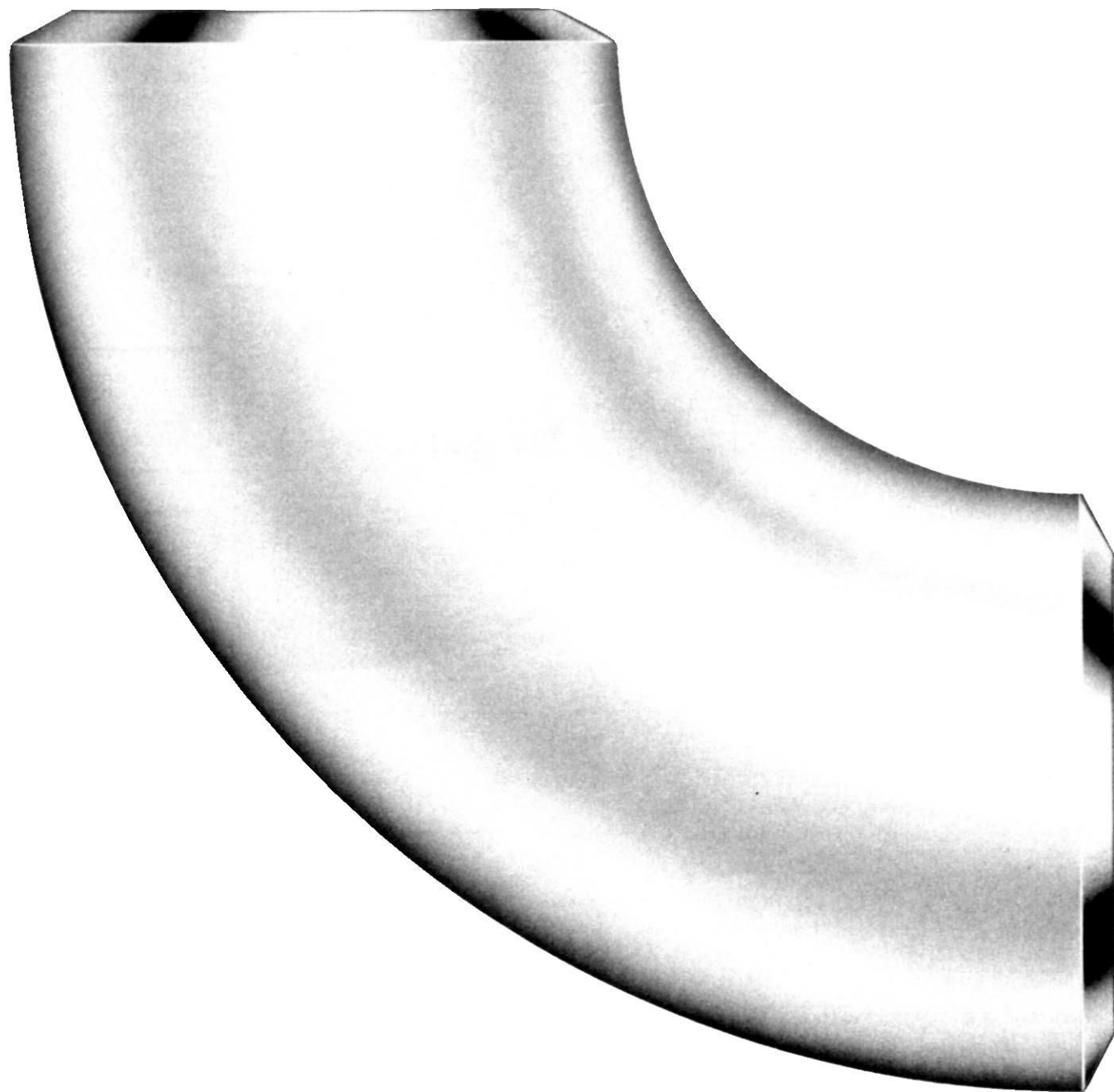
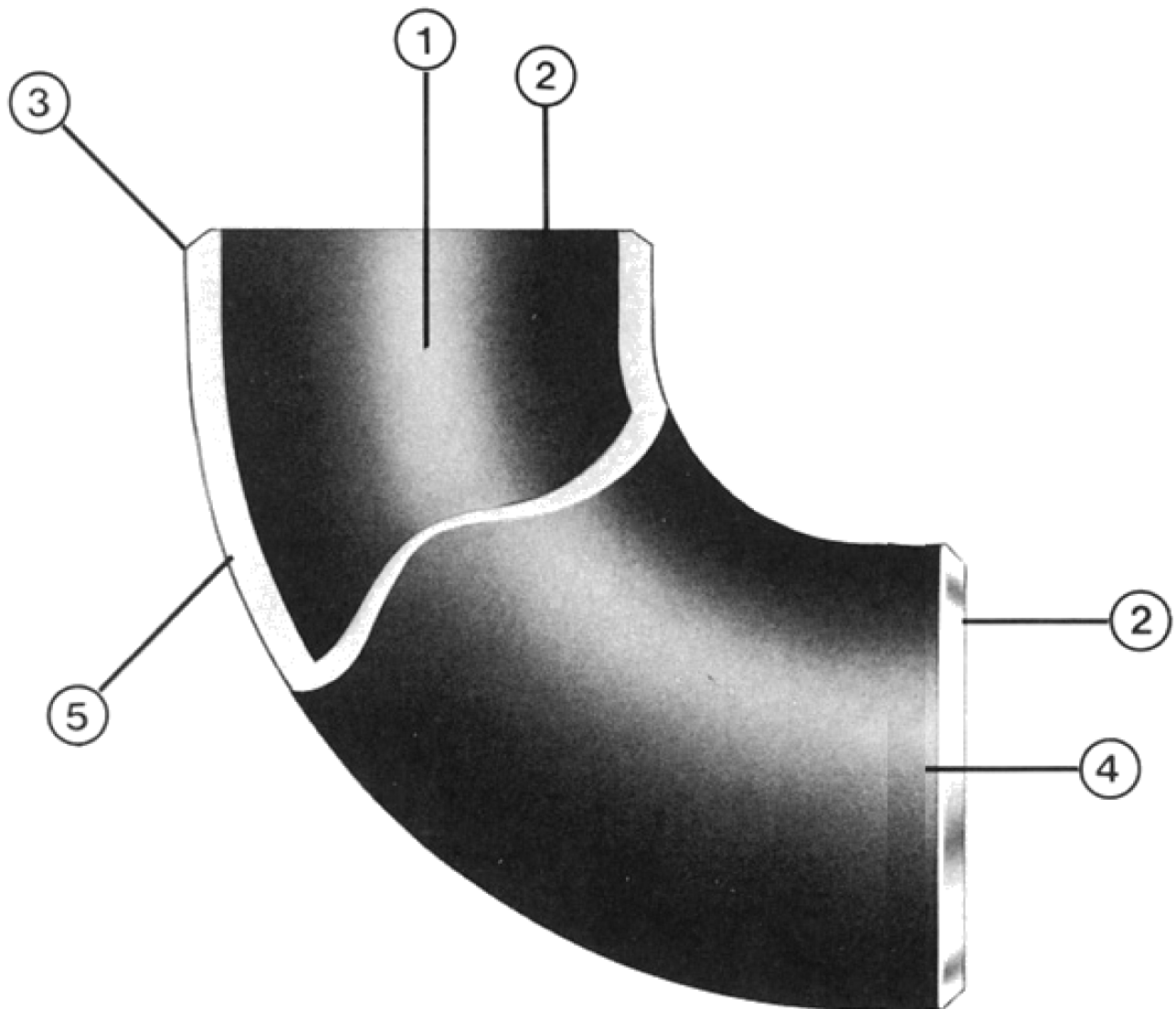


SEAMLESS WELDING FITTINGS





PRIDUCT DETAILS



1. True diameter maintained throughout the smooth bore for unrestricted flow.
2. Ends are true and square.
3. Bevels and lands accurately machined for good welding.
4. Clear identification of size, schedule or nominall wall thickness, material and heat code.
5. Full, uniform wall thickness for maximum strength.



Seamless Welding Fittings Index



90° Elbows
Long Radius



Reducing Tees and Reducers,
Concentric and Eccentric



90° Reducing Elbows
Long Radius



Caps



90° Elbows
Long Radius, Long Tangent



Lap Joint
Stub Ends



90° Elbows
Short Radius



Saddles



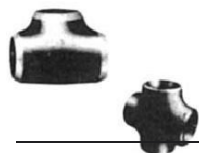
45° Elbows
Long Radius



Laterals



180° Returns
Long Radius
Short Radius



Straight Tees and Crosses



Material and Manufacturing Standards

The manufacture of welding fittings is governed by industry standards established by such associations as 1) the American Society for Testing and Materials (ASTM): 2) the American National Standards Institute (ANSI): 3) the Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS): 4) the Pipe Fabrication Institute (PFI): and 5) the Canadian Standards Association (CSA). They cover specifications for materials, methods of manufacture, dimensions and quality control procedures. All welding fittings conform to one or more of these standards.

ASTM STANDARDS

carbon steel welding fittings are manufactured from seamless steel tubing and furnished in accordance with ASTM Standard A-234, with material specifications in accordance with ASTM A-106, Grade B, for fittings made from pipe; ASTM A-515, Grade 65 or 70, for fittings made from plate.

alloy steel welding fittings are furnished in accordance with ASTM standard A-234, with materials specification including A-335, Grade P1, carbon-molybdenum, and Grade P12, P11, P22, P5, P7; P9 chrome molybdenum, for fittings made from pipe.

ASTM A-204 Grade B, carbon molybdenum, and ASTM A-387 Grades 12, 11, 22, 5, 7, 9 chrome molybdenum for fittings made from plate.

welding fittings are also available in accordance with ASTM specification A-420 covering low-temperature service, down to -150°F (-101°C).

stainless steel welding fittings are manufactured and available in the following types: 304, 304L, 316, 316L and 347. They are furnished in accordance with ASTM Standard A-403, with material specifications to ASTM A-312 covering fittings made from pipe, and A-240 for fittings made from plate. Refer to catalogue "Stainless Steel Welding Fittings".

ANSI, MSS, ASME and CSA Standards

ASME/ANSI and MSS standards govern fitting dimensions and tolerances, ASME/ANSI B16.9 "Wrought Steel Buttwelding Fittings", is the basic standard. It covers steel butt-welding fittings sizes NPS 1/2 through NPS 48 (DN 15 through DN 1200).

Other ASME/ANSI and MSS standards, written to supplement B16.9, are as follows:

ASME/ANSI B16.25: Butt-welding Ends

ASME/ANSI B16.28: Butt-welding short radius elbows and returns

MSS SP-43: Light-wall stainless steel fittings, NPS 3/4 through NPS 24 (DN 20 through DN 600)

MSS SP-75: High Test Wrought Welding Fittings

The following codes and standards influence the manufacture of welding fittings, where applicable.

ASME/ANSI B31.1: Power piping

ASME/ANSI B31.3: Petroleum refinery piping

ASME/ANSI B31.4: Liquid petroleum transportation piping system

ASME/ANSI B31.5: Refrigeration piping

ASME/ANSI B31.8: Gas transmission and distribution piping systems

ANSI/ASME B36.10M: Welded and seamless wrought steel pipe

ANSI/ASME B36.19M: Stainless steel pipe

CSA Z183: Oil pipe line transportation systems

CSA Z184: Gas pipe line systems

CAN3-Z245.11-M91: Requirements for wrought steel butt welding fittings

ASME: Boiler and pressure vessel code

SPECIAL METALS

High Test Steel. High test pipe line welding fittings, conforming to CSA Standard CAN3-Z245.11 or MSS SP-75, are available with physical properties to match pipe with *42,000, 46,000, 52,000, 60,000, 65,000, and over p.s.i. minimum yield strengths.

Other Ferrous Alloys. Fittings are available manufactured from ASTM alloy specifications other than those listed in the "ASTM Standards" above.

Non-Ferrous Metals. Fittings of relatively common metals, such as aluminum, nickel, copper, etc., can be readily furnished; production is limited only by availability of raw materials. The same is true of less common metals, such as the various grades of Hastelloy, Inconel, Incoloy, Monel, Alloy-20, rare types of stainless steel and other unusual analyses.

*Equals 290, 317, 359, 414, 448 Mpa, respectively.

METRIC EQUIVALENTS

The International System (SI) metric equivalent of British units are shown throughout this catalogue.

NPS (Nominal Pipe Size) = DN, ▲ (Nominal Diameter)

Operating Pressure Class = PN, ▲ (Pressure Number)

1 inch = 25.4 millimetres

1 pound, weight = 0.4536 kilograms

1 psi = 0.06895 bars

1 psi, stress = 0.006895 megapascals (MPa)

▲ From the SI designations, Diamètre Nominal and Pression Nominale.

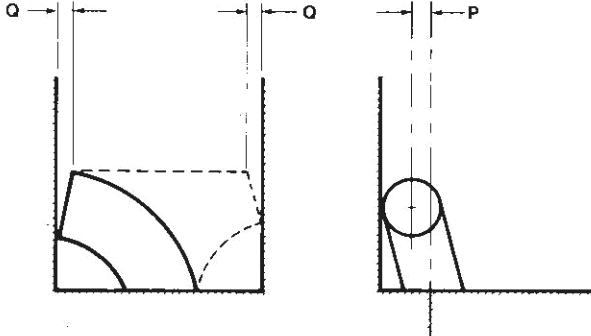
*DIMENSIONS & TOLERANCES

DIMENSIONAL TOLERANCES

All Fittings				90° & 45° Elbows Tees Crosses Laterals	Caps	180° Returns			Lap-Joint Stub Ends and Reducers	Lap-Joint Stub Ends			
NPS	Outside Diameter at Bevel	Inside Diameter at End	Wall Thickness	Center to End A,B,C,M	Overall Length E	Center to Center H	Back to Face K	Parallelity of Planes of Ends	Overall Length F,L	Outside Diameter of Lap G	Thickness of Lap t	Fillet Radius of Lap R	Outside Diameter of Barrel
DN	O.D.	I.D.											
1/2 - 2 1/2	+0.06 -0.03	±0.03	thickness	±0.06	±0.12	±0.25	±0.25	±0.03	±0.06	+0 -0.03	+0.06 -0	+0 -0.03	
15 - 65	±1	±0.8		±0.2	±0.4	±0.7	±0.7	±0.1	±0.2	+0 -0.1	+0.06 -0	+0 -0.1	
3 - 3 1/2	±0.06	±0.06		±0.06	±0.12	±0.25	±0.25	±0.03	±0.06	+0 -0.03	+0.06 -0	+0 -0.03	
80 - 90	±1	±1.6		±0.2	±0.4	±0.7	±0.7	±0.1	±0.2	+0 -0.1	+0.06 -0	+0 -0.1	
4	±0.06	±0.06		±0.06	±0.12	±0.25	±0.25	±0.03	±0.06	+0 -0.03	+0.06 -0	+0 -0.06	
100	+0.2 -0.1	±1.6		±0.2	±0.4	±0.7	±0.7	±0.1	±0.2	+0 -0.1	+0.06 -0	+0 -0.2	
5 - 6	+0.09 -0.06	±0.06		±0.06	±0.25	±0.25	±0.25	±0.03	±0.06	+0 -0.03	+0.06 -0	+0 -0.06	
125 - 150	+0.3 -0.1	±1.6		±0.2	±0.7	±0.7	±0.7	±0.1	±0.2	+0 -0.1	+0.06 -0	+0 -0.2	
8	+0.09 -0.06	±0.06		±0.06	±0.25	±0.25	±0.25	±0.03	±0.06	+0 -0.03	+0.06 -0	+0 -0.06	
200	±0.2	±1.6		±0.2	±0.7	±0.7	±0.7	±0.1	±0.2	+0 -0.1	+0.06 -0	+0 -0.2	
10	+0.16 -0.12	±0.12		±0.09	±0.25	±0.38	±0.25	±0.06	±0.09	+0 -0.06	+0.06 -0	+0 -0.06	
250	+0.4 -0.3	±3.2		±0.2	±0.7	±1.0	±0.7	±0.2	±0.2	+0 -0.2	+0.06 -0	+0 -0.2	
12 - 18	+0.16 -0.12	±0.12	less Not	±0.09	±0.25	±0.38	±0.25	±0.06	±0.09	+0 -0.06	+0.06 -0	+0 -0.06	
300 - 450	+0.4 -0.3	±3.2		±0.3	±0.7	±1.0	±0.7	±0.2	±0.3	+0 -0.2	+0.06 -0	+0 -0.2	
20 - 24	±0.25 -0.19	±0.19		±0.09	±0.25	±0.38	±0.25	±0.06	±0.09	+0 -0.06	+0.06 -0	+0 -0.06	
500 - 600	+0.6 -0.5	±4.8		±0.3	±0.7	±1.0	±0.7	±0.2	±0.3	+0 -0.2	+0.06 -0	+0 -0.2	
26 - 30	+0.25 -0.19	±0.19		+0.12	±0.38				±0.19				
650 - 750	+0.7 -0.5	±4.8		±0.3	±1.0				±0.5				
32 - 48	±0.25 -0.19	±0.19		±0.19	±0.38				±0.19				
800 - 1200	+0.7 -0.5	±4.8		±0.5	±1.0				±0.5				

¹Out-of-round is the sum of absolute values of plus and minus tolerance.

ANGULARITY TOLERANCES, ASME/ANSI B16.9

ANGULARITY TOLERANCES ±							
Nominal Pipe Size NPS DN	Off Angle Q	Off Plane P	Nominal Pipe Size NPS DN	Off Angle Q	Off Plane P		
1/2 - 4	.03	.06	18 - 24	.12	.38		
15 - 100	1	2	450 - 600	4	10		
5 - 8	.06	.12	26 - 30	.19	.38		
125 - 200	2	4	650 - 750	5	10		
10 - 12	.09	.19	32 - 34	.19	.50		
250 - 300	3	5	800 - 850	5	13		
14 - 16	.09	.25	44 - 48	.19	.75		
350 - 400	3	7	1125 - 1200	5	20		

*For design and dimensions of butt welding ends see page 24.

INCHES
MILLIMETRES