CS
Carbon Steel Piping

Service:	Service Water, Utility Air, Lube Oil	
General Material:	Carbon Steel ANSI Class 150	Corrosion Allowance: 0.1”
Maximum Allowable: Operating Pressure	285 psig @ –20 to 100ºF	Code: ASME B31.1

Item	Size	Description
Pipe:	2” and smaller	Carbon Steel, ASTM A106, Grade B, Seamless, Schedule 80, PE
	3” to 18 ”	ASTM A53, Grade B, Type E (welded), Standard Wall, Beveled ends (Note 4)
Fittings:	2” and Smaller	ASTM A105 Forged Carbon Steel, Class 3000, Socket Weld Ends, in accordance with ASME B16.11
	3 ” to 18”	ASTM A234 Gr. WPB Carbon Steel, Welded, Buttweld Ends, Wall Thickness to Match Pipe, in accordance with ASME B16.9 (Note 4)
Flanges:	2” and Smaller	ASTM A105, Forged Carbon Steel, Class 150, Raised Face, Socket Weld, Same Bore as Matching Pipe, in accordance with ASME B16.5. (Note 1)
	3” to 18 ”	ASTM A105, Forged Carbon Steel, Class 150, Raised Face, Slip-on (Note 2), in accordance with ASME B16.5. (Note 1)
	3” to 18 ”	ASTM A105, Forged Carbon Steel, Class 150, Raised Face, Weld-neck (Note 2), Same bore as matching pipe, in accordance with ASME B16.5. (Note 1)

Gaskets:	All	Spiral Wound Stainless Steel with Graphite Non-Asbestos Filler, Flat Ring, Dimensional Requirements per ANSI B16.21, 1/16” thick after compression (Note 3)
Bolting:		
Stud Bolts	All sizes	Continuously Threaded, ASTM A193, Grade B7, Dimensional Requirements per ANSI B18.2.1
Nuts:	All sizes	ASTM A194, Grade 2H, Semi-finished, Heavy Hex Series, Dimensional Requirements per ANSI B18.2.2
Unions:	2” and Smaller	Forged Carbon Steel, ASTM A105, 3000#, Socket Weld, Integral Seat and Ground Joint Construction
Joints:	2” and Smaller	Socket Weld, Dimensional Requirements per ANSI B16.11
	3” to 18”	Butt Weld
Welded Outlet Fittings:	2” and Smaller	ASTM A105, Forged, Class 3000, Integrally reinforced, Socket-weld (Sockolet), Same bore as matching pipe, in accordance with MSS SP-97
	3” to 18”	ASTM A105, Forged, Class 3000, Integrally reinforced, Butt-weld (Weldolet), Same bore as matching pipe, in accordance with MSS SP-97
Branch Connections:	ALL	See Branch Connection Table CS
Swage Nipples:	2” and Smaller	ASTM A234, Grade WPB, Schedule 80, Plain ends, in accordance with MSS SP-95
Plugs	2” and Smaller	ASTM A105, Solid, Hex Head, Threaded, in accordance with ASME B16.11

Valves:

Ball Valves	2” and Smaller	1000 psig CWP, Socket Weld or Socket Weld x Threaded, Carbon Steel Body, 316 SS Ball and Stem, Reinforced TFE Seat and Packing/Seals, Hand Lever Operated, Three Piece Body, Full Port, Floating Ball, Jamesbury Series 4000, McCanna/Marpac TRI-PAC E525, Nibco 590-CS Series, Worcester Series 59, or approved equal.
	3” and Larger	ANSI Class 150, Raised Face Flanges, Carbon Steel Body, 316 SS Ball and Stem, Reinforced TFE Seat and Packing/Seals, Hand Lever Operated to 6”, Geared Handwheel 8” and Above, Two Piece Split Body, Full Port, Floating Ball, Jamesbury Series 9000, McCanna/Marpac E Series, or approved equal.
Butterfly:	3” and Larger	Mosites C Series Butterfly Valve, 150 psi rating, Carbon Steel ASTM A216 Grade WCB Body, Rubber-Lined Carbon Steel Disc, Lug Style, Mosites Model C10 or approved equal
Check Valves	2” and Smaller	ASME Class 800, Socket Weld, Swing Check, Forged Carbon Steel Body, 13% Chrome (410 SS) Disk and SS Pin, Hard Faced Seat Ring, Graphite Packing/Gasket, Bolted Cover, Configured for both Horizontal and Vertical Upward Flow, Velan 114B, Vogt SWS701, or approved equal.
	3” and Larger	ASME Class 150, Raised Face Flanges, Swing Check, Cast Carbon Steel Body, 13% Chrome (410 SS) Disk and SS Pin, Hard Faced Seat Ring, Graphite Packing/Gasket, Bolted Cover, Configured for both Horizontal and Vertical Upward Flow, Velan 114C, Crane 147, Kitz 150SCO, or approved equal.

Notes:

(1) Use flat faced (FF) flanges when bolting to FRP, cast or ductile iron flanges (not applicable to wafer body valves).

(2) Use weld-neck flanges only when welding to fittings.

(3) Full faced gaskets shall be used with flat faced (FF) flanges

(4) Welded pipe and fittings shall be heat treated in accordance with the ASTM standard specification.

BRANCH CONNECTION TABLE CS

TABLE CS LEGEND	
SOL	Socket-weld (Sockolet) Integrally Reinforced Outlet Connection
WOL	Butt-weld (Weldolet) Integrally Reinforced Outlet Connection
S	Stub-on (Note 2 & 3)
RS	Reinforced Stub-on (Note 2, 3 & 4)
T	Tee
RT	Reducing Tee

BRANCH - NPS	18	16	14	12	10	8	6	4	3	2	1 ½	1	¾	½
18	T													
16	RT	T												
14	RT	RT	T											
12	RT	RT	RT	T										
10	RT	RT	RT	RT	T									
8	RT	RT	RT	RT	RT	T								
6	WOL	WOL	WOL	RT	RT	RT	T							
4	WOL	WOL	WOL	WOL	WOL	WOL	RT	T						
3	WOL	WOL	WOL	WOL	WOL	WOL	RT	RT	T					
2	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	T				
1 ½	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	RT	T			
1	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	RT	RT	T		
¾	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	RT	RT	RT	T	
½	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	RT	RT	T
	18	**16**	**14**	**12**	**10**	**8**	**6**	**4**	**3**	**2**	**1 ½**	**1**	**¾**	**½**

HEADER – NPS

BRANCH NOTES:

(1) This table is provided for 90° branch connections only. Branch connections other than 90° shall be as specified on the design drawings. Table is to be used for the pipe sizes allowed in the material class.

(2) Although not shown in the table, integrally reinforced outlet connections (Weldolets) may be used in lieu of stub-ons when specified for all 3-inch NPS and larger branches as approved for use by ADVATECH.

(3) Reducing tees may be substituted in lieu of stub-on connections and reinforcing pads provided their use is economically justified or if necessary to provide increased flexibility and their use is specified or approved by ADVATECH.

(4) Re-pad thickness to match the header pipe wall thickness or the next larger plate thickness. Re-pad outside (largest) diameter (O.D.) shall be two times the branch pipe O.D. at a minimum.