



Dragon Aromatics Zhangzhou Co.,Ltd. DAC

DAC PX Complex Project

SPECIFICATION OF HIGH PRESSURE FITTINGS

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REV.	DATE	DESCRIPTION	PREPATED BY	CHECKED BY	APPROVED BY		ISSUED FOR APPROVAL

SEI

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1 GENERAL

1.1 SCOPE

ASTM

This specification is the basic technical requirement for Fittings and Flanges. Manufacturer shall comply with relative standards except this.

1.2 STANDARDS AND CODES

The latest edition of the following standards and codes shall be applied unless otherwise noted.

ASME B31.3 Process piping

ASME B36.10M Welded and seamless wrought steel pipes

ASME B36.19M Stainless steel pipe

API 590 American Petroleum Institute Steel Line Blanks

ASME B16.5 Pipe Flanges and Flanged Fitting

ASME B16.9 Factory-Made Wrought Steel Buttwelding , Fittings.

ASME B16.11 Forged Fittings, Socket-Welding and Treaded.

ASME B16.28 Wrought Steel Butt-welding Short Radius Elbows and Returns
90 ° 180 °

ASME B16.47 Large Diameter Steel Flanges

MSS-SP-25 Standard Marking, System for Valves, Fittings, Flanges and Unions

MSS SP-83 Steel Pipe Unions, Socket-Welding and Threaded

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MSS SP-95	Swage(d) Nipples and Bull Plugs
MSS SP-97	Integrally Reinforced Forged Branch Outlet Fittings - Socket Welding, Threaded and Buttwelding Ends
ASTM A106	Seamless Carbon Steel Pipe for High-Temperature Service (P)
ASTM A335	Seamless ferritic alloy-steel pipe for high-temperature service (P)
ASTM A312	Seamless and welded austenitic stainless steel pipes (P)
ASTM A388	Ultrasonic Examination of Heavy Steel Forgings
ASTM A530	General requirements for specialized carbon and alloy-steel pipe
ASTM A691	Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperature (P)
ASTM A358	Electric-Fusion-Welded Austenitic Chromium-Nickel Alloy Steel Pipe for High-Temperature Service - (P)
ASTM A105	Carbon Steel Forgings for Piping Applications
ASTM A182	Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
ASTM A234	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
ASTM A403	Wrought Austenitic Stainless Steel Piping Fittings
ASTM A815	Wrought Ferritic, Ferritic/Austenitic, and Martensitic

Stainless Steel Piping Fittings

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ASTM B564 Nickel Alloy Forgings

ASTM B366 Factory-Made Wrought Nickel and Nickel Alloy Fittings

NACE MR0175 Petroleum and natural gas industries—Materials for use in
H₂S-containing Environments in oil and gas production

ASTM E213

1.3 EXPLAINING

The Chinese version of specification has precedence to their English translations that are only for reference.

2 REQUIREMENTS OF RAW MATERIAL

2.1 +VOD() AOD()
+VD()

The pipes as raw material for fittings shall be refined with electric furnace +AOD or VOD, Carbon Steel pipes can be with electric furnace + AD.

2.2

Chemical composition of raw material shall conform to the requirements of the following.

Material	C	S	P	N	Other chemical
321, 316	0.04~0.08%	≤ 0.02%	≤ 0.03%	N/A	ASTM as per relevant ASTM standards
304L	≤ 0.03%	≤ 0.02%	≤ 0.03%	N/A	
A106 Gr.B	≤ 0.25%	≤ 0.02%	≤ 0.03%	N/A	
P11	0.05~0.15%	≤ 0.02%	≤ 0.012%	N/A	
P22	0.05~0.15%	≤ 0.02%	≤ 0.02%	N/A	

2205	$\leq 0.03\%$	$\leq 0.02\%$	$\leq 0.02\%$	0.145~0.2%	
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2.3 ASTM A370

ASTM

Tensile test shall be performed at two pipes for each batch per ASTM A370.

2.4 2 " 2 "

2 " ASTM A530

Bending test is required for pipe smaller than NPS 2", and flattening test is required for pipes NPS 2" and larger. Specimen must be taken from both ends of pipe as per each material size, heat of steel and heat treatment batch.

2.5 ASTM E213/

A388 100% ASTM E213 2 B 8%

1.5mm

The pipes, plates, or forgings used as raw material for fittings, shall have ultrasonic result in quality files, otherwise, shall be ultrasonic tested according to ASTM E213/A388, notch shape as Fig.2(B)Butters in the depth of 8% of wall thickness but not deeper than one(1.5) mm.

2.6 ASTM

E45 A B C D 2.5

8.5 $A \leq 1.5$ $B \leq 2.0$ $C \leq 2.0$ $D \leq 1.5$ $A+B+C+D \leq 5$

Nonmetallic inclusions shall be spot examined at two pipes for each batch per ASTM E45: For carbon and alloy steel, nonmetallic inclusion A,B,C,D $\leq$ level 2.5 respectively, furthermore $A+B+C+D \leq$ level 8.5; For stainless steel, nonmetallic inclusion A $\leq$ level 1.0, B $\leq$ level 2.0, C $\leq$ level 2.0, D $\leq$ level 1.5, furthermore $A+B+C+D \leq$ level 5.

2.7 Cr-Mo +

The Heat Treatment is required for the pipes used as raw material for fittings as follows: Normalizing heat treatment is required for carbon steel (A106B), Normalizing and tempering or full annealing are required for all

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Chrome-Molybdenum pipes, Solution is required for stainless steel.

2.8 2205 PREN 34 $PREN = \%Cr + 3.3\%Mo + 16\%N$

For duplex stainless steel 2205, PREN should not less than 34 $PREN = \%Cr + 3.3\%Mo + 16\%N$.

3 MANUFACTURE

3.1

All carbon parts shall be killed carbon steel.

3.2

The surface imperfection shall be removed with grinding and no any repair welding.

3.3

Fittings shall be delivered after the heat treatment. Pickling and passivation are required for Austenitic Stainless Steel, but machined parts can be delivered without pickling.

3.5 4 XXS(min) (min) 0 +25%
-12.5% +2.5%

Unless otherwise noted, for example: 0 +25%, the wall thickness tolerance for all other pipe shall be -12.5% +12.5%

3.5 ASME B16.9 ASME B16.11

End of butt-weld fittings shall be finished in accordance with ANSI B16.9. The socket weld ends as per ANSI B16.11.

Normalizing and tempering or full annealing are required for all Chrome-Molybdenum fittings.

4.3 321 347 347H 900 ± 10

25mm 2 4.7min/mm 304L, 316

Solution and stabilizing heat treatment are required after processing for 321s.s, 347s.s, 347Hs.s Fittings. Stabilizing heat treatment shall be at a temperature 900 ± 10 , heat preservation of 2 hours per 25mm wall thickness 4.7min/mm , and air cooling. Solution heat treatment is required for 304L, 316 S.S.

4.4 ASTM A790

Solution heat treatment is required for Duplex S.S. per ASTM A790.

4.5

Heat treatment shall be recorded and its report is required

5 INSPECTION AND TESTING

5.1

All Fittings shall be examined visually one by one. Cracks, scabs and other defects are not allowed on surface of the components.

5.2 ASTM A262 E ASTM A923 C

For austenitic stainless steel and austenitic/ferritic stainless steel pipes, intergranular corrosion tests are required respectively according to ASTM A262 practice E and ASTM A923 practice C, as per each lot of heat treatment, and testing is required on the sensitized condition.

5.3 ASTM E112 5 7

The grain size value for S.S. pipe as ASTM E112 shall be grade 5 7.

5.4 CL1500 6" ASTM A388 100%

ASTM E213 2 B 8% 1.5mm

100% ultrasonic inspection according to ASTM A388 on flange ($\geq$ CL1500) and fittings not less than 6" , notch shape as ASTM E213 Fig.2(B) Butters in the depth of 5% of wall thickness but not deeper than 1.5 mm.

5.5 () E165 100% () ASTM
 E709 100% ,
 100% liquid penetrant test according to ASTM E165 method B on stainless steel fittings
 whereas 100% magnetic examination for carbon steel and Cr-Mo steel fittings are required
 according to A “ c 4 ame Εucσ (oM ‡

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6.1.2

Painting material used for the color coding and stencil marking on components shall not contain an harmful metal, or metal salts, such as tin, zinc, lead, sulfur, copper or chlorides, which cause corrosive attack on heating and shall be resistant to salt water atmosphere, tropical or similar attack.

6.1.3 , 0.25mm

Marking by stamp shall be applied with low-stress hard-die stamping and a low-stress stamp shall be round nosed with a radius of 0.25mm minimum.

6.1.4

Marking shall be clearly indicated and shall not be easily erasable.

6.1.5

6.2 MARKING

6.2.1 , ,

Marking shall be carried out, in general, with regard to the following items using easily identifiable symbols.

Nominal Size

Wall Thickness (Schedule Number)

Material Specification and Grade

Manufacturer's Name or Trade Mark

Charge/Heat No.

Commodity Code as stated on Purchase Order

6.2.2 ,

Small bore items which would be difficult to mark shall have stainless steel labels attached by stainless steel wire.

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7 PACKING AND SHIPPING

7.1

After inspection and test, fitting shall be completely free of water, dried and prepared for shipment. Adequate protection shall be provided against mechanical damage and atmospheric corrosion in transit.

7.2

Bevel ends shall be covered or plugged with substantial wood, metal or plastic closures in order to avoid damage.

7.3

For all fittings, no damage can be made during shipments (bending, colliding, pressing, etc).

7.4

Packing shall be the responsibility of the manufacturer.

7.5

All stainless steel (S.S) fittings shall be kept away from alloy steel (A.S) fittings, and packed respectively.

8

bolted cover
bevel large end
butt welding

CALC	calculation		
	comm	ALC	ca ca
CON	concentric		

DSAW double submerged arc weld

GALV galvanized

ID

OR outer ring

OR	outer ring	
OS&Y	outside screw and yoke	
PBE	plain both ends	
PE	plain end	
PPL	Polyphenyl	
PSB	pressure seal bonnet	
PSE	plain small end	
R ₂	55° taper pipe external thread	55°
R _c	55° taper pipe internal thread	55°
RED	reduced	
RF	raised face	
RJ	ring joint face	
TB	threaded bonnet	
TBE	threaded both ends	
TEMP	temperature	
TFWT	tolerance for wall thickness	
THR	thread	
TOE	threaded one end	
TRI-ECC	TRI-eccentric	
SAW	submerged arc weld	
SMLS	seamless	
SO	slip-on	
SR	short radius	
STL	stellite	
SS	stainless steel	
SW	socket welding	
WN	welding neck	