
25	1	33	51
32	1-1/4	43	51
40	1-1/2	48	51
50	2	60	64
65	2-1/2	73	70
80	3	89	70
100	4	114	76

DIMENSIONAL TOLERANCE OF ASME B16.11

ASME B16.11-2009

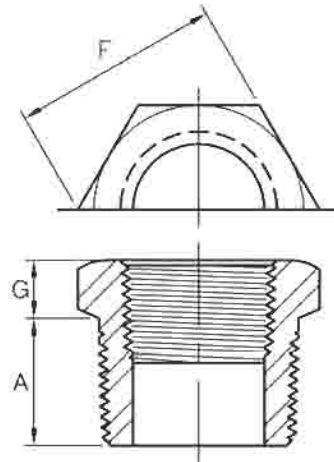
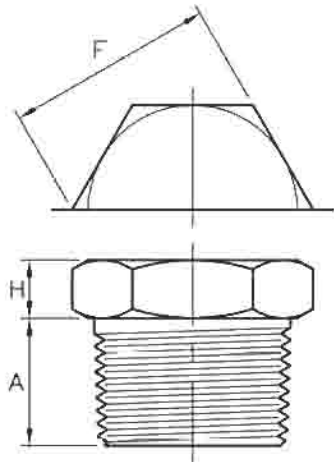
Unit: m / m

Item	Type of Pipe Fitting	Size				
		DN	6 to 8	10 to 20	25 to 50	65 to 100
		NPS	1/8 to 1/4	3/8 to 3/4	1 to 2	2-1/2 to 4
Bore diameter of socket (B)	All types of Pipe fittings	+0.4 -0	+0.4 -0	+0.4 -0	+0.5 -0	
Bore diameter of fitting (D)		±0.7	±0.7	±0.7	±1.4	
Concentricity of bore (X)		±0.8				
Coincidence of axes (Y)		1 / 200 Max				
Center to bottom of socket (A)	45° 90° Elbow Tee, Cross	±1.0	±1.5	±2.0	±2.5	
Bottom to bottom of socket (E)	Full Coupling	±1.5	±3.0	±4.0	±5.0	
Bottom to socket to opposite face (F)	Half Coupling	±1.0	±1.5	±2.0	±2.5	



HEX HEAD PLUG & BUSHING

ASME B16.11-2009 (Revision of ASME B16.11-2005)



Dimensions in Millimeters.

Hex Head Plug				
DN	Nom. Pipe Size	A (Min)	F (Nom.)	H (Min)
6	1/8	10	11	6
8	1/4	11	16	6
10	3/8	13	18	8
15	1/2	14	22	8
20	3/4	16	27	10
25	1	19	36	10
32	1-1/4	21	46	14
40	1-1/2	21	50	16
50	2	22	65	18
65	2-1/2	27	75	19
80	3	28	90	21
100	4	32	115	25

Dimensions in Millimeters.

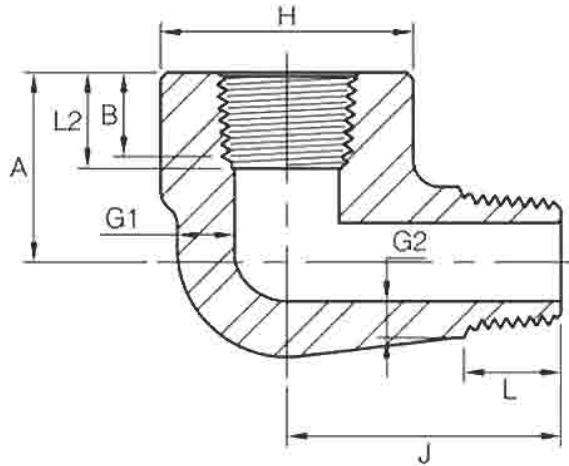
Hex Head Bushing				
DN	Nom. Pipe Size	A (Min)	F (Nom.)	G (Min)
8	1/4	11	16	3
10	3/8	13	18	4
15	1/2	14	22	5
20	3/4	16	27	6
25	1	19	36	6
32	1-1/4	21	46	7
40	1-1/2	21	50	8
50	2	22	65	9
65	2-1/2	27	75	10
80	3	28	90	10
100	4	32	115	13

(1) CAUTIONARY NOTE REGARDING HEX BUSHINGS.
Hex Head Bushings of one-size reduction should not be Used in services where they might be subject to harmful Loads and forces ther than internal pressures.



STREET ELBOW

ASME B16.11-2009(Revision of ASME B16.11-2005)



Dimensions in Millimeters.

DN	Nom. Pipe Size	H	A	J	G1 (Min)	G2 ⁽¹⁾ (Min)	B ⁽²⁾ (Min)	L2 ⁽²⁾ (Min)	L (Min)
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3000Lb

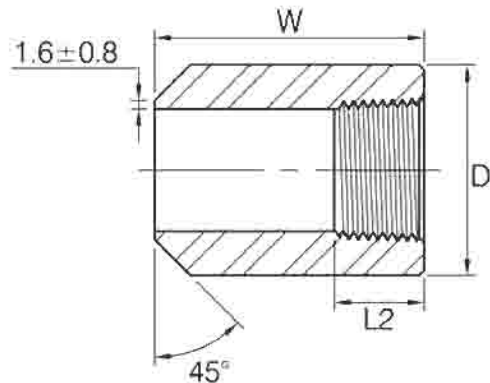
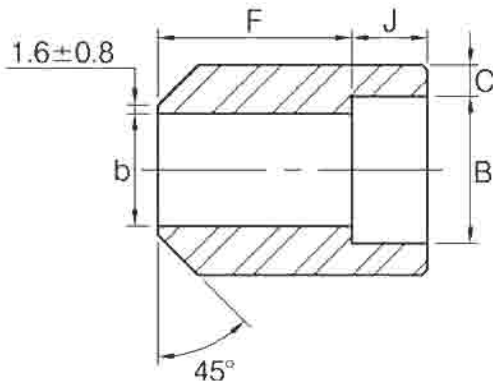
6	1/8	19	19	25	3.18	2.74	6.4	6.7	10.0
8	1/4	25	22	32	3.30	3.22	8.1	10.2	11.0
10	3/8	32	25	38	3.51	3.50	9.1	10.4	13.0
15	1/2	38	28	41	4.09	4.16	10.9	13.6	14.0
20	3/4	44	35	48	4.32	4.88	12.7	13.9	16.0
25	1	51	44	57	4.98	5.56	14.7	17.3	19.0
32	1-1/4	62	51	66	5.28	5.56	17.0	18.0	21.0
40	1-1/2	70	54	71	5.56	6.25	17.8	18.4	21.0
50	2	84	64	84	7.14	7.64	19.0	19.0	22.0

6000Lb

6	1/8	25	22	32	5.08	4.22	6.4	6.7	10.0
8	1/4	32	25	38	5.66	5.28	8.1	10.2	11.0
10	3/8	38	28	41	6.98	5.59	9.1	10.4	13.0
15	1/2	44	35	48	8.15	6.53	10.9	13.6	14.0
20	3/4	51	44	57	8.53	6.86	12.7	13.9	16.0
25	1	62	51	66	9.93	7.95	14.7	17.3	19.0
32	1-1/4	70	54	71	10.59	8.48	17.0	18.0	21.0
40	1-1/2	84	64	84	11.07	8.89	17.8	18.4	21.0
50	2	102	83	105	12.09	9.70	19.0	19.0	22.0

(1) Wall thickness before threading.

(2) Dimension B is minimum length of perfect thread. The length of useful thread (B plus threads with fully formed roots and flat crests) shall not be less than L2 (effective length of external thread) required by American National Standard for pipe threads (ANSI / ASME B1.20.1)



Dimensions in Millimeters.

Dimensions in Millimeters.

Socket weld						
Nom. Pipe Size	DN	B (Min)	b	J (Min)	F	C (Min)
3000Lb						
1/8	6	10.7	6.8	10.0	28.0	3.2
1/4	8	14.1	9.2	10.0	32.0	3.3
3/8	10	17.6	12.5	11.0	34.0	3.5
1/2	15	21.8	15.5	13.0	38.0	4.1
3/4	20	27.4	21.0	13.0	38.0	4.3
1	25	34.1	26.5	16.0	35.0	5.0
1-1/2	40	49.0	40.5	19.0	32.0	5.6
2	50	61.0	52.0	22.0	29.0	6.1
2-1/2	65	73.8	62.0	22.0	29.0	7.7
3	80	89.7	78.0	22.0	29.0	8.3
6000Lb						
1/2	15	21.8	11.8	13.0	38.0	5.2
3/4	20	27.4	15.5	13.0	38.0	6.1
1	25	34.1	20.7	16.0	35.0	7.0
1-1/2	40	49.0	34.0	19.0	32.0	7.8
2	50	61.0	43.0	22.0	29.0	9.5
2-1/2	65	73.8	54.0	22.0	29.0	10.4
3	80	89.7	66.0	22.0	29.0	12.2

Threaded				
Nom. Pipe Size	DN	D	W	L2 (Min)
3000Lb				
1/8	6	16.0	38.0	6.70
1/4	8	19.0	41.0	10.21
3/8	10	22.0	45.0	10.36
1/2	15	29.0	51.0	13.56
3/4	20	35.0	51.0	13.86
1	25	45.0	51.0	17.34
1-1/2	40	64.0	51.0	18.38
2	50	76.0	51.0	19.22
2-1/2	65	95.0	51.0	28.89
3	80	110.0	57.0	30.48
4	100	140.0	64.0	33.02
6000Lb				
1/8	6	22.0	38.0	6.70
1/4	8	26.0	41.0	10.21
3/8	10	32.0	45.0	10.36
1/2	15	38.0	51.0	13.56
3/4	20	45.0	51.0	13.86
1	25	60.0	51.0	17.34
1-1/2	40	76.0	51.0	18.38
2	50	95.0	51.0	19.22

DIMENSIONAL TOLERANCE OF BS3799

BS3799-1974

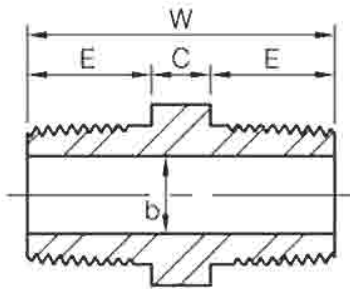
Unit: m / m

Item	Type of pipe fitting	DN	6~8	10~20	25~50	65~80
		NPS	1/8"~1/4"	3/8"~3/4"	1"~2"	2-1/2"~3"
Concentricity of bore (X)	All fittings	±0.8				
Coincidence of axes (Y)		1 / 200 Max				
Bore diameter of fitting (b)	Boss & Hex Nipple	±0.4				±0.8
Bottom of socket to opposite face	Boss	±0.8	±1.5	±2.0	±2.5	

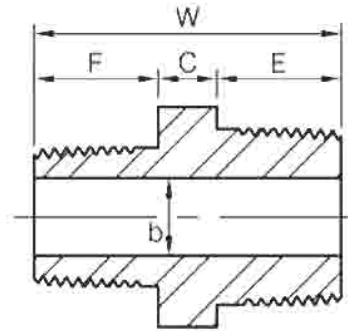
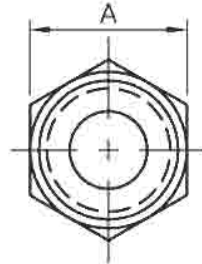


HEX NIPPLE

BS3799-1974



FULL SIZE



REDUCING SIZE

Dimensions in Millimeters.

Nominal Size				A (Min)	W (Min)	E (Min)	b ⁽¹⁾		C (Min)	F (Min)
Equal		Reducing					3M ⁽²⁾	6M ⁽²⁾		
In	DN	In	DN							
1/8	(6)	—	—	11	26	10	5	2	6	—
1/4	(8)	—	—	15	36	15	8	6	6	—
—	—	1/4 x 1/8	(8 x 6)	15	31	15	5	2	6	10
3/8	(10)	—	—	18	40	16	11	8	8	—
—	—	3/8 x 1/4	(10 x 8)	18	39	16	8	6	8	15
1/2	(15)	—	—	22	48	20	14	11	8	—
—	—	1/2 x 3/8	(15 x 10)	22	44	20	11	8	8	16
—	—	1/2 x 1/4	(15 x 8)	22	43	20	8	6	8	15
3/4	(20)	—	—	27	52	21	19	13	10	—
—	—	3/4 x 1/2	(20 x 15)	27	50	21	14	11	9	20
—	—	3/4 x 3/8	(20 x 10)	27	46	21	11	8	9	16
1	(25)	—	—	35	60	25	24	17	10	—
—	—	1 x 3/4	(25 x 20)	35	56	25	19	13	10	21
—	—	1 x 1/2	(25 x 15)	35	55	25	14	11	10	20
1-1/2	(40)	—	—	50	68	26	38	30	16	—
—	—	1-1/2 x 1	(40 x 25)	50	67	26	24	17	16	25
—	—	1-1/2 x 3/4	(40 x 20)	50	63	26	19	13	16	21
—	—	1-1/2 x 1/2	(40 x 15)	50	62	26	14	11	16	20
2	(50)	—	—	62	71	27	49	39	17	—
—	—	2 x 1-1/2	(50 x 40)	62	70	27	38	30	17	26
—	—	2 x 1	(50 x 25)	62	70	27	24	17	18	25
—	—	2 x 3/4	(50 x 20)	62	65	27	19	13	17	21
—	—	2 x 1/2	(50 x 15)	62	65	27	14	11	18	20

(1) Tolerance See page 19.

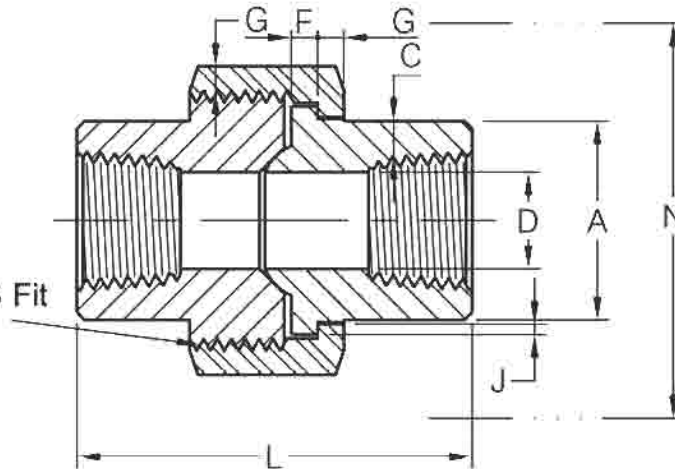
(2) 3M & 6M Symbols denote 3000 & 6000 Classes.



THREADED END UNION

MSS SP-83-2006

H-Thrd's
Minimum 4 Full Thrd's
Engagement Class 2A/2B Fit
ANSI B1.1



3000#

Dimensions in Millimeters.

Nom. Pipe Size	Pipe End (Min) A	Wall (Min) C	Water Way Bore $D^{(1)}$	Male Flange (Min) F	Nut (Min) G	Thrds. Per 25.4mm H	Bearing (Min) J	Length Assem. Nom. L	Clear Assem. Nut N
1/8	14.7	2.41	8.43 6.43	3.18	3.18	16	1.24	41.4	50.8
1/4	19.0	3.02	11.13 9.45	3.18	3.18	16	1.24	41.4	50.8
3/8	22.9	3.20	14.27 13.51	3.43	3.43	14	1.37	46.0	55.9
1/2	27.7	3.73	17.86 17.07	3.68	3.68	14	1.50	49.0	58.4
3/4	33.5	3.91	23.01 21.39	4.06	4.06	11	1.68	56.9	66.0
1	41.4	4.55	28.98 27.74	4.57	4.45	11	1.85	62.0	78.7
1-1/4	50.5	4.85	37.69 35.36	5.33	5.21	10	2.13	71.1	94.0
1-1/2	57.2	5.08	43.54 41.20	5.84	5.59	10	2.31	76.5	111.8
2	70.1	5.54	55.58 52.12	6.60	6.35	10	2.69	86.1	132.1
2-1/2	85.3	7.01	66.27 64.31	7.49	7.11	8	3.07	102.4	149.9
3	102.4	7.62	88.25 77.27	8.26	8.00	8	3.53	109.0	175.3

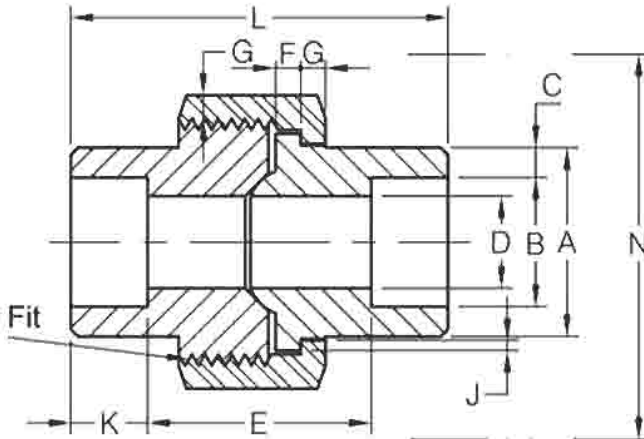
(1) Upper and lower values for each size are the respective maximum and minimum dimensions.



SOCKET WELD END UNION

MSS SP-83-2006

H-Thrd's
Minimum 4 Full Thrd's
Engagement Class 2A/2B Fit
ANSI B1.1



3000#

Dimensions in Millimeters.

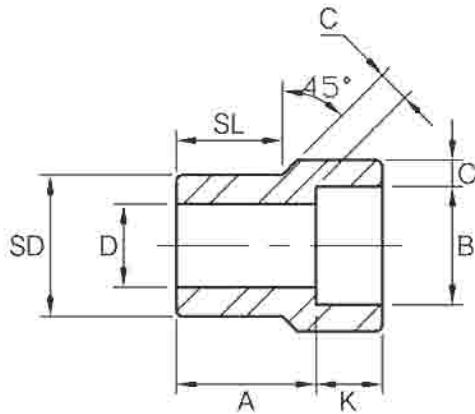
Nom. Pipe Size	Pipe End (Min) A	Socket Bore Dia. (Min) B ⁽¹⁾	Socket Wall (Min) C	Water Way Bore D ⁽¹⁾	Laying Length E ⁽¹⁾	Male Flange (Min) F	Nut (Min) G	Thrds. Per 25.4mm H	Beaming (Min) J	Depth of Socket (Min) K	Length Assem. Nom. L	Clear Assem. Nut N
1/8	21.8	11.18 10.67	3.18	7.59 6.07	22.4 19.1	3.18	3.18	16	1.24	9.7	41.4	50.8
1/4	21.8	14.61 14.10	3.30	10.01 8.48	22.4 19.1	3.18	3.18	16	1.24	9.7	41.4	50.8
3/8	25.9	18.03 17.53	3.51	13.28 11.76	26.9 20.6	3.43	3.43	14	1.37	9.7	46.0	55.9
1/2	31.2	22.23 21.72	4.09	16.56 15.04	26.9 20.6	3.68	3.68	14	1.50	9.7	49.0	58.4
3/4	37.1	27.56 27.05	4.27	21.69 20.17	31.8 25.4	4.06	4.06	11	1.68	12.7	56.9	66.0
1	45.5	34.29 33.78	4.98	27.41 25.88	34.3 26.2	4.57	4.45	11	1.85	12.7	62.0	78.7
1-1/4	54.9	43.05 42.55	5.28	35.81 34.29	40.6 32.5	5.33	5.21	10	2.13	12.7	71.1	94.0
1-1/2	61.5	49.15 48.64	5.54	41.66 40.13	42.2 34.0	5.84	5.59	10	2.31	12.7	76.5	111.8
2	75.2	61.62 61.11	6.05	53.26 51.74	45.5 37.3	6.60	6.35	10	2.69	15.7	86.1	132.1
2-1/2	91.7	74.45 73.81	7.67	64.24 61.19	61.7 52.1	7.49	7.11	8	3.07	15.7	102.4	149.9
3	109.2	90.42 89.79	8.31	79.45 76.40	63.8 53.6	8.26	8.00	8	3.53	15.7	109.0	175.3

(1) Upper and lower values for each size are the respective maximum and minimum dimensions.

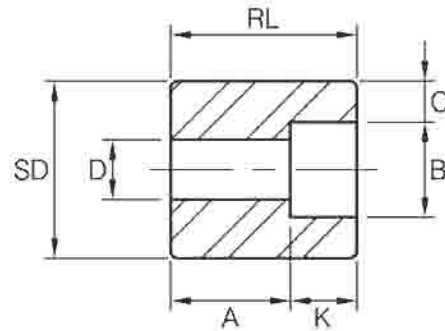


REDUCER INSERT

MSS SP-79-2004



TYPE 1



TYPE 2 ⁽¹⁾

Dimensions in Millimeters.

Nom. Pipe Size	Type ⁽²⁾		Socket		Shank Dia. SD	Laying Length A		Bore D		Wall (Min) C		Length			
	3M	6M	Dia. B	Depth (Min) K		3M	6M	3M	6M	3M	6M	SL		RL (Min)	
					3M							6M	3M	6M	
3/8 × 1/4	1	1	14.35	10	17.15	19	21	9.0	6.5	3.78	4.60	14	16	—	—
1/2 × 3/8	1	1	17.78	10	21.34	21	23	12.5	9.0	4.01	5.03	16	16	—	—
1/2 × 1/4	1	1	14.35	10	21.34	21	21	9.0	6.5	3.78	4.60	16	16	—	—
3/4 × 1/2	1	1	21.97	10	26.67	22	25	16.0	12.0	4.67	5.97	17	19	—	—
3/4 × 3/8	2	1	17.78	10	26.67	16	22	12.5	9.0	4.01	5.03	—	19	27	—
3/4 × 1/4	2	2	14.35	10	26.67	18	22	9.0	6.5	3.78	4.60	—	—	27	32
1 × 3/4	1	1	27.31	13	33.40	24	28	21.0	15.5	4.90	6.96	19	21	—	—
1 × 1/2	2	1	21.97	10	33.40	16	28	16.0	12.0	4.67	5.97	—	21	28	—
1 × 3/8	2	2	17.78	10	33.40	18	22	12.5	9.0	4.01	5.03	—	—	28	33
1 × 1/4	2	2	14.35	10	33.40	19	24	9.0	6.5	3.78	4.60	—	—	28	33
1-1/4 × 1	1	1	34.04	13	42.16	25	30	26.5	20.5	5.69	7.92	21	22	—	—
1-1/4 × 3/4	2	2	27.31	13	42.16	18	21	21.0	15.5	4.90	6.96	—	—	32	35
1-1/4 × 1/2	2	2	21.97	10	42.16	19	22	16.0	12.0	4.67	5.97	—	—	32	35
1-1/4 × 3/8	2	2	17.78	10	42.16	21	24	12.5	9.0	4.01	5.03	—	—	32	35
1-1/4 × 1/4	2	2	14.35	10	42.16	22	25	9.0	6.5	3.78	4.60	—	—	32	35
1-1/2 × 1-1/4	1	1	42.80	13	48.26	28	35	35.0	29.5	6.07	7.92	22	25	—	—
1-1/2 × 1	2	1	34.04	13	48.26	18	29	26.5	20.5	5.69	7.92	—	25	33	—
1-1/2 × 3/4	2	2	27.31	13	48.26	19	25	21.0	15.5	4.90	6.96	—	—	33	40
1-1/2 × 1/2	2	2	21.97	10	48.26	21	27	16.0	12.0	4.67	5.97	—	—	33	40
1-1/2 × 3/8	2	2	17.78	10	48.26	22	28	12.5	9.0	4.01	5.03	—	—	33	40
2 × 1-1/2	1	1	48.90	13	60.33	32	39	41.0	34.0	6.35	8.92	25	28	—	—
2 × 1-1/4	2	2	42.80	13	60.33	21	24	35.0	29.5	6.07	7.92	—	—	38	41
2 × 1	2	2	34.04	13	60.33	22	25	26.5	21.0	5.69	7.92	—	—	38	41
2 × 3/4	2	2	27.31	13	60.33	24	27	21.0	15.5	4.90	6.96	—	—	38	41
2 × 1/2	2	2	21.97	10	60.33	25	28	16.0	12.0	4.67	5.97	—	—	38	41

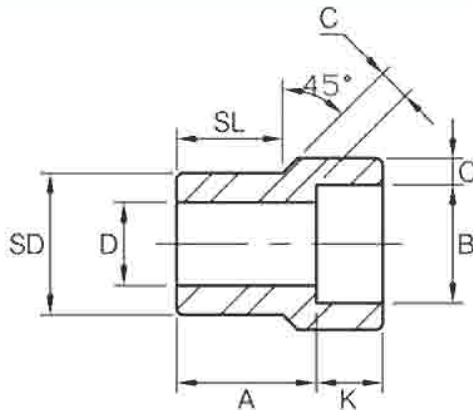
(1) At the option of the manufacturer Type 2 Reducers may be furnished in Type 1 configuration.

(2) 3M & 6M symbols denote 3000 and 6000 classes.

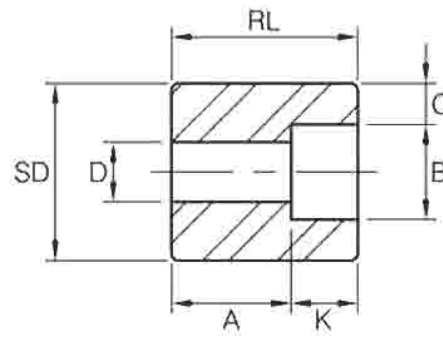


REDUCER INSERT

MSS SP-79-2004



TYPE 1



TYPE 2 ⁽¹⁾

(Continued)

Dimensions in Millimeters.

Nom. Pipe Size	Type ⁽²⁾		Socket		Shank Dia. SD	Laying Length A		Bore D		Wall (Min) C		Length			
	3M	6M	Dia. B	Depth (Min) K		3M	6M	3M	6M	3M	6M	SL		RL (Min)	
												3M	6M	3M	6M
2-1/2 × 2	1	1	61.37	16	73.02	46	43	52.5	43.0	6.93	10.92	32	38	—	—
2-1/2 × 1-1/2	2	2	48.90	13	73.02	35	35	41.0	34.0	6.35	8.92	—	—	54	54
2-1/2 × 1-1/4	2	2	42.80	13	73.02	37	37	35.0	29.5	6.07	7.92	—	—	54	54
2-1/2 × 1	2	2	34.04	13	73.02	38	38	26.5	20.5	5.69	7.92	—	—	54	54
2-1/2 × 3/4	2	2	27.31	13	73.02	40	38	21.0	15.5	4.90	6.96	—	—	54	54
3 × 2-1/2	1	1	74.07	16	88.90	38	57	62.5	54.0	8.76	11.91	32	44	—	—
3 × 2	2	2	61.37	16	88.90	25	32	52.5	43.0	6.93	10.92	—	—	48	54
3 × 1-1/2	2	2	48.90	13	88.90	28	32	41.0	34.0	6.35	8.92	—	—	48	54
3 × 1-1/4	2	2	42.80	13	88.90	30	32	35.0	29.5	6.07	7.92	—	—	48	54
3 × 1	2	2	34.04	13	88.90	32	32	26.5	20.5	5.69	7.92	—	—	48	54
4 × 3	2	—	90.04	16	114.30	33	—	78.0	—	9.5	—	—	—	60	—
4 × 2-1/2	2	—	74.07	16	114.30	38	—	62.5	—	8.76	—	—	—	60	—
4 × 2	2	—	61.37	16	114.30	38	—	52.5	—	6.93	—	—	—	60	—
4 × 1-1/2	2	—	48.90	13	114.30	42	—	41.0	—	6.35	—	—	—	60	—
4 × 1-1/4	2	—	42.80	13	114.30	43	—	35.0	—	6.07	—	—	—	60	—

(1) At the option of the manufacturer Type 2 Reducers may be furnished in Type 1 configuration.

(2) 3M & 6M symbols denote 3000 and 6000 classes.

DIMENSIONAL TOLERANCES OF REDUCER INSERT

MSS SP-79-2004

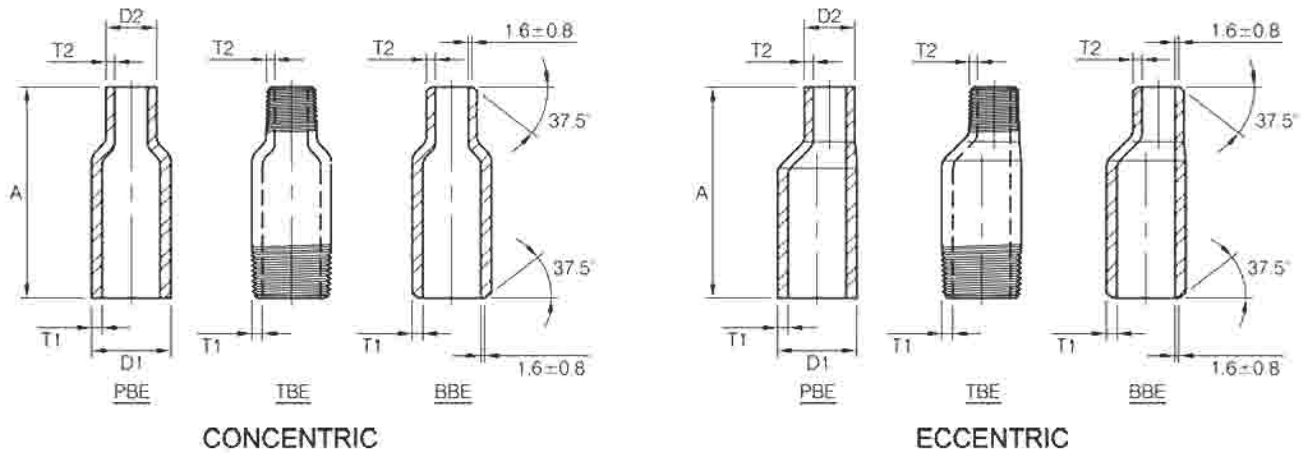
Unit : m/m

	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
Laying Length (A)	×		+1.5 -0			+2.0 -0				+2.5 -0	
Socket Dia (B)										+0.4 -0.25	×
Bore (D)										±1.5	×
Shank Dia (SD)	×									±0.50	±0.75
Shank Length (SL)	×		+0 -1.5			+0 -2.0				+0 -0.25	



SWAGED NIPPLE

MSS SP-95-2006



Dimensions in Millimeters.

Nom. Pipe Size	Outside Diameter		End to End "A"	Wall Thickness							
	Large End D1	Small End D2		T1				T2			
				Sch40 (STD)	Sch80 (XS)	Sch160	XXS	Sch40 (STD)	Sch80 (XS)	Sch160	XXS
1/4 x 1/8	13.7	10.3	57	2.2	3.0	3.7	6.1	1.7	2.4	—	—
3/8 x 1/8	17.1	10.3	64	2.3	3.2	4.0	6.4	1.7	2.4	—	—
3/8 x 1/4	17.1	13.7	64	2.3	3.2	4.0	6.4	2.2	3.0	—	—
1/2 x 1/8	21.3	10.3	70	2.8	3.7	4.8	7.5	1.7	2.4	—	—
1/2 x 1/4	21.3	13.7	70	2.8	3.7	4.8	7.5	2.2	3.0	—	—
1/2 x 3/8	21.3	17.1	70	2.8	3.7	4.8	7.5	2.3	3.2	—	—
3/4 x 1/8	26.7	10.3	76	2.9	3.9	5.6	7.8	1.7	2.4	—	—
3/4 x 1/4	26.7	13.7	76	2.9	3.9	5.6	7.8	2.2	3.0	—	—
3/4 x 3/8	26.7	17.1	76	2.9	3.9	5.6	7.8	2.3	3.2	—	—
3/4 x 1/2	26.7	21.3	76	2.9	3.9	5.6	7.8	2.8	3.7	4.8	7.5
1 x 1/8	33.4	10.3	89	3.4	4.5	6.4	9.1	1.7	2.4	—	—
1 x 1/4	33.4	13.7	89	3.4	4.5	6.4	9.1	2.2	3.0	—	—
1 x 3/8	33.4	17.1	89	3.4	4.5	6.4	9.1	2.3	3.2	—	—
1 x 1/2	33.4	21.3	89	3.4	4.5	6.4	9.1	2.8	3.7	4.8	7.5
1 x 3/4	33.4	26.7	89	3.4	4.5	6.4	9.1	2.9	3.9	5.6	7.8
1-1/4 x 1/8	42.2	10.3	102	3.6	4.9	6.4	9.7	1.7	2.4	—	—
1-1/4 x 1/4	42.2	13.7	102	3.6	4.9	6.4	9.7	2.2	3.0	—	—
1-1/4 x 3/8	42.2	17.1	102	3.6	4.9	6.4	9.7	2.3	3.2	—	—
1-1/4 x 1/2	42.2	21.3	102	3.6	4.9	6.4	9.7	2.8	3.7	4.8	7.5
1-1/4 x 3/4	42.2	26.7	102	3.6	4.9	6.4	9.7	2.9	3.9	5.6	7.8
1-1/4 x 1	42.2	33.4	102	3.6	4.9	6.4	9.7	3.4	4.5	6.4	9.1
1-1/2 x 1/8	48.3	10.3	114	3.7	5.1	7.1	10.2	1.7	2.4	—	—
1-1/2 x 1/4	48.3	13.7	114	3.7	5.1	7.1	10.2	2.2	3.0	—	—
1-1/2 x 3/8	48.3	17.1	114	3.7	5.1	7.1	10.2	2.3	3.2	—	—
1-1/2 x 1/2	48.3	21.3	114	3.7	5.1	7.1	10.2	2.8	3.7	4.8	7.5
1-1/2 x 3/4	48.3	26.7	114	3.7	5.1	7.1	10.2	2.9	3.9	5.6	7.8
1-1/2 x 1	48.3	33.4	114	3.7	5.1	7.1	10.2	3.4	4.5	6.4	9.1
1-1/2 x 1-1/4	48.3	42.2	114	3.7	5.1	7.1	10.2	3.6	4.9	6.4	9.7
2 x 1/8	60.3	10.3	165	3.9	5.5	8.7	11.1	1.7	2.4	—	—
2 x 1/4	60.3	13.7	165	3.9	5.5	8.7	11.1	2.2	3.0	—	—
2 x 3/8	60.3	17.1	165	3.9	5.5	8.7	11.1	2.3	3.2	—	—
2 x 1/2	60.3	21.3	165	3.9	5.5	8.7	11.1	2.8	3.7	4.8	7.5
2 x 3/4	60.3	26.7	165	3.9	5.5	8.7	11.1	2.9	3.9	5.6	7.8
2 x 1	60.3	33.4	165	3.9	5.5	8.7	11.1	3.4	4.5	6.4	9.1
2 x 1-1/4	60.3	42.2	165	3.9	5.5	8.7	11.1	3.6	4.9	6.4	9.7
2 x 1-1/2	60.3	48.3	165	3.9	5.5	8.7	11.1	3.7	5.1	7.1	10.2
2-1/2 x 1/8	73.0	10.3	178	5.2	7.0	9.5	14.0	1.7	2.4	—	—
2-1/2 x 1/4	73.0	13.7	178	5.2	7.0	9.5	14.0	2.2	3.0	—	—
2-1/2 x 3/8	73.0	17.1	178	5.2	7.0	9.5	14.0	2.3	3.2	—	—
2-1/2 x 1/2	73.0	21.3	178	5.2	7.0	9.5	14.0	2.8	3.7	4.8	7.5
2-1/2 x 3/4	73.0	26.7	178	5.2	7.0	9.5	14.0	2.9	3.9	5.6	7.8
2-1/2 x 1	73.0	33.4	178	5.2	7.0	9.5	14.0	3.4	4.5	6.4	9.1



SWAGED NIPPLE

MSS SP-95-2006

(Continued)

Dimensions in Millimeters.

Nom. Pipe Size	Outside Diameter		End to End "A"	Wall Thickness							
	Large End D1	Small End D2		T1				T2			
				Sch40 (STD)	Sch80 (XS)	Sch160	XXS	Sch40 (STD)	Sch80 (XS)	Sch160	XXS
2-1/2 X 1-1/4	73.0	42.2	178	5.2	7.0	9.5	14.0	3.6	4.9	6.4	9.7
2-1/2 X 1-1/2	73.0	48.3	178	5.2	7.0	9.5	14.0	3.7	5.1	7.1	10.2
2-1/2 X 2	73.0	60.3	178	5.2	7.0	9.5	14.0	3.9	5.5	8.7	11.1
3 X 1/8	88.9	10.3	203	5.5	7.6	11.1	15.2	1.7	2.4	—	—
3 X 1/4	88.9	13.7	203	5.5	7.6	11.1	15.2	2.2	3.0	—	—
3 X 3/8	88.9	17.1	203	5.5	7.6	11.1	15.2	2.3	3.2	—	—
3 X 1/2	88.9	21.3	203	5.5	7.6	11.1	15.2	2.8	3.7	4.8	7.5
3 X 3/4	88.9	26.7	203	5.5	7.6	11.1	15.2	2.9	3.9	5.6	7.8
3 X 1	88.9	33.4	203	5.5	7.6	11.1	15.2	3.4	4.5	6.4	9.1
3 X 1-1/4	88.9	42.2	203	5.5	7.6	11.1	15.2	3.6	4.9	6.4	9.7
3 X 1-1/2	88.9	48.3	203	5.5	7.6	11.1	15.2	3.7	5.1	7.1	10.2
3 X 2	88.9	60.3	203	5.5	7.6	11.1	15.2	3.9	5.5	8.7	11.1
3 X 2-1/2	88.9	73.0	203	5.5	7.6	11.1	15.2	5.2	7.0	9.5	14.0
3-1/2 X 1/8	101.6	10.3	203	5.7	8.1	—	—	1.7	2.4	—	—
3-1/2 X 1/4	101.6	13.7	203	5.7	8.1	—	—	2.2	3.0	—	—
3-1/2 X 3/8	101.6	17.1	203	5.7	8.1	—	—	2.3	3.2	—	—
3-1/2 X 1/2	101.6	21.3	203	5.7	8.1	—	—	2.8	3.7	4.8	7.5
3-1/2 X 3/4	101.6	26.7	203	5.7	8.1	—	—	2.9	3.9	5.6	7.8
3-1/2 X 1	101.6	33.4	203	5.7	8.1	—	—	3.4	4.5	6.4	9.1
3-1/2 X 1-1/4	101.6	42.2	203	5.7	8.1	—	—	3.6	4.9	6.4	9.7
3-1/2 X 1-1/2	101.6	48.3	203	5.7	8.1	—	—	3.7	5.1	7.1	10.2
3-1/2 X 2	101.6	60.3	203	5.7	8.1	—	—	3.9	5.5	8.7	11.1
3-1/2 X 2-1/2	101.6	73.0	203	5.7	8.1	—	—	5.2	7.0	9.5	14.0
3-1/2 X 3	101.6	88.9	203	5.7	8.1	—	—	5.5	7.6	11.1	15.2
4 X 1/4	114.3	13.7	229	6.0	8.6	13.5	17.1	2.2	3.0	—	—
4 X 3/8	114.3	17.1	229	6.0	8.6	13.5	17.1	2.3	3.2	—	—
4 X 1/2	114.3	21.3	229	6.0	8.6	13.5	17.1	2.8	3.7	4.8	7.5
4 X 3/4	114.3	26.7	229	6.0	8.6	13.5	17.1	2.9	3.9	5.6	7.8
4 X 1	114.3	33.4	229	6.0	8.6	13.5	17.1	3.4	4.5	6.4	9.1
4 X 1-1/4	114.3	42.2	229	6.0	8.6	13.5	17.1	3.6	4.9	6.4	9.7
4 X 1-1/2	114.3	48.3	229	6.0	8.6	13.5	17.1	3.7	5.1	7.1	10.2
4 X 2	114.3	60.3	229	6.0	8.6	13.5	17.1	3.9	5.5	8.7	11.1
4 X 2-1/2	114.3	73.0	229	6.0	8.6	13.5	17.1	5.2	7.0	9.5	14.0
4 X 3	114.3	88.9	229	6.0	8.6	13.5	17.1	5.5	7.6	11.1	15.2
4 X 3-1/2	114.3	101.6	229	6.0	8.6	13.5	17.1	5.7	8.1	—	—

(1) Wall Thickness (T1, T2) In Accordance with ASME B36.10M.

PBE: PLAIN BOTH ENDS
PSE: PLAIN SMALL END
PLE: PLAIN LARGE END

BBE: BEVEL BOTH ENDS
BSE: BEVEL SMALL END
BLE: BEVEL LARGE END

TBE: THREAD BOTH ENDS
TSE: THREAD SMALL END
TLE: THREAD LARGE END

DIMENSIONAL TOLERANCES OF SWAGED NIPPLES

MSS SP-95-2006

Unit : m/m

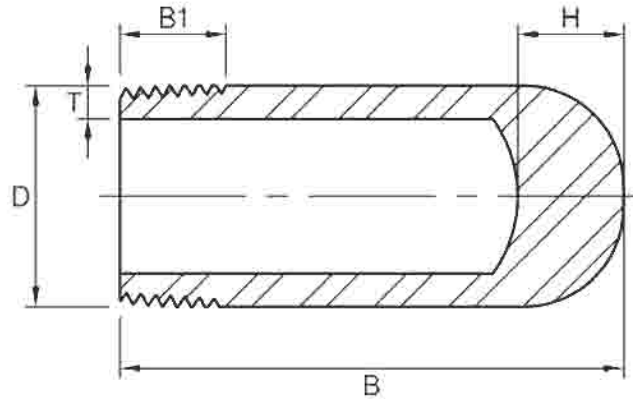
Nominal Pipe Size (Inch)	Overall Length	Outside Diameter at End		Fitting Wall Thickness (see Note 1)
		Square Cut Ends	Other End Connections	
1/8~3/8	±1.5	+0.4 -0.8	±0.8	Not less than 87.5% of Nominal Wall Thickness
1/2~1-1/2	±1.5	+0.4 -0.8	+1.5 -0.8	
2~2-1/2	±3.0	±0.8	+1.5 -0.8	
3~4	±3.0	±0.8	±1.5	

Note 1 : Prior to threading or grooving



BULL PLUG

MSS SP-95-2006



Dimensions in Millimeters.

Nom. Pipe Size	D	B	B1	T (Min)				H
				Sch 40/STD	Sch 80/XS (3M)	Sch160 (6M)	XXS	
1/8	10.3	51	9.5	1.73	2.41	—	—	14
1/4	13.7	51	11.0	2.24	3.02	—	—	14
3/8	17.1	57	12.5	2.31	3.20	—	—	14
1/2	21.3	64	14.5	2.77	3.73	4.78	7.47	14
3/4	26.7	70	16.0	2.87	3.91	5.56	7.82	18
1	33.4	76	19.0	3.38	4.55	6.35	9.09	18
1-1/4	42.2	83	20.5	3.56	4.85	6.35	9.70	18
1-1/2	48.3	89	20.5	3.68	5.08	7.14	10.15	18
2	60.3	102	22.0	3.91	5.54	8.74	11.07	20
2-1/2	73.0	127	27.0	5.16	7.01	9.53	14.02	20
3	88.9	152	28.5	5.49	7.62	11.13	15.24	20
4	114.3	178	32.0	6.02	8.56	13.49	17.12	20

(1) Thread in Accordance with ASME B1.20.1

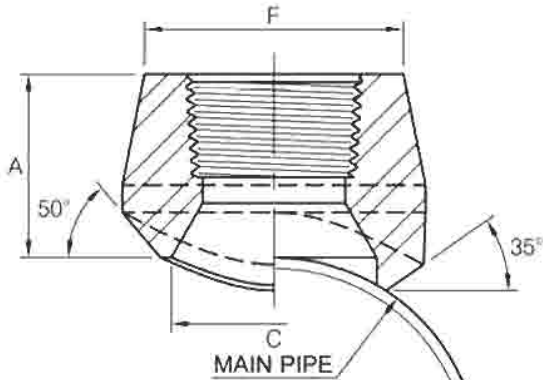
(2) Wall Thickness (T Min.) in Accordance with ASME B36.10M



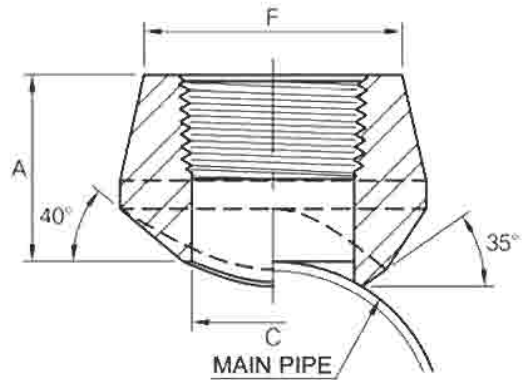
THREADED END BRANCH OUTLET

REDUCING SIZE

MSS SP-97-2006



REDUCING WAY



STRAIGHT WAY

Dimensions in Millimeters.

Reducing way			
OutLet Pipe (in)	A	C	F

3000Lb (XS)			
1/8	19.0	13.7	17.3
1/4	19.0	13.7	22.0
3/8	21.0	17.1	25.9
1/2	25.0	21.3	31.4
3/4	27.0	26.7	37.1
1	33.0	33.4	45.5
1-1/4	33.0	42.2	57.0
1-1/2	35.0	48.3	64.0
2	38.0	60.3	76.0
2-1/2	46.0	73.0	92.0
3	51.0	88.9	109.2
4	57.0	114.3	140.0

6000Lb (S160)			
1/2	32.0	16.6	33.9
3/4	37.0	21.2	41.2
1	40.0	27.0	49.9
1-1/4	41.0	35.8	58.6
1-1/2	43.0	41.2	66.7
2	52.0	51.6	83.2

Dimensions in Millimeters.

Straight way			
OutLet Pipe (in)	A	C	F

3000Lb			
1/4	19.0	11.5	22.0
3/8	21.0	14.5	25.9
1/2	25.0	16.5	31.4
3/4	27.0	21.5	37.1
1	33.0	27.2	45.5
1-1/4	33.0	36.0	57.0
1-1/2	35.0	42.0	64.0
2	38.0	53.0	76.0
2-1/2	46.0	65.0	92.0
3	51.0	80.0	109.2
4	57.0	104.0	140.0

(1) Thread in Accordance with ASME B1.20.1

DIMENSIONAL TOLERANCE

MSS SP-97-2006

Unit : m/m

Item	1/8"~3/4"	1"~4"
Face of fitting to Crotch (A)	±0.76	±1.52

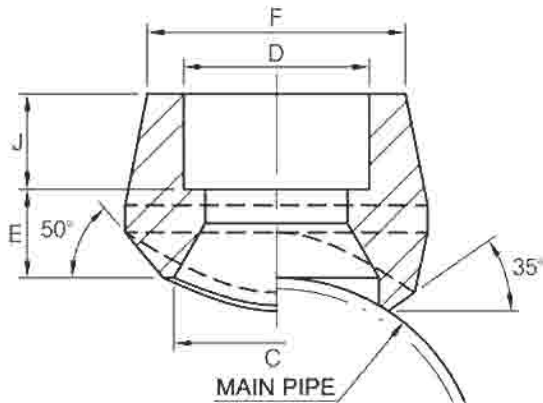
- (1) Thread in Accordance with ASME B1.20.1 .
 (2) 3000LB outlet size 4 and less fit a number of run pipe sizes and the fitting are marked accordingly.
 See page 32 for conventional run size combination.



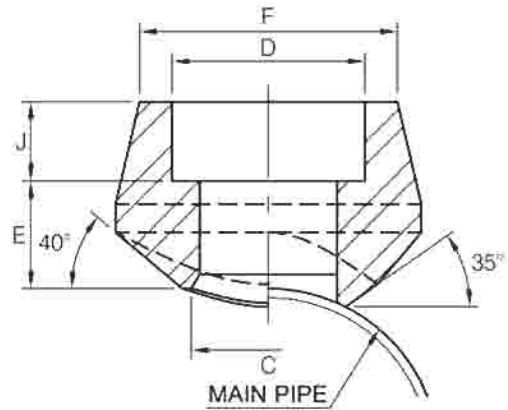
SOCKET WELDING END BRANCH OUTLET

REDUCING SIZE

MSS SP-97-2006



REDUCING WAY



STRAIGHT WAY

Dimensions in Millimeters.

Reducing way					
OutLet Pipe (In)	C	D	F	J (Min)	E (Max)
3000Lb (XS)					
1/8	13.7	10.8	22.0	9.7	10.4
1/4	13.7	14.2	22.0	9.7	10.4
3/8	19.1	17.6	25.9	9.7	12.7
1/2	21.3	21.8	31.4	9.7	16.0
3/4	26.7	27.2	37.1	12.7	16.0
1	33.4	33.9	45.5	12.7	22.4
1-1/4	42.2	42.7	57.0	12.7	22.4
1-1/2	48.3	48.8	64.0	12.7	23.9
2	60.3	61.2	76.0	15.8	23.9
2-1/2	73.2	73.9	92.0	15.8	25.4
3	88.9	89.8	109.2	15.8	30.2
4	114.3	115.2	140.0	19.1	30.2

Dimensions in Millimeters.

Straight way					
OutLet Pipe (In)	C	D	F	J (Min)	E (Max)
3000Lb					
1/4	11.5	14.2	22.0	9.7	10.4
3/8	14.5	17.6	25.9	9.7	12.7
1/2	16.5	21.8	31.4	9.7	16.0
3/4	21.5	27.2	37.1	12.7	16.0
1	27.2	33.9	45.5	12.7	22.4
1-1/4	36.0	42.7	57.0	12.7	22.4
1-1/2	42.0	48.8	64.0	12.7	23.9
2	53.0	61.2	76.0	15.8	23.9
2-1/2	65.0	73.9	92.0	15.8	25.4
3	80.0	89.8	109.2	15.8	30.2
4	104.0	115.2	140.0	19.1	30.2

(1) Socket Dimension in Accordance with ASME B16.11 .

6000Lb (S160)

1/2	16.6	21.8	38.0	9.7	23.9
3/4	21.2	27.2	44.0	12.7	25.4
1	27.0	33.9	57.0	12.7	28.7
1-1/4	35.8	42.7	64.0	12.7	30.2
1-1/2	41.2	48.8	76.0	12.7	31.8
2	51.6	61.2	92.0	15.8	36.6

(1) Socket Dimension in Accordance with ASME B16.11.

(2) 3000LB Outlet size 4 and less fit a number of run pipe sizes and the fitting are marked accordingly.

See page 32 for conventional run size combination.

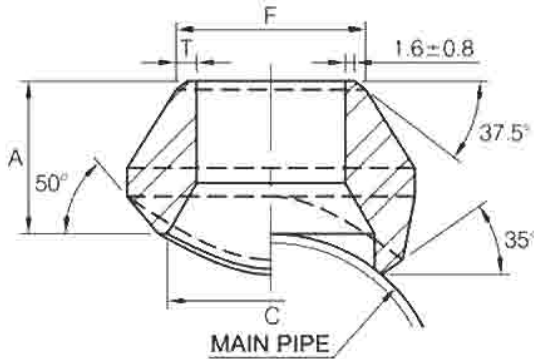


BUTT WELDING END BRANCH OUTLET

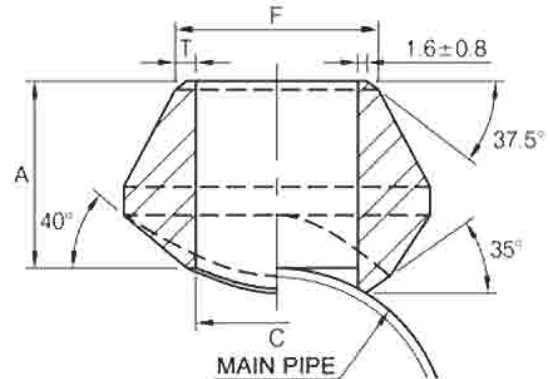
REDUCING SIZE

MSS SP-97-2006

STANDARD WEIGHT



REDUCING WAY



STRAIGHT WAY

Dimensions in Millimeters.

Reducing way				
OutLet Pipe (in)	A	C	F	T
1/8	16.0	13.7	10.3	1.73
1/4	16.0	13.7	13.7	2.24
3/8	19.0	17.1	17.1	2.31
1/2	19.0	21.3	21.3	2.77
3/4	22.0	26.7	26.7	2.87
1	27.0	33.4	33.4	3.38
1-1/4	32.0	42.2	42.2	3.56
1-1/2	33.0	48.3	48.3	3.68
2	38.0	60.3	60.3	3.91
2-1/2	41.0	73.0	73.0	5.16
3	44.0	88.9	88.9	5.49
3-1/2	48.0	101.6	101.6	5.74
4	51.0	114.3	114.3	6.02
5	57.0	141.3	141.3	6.55
6	60.0	168.3	168.3	7.11
8	70.0	219.3	219.3	8.11
10	78.0	273.1	273.1	9.27
12	86.0	323.9	323.9	9.53
14	89.0	355.6	355.6	9.53
16	94.0	406.4	406.4	9.53
18	97.0	457.2	457.2	9.53
20	102.0	508.0	508.0	9.53
24	116.0	609.6	609.6	9.53

Dimensions in Millimeters.

Straight way				
OutLet Pipe (in)	A	C	F	T
1/4	16.0	11.5	13.7	2.24
3/8	19.0	14.5	17.1	2.31
1/2	19.0	16.5	21.3	2.77
3/4	22.0	21.5	26.7	2.87
1	27.0	27.2	33.4	3.38
1-1/4	32.0	36.0	42.2	3.56
1-1/2	33.0	42.0	48.3	3.68
2	38.0	53.0	60.3	3.91
2-1/2	41.0	65.0	73.0	5.16
3	44.0	80.0	88.9	5.49
4	51.0	104.0	114.3	6.02

(1) Weld Bevel in Accordance with ASME B16.25.

DIMENSIONAL TOLERANCE

MSS SP-97-2006

Unit : m/m

Item	1/8"~3/4"	1"~4"	5"~12"	14"~24"
Face of fitting to Crotch (A)	±0.76	±1.52	±3.05	±4.83

- (1) Weld Bevel in Accordance with ASME B16.25.
- (2) Outlet size 4 and less fit a number of run pipe sizes and the fittings are marked accordingly.
See page 32 for conventional run size combination.
- (3) Outlet sizes 5 and up order to specific size combination.

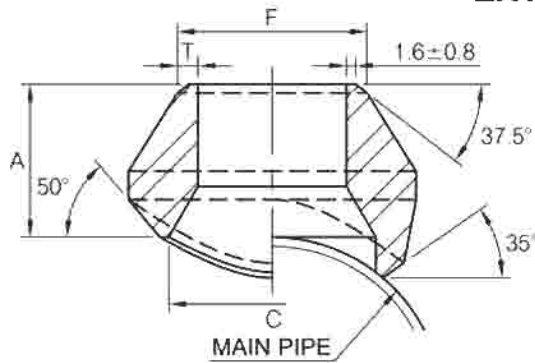


BUTT WELDING END BRANCH OUTLET

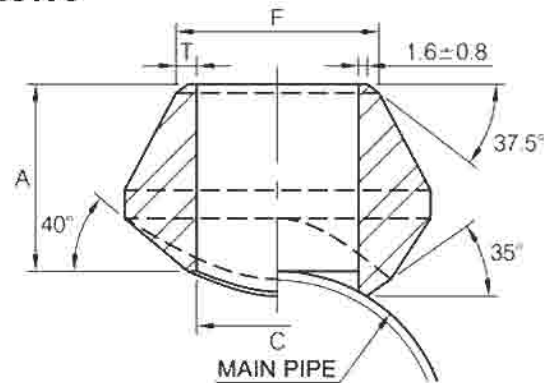
REDUCING SIZE

MSS SP-97-2006

EXTRA STRONG



REDUCING WAY



STRAIGHT WAY

Dimensions in Millimeters.

Reducing way				
OutLet Pipe (In)	A	C	F	T
1/8	16.0	13.7	10.3	2.41
1/4	16.0	13.7	13.7	3.02
3/8	19.0	17.1	17.1	3.20
1/2	19.0	21.3	21.3	3.73
3/4	22.0	26.7	26.7	3.91
1	27.0	33.4	33.4	4.55
1-1/4	32.0	42.2	42.2	4.85
1-1/2	33.0	48.3	48.3	5.08
2	38.0	60.3	60.3	5.54
2-1/2	41.0	73.0	73.0	7.01
3	44.0	88.9	88.9	7.62
3-1/2	48.0	101.6	101.6	8.56
4	51.0	114.3	114.3	8.56
5	57.0	141.3	141.3	9.53
6	78.0	168.3	168.3	10.97
8	99.0	219.3	219.3	12.70
10	94.0	273.1	273.1	12.70
12	103.0	323.9	323.9	12.70
14	100.0	355.6	355.6	12.70
16	106.0	406.4	406.4	12.70
18	111.0	457.2	457.2	12.70
20	119.0	508.0	508.0	12.70
24	140.0	609.6	609.6	12.70

Dimensions in Millimeters.

Straight way				
OutLet Pipe (in)	A	C	F	T
1/4	16.0	11.5	13.7	3.02
3/8	19.0	14.5	17.1	3.20
1/2	19.0	16.5	21.3	3.73
3/4	22.0	21.5	26.7	3.91
1	27.0	27.2	33.4	4.55
1-1/4	32.0	36.0	42.2	4.85
1-1/2	33.0	42.0	48.3	5.08
2	38.0	53.0	60.3	5.54
2-1/2	41.0	65.0	73.0	7.01
3	44.0	80.0	88.9	7.62
4	51.0	104.0	114.3	8.56

(1) Weld Bevel in Accordance with ASME B16.25.

DIMENSIONAL TOLERANCE

MSS SP-97-2006

Unit : m/m

Item	1/8"~3/4"	1"~4"	5"~12"	14"~24"
Face of fitting to Crotch (A)	±0.76	±1.52	±3.05	±4.83

- (1) Weld Bevel in Accordance with ASME B16.25
- (2) Outlet size 4 and less fit a number of run pipe sizes and the fittings are marked accordingly.
See page 32 for conventional run size combination.
- (3) Outlet sizes 5 and up order to specific size combination.

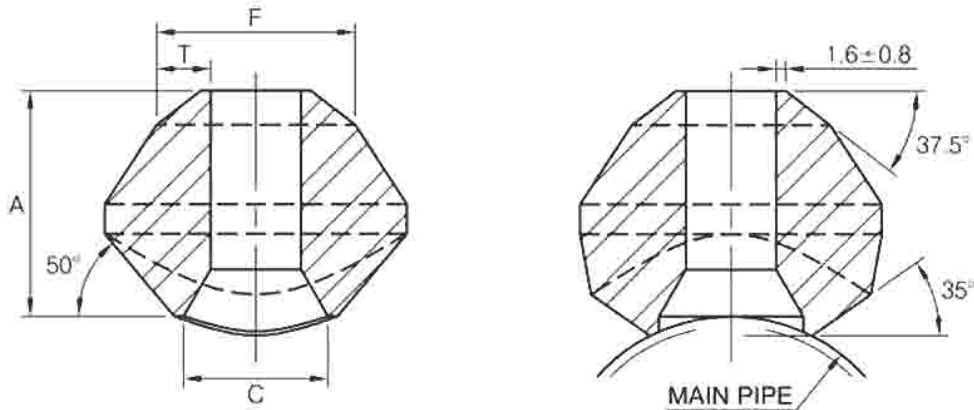


BUTT WELDING END BRANCH OUTLET

REDUCING SIZE

MSS SP-97-2006

SCHEDULE 160 & DOUBLE EXTRA STRONG



Dimensions in Millimeters.

Reducing way					
OutLet Pipe (in)	A	C	F	T	
				S160	XXS
1/2	28.0	13.8	21.3	4.78	7.47
3/4	32.0	18.9	26.7	5.56	7.82
1	38.0	24.3	33.4	6.35	9.09
1-1/4	44.0	32.5	42.2	6.35	9.70
1-1/2	51.0	38.1	48.3	7.14	10.15
2	55.0	49.2	60.3	8.74	11.07
2-1/2	62.0	59.0	73.0	9.53	14.02
3	73.0	73.7	88.9	11.13	15.24
4	84.0	97.2	114.3	13.49	17.12
5	94.0	122.2	141.3	15.88	19.05
6	105.0	146.4	168.3	18.26	21.95

- (1) Weld Bevel in Accordance with ASME B16.25
- (2) Outlet size by order to specific size combination.

CONVENTIONAL RUN SIZE COMBINATIONS

3000# THREAD/SOCKET-WELD END STD/XS BUTT WELDING END

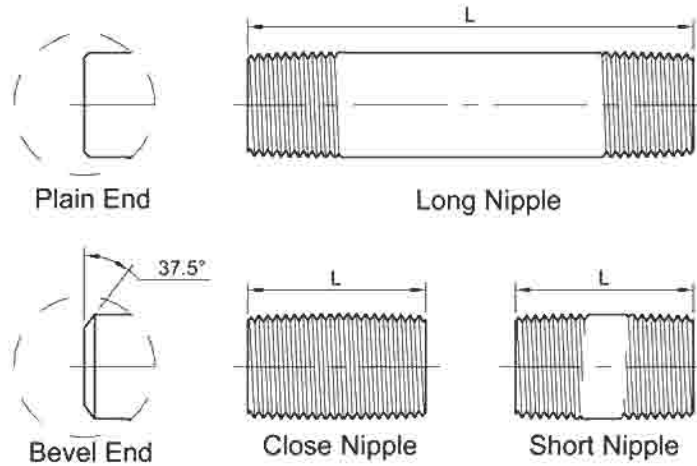
		OUTLET SIZE										
		1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
RUN SIZE (MAIN PIPE)	Reducing way	3/8"~3/4" 1"~36"	1/2" 3/4"~1-1/4" 1-1/2"~36"	3/4" 1" 1-1/4" 1-1/2"~3" 3-1/2"~36"	1" 1-1/4" 1-1/2" 2"~3" 3-1/2"~6" 8"~36"	1-1/4" 1-1/2" 2" 2-1/2" 3" 3-1/2"~4" 5"~10" 12"~36"	1-1/2" 2" 2-1/2" 3" 3-1/2"~5" 6"~8" 10"~36"	2" 2-1/2" 3" 3-1/2" 4"~5" 6"~10" 12"~36"	2-1/2" 3" 3-1/2" 4" 5"~6" 8"~10" 12"~18" 20"~36"	3" 3-1/2" 4" 5" 6" 8" 10"~14" 16"~36"	3-1/2" 4" 5" 6" 8" 10" 12"~16" 18"~36"	5" 6" 8" 10" 12"~14" 16"~18" 20"~24" 26"~36"
	Straight way	3/8"~36"	1/2"~36"	3/4"~36"	1"~36"	1-1/4"~1-1/2" 2"~36"	1-1/2" 2"~3" 3-1/2"~36"	2" 2-1/2"~4" 5"~36"	2-1/2" 3"~3-1/2" 4"~6" 8"~36"	3" 3-1/2"~4" 5"~8" 10"~36"	3-1/2" 4" 5" 6" 8"~12" 14"~36"	5" 6" 8" 10" 12"~16" 18"~36"

Each charted outlet size are designed to fit a number of run pipe size.



NIPPLE

ASME A733-03

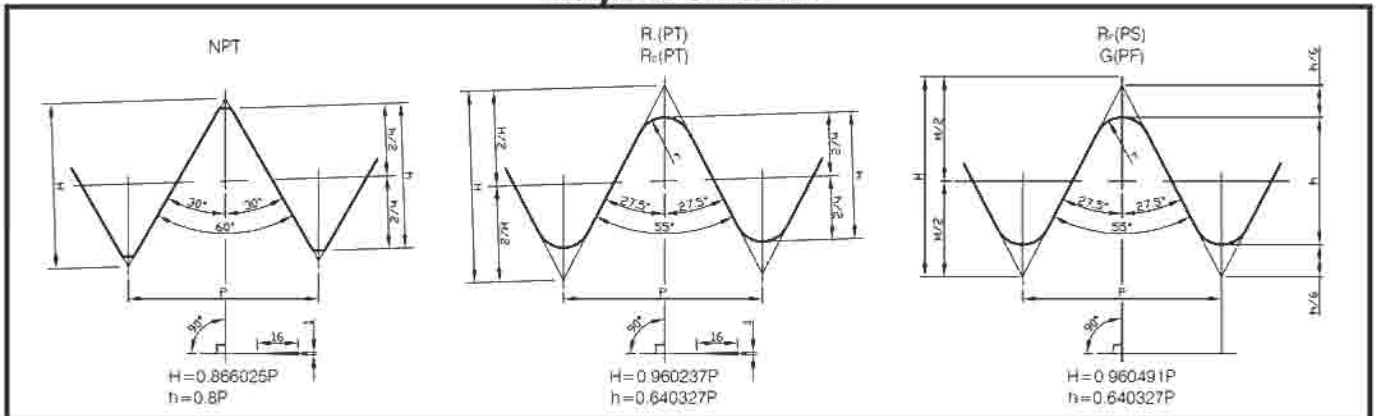


Dimensions in Inch.

Nom. Pipe Size	L		
	Close Nipple	Short Nipple	Long Nipple
1/8	3/4	1-1/2	2~12
1/4	7/8	1-1/2	2~12
3/8	1	1-1/2	2~12
1/2	1-1/8	1-1/2	2~12
3/4	1-3/8	1-1/2	2-1/2~12
1	1-1/2	2	2-1/2~12
1-1/4	1-5/8	2	3~12
1-1/2	1-3/4	2	3~12
2	2	2-1/2	3~12
2-1/2	2-1/2	3	3-1/2~12
3	2-5/8	3	3-1/2~12
3-1/2	2-3/4	4	4-1/2~12
4	2-7/8	4	4-1/2~12
5	3	4-1/2	5~12
6	3-1/8	4-1/2	5~12

- (1) Thread in Accordance with ASME B1.20.1
- (2) Weld Bevel in Accordance with ASME B16.25

Shape of Threaded





DIMENSIONS OF SEAMLESS STEEL PIPE AND SEAMLESS STAINLESS STEEL PIPE

(ASME B36.10M-2004 , ASME B36.19M-2004)

Unit : m/m

TOLERANCES			STEEL PIPE																ST. ST. PIPE				
			NPS IN		Outside Dia.			Wall Thickness										Wall Thickness					
			API 5L O.D.	A530 O.D.	STD	MAX	MIN	S/10	S/20	S/30	S/40	STD	S/60	XS	S/80	S/100	S/120	S/140	S/160	XXS	S/5S	S/10S	S/40S
+1/64" -1/32	+1/64" -1/32	1/8	10.3	10.7	9.5	1.24	-	1.45	1.73	S/40	-	S/80	2.41	-	-	-	3.15	4.83	1.7	1.2	1.7	2.4	
		1/4	13.7	14.1	12.9	1.85	-	1.85	2.24	S/40	-	S/80	3.02	-	-	-	3.68	6.05	1.7	1.7	2.2	3.0	
		3/8	17.1	17.5	16.3	1.85	-	1.85	2.31	S/40	-	S/80	3.20	-	-	-	4.01	6.40	1.7	1.7	2.3	3.2	
		1/2	21.3	21.7	20.5	2.11	-	2.41	2.77	S/40	-	S/80	3.73	-	-	-	4.78	7.47	1.7	2.1	2.8	3.7	
+1/8" -1/32	+1/8" -1/32	3/4	26.7	27.1	25.9	2.11	-	2.41	2.87	S/40	-	S/80	3.91	-	-	-	5.56	7.82	1.7	2.1	2.9	3.9	
		1	33.4	33.8	32.8	2.77	-	2.97	3.38	S/40	-	S/80	4.55	-	-	-	6.35	9.09	1.7	2.8	3.4	4.5	
		1-1/4	42.2	42.6	41.4	2.77	-	2.97	3.56	S/40	-	S/80	4.85	-	-	-	6.35	9.70	2.1	2.8	3.6	4.9	
		1-1/2	48.3	48.7	47.5	2.77	-	3.18	3.68	S/40	-	S/80	5.08	-	-	-	7.14	10.15	2.1	2.8	3.7	5.1	
±0.75%	±0.75%	2	60.3	60.9	59.7	2.77	-	3.18	3.91	S/40	-	S/80	5.54	-	-	-	8.74	11.07	2.1	2.8	3.9	5.5	
		2-1/2	73.0	73.7	72.2	3.05	-	4.78	5.16	S/40	-	S/80	7.01	-	-	-	9.53	14.02	2.1	3.0	5.2	7.0	
		3	88.9	89.8	88.0	3.05	-	4.78	5.49	S/40	-	S/80	7.62	-	-	-	11.13	15.24	2.8	3.0	5.5	7.6	
		3-1/2	101.6	102.6	100.6	3.05	-	4.78	5.74	S/40	-	S/80	8.08	-	-	-	-	-	-	2.8	3.0	5.7	8.1
±1%	±1%	4	114.3	115.4	113.2	3.05	-	4.78	6.02	S/40	-	S/80	8.56	-	11.13	-	13.49	17.12	2.8	3.0	6.0	8.6	
		5	141.3	142.7	139.9	3.40	-	-	6.55	S/40	-	S/80	9.53	-	12.70	-	15.88	19.05	3.4	3.4	6.6	9.5	
		6	168.3	170.0	166.6	3.40	-	-	7.11	S/40	-	S/80	10.97	-	14.27	-	18.26	21.95	4.0	3.4	7.1	11.0	
		8	219.1	221.3	216.9	3.76	6.35	7.04	8.18	S/40	10.31	S/80	12.70	12.70	15.09	18.26	20.62	23.01	22.23	4.0	3.8	8.2	12.7
+0.15% -0.25%	+0.15% -0.25%	10	273.0	275.8	270.4	4.19	6.35	7.80	9.27	S/40	12.70	S/60	15.09	15.09	18.26	21.44	25.40	28.58	S/140	4.2	4.2	9.3	12.7
		12	323.8	327.1	320.7	4.57	6.35	8.38	10.31	S/30	14.27	12.70	17.48	17.48	21.44	25.40	28.58	33.32	S/120	4.2	4.6	9.5	12.7
		14	355.6	359.2	352.0	6.35	7.92	9.53	11.13	S/30	15.09	12.70	19.05	19.05	23.83	27.79	31.75	35.71	-	4.8	-	-	-
		16	406.4	410.5	402.3	6.35	7.92	9.53	12.70	S/30	16.66	S/40	21.44	21.44	26.19	30.96	36.53	40.49	-	4.8	-	-	-
+0.15% -0.25%	+0.15% -0.25%	18	457.0	461.8	452.6	6.35	7.92	11.13	14.27	S/30	19.05	12.70	23.83	23.83	29.36	34.93	39.67	45.24	-	5.5	6.4	-	-
		20	508.0	513.1	502.9	6.35	9.53	12.70	15.09	S/20	20.62	S/30	26.19	26.19	32.54	38.10	44.45	50.01	-	-	-	-	-
		22	559.0	-	-	6.35	9.53	12.70	-	S/20	22.23	S/30	28.58	28.58	34.93	41.28	47.63	53.98	-	-	-	-	-
		24	610.0	615.7	603.5	6.35	9.53	14.27	17.48	S/20	24.61	12.70	30.96	30.96	38.89	46.02	52.37	59.54	-	6.4	7.9	-	-
+0.15% -0.25%	+0.15% -0.25%	26	660.0	-	-	7.92	12.70	-	-	S/20	-	S/20	9.53	-	-	-	-	-	-	-	-	-	-
		28	711.0	-	-	7.92	12.70	15.88	-	S/20	-	S/20	9.53	-	-	-	-	-	-	-	-	-	-
		30	762.0	-	-	7.92	12.70	15.88	-	S/20	-	S/20	9.53	-	-	-	-	-	-	-	-	-	-
		32	813.0	-	-	7.92	12.70	15.88	17.48	S/20	-	S/20	9.53	-	-	-	-	-	-	-	-	-	-
+0.15% -0.25%	+0.15% -0.25%	34	864.0	-	-	7.92	12.70	15.88	17.48	S/20	-	S/20	9.53	-	-	-	-	-	-	-	-	-	-
		36	914.0	-	-	7.92	12.70	15.88	19.05	S/20	-	S/20	9.53	-	-	-	-	-	-	-	-	-	-

* The Thickness in accordance with ASME B16.11.



PACKING LIST

Carton Size : 28 x 20 x 18 cm (L x W x H)

Unit : PC

SIZE NPS	90° Elbow				45° Elbow				Tee				
	2M NPT 3M SW	3M NPT	6M SW	6M NPT	2M NPT 3M SW	3M NPT	6M SW	6M NPT	2M NPT 3M SW	3M NPT	6M SW	6M NPT	9M SW
1/4"	150	100	100	80	150	100	100	80	100	80	80	50	-
3/8"	100	80	80	50	100	80	80	50	80	50	50	35	-
1/2"	80	50	50	25	80	50	50	25	50	35	35	20	25
3/4"	50	25	25	20	50	30	30	20	35	20	20	12	15
1"	30	20	20	12	30	20	20	12	20	15	15	10	10
1-1/4"	20	15	15	5	20	15	15	5	15	10	10	5	6
1-1/2"	15	6	6	4	15	8	8	4	10	5	5	4	4
2"	8	5	5	2	10	6	6	2	6	4	4	2	2
2-1/2"	4	2	2	1	5	2	2	-	3	2	2	1	-
3"	2	2	-	-	2	2	-	-	2	1	1	-	-
4"	1	1	-	-	1	1	-	-	1	1	1	-	-

SIZE NPS	Cross				Full Coupling				Half Coupling			
	2M NPT 3M SW	3M NPT	6M SW	6M NPT	3M SW	3M NPT	6M SW	6M NPT	3M SW	3M NPT	6M SW	6M NPT
1/4"	40	40	80	40	350	250	250	200	400	800	300	150
3/8"	40	40	40	30	250	200	200	100	250	500	150	80
1/2"	40	30	30	20	120	100	100	60	120	250	80	80
3/4"	30	20	20	12	80	70	70	35	80	150	50	50
1"	20	12	12	6	50	35	35	20	50	80	30	35
1-1/4"	10	6	6	4	30	20	20	15	30	35	25	25
1-1/2"	6	4	4	2	25	15	15	10	25	30	15	20
2"	4	4	2	1	15	10	10	5	15	20	10	6
2-1/2"	2	1	-	-	10	5	5	3	10	12	-	4
3"	1	1	-	-	6	3	3	2	6	6	-	2
4"	-	1	-	-	4	2	2	1	4	4	-	1

SIZE NPS	Cap			Boss				Street Elbow		Insert	
	3M SW/NPT	6M SW	6M NPT	3M SW	3M NPT	6M SW	6M NPT	3M NPT	6M NPT	3M SW	6M SW
1/4"	300	200	250	250	200	200	150	150	80	300	250
3/8"	250	150	130	200	150	150	100	80	50	300	200
1/2"	130	80	80	90	80	80	60	50	25	150	120
3/4"	80	50	50	70	40	40	35	30	20	100	80
1"	50	30	30	35	30	30	20	20	12	80	60
1-1/4"	30	25	25	30	20	20	15	15	5	60	50
1-1/2"	25	15	15	25	15	15	10	8	4	40	40
2"	15	8	10	15	10	10	5	5	2	25	20
2-1/2"	10	5	4	-	-	-	-	4	-	12	10
3"	4	3	3	-	-	-	-	2	-	10	8
4"	3	2	2	-	-	-	-	1	-	4	2

SIZE NPS	OutLet		Union		Hex Plug	Round Plug	Square Plug	Bushing	Hex Nipple	Swage Nipple
	3M SW/NPT	6M SW/NPT	3M SW/NPT	6M SW/NPT	NPT	NPT	NPT	NPT	NPT	S40/S80 S160/XXS
1/4"	200	100	70	100	800	250	800	600	500	200
3/8"	150	100	70	100	600	200	500	500	400	150
1/2"	150	100	50	100	250	150	300	400	200	100
3/4"	100	50	30	50	150	100	200	200	100	70
1"	50	30	20	30	100	80	150	100	65	50
1-1/4"	35	25	14	25	35	50	80	60	35	30
1-1/2"	25	15	10	15	25	30	50	50	25	20
2"	15	10	6	10	20	20	30	25	15	8
2-1/2"	10	-	3	-	8	10	15	15	5	4
3"	6	-	2	-	6	5	10	10	3	3
4"	3	-	-	-	3	3	3	5	2	1

WOODEN CASE SIZE : 102×86×72 cm / 60 CARTON
 WOODEN CASE SIZE : 86×82×72 cm / 48 CARTON
 WOODEN CASE SIZE : 86×82×54 cm / 36 CARTON



WEIGHT LIST

Unit : KG

SIZE NPS	90° Elbow					45° Elbow					Tee				
	2M NPT	3M SW	3M NPT	6M SW	6M NPT	2M NPT	3M SW	3M NPT	6M SW	6M NPT	2M NPT	3M SW	3M NPT	6M SW	6M NPT
1/8"	0.10	0.09	0.10	-	0.17	0.14	0.16	0.13	-	0.11	0.13	0.13	0.13	0.14	0.20
1/4"	0.08	0.08	0.14	-	0.33	0.13	0.14	0.12	-	0.27	0.12	0.09	0.20	0.20	0.45
3/8"	0.13	0.12	0.29	0.29	0.45	0.10	0.12	0.24	-	0.39	0.17	0.15	0.38	0.43	0.63
1/2"	0.25	0.22	0.43	0.40	0.80	0.20	0.20	0.34	0.36	0.63	0.31	0.29	0.56	0.56	0.98
3/4"	0.35	0.33	0.69	0.73	1.31	0.27	0.28	0.56	0.57	1.07	0.43	0.42	0.92	0.94	1.65
1"	0.53	0.53	1.14	1.17	1.61	0.41	0.42	0.94	0.92	1.27	0.69	0.65	1.49	1.49	2.17
1-1/4"	0.82	0.84	1.42	1.48	2.93	0.68	0.69	1.03	1.11	2.24	1.07	1.04	1.76	1.93	3.74
1-1/2"	1.06	1.08	2.63	2.79	3.79	0.82	0.80	2.05	2.01	2.54	1.39	1.35	3.27	3.37	4.71
2"	1.70	1.68	2.92	3.28	7.31	1.41	1.35	2.23	2.09	4.37	2.16	2.04	3.53	3.95	7.88
2-1/2"	3.14	3.20	5.99	-	9.88	3.46	2.53	3.71	-	7.01	4.11	3.98	6.99	-	13.11
3"	4.81	5.38	8.88	-	16.43	5.44	5.10	5.97	-	14.16	6.12	5.90	10.19	-	22.50
4"	10.21	10.95	14.85	-	-	8.96	9.41	8.96	-	-	14.74	17.91	19.13	-	-

SIZE NPS	Cross				Full Coupling				Half Coupling			
	2M NPT	3M SW	3M NPT	6M SW	3M SW	3M NPT	6M SW	6M NPT	3M SW	3M NPT	6M SW	6M NPT
1/8"	-	0.57	0.56	-	0.04	0.05	0.05	0.08	0.04	0.02	-	0.07
1/4"	-	0.53	0.52	-	0.05	0.04	-	0.13	0.05	0.02	0.11	0.06
3/8"	-	0.46	0.49	-	0.07	0.06	0.14	0.20	0.07	0.03	-	0.09
1/2"	0.40	0.39	0.65	0.69	0.13	0.13	0.24	0.34	0.13	0.06	0.21	0.16
3/4"	0.51	0.48	1.05	-	0.17	0.19	0.27	0.50	0.21	0.10	0.31	0.24
1"	0.77	0.75	1.70	-	0.29	0.45	0.44	0.87	0.30	0.23	0.51	0.45
1-1/4"	1.11	1.19	2.17	-	0.45	0.81	0.60	1.09	0.34	0.34	0.75	0.55
1-1/2"	1.62	1.61	3.93	-	0.59	1.07	1.11	1.94	0.66	0.54	1.25	0.96
2"	-	2.35	4.39	-	0.86	1.40	1.62	2.87	1.09	0.70	1.92	1.70
2-1/2"	-	-	-	-	1.40	2.29	-	4.20	1.63	1.13	-	2.10
3"	-	-	-	-	1.78	3.38	-	6.10	2.10	1.68	-	3.05
4"	-	-	20.97	-	2.85	6.28	-	10.04	3.71	3.11	-	5.02

SIZE NPS	Reducing Coupling				Cap				Union	
	3M SW	3M NPT	6M SW	6M NPT	3M SW	3M NPT	6M SW	6M NPT	3M SW	3M NPT
1/8"	0.04	0.05	-	0.08	0.03	0.02	-	0.06	0.28	0.28
1/4"	0.05	0.05	-	0.06	0.04	0.04	-	0.06	0.28	0.28
3/8"	0.07	0.06	-	0.18	0.07	0.05	-	0.09	0.25	0.24
1/2"	0.13	0.13	0.24	0.31	0.10	0.11	0.16	0.26	0.35	0.34
3/4"	0.19	0.19	0.33	0.41	0.16	0.18	0.23	0.40	0.49	0.48
1"	0.27	0.39	0.65	0.85	0.25	0.37	0.36	0.71	0.81	0.77
1-1/4"	0.49	0.68	0.75	1.05	0.45	0.62	0.64	0.90	1.10	1.03
1-1/2"	0.59	0.99	1.20	1.81	0.59	0.72	0.94	1.28	1.61	1.63
2"	0.97	1.37	2.12	3.40	0.96	1.09	1.41	2.23	2.16	2.43
2-1/2"	1.42	2.07	-	4.20	1.43	2.22	-	-	3.50	3.63
3"	1.88	3.08	-	6.10	2.74	3.50	-	-	5.15	5.27
4"	3.31	5.44	-	10.04	4.24	4.84	-	-	11.59	12.00

SIZE NPS	Street Elbow	Hex Nipple	Square Head	Hex Head	Round Head	Bushing
	3M NPT	3M NPT	Plug	Plug	Plug	
1/8"	0.13	0.03	0.01	0.01	0.02	-
1/4"	0.11	0.04	0.01	0.03	0.05	0.01
3/8"	0.22	0.05	0.03	0.05	0.07	0.01
1/2"	0.31	0.09	0.05	0.07	0.12	0.03
3/4"	0.53	0.15	0.09	0.14	0.20	0.05
1"	1.02	0.47	0.16	0.22	0.34	0.09
1-1/4"	1.13	0.45	0.27	0.44	0.55	0.25
1-1/2"	2.01	0.62	0.38	0.59	0.79	0.34
2"	2.91	1.03	0.63	1.03	1.47	0.45
2-1/2"	-	1.51	0.96	1.80	2.34	0.60
3"	-	2.22	1.53	2.60	3.26	1.16
4"	-	4.00	3.83	5.20	6.24	3.20



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