

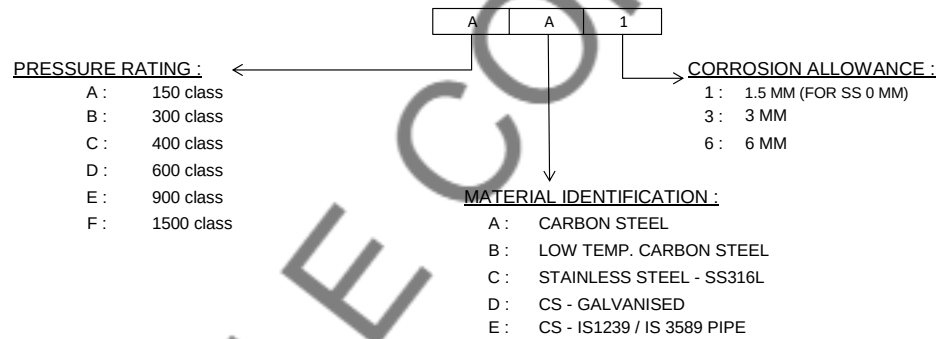
Piping Specification : Index, Notes, Abbreviations

Pipe Class Index :

Pipe Class	Fluids	MOC	Design Conditions		Corr.Allw. (mm)
			Pressure kg/cm ² (g)	Temperature (°C)	
AA3	Process , Closed Drain, Effluent Water, Chemical, Fuel Gas, Flare, Diesel Fuel, Raw Water, Fire Water, Service Water, Treated Water.	CS	18.75	65	3.0
AD1	Instrument Air, Utility Air.	CS-Gal.	18.75	65	1.5
BA3	Process, Chemical	CS	46.6	65	3.0
FA3	Process	CS	163.4	65	3.0
FA6	Process	CS	161.7	65	6.0
AC1	Chemical	CS	18.08	65	0
BC1	Chemical	CS	47.25	65	0

Notes :

1) Pipe Class Designation



2) REFERRED CODES & STANDARDS

2.1

All Piping shall be designed in accordance with the Process Piping Code, ASME B31.3, edition 2012.

2.2

For the sake of brevity, the initials of the society to which the codes are referred to may be omitted in the specification. For example; B16.5 is a code referring to ASME; A106 is a standard referring to ASTM.

3) MATERIAL SPECIFICATIONS

3.1

Individual piping Class has been generally designed to cover a set of services operating within pressure-temp. combination as per ASME B16.5 / B16.34 or part of it.

3.2

The PMS shall be strictly adhered to in the design, requisitioning, purchasing, fabrication and testing of the piping system. However, deviations of material may occur due to design conditions and/or availability. All substitutions must be duly approved.

3.3

Unless mentioned otherwise, pipe thicknesses in the specs are for above ground piping.

3.4

Materials shall be new and unused, clean and free from rust, pits and obvious defects. Material older than one year from date of manufacturing shall not be permitted.

3.5

Cast, ductile or malleable iron, aluminum, copper, or copper-bearing alloys shall not be used in hydrocarbon service.

4) PIPES

4.1

Pipe dimension shall be in accordance with ASME B36.10, IS:1239 & IS:3589 for wrought steel and wrought iron pipe; to B36.10 / B36.19 for stainless steel pipe and respective ASTM Standard for non-ferrous and non-metallic pipes.

4.2

Pipe made by acid-bessemer process shall not be acceptable, steel pipe shall be made by open hearth, electric furnace or basic Oxygen process.

4.3

All pipe threads shall conform to ASME B1.20.1 except where otherwise noted.

4.4

Pipe thicknesses not covered in different classes of this specification shall be calculated to meet specific job requirement based on actual max. design condition to economise on thickness. However, in such cases the thickness shall be calculated at not less than 80% of class rating unless defined otherwise in the Job Engineering Design Basis (Piping).

4.5

Non-standard pipe sizes 1½", 2½", 3½", 5" and 22" shall not be treated as a part of this specification unless these sizes are separately called out.

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- 4.6 All CS Pipes shall be seamless up to 16". Above 16" pipes shall be SAW with 100% radiography. All stainless steel piping up to 8" shall be seamless. Above 8" shall be EFW with 100% radiography.
- 4.7 All pipes shall have bevel end for size equal to and above 2" and plain end below 2.
- 4.8 Galvanized pipe shall not be bent or welded. Piping requiring bending, welding or threading shall be galvanized after fabrication. All pipe fittings specified as galvanized shall be hot dip galvanized with a minimum of 763 grams of galvanizing material per square meter of surface area, in accordance with ASTM A123M/ASTM A153.
- 4.9 Minimum wall thickness of carbon steel & low alloy pipes, including corrosion allowance, shall be as following :
- DN 40 (1 1/2") or less – schedule 80
DN 50 (2") through DN 150 (6")- schedule 80
DN 200 (8") through DN 600 (24")- standard wall.
- 4.10 Threaded Piping shall not be used to carry hydrocarbons.
- 5) FLANGES
- 5.1 Flanges shall be in accordance with the following codes, except where otherwise noted:
- Upto 24" (150# -1500#) ASME B16.5
Upto 12" , 2500# ASME B16.5
Above 24" ASME B16.47 SERIES B
- Flanges to ASME B16.47 SERIES 'A' or any other standard (e.g. DIN, GOST, JIS etc.) may be specified to mate with equipment or valve flanges with the corresponding bolting.
- 5.2 Flanges shall be raised face up to #600 rating and shall be RTJ above #600 rating.
Finish of steel flange faces shall be as follows:
- Stock Finish : 1000 µin AARH max.
Serrated Finish / 125 AARH : Serrations with 125-250µin AARH Smooth finish /Smooth finish
63 AARH : 32 TO 63 µin AARH
- 5.3 ASME ring joint (RTJ) flanges shall have octagonal grooves conforming to ASME B16.5. API ring joint flanges shall conform to API specification 6A
- 5.4 Brinell hardness for RTJ groove shall be atleast 20 BHN more than that of corresponding gasket as specified.
- 5.5 Fig.8 blind and SPCR & BLN shall be as per B16.48 upto 24" (150-1500#) & upto 12" for 2500#.
- 5.6 The bolt-hole pitch circle diameter for orifice flanges DN50, DN80 and DN100 shall be 1.6 mm smaller than specified in ASME B16.5.
- 6) FITTINGS
- 6.1 Forged steel SW and threaded fittings shall be in accordance with ASME B16.11, unless otherwise specified. For items not covered under B16.11, reference may be made to BS 3799 or appropriate MSS-SP-Std.
- 6.2 BW Fittings shall be in accordance with ASME B16.9, unless otherwise specified.
- 6.3 Dimensions of steel BW fittings for sizes not covered in ASME B16.9 shall conform to MSS-SP-48
- 6.4 Usage of unions shall be restricted to utilities only.
- 6.5 The thickness of reducing fittings shall match the wall thickness of the higher schedule pipe wall. The fitting wall thickness shall be tapered on a 1:4 gradient to ensure that the pipefitting wall thickness matches the lower schedule pipe wall.
- 6.6 All 90° weld elbows shall be long radius, unless restricted by available space. Short radius (SR) welding elbows shall not be used unless absolutely required for clearance purpose with prior approval from the company. If short radius weld elbows are used, they shall be de-rated to 80% of the calculated allowable working pressure if subject to pulsations
- 6.7 Fittings DN40 (1 1/2 ") and smaller shall be socket weld except as dictated. Fittings DN50 (2") and larger shall be butt welded except as dictated. Miter joints shall not be used."
- 7) DELETED.
- 7.1 DELETED.
- 8) GASKETS
- 8.1 Gaskets for raised face flanges shall be spiral wound, non-asbestos filled, with 316 stainless steel in accordance with ASME B16.20, with the exception that compressed fibre gaskets complying with ASME B16.21 are acceptable for cooling water service.
- 8.2 Full-face gaskets for flat face flanges shall be made from 3-mm (1/8") thick compressed, oil-resisting non-asbestos sheets, or neoprene. Materials shall be specified in the pipe class data sheets.
- 8.3 Ring gasket for ring type joint shall be octagonal and shall be as per ASME B 16.20.
- 8.4 Rings for API 5000# flanges shall conform to API 6A. Type RX rings shall be used.

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- 9) **BOLTING**
- 9.1 All bolts shall conform to B18.2.1, nuts to be B18.2.2. Reference shall also be made to B16.5 for studs.
- 9.2 Threads shall be to coarse Thread Series, B1.1, having Class 2A allowances for bolts and studs, and Class 2B tolerance for nuts.
- 9.3 Nuts for Bolts and Studs shall be the American Standard Hexagon Heavy Series.
- 10) **THREADS**
- 10.1 Threads for threaded Pipes, Fittings, Flanges and Valves shall be in accordance with B1.20.1 taper threads, unless otherwise specified.
- 10.2 Upto 204 deg.C, threaded joints shall be made with 1" width PTFE joining tape.
- 10.3 Above 204 deg.C, threaded joints shall be seal welded with a full strength fillet weld.
- 10.4 All threaded joints irrespective of pressure and temperature on lines carrying toxic fluid shall be seal welded with a full strength fillet weld.
- 11) **VALVES**
- 11.1 Face to Face / End to End dimension of valves shall conform to B16.10 to the extent covered. For valves not covered in B16.10, reference shall be made to BS 2080 and / or the manufacturer's drawings.
- 11.2 Flange / weld ends of the valve shall be as per the corresponding Flange / Fitting ends of the piping class, unless otherwise specified.
- 11.3 Pressure-temperature rating for flanged and butt welding end valves shall be as per ASME B16.34 except for ball, plug & butterfly valves. Wall thickness of valve body at different locations should not be less than as calculated as per B16.34.
- 11.4 Unless called-out specifically, valves shall be as per the following Standards:

Valve	Size	Rating	Des. Std.	Testing Std.
Gate	1/2"- 1-1/2"	800 / 1500	API-602	API-598/BS EN ISO 12266
Globe / Check	-do-	800 / 1500	BS EN ISO 15761	API-598/BS EN ISO 12266
Gate	2"-24"	150 / 300 / 600 / 900 / 1500 / 2500	API-600	API-598/BS EN ISO 12266
Globe	2"-8"	150 / 300 / 600 / 900 / 1500 / 2500	BS-1873	API-598/BS EN ISO 12266
Check	2"-24"	-do-	BS-1868	API-598/BS EN ISO 12266
Ball	1/2"- 1 1/2"	150 / 300 / 600 / 800	BS EN ISO 17292	API-598/BS EN ISO 12266
	2"-16"		BS EN ISO 17292 /	
	2"-16"	900 / 1500	API 6D	API-598/BS EN ISO 12266
Plug	1/2"-12"	All	API-599 / BS 5353	API-598/BS EN ISO 12266
Butfly	3" & above	All	API-609 / BS EN 593 / AWWA C504	API-598 / BS EN ISO 10497 Pt-I/ AWWA
Diaphram	ALL	-	BS EN 13397	BS EN ISO 10497 Pt-I
Bronze			RELEVANT IS STD.	RELEVANT IS STD.
Cast Iron			RELEVANT IS STD.	RELEVANT IS STD.

- 11.5 For details of the valves specifications refer valve material specification Doc. No. BKGP-SBK-PP-DO-VMS-A-202.

Piping Specification : Index, Notes, Abbreviations

Abbreviation :

CA	:	Corrosion Allowance
EFW	:	Electric Fusion Welded
ERW	:	Electric Resistance Welded
MT	:	Magnetic Particle Testing
NDE	:	Non Destructive Examination
PT	:	Penetrant Testing.
PWHT	:	Post Weld Heat Treatment
RF	:	Raised Face
RT	:	Radiographic Testing
SCRF	:	Screwed Female
SCRM	:	Screwed Male
SMLS	:	Seamless
UT	:	Ultrasonic Teesting

References :

Spec No. 2007A : Functional Specification for Onshore Piping Design

Hold :



Rev. No.	Description	Prepared By	Checked By	Approved By
A	Issued For Approval	SSD	DRS	PVP
B	Issued For Approval	SSD	DRS	PVP
0	Approved For Construction	DRS	SSD	PVP
1	AC1, BC1 added	DRS	SSD	PVP
2	Marked as  and reissued	DRS	SSD	PVP

			Piping Class : AA3					Fluid: Process , Closed Drain, Effluent Water, Chemical, Fuel Gas, Flare, Diesel Fuel, Raw Water, Fire Water, Service Water, Treated Water.										
Range of Validity	CLASS 150			Design Code : ASME B 31.3 - 2012						Sealing Surface: RF, 125 AARH, ASME B 16.5								
	Temp. °C	-29		65			T = 65°C; P = 18.75 kg/cm ² (g); CA= 3 mm; thk Tol = ±12.5% ; Thrd All = 0 mm											
Operating Range	Pres. (kg/cm ² (g))	19.6		18.75														
Nominal Diameter DN		15	20	25	40	50	80	100	150	200	250	300	350	400	450	500	600	
Nominal Pipe Size NPS		1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	
Dimensions: Pipe		OD mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.0	323.8	355.6	406.4	457	508	610
		thk mm	3.73	3.91	4.45	5.08	5.54	7.62	8.56	10.97	8.18	9.27	9.53	9.53	-	-	-	-
		SCH	80	80	80	80	80	80	80	80	80	STD	STD	STD	STD	-	-	-
Piping Component		Nom. dia. from to		Class / Sch	Standard			Material		Tech. delivery specification			End Connection		Remark			
PIPE & PIPE FITTINGS																		
Pipe		15-40		Sch 80	ASME B36.10			A106 Gr B		ASTM A106 / ASME B36.10			Plain End		Seamless			
		50-150		Sch 80									Bevel End					
		200-350		Sch STD														
Elbow 45°		15-40		CL 3000	ASME B16.11			A105		ASTM A105 / ASME B16.11			Socket End		Seamless			
		50-150		Sch 80	ASME B16.9			A234 Gr WPB		ASTM A234 / ASME B16.9			Bevel End					
		200-350		Sch STD														
Elbow 90°		15-40		CL 3000	ASME B16.11			A105		ASTM A105 / ASME B16.11			Socket End		Seamless			
		50-150		Sch 80	ASME B16.9			A234 Gr WPB		ASTM A234 / ASME B16.9			Bevel End					
		200-350		Sch STD														
Swaged Nipple Concentric		15-40		Sch 80	MSS-SP 95			A105		ASTM A105 / MSS-SP 95			Socket End		Seamless			
Reducer Concentric		50-150		Sch 80	ASME B16.9			A234 Gr WPB		ASTM A234 / ASME B16.9			Bevel End		Seamless			
		200-350		Sch STD														
Swaged Nipple Eccentric		15-40		Sch 80	MSS-SP 95			A105		ASTM A105 / MSS-SP 95			Socket End		Seamless			
Reducer Eccentric		50-150		Sch 80	ASME B16.9			A234 Gr WPB		ASTM A234 / ASME B16.9			Bevel End		Seamless			
		200-350		Sch STD														
Half Coupling		15-40		CL 3000	ASME B16.11			A105		ASTM A105 / ASME B16.11			Socket End					
Full Coupling		15-40		CL 3000	ASME B16.11			A105		ASTM A105 / ASME B16.11			Socket End					
Tee Equal		15-40		CL 3000	ASME B16.11			A105		ASTM A105 / ASME B16.11			Socket End		Seamless			
		50-150		Sch 80	ASME B16.9			A234 Gr WPB		ASTM A234 / ASME B16.9			Bevel End					
		200-350		Sch STD														
Tee Reduced		15-40		CL 3000	ASME B16.11			A105		ASTM A105 / ASME B16.11			Socket End		Seamless			
		50-150		Sch 80	ASME B16.9			A234 Gr WPB		ASTM A234 / ASME B16.9			Bevel End					
		200-350		Sch STD														
End Cap		15-40		CL 3000	ASME B16.11			A105		ASTM A105 / ASME B16.11			Socket End		Seamless			
		50-150		Sch 80	ASME B16.9			A234 Gr WPB		ASTM A234 / ASME B16.9			Bevel End					
		200-350		Sch STD														
Slip-On Flange		15-350		CL 150	ASME B16.5			A105		ASTM A105 / ASME B16.5			Raised Face					
Fig 8. Blank		15-350		CL 150	ASME B16.48			A516 GR 70		ASTM A516 / ASME B16.48			Raised Face					
Blind Flange		15-350		CL 150	ASME B16.5			A105		ASTM A105 / ASME B16.5			Raised Face					
Gate Valve		15-40		CL 800	API 602 / ASME B16.34			A105		API 602 / ASME B16.34			Socket End		Trim 13% Cr			
		50-350		CL 150	API 600 / ASME B16.34			A216 Gr WCB		API 600 / ASME B16.34			Flanged End					
Ball Valve		15-40		CL 800	BS EN ISO 17292 / ASME B16.34			A105		BS EN ISO 17292 / ASME B16.34			Socket End		Ball : SS316, Seat : PTFE, Fire Safe Design			
		50-350		CL 150	API 6D / ASME B16.34			A216 Gr WCB		API 6D / ASME B16.34			Flanged End					
Lift Check Valve		15-40		CL 800	BS EN ISO 15761 / ASME B16.34			A105		BS EN ISO 15761 / ASME B16.34			Socket End		Trim 13% Cr			
Swing Check Valve		50-350		CL 150	BS 1868 / ASME B16.34			A216 Gr WCB		BS 1868 / ASME B16.34			Flanged End		Trim 13% Cr			
Globe Valve		15-40		CL 800	BS EN ISO 15761 / ASME B16.34			A105		BS EN ISO 15761 / ASME B16.34			Socket End		Trim 13% Cr			
		50-350		CL 150	BS 1873 / ASME B16.34			A216 Gr WCB		BS 1873 / ASME B16.34			Flanged End					
Y- Type Strainer		15-40		CL 800	MFG STD			A105		MFG STD			Socket End		SS 316 Internals Mesh Size 40			
		50-350		CL 150	MFG STD			A216 Gr WCB		MFG STD			Flanged End					
Spiral Wound Gasket		15-350		CL 150	ASME B16.20			SS 316 + Graphite filled		ASME B16.20			---					
Fasteners		15-350		CL 150	ASME B18.2.1 / ASME B18.2.2			A193 Gr B7 / A194 Gr 2H		ASTM A193 / ASTM A194			---					
1) NDE Radiography shall be as per below table. For fillet welds DP Test shall be carried out to the extent given below:																		
		Process, Flare, Fuel Gas			OTHERS													
		50NB & ABOVE		LESS THAN 50NB		ALL SIZES												
		50%		10%		10%												
		50%		10%		10%												
		100%		100%		100%												
2) Hydrostatic Test Pressure : 29.4 ka/cm ² (a)																		
Rev. No.	Description							Prepared By			Checked By			Approved By				
A	Issued For Approval							DRS			SSD			PVP				
B	Issued For Approval							DRS			SSD			PVP				
0	Approved For Construction							DRS			SSD			PVP				

Piping Class : AA3

Fluid: Process , Closed Drain, Effluent Water,
Chemical, Fuel Gas, Flare, Diesel Fuel, Raw Water,
Fire Water, Service Water, Treated Water.

Branch Table

	DN	TO	15	20	25	32	40	50	65	80	90	100	125	150	200	250	300	350	400	450	500	550	600
	BRANCH																						
H E A D E R	15		T																				
	20		TR	T																			
	25		TR	TR	T																		
	32		--	--	--	--																	
	40		TR	TR	TR	--	T																
	50		H	TR	TR	--	TR	T															
	65		--	--	--	--	TR	TR	--														
	80		H	H	H	--	TR	TR	--	T													
	90		--	--	--	--	--	--	--	--	--												
	100		H	H	H	--	TR	TR	--	TR	--	T											
	125		--	--	--	--	--	--	--	--	--	--	--										
	150		H	H	H	--	H	P	--	TR	--	TR	--	T									
	200		H	H	H	--	H	P	--	P	--	TR	--	TR	T								
	250		H	H	H	--	H	P	--	P	--	TR	--	TR	TR	T							
	300		H	H	H	--	H	P	--	P	--	P	--	TR	TR	TR	T						

LEGEND

T	Tee Equal ASME B 16.9/ B 16.11	TR1	Tee Reduced Special
T1	Tee Equal Special	RP	Branch with Reinforced Pad R.PAD = 2xBRANCH DIA. : THK = HEADER THK
TR	Tee Reduced ASME B 16.9/B16.11	H	Half coupling
P	Pipe-To-Pipe		

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0	Approved For Construction	DRS	SSD	PVP