Piping for PBC(S)

Pipe ID: 11

Pipe Material Specification: 4AA2

Pipe Material

Minimum Pipe OD	Maximum Pipe OD	Pipe Material	Pipe Schedule
1/2"	1-1/2"	A106 Grade B	160
2"	8"	A106 Grade B	Special
10"	42"	A53 Type E Grade B (seamless or ERW)	Calculated

Pipe Nipples

Tubing for PBC(S)

Tube ID: 4

Notes: All fittings to be compression type. Pressure and temperature to be the same as the pipe. Tubing maybe tested pneumatically using air at 15 psig. All pipe fiitings to be the same as pipe specification. This spec starts at first block valve off header, instrument run can have no more than two instrumentation take offs.

Tube Material

Tube Size	Tube Wall Thickness	Tube Material
1/4"	.083"	316ss SA213-TP316 seamless Hardness Rb 80 max
3/8"	.035"	316ss SA213-TP316 seamless Hardness Rb 80 max
1/2"	.049"	

Tube Valves

Valve Type	Valve Body Material	Valve Manufacture	Model Number
316ss	Gate	Swagelok	N series class 2500
Alloy 20	Globe	Whitey	

Fittings for PBC(S)

NOTE: Fittings applies to:
90deg Elbows,
45deg Elbows,
Tees,
Couplings
and Laterals

ID	Fitting Code	Material Specification
74	FC.4.8.4.6.7.9.15.3.8.7.16.20.3.7.4	1AG2

Min. Pipe Diameter	Max. Pipe Diameter	End Connections	Material	Schedule Class
1/2"	1-1/2"	Socket Welded	A105	3000
2"	6"	Butt Welded	A234 - WPB - W	40/Std *
8"	16"	Butt Welded	A234 - WPB - S	20

Flanges for PBC(S)

ID	Flange Code	Material Specification
10	FC.6.9.2.1.6.1.11.15.1.1.6.1.16.18.1.6.6.1	1AG2

Min. Pipe Diameter	Max. Pipe Diameter	Flange Style	Flange Face	Material	Schedule Class
1"	2"	Slip On	Raised Face	A105	150
3"	6"	Weld Neck	Raised Face	A105	150
8"	12"	Weld Neck	Raised or Flat Face	A105	150

Orifice Flanges for PBC(S)

ID	Orifice Flange Code	Material Specification
9	OC.6.11.1.1.6.2.13.17.1.1.6.3	1AG2

Min. Pipe Diameter	Max. Pipe Diameter	Flange Style	Flange Face	Material	Schedule Class
1"	3"	Weld Neck	Raised Face	A105	300
4"	10"	Weld Neck	Raised Face	A105	600

Unions for PBC(S)

ID	Union Code	Material Specification
8	UC.6.11.4.1.6.7	1AG2

Min. Pipe Diameter	Max. Pipe Diameter	Flange Style	Flange Face	Material	Schedule Class
1"	3"	Socket Welded	Stellite 6	A105	3000

O Lets for PBC(S)

ID	Olet Code	Material Specification
21	OC.1.3.1.1.6.2	1AG2

Min. Pipe Diameter	Max. Pipe Diameter	Flange Style	Flange Face	Material	Schedule Class
1/8"	3/8"	1/8"	Sock-O-Let	A105	3000 #

Groove Clamps for PBC(S)

ID	Groove Clamp Code	Material Specification
3	GC.1.4.1.2.3.2.6	1AG2

Min. Pipe Diameter	Max. Pipe Diameter	Schedule	Groove Type	Style	Seal Material	Clamp Material
1/8"	1/2"	5 S	Rolled	77 Flexible Coupling	Nitrile - HMT	A105

Gate Valve for PBC(S)

ID	Valve Code	Rating Designation	Minimum Pipe Size	Maximum Pipe Size	End Connection	Matr Type Designation	Body Material
98	GT.1.10.18.1.A.2.1.1.1.1.1.1.5	150	2-1/2"	12"	Flanged	Carbon steel	A216-WCB
99	GT.1.4.9.1.A.1.1.1.2.1.1.1.5	150	1/2"	2"	Flanged	Carbon steel	A105
100	GT.1.4.9.2.A.1.1.1.2.1.1.1.5	150	1/2"	2"	Threaded	Carbon steel	A105
102	GT.1.4.9.3.A.1.1.1.2.1.1.1.5	150	1/2"	2"	Butt Welded	Carbon steel	A105

ID	Wedge Material	Stem Material	Stem Packing Gasket	Bonnet Type	Seat Material	Wedge Type	Porting	Notes
98	13 Cr	13Cr	Exfoliated graphite packing rings. 304ss spiral wound exfoliated graphite filled body gasket. Corrugated or flat metal gaskets maybe substituted for the spiral wound gasket, for class 150 only.	Bolted	Stellite 6	Flexible	Regular	To be dsigned,constructed and tested to API 600 or API 602 requirements. Small bore vales maybe ANSI Class 800.
99	13 Cr	13Cr	Exfoliated graphite packing rings. 304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	Flexible	Regular	To be dsigned,constructed and tested to API 600 or API 602 requirements. Small bore vales maybe ANSI Class 800.
100	13 Cr	13Cr	Exfoliated graphite packing rings. 304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	Flexible	Regular	To be dsigned,constructed and tested to API 600 or API 602 requirements. Small bore vales maybe ANSI Class 800.
102	13 Cr	13Cr	Exfoliated graphite packing rings. 304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	Flexible	Regular	To be dsigned,constructed and tested to API 600 or API 602 requirements. Small bore vales maybe ANSI Class 800.

ID	Valve Code	Rating Designation	Minimum Pipe Size	Maximum Pipe Size	End Connection	Matr Type Designation	Body Material
103	GT.1.10.18.2.A.2.1.1.1.1.1.1.5	150	2-1/2"	12"	Threaded	Carbon steel	A216-WCB

ID	Wedge Material	Stem Material	Stem Packing Gasket	Bonnet Type	Seat Material	Wedge Type	Porting	Notes
103	13 Cr	13Cr	Exfoliated graphite packing rings. 304ss spiral wound exfoliated graphite filled body gasket. Corrugated or flat metal gaskets maybe substituted for the spiral wound gasket, for class 150 only.	Bolted	Stellite 6	Flexible	Regular	To be dsigned,constructed and tested to API 600 or API 602 requirements. Small bore vales maybe ANSI Class 800.

Globe Valve for PBC(S)

ID	Valve Code	Rating Designation	Minimum Pipe Size	Maximum Pipe Size	End Connection	Matr Type Designation	Body Material
17	GL.1.4.9.1.A.1.1.1.2.1.1	150	1/2"	2"	Flanged	Carbon steel	A105
18	GL.1.4.9.2.A.1.1.1.2.1.1	150	1/2"	2"	Threaded	Carbon steel	A105
19	GL.1.4.9.3.A.1.1.1.2.1.1	150	1/2"	2"	Butt Welded	Carbon steel	A105
20	GL.1.10.18.1.A.2.1.1.2.1.1	150	2-1/2"	12"	Flanged	Carbon steel	A216-WCB

ID	Plug Material	Stem Material	Stem Packing Gasket	Bonnet Type	Seat Material	Notes
17	13 Cr	13Cr	Exfoliated graphite packing rings. 304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.
18	13 Cr	13Cr	Exfoliated graphite packing rings. 304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.
19	13 Cr	13Cr	Exfoliated graphite packing rings. 304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.

20	13 Cr	13Cr	Exfoliated graphite packing rings. 304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.

ID	Valve Code	Rating Designation	Minimum Pipe Size	Maximum Pipe Size	End Connection	Matr Type Designation	Body Material
21	GL.1.10.18.2.A.2.1.1.2.1.1	150	2-1/2"	12"	Threaded	Carbon steel	A216-WCB

ID	Plug Material	Stem Material	Stem Packing Gasket	Bonnet Type	Seat Material	Notes
21	13 Cr	13Cr	Exfoliated graphite packing rings. 304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.

Plug Valve for PBC(S)

ID	Valve Code	Rating Designation	Minimum Pipe Size	Maximum Pipe Size	End Connection	Matr Type Designation	Body Material
6	PG.1.4.16.1.A.12.4.4.8.2.1.5	150	1/2"	8"	Flanged	Carbon steel	A105 or A216 WCB
10	PG.1.4.9.3.A.12.4.4.8.2.1.5	150	1/2"	2"	Butt Welded	Carbon steel	A105 or A216 WCB

ID	Plug Material	Stem Material	Stem Packing Gasket	Body Type	Sleeve Material	Porting	Notes
6	A182-316	A182-316	PTFE diaphragm, packing and gasket. Adjustable packing.	Top entry	PTFE	Regular	To meet ASME/ANSI B16.34 pressure temperature ratings and shell tests. Seats to meet API 608 pressure temperature ratings. All plug valves sahll have electrical continuity between the valve stem and valve body. Plugs to be tapered.
10	A182-316	A182-316	PTFE diaphragm, packing and gasket. Adjustable packing.	Top entry	PTFE	Regular	To meet ASME/ANSI B16.34 pressure temperature ratings and shell tests. Seats to meet API 608 pressure temperature ratings. All plug valves sahll have electrical continuity between the valve stem and valve body. Plugs to be tapered.

Ball Valve for PBC(S)

ID	Valve Code	Rating Designation	Minimum Pipe Size	Maximum Pipe Size	End Connection	Matr Type Designation	Body Material
8	BL.1.4.13.1.A.12.4.4.17.1.2.5	150	1/2"	4"	Flanged	Carbon steel	A105 or A216 WCB
9	BL.1.4.13.2.A.12.4.4.17.1.2.5	150	1/2"	4"	Threaded	Carbon steel	A105 or A216 WCB
10	BL.1.4.13.3.A.12.4.4.17.1.2.5	150	1/2"	4"	Butt Welded	Carbon steel	A105 or A216 WCB

ID	Ball Material	Stem Material	Stem Packing Gasket	Body Type	Seat Material	Porting	Notes
8	A182-316	A182-316	PTFE packing rings, 304SS spiral wound PTFE filled body gasket.	Split, Top entry, End entry, 3 piece or 1 piece.	Glass Reinforced TFE	Regular	To be designed, constructed and tested to ASME/ANSI B16.34 and API 608 requirements. ASME/ANSI B16.34 shall supercede API 608 if needed. All valves shall have electrical continuity between the valve stem and valve body.
9	A182-316	A182-316	PTFE packing rings, 304SS spiral wound PTFE filled body gasket.	Split, Top entry, End entry, 3 piece or 1 piece.	Glass Reinforced TFE	Regular	To be designed, constructed and tested to ASME/ANSI B16.34 and API 608 requirements. ASME/ANSI B16.34 shall supercede API 608 if needed. All valves shall have electrical continuity between the valve stem and valve body.
10	A182-316	A182-316	PTFE packing rings, 304SS spiral wound PTFE filled body gasket.	Split, Top entry, End entry, 3 piece or 1 piece.	Glass Reinforced TFE	Regular	To be designed, constructed and tested to ASME/ANSI B16.34 and API 608 requirements. ASME/ANSI B16.34 shall supercede API 608 if needed. All valves shall have electrical continuity between the valve stem and valve body.

Piston Check Valve for PBC(S)

ID	Valve Code	Rating Designation	Minimum Pipe Size	Maximum Pipe Size	End Connection	Matr Type Designation	Body Material
14	PC.1.4.9.1.A.1.1.1.12.1.1	150	1/2"	2"	Flanged	Carbon steel	A105
15	PC.1.4.9.2.A.1.1.1.12.1.1	150	1/2"	2"	Threaded	Carbon steel	A105
16	PC.1.4.9.3.A.1.1.1.12.1.1	150	1/2"	2"	Butt Welded	Carbon steel	A105
17	PC.1.10.18.1.A.2.1.1.12.1.1	150	2-1/2"	12"	Flanged	Carbon steel	A216-WCB

ID	Ball Material	Spring Material	Stem Packing Gasket	Bonnet Type	Seat Material	Notes
14	13 Cr	302ss	304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.
15	13 Cr	302ss	304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.
16	13 Cr	302ss	304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.

17	13 Cr	302ss	304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.

ID	Valve Code	Rating Designation	Minimum Pipe Size	Maximum Pipe Size	End Connection	Matr Type Designation	Body Material
18	PC.1.10.18.2.A.2.1.1.12.1.1	150	2-1/2"	12"	Threaded	Carbon steel	A216-WCB

ID	Ball Material	Spring Material	Stem Packing Gasket	Bonnet Type	Seat Material	Notes
18	13 Cr	302ss	304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.

Swing Check Valve for PBC(S)

ID	Valve Code	Rating Designation	Minimum Pipe Size	Maximum Pipe Size	End Connection	Matr Type Designation	Body Material
28	SC.1.4.9.1.A.1.1.1.12.1.1	150	1/2"	2"	Flanged	Carbon steel	A105
29	SC.1.4.9.2.A.1.1.1.21.1.1	150	1/2"	2"	Threaded	Carbon steel	A105
30	SC.1.4.9.3.A.1.1.1.12.1.1	150	1/2"	2"	Butt Welded	Carbon steel	A105
31	SC.1.10.18.1.A.2.1.1.12.1.1	150	2-1/2"	12"	Flanged	Carbon steel	A216-WCB

ID	Disc Material	Pin Material	Stem Packing Gasket	Bonnet Type	Seat Material	Notes
28	13 Cr	13 Cr	304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.
29	13 Cr	13 Cr	Exfoliated graphite packing rings. 316ss spiral wound exfoliated graphite filled body gasket. Corrugated or flat metal gaskets maybe substituted for the spiral wound gasket, for class 150 only. Stem packing is to be "Live Loaded".	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.

30	13 Cr	13 Cr	304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.
31	13 Cr	13 Cr	304ss spiral wound exfoliated graphite filled body gasket.	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.

ID	Valve Code	Rating Designation	Minimum Pipe Size	Maximum Pipe Size	End Connection	Matr Type Designation	Body Material
32	SC.1.10.18.2.A.2.1.1.21.1.1	150	2-1/2"	12"	Threaded	Carbon steel	A216-WCB

ID	Disc Material	Pin Material	Stem Packing Gasket	Bonnet Type	Seat Material	Notes
32	13 Cr	13 Cr	Exfoliated graphite packing rings. 316ss spiral wound exfoliated graphite filled body gasket. Corrugated or flat metal gaskets maybe substituted for the spiral wound gasket, for class 150 only. Stem packing is to be "Live Loaded".	Bolted	Stellite 6	To be designed, constructed and tested to ASME/ANSI B16.34 requirements. Small bore valves maybe ANSI Class 800.

Butterfly Valves have not been set up.

Gasket Packs for PBC(S)

ID	ANSI Class	Description	Notes
3	150	<12" NPS 304ss spiral wound with exfoliated graphite filler and carbon steel outer ring, >= 12" NPS add 304ss inner ring.	Alternate: 1/16" Gore-Tex GR, 1/16" Gore-Tex G2F or 1/16" Grafoil GHE 316ss tanged gasket.

Inspection Packs for PBC(S)

ID	Fluid Category	Enhanced Inspection	Notes
3	Innocuous	Visual inspection is to be completed to the extent to satisfy the examiner that B31.3 conformance is met.\r\nLesser of 5 psig or 25% of Design Pressure snoop test of random mechanical joints for vapour / gas commodities. 5% MT for carbon steel pipe \r\n5% PT for stainless steel pipe	In service visual inspection to be completed during initial commissioning of lines.

Paint Spec for PBC(S)

ID	Surface Prep	Base Coat	Final Coat	Color	Tagging	Notes
5	SSPC-SP 2	Primer	enamel	Light Blue	Commodity Code	as per manufacture recommendations

Fasteners for BFW-1AG2

Bolt Material	Nut Material
A320 - B8M (316SS)	A194 - 8MA
A193 - B8M (316SS)	A194 - 8MA

Weld Requirements for PBC(S)

These weld procedures are indicators only.
Actual details are needed from the WPS sheets.
Either supplied by the company or supplied by
the fabricator and approved by the company.

Process: GTAW (TIG) or SMAW (stick) root, GTAW (TIG) or SMAW (stick) fill and cap.

Notes: Test

Weld Procedure	Process	Weld Filler	Filler Group	Approved Thickness	Material	Position	Position Description	Welder Qualification Certificate Notes	Notes
WP309	GTAW (Tig) root, fill and cap.	ER70S-2	F6	1/16" to 0.43"	P1 / P1	6G	Pipe at 45 degree angle, weld deposited in vertical plane right angles to pipe		
WP305	GTAW (TIG) root, SMAW (stick) fill and cap.	E7018-1	F4	1/16" to 2.6"	P1 / P1	6G	Pipe at 45 degree angle, weld deposited in vertical plane right angles to pipe		

Specialty Items for PBC(S)

ID	Item Type	Description	Notes	Vendor	Part Number
8	Back Flow Preventor	Required on special tie points to main header, check valves are not accepted in this application.	Consult with operations regarding the need.	Velam	special specification
9	Expansion Joints	Rubber carcus with butal liner, c/w backing rings drilled to ANSI class 150	not to be used above 300 degrees farenheit	Petro Rubber	12-22

Commodity Notes for PBC(S)

ID	Category	Note
8	Branch Connections	USE FULL WRAP AROUND REINFORCEMENT FOR BRANCH CONNECTIONS WITH ACOUSTICALLY INDUCED VIBRATIONS. BRANCH WALL THICKNESS SHALL BE 2T A MINIMUM OF TWO BRANCH PIPE DIAMETERS FROM THE HEADER, WHERE T IS THE NORMAL BRANCH THICKNESS LISTED IN THIS SPECIFICATION. PIPING ENGINEERING SHALL VERIFY BRANCH WALL THICKNESS AND REINFORCEMENT REQUIREMENTS.
9	Branch Connections	INTEGRALLY REINFORCED BRANCH CONNECTIONS ARE PERMITTED OUTSIDE THE SIZES SHOWN IN THE BRANCH CONNECTION TABLE FOR SPECIAL APPLICATIONS (E.G., HOT TAP CONNECTIONS, ETC.). PIPING ENGINEERING SHALL CHECK WELD THICKNESS OF INTEGRALLY REINFORCED BRANCH TO DETERMINE IF PWHT IS REQUIRED.
11	Branch Connections	BRANCH PIPING NPS 1/2 TO 1 1/2 SHALL BE SCH 80S FROM RUN PIPE TO FIRST VALVE OR FITTING.
21	Ball Valve	FOR NON VACUUM SERVICES, BALL VALVES WITH RTFE SEATS ARE LIMITED TO 300 PSIG AT 350 DEG. F, 400 PSIG AT 300 DEG. F, AND 550 PSIG AT 250 DEG. F.
89	Fittings	USE SOCKETWELD PLUG ONLY TO JOIN DUMMY SUPPORTS TO SOCKETWELD TEE.

Insulation requirements for PBC(S)

ID:3
Insulation Code:IC.6.11.3.1.13.16.3.1.16.19.3.1.4.2.1.1.1
Jacketing: Paper/foil/scrim Laminate
Surface Prep: Hand Tool Cleaning
Insulation Class: Personnel Protection
Adhesive: Silicon
Sealer: Mastic
Note: None

Min. Dia	Max. Dia	Material	Thickness
1"	3"	Calcium Silicate	1"
4"	8"	Calcium Silicate	1"
8"	14"	Calcium Silicate	1"

Branch Connection Chart for PBC(S)

1"	ET															
1-1/4"	RT	ET														
1-1/2"	RT	RT	ET													
2"	RT	RT	RT	ET												
2-1/2"	RT	RT	RT	RT	ET											
3"	RT	RT	RT	RT	RT	ET										
3-1/2"	OL	OL	OL	OL	OL	RT	ET									
4"	OL	OL	OL	OL	OL	Eng	RT	ET								
5"	OL	OL	OL	OL	OL	Eng	Eng	RT	ET							
6"	OL	OL	OL	OL	OL	Eng	Eng	Eng	RT	ET						
8"	OL	OL	OL	OL	OL	Eng	Eng	Eng	Eng	RT	ET					
10"	OL	OL	OL	OL	OL	Eng	Eng	Eng	Eng	Eng	RT	ET				
12"	OL	OL	OL	OL	OL	Eng	Eng	Eng	Eng	Eng	Eng	RT	ET			
14"	OL	OL	OL	OL	OL	Eng	Eng	Eng	Eng	Eng	Eng	Eng	RT	ET		
16"	OL	OL	OL	OL	OL	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	RT	ET	
18"	OL	OL	OL	OL	OL	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	RT	ET
Run^	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"	5"	6"	8"	10"	12"	14"	16"	18"

Branch Connection Pipe OD

Allowed end connections for PBC(S) are Flanged, BW, SW & Slip On

LEGEND

ET - equal tee
RT - reducing tee
OL - O-Let (end connection and weight to be specified by commodity property)
BO - butt-on or set-on type fabrication, requires enginnering stamped approval
SW - sweep outlet requiring engineering design and approval
Eng - special engineering designed connection excluding Hot Tapes