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3	A01DA1CA	X					21							
4	A01DA1E	X					22							
5	A01DA1EA	X					23							
6	A01SC1B	X	X				24							
7	A01SC1BA	X					25							
8	A01SC1BX	X					26							
9	A01SC1SAX	X	X				27							
10	A01SC1SX	X	X				28							
11	A01SC2C	X					29							
12	A03AB1SX	✕					30							
13	A03AB1SAX	X					31							
14	A03DA1C	X					32							
15	A03SC1B	X					33							
16	A03SC1SX	✕					34							
17	A03SC1SAX	X					35							
18	A06DA1C	X					36							
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Rev.	Date	Prepared	Checked	Audited	Approved	Status	Revision description							

ASME Class 150 Carbon Steel, General A01DA1C

Rev.	Date	Prepared by	Checked By	Approved By	Description
0	19/08/2022	YJ Chen	C Shen		First issue

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ASME Class 150 Carbon Steel, General A01DA1C

DESIGN CODE:	ASME B31.3 Latest Edition / Addenda - Normal Fluid Service
RATING CLASS:	150
MATERIAL:	Carbon Steel High Temperature
SERVICE:	General
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0.0625 in (1.6 mm)
MATERIAL GROUP:	ASME B16.5-2017, 1.1
TRIM:	Trim 8
FLUID CODE:	AA / AC / AD / AG / AI / AIN / AS / NG / NS / NW
CALCULATION NO:	AL_CORP_502_16_branch_120_PO

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 48in								
Temp. DegC	-29	38	50	100	150	200	250	300
Pressure BarG	19.6	19.6	19.2	17.7	15.8	13.8	12.1	10.2
Temp. DegF	-20	100	122	212	302	392	482	572
Pressure Psig	285	285	278	257	229	200	175	147
Full Vacuum NPS 0.5 to 48in								
Temp. DegC	200							
Pressure BarG	-1							
Temp. DegF	392							
Pressure Psig	-14.5							

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-XS	S-XS	S-XS	S-XS	S-XS	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD
THK (in)	0.147	0.154	0.179	0.191	0.2	0.154	0.203	0.216	0.226	0.237	0.258
THK (mm)	3.73	3.91	4.55	4.85	5.08	3.91	5.16	5.49	5.74	6.02	6.55
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3
NPS	6	8	10	12	14	16	18	20	24	26	28
DN	150	200	250	300	350	400	450	500	600	650	700
SCH	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD
THK (in)	0.28	0.322	0.365	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
THK (mm)	7.11	8.18	9.27	9.53	9.53	9.53	9.53	9.53	9.53	9.53	9.53
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	610	660	711
NPS	30	32	34	36	38	40	42	44	46	48	
DN	750	800	850	900	950	1000	1050	1100	1150	1200	
SCH	S-STD	S-STD	S-STD	S-STD	0.406"	0.438"	0.438"	0.469"	S-XS	S-XS	
THK (in)	0.375	0.375	0.375	0.375	0.406	0.438	0.438	0.469	0.5	0.5	
THK (mm)	9.53	9.53	9.53	9.53	10.31	11.13	11.13	11.91	12.7	12.7	
OD (mm)	762	813	864	914	965	1016	1067	1118	1168	1219	

GENERAL NOTES:

- A All butt welded components wall thickness shall match PIPE WALL THICKNESS.
- B Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.
- BX Piping Class Specification has been calculated to withstand Full Vacuum, max. buckling length 6m [19.68 ft].

ASME Class 150 Carbon Steel, General A01DA1C

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
NIPPLES						
	.5-1.5	S-XS	Nipple, B36.10 M,(100mm), Plain - NPT, Seamless, ASTM A106 Gr B	APPN1DF5H0EA	NPTG1	
	.5-1.5	S-XS	Nipple, B36.10 M,(180mm) ,Plain - NPT, Seamless, ASTM A106 Gr B	APPN1DF5H0EB	NPTG3	
	.5-1.5	S-XS	Nipple, B36.10 M(100mm), NPT – NPT, Seamless, ASTM A106 Gr B	APPN1DF6H0EA	NTTG1	
	.5-1.5	S-XS	Nipple, B36.10 M,(180mm), NPT - NPT, Seamless, ASTM A106 Gr B	APPN1DF6H0EB	NTTG3	
PIPE						
	.5-1.5	S-XS	Pipe, B36.10 M, Plain end, Seamless, ASTM A106 Gr B	APPP1DF2H0EE	P	
	2-6	S-STD	Pipe, B36.10 M, Beveled end, API 5L Gr. B, SAWL, E=0.9		P	
	8-20	S-STD	Pipe, B36.10 M, Beveled end, API 5L Gr. B, SAWL, E=0.9		P	
FORGED FITTINGS						
	.5-1.5		90Deg. Elbow, B16.11, SW, CL 3000, ASTM A105N	APKA1DD130EA	9E	
	.5-1.5		Equal Tee, B16.11, SW, CL 3000, ASTM A105N	APKB1DD130EA	T	
	.5-1.5		45Deg. Elbow, B16.11, SW, CL 3000, ASTM A105N	APKC1DD130EA	4E	
	.5-1.5		Cap, B16.11, SW, CL3000, ASTM A105N	APKF1DD130EA	C	
	.5-1		CAP, B16.11, Threaded NPT, CL3000, ASTM A105N	APKF1DD230EA	CT	
	.5-1		Plug, B16.11, Threaded NPT, CL3000, ASTM A105N	APKP1DD230EA	PL	
	.5-1.5		Full Coupling, B16.11, SW, CL3000, ASTM A105N		FCL	
	.5-1.5		Reduced Tee, B16.11, SW, CL 3000, ASTM A105N	APKQ1DD130EA	RT	
	2-20 .5-1.5		Sockolet, MSS SP-97, SW, B16.11, CL 3000, ASTM A105N	APKM7DD130EB	SOL	
	2-16 .75-1		Threadolet, MSS SP-97, Threaded NPT, B16.11, CL 3000, ASTM A105N	APKN7DD230EB	TOL	

ASME Class 150 Carbon Steel, General A01DA1C

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
WELDED FITTINGS						
	.5-1.5	S-XS	Swage Nipple Conc, MSS SP-95, Beveled End, ASTM A234 Gr WPB	APWT5DH1XXEA	CBB	
	.5-1.5	S-XS	Swage Nipple Ecc, MSS SP-95, Beveled End, ASTM A234 Gr WPB	APWU5DH1XXEA	EBB	
	2-20	S-STD	90Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPBW	APWA1DH7XXEA	9E	
	2-20	S-STD	45Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPBW	APWB1DH7XXEA	4E	
	2-20	S-STD	Equal Tee, B16.9, BW, ASTM, ASTM A234 Gr WPBW	APWD1DH7XXEA	T	
	2-20	S-STD	Cap, B16.9, BW, ASTM A234 Gr WPBW	APWF1DH7XXEA	C	
	2-20	S-STD	Concentric Reducer, B16.9, BW, ASTM A234 Gr WPBW	APWG1DH7XXEA	CR	
	2-20	S-STD	Eccentric Reducer, B16.9, BW, ASTM A234 Gr WPBW	APWH1DH7XXEA	ER	
	2.5-20	S-STD	Reducing Tee, B16.9, BW, ASTM A234 Gr WPBW	APWE1DH7XXEA	RT	
FLANGES						
	.5-20		Flange, Blind, B16.5, RF, CL 150, ASTM A105N	APFA2DD101EA	BF	
59	.5-16		Flange, Blind, B16.5, RF, CL 300, ASTM A105N	APFA2DD103EA	BF3	
53	.5-.5		Flange, Threaded, B16.5, RF, CL 150, ASTM A105N	APFK2DD101EA	TF	
	.5-14		Flange, Spectacle Figure 8, B16.48, RF, CL 150, ASTM A516 Gr 70N	APFM6DG101EA	F8	
	.5-1.5		Flange, SW, B16.5, RF, CL 150, ASTM A105N	APFS2DD101EA	SF	
59	.5-1.5		Flange, SW, B16.5, RF, CL 300, ASTM A105N	APFS2DD103EA	SF3	
402	.75-2 .5-.5		Flange, Blind with Thd Bore, B16.5, 1/2" NPT, RF, CL 150, ASTM A105N	APFG2DD101EB	BFI	
402 59	.75-2 .5-.5		Flange, Blind with Thd Bore, B16.5, 1/2" NPT, RF, CL 300, ASTM A105N,,	APFG2DD103EB	BFI3	
	2-20	See Note A	Flange, WN, B16.5, RF, CL 150, ASTM A105N	APFL2DD101EA	WN	
	2-16	See Note A	Flange, WN, B16.5, RF, CL 300, ASTM A105N	APFL2DD103EA	WN3	
	16-16		Paddle Blank, B16.48, RF, CL 150, ASTM A516 Gr 70N	APFN6DG101EA	PB	
	16-16		Paddle Spacer, B16.48, RF, CL 150, ASTM A516 Gr 70N	APFP6DG101EA	PS	
ORIFICE FLANGE						
	12-12	See Note A	Orif Flg, WN 0.5 NPT + jack scr. B16.36, RF, CL 300, ASTM A105N	APOA1DD103EA	OF	

ASME Class 150 Carbon Steel, General A01DA1C

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
GASKETS						
	.5-10		Gasket, Flat Ring, 1.5 mm Thk, CL 150, Expanded graphite 98% with metallic reinforcement	APGF2GN001AC	G	
	.5-16		Gasket, Spiral Wound, 4.5 mm Thk, CL 300, Filler graphite 98%, spiral 316SS, IR 316SS, OR CS	APGS1GB003EB	G3	
	.5-20		Gasket, Flat Ring, 3.0 mm Thk, CL 150, Expanded graphite 98% with metallic reinforcement	APGF2GN001AD	G	
BOLTING						
	.5-20		Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / SA194 Gr 2H, Coating	APBA1CB000EB	BT	
	.5-16		Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / SA194 Gr 2H, Coating	APBA1CB000EB	BT3	
VALVES						
407	.5-2		Ball Valve, Float Ball, Thrd, NPT, RB, ASTM A182 Gr. F316/316L, 316SS Ball, PTFE, Oval Handle	APVB1QW333EH	BV	
	.5-1.5		Check Valve, API602, piston type, horiz.and vert, SW, CL800, ASTM A105N, Trim No. 8, BC	APVC6DC208EV	CH	
413	.5-1.5		Gate Valve, API 602, SWxNPT, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC008EJ	GA1	
	.5-1.5		Gate Valve, API 602, SW, CL800,,ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC208ER	GA	
60	.5-1.5		Gate Valve, API 602, Flanged, RF, CL150, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC401FL	GAF	
59, 60	.5-1.5		Gate Valve, API 602, Flanged, RF, CL300, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC403FL	GAF3	
405	.5-1.5		Globe Valve, API 602, Straight seat, SW, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVL5DC208EA	GL	
	.5-1.5		Globe Valve, API 602, Straight seat, SWxNPT, CL800, ASTM A105N, Trim No. 8, BB, OS & Y		GL1	
	2-4		Check Valve, API 602, Swing Check, Bolted cover, RF, CL150, ASTM A216 Gr WCB, Trim No. 8,	APVC4DD401EW	CH	
	2-16		Check Valve, API 594, Dual Plate Check, Bolted, Wafer, RF, CL150, ASTM A216 Gr WCB, Trim No. 8,	APVC4DD601EF	CHW	
	2-16		Check Valve, API 594, Dual Plate Check, Bolted, Wafer, RF, CL300, ASTM A216 Gr WCB, Trim No. 8,	APVC4DD603EF	CHW3	
	2-12		Gate Valve, API 600, flex. wedge, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVG3DD401ES	GA	
59, 60	2-2		Gate Valve, API 600, flex. wedge, Flanged, RF, CL300, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y,	APVG3DD403ES	GA3	

ASME Class 150 Carbon Steel, General A01DA1C

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
VALVES						
405	2-4		Globe Valve, API 623, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVL7DD401EL	GL	
405	6-12		Globe Valve, API 623, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y, Gear OP	APVL7DD401EM	GL	
	14-16		Gate Valve, API 600, flex. wedge, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y, Gear OP	APVG3DD401ET	GA	
	3-4		Butterfly Valve, API 609, Double ecc, Bolted, Wafer, RF, CL150, ASTM A216 Gr WCB, Disc SS, Seat PTFE, Lever OP	APVF2DD601EH	BU	
	6-20		Butterfly Valve, API 609, Double ecc, Bolted, Wafer, RF, CL150, ASTM A216 Gr WCB, Disc SS, Seat PTFE, Gear OP	APVF2DD601EA	BU	
FILTERS / STRAINERS						
	.5-1.5		Y-Strainer, SW, CL800, ASTM A105N, Screen retainer: CS / Screen: SS316-Filtering 0.3mm, Gasket Spir SS and Graphite	APVY3DC208EC	STY	
	2-3		Y Strainer, Flanged, RF, CL150, ASTM A216 Gr WCB, Screen retainer: CS / Screen: SS316-Filtering 0.3mm, Gasket Spir SS and Graphite	APVY3DD401GD	STY	
	4-16		Conical filter, G-DS-5-4-2, Wafer, CL150, all fluids except oxygen and water	APMN0QA701EA	CFR	

SPEC ITEM NOTES:

53	For orifice flange tapping
58	To use only if necessary
59	For connection PN/class > rating pipe class
60	For connection to equipments
401	For insulated pressure testing vents (see G-DS-5-0-1)
402	For instrument connection (PI, TI, etc.)
403	For non-insulated pressure testing vents (see G-DS-5-0-1)
404	For vents
405	For regulation only
407	To be used for automatic valve connection
413	For instrument connection : Pressure, flow transmitters, analysers, vents and orifice tappings
10007	To be used as option of B16.9 fitting (default)

ASME Class 150 Carbon Steel, General A01DA1C

BRANCH CHART (Preference 1)

LEGEND:

0 - No Branch

1 - Equal Tee
130 - Class 3000

1 - Equal Tee
1XX - -

2 - Reducing Tee
230 - Class 3000

2 - Reducing Tee
2XX - -

3 - Stub-on
31 - Welded Connection

3 - Stub-on
32 - Reinforcing Pad

5 - Sockolet
530 - Class 3000

Branch Diameter		0,5	0,75	1	1,25	1,5	2	2,5	3	3,5	4	5	6	8	10	12	14	16	18	20	24
Header Diameter	0,5	130																			
	0,75	230	130																		
	1	230	230	130																	
	1,25	230	230	230	130																
	1,5	230	230	230	230	130															
	2	530	530	530	530	530	1XX														
	2,5	530	530	530	530	530	2XX	1XX													
	3	530	530	530	530	530	2XX	2XX	1XX												
	3,5	530	530	530	530	530	31	2XX	2XX	1XX											
	4	530	530	530	530	530	31	31	2XX	2XX	1XX										
	5	530	530	530	530	530	31	31	31	2XX	2XX	1XX									
	6	530	530	530	530	530	31	31	31	31	2XX	2XX	1XX								
	8	530	530	530	530	530	31	31	31	31	31	2XX	2XX	1XX							
	10	530	530	530	530	530	31	31	31	31	31	31	2XX	2XX	1XX						
	12	530	530	530	530	530	31	31	31	31	31	31	31	2XX	2XX	1XX					
	14	530	530	530	530	530	31	31	31	31	31	31	31	31	2XX	2XX	1XX				
	16	530	530	530	530	530	31	31	31	31	31	31	31	31	31	2XX	2XX	1XX			
	18	530	530	530	530	530	31	31	31	31	31	31	31	31	31	31	2XX	2XX	1XX		
	20	530	530	530	530	530	31	31	31	31	31	31	31	31	31	31	31	2XX	2XX	1XX	
	24	530	530	530	530	530	32	32	32	32	32	32	32	32	32	32	32	2XX	2XX	1XX	

ASME Class 150 Carbon Steel, General - Alternate A01DA1CA

Rev.	Date	Prepared by	Checked By	Approved By	Description
0	19/08/2022	YJ Chen	C Shen		First issue

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ASME Class 150 Carbon Steel, General - Alternate A01DA1CA

DESIGN CODE:	B31.3 Latest Edition / Addenda - Normal Fluid Service
RATING CLASS:	150
MATERIAL:	Carbon Steel High Temperature
SERVICE:	General
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0.0625 in (1.6 mm)
MATERIAL GROUP:	B16.5-2017, 1.1
TRIM:	Trim 8
FLUID CODE:	AA / AC / AD / AE / AG / AI / AIN / AS / AU / AW / ND / NG / NH / NS / NW
CALCULATION NO:	AL_CORP_D_502_16_S_300/400

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 48in							
Temp. DegC	-29	38	50	100	150	200	300
Pressure BarG	10	10	10	10	10	10	6.9
Temp. DegF	-20	100	122	212	302	392	572
Pressure Psig	145	145	145	145	145	145	100
Full Vacuum NPS 0.5 to 18in							
Temp. DegC	200						
Pressure BarG	-1						
Temp. DegF	392						
Pressure Psig	-14.5						

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-XS	S-XS	S-XS	S-XS	S-XS	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD
THK (in)	0.147	0.154	0.179	0.191	0.2	0.154	0.203	0.216	0.226	0.237	0.258
THK (mm)	3.73	3.91	4.55	4.85	5.08	3.91	5.16	5.49	5.74	6.02	6.55
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3
NPS	6	8	10	12	14	16	18	20	24	26	28
DN	150	200	250	300	350	400	450	500	600	650	700
SCH	S-STD	S-20	S-20	S-20	S-10	S-10	S-10	S-10	S-10	S-10	S-10
THK (in)	0.28	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.312	0.312
THK (mm)	7.11	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	7.92	7.92
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	610	660	711
NPS	30	32	34	36	38	40	42	44	46	48	52
DN	750	800	850	900	950	1000	1050	1100	1150	1200	1300
SCH	S-10	S-10	S-10	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	0.375"
THK (in)	0.312	0.312	0.312	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
THK (mm)	7.92	7.92	7.92	9.53	9.53	9.53	9.53	9.53	9.53	9.53	9.53
OD (mm)	762	813	864	914	965	1016	1067	1118	1168	1219	1321
	56	60									
	1400	1500									
	0.375"	0.500"									
	0.375	0.5									
	9.53	12.7									
	1422	1524									

GENERAL NOTES:

- A All butt welded components wall thickness shall match PIPE WALL THICKNESS.
- B Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.
- BX Piping Class Specification has been calculated to withstand Full Vacuum, max. buckling length 6m [19.68 ft].

ASME Class 150 Carbon Steel, General - Alternate A01DA1CA

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
NIPPLES						
53	.5-1.5	S-XS	Nipple, B36.10 M,(100mm), Plain - NPT, Seamless, ASTM A106 Gr B	APPN1DF5H0EA	NPTG1	
53	.5-1.5	S-XS	Nipple, B36.10 M,(180mm), Plain - NPT, Seamless, ASTM A106 Gr B	APPN1DF5H0EB	NPTG3	
53	.5-1.5	S-XS	Nipple, B36.10 M,(100mm), NPT - NPT, Seamless, ASTM A106 Gr B	APPN1DF6H0EA	NTTG1	
53	.5-1.5	S-XS	Nipple, B36.10 M,(180mm), NPT - NPT, Seamless, ASTM A106 Gr B	APPN1DF6H0EB	NTTG3	
PIPE						
	.5-1.5	S-XS	Pipe, B36.10 M, Plain end, Seamless, ASTM A106 Gr B	APPP1DF2H0EE	P	
	2-6	S-STD	Pipe, B36.10 M, Beveled end, API 5L Gr. B, SAWL, E=0.9		P	
	8-12	S-20	Pipe, B36.10 M, Beveled end, API 5L Gr. B, SAWL, E=0.9		P	
	14-24	S-10	Pipe, B36.10 M, Beveled end. API 5L Gr. B, SAWL, E=0.9		P	
	26-34	S-10	Pipe, B36.10 M, Beveled end, EFW (E=0.85), ASTM A672 Gr C60 Cl 13	APPP1FR1D0EE	P	
	36-48	S-STD	Pipe, B36.10 M, Beveled end, EFW (E=0.85), ASTM A672 Gr C60 Cl 13	APPP1FR1D0EE	P	
	52-52	0.375"	Pipe, B36.10 M, Beveled end, EFW (E=0.85), ASTM A672 Gr C60 Cl 13	APPP1FR1D0EE	P	
FORGED FITTINGS						
58	.5-1.5		90Deg. Elbow, B16.11, SW, CL 3000,ASTM A105N	APKA1DD130EA	9E	
	.5-1.5		Equal Tee, B16.11, SW, CL 3000, ASTM A105N	APKB1DD130EA	T	
58	.5-1.5		45Deg. Elbow, B16.11, SW, CL 3000, ASTM A105N	APKC1DD130EA	4E	
	.5-1.5		Cap, B16.11, SW, CL3000, ASTM A105N	APKF1DD130EA	C	
404	.5-1		Plug, B16.11, Threaded NPT, CL3000, ASTM A105N	APKP1DD230EA	PL	
401	.5-1		Cap, B16.11, Threaded NPT, CL3000, ASTM A105N	APKF1DD230EA	CT	
	.5-1.5		Full Coupling, B16.11, SW, CL3000, ASTM A105N		FCL	
	.75-1.5 .5-1.25		Reduced Tee, B16.11, SW, CL 3000, ASTM A105N	APKQ1DD130EA	RT	
	2-48 .5-1.5		Sockolet, MSS SP-97, SW, B16.11, CL 3000, ASTM A105N	APKM7DD130EB	SOL	
403	2-52 .75-1		Threadolet, MSS SP-97, Threaded NPT, B16.11, CL 3000, ASTM A105N	APKN7DD230EB	TOL	

ASME Class 150 Carbon Steel, General - Alternate A01DA1CA

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
WELDED FITTINGS						
	.75-1.5 .5-1.25	S-XS	Swage Nipple Conc. MSS SP-95, Beveled end, ASTM A234 Gr WPB	APWT5DH1XXEA	CBB	
	.75-1.5 .5-1.25	S-XS	Swage Nipple Ecc. MSS SP-95, Beveled end, ASTM A234 Gr WPB	APWU5DH1XXEA	EBB	
	2-48	See Note A	90Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPBW	APWA1DH7XXEA	9E	
	2-48	See Note A	45Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPBW	APWB1DH7XXEA	4E	
	2-48	See Note A	Equal Tee, B16.9, BW, ASTM A234 Gr WPBW	APWD1DH7XXEA	T	
	2-48	See Note A	Cap, B16.9, BW ends, ASTM A234 Gr WPBW	APWF1DH7XXEA	C	
	2-48 .75-46	See Note A	Concentric Reducer, B16.9, BW, ASTM A234 Gr WPBW	APWG1DH7XXEA	CR	
	2-48 .75-46	See Note A	Eccentric Reducer, B16.9, BW, ASTM A234 Gr WPBW	APWH1DH7XXEA	ER	
	2.5-48 2-46	See Note A	, Reducing Tee, B16.9 ,BW, ASTM A234 Gr WPBW	APWE1DH7XXEA	RT	
FLANGES						
	.5-24		Flange, Blind, B16.5, RF, CL 150, ASTM A105N	APFA2DD101EA	BF	
59	.5-24		Flange, Blind, B16.5, RF, CL 300, ASTM A105N	APFA2DD103EA	BF3	
53	.5-.5		Flange, Threaded, B16.5, RF, CL 150, ASTM A105N	APFK2DD101EA	TF	
	.5-14		Flange, Spectacle Figure 8, B16.48, RF, CL 150, ASTMA516 Gr 70N	APFM6DG101EA	F8	
	.5-1.5		Flange, SW, B16.5, RF, CL 150, ASTM A105N	APFS2DD101EA	SF	
59	.5-1.5		Flange, SW, B16.5, RF, CL 300, ASTM A105N	APFS2DD103EA	SF3	
402	.75-2 .5-.5		Flange, Blind with Thd bore, B16.5, 1/2" NPT, RF, CL 150, ASTM A105N	APFG2DD101EB	BFI	
402, 59	.75-2 .5-.5		Flange, Blind with Thd bore, B16.5, 1/2" NPT, RF, CL 300, ASTM A105N	APFG2DD103EB	BFI3	
	2-24	See Note A	Flange, WN, B16.5, RF, CL 150, ASTM A105N	APFL2DD101EA	WN	
59	2-24	See Note A	Flange, WN, B16.5, RF, CL 300, ASTM A105N	APFL2DD103EA	WN3	
	16-24		Paddle Blank, B16.48, RF, CL 150, ASTM A516 Gr 70N	APFN6DG101EA	PB	
	16-24		Paddle Spacer, B16.48, RF, CL 150, ASTM A516 Gr 70N	APFP6DG101EA	PS	
	26-48		Flange, Blind, B16.47 B, RF, CL 150, ASTM A105N	APFA4DD101EA	BF	
	26-52	See Note A	Flange, WN, B16.47 B, RF, CL 150, ASTM A105N	APFL4DD101EA	WN	
	26-48		Paddle, Blank, G-DS-5-2-6, RF, CL 150, ASTM A516 Gr 70N	APFN0DG101ER	PB	
	26-48		Paddle, Spacer, G-DS-5-2-6, RF, CL 150, ASTM A516 Gr 70N	APFP0DG101ER	PS	
	4-18	See Note A	Flange, WN, B16.5, FF, CL 150, ASTM A105N		WNF	
ORIFICE FLANGE						
	1-24	See Note A	ASME Orif Flg, WN 0.5NPT+jacl scr, B16.36, RF, CL 150, ASTM A105N	APOADD101EA	OF1	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
GASKETS						
	.5-10		Gasket, Flat Ring, 1.5 mm Thk, CL 150, Expanded graphite 98% with metallic reinforcement	APGF2GN001AC	G	
59	.5-24		Gasket, Spiral Wound, 4.5 mm Thk, CL 300, Filler graphite 98%, spiral 316SS, IR 316SS, OR CS	APGS1GB003EB	G3	
	12-24		Gasket, Flat Ring, 3.0 mm Thk, CL 150, Expanded graphite 98% with metallic reinforcement	APGF2GN001AD	G	
	26-52		Gasket, Spiral Wound, B16.47 B, 4.5 mm Thk, CL 150, Filler graphite 98%, spiral 316SS, IR 316SS, OR CS	APGS5GB001EB	G	
	38-52		Gasket, ASME B16.47-B, for Full Face Flange, 3.0 mm Thk, CL 150, Expanded graphite 98% with metallic reinforcement.		GF	
BOLTING						
	.5-52		Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / SA194 Gr 2H, Coating	APBA1CB000EB	BT	
	.5-48		Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / SA194 Gr 2H, Coating	APBA1CB000EB	BT3	
	4-18	Bolt size : 추후 제공 예정임	Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / SA194 Gr 2H, Metric Bolt / Nuts		BTM	
VALVES						
407	.5-2	See Note A	Ball Valve, Float Ball, Thrd, NPT, RB, ASTM A182 Gr. F316/316L, 316SS Ball, PTFE, Oval Handle	APVB1QW333EH	BV	
	.5-1.5	See Note A	Check Valve, API 602, Piston Type, Horiz and Vert, SW, CL800, ASTM A105N, Trim No. 8, BC	APVC6DC208EV	CH	
	.5-1.5	See Note A	Check Valve, API 602, Swing Type, SW, CL800, ASTM A105N, Trim No. 8, BC		CH1	
	.5-1.5	See Note A	Gate Valve, API 602, SW, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC208ER	GA	
60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL150, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC401FL	GAF	
59, 60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL300, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC403FL	GAF3	
405	.5-1.5	See Note A	Globe Valve, API 602, straight seat, SW, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVL5DC208EA	GL	
	.5-1.5	See Note A	Globe Valve, API 602, straight seat, SWxNPT, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVL5DC208ET	GL1	
	2-4		Check Valve, API 602, Swing Check, Bolted cover, RF, CL150, ASTM A216 Gr WCB, Trim No. 8,	APVC4DD401EW	CH	
	2-24	See Note A	Check Valve, API 594, Dual Plate Check, Bolted, Wafer, RF, CL150, ASTM A216 Gr WCB, Trim No. 8	APVC4DD601EF	CHW	
	2-12	See Note A	Gate Valve, API 600, Flex. Wedge, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVG3DD401ES	GA	
59, 60	2-2	See Note A	Gate Valve, API 600, Flex. Wedge, Flanged, RF, CL300, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVG3DD403ES	GA3	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
VALVES						
405	2-4	See Note A	Globe Valve, API 623, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVL7DD401EL	GL	
	1.5-4		Butterfly Valve, API 609, Double ecc, Bolted, Wafer, RF, CL150, ASTM A216 Gr WCB, Disc SS, Seat PTFE, Lever OP	APVF2DD601EH	BU	
	6-24		Butterfly Valve, API 609, Double ecc, Bolted, Wafer, RF, CL150, ASTM A216 Gr WCB, Disc SS, Seat PTFE, Gear OP	APVF2DD601EA	BU	
405	6-12	See Note A	Globe Valve, API 623, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y, Gear OP	APVL7DD401EM	GL	
	14-24	See Note A	Gate Valve, API 600, Flex. Wedge, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y, Gear OP	APVG3DD401ET	GA	
	26-48		Butterfly Valve, Double Flanged - fire safe design, B16.47-B Flanged, RF, CL150, A216-WCB, Disc A351-CF8M, Graphite Gasket, Gear OP	APVF0DD401FF	BU	
	0.5-0.5		Needle Valve, Integral Bonnet, Screwed NPT, Manufacturer Std., Forged Carbon Steel Body, SS316 Trim		NI	
FILTERS / STRAINERS						
	.5-1.5		Y Strainer, SW. CL800, ASTM A105N, Screen Retainer: CS / Screen: SS316-Filtering 0.3mm, Gasket spir SS and Graphite	APVY3DC208EC	STY	
	2-3		Y Strainer, Flanged, RF, CL150, ASTM A216 Gr WCB, Screen Retainer: CS / Screen: SS316-Filtering 0.3mm, Gasket spir SS and Graphite	APVY3DD401GD	STY	
	4-24		Conical filter, G-DS-5-4-2, Wafer, CL150, all fluid except oxygen and water	APMN0QA701EA	CFR	
FABRICATED ITEMS						
10007	52-52 38-38	See Note A	Fabricated Concentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A516 Gr 70N L=1000	APSP0DC1G0EB	FCR	1
10007	24-48 14-32	See Note A	Fabricated Eccentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A516 Gr 70N	APSQ0DC1G0EB	FER	1
	24-24 2-10	See Note A	ASME Fabricated Item, weld with Reinf., B36.10 M, Seamless (E=1), ASTM A106 Gr B	APSY1DF0H0EA	RPAD	
414	24-24 12-14	See Note A	ASME Fabricated Item, RH Run Reduc., B31.3, Beveled end acc. ASME B16.25, ASTM A106 Gr B	APSX9DF1X0EE	RPAD1	
	30-32 2-16	See Note A	ASME Fabricated Item, weld with Reinf., B36.10 M, Electric fusion straight weld pipe (E=0.85), ASTM A672 Gr C60 Cl 13	APSY1FR0D0EA	RPAD	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev

SPEC ITEM NOTES:

53	For orifice flange tapping
58	To use only if necessary
59	For connection PN/class > rating pipe class
60	For connection to equipments
401	For insulated pressure testing vents (see G-DS-5-0-1)
402	For instrument connection (PI, TI, etc.)
403	For non-insulated pressure testing vents (see G-DS-5-0-1)
404	For vents
405	For regulation only
407	To be used for automatic valve connection
414	On Project level TSH may be recalculated via Sec. VIII Div. 1 or Div. 2, see also rules defined within G-EP-5-2-4
10007	To be used as option of B16.9 fitting (default)

	0,5	0,75	1	1,5	2	2,5	3	3,5	4	5	6	8	10	12	14	16	18	20	24	26
0,5	130																			
0,75	230	130																		
1	230	230	130																	
1,5	230	230	230	130																
2	530	530	530	530	1XX															
2,5	530	530	530	530	2XX	1XX														
3	530	530	530	530	2XX	2XX	1XX													
3,5	530	530	530	530	31	2XX	2XX	1XX												
4	530	530	530	530	31	31	2XX	2XX	1XX											
5	530	530	530	530	31	31	31	2XX	2XX	1XX										
6	530	530	530	530	31	31	31	31	2XX	2XX	1XX									
8	530	530	530	530	31	31	31	31	31	2XX	2XX	1XX								
10	530	530	530	530	31	31	31	31	31	31	2XX	2XX	1XX							
12	530	530	530	530	31	31	31	31	31	31	31	2XX	2XX	1XX						
14	530	530	530	530	31	31	31	31	31	31	31	31	2XX	2XX	1XX					
16	530	530	530	530	31	31	31	31	31	31	31	31	31	2XX 32	2XX	1XX				
18	530	530	530	530	31	31	31	31	31	31	31	31	31	31	2XX	2XX	1XX			
20	530	530	530	530	31	31	31	31	31	31	31	31	31	31 32	31	2XX	2XX	1XX		
24	530	530	530	530	32	32	32	32	32	32	32	32	32	34	34	2XX	2XX	2XX	1XX	
26	530	530	530	530	31	31	31	31	31	31	31	31	31	31	31	31	31	2XX	2XX	1XX
28	530	530	530	530	31	31	31	31	31	31	31	31	31	31	31	31	31	2XX	2XX	2XX
30	530	530	530	530	32	31	31	31	31	31	31	32	32	32	32	32	2XX	2XX	2XX	2XX
32	530	530	530	530	32	32	32	32	32	32	32	32	32	32	32	32	32	2XX	2XX	2XX 32
34	530	530	530	530	32	32	32	32	32	32	32	32	32	32	32	32	34	34	34	34
36	530	530	530	530	31	31	31	31	31	31	31	31	32	32	32	32	32	32	32	32
38	530	530	530	530	32	32	32	32	32	32	32	32	32	32	32	32	32	34	34	34
40	530	530	530	530	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34	34
42	530	530	530	530	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34	34
44	530	530	530	530	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34	34
46	530	530	530	530	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34	34
48	530	530	530	530	32	32	32	32	32	32	32	32	32	32	32	32	32	32	31	34
52	530	530	530	530	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31	-

LEGEND:

0 - No Branch	1 - Equal Tee 130 - Class 3000	1 - Equal Tee 1XX - -	2 - Reducing Tee 230 - Class 3000	2 - Reducing Tee 2XX - -
3 - Stub-on 31 - Welded Connection	3 - Stub-on 32 - Reinforcing Pad	3 - Stub-on 34 - Reinforced Header Run (TSH) Reducing	5 - Sockolet 530 - Class 3000	

Branch Diameter

[illegible]

ASME Class 150 Carbon Steel, General and Water A01DA1E

Rev.	Date	Prepared by	Checked By	Approved By	Description
0	19/08/2022	YJ Chen	C Shen		First issue

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ASME Class 150 Carbon Steel, General and Water A01DA1E

DESIGN CODE:	B31.3 - 2016
RATING CLASS:	150
MATERIAL:	Carbon Steel High Temperature
SERVICE:	General and Water
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0.0625 in (1.6 mm)
MATERIAL GROUP:	B16.5-2017, 1.1
TRIM:	Trim 8 and EPDM
FLUID CODE:	DWC / DWR / WC / WCR / WCS / WER / WES / WF / WG / WGR / WGS / WH / WHH / WHP / WPW / WPZ / WR / WSR / WSS / WT / WU / WWD / WWG / WWS / WWT
CALCULATION NO:	AL_CORP_502_16_300/400

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 48in				
Temp. DegC	-29	38	50	80
Pressure BarG	19.6	19.6	19.2	18.3
Temp. DegF	-20	100	122	176
Pressure Psig	285	285	278	265
Full Vacuum NPS 0.5 to 48in				
Temp. DegC	80			
Pressure BarG	-1			
Temp. DegF	176			
Pressure Psig	-14.5			

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-XS	S-XS	S-XS	S-XS	S-XS	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD
THK (in)	0.147	0.154	0.179	0.191	0.2	0.154	0.203	0.216	0.226	0.237	0.258
THK (mm)	3.73	3.91	4.55	4.85	5.08	3.91	5.16	5.49	5.74	6.02	6.55
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3
NPS	6	8	10	12	14	16	18	20	24	26	28
DN	150	200	250	300	350	400	450	500	600	650	700
SCH	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD
THK (in)	0.28	0.322	0.365	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
THK (mm)	7.11	8.18	9.27	9.53	9.53	9.53	9.53	9.53	9.53	9.53	9.53
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	610	660	711
NPS	30	32	34	36	38	40	42	44	46	48	
DN	750	800	850	900	950	1000	1050	1100	1150	1200	
SCH	S-STD	S-STD	S-STD	S-STD	0.406"	0.438"	0.438"	0.469"	0.469"	S-XS	
THK (in)	0.375	0.375	0.375	0.375	0.406	0.438	0.438	0.469	0.469	0.5	
THK (mm)	9.53	9.53	9.53	9.53	10.31	11.13	11.13	11.91	11.91	12.7	
OD (mm)	762	813	864	914	965	1016	1067	1118	1168	1219	

GENERAL NOTES:

- A All butt welded components wall thickness shall match PIPE WALL THICKNESS.
- B Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.
- BX Piping Class Specification has been calculated to withstand Full Vacuum, max. buckling length 6m [19.68 ft].

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
NIPPLES						
53	.5-1.5	S-XS	Nipple, B36.10 M,(100mm), Plain - NPT, Seamless, ASTM A106 Gr B	APPN1DF5H0EA	NPTG1	
53	.5-1.5	S-XS	Nipple, B36.10 M,(180mm), Plain - NPT, Seamless, ASTM A106 Gr B	APPN1DF5H0EB	NPTG3	
53	.5-1.5	S-XS	Nipple, B36.10 M,(100mm), NPT - NPT, Seamless), ASTM A106 Gr B	APPN1DF6H0EA	NTTG1	
53	.5-1.5	S-XS	Nipple, B36.10 M,(180mm), NPT - NPT, Seamless, ASTM A106 Gr B	APPN1DF6H0EB	NTTG3	
PIPE						
	.5-1.5	S-XS	Pipe, B36.10 M, Plain end, Seamless, ASTM A106 Gr B	APPP1DF2H0EE	P	
	2-6	S-STD	Pipe, B36.10 M, Beveled end, API 5L Gr. B, SAWL, E=0.9		P	
	8-24	S-STD	Pipe, B36.10 M, Beveled end, API 5L Gr. B, SAWL, E=0.9		P	
FORGED FITTINGS						
58	.5-1.5		90Deg. Elbow, B16.11, SW, CL 3000, ASTM A105N	APKA1DD130EA	9E	
	.5-1.5		Equal Tee, B16.11, SW, CL 3000, ASTM A105N	APKB1DD130EA	T	
58	.5-1.5		45Deg. Elbow, B16.11, SW, 3000, ASTM A105N	APKC1DD130EA	4E	
	.5-1.5		Cap, B16.11, SW, CL3000, ASTM A105N	APKF1DD130EA	C	
401	.75-1		Cap, B16.11, Threaded NPT, CL3000, ASTM A105N	APKF1DD230EA	CT	
404	.75-1		Plug, B16.11, Threaded NPT, CL3000, ASTM A105N	APKP1DD230EA	PL	
	.5-1.5		Full Coupling, B16.11, SW, CL3000, ASTM A105N		FCL	
	.5-1.5		Full Coupling, B16.11, SWxNPT, CL3000, ASTM A105N		FCL1	
	.75-1.5 .5-1.25		Reduced tee, B16.11, SW, CL 3000, ASTM A105N	APKQ1DD130EA	RT	
	2-24 .5-1.5		Sockolet, MSS SP-97, SW, B16.11, CL3000, ASTM A105N	APKM7DD130EB	SOL	
403	2-24 .75-1		Thredolet, MSS SP-97, Threaded-NPT, B16.11, CL 3000, ASTM A105N	APKN7DD230EB	TOL	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
WELDED FITTINGS						
	.75-1.5 .5-1.25	See Note A	Swage Nipple Conc, MSS SP-95, Beveled end, ASTM A234 Gr WPB	APWT5DH1XXEA	CBB	
	.75-1.5 .5-1.25	See Note A	Swage Nipple Ecc., MSS SP-95, Beveled end, ASTM A234 Gr WPB	APWU5DH1XXEA	EBB	
	2-24	See Note A	90Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPBW	APWA1DH7XXEA	9E	
	2-24	See Note A	45Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPBW	APWB1DH7XXEA	4E	
	2-24	See Note A	Equal Tee, B16.9, BW, ASTM A234 Gr WPB	APWD1DH7XXEA	T	
	2-24	See Note A	Cap, B16.9, BW, ASTM A234 Gr WPBW	APWF1DH7XXEA	C	
	2-24 .75-24	See Note A	Concentric Reducer, B16.9, BW, ASTM A234 Gr WPBW	APWG1DH7XXEA	CR	
	2-24 .75-24	See Note A	Eccentric Reducer, B16.9, BW, ASTM A234 Gr WPBW	APWH1DH7XXEA	ER	
	2.5-24 2-24	See Note A	Reducing Tee, B16.9, BW, ASTM A234 Gr WPBW	APWE1DH7XXEA	RT	
FLANGES						
	.5-24		Flange, Blind, B16.5, RF, CL 150, ASTM A105N	APFA2DD101EA	BF	
59	.5-24		Flange, Blind, B16.5, RF, CL 300, ASTM A105N	APFA2DD103EA	BF3	
53	.5-.5		Flange, Threaded, B16.5, RF, CL 150, ASTM A105N	APFK2DD101EA	TF	
	.5-14		Flange, Spectacle Figure 8, B16.48, RF, CL 150, ASTM A516 Gr 70N	APFM6DG101EA	F8	
	.5-1.5		Flange, SW, B16.5, RF, CL 150, ASTM A105N	APFS2DD101EA	SF	
59	.5-1.5		Flange, SW, B16.5, RF, CL 300, ASTM A105N	APFS2DD103EA	SF3	
402	.75-2 .5-.5		Flange, Blind with Thd Bore, B16.5, 1/2" NPT, RF, CL 150, ASTM A105N	APFG2DD101EB	BFI	
402, 59	.75-2 .5-.5		Flange, Blind with Thd Bore, B16.5, 1/2" NPT, RF, CL300, ASTM A105N	APFG2DD103EB	BFI3	
	2-24	See Note A	Flange, WN, B16.5, RF, CL 150, ASTM A105N	APFL2DD101EA	WN	
59	2-24	See Note A	Flange, WN, B16.5, RF, CL 300, ASTM A105N	APFL2DD103EA	WN3	
	16-24		Paddle, Blank, B16.48, RF, CL 150, ASTM A516 Gr 70N	APFN6DG101EA	PB	
	16-24		Paddle, Spacer, B16.48, RF, CL 150, ASTM A516 Gr 70N	APFP6DG101EA	PS	
ORIFICE FLANGE						
	1-24	See Note A	Orif Flg, WN 0.5 NPT + jack scr. B16.36, RF, CL 300, ASTM A105N	APOA1DD103EA	OF	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
GASKETS						
	.5-10		Gasket, Flat Ring, 1.5 mm Thk, CL 150, Synthetic Fiber with NBR / HNBR binder	APGF2PB001EC	G	
59	.5-24		Gasket, Spiral Wound, 4.5 mm Thk, CL 300, Filler Graphite 98%, Spiral 316SS, IR 316SS, OR CS	APGS1GB003EB	G3	
	12-24		Gasket, Flat Ring, 3.0 mm Thk, CL 150, Synthetic Fiber with NBR / HNBR binder	APGF2PB001ED	G	
BOLTING						
	.5-24		Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / 194 Gr 2H, Coating	APBA1CB000EB	BT	
	.5-24		Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / 194 Gr 2H, Coating	APBA1CB000EB	BT3	
VALVES						
	.5-1.5	See Note A	Check Valve, API 602, piston type, horiz.and vert, SW, CL800, ASTM A105N, Trim No. 8, BC	APVC6DC208EV	CH	
413	.5-1.5	See Note A	Gate Valve, API 602, SWxNPT, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC008EJ	GA1	
	.5-1.5	See Note A	Gate Valve, API 602, SW, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC208ER	GA	
60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL150, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC401FL	GAF	
59, 60	.5-1.5	See Note A	Gate Valve, Aapi 602, Flanged, RF, CL300, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC403FL	GAF3	
405	.5-1.5	See Note A	Globe Valve, API 602, straight seat, SW, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVL5DC208EA	GL	
	2-24	See Note A	Check Valve, API 594, Dual Plate Check, Bolted, Wafer, RF, CL150, ASTM A216 Gr WCB, Trim No. 8	APVC4DD601EF	CHW	
204	2-24	See Note A	Check Valve, API 594, Dual Plate Check, Bolted, Wafer, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, Plates drilled	APVC4DD601EG	CHW1	
	2-4	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVG3DD401ES	GA	
59, 60	2-2	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL300, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVG3DD403ES	GA3	
405	2-4	See Note A	Globe Valve, API 623, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVL7DD401EL	GL	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
VALVES						
	4-4		Butterfly Valve, API 609, center lined (Cat.A), Bolted, Lug RF, CL150, ASTM A216 Gr WCB, Disc SS, Liner EPDM, adj. Lever	APVF2DD601EL	BU	
	6-24		Butterfly Valve, API 609, center lined (Cat.A), Bolted, Lug RF, CL150, ASTM A216 Gr WCB, Disc SS, Liner EPDM, Gear OP	APVF2DD601EK	BU	
405	6-12	See Note A	Globe Valve, API 623, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS &Y, Gear OP	APVL7DD401EM	GL	
FILTERS / STRAINERS						
	.5-1.5		Y Strainer, SW, CL800, ASTM A105N, screen retainer: CS/Screen: SS316 - Filtering 0,8mm, Gasket spir SS and graphite	APVY3DC208EA	STY	
	2-3		Y Strainer, Flanged, RF, CL150, ASTM A216 Gr WCB, screen retainer: CS/Screen SS316-Filtering 0,8mm, Gasket spir SS and graphite	APVY3DD401EB	STY	
	4-24	See Note A	T-Strainer, Type TB, Blind Fl. TYPE 2, Flanged, RF, CL150, ASTM A234 Gr.WPB, Flanges ASTM A105N, Perfor. plate: SS304 or SS316, Wire Mesh: SS304 or SS316, mesh size 2, B/N: SA193 Gr. B7/SA194 Gr. 2H	APVT0DJ401EH	STT	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
FABRICATED ITEMS						
	.5-1.5	S-XS	Pipe bend, R=5xOD, Plain end, ,Seamless (E=1), ASTM A106 Gr B	APSR1DF2H0EA	9B5D	
10007	6-24 2-22	See Note A	Fabricated Concentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A516 Gr 70N	APSP0DC1G0EB	FCR	
10007	6-24 2-22	See Note A	Fabricated Eccentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A516 Gr 70N	APSQ0DC1G0EB	FER	
	24-24 2-16	See Note A	ASME Fabricated Item, weld with Reinf., B36.10 M, Seamless (E=1), ASTM A106 Gr B, Permissible Substitution	APSY1DF0H0EC	RPAD	

SPEC ITEM NOTES:

53	For orifice flange tapping
58	To use only if necessary
59	For connection PN/class > rating pipe class
60	For connection to equipments
204	Drilled plates check valves for water pumps
401	For insulated pressure testing vents (see G-DS-5-0-1)
402	For instrument connection (PI, TI, etc.)
403	For non-insulated pressure testing vents (see G-DS-5-0-1)
404	For vents
405	For regulation only
413	For instrument connection : Pressure, flow transmitters, analysers, vents and orifice tappings
414	On Project level TSH may be recalculated via Sec. VIII Div. 1 or Div. 2, see also rules defined within G-EP-5-2-4 10007 To be used as option of B16.9 fitting (default)

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BRANCH CHART (Preference 1)

LEGEND:

0 - No Branch

1 - Equal Tee
130 - Class 3000

1 - Equal Tee
1XX - -

2 - Reducing Tee
230 - Class 3000

2 - Reducing Tee
2XX - -

3 - Stub-on
31 - Welded Connection

3 - Stub-on
32 - Reinforcing Pad

3 - Stub-on
34 - Reinforced Header
Run (TSH) Reducing

5 - Sockolet
530 - Class 3000

Branch Diameter

Header Diameter	0,5	0,75	1	1,25	1,5	2	2,5	3	3,5	4	5	6	8	10	12	14	16	18	20	24
0,5	130																			
0,75	230	130																		
1	230	230	130																	
1,25	230	230	230	130																
1,5	230	230	230	230	130															
2	530	530	530	530	530	1XX														
2,5	530	530	530	530	530	2XX	1XX													
3	530	530	530	530	530	2XX	2XX	1XX												
3,5	530	530	530	530	530	31	2XX	2XX	1XX											
4	530	530	530	530	530	31	31	2XX	2XX	1XX										
5	530	530	530	530	530	31	31	31	2XX	2XX	1XX									
6	530	530	530	530	530	31	31	31	31	2XX	2XX	1XX								
8	530	530	530	530	530	31	31	31	31	31	2XX	2XX	1XX							
10	530	530	530	530	530	31	31	31	31	31	31	2XX	2XX	1XX						
12	530	530	530	530	530	31	31	31	31	31	31	31	2XX	2XX	1XX					
14	530	530	530	530	530	31	31	31	31	31	31	31	31	2XX	2XX	1XX				
16	530	530	530	530	530	31	31	31	31	31	31	31	31	31	2XX	2XX	1XX			
18	530	530	530	530	530	31	31	31	31	31	31	31	31	31	31	2XX	2XX	1XX		
20	530	530	530	530	530	31	31	31	31	31	31	31	31	31	31	31	2XX	2XX	1XX	
24	530	530	530	530	530	32	31	32	32	32	32	32	32	32	32	32	32	2XX	2XX	1XX

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Rev.	Date	Prepared by	Checked By	Approved By	Description
0	19/08/2022	YJ Chen	C Shen		First issue

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ASME Class 150 Carbon Steel, General and Water - Alternate A01DA1EA

DESIGN CODE:	B31.3 Latest Edition / Addenda - Normal Fluid Service
RATING CLASS:	150
MATERIAL:	Carbon Steel High Temperature
SERVICE:	General and Water
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0.0625 in (1.6 mm)
MATERIAL GROUP:	B16.5-2017, 1.1
TRIM:	Trim 8 and EPDM
FLUID CODE:	WCR / WCS
CALCULATION NO:	AL_CORP_D2_502_16_300/400

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 76in				
Temp. DegC	-29	38	50	80
Pressure BarG	10.0	10.0	10.0	10.0
Temp. DegF	-20	100	122	176
Pressure Psig	145	145	145	145
Full Vacuum NPS 0.5 to 76in				
Temp. DegC	80			
Pressure BarG	-1			
Temp. DegF	176			
Pressure Psig	-14.5			

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-XS	S-XS	S-XS	S-XS	S-XS	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD
THK (in)	0.147	0.154	0.179	0.191	0.2	0.154	0.203	0.216	0.226	0.237	0.258
THK (mm)	3.73	3.91	4.55	4.85	5.08	3.91	5.16	5.49	5.74	6.02	6.55
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3
NPS	6	8	10	12	14	16	18	20	24	26	28
DN	150	200	250	300	350	400	450	500	600	650	700
SCH	S-STD	S-20	S-20	S-20	S-10	S-10	S-10	S-10	S-10	S-10	S-10
THK (in)	0.28	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.312	0.312
THK (mm)	7.11	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	7.92	7.92
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	610	660	711
NPS	30	32	34	36	38	40	42	44	46	48	
DN	750	800	850	900	950	1000	1050	1100	1150	1200	
SCH	S-10	S-10	S-10	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD	
THK (in)	0.312	0.312	0.312	0.375	0.375	0.375	0.375	0.375	0.375	0.375	
THK (mm)	7.92	7.92	7.92	9.53	9.53	9.53	9.53	9.53	9.53	9.53	
OD (mm)	762	813	864	914	965	1016	1067	1118	1168	1219	

GENERAL NOTES:

- A All butt welded components wall thickness shall match PIPE WALL THICKNESS.
- B Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.
- VB Piping Class Specification has been calculated to withstand Full Vacuum, max. buckling length 6m [19.68 ft] up to NPS 76 except NPS 24, 34 and 52 to 64 withstand Full Vacuum, max. buckling length 4m [13.12 ft].

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
NIPPLES						
53	.5-1.5	S-XS	Nipple, B36.10 M,(100mm), Plain – NPT, Seamless ASTM A106 Gr B	APPN1DF5H0EA	NPTG1	
53	.5-1.5	S-XS	Nipple, B36.10 M,(180mm), Plain - NPT, Seamless, ASTM A106 Gr B	APPN1DF5H0EB	NPTG3	
53	.5-1.5	S-XS	Nipple, B36.10 M,(100mm), NPT - NPT, Seamless, ASTM A106 Gr B	APPN1DF6H0EA	NTTG1	
53	.5-1.5	S-XS	Nipple, B36.10 M,(180mm), NPT - NPT, Seamless, ASTM A106 Gr B	APPN1DF6H0EB	NTTG3	
PIPE						
	.5-1.5	S-XS	Pipe, B36.10 M, Plain end, Seamless, ASTM A106 Gr B	APPP1DF2H0EE	P	
	2-6	S-STD	Pipe, B36.10 M, Beveled end, API 5L Gr. B, SAWL, E=0.9		P	
	8-12	S-20	Pipe, B36.10 M, Beveled end, API 5L Gr. B, SAWL, E=0.9		P	
	14-24	S-10	Pipe, B36.10 M, Beveled end, API 5L Gr. B, SAWL, E=0.9		P	
	26-32	S-10	Pipe, B36.10 M, Beveled end, EFW (E=0.85), ASTM A672 Gr C60 Cl 13	APPP1FR1D0EE	P	
FORGED FITTINGS						
58	.5-1.5		90Deg. Elbow, B16.11, SW, CL 3000, ASTM A105N	APKA1DD130EA	9E	
	.5-1.5		Equal Tee, B16.11, SW, CL 3000, ASTM A105N	APKB1DD130EA	T	
58	.5-1.5		45Deg. Elbow, B16.11, SW, CL 3000, ASTM A105N	APKC1DD130EA	4E	
	.5-1.5		Cap, B16.11, SW, CL3000, ASTM A105N	APKF1DD130EA	C	
404	.5-1		Plug, B16.11, Threaded NPT, CL3000, ASTM A105N	APKP1DD230EA	PL	
401	.5-1		Cap, B16.11, Threaded NPT, CL3000, ASTM A105N	APKF1DD230EA	CT	
	.5-1.5		Full Coupling, B16.11, SW, CL3000, ASTM A105N		FCL	
	.75-1.5 .5-1.25		Reduced tee, B16.11, SW, CL 3000, ASTM A105N	APKQ1DD130EA	RT	
	2-24 .5-1.5		Sockolet, MSS SP-97, SW,B16.11,CL 3000, ASTM A105N	APKM7DD130EB	SOL	
403	2-24 .75-1		Threadolet, MSS SP-97, Threaded NPT, B16.11, CL 3000, ASTM A105N	APKN7DD230EB	TOL	
WELDED FITTINGS						
	.75-1.5 .5-1.25	See Note A	Swage Nipple Conc,MSS SP-95, Beveled end, ASTM A234 Gr WPB	APWT5DH1XXEA	CBB	
	.75-1.5 .5-1.25	See Note A	Swage Nipple Ecc,MSS SP-95,Beveled end, ASTM A234 Gr WPB	APWU5DH1XXEA	EBB	
	2-24	See Note A	90Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPBW	APWA1DH7XXEA	9E	
	2-24	See Note A	45Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPBW	APWB1DH7XXEA	4E	
	2-24	See Note A	Equal Tee, B16.9, BW, ASTM A234 Gr WPBW	APWD1DH7XXEA	T	
	2-24	See Note A	Cap, B16.9, BW, ASTM A234 Gr WPBW	APWF1DH7XXEA	C	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
WELDED FITTINGS						
	2-24 .75-22	See Note A	Concentric Reducer, B16.9, BW, ASTM A234 Gr WPBW	APWG1DH7XXEA	CR	
	2-24 .75-22	See Note A	Eccentric Reducer, B16.9, BW, ASTM A234 Gr WPBW	APWH1DH7XXEA	ER	
	2.5-24 2-22	See Note A	Reducing Tee, B16.9, BW, ASTM A234 Gr WPBW	APWE1DH7XXEA	RT	
FLANGES						
	.5-24		Flange, Blind, B16.5, RF,CL 150, ASTM A105N	APFA2DD101EA	BF	
59	.5-24		Flange, Blind, B16.5, RF,CL 300, ASTM A105N	APFA2DD103EA	BF3	
53	.5-.5		Flange, Threaded, B16.5, RF,CL 150, ASTM A105N	APFK2DD101EA	TF	
	.5-14		Flange, Spectacle Figure 8, B16.48, RF,CL 150, ASTMA516 Gr 70N	APFM6DG101EA	F8	
	.5-1.5		Flange, SW, B16.5, RF,CL 150, ASTM A105N	APFS2DD101EA	SF	
59	.5-1.5		Flange, SW, B16.5, RF,CL 300, ASTM A105N	APFS2DD103EA	SF3	
402	.75-2 .5-.5		Flange, Blind with Thd Bore, B16.5, 1/2" NPT, RF, CL 150, ASTM A105N	APFG2DD101EB	BF1	
402, 59	.75-2 .5-.5		Flange, Blind with Thd Bore, B16.5, 1/2" NPT, RF, CL 300, ASTM A105N	APFG2DD103EB	BFI3	
	2-6	S-STD	Flange, WN, B16.5, RF,CL 150, ASTM A105N	APFL2DD101EA	WN	
	8-12	S- 20	Flange, WN, B16.5, RF,CL 150, ASTM A105N	APFL2DD101EA	WN	
	14-24	S-10	Flange, WN, B16.5, RF,CL 150, ASTM A105N	APFL2DD101EA	WN	
59	2-6	S-STD	Flange, WN, B16.5, RF,CL 300, ASTM A105N	APFL2DD103EA	WN3	
59	8-12	S- 20	Flange, WN, B16.5, RF,CL 300, ASTM A105N	APFL2DD103EA	WN3	
59	14-24	S-10	Flange, WN, B16.5, RF,CL 300, ASTM A105N	APFL2DD103EA	WN3	
	26-32		Flange, Blind, B16.47 B, RF, CL 150, ASTM A105N	APFA4DD101EA	BF	
	26-32	See Note A	Flange, WN, B16.47 B, RF, CL 150, ASTM A105N	APFL4DD101EA	WN	
	16-24	S-10	Paddle, Blank, B16.48, RF, CL 150, ASTM A516 Gr 70N	APFN6DG101EA	PB	
	16-24	S-10	Paddle, Spacer, B16.48, RF, CL 150, ASTMA516 Gr 70N	APFP6DG101EA	PS	
ORIFICE FLANGE						
	1-24	See Note A	Orif Flg, WN 0.5 NPT+jack scr. B16.36, RF, CL 300,A STM A105N	APOA1DD103EA	OF	
GASKETS						
	.5-10		Gasket, Flat Ring, 1.5 mm Thk, CL 150, Synthetic fiber with NBR / HNBR binder	APGF2PB001EC	G	
59	.5-24		Gasket, Spiral Wound, 4.5 mm Thk, CL 300, Filler graphite 98%, spiral 316SS, IR 316SS, OR CS	APGS1GB003EB	G3	
	12-24		Gasket, Flat Ring, 3.0 mm Thk, CL 150, Synthetic fiber with NBR / HNBR binder	APGF2PB001ED	G	
	26-32		Gasket, Flat Ring, B16.47 B, 3.0 mm Thk, CL 150, Synthetic fiber with NBR / HNBR binder	APGF6PB001ED	G	
BOLTING						
	.5-32		Stud Bolt w/2-Heavy hex Nuts, SA193 Gr B7 / SA194 Gr 2H, Coating	APBA1CB000EB	BT	

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	.5-32		Stud Bolt w/2-Heavy hex Nuts, SA193 Gr B7 / SA194 Gr 2H, Coating	APBA1CB000EB	BT3	
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ASME Class 150 Carbon Steel, General and Water - Alternate A01DA1EA

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
VALVES						
	.5-1.5	See Note A	Check Valve, API602, piston type, horiz.and vert, SW, CL800, ASTM A105N, Trim No. 8, BC	APVC6DC208EV	CH	
	.5-1.5	See Note A	Gate Valve, API 602, SW, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC208ER	GA	
	.5-1.5	See Note A	Gate Valve, API 602, SWxNPT, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC008EJ	GA1	
60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL150, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC401FL	GAF	
59, 60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL300, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC403FL	GAF3	
405	.5-1.5	See Note A	Globe Valve, API 602, straight seat, SW, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVL5DC208EA	GL	
413	.5-1.5	See Note A	Globe Valve, API 602, straight seat, SWxNPT, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVL5DC208ET	GL1	
	2-24	See Note A	Check Valve, API 594, Dual Plate Check, Bolted, Wafer RF, CL150, ASTM A216 Gr WCB, Trim No. 8	APVC4DD601EF	CHW	
204	2-24	See Note A	Check Valve, API 594, Dual Plate Check, Bolted, Wafer RF, CL150, ASTM A216 Gr WCB, Trim No. 8, Plates drilled	APVC4DD601EG	CHW1	
	2-3	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVG3DD401ES	GA	
59, 60	2-2	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL300, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVG3DD403ES	GA3	
405	2-4	See Note A	Globe Valve, API 623, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVL7DD401EL	GL	
	3-4		Butterfly Valve, API 609, center lined (Cat.A), Bolted,Lug, RF, CL150, ASTM A216 Gr WCB, Disc SS, Liner EPDM, adj. Lever	APVF2DD601EL	BU	
	6-24		Butterfly Valve, API 609, center lined (Cat.A), Bolted,Lug, RF, CL150, ASTM A216 Gr WCB, Disc SS, Liner EPDM, Gear OP	APVF2DD601EK	BU	
405	6-12	See Note A	Globe Valve, API 623, Flanged, RF, CL150, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y, Gear OP	APVL7DD401EM	GL	

ASME Class 150 Carbon Steel, General and Water - Alternate A01DA1EA

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
VALVES						
FILTERS / STRAINERS						
	.5-1.5		Y Strainer, SW, CL800, ASTM A105N, screen retainer: CS/Screen SS316 - Filtering 0.8mm, Gasket spir SS and Graphite	APVY3DC208EA	STY	
	2-3		Y Strainer, Flanged, RF , CL150, ASTM A216 Gr WCB, Screen retainer: CS, Screen SS316-Filtering 0.8mm, Gasket spir SS and Graphite	APVY3DD401EB	STY	
	4-24	See Note A	Tee Strainer, Type TB, Blind Fl. Type 2, Flanged, RF, CL150, ASTM A234 Gr WPB, Flange ASTM A105N, Perfor. Plate SS304 or SS316, Wire mesh SS304 or SS316, Mesh size 2, B/N: ASME SA193 Gr.B7/SA194 Gr. 2H	APVT0DJ401EH	STT	
FABRICATED ITEMS						
	.5-1.5	S-XS	Pipe bend, R=5xOD, Plain end, Seamless (E=1), ASTM A106 Gr B	APSR1DF2H0EA	9B5D	
10007	6-32 2-30	See Note A	Fabricated Concentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A516 Gr 70N	APSP0DC1G0EB	FCR	
10007	6-32 2-30	See Note A	Fabricated Eccentric reducer, Beveled end, Electric fusion straight weld(E=1), ASTM A516 Gr 70N	APSQ0DC1G0EB	FER	
414	24-24 12-16	See Note A	ASME Fabricated Item, RH Run Reduc., B31.3, Beveled end acc. ASME B16.25, ASTM A106 Gr B	APSX9DF1X0EC	RPAD1	

ASME Class 150 Carbon Steel, General and Water - Alternate A01DA1EA

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
FABRICATED ITEMS						
	0.5-0.5		Needle Valve, API#800, Screwed		NI	

SPEC ITEM NOTES:

53	For orifice flange tapping
58	To use only if necessary
59	For connection PN/class > rating pipe class
60	For connection to equipments
204	Drilled plates check valves for water pumps
401	For insulated pressure testing vents (see G-DS-5-0-1)
402	For instrument connection (PI, TI, etc.)
403	For non-insulated pressure testing vents (see G-DS-5-0-1)
404	For vents
405	For regulation only
413	For instrument connection : Pressure, flow transmitters, analysers, vents and orifice tappings
414	On Project level TSH may be recalculated via Sec. VIII Div. 1 or Div. 2, see also rules defined within G-EP-5-2-4 10007 To be used as option of B16.9 fitting (default)

ASME Class 150 Stainless Steel, General A01SC1B

Rev.	Date	Prepared by	Checked By	Approved By	Description
0	19/08/2022	YJ Chen	C Shen		First issue

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ASME Class 150 Stainless Steel, General A01SC1B

DESIGN CODE:	B31.3 - 2016
RATING CLASS:	150
MATERIAL:	SS 304 / 304 L Dual Certified
SERVICE:	General
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0 in (0 mm)
MATERIAL GROUP:	B16.5-2017, 2.1
TRIM:	Trim 10
FLUID CODE:	AA / AC / AD / AG / AI / AIN / AS / NG / NS / NW
CALCULATION NO:	AL_CORP_613_16_300/400

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 24in						
Temp. DegC	-45	38	50	100	150	200
Pressure BarG	19.0	19.0	18.3	15.7	14.2	13.2
Temp. DegF	-49	100	122	212	302	392
Pressure Psig	275	275	265	228	205	191
Full Vacuum (NPS 0.5 to 24in)						
Temp. DegC	200					
Pressure BarG	-1					
Temp. DegF	392					
Pressure Psig	-14.5					

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S
THK (in)	0.083	0.083	0.109	0.109	0.109	0.109	0.12	0.12	0.12	0.12	0.134
THK (mm)	2.11	2.11	2.77	2.77	2.77	2.77	3.05	3.05	3.05	3.05	3.4
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3
NPS	6	8	10	12	14	16	18	20	24		
DN	150	200	250	300	350	400	450	500	600		
SCH	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10	S-10	S-10		
THK (in)	0.134	0.148	0.165	0.18	0.188	0.188	0.25	0.25	0.25		
THK (mm)	3.4	3.76	4.19	4.57	4.78	4.78	6.35	6.35	6.35		
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	610		

GENERAL NOTES:

- A All butt welded components wall thickness shall match PIPE WALL THICKNESS.
- B Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.
- BX Piping Class Specification has been calculated to withstand Full Vacuum, max. buckling length 6m [19.68 ft].

ASME Class 150 Stainless Steel, General A01SC1B

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
NIPPLES						
53	.5-1.5	S-40S	Nipple, B36.19 M,(100mm), Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EA	NPTG1	
53	.5-1.5	S-40S	Nipple, B36.19 M,(180mm), Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EB	NPTG3	
53	.5-1.5	S-40S	Nipple, B36.19 M,(100mm), NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EA	NTTG1	
53	.5-1.5	S-40S	Nipple, B36.19 M,(180mm), NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EB	NTTG3	
PIPE						
	.5-1.5	S-10S	Pipe, B36.19 M, Plain end, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPP7QP2H0EE	P	
	2-16	S-10S	Pipe, B36.19 M, Beveled end, EFW(E=0.80), ASTM A312 Gr TP304/TP304L, Dual Certified	APPP7QP1C0EE	P	
	18-24	S-10S	Pipe, B36.19 M, Beveled end, EFW(E=0.80), ASTM A312 Gr TP304/TP304L, Dual Certified	APPP7QP1C0EE	P	
FORGED FITTINGS						
58	.5-1.5		90Deg. Elbow, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKA1QC130EA	9E	
	.5-1.5		Equal Tee, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKB1QC130EA	T	
58	.5-1.5		45Deg. Elbow, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKC1QC130EA	4E	
	.5-1.5		Cap, B16.11, SW, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKF1QC130EA	C	
404	.5-1		Plug, B16.11, Threaded NPT, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKP1QC230EA	PL	
401	.5-1		Cap, B16.11, Threaded NPT, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKF1QC230EA	CT	
	.5-1.5		Full Coupling, B16.11, SW, CL3000, ASTM A182 Gr F304/304L, Dual Certified		FCL	
	.75-1.5 .5-1.25		Reduced tee, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKQ1QC130EA	RT	
	2-16 .5-1.5		Sockolet, MSS SP-97, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKM7QC130EB	SOL	
403	2-16 .75-1		Thredolet, MSS SP-97, Threaded NPT, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKN7QC230EB	TOL	
WELDED FITTINGS						
	.75-1.5 .5-1.25	S-10S	Swage Nipple Conc, MSS SP-95, BW, ASTM A403 Gr WP304/304L, Dual Certified -S	APWT5SH1XXEA	CBB	
	.75-1.5 .5-1.25	S-10S	Swage Nipple Ecc, MSS SP-95, BW, ASTM A403 Gr WP304/304L, Dual Certified -S	APWU5SH1XXEA	EBB	
	2-16	See Note A	90Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L,Dual Certified -S/WX	APWA1SG7XXEA	9E	
	2-16	See Note A	45Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L,Dual Certified -S/WX	APWB1SG7XXEA	4E	
	2-16	See Note A	Equal Tee, B16.9, BW,ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWD1SG7XXEA	T	

ASME Class 150 Stainless Steel, General A01SC1B

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
WELDED FITTINGS						
	2-16 1.25-14	See Note A	Reducing Tee, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWE1SG7XXEA	RT	
	2-16	See Note A	Cap, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWF1SG7XXEA	C	
	2-16 .75-14	See Note A	Concentric Reducer, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWG1SG7XXEA	CR	
	2-16 .75-14	See Note A	Eccentric Reducer, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWH1SG7XXEA	ER	
FLANGES						
	.5-16		Flange, Blind, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFA2QC101EA	BF	
59	.5-16		Flange, Blind, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFA2QC103EA	BF3	
53	.5-.5		Flange, Threaded, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFK2QC101EA	TF	
	.5-14		Flange, Spectacle Figure 8, B16.48, RF, CL 150, ASTM A240 Type 304/304 L, Dual Certified	APFM6RL101EA	F8	
	.5-1.5		Flange, SW, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFS2QC101EA	SF	
59	.5-1.5		Flange, SW, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFS2QC103EA	SF3	
402	.75-2 .5-.5		Flange, Blind with Thd Bore, B16.5, 1/2" NPT, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFG2QC101EB	BFI	
402, 59	.75-2 .5-.5		Flange, Blind w Thd Bore, B16.5, 1/2" NPT, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFG2QC103EB	BFI3	
	2-16	See Note A	Flange, WN, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFL2QC101EA	WN	
59	2-16	See Note A	Flange, WN, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFL2QC103EA	WN3	
	16-16		Paddle, Blank, B16.48, RF, CL 150, ASTM A240 Type 304/304 L, Dual Certified	APFN6RL101EA	PB	
	16-16		Paddle, Spacer, B16.48, RF, CL 150, ASTM A240 Type 304/304 L, Dual Certified	APFP6RL101EA	PS	
ORIFICE FLANGE						
	1-16	See Note A	Orif Flg, WN 0.5 NPT+jack scr. B16.36, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APOA1QC103EA	OF	
GASKETS						
	.5-10		Gasket, Flat Ring, 1.5 mm Thk, CL 150, Modified PTFE	APGF2PA001EN	G	
59	.5-16		Gasket, Spiral Wound, 4.5 mm Thk, CL 300, Filler graphite 98%, spiral 316SS, IR 316SS, OR CS	APGS1GB003EB	G3	
	12- 16		Gasket, Flat Ring, 3.0 mm Thk, CL 150, Modified PTFE	APGF2PA001EP	G	
BOLTING						
	.5-16		Stud Bolt w/2-Heavy hex Nuts, ASTM A193 Gr B8 Cl 2 / A194 Gr 8M	APBA1SG000EF	BT	
	.5-16		Stud Bolt w/2-Heavy hex Nuts, ASTM A193 Gr B8 Cl 2 / A194 Gr 8M	APBA1SG000EF	BT3	
VALVES						
407	.5-2	See Note A	Ball Valve, Float Ball, Thrd, NPT, RB, ASTM A182 Gr F316/316L, 316SS Ball, PTFE, Oval Handle	APVB1QW333EH	BV	

ASME Class 150 Stainless Steel, General A01SC1B

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
VALVES						
	.5-1.5	See Note A	Check Valve, API602, piston type, horiz.and vert, SW, CL800, ASTM A182 Gr F316/316L, Trim No. 10, BC	APVC6QW208EU	CH	
	.5-1.5	See Note A	Gate Valve, API 602, SW, CL800, ASTM A182 Gr F316/316L TrimNo. 10, BB, OS & Y	APVG4QW208EH	GA	
60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL150, ASTM A182 Gr F316/316L, TrimNo. 10, BB, OS & Y	APVG4QW401EJ	GAF	
59, 60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL300, ASTM A182 Gr F316/316L, TrimNo. 10, BB, OS & Y	APVG4QW403EJ	GAF3	
413	.5-1.5	See Note A	Globe Valve,API 602, SWxNPT, CL800, RB, ASTM A182 Gr F316/316L, Trim No. 12, Graphite	APVL5QW008FT	GL1	
405	.5-1.5	See Note A	Globe Valve, API 602, straight seat, SW, CL800, ASTM A182 Gr F316/316L, Trim No. 10, BB, OS & Y	APVL5QW208ED	GL	
	2-16	See Note A	Check Valve, API 594, Type B, swing check - horiz. and vert. pos., Flanged, RF, CL150, ASTM A351 Gr CF3, Trim No. 10, BC, hinge pin inside	APVC4QH401EB	CH	
	2-14	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL150, ASTM A351 Gr CF3, Trim No. 10, BB, OS & Y	APVG3QH401ED	GA	
59, 60	2-2	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL300, ASTM A351 Gr CF3, Trim No. 10, BB, OS & Y	APVG3QH403ED	GA3	
405	2-4	See Note A	Globe Valve, API 623, straight seat, Flanged, RF, CL150, ASTM A351 Gr CF3, Trim No. 10, BB, OS & Y	APVL7QH401EE	GL	
405	6-12	See Note A	Globe Valve, API 623, straight seat, Flanged, RF, CL150, ASTM A351 Gr CF3, Trim No. 10, BB, OS & Y, Gear OP	APVL7QH401EB	GL	
	16-16	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL150, ASTM A351 Gr CF3, Trim No. 10, BB, OS & Y, Gear OP	APVG3QH401EB	GA	
	.5-1		Ball Valve, Flanged, RF, CL 150, A182 F304 Body, Full Bore		BA	
	.5-1		Ball Valve, API 800 SW x Serewed NPT, FULL PORT		BA1	
FILTERS / STRAINERS						
	.5-1.5		Y Strainer, SW, CL800, ASTM A182 Gr F316/316L, Screen retainer SS316, Screen SS316, Filtering 0.3mm, Gasket spir SS and Graphite	APVY3QW208EG	STY	

ASME Class 150 Stainless Steel, General A01SC1B

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
FILTERS / STRAINERS						
	2-3		Y Strainer, Flanged, RF, CL150, ASTM A351 Gr CF3, Screen retainer: SS316, Screen SS316, Filtering 0.3mm, Gasket spir SS and Graphite	APVY3QH401EL	STY	
	4-16		Conical filter, G-DS-5-4-2, Wafer, CL150, all fluids except oxygen and water	APMN0QA701EA	CFR	
FABRICATED ITEMS						
	.5-1.5	S-10S	Pipe bend, R=3xOD, Plain end, Seamless (E=1), ASTM A312 Gr TP304/TP304L, Dual Certified	APSR2QP2H0EB	9B3D	
10007	6-16 2-14	See Note A	Fabricated Concentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L	APSP0QD1G0EB	FCR	
10007	6-16 2-14	See Note A	Fabricated Eccentric reducer, Beveled end, Electric fusion straight weld(E=1), ASTM A240 Type 304/304L	APSQ0QD1G0EB	FER	
	12-16 2-14	See Note A	ASME Fabricated Item, weld with Reinf., B36.19 M / B36.10 M, EFW pipe(E=0.8), ASTM A312 Gr TP304/TP304L Dual Certified	APSY7QP0C0EA	RPAD	
414	16-16 12-14	See Note A	ASME Fabricated Item, RH Run Reduc., B31.3, BE acc. ASME B16.25, ASTM A312 Gr TP304/TP304L Dual Certified	APSX9QP1X0EF	RPAD1	

SPEC ITEM NOTES:

53	For orifice flange tapping
58	To use only if necessary
59	For connection PN/class > rating pipe class
60	For connection to equipments
401	For insulated pressure testing vents (see G-DS-5-0-1)
402	For instrument connection (PI, TI, etc.)
403	For non-insulated pressure testing vents (see G-DS-5-0-1)
404	For vents
405	For regulation only
407	To be used for automatic valve connection
413	For instrument connection : Pressure, flow transmitters, analysers, vents and orifice tappings
414	On Project level TSH may be recalculated via Sec. VIII Div. 1 or Div. 2, see also rules defined within G-EP-5-2-4 10007 To be used as option of B16.9 fitting (default)

ASME Class 150 Stainless Steel, General A01SC1B

BRANCH CHART (Preference 1)

LEGEND:

0 - No Branch

1 - Equal Tee
130 - Class 3000

1 - Equal Tee
1XX - -

2 - Reducing Tee
230 - Class 3000

2 - Reducing Tee
2XX - -

3 - Stub-on
31 - Welded Connection

3 - Stub-on
32 - Reinforcing Pad

3 - Stub-on
34 - Reinforced Header
Run (TSH) Reducing

5 - Sockolet
530 - Class 3000

Branch Diameter

Header Diameter	0,5	0,75	1	1,25	1,5	2	2,5	3	3,5	4	5	6	8	10	12	14	16
0,5	130																
0,75	230	130															
1	230	230	130														
1,25	230	230	230	130													
1,5	230	230	230	230	130												
2	530	530	530	530	530	1XX											
2,5	530	530	530	530	530	2XX	1XX										
3	530	530	530	530	530	2XX	2XX	1XX									
3,5	530	530	530	530	530	31	2XX	2XX	1XX								
4	530	530	530	530	530	31	31	2XX	2XX	1XX							
5	530	530	530	530	530	31	31	31	2XX	2XX	1XX						
6	530	530	530	530	530	31	31	31	31	2XX	2XX	1XX					
8	530	530	530	530	530	32	32	32	32	32	2XX	2XX	1XX				
10	530	530	530	530	530	32	32	32	32	32	32	2XX	2XX	1XX			
12	530	530	530	530	530	32	32	32	32	32	32	32	2XX	2XX	1XX		
14	530	530	530	530	530	32	32	32	32	32	32	32	32	2XX	2XX	1XX	
16	530	530	530	530	530	32	32	32	32	32	32	32	32	32	2XX	2XX	1XX

ASME Class 150 Stainless Steel, Non Cryogenic Oxygen A01SC1BX

Rev.	Date	Prepared by	Checked By	Approved By	Description
0	19/08/2022	YJ Chen	C Shen		First issue

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ASME Class 150 Stainless Steel, Non Cryogenic Oxygen A01SC1BX

DESIGN CODE:	B31.3 - 2016
RATING CLASS:	150
MATERIAL:	SS 304 / 304 L Dual Certified
SERVICE:	O2
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0 in (0 mm)
MATERIAL GROUP:	B16.5-2017, 2.1
TRIM:	Trim 9
FLUID CODE:	OG / ORG / OW
CALCULATION NO:	-

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 24in								
Temp. DegC	-45	38	50	100	150	200	250	300
Pressure BarG	19.0	19.0	18.3	15.7	14.2	13.2	12.1	10.2
Temp. DegF	-49	100	122	212	302	392	482	572
Pressure Psig	275	275	265	228	205	191	175	147

Full Vacuum (NPS 0.5 to 24in)	
Temp. DegC	200
Pressure BarG	-1
Temp. DegF	392
Pressure Psig	-14.5

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S
THK (in)	0.083	0.083	0.109	0.109	0.109	0.109	0.12	0.12	0.12	0.12	0.134
THK (mm)	2.11	2.11	2.77	2.77	2.77	2.77	3.05	3.05	3.05	3.05	3.4
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3
NPS	6	8	10	12	14	16	18	20	24	26	28
DN	150	200	250	300	350	400	450	500	600	650	700
SCH	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10	S-10	S-20	S-10	S-10
THK (in)	0.134	0.148	0.165	0.18	0.188	0.188	0.25	0.25	0.375	0.312	0.312
THK (mm)	3.4	3.76	4.19	4.57	4.78	4.78	6.35	6.35	9.53	7.92	7.92
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	610	660	711

30
750
S-STD
0.375
9.53
762

GENERAL NOTES:

- A All butt welded components wall thickness shall match PIPE WALL THICKNESS.
- B Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.
- BX Piping Class Specification has been calculated to withstand Full Vacuum, max. buckling length 6m [19.68 ft].

ASME Class 150 Stainless Steel, Non Cryogenic Oxygen A01SC1BX

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
NIPPLES						
53	.5-1.5	S-40S	Nipple, B36.19 M,(100mm), Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EA	NPTG1	
53	.5-1.5	S-40S	Nipple, B36.19 M,(180mm), Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EB	NPTG3	
53	.5-1.5	S-40S	Nipple, B36.19 M,(100mm), NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EA	NTTG1	
53	.5-1.5	S-40S	Nipple, B36.19 M,(180mm), NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EB	NTTG3	
PIPE						
	.5-1.5	S-10S	Pipe, B36.19 M, Plain end, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPP7QP2H0EE	P	
	2-16	S-10S	Pipe, B36.19 M, Beveled end, EFW (E=0.8), ASTM A312 Gr TP304/TP304L, Dual Certified	APPP7QP1C0EE	P	
FORGED FITTINGS						
58	.5-1.5		90Deg. Elbow, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKA1QC130EA	9E	
	.5-1.5		Equal Tee, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKB1QC130EA	T	
58	.5-1.5		45Deg. Elbow, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKC1QC130EA	4E	
	.5-1.5		Cap, B16.11, SW, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKF1QC130EA	C	
404	.5-1		Plug, B16.11, Threaded NPT, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKP1QC230EA	PL	
401	.75-1		Cap, B16.11, Threaded NPT, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKF1QC230EA	CT	
	.5-1.5		Full Coupling, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified		FCL	
	.75-1.5 .5-1.25		Reduced tee, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKQ1QC130EA	RT	
	2-16 .5-1.5		Sockolet, MSS SP-97, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKM7QC130EB	SOL	
403	2-16 .75-1		Thredolet, MSS SP-97, Threaded NPT, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKN7QC230EB	TOL	

ASME Class 150 Stainless Steel, Non Cryogenic Oxygen A01SC1BX

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
WELDED FITTINGS						
	.75-1.5 .5-1.25	S-10S	Swage Nipple Conc, MSS SP-95, BW, ASTM A403 Gr WP304/304L, Dual Certified -S	APWT5SH1XXEA	CBB	
	.75-1.5 .5-1.25	S-10S	Swage Nipple, Ecc, MSS SP-95, BW, ASTM A403 Gr WP304/304L, Dual Certified -S	APWU5SH1XXEA	EBB	
	2-16	S-10S	90Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWA1SG7XXEA	9E	
	2-16	S-10S	45Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWB1SG7XXEA	4E	
	2-16	S-10S	Equal Tee, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWD1SG7XXEA	T	
	2-16 1.25-14	S-10S	Reducing Tee, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWE1SG7XXEA	RT	
	2-16	S-10S	Cap, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWF1SG7XXEA	C	
	2-16 .75-14	S-10S	Concentric Reducer, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWG1SG7XXEA	CR	
	2-16 .75-14	S-10S	Eccentric Reducer, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWH1SG7XXEA	ER	
FLANGES						
	.5-16		Flange, Blind, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFA2QC101EA	BF	
59	.5-16		Flange, Blind, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFA2QC103EA	BF3	
53	.5-.5		Flange, Threaded, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFK2QC101EA	TF	
	.5-14		Flange, Spectacle Figure 8, B16.48, RF, CL 150, ASTM A240 Type 304/304 L, Dual Certified	APFM6RL101EA	F8	
	.5-1.5		Flange, SW, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFS2QC101EA	SF	
59	.5-1.5		Flange, SW, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFS2QC103EA	SF3	
402	.75-2 .5-.5		Flange, Blind w Thd Bore, B16.5, 1/2" NPT, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFG2QC101EB	BF1	
402, 59	.75-2 .5-.5		Flange, Blind w Thd Bore, B16.5, 1/2" NPT, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFG2QC103EB	BF13	
	2-16	S-10S	Flange, WN, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFL2QC101EA	WN	
59	2-16	S-10S	Flange, WN, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFL2QC103EA	WN3	
	16-16		Paddle, Blank, B16.48, RF, CL 150, ASTM A240 Type 304/304 L, Dual Certified	APFN6RL101EA	PB	
	16-16		Paddle, Spacer, B16.48, RF, CL 150, ASTM A240 Type 304/304 L, Dual Certified	APFP6RL101EA	PS	
ORIFICE FLANGE						
	1-16	See Note A	Orif Flg, WN 0.5 NPT+jack scr. B16.36, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APOA1QC103EA	OF	
	1-16	See Note A	Orif Flg, WN 0.5 NPT+jack scr. B16.36, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APOA1QC101EA	OF1	

ASME Class 150 Stainless Steel, Non Cryogenic Oxygen A01SC1BX

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
GASKETS						
	.5-10		Gasket, Flat Ring, 1.5 mm Thk, CL 150, Approved for ox. Service, Expanded graphite 98% with metallic reinforcement	APGF2GN001ES	G	
59	.5-16		Gasket, Spiral Wound, 4.5 mm Thk, CL 300, Approved for ox. Service, Filler graphite 98%, spiral 316SS, IR 316SS, OR CS	APGS1GB003EV	G3	
	12-16		Gasket, Flat Ring, 3.0 mm Thk, CL 150, Approved for ox. Service, Expanded graphite 98% with metallic reinforcement	APGF2GN001ET	G	
BOLTING						
	.5-16		Stud Bolt w/2-Heavy Hex Nuts, ASTMA193 Gr B8 Cl 2 / A194 Gr 8M	APBA1SG000EF	BT	
	.5-16		Stud Bolt w/2-Heavy Hex Nuts, ASTMA193 Gr B8 Cl 2 / A194 Gr 8M	APBA1SG000EF	BT3	
VALVES						
	.5-2	See Note A	Check Valve, API 602, Piston check, SW, CL800, ASTM A182 Gr F316/316L, Disc monel , spg monel , Gasket spir SS and graph, Cleaned & degreased for oxygen service	APVC6QW208GM	CH	
413	.5-.5	See Note A	Globe Valve, Service range -46°C to 300°C, Thrd, Female NPT, CL1500, RB, ASTM A182 Gr F316L, Plug SS, Graph packing, Gasket graph/metal, UB, inside screw, HW, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service,,	APVL1QF315GQ	GL	
	3-16	See Note A	Check Valve, API 594, Dual Plate Check, Bolted, Wafer RF, CL150, ASTM A351 Gr CF8M, Plates monel , int. Monel, Equipot. Connect. acc. to AL std. CPY- EP-5-2-002 - Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service,,	APVC4QN601FU	CHW	
FILTERS / STRAINERS						
233	2-16		Conical filter, G-DS-5-4-10, CL 150, liquid oxygen	APMN0QA701EG	CFR	
FABRICATED ITEMS						
	.5-1.5	S-10S	Pipe bend, R=5xOD, Plainend, Seamless (E=1), ASTM A312 Gr TP304/TP304L, Dual Certified	APSR2QP2H0ED	9B5D	
10007	6-16 2-12	See Note A	Fabricated Concentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L	APSP0QD1G0EB	FCR	
10007	6-16 2-12	See Note A	Fabricated Eccentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L	APSQ0QD1G0EB	FER	
	12-16 2-12	See Note A	ASME Fabricated Item, weld with Reinf., B36.19 M / B36.10 M, EFW pipe (E=0.80), ASTM A312 Gr TP304/TP304L Dual Certified	APSY7QP0C0EA	RPAD	

SPEC ITEM NOTES:

53	For orifice flange tapping
58	To use only if necessary
59	For connection PN/class > rating pipe class

ASME Class 150 Stainless Steel, Non Cryogenic Oxygen A01SC1BX

233	Heat Fusion Joining (Thermoplastic): Requirements of ASTM F2620, Standard Practice for Heat Fusion Joining of PE Pipe and
401	For insulated pressure testing vents (see G-DS-5-0-1)
402	For instrument connection (PI, TI, etc.)
403	For non-insulated pressure testing vents (see G-DS-5-0-1)
404	For vents
413	For instrument connection : Pressure, flow transmitters, analysers, vents and orifice tappings
414	On Project level TSH may be recalculated via Sec. VIII Div. 1 or Div. 2, see also rules defined within G-EP-5-2-4
10007	To be used as option of B16.9 fitting (default)

ASME Class 150 Stainless Steel, Non Cryogenic Oxygen A01SC1BX

BRANCH CHART (Preference 1)

LEGEND:

0 - No Branch

1 - Equal Tee
130 - Class 3000

1 - Equal Tee
1XX - -

2 - Reducing Tee
230 - Class 3000

2 - Reducing Tee
2XX - -

3 - Stub-on
31 - Welded Connection

3 - Stub-on
32 - Reinforcing Pad

3 - Stub-on
34 - Reinforced Header
Run (TSH) Reducing

5 - Sockolet
530 - Class 3000

Branch Diameter

Header Diameter	0,5	0,75	1	1,25	1,5	2	2,5	3	3,5	4	5	6	8	10	12	14	16
0,5	130																
0,75	230	130															
1	230	230	130														
1,25	230	230	230	130													
1,5	230	230	230	230	130												
2	530	530	530	530	530	1XX											
2,5	530	530	530	530	530	2XX	1XX										
3	530	530	530	530	530	2XX	2XX	1XX									
3,5	530	530	530	530	530	31	2XX	2XX	1XX								
4	530	530	530	530	530	31	31	2XX	2XX	1XX							
5	530	530	530	530	530	31	31	31	2XX	2XX	1XX						
6	530	530	530	530	530	31	31	31	31	2XX	2XX	1XX					
8	530	530	530	530	530	32	32	32	32	32	2XX	2XX	1XX				
10	530	530	530	530	530	32	32	32	32	32	32	2XX	2XX	1XX			
12	530	530	530	530	530	32	32	32	32	32	32	32	2XX	2XX	1XX		
14	530	530	530	530	530	32	32	32	32	32	32	32	32	2XX	2XX	1XX	
16	530	530	530	530	530	32	32	32	32	32	32	32	32	32	2XX	2XX	1XX

ASME Class 150 Stainless Steel Cryogenic Air Gases - Alternate A01SC1SAX

3 - Stub-on

34 - Reinforced HeaderRun (TSH) Reducing

Rev.	Date	Prepared by	Checked By	Approved By	Description
0	19/08/2022	YJ Chen	C Shen		First issue

Disclaimer:

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ASME Class 150 Stainless Steel Cryogenic Air Gases - Alternate A01SC1SAX

DESIGN CODE:	B31.3 Latest Edition / Addenda - Normal Fluid Service
RATING CLASS:	150
MATERIAL:	SS 304 / 304 L Dual Certified
SERVICE:	General Cryogenic
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0 in (0 mm)
MATERIAL GROUP:	B16.5-2017, 2.1
FLUID CODE:	AD / AG / AL / DK / KAC / KAD / KAG / KAL / KHN / KXL / KXP / KXR / KXS / KXT / NG / NL / NLO / NW / OG / OL / ON / ONV / ORG / ORL / OW
CALCULATION NO:	-

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 48in					
Temp. DegC	-196	-29	38	50	100
Pressure BarG	10	10	10	10	10
Temp. DegF	-321	-20	100	/	212
Pressure Psig	145	145	145	/	145

Full Vacuum NPS 0.5 to 24in	
Temp. DegC	100
Pressure BarG	-1
Temp. DegF	212
Pressure Psig	-14.5

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S
THK (in)	0.083	0.083	0.109	0.109	0.109	0.109	0.12	0.12	0.12	0.12	0.134
THK (mm)	2.11	2.11	2.77	2.77	2.77	2.77	3.05	3.05	3.05	3.05	3.4
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3

NPS	6	8	10	12	14	16	18	20	22	24	26
DN	150	200	250	300	350	400	450	500	550	600	650
SCH	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10
THK (in)	0.134	0.148	0.165	0.18	0.188	0.188	0.188	0.218	0.218	0.25	0.312
THK (mm)	3.4	3.76	4.19	4.57	4.78	4.78	4.78	5.54	5.54	6.35	7.92
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	559	610	660

NPS	28	30	32	34	36	38	40	42	44	46	48
DN	700	750	800	850	900	950	1000	1050	1100	1150	1200
SCH	S-10	S-10	S-10	S-10	S-10	0.312"	0.312"	S-STD	S-STD	S-STD	S-STD
THK (in)	0.312	0.312	0.312	0.312	0.312	0.312	0.312	0.375	0.375	0.375	0.375
THK (mm)	7.92	7.92	7.92	7.92	7.92	7.92	7.92	9.53	9.53	9.53	9.53
OD (mm)	711	762	813	864	914	965	1016	1067	1118	1168	1219

GENERAL NOTES:

- A All butt welded components wall thickness shall match PIPE WALL THICKNESS.
- B Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.

ASME Class 150 Stainless Steel Cryogenic Air Gases - Alternate A01SC1SAX

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
NIPPLES						
	.5-1.5	S-40S	Nipple, B36.19 M,(100mm), Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EA	NPTG1	
	.5-1.5	S-40S	Nipple, B36.19 M,(180mm), Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EB	NPTG3	
	.5-1.5	S-40S	Nipple, B36.19 M,(100mm), NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EA	NTTG1	
	.5-1.5	S-40S	Nipple, B36.19 M,(180mm), NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EB	NTTG3	
PIPE						
	.5-12	S-10S	Pipe, B36.19 M, Bevel end, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPP2QP2H0EE	P	
	14-24	S-10S	Pipe, B36.19 M, Bevel end, EFW (E=1), ASTM A358 Gr 304/304L Cl 1, Dual Certified	APPP7RY2G0EE	P	
FORGED FITTINGS						
	.5-1.5		Full Coupling, B16.11, Threaded NPT, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKD1QC230EM	FCL1	
	.5-1.5		Cap, B16.11, Threaded NPT, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKF1QC230EA	CT	
	.5-1.5		Plug, B16.11, Threaded NPT, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKP1QC230EM	PL	
902	3-24 .5-.75		Threadolet, MSS SP-97, Threaded NPT, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKN7QC230EA	TOL	
WELDED FITTINGS						
	.5-1.5	S-10S	90Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWA1SG1XXEU	9E	
	.5-1.5	S-10S	45Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWB1SG1XXEU	4E	
	.5-24	S-10S	Equal Tee, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWD1SG1XXEU	T	
	.5-24	S-10S	Cap, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWF1SG1XXEU	C	
	.75-24 .5-22	S-10S	Reducing Tee, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWE1SG1XXEU	RT	
	.75-24 .5-22	S-10S	Concentric Reducer, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWG1SG1XXEU	CR	
	.75-24 .5-22	S-10S	Eccentric Reducer, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWH1SG1XXEU	ER	

ASME Class 150 Stainless Steel Cryogenic Air Gases - Alternate A01SC1SAX

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
WELDED FITTINGS						
	.75-24 .5-22	S-10S	Eccentric Reducer, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWH1SG1XXEU	ER	
	2-24	S-10S	90Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWA1SG1XXEU	9E	
	2-24	S-10S	45Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWB1SG1XXEU	4E	
	2-24	S-10S	90Deg SR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWC1SG1XXEU	9ES	
FLANGES						
	.5-24		Flange, Blind, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified, Serrated Spiral 125/250	APFA2QC101EZ	BF	
	.5-24	S-10S	Flange, WN, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified, Serrated spiral 125/250	APFL2QC101EZ	WN	
59	.5-24	S-10S	Flange, WN, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified, Serrated spiral 125/250	APFL2QC103EZ	WN3	
	.5-14		Flange, Spectacle Figure 8, B16.48, RF, CL 150, ASTM A240 Type 304/304L, Dual Certified, Serrated spiral 125/250	APFM6RL101EZ	F8	
	16-24		Paddle, Blank, B16.48, RF, CL 150, ASTM A240 Type 304/304L, Dual Certified, Serrated spiral 125/250	APFN6RL101EZ	PB	
	16-24		Paddle, Spacer, B16.48, RF, CL 150, ASTM A240 Type 304/304L, Dual Certified, Serrated spiral 125/250	APFP6RL101EZ	PS	
ORIFICE FLANGE						
	1-24	See Note A	Orif Flg, WN 0.5NPT+jack scr, B16.36, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APOA1QC103EF	OF	
GASKETS						
	.5-10		Gasket, Flat Ring, 1.5 mm Thk, CL 150, Approved ox. Service, Expanded graphite 98% with metallic reinforcement	APGF2GN001ES	G	
59	.5-10		Gasket, Flat Ring, 1.5 mm Thk, CL 300, Approved ox. Service, Expanded graphite 98% with metallic reinforcement	APGF2GN003ES	G3	
	12-24		Gasket, Flat Ring, 3.0 mm Thk, CL 150, Approved ox. Service, Expanded graphite 98% with metallic reinforcement	APGF2GN001ET	G	
59	12-24		Gasket, Flat Ring, 3.0 mm Thk, CL 300, Approved ox. Service, Expanded graphite 98% with metallic reinforcement	APGF2GN003ET	G3	

ASME Class 150 Stainless Steel Cryogenic Air Gases - Alternate A01SC1SAX

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
BOLTING						
	.5-24		Stud Bolt w/2-Heavy Hex Nuts, SA320 Gr B8 Cl 2 / SA194 Gr 8	APBA1SC000XX	BT	
	.5-24		Stud Bolt w/2-Heavy Hex Nuts, SA320 Gr B8 Cl 2 / SA194 Gr 8	APBA1SC000XX	BT3	
	.5-2		Stud Bolt w/2-Heavy Hex Nuts, SA320 Gr B8 Cl 2 / SA194 Gr 8 Flat Washer for Bolting, Stainless Steel, 17.7 PH	APBB3SD000EF	BTFW	
	.5-2		Stud Bolt w/2-Heavy Hex Nuts, SA320 Gr B8 Cl 2 / SA194 Gr 8 Spring Washer for Bolting, Stainless Steel 17.7 PH	APBH0SD000EF	BTSW	
VALVES						
	.5-2	See Note A	Check Valve, Service range -196°C to 100°C, Piston check, Welded, BW, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, Spg SS, PTFE, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service,	APVC1QM103FP	CH3	
210, 298	.5-10	See Note A	Gate Valve, Service range -196°C to 150°C- pressure Design : PN10, Welded, BW, CL150, FB, ASTM A182 Gr F304L, Graph packing, Gasket spir SS and graph, Cryo ASU ext. BB acc. to AL std G-GS-5-4-1 (replaces CPY-GS-5-4-1), HW, Cleaned & degreased for oxygen service,,	APVG1QC101GV		
211, 298	.5-10	See Note A	Gate Valve, Service range -196°C to 150°C- pressure Design : PN10, Welded, BW, CL150, FB, ASTM A182 Gr F304L, Graph packing, Gasket spir SS and graph, Cryo ext. BB acc. manufac. Std, HW, Cleaned & degreased for oxygen service,,	APVG1QC101HT	GA	
	.5-5	See Note A	Globe Valve, Service range -196°C to 100°C, SW, CL300, ASTM A182 Gr F316L, Disc SS-PTFE insert, Bellow seal, Gasket : Copper, BB, HW, Non metal. Int. parts agreed for oxygen	APVL1QF203JY	GL	
211	.5-4	See Note A	Globe Valve, Service range -196°C to 100°C, Welded, BW, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, PTFE packing & Live loaded, PTFE, Cryo ext. BB, acc. manufac. Std, inside screw, HW, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service	APVL1QM103GV	GL3	
210	.5-4	See Note A	Globe Valve, Service range -196°C to 100°C, Welded, BW, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, PTFE packing & Live loaded, PTFE, Cryo ASU ext. BB acc. to AL std G-GS-5-4-1 (replaces CPY-GS- 5-4-1), inside screw, HW, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service	APVL1QM103GW		
212	.5-2	See Note A	Globe Valve, Service range -196°C to 100°C, Welded, BW, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, PTFE packing & Live loaded, PTFE, Top entry bonnet acc. to AL std G- GS-5-4-1 (replaces CPY-GS- 5-4-1), inside screw, HW, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service	APVL1QM103GX		
413	.5-5	See Note A	Globe Valve, Service range -196°C to 100°C, Thrd, Female NPT, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, PTFE packing & Live loaded, PTFE, BB, inside screw, HW, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service	APVL1QM303GY	GLT	
404	.5-5	See Note A	Globe Valve, API 602, BWxNPT, CL800, ASTM A182 Gr F304/304L, Trim No. 12, PTFE, PTFE, ext. BB, OS & Y, HW, Cleaned & degreased for oxygen service	APVL5QY008FZ	GL1	
	3-24	See Note A	Check Valve, API 594,, Service range -196°C to 100°C, Dual Plate Check, Bolted, Wafer RF, CL150, ASTM A351 Gr CF8M, Plates SS, Spg inconel, Cleaned & degreased for oxygen service,,	APVC4QN601FQ	CHW	

ASME Class 150 Stainless Steel Cryogenic Air Gases - Alternate A01SC1SAX

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
VALVES						
211	3-24		Butterfly Valve, API 609,, Service range-196°C to 100°C, high performance, Bolted, Lug RF, CL150, ASTM A351 Gr CF8M, Disc SS, Seat PCTFE, Viton O-ring - vent hole, Cryo ext. acc. to manufact. Std, Gear OP, Cleaned & degreased for oxygen service	APVF2QN601ED	BU	
210	3-24		Butterfly Valve,API 609, Service range-196°C to 100°C,high performance, Bolted, Lug RF, CL150, ASTM A351 Gr CF8M, Disc SS, Seat PCTFE, Viton O-ring - vent hole, Cryo ext. acc. to AL std G-DS-5-3-3 (replacesCPY-DS-5-3-3), Gear OP, Cleaned & degreased for oxygen service			
FILTERS / STRAINERS						
224	1-16		Conical filter, G-DS-5-4-10, Wafer, CL 150, liquid oxygen	APMN0QA701EF	CFR2	
319	2-24		Conical filter, G-DS-5-4-2, Wafer, CL150, all fluids except oxygen and water	APMN0QA701EA	CFR	
FABRICATED ITEMS						
	.5-1.5	S-10S	Pipe bend, R=5xOD, Plainend, Seamless (E=1), ASTM A312 Gr TP304/TP304L, Dual Certified	APSR2QP2H0ED	9B5D	
10007	6-24 2-22	See Note A	Fabricated Concentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L	APSP0QD1G0EB	FCR	
10007	6-24 2-22	See Note A	Fabricated Eccentric reducer, Beveled end, Electric fusion straight weldpipe (E=1), ASTM A240 Type 304/304L	APSQ0QD1G0EB	FER	
	26-48	See Note A	Fabricated Item, Miter 3P/2W, B31.3, acc. G-DS-5-2-5,,30deg - Miter Bend R=1 D,Beveled end acc. B16.25, , Electric fusion straight weld pipe (E=1),ASTM A240 Type 304/304L Dual Certified,,, , , -			
	26-48	See Note A	Fabricated Item, Miter 3P/2W, B31.3, acc. G-DS-5-2-5,,45 deg - Miter Bend R=1 D,Beveled end acc. B16.25, ,Electric fusion straight weld pipe (E=1),ASTM A240 Type 304/304L Dual Certified,,, , , -			
	26-48	See Note A	Fabricated Item, Miter 3P/2W, B31.3, acc. G-DS-5-2-5,,60 deg - Miter Bend R=1 D,Beveled end acc. B16.25, ,Electric fusion straight weld pipe (E=1),ASTM A240 Type 304/304L Dual Certified,,, , , -			
	26-48	See Note A	Fabricated Item, Miter 4P/3W, B31.3, acc. G-DS-5-2-5,,90 deg - Miter Bend R=1 D,Beveled end acc. B16.25, ,Electric fusion straight weld pipe (E=1),ASTM A240 Type 304/304L Dual Certified,,, , , -			

SPEC ITEM NOTES:

59	For connection PN/class > rating pipe class
210	Valve inside cold box.
211	Valve outside cold box.
212	Valve top entry inside cold box.
224	Liquid with Enriched Oxygen Only
298	For bottom tank line PS 10 bar
319	All fluids except Oxygen & Water

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404	For vents
413	For instrument connection : Pressure, flow transmitters, analysers, vents and orifice tappings
902	For thermowell connection in cryogenic insulation casing only
10007	To be used as option of B16.9 fitting (default)

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Rev.	Date	Prepared by	Checked By	Approved By	Description
0	19/08/2022	YJ Chen	C Shen		First issue

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ASME Class 150 Stainless Steel Cryogenic Air Gases A01SC1SX

DESIGN CODE:	B31.3 Latest Edition / Addenda - Normal Fluid Service
RATING CLASS:	150
MATERIAL:	SS 304 / 304 L Dual Certified
SERVICE:	General Cryogenic
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0 in (0 mm)
MATERIAL GROUP:	B16.5-2017, 2.1
FLUID CODE:	AD / AG / AL / DK / KAC / KAD / KAG / KAL / KHN / KXL / KXP / KXR / KXS / KXT / NG / NL / NLO / NW / OG / OL / ON / ONV / ORG / ORL / OW
CALCULATION NO:	AL_CORP_613_16_120_PO

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 48in					
Temp. DegC	-196	-29	38	50	100
Pressure BarG	19.0	19.0	19.0	18.3	15.7
Temp. DegF	-321	-20	100	/	212
Pressure Psig	275	275	275	/	227

Full Vacuum NPS 0.5 to 24in	
Temp. DegC	100
Pressure BarG	-1
Temp. DegF	212
Pressure Psig	-14.5

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S
THK (in)	0.083	0.083	0.109	0.109	0.109	0.109	0.12	0.12	0.12	0.12	0.134
THK (mm)	2.11	2.11	2.77	2.77	2.77	2.77	3.05	3.05	3.05	3.05	3.4
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3

NPS	6	8	10	12	14	16	18	20	22	24	26
DN	150	200	250	300	350	400	450	500	550	600	650
SCH	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10	S-10	S-20	S-20	S-10
THK (in)	0.134	0.148	0.165	0.18	0.188	0.188	0.25	0.25	0.375	0.375	0.312
THK (mm)	3.4	3.76	4.19	4.57	4.78	4.78	6.35	6.35	9.53	9.53	7.92
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	559	610	660

NPS	28	30	32	34	36	38	40	42	44	46	48
DN	700	750	800	850	900	950	1000	1050	1100	1150	1200
SCH	S-10	S-STD	S-STD	S-STD	S-STD	S-XS	S-XS	S-XS	S-XS	S-XS	S-XS
THK (in)	0.312	0.375	0.375	0.375	0.375	0.5	0.5	0.5	0.5	0.5	0.5
THK (mm)	7.92	9.53	9.53	9.53	9.53	12.7	12.7	12.7	12.7	12.7	12.7
OD (mm)	711	762	813	864	914	965	1016	1067	1118	1168	1219

GENERAL NOTES:

- A All butt welded components wall thickness shall match PIPE WALL THICKNESS.
- B Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
NIPPLES						
	.5-1.5	S-40S	Nipple, B36.19 M,(100mm), Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EA	NPTG1	
	.5-1.5	S-40S	Nipple, B36.19 M,(180mm), Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EB	NPTG3	
	.5-1.5	S-40S	Nipple, B36.19 M,(100mm), NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EA	NTTG1	
	.5-1.5	S-40S	Nipple, B36.19 M,(180mm), NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EB	NTTG3	
PIPE						
	.5-12	S-10S	Pipe, B36.19 M, Bevel end, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPP2QP2H0EE	P	
	14-16	S-10S	Pipe, B36.19 M, Bevel end, EFW (E=1), ASTM A358 Gr 304/304L Cl 1, Dual Certified	APPP7RY2G0EE	P	
FORGED FITTINGS						
	.5-1.5		Full Coupling, B16.11, Threaded NPT, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKD1QC230EM	FCL1	
	.5-1.5		Cap, B16.11, Threaded NPT,CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKF1QC230EA	CT	
	.5-1.5		Plug, B16.11, Threaded NPT,CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKP1QC230EM	PL	
902	3-16 .5-.75		Threadolet, MSS SP-97, Threaded NPT, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKN7QC230EA	TOL	
WELDED FITTINGS						
	.5-1.5	S-10S	90Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWA1SG1XXEU	9E	
	.5-1.5	S-10S	45Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWB1SG1XXEU	4E	
	.5-16	S-10S	Equal Tee, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWD1SG1XXEU	T	
	.5-16	S-10S	Cap, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWF1SG1XXEU	C	
	.75-16 .5-14	S-10S	Reducing Tee, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWE1SG1XXEU	RT	
	.75-16 .5-14	S-10S	Concentric Reducer, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWG1SG1XXEU	CR	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
WELDED FITTINGS						
	.75-16 .5-14	S-10S	Eccentric Reducer, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWH1SG1XXEU	ER	
	2-16	S-10S	90Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWA1SG1XXEU	9E	
	2-16	S-10S	45Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWB1SG1XXEU	4E	
	2-16	S-10S	90Deg SR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWC1SG1XXEU	9ES	
FLANGES						
	.5-16		Flange, Blind, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified, Serrated spiral 125/250	APFA2QC101EZ	BF	
	.5-16	S-10S	Flange, WN, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified, Serrated spiral 125/250	APFL2QC101EZ	WN	
59	.5-16	S-10S	Flange, WN, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified, Serrated spiral 125/250	APFL2QC103EZ	WN3	
	.5-14		Flange, Spectacle Figure 8, B16.48, RF, CL 150, ASTM A240 Type 304/304L, Dual Certified, Serrated spiral 125/250	APFM6RL101EZ	F8	
	16-16		Paddle, Blank, B16.48, RF, CL 150, ASTM A240 Type 304/304L, Dual Certified, Serrated spiral 125/250	APFN6RL101EZ	PB	
	16-16		Paddle, Spacer, B16.48, RF, CL 150, ASTM A240 Type 304/304L, Dual Certified, Serrated spiral 125/250	APFP6RL101EZ	PS	
ORIFICE FLANGE						
	1-16	See Note A	Orif Flg, WN 0.5 NPT+jack scr. B16.36, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APOA1QC103EF	OF	
GASKETS						
	.5-10		Gasket, Flat Ring, 1.5 mm Thk, CL 150, Approved ox. Service, Expanded graphite 98% with metallic reinforcement	APGF2GN001ES	G	
	.5-10		Gasket, Flat Ring, 1.5 mm Thk, CL 300, Approved ox. Service, Expanded graphite 98% with metallic reinforcement	APGF2GN003ES	G3	
	12-16		Gasket, Flat Ring, 3.0 mm Thk, CL 150, Approved ox. Service, Expanded graphite 98% with metallic reinforcement	APGF2GN001ET	G	
	12-16		Gasket, Flat Ring, 3.0 mm Thk, CL 300, Approved ox. Service, Expanded graphite 98% with metallic reinforcement	APGF2GN003ET	G3	

ASME Class 150 Stainless Steel Cryogenic Air Gases

A01SC1SX

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
BOLTING						
	.5-16		Stud Bolt w/2-Heavy Hex Nuts, SA320 Gr B8 Cl 2 / SA194 Gr 8	APBA1SC000XX	BT	
	.5-16		Stud Bolt w/2-Heavy Hex Nuts, SA320 Gr B8 Cl 2 / SA194 Gr 8	APBA1SC000XX	BT3	
	.5-2		Stud Bolt w/2-Heavy Hex Nuts, SA320 Gr B8 Cl 2 / SA194 Gr 8, Flat Washer for Bolting, Stainless Steel, 17.7 PH	APBB3SD000EF	BTFW	
	.5-2		Stud Bolt w/2-Heavy Hex Nuts, SA320 Gr B8 Cl 2 / SA194 Gr 8, Spring Washer for Bolting, Stainless Steel, 17.7 PH	APBH0SD000EF	BTSW	
VALVES						
	.5-2	See Note A	Check Valve, Service range -196°C to 100°C, Piston check, Welded, BW, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, Spg SS, PTFE, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service	APVC1QM103FP	CH3	
210, 298	.5-10	See Note A	Gate Valve, Service range -196°C to 150°C- pressure Design : PN10, Welded, BW, CL150, FB, ASTM A182 Gr F304L, Graph packing, Gasket spir SS and graph, Cryo ASU ext. BB acc.to AL std G-GS-5-4-1 (replaces CPY-GS-5-4-1), HW, Cleaned & degreased for oxygen service	APVG1QC101GV		
211, 298	.5-10	See Note A	Gate Valve, Service range -196°C to 150°C- pressure Design : PN10, Welded, BW, CL150, FB, ASTM A182 Gr F304L, Graph packing, Gasket spir SS and graph, Cryo ext. BB acc. manufac. Std, HW, Cleaned & degreased for oxygen service	APVG1QC101HT	GA	
	.5-5	See Note A	Globe Valve, Service range -196°C to 100°C, SW, CL300, ASTM A182 Gr F316L, Disc SS-PTFE insert, Bellow seal, Gasket: Copper, BB, HW, Non metal. Int. parts agreed for oxygen	APVL1QF203JY	GLS	
211	.5-4	See Note A	Globe Valve, Service range -196°C to 100°C, Welded, BW, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, PTFE packing & Live loaded, PTFE, Cryo ext. BB acc. manufac. Std, inside screw, HW, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service	APVL1QM103GV	GL	
210	.5-4	See Note A	Globe Valve, Service range -196°C to 100°C, Welded, BW, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, PTFE packing & Live loaded, PTFE, Cryo ASU ext. BB acc.to AL std G-GS-5-4-1 (replaces CPY-GS- 5-4-1), inside screw, HW, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service			
212	.5-2	See Note A	Globe Valve, Service range -196°C to 100°C, Welded, BW, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, PTFE packing & Live loaded, PTFE, Top entry bonnet acc. to AL std G-GS-5-4-1 (replaces CPY-GS- 5-4-1), inside screw, HW, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service			
413	.5-5	See Note A	Globe Valve, Service range -196°C to 100°C, Thrd, Female NPT, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, PTFE packing & Live loaded, PTFE, BB, inside screw, HW, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service,,	APVL1QM303GY	GLT	
404	.5-5	See Note A	Globe Valve, API 602, BWxNPT, CL800, ASTM A182 Gr F304/304L, Trim No. 12, PTFE, PTFE,ext. BB, OS & Y,HW, Cleaned & degreased for oxygen service	APVL5QY008FZ	GL1	
	3-16	See Note A	Check Valve, API 594,, Service range -196°C to 100°C, Dual Plate Check, Bolted, Wafer RF, CL150, ASTM A351 Gr CF8M, Plates SS, Spg inconel, Cleaned & degreased for oxygen service	APVC4QN601FQ	CHW	

ASME Class 150 Stainless Steel Cryogenic Air Gases A01SC1SX

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
VALVES						
211	3-16		Butterfly Valve, API 609, Service range -196°C to 100°C, high performance, Bolted, Lug RF, CL150, ASTM A351 Gr CF8M, Disc SS, Seat PCTFE, Viton O-ring - vent hole, Cryo ext. acc. to manufact. Std, Gear OP, Cleaned & degreased for oxygen service	APVF2QN601ED	BU	
210	3-16		Butterfly Valve, API 609, Service range -196°C to 100°C, high performance, Bolted, Lug RF, CL150, ASTM A351 Gr CF8M, Disc SS, Seat PCTFE, Viton O-ring - vent hole, Cryo ext. acc. to AL std G-DS-5-3-3 (replaces CPY-DS-5-3-3), Gear OP, Cleaned & degreased for oxygen service			
FILTERS / STRAINERS						
224	1-16		Conical filter, G-DS-5-4-10, Wafer, CL 150, liquid oxygen	APMN0QA701EF	CFR2	
319	2-16		Conical filter, G-DS-5-4-2, Wafer, CL150, all fluids except oxygen and water	APMN0QA701EA	CFR	
FABRICATED ITEMS						
	.5-1.5	S-10S	Pipe bend, R=5xOD, Plainend, Seamless (E=1), ASTM A312 Gr TP304/TP304L, Dual Certified	APSR2QP2H0ED	9B5D	
10007	6-16 2-14	See Note A	Fabricated Concentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L	APSP0QD1G0EB	FCR	
10007	6-16 2-14	See Note A	Fabricated Eccentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L	APSQ0QD1G0EB	FER	
	12-16 2-12	See Note A	ASME Fabricated Item, weld with Reinf., B36.19 M, acc. G-DS-5-2-4	APSY2QA0X0EA	RPAD	
	14-16 .75-1.5	See Note A	ASME Fabricated Item, weld with Reinf., B36.19 M, calculated	APSY2QA0X0EL	RPAD	
	26-48	See Note A	Fabricated Item, Miter 3P/2W, B31.3, acc. G-DS-5-2-5,,30deg - Miter Bend R=1 D, Beveled end acc. B16.25, , Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L Dual Certified,,, , -			
	26-48	See Note A	Fabricated Item, Miter 3P/2W, B31.3, acc. G-DS-5-2-5,,45 deg - Miter Bend R=1 D, Beveled end acc. B16.25, , Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L Dual Certified,,, , -			
	26-48	See Note A	Fabricated Item, Miter 3P/2W, B31.3, acc. G-DS-5-2-5,,60 deg - Miter Bend R=1 D, Beveled end acc. B16.25, , Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L Dual Certified,,, , -			
	26-48	See Note A	Fabricated Item, Miter 4P/3W, B31.3, acc. G-DS-5-2-5,,90 deg - Miter Bend R=1 D, Beveled end acc. B16.25, , Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L Dual Certified,,, , -			

SPEC ITEM NOTES:

59	For connection PN/class > rating pipe class
210	Valve inside cold box.
211	Valve outside cold box.
212	Valve top entry inside cold box.
224	Liquid with Enriched Oxygen Only
298	For bottom tank line PS 10 bar
319	All fluids except Oxygen & Water

ASME Class 150 Stainless Steel Cryogenic Air Gases A01SC1SX

404	For vents
413	For instrument connection : Pressure, flow transmitters, analysers, vents and orifice tappings
902	For thermowell connection in cryogenic insulation casing only
10007	To be used as option of B16.9 fitting (default)

ASME Class 150 Stainless Steel Cryogenic Air Gases A01SC1SX

404	For vents
413	For instrument connection : Pressure, flow transmitters, analysers, vents and orifice tappings
902	For thermowell connection in cryogenic insulation casing only
10007	To be used as option of B16.9 fitting (default)

ASME Class 150 Stainless Steel Cryogenic Air Gases

A01SC1SX

BRANCH CHART (Preference 1)

LEGEND:

0 - No Branch

1 - Equal Tee
1XX - -

2 - Reducing Tee
2XX - -

3 - Stub-on
31 - Welded Connection

3 - Stub-on
32 - Reinforcing Pad

Branch Diameter

[illegible]

ASME Class 150 SS (304/304L Dual Certified)
A01SC2C

Rev.	Date	Prepared by	Checked By	Approved By	Description
0	04/01/2024	SC	CYJ	XWJ	Approved for Design

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ASME Class 150 SS (304/304L Dual Certified)

A01SC2C

DESIGN CODE:	B31.3 – Latest Edition/Addenda-Normal Service
RATING CLASS:	150
MATERIAL:	SS 304 / 304 L Dual Certified
SERVICE:	FT
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0 in (0 mm)
MATERIAL GROUP:	B16.5-2017, 2.1
TRIM:	Trim 10
FLUID CODE:	XGO/XL/XO
CALCULATION NO:	AL_CORP_613_14_300/350

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 24in						
Temp. DegC	-29	100	200	300	400	425
Pressure BarG	19.0	15.7	13.2	10.2	6.5	5.5
Temp. DegF	-20	212	392	572	752	797
Pressure Psig	275	227	191	147	94	79
Full Vacuum (NPS 0.5 to 24in)						
Temp. DegC	200					
Pressure BarG	-1					
Temp. DegF	392					
Pressure Psig	-14.5					

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-40S	S-40S	S-40S	S-40S	S-40S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S
THK (in)	0.109	0.113	0.133	0.14	0.145	0.109	0.12	0.12	0.12	0.12	0.134
THK (mm)	2.11	2.11	2.77	2.77	2.77	2.77	3.05	3.05	3.05	3.05	3.4
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3
NPS	6	8	10	12	14	16	18	20	24		
DN	150	200	250	300	350	400	450	500	600		
SCH	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10	S-10	STD		
THK (in)	0.134	0.148	0.165	0.18	0.188	0.188	0.25	0.25	0.375		
THK (mm)	3.4	3.76	4.19	4.57	4.78	4.78	6.35	6.35	6.35		
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	610		

GENERAL NOTES:

- C All butt welded components wall thickness shall match PIPE WALL THICKNESS.
- D Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.
- BX Piping Class Specification has been calculated to withstand Full Vacuum, max. buckling length 6m [19.68 ft].

ASME Class 150 SS (304/304L Dual Certified) A01SC2C

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
NIPPLES						
53	.5-1.5	S-40S	Nipple, B36.19 M,(100mm), Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EA	NPTG1	
53	.5-1.5	S-40S	Nipple, B36.19 M,(180mm), Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EB	NPTG3	
53	.5-1.5	S-40S	Nipple, B36.19 M,(100mm), NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EA	NTTG1	
53	.5-1.5	S-40S	Nipple, B36.19 M,(180mm), NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EB	NTTG3	
PIPE						
	.5-1.5	S-40S	Pipe, B36.19 M, Plain end, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPP7QP2H0EE	P	
	2-6	S-10S	Pipe, B36.19 M, Beveled end, EFW(E=0.80), ASTM A312 Gr TP304/TP304L, Dual Certified	APPP7QP1C0EE	P	
FORGED FITTINGS						
	.5-1.5		90Deg. Elbow, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKA1QC130EA	9E	
	.5-1.5		Equal Tee, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKB1QC130EA	T	
	.5-1.5		45Deg. Elbow, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKC1QC130EA	4E	
	.5-1.5		Cap, B16.11, SW, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKF1QC130EA	C	
404	.5-1		Plug, B16.11, Threaded NPT, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKP1QC230EA	PL	
401	.5-1		Cap, B16.11, Threaded NPT, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKF1QC230EA	CT	
	.5-1.5		Full Coupling, B16.11, SW, CL3000, ASTM A182 Gr F304/304L, Dual Certified		FCL	
	.75-1.5 .5-1.25		Reduced tee, B16.11, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKQ1QC130EA	RT	
	2-6 .5-1.5		Sockolet, MSS SP-97, SW, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKM7QC130EB	SOL	
403	2-6 .75-1		Threadolet, MSS SP-97, Threaded NPT, CL 3000, ASTM A182 Gr F304/304L, Dual Certified	APKN7QC230EB	TOL	
WELDED FITTINGS						
	.75-1.5 .5-1.25	S-40S	Swage Nipple Conc, MSS SP-95, BW, ASTM A403 Gr WP304/304L, Dual Certified -S	APWT5SH1XXEA	CBB	
	.75-1.5 .5-1.25	S-40S	Swage Nipple Ecc, MSS SP-95, BW, ASTM A403 Gr WP304/304L, Dual Certified -S	APWU5SH1XXEA	EBB	
	2-6	See Note A	90Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L,Dual Certified -S/WX	APWA1SG7XXEA	9E	
	2-6	See Note A	45Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L,Dual Certified -S/WX	APWB1SG7XXEA	4E	
	2-6	See Note A	Equal Tee, B16.9, BW,ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWD1SG7XXEA	T	

ASME Class 150 SS (304/304L Dual Certified) A01SC2C

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
WELDED FITTINGS						
	2-6 1.25-4	See Note A	Reducing Tee, B16.9, BW,ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWE1SG7XXEA	RT	
	2-6	See Note A	Cap, B16.9, BW,ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWF1SG7XXEA	C	
	2-6 .75-4	See Note A	Concentric Reducer, B16.9, BW,ASTM A403 Gr WP304/304L,Dual Certified -S/WX	APWG1SG7XXEA	CR	
	2-6 .75-4	See Note A	Eccentric Reducer, B16.9, BW,ASTM A403 Gr WP304/304L,Dual Certified -S/WX	APWH1SG7XXEA	ER	
FLANGES						
	.5-6		Flange, Blind, B16.5, RF,CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFA2QC101EA	BF	
59	.5-6		Flange, Blind, B16.5, RF,CL 300,ASTM A182 Gr F304/304L,Dual Certified	APFA2QC103EA	BF3	
53	.5-.5		Flange, Threaded, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFK2QC101EA	TF	
	.5-6		Flange, Spectacle Figure 8, B16.48, RF,CL 150, ASTM A240 Type 304/304 L, Dual Certified	APFM6RL101EA	F8	
	.5-1.5		Flange, SW, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFS2QC101EA	SF	
59	.5-1.5		Flange, SW, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFS2QC103EA	SF3	
402	.75-2 .5-.5		Flange, Blind with Thd Bore, B16.5, 1/2" NPT, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFG2QC101EB	BFI	
402, 59	.75-2 .5-.5		Flange, Blind w Thd Bore, B16.5, 1/2" NPT, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFG2QC103EB	BFI3	
	2-6	See Note A	Flange, WN, B16.5, RF, CL 150, ASTM A182 Gr F304/304L, Dual Certified	APFL2QC101EA	WN	
59	2-6	See Note A	Flange, WN, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFL2QC103EA	WN3	
ORIFICE FLANGE						
	1-6	See Note A	Orif Flg, WN 0.5 NPT+jack scr. B16.36, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APOA1QC103EA	OF	
GASKETS						
	.5-6		Gasket, Flat Ring, 2.0 mm Thk, CL 150, pure graphite 98%-impregnated inlet perforated plate 316SS-inlet cover 316SS	APGF2GF001EA	G	
59	.5-6		Gasket, Spiral Wound, 4.5 mm Thk, CL 300, Filler graphite 98%, spiral 316SS, IR/OR 316SS	APGS1GC003EB	G3	
BOLTING						
	.5-6		Stud Bolt w/2-Heavy hex Nuts, ASTM A193 Gr B8 Cl 2 / A194 Gr 8M	APBA1SG000EF	BT	
	.5-6		Stud Bolt w/2-Heavy hex Nuts, ASTM A193 Gr B8 Cl 2 / A194 Gr 8M	APBA1SG000EF	BT3	

ASME Class 150 SS (304/304L Dual Certified) A01SC2C

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
VALVES						
	.5-1.5	See Note A	Check Valve, API602, piston type, horiz.and vert, SW, CL800, ASTM A182 Gr F316/316L, Trim No. 10, BC	APVC6QW208EU	CH	
406	.5-1.5	See Note A	Gate Valve, API 602, SW/NPT, CL800, ASTM A182 Gr F316/316L TrimNo. 10, BB, OS & Y	APVG4QW008FN	GA1	
	.5-1.5	See Note A	Gate Valve, API 602, SW, CL800, ASTM A182 Gr F316/316L, TrimNo. 10, BB, OS & Y	APVG4QW208FM	GA	
60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL150, ASTM A182 Gr F316/316L, TrimNo. 10, BB, OS & Y	APVG4QW401FP	GAF	
59,60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL300, ASTM A182 Gr F316/316L, TrimNo. 10, BB, OS & Y	APVG4QW403FP	GAF3	
	.5-1.5	See Note A	Globe Valve,API 602, straight seat, SWxNPT, CL800, ASTM A182 Gr F316/316L, Trim No.10, BB, OS & Y		GL1	
405	.5-1.5	See Note A	Globe Valve, API 602, straight seat, SW, CL800, ASTM A182 Gr F316/316L, Trim No. 10, BB, OS & Y	APVL5QW208FH	GL	
	2-6	See Note A	Check Valve, API 594, Type B, swing check - horiz. and vert. pos., Flanged, RF, CL150, ASTM A351 Gr CF3, Trim No. 10, BC, hinge pin inside	APVC4QH401EB	CH	
	2-6	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL150, ASTM A351 Gr CF3, Trim No. 10, BB, OS & Y	APVG3QH401FQ	GA	
59,60	2-2	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL300, ASTM A351 Gr CF3, Trim No. 10, BB, OS & Y	APVG3QH403FQ	GA3	
405	2-4	See Note A	Globe Valve, API 623, Flanged, RF, CL150, ASTM A351 Gr CF3, Trim No. 10, BB, OS & Y	APVL7QH401FD	GL	
405	6-6	See Note A	Globe Valve, API 623, Flanged, RF, CL150, ASTM A351 Gr CF3, Trim No. 10, BB, OS & Y, Gear OP	APVL7QH401FE	GL	
FILTERS / STRAINERS						
	.5-1.5		Y Strainer, SW, CL800, ASTM A182 Gr F316/316L, Screen retainer SS316, Screen SS316, Filtering 0.8mm, Gasket spir SS and Graphite	APVY3QW208FG	STY	

ASME Class 150 SS (304/304L Dual Certified) A01SC2C

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
FILTERS / STRAINERS						
	2-3		Y Strainer, Flanged, RF, CL150, ASTM A351 Gr CF3, Screen retainer: SS316, Screen SS316, Filtering 0.8mm, Gasket spir SS and Graphite	APVY3QH401FH	STY	
	4-6		T Strainer, Type TA, Blind FI Type 1, Welded for Tee, CL150, ASTM A403 WP-S/WX304/304L, Perfor plate, Wire mesh : SS304 or SS316, Mesh size 1 B/N	APVT0QU101FC	STT	
FABRICATED ITEMS						

SPEC ITEM NOTES:

53	For orifice flange tapping
59	For Connection PN/Class > rating pipe class
60	For Connection to Equipments
401	For insulated pressure testing vents (see G-DS-5-0-1)
402	For instrument connection (PI, TI, etc.)
403	For non-insulated pressure testing vents (see G-DS-5-0-1)
404	For vents
405	For regulation only
406	For instrument Connection (PI, TI, etc.) vents and orifice tappings
10007	To be used as option of ASME B16.9 fitting (default)

ASME Class 150 SS (304/304L Dual Certified) A01SC2C

BRANCH CHART (Preference 1)

LEGEND:

0 - No Branch

1 - Equal Tee
130 - Class 3000

1 - Equal Tee
1XX - -

2 - Reducing Tee
230 - Class 3000

2 - Reducing Tee
2XX - -

3 - Stub-on
31 - Welded Connection

3 - Stub-on
32 - Reinforcing Pad

3 - Stub-on
34 - Reinforced Header
Run (TSH) Reducing

5 - Sockolet
530 - Class 3000

Branch Diameter

Header Diameter	0,5	0,75	1	1,25	1,5	2	2,5	3	3,5	4	5	6	8
0,5	130												
0,75	230	130											
1	230	230	130										
1,25	230	230	230	130									
1,5	230	230	230	230	130								
2	530	530	530	530	530	1XX							
2,5	530	530	530	530	530	2XX	1XX						
3	530	530	530	530	530	2XX	2XX	1XX					
3,5	530	530	530	530	530	31	2XX	2XX	1XX				
4	530	530	530	530	530	31	31	2XX	2XX	1XX			
5	530	530	530	530	530	31	31	31	2XX	2XX	1XX		
6	530	530	530	530	530	31	31	31	31	2XX	2XX	1XX	
8	530	530	530	530	530	32	32	32	32	32	2XX	2XX	1XX

ASME Class 300 Carbon Steel, General - Forging mat. split required A03DA1C

Rev.	Date	Prepared by	Checked By	Approved By	Description
0	19/08/2022	YJ Chen	C Shen		First issue

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ASME Class 300 Carbon Steel, General - Forging mat. split required A03DA1C

DESIGN CODE:	B31.3 - 2016
RATING CLASS:	300
MATERIAL:	Carbon Steel High Temperature
SERVICE:	General
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0.0625 in (1.6 mm)
MATERIAL GROUP:	B16.5-2013, 1.1
TRIM:	Trim 8
FLUID CODE:	AA / AC / AD / AE / AG / AI / AIN / AS / AU / ND / NG / NH / NS / NW
CALCULATION NO:	AL_CORP_521_14_120_PO

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 48in				
Temp. DegC	-29	38	50	100
Pressure BarG	51.1	51.1	50.1	46.6
Temp. DegF	-20	100	122	212
Pressure Psig	741	741	726	676

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-XS	S-XS	S-XS	S-XS	S-XS	S-STD	S-STD	S-STD	S-STD	S-STD	S-STD
THK (in)	0.147	0.154	0.179	0.191	0.2	0.154	0.203	0.216	0.226	0.237	0.258
THK (mm)	3.73	3.91	4.55	4.85	5.08	3.91	5.16	5.49	5.74	6.02	6.55
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3
NPS	6	8	10	12	14	16	18	20	24	26	28
DN	150	200	250	300	350	400	450	500	600	650	700
SCH	S-STD	S-STD	S-STD	S-40	S-40	S-XS	S-40	S-40	S-40	0.750"	0.812"
THK (in)	0.28	0.322	0.365	0.406	0.438	0.5	0.562	0.594	0.688	0.75	0.812
THK (mm)	7.11	8.18	9.27	10.31	11.13	12.7	14.27	15.09	17.48	19.05	20.62
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	610	660	711
NPS	30	32	34	36	38	40	42	44	46	48	
DN	750	800	850	900	950	1000	1050	1100	1150	1200	
SCH	0.812"	0.875"	0.938"	1.000"	1.062"	1.062"	1.125"	1.188"	1.250"	1.250"	
THK (in)	0.812	0.875	0.938	1	1.062	1.062	1.125	1.188	1.25	1.25	
THK (mm)	20.62	22.23	23.83	25.4	26.97	26.97	28.58	30.18	31.75	31.75	
OD (mm)	762	813	864	914	965	1016	1067	1118	1168	1219	

GENERAL NOTES:

- A All butt welded components wall thickness shall match PIPE WALL THICKNESS.
- B Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.
- BX Piping Class Specification has been calculated to withstand Full Vacuum, max. buckling length 6m [19.68 ft].

ASME Class 300 Carbon Steel, General - Forging mat. split required
A03DA1C

[illegible]

ASME Class 300 Carbon Steel, General - Forging mat. split required A03DA1C

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
FORGED FITTINGS						
58	.5-1.5		90Deg. Elbow, B16.11, SW, CL 3000, ASTM A105N	APKA1DD130EA	9E	
	.5-1.5		Equal Tee, B16.11, SW, CL 3000, ASTM A105N	APKB1DD130EA	T	
58	.5-1.5		45Deg. Elbow, B16.11, SW, CL 3000, ASTM A105N	APKC1DD130EA	4E	
	.5-1.5		Cap, B16.11, SW, CL3000, ASTM A105N	APKF1DD130EA	C	
401	.5-1		CAP, B16.11, Threaded NPT, CL3000, ASTM A105N	APKF1DD230EA	CT	
404	.5-1		ASME, Plug, B16.11, Threaded NPT, CL3000, ASTM A105N	APKP1DD230EA	PL	
	.5-1.5		Full Coupling, B16.11, SW, CL 3000, ASTM A105N		FCL	
	.75-1.5 .5-1.25		Reduced Tee, B16.11, SW, CL 3000, ASTM A105N	APKQ1DD130EA	RT	
	2-16 .5-1.5		Sockolet, MSS SP-97, SW, B16.11, CL 3000, ASTM A105N	APKM7DD130EB	SOL	
403	2-16 .75-.75		Threadolet, MSS SP-97, Threaded NPT, B16.11, CL 3000, ASTM A105N	APKN7DD230EB	TOL	
	14-16 .5-1.5		Sockolet, MSS SP-97, SW, B16.11, CL 6000, ASTM A105N	APKM7DD160EB	SOL6	
403	14-16 .75-1		Threadolet, MSS SP-97, Threaded NPT, B16.11, CL 6000, ASTM A105N	APKN7DD260EB	TOL6	
WELDED FITTINGS						
	.75-1.5 .5-1.25	S-XS	BW, Swage Nipple Conc, MSS SP-95, Beveled End, ASTM A234 Gr WPB	APWT5DH1XXEA	CBB	
	.75-1.5 .5-1.25	S-XS	Swage Nipple Ecc, MSS SP-95, Beveled End, ASTM A234 Gr WPB	APWU5DH1XXEA	EBB	
	2-10	S-40	90Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPB	APWA1DH7XXEA	9E	
	12-16	S-40	90Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPB	APWA1DH7XXEA	9E	
	2-10	S-40	45Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPB	APWB1DH7XXEA	4E	
	12-16	S-40	45Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPB	APWB1DH7XXEA	4E	
	2-10	S-40	Equal Tee, B16.9, BW, ASTM A 234 Gr WPB	APWD1DH7XXEA	T	
	12-16	S-40	Equal Tee, B16.9, BW, ASTM A 234 Gr WPB	APWD1DH7XXEA	T	
	2-10	S-40	Cap, B16.9, BW, ASTM A234 Gr WPB	APWF1DH7XXEA	C	
	12-16	S-40	Cap, B16.9, BW, ASTM A234 Gr WPB	APWF1DH7XXEA	C	
	2-10 .75-8	S-40	Concentric Reducer, B16.9, BW, ASTM A234 Gr WPB	APWG1DH7XXEA	CR	
	12-16 .75-14	S-40	Concentric Reducer, B16.9, BW, ASTM A234 Gr WPB	APWG1DH7XXEA	CR	
	2-10 .75-8	S-40	Eccentric Reducer, B16.9, BW, ASTM A234 Gr WPB	APWH1DH7XXEA	ER	
	12-16 .75-14	S-40	Eccentric Reducer, B16.9, BW, ASTM A234 Gr WPB	APWH1DH7XXEA	ER	
	2.5-10 2-12	S-40	Reducing Tee, B16.9, BW, ASTM A234 Gr WPB	APWE1DH7XXEA	RT	
	12-16 2-14	S-40	Reducing Tee, B16.9, BW, ASTM A234 Gr WPB	APWE1DH7XXEA	RT	
	16-16 3-3	S-STD	Weldolet, MSS SP-97, BW, B16.25, STD. SCH., ASTM A105N.		WOL	

ASME Class 300 Carbon Steel, General - Forging mat. split required A03DA1C

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
FLANGES						
	.5-16		Flange, Blind, B16.5, RF,CL 300, ASTM A105N	APFA2DD103EA	BF	
59	.5-16		Flange, Blind, B16.5, RF,CL 600, ASTM A105N	APFA2DD106EA	BF6	
53	.5-.5		Flange, Threaded, B16.5, RF, CL 300, ASTM A105N	APFK2DD103EA	TF	
	.5-10		Flange, Spectacle Figure 8, B16.48, RF,CL 300, ASTMA516 Gr 70N	APFM6DG103EA	F8	
	.5-1.5		Flange, SW, B16.5, RF,CL 300, ASTM A105N	APFS2DD103EA	SF	
59	.5-1.5		Flange, SW, B16.5, RF,CL 600, ASTM A105N	APFS2DD106EA	SF6	
402	.75-2 .5-.5		Flange, Blind with Thd Bore, B16.5, 1/2" NPT, RF, CL 300, ASTM A105N	APFG2DD103EB	BFI	
402, 59	.75-2 .5-.5		Flange, Blind with Thd Bore, B16.5, 1/2" NPT, RF, CL 600, ASTM A105N	APFG2DD106EB	BFI6	
	2-10	S-40	Flange, WN, B16.5, RF,CL 300,ASTM A105N	APFL2DD103EA	WN	
	12-16	S-40	Flange, WN, B16.5, RF,CL 300,ASTM A105N	APFL2DD103EA	WN	
59	2-10	S-40	Flange, WN, B16.5, RF,CL 600,ASTM A105N	APFL2DD106EA	WN6	
59	12-16	S-40	Flange, WN, B16.5, RF,CL 600,ASTM A105N	APFL2DD106EA	WN6	
	12-14		Paddle, Blank, B16.48, RF,CL 300, ASTM A516 Gr 70N	APFN6DG103EA	PB	
	12-14		Paddle, Spacer, B16.48, RF,CL 300, ASTMA516 Gr 70N	APFP6DG103EA	PS	
ORIFICE FLANGE						
	1-14	See Note A	Orif Flg, WN 0.5 NPT+jack scr. B16.36, RF, CL 300, ASTM A105N	APOA1DD103EA	OF	
GASKETS						
	.5-16		Gasket, Spiral Wound, 4.5 mm Thk, CL 300, Filler graphite 98%, spiral 316SS, IR 316SS, OR CS	APGS1GB003EB	G	
59	.5-16		Gasket, Spiral Wound, 4.5 mm Thk, CL 600, Filler graphite 98%, spiral 316SS, IR 316SS, OR CS	APGS1GB006EB	G6	

ASME Class 300 Carbon Steel, General - Forging mat. split required A03DA1C

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
BOLTING						
	.5-16		Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / SA194 Gr 2H	APBA1CB000EA	BT	
	.5-16		Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / SA194 Gr 2H	APBA1CB000EA	BT6	
	12-12	Bolt Chart : 추후제 공예 정임	Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / SA194 Gr 2H Metric Bolt /Nuts for Butterfly valve		BTM	
	12-12	Bolt Chart : 추후제 공예 정임	Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / SA194 Gr 2H Metric Bolt /Nuts for Butterfly valve		BTM1	
VALVES						
	.5-1.5	See Note A	Check Valve, API602, piston type, horiz.and vert, SW, CL800, ASTM A105N, Trim No. 8, BC	APVC6DC208EV	CH	
413	.5-1.5	See Note A	Gate Valve, API 602, SWxNPT, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC008EJ	GA1	
	.5-1.5	See Note A	Gate Valve, API 602, SW, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC208ER	GA	
60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL300, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC403FL	GAF	
59, 60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL600, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC406FL	GA6	
405	.5-1.5	See Note A	Globe Valve, API 602, straight seat, SW, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVL5DC208EA	GL	
	.5-1.5	See Note A	Globe Valve, API 602, straight seat, SWxNPT, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVL5DC208ET	GL1	
	2-14	See Note A	Check Valve, API 594, Type B, swing check - horiz. and vert.pos. Flanged, RF, CL300, ASTM A216 Gr WCB, Trim No. 8, BC, hinge pin inside	APVC4DD403EW	CH	
	2-16	See Note A	Check Valve, API 594, Dual Plate Check, Bolted, Wafer, RF, CL300, ASTM A216 Gr WCB, Trim No. 8,	APVC4DD603EF	CHW	
	2-12	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL300, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVG3DD403ES	GA	
59, 60	2-2	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL600, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVG3DD406ES	GA6	
405	2-5	See Note A	Globe Valve, API 623, Flanged, RF, CL300, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVL7DD403EL	GL	
405	6-12	See Note A	Globe Valve, API 623, Flanged, RF, CL300, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y, Gear OP	APVL7DD403EM	GL	
	14-14	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL300, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y, Gear OP	APVG3DD403ET	GA	
	8-16		Butterfly Valve, API 609, Wafer, RF, CL300, ASTM A216 Gr WCB, Disc SS, Seat PTFE, Gear OP		BU	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
FILTERS / STRAINERS						
	.5-1.5		Y Strainer, SW, CL800, ASTM A105N, Screen retainer: CS/Screen: SS316 - Filing 0.8mm, Gasket spir SS and Graphite	APVY3DC208EA	STY	
10009	2-14		Conical filter,G-DS-5-4-2,Wafer,CL300, all fluids except oxygen and water	APMN0QA703EA	CFR	
	2-3		Y Strainer, Flanged, RF, CL300, ASTM A216 Gr WCB, screen retainer: CS / Screen SS316 - Filtering 0.8mm, Gasket spir SS and Graphite	APVY3DD403EB	STY	
	4-14	See Note A	Tee Strainer, Body Type TA, Blind Fl. Type 2, CL300, ASTM A420 Gr. WPL6, Flange ASTM A350 Gr. LF2 Cl.1, Perfor. Plate SS304 or SS316, Wire mesh SS304 or SS316-Mesh size 2B/N	APVT0DJ103EQ	STT	
FABRICATED ITEMS						
	8-14 2-8	See Note A	ASME Fabricated Item, weld with Reinf., B36.10 M, Seamless (E=1), ASTM A106 Gr B, Permissible Substitution	APSY1DF0H0EC	RPAD	

SPEC ITEM NOTES:

53	For orifice flange tapping
58	To use only if necessary
59	For connection PN/class > rating pipe class
60	For connection to equipments
401	For insulated pressure testing vents (see G-DS-5-0-1)
402	For instrument connection (PI, TI, etc.)
403	For non-insulated pressure testing vents (see G-DS-5-0-1)
404	For vents

ASME Class 300 Carbon Steel, General - Forging mat. split required A03DA1C

405	For regulation only
413	For instrument connection : Pressure, flow transmitters, analysers, vents and orifice tappings
10007	To be used as option of B16.9 fitting (default)
10009	To be used as option.

ASME Class 300 Carbon Steel, General - Forging mat. split required A03DA1C

BRANCH CHART (Preference 1)

LEGEND:

0 - No Branch	1 - Equal Tee 130 - Class 3000	1 - Equal Tee 1XX - -	2 - Reducing Tee 230 - Class 3000	2 - Reducing Tee 2XX - -
3 - Stub-on 32 - Reinforcing Pad	5 - Sockolet 530 - Class 3000	5 - Sockolet 560 - Class 6000		
4 - Weldolet 401 - STANDARD				

Branch Diameter

Header Diameter	0,5	0,75	1	1,25	1,5	2	2,5	3	3,5	4	5	6	8	10	12	14	16
0,5	130																
0,75	230	130															
1	230	230	130														
1,25	230	230	230	130													
1,5	230	230	230	230	130												
2	530	530	530	530	530	1XX											
2,5	530	530	530	530	530	2XX	1XX										
3	530	530	530	530	530	2XX	2XX	1XX									
3,5	530	530	530	530	530	32	2XX	2XX	1XX								
4	530	530	530	530	530	32	32	2XX	2XX	1XX							
5	530	530	530	530	530	32	32	32	2XX	2XX	1XX						
6	530	530	530	530	530	32	32	32	32	2XX	2XX	1XX					
8	530	530	530	530	530	32	32	32	32	32	2XX	2XX	1XX				
10	530	530	530	530	530	32	32	32	32	32	32	2XX	2XX	1XX			
12	530	530	530	530	530	32	32	32	32	32	32	32	2XX	2XX	1XX		
14	530	530	530	530	530	32	32	32	32	32	32	32	2XX	2XX	2XX	1XX	
16	530	530	530	530	530	32	32	32/401	32	32	32	32	32	32	2XX	2XX	1XX

SEP. 19. 2024 REVISION 14"x 8" : 32-WELDED CONNECTION → 2XX-REDUCING TEE

**ASME Class 300 Stainless Steel Cryogenic Air Gases - Alternate
A03SC1SAX**

Rev.	Date	Prepared by	Checked By	Approved By	Description
0	22/04/2024	SC	CYJ	XWJ	Approved for Design

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ASME Class 300 Stainless Steel Cryogenic Air Gases - Alternate A03SC1SAX

DESIGN CODE:	B31.3 Latest Edition / Addenda – Normal Fluid Service
RATING CLASS:	300
MATERIAL:	SS 304 / 304 L Dual Certified
SERVICE:	General
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0 in (0 mm)
MATERIAL GROUP:	B16.5-2013, 2.1
FLUID CODE:	AG / AL / BOG / BOL / DK / KAC / KAD / KAG / KAL / KHN / KXP / KXR / KXS / KXT / NG / NL / NLO / NW / OG / OL / ON / ONV / ORG / OW
CALCULATION NO:	-

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 24in					
Temp. DegC	-196	-29	38	50	100
Pressure BarG	35	35	35	35	35
Temp. DegF	-321	-20	100	/	212
Pressure Psig	507	507	507	/	507

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S	S-10S
THK (in)	0.083	0.083	0.109	0.109	0.109	0.109	0.12	0.12	0.12	0.12	0.134
THK (mm)	2.11	2.11	2.77	2.77	2.77	2.77	3.05	3.05	3.05	3.05	3.4
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3
NPS	6	8	10	12	14	16	18	20	24		
DN	150	200	250	300	350	400	450	500	600		
SCH	S-10S	S-20	S-20	S-20	S-20	S-20	S-STD	S-STD	S-XS		
THK (in)	0.134	0.25	0.25	0.25	.312	0.312	0.375	0.375	0.5		
THK (mm)	3.4	6.35	6.35	6.35	7.92	7.92	9.53	9.53	12.7		
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	610		

GENERAL NOTES:

- A All butt welded components wall thickness shall match PIPE WALL THICKNESS.
 B Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.

ASME Class 300 Stainless Steel Cryogenic Air Gases - Alternate A03SC1SAX

Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
NIPPLES						
53	.5-1.5	S-80S	Nipple, B36.19 M, L=100mm, Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EA	NPTG1	
53	.5-1.5	S-80S	Nipple, B36.19 M, L=180mm, Plain - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP5H0EB	NPTG3	
53	.5-1.5	S-80S	Nipple, B36.19 M, L=100mm, NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EA	NTTG1	
53	.5-1.5	S-80S	Nipple, B36.19 M, L=180mm, NPT - NPT, Seamless, ASTM A312 Gr TP304/TP304L, Dual Certified	APPN2QP6H0EB	NTTG3	
PIPE						
	.5-4	S-10S	Pipe, B36.19 M / B36.10 M, Plain end, Seamless, ASTM A312 Gr TP304/TP304L Dual Certified	APPP2QP2H0EE	P	
	5-6	S-10S	Pipe, B36.19 M / B36.10 M, Beveled end, EFW(E=1), ASTM A358 Gr TP304/TP304L Cl 1, Dual Certified	APPP7RY2G0EE	P	
	8-16	S-20	Pipe, B36.19 M / B36.10 M, Beveled end, EFW(E=1), ASTM A358 Gr TP304/TP304L Cl 1, Dual Certified	APPP7RY2G0EE	P	
FORGED FITTINGS						
	.5-1.5		Plug, B16.11, Threaded NPT, CL3000, ASTM A182 Gr F304/304L, Dual Certified	APKP1QC230EM	PL	
WELDED FITTINGS						
	.5-16	See Note A	90Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWA1SG1XXEU	9E	
	.5-16	See Note A	45Deg LR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWB1SG1XXEU	4E	
	.5-16	See Note A	Equal Tee, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWD1SG1XXEU	T	
	.5-16	See Note A	Cap, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWF1SG1XXEU	C	
	.75-16 .5-14	See Note A	Reducing Tee, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWE1SG1XXEU	RT	
	.75-16 .5-14	See Note A	Concentric Reducer, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWG1SG1XXEU	CR	
	.75-16 .5-14	See Note A	Eccentric Reducer, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWH1SG1XXEU	ER	
	.5-16	See Note A	90Deg SR Elbow, B16.9, BW, ASTM A403 Gr WP304/304L, Dual Certified -S/WX	APWC1SG1XXEU	9ES	

ASME Class 300 Stainless Steel Cryogenic Air Gases - Alternate A03SC1SAX

FLANGES						
	.5-16		Flange, Blind, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFA2QC103EZ	BF	
	.5-16	See Note A	Flange, Welding Neck, B16.5, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APFL2QC103EZ	WN	
59	.5-16	See Note A	Flange, Welding Neck, B16.5, RF, CL 600, ASTM A182 Gr F304/304L, Dual Certified,,,	APFL2QC106EZ	WN6	
	.5-10		Flange, Spectacle Figure 8, B16.48, RF, CL 300, ASTM A240 Type 304/304L, Dual Certified	APFM6RL103EZ	F8	
	12-16		Paddle, Blank, B16.48, RF, CL 300, ASTM A240 Type 304/304 L Dual Certified	APFN6RL103EZ	PB	
	12-16		Paddle, Spacer, B16.48, RF, CL 300, ASTM A240 Type 304/304L, Dual Certified	APFP6RL103EZ	PS	
ORIFICE FLANGE						
	1-16	See Note A	Orif Flg, WN 0.5NPT+jack scr, B16.36, RF, CL 300, ASTM A182 Gr F304/304L, Dual Certified	APOA1QC103EF	OF	
GASKETS						
	.5-10		Gasket, Flat Ring, 1.5 mm Thk, Approved for ox serv., CL 300, Expanded graphite 98% with metallic reinforcement	APGF2GN003ES	G	
59	.5-16		Gasket, Spiral Wound, 4.5 mm Thk, Approved ox serv., CL 600, Filler graphite 98%, spiral 316SS, IR 316SS, OR 316SS	APGS1GC006EV	G6	
	12-16		Gasket, Spiral Wound, 4.5 mm Thk, Approved ox serv., CL 300, Filler graphite 98%, spiral 316SS, IR 316SS, OR 316SS	APGF2GN003ET	G	
BOLTING						
	.5-16		Stud Bolt w/2-Heavy Hex Nuts, ASME SA320 Gr B8 Cl 2 / ASME SA194 Gr 8	APBA1SC000EA	BT	
	.5-16		Stud Bolt w/2-Heavy Hex Nuts, ASME SA320 Gr B8 Cl 2 / ASME SA194 Gr 8	APBA1SC000EA	BT6	
	.5-2		Flat Washer, NF.EN.7091, Stainless Steel 17.7PH	APBB3SD000EF	BTFW	
	.5-2		Spring Washer, Stainless Steel 17.7 PH	APBH0SD000EF	BTSW	
VALVES						
	.5-2	See Note A	Check Valve, Service range -196°C to 100°C, Piston check, Welded, BW, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, Spg SS, PTFE, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service,	APVC1QM103FP	CH	
211	.5-6	See Note A	Globe Valve, Service range -196°C to 100°C, Welded, BW, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, PTFE packing & Live loaded, PTFE, Cryo ext. BB, acc. manufac. Std, inside screw, HW, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service	APVL1QM103GV	GL	

ASME Class 300 Stainless Steel Cryogenic Air Gases - Alternate A03SC1SAX

202	.5-.5	See Note A	Globe Valve, Service range -196°C to 100°C, Thrd, Female NPT, CL300, FB, ASTM A351 Gr CF8, Disc SS-PTFE insert, PTFE packing & Live loaded, PTFE, BB, inside screw, HW, Non metal. Int. parts agreed for oxygen, Cleaned & degreased for oxygen service	APVL1QM303GY	GLT	
404	.5-.5	See Note A	Globe Valve, API 602, BWxNPT, CL800, ASTM A182 Gr F304/304L, Trim No. 12, PTFE, PTFE, ext. BB, OS & Y, HW, Cleaned & degreased for oxygen service	APVL5QY008FZ	GL1	
	3-16	See Note A	Check Valve, API 594,, Service range -196°C to 100°C, Dual Plate Check, Bolted, Wafer RF, CL300, ASTM A351 Gr CF8M, Plates SS, Spg inconel, Cleaned & degreased for oxygen service,,	APVC4QN603FQ	CHW	
FILTERS / STRAINERS						
319	2-16		Conical Filter, acc. G-DS-S-4-2, Wafer, CL300, all fluid except oxygen & water	APMN0QA703EA	CFR2	
224	2-16		Conical Filter, acc. G-DS-S-4-2 (replaces CRY-DS-5-4-4), Wafer, CL300, all fluid except oxygen & water	APMN0QA703EF	CFR	
FABRICATED ITEMS						
	.5-1.5		Pipe bend, R=5xOD, Plainend, Seamless (E=1), ASTM A312 Gr TP304/TP304L, Dual Certified	APSR2QP2H0ED	9B5D	
10007	6-16 2-14	See Note A	Fabricated Concentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L, Dual Certified	APSP0QD1G0EB	FCR	
10007	6-16 2-14	See Note A	Fabricated Eccentric reducer, Beveled end, Electric fusion straight weld pipe (E=1), ASTM A240 Type 304/304L, Dual Certified	APSQ0QD1G0EB	FER	

SPEC ITEM NOTES:

- '59 For connection PN/class > rating pipe class
- '202 For instrument connection : pressure/flow transmitters and analysers
- '210 Valve inside cold box
- '211 Valve outside cold box
- 212 Valve top entry inside cold box
- 224 Liquid with Enriched Oxygen only
- 319 All fluids except Oxygen & Water
- 404 For vents
- 10007 To be used as option of ASME B16.9 fitting (default)

ASME Class 600 Carbon Steel, General - Forging mat. split required A06DA1C

Rev.	Date	Prepared by	Checked By	Approved By	Description
0	19/08/2022	YJ Chen	C Shen		First issue

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ASME Class 600 Carbon Steel, General - Forging mat. split required A06DA1C

DESIGN CODE:	B31.3 - 2016
RATING CLASS:	600
MATERIAL:	Carbon Steel High Temperature
SERVICE:	General
FLANGE FACING:	Raised Face
NOMINAL CORROSION ALLOWANCE:	0.0625 in (1.6 mm)
MATERIAL GROUP:	B16.5-2017, 1.1
TRIM:	Trim 8
FLUID CODE:	AG / AH / BEL / KA / KAC / KAG / KH / KHN / KK / KKG / KN / KX / KXG / KXP / KXR / MEI / RF / XGD / ZB / ZH / ZH
CALCULATION NO:	AL CORP_541_16_WT_S_W_PO

DESIGN PRESSURE-TEMPERATURE RATING:

From NPS 0.5 to 24in										
Temp. DegC	-29	-29	38	38	50	50	100	100	150	200
Temp. DegC	102.1	10.0	10.0	102.1	10.0	100.2	93.2	10.0	90.2	87.6
Pressure BarG	-20	-20	100	100	122	122	212	212	302	392
Pressure BarG	1480	145	145	1480	145	1453	1351	145	1308	1270
Temp. DegF	250	300	325	350	375	400	425			
Temp. DegF	83.9	79.6	77.4	75.1	72.7	69.4	57.5			
Pressure Psig	482	572	617	662	707	752	797			
Pressure Psig	1216	1154	1122	1089	1054	1006	833			
Temp. DegC										
Temp. DegC										
Pressure BarG										
Pressure BarG										
Temp. DegF										
Temp. DegF										
Pressure Psig										
Pressure Psig										
Full Vacuum NPS 0.5 to 24in										
Temp. DegC	425									
Temp. DegC	1									
Pressure BarG	797									
Pressure BarG	14.5									
Temp. DegF										
Temp. DegF										
Pressure Psig										
Pressure Psig										
Temp. DegC										
Temp. DegC										
Pressure BarG										
Pressure BarG										
Temp. DegF										
Temp. DegF										
Pressure Psig										
Pressure Psig										

PIPE WALL THICKNESS:

NPS	.5	.75	1	1.25	1.5	2	2.5	3	3.5	4	5
DN	15	20	25	32	40	50	65	80	90	100	125
SCH	S-XS	S-XS	S-XS	S-XS	S-XS	S-XS	S-XS	S-XS	S-XS	S-XS	S-XS
THK (in)	0.147	0.154	0.179	0.191	0.2	0.218	0.276	0.3	0.318	0.337	0.375
THK (mm)	3.73	3.91	4.55	4.85	5.08	5.54	7.01	7.62	8.08	8.56	9.53
OD (mm)	21.3	26.7	33.4	42.2	48.3	60.3	73	88.9	101.6	114.3	141.3

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NPS	6	8	10	12	14	16	18	20	24
DN	150	200	250	300	350	400	450	500	600
SCH	S-XS	S-XS	S-80	S-80	S-80	S-80	S-80	S-80	S-80
THK (in)	0.432	0.5	0.594	0.688	0.75	0.844	0.938	1.031	1.219
THK (mm)	10.97	12.7	15.09	17.48	19.05	21.44	23.83	26.19	30.96
OD (mm)	168.3	219.1	273	323.8	355.6	406.4	457	508	610

GENERAL NOTES:

- A All butt welded components wall thickness shall match PIPE WALL THICKNESS.
- B Non-standard pipe sizes NPS 1.25", 2.5", 3.5", 5" etc. shall not be used except for connection to the equipment or in special circumstances.
- BX Piping Class Specification has been calculated to withstand Full Vacuum, max. buckling length 6m [19.68 ft].

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
NIPPLES						
53	.5-1.5	S-160	Nipple, B36.10 M,(100mm), Plain - NPT, Seamless, ASTM A106 Gr B	APPN1DF5H0EA	NPTG1	
53	.5-1.5	S-160	Nipple, B36.10 M,(180mm), Plain - NPT, Seamless, ASTM A106 Gr B	APPN1DF5H0EB	NPTG3	
53	.5-1.5	S-160	Nipple, B36.10 M,(100mm), NPT - NPT, Seamless, ASTM A106 Gr B	APPN1DF6H0EA	NTTG1	
53	.5-1.5	S-160	Nipple, B36.10 M,(180mm), NPT - NPT, Seamless, ASTM A106 Gr B	APPN1DF6H0EB	NTTG3	
PIPE						
	.5-1.5	S-XS	Pipe, B36.10 M, Plain end, Seamless, ASTM A106 Gr B	APPP1DF2H0EE	P	
	2-6	S-XS	Pipe, B36.10 M, Beveled end, Seamless, ASTM A106 Gr B	APPP1DF1H0EE	P	
	8-8	S-XS	Pipe, B36.10 M, Beveled end, Seamless, ASTM A106 Gr B, Permissible Substitution	APPP1DF1H0EG	P	
	10-12	S-80	Pipe, B36.10 M, Beveled end, Seamless, ASTM A333 Gr 6, Permissible Substitution	APPP1FC1H0EH	P	
FORGED FITTINGS						
58	.5-1.5		90Deg. Elbow, B16.11, SW, CL 3000, ASTM A105N	APKA1DD130EA	9E	
	.5-1.5		Equal Tee, B16.11, SW, CL 3000, ASTM A105N	APKB1DD130EA	T	
58	.5-1.5		45Deg. Elbow, B16.11, SW, CL 3000, ASTM A105N	APKC1DD130EA	4E	
	.5-1.5		Cap, B16.11, SW, CL3000, ASTM A105N	APKF1DD130EA	C	
401	.75-.75		Cap, B16.11, Threaded NPT, CL3000, ASTM A105N	APKF1DD230EA	CT	
404	.75-1		ASME, Plug, B16.11, Threaded NPT, CL3000, ASTM A105N	APKP1DD230EA	PL	
	.5-1.5		Full Coupling, B16.11, SW, CL 3000, ASTM A105N		FCL	
	.75-1.5 .5-1.25		Reduced Tee, B16.11, SW, CL 3000, ASTM A105N	APKQ1DD130EA	RT	
	2-8 .5-1.5		Sockolet, MSS SP-97, SW, B16.11, CL 3000, ASTM A105N	APKM7DD130EB	SOL	
403	2-8 .75-.75		Thredolet, MSS SP-97, Threaded NPT, B16.11, CL 3000, ASTM A105N	APKN7DD230EB	TOL	
	10-12 .5-1.5		Sockolet, MSS SP-97, SW,B16.11, CL 6000, ASTM A105N,	APKM7DD160EB	SOL6	
403	10-12 .75-.75		Thredolet, MSS SP-97,ThreadedNPT,B16.11,CL 6000, ASTM A105N	APKN7DD260EB	TOL6	
WELDED FITTINGS						
	.75-1.5 .5-1.25	See Note A	BW, Swage Nipple Conc, MSS SP-95, Beveled End, ASTM A234 Gr WPB	APWT5DH1XXEA	CBB	
	.75-1.5 .5-1.25	See Note A	Swage Nipple Ecc, MSS SP-95, Beveled End, ASTM A234 Gr WPB	APWU5DH1XXEA	EBB	
	2-12	See Note A	90Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPB	APWA1DH7XXEA	9E	
	2-12	See Note A	45Deg LR Elbow, B16.9, BW, ASTM A234 Gr WPB	APWB1DH7XXEA	4E	
	2-12	See Note A	Equal Tee, B16.9, BW, ASTM A 234 Gr WPB	APWD1DH7XXEA	T	
	2-12	See Note A	Cap, B16.9, BW, ASTM A234 Gr WPB	APWF1DH7XXEA	C	
	2-12 1.25-10	See Note A	Concentric Reducer, B16.9, BW, ASTM A234 Gr WPB	APWG1DH7XXEA	CR	
	2-12 1.25-10	See Note A	Eccentric Reducer, B16.9, BW, ASTM A234 Gr WPB	APWH1DH7XXEA	ER	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
WELDED FITTINGS						
	2.5-12 2-10	See Note A	Reducing Tee, B16.9, BW, ASTM A234 Gr WPB	APWE1DH7XXEA	RT	
	3.5-8 2-4	See Note A	BW, Weldolet, MSS SP-97, BW, B16.25, XS, ASTM A105N	APWJ3DC102EB	WOL	
	10-12 2-6	See Note A	BW, Weldolet, MSS SP-97, BW, B16.25, SCH 160, ASTM A105N	APWJ3DC103EB	WOL	
FLANGES						
	.5-8		Flange, Blind, B16.5, RF, CL 600, ASTM A105N	APFA2DD106EA	BF	
53	.5-.5		Flange, Threaded, B16.5, RF, CL 600, ASTM A105N	APFK2DD106EA	TF	
	.5-8		Flange, Spectacle Figure 8, B16.48, RF, CL 600, ASTM A516 Gr 70N	APFM6DG106EA	F8	
	.5-1.5		Flange, SW, B16.5, RF, CL 600, ASTM A105N	APFS2DD106EA	SF	
402	.75-2 .5-.5		Flange, Blind with Thd Bore, B16.5, 1/2" NPT, RF, CL 600, ASTM A105N	APFG2DD106EB	BFI	
	2-8	See Note A	Flange, WN, B16.5, RF, CL 600, ASTM A105N	APFL2DD106EA	WN	
	10-12		Flange, Blind, B16.5, RF, CL 600, ASTM A350 Gr LF2 Cl 1	APFA2FD106EN	BF	
	10-12	See Note A	Flange, WN, B16.5, RF, CL 600, ASTM A350 Gr LF2 Cl 1	APFL2FD106EN	WN	
	10-12		Paddle, Blank, B16.48, RF, CL 600, ASTM A516Gr 70N	APFN6DG106EA	PB	
	10-12		Paddle, Spacer, B16.48, RF, CL 600, ASTM A516 Gr 70N	APFP6DG106EA	PS	
ORIFICE FLANGE						
	1-12	See Note A	Orif Flg, WN 0.5 NPT+jack scr. B16.36, RF, CL 600, ASTM A105N	APOA1DD106EA	OF	
GASKETS						
	.5-12		Gasket, Spiral Wound, 4.5 mm Thk, CL 600, Filler graphite 98%, spiral 316SS, IR 316SS, OR CS	APGS1GB006EB	G	
BOLTING						
	.5-12		Bolting, Stud Bolt w/2-Heavy Hex Nuts, SA193 Gr B7 / SA194 Gr 2H	APBA1CB000EA	BT	

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Notes	NPS/DN (in)	Sch	Description	Commodity Code	Short Code	Rev
VALVES						
	.5-1.5	See Note A	Check Valve, API602, piston type, horiz.and vert, SW, CL800, ASTM A105N, Trim No. 8, BC	APVC6DC208EV	CH	
413	.5-1.5	See Note A	Gate Valve, API 602, SWxNPT , CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC008EJ	GA1	
	.5-1.5	See Note A	Gate Valve, API 602, SW, CL800, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC208ER	GA	
60	.5-1.5	See Note A	Gate Valve, API 602, Flanged, RF, CL600, ASTM A105N, Trim No. 8, BB, OS & Y	APVG4DC406FL	GAF	
405	.5-1.5	See Note A	Globe Valve, API 602, straight seat, SW, CL800, ASTM A105N, - Trim No. 8, BB, OS & Y	APVL5DC208EA	GL	
	2-12	See Note A	Check Valve, API 594, Type B, swing check - horiz. and vert.pos. Flanged, RF, CL600, ASTM A216 Gr WCB, Trim No. 8, BC, hinge pin inside	APVC4DD406EW	CH	
	2-6	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL600, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVG3DD406ES	GA	
405	2-4	See Note A	Globe Valve, API 623, Flanged, RF, CL600, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y	APVL7DD406EL	GL	
405	6-12	See Note A	Globe Valve, API 623, Flanged, RF, CL600, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y, Gear OP	APVL7DD406EM	GL	
	8-12	See Note A	Gate Valve, API 600, flex. wedge, Flanged, RF, CL600, ASTM A216 Gr WCB, Trim No. 8, BB, OS & Y, Gear OP	APVG3DD406ET	GA	
FILTERS / STRAINERS						
	.5-1.5		Y Strainer, SW, CL800, ASTM A105N, screen retainer: CS/Screen: SS316 – Filtering 0.8mm, Gasket spir SS and Graphite	APVY3DC208EA	STY	
	2-3		Y Strainer, Flanged, RF, CL600, ASTM A216 Gr WCB, screen retainer: CS / Screen SS316 – Filtering 0.8mm, Gasket spir SS and Graphite	APVY3DD406EN	STY	
	4-12	See Note A	Tee Strainer, Body Type TA, Blind Fl. TYPE 1, Welded, for Tee BW, CL600, ASTM A234 Gr WPB, Flanges: ASTM A105N Strainer element: Perfor. plate: CS / Wire Mesh: SS316 - mesh size 1 B/N: SA193 Gr. B7/SA194 Gr. 2H, Gasket: CRNI spiral graphite, welding coefficient E=1.0	APVT0DJ106EW	STT	

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FABRICATED ITEMS						
	.5-1.5	S-XS	Pipe bend, R=5xOD, Plain end, Seamless (E=1), ASTM A106 Gr B	APSR1DF2H0EA	9B5D	

SPEC ITEM NOTES:

53	For orifice flange tapping
58	To use only if necessary
60	For connection to equipments
401	For insulated pressure testing vents (see G-DS-5-0-1)
402	For instrument connection (PI, TI, etc.)
403	For non-insulated pressure testing vents (see G-DS-5-0-1)
404	For vents
405	For regulation only
413	For instrument connection : Pressure, flow transmitters, analysers, vents and orifice tappings

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BRANCH CHART (Preference 1)

LEGEND:

0 - No Branch	1 - Equal Tee 130 - Class 3000	1 - Equal Tee 1XX - -	2 - Reducing Tee 230 - Class 3000	2 - Reducing Tee 2XX - -
4 - Weldolet 402 - EXTRA STRONG class	4 - Weldolet 403 - 160 SCHEDULE class	5 - Sockolet 530 - Class 3000	5 - Sockolet 560 - Class 6000	

Branch Diameter

Header Diameter	0,5	0,75	1	1,25	1,5	2	2,5	3	3,5	4	5	6	8	10	12
0,5	130														
0,75	230	130													
1	230	230	130												
1,25	230	230	230	130											
1,5	230	230	230	230	130										
2	530	530	530	530	530	1XX									
2,5	530	530	530	530	530	2XX	1XX								
3	530	530	530	530	530	2XX	2XX	1XX							
3,5	530	530	530	530	530	402	2XX	2XX	1XX						
4	530	530	530	530	530	402	402	2XX	2XX	1XX					
5	530	530	530	530	530	402	402	402	2XX	2XX	1XX				
6	530	530	530	530	530	402	402	402	402	2XX	2XX	1XX			
8	530	530	530	530	530	402	402	402	402	402	2XX	2XX	1XX		
10	560	560	560	560	560	403	403	403	403	403	403	2XX	2XX	1XX	
12	560	560	560	560	560	403	403	403	403	403	403	403	2XX	2XX	1XX

