PIPING CLASS: AG1A1L-FH

SECTION 1.0 – GENERAL

PIPE CLASS:	**AG1A1L-FH**	**DESIGN CODE:**	ASME B31.3
RATING:	150	**PWHT:**	NOTE 52
FLANGE FACE:	RF	**VALVE TRIM:**	AISI 321+HF
BASIC MATERIAL:	1 1/4Cr - 1/2Mo P11 (GROUP 1.9)	**SOUR:**	NO
CORROSION ALLOWANCE:	1.5 MM	**SPECIAL REQUIREMENT:**	NOTE 97

TEMPERATURE (DEG.C) AND PRESSURE (BARG) RATING - (NOTE-22)

TEMP.	-29	0	38	50	100	150	200	250	300	350	400	450
PRESS.	19.8	19.8	19.8	19.5	17.7	15.8	13.8	12.1	10.2	8.4	6.5	4.6

TEMP.	500	538
PRESS.	2.8	1.4

SERVICE

REFER TO PIPING CLASS INDEX

SIZE RANGE, PIPE WALL THICKNESS (MM) TABLE - (NOTE-80)

NPS	½	¾	1	1 ½	2	3	4	6	8	10	12
SCHEDULE	80	80	80	80	80	40	40	40	20	20	20
THICKNESS	3.73	3.91	4.55	5.08	5.54	5.49	6.02	7.11	6.35	6.35	6.35

NPS	14	16	18	20	24
SCHEDULE	20	20	20	20	20
THICKNESS	7.92	7.92	7.92	9.53	9.53

PIPING CLASS: AG1A1L-FH

SECTION 2.0 – NOTES

GENERAL NOTES

1. IN LINE WITH AGES-GL-08-001 (PROCESS DESIGN BASIS) THE MINIMUM PIPING SIZE IS NPS 1. HOWEVER THE LINE SIZE IN THIS CLASS NPS 3/4 & NPS 1/2 ARE INCLUDED FOR INSTRUMENT CONNECTIONS ONLY.
2. ALL BUTT-WELDED COMPONENT THICKNESSES SHALL MATCH THE PIPE THICKNESS.
3. FOR SPECTACLE BLINDS (FIG-8 FLANGES) & BLINDS REFER TO SPECIFICATION AGES-SP-09-002.

16. ALL VALVES IN SOUR OR TOXIC OR HYDROCARBON SERVICE SHALL MEET FUGITIVE EMISSION TESTING REQUIREMENTS AS PER BS EN ISO 15848 PART-1 & PART-2 WITH LEAKAGE CLASS 'BH' (REFER TO VALVE SPECIFICATION AGES-SP-09-003).
22. ALL PIPING COMPONENTS UPTO NPS 24 SHALL BE DESIGNED FOR VACUUM CONDITION AT AMBIENT TEMPERATURE. FOR HIGHER SIZES VACUUM DESIGN SHALL BE APPLICABLE IF INDICATED IN THE LINELIST.
25. 13CR MAY SUBSTIUTE SS316 IN NON-SOUR SERVICE WHEN APPROVED BY COMPANY BASED ON THE SERVICE CONDITION.
33. TO BE USED FOR FLANGED CLASS 300 RF CONNECTION.
52. PWHT SHALL BE BASED ON ASME B31.3 AND THE REQUIREMENTS OF SPECIFICATION AGES-SP-09-002 PIPING MATERIAL SPECIFICATION INDEX.
54. COMPLETE ORIFICE ASSEMBLY SHALL BE SUPPLIED WITH PAIR OF ORIFICE FLANGES EACH HAVING ONE NPS 1/2 FLANGED TAP (RATING SAME AS PIPE CLASS).
68. VALVES FOR TEMPERATURE ABOVE 450 DEG. C SHALL BE SUPPLIED WITH HEAT DISSIPATION BONNETS, MEETING THE MINMUM LENGTH REQUIREMENTS FOR HEAT DISSIPATION.
70. LOW STRESS SPIRAL WOUND GASKET.
71. TO BE USED ONLY WHEN INDICATED ON THE P&ID.
73. NIPOFLANGE SHALL BE USED FOR THERMOWELL CONNECTION FOR HEADER NPS 4 AND ABOVE.
74. FOR BOLT COATING ABOVE 200 DEG C SUITABLE PROPRIETARY COATINGS WITH PRIOR COMPANY APPROVAL SHALL BE PROPOSED.
80. THE PIPE THICKNESS ARE CALCULATED BASED ON P-T RATING TABLE FOR THIS CLASS, HOWEVER FOR SIZES NPS 26 AND ABOVE THICKNESS SHALL BE CALCULATED BASED ON PROJECT PROCESS DESIGN PARAMETER.
81. PIPING CLASS COVERS ALL TYPES OF VALVES NORMALLY USED IN THE INDUSTRY. HOWEVER, VALVE TYPE SELECTION SHALL BE AS PER PROCESS ISOLATION PHILOSOPHY (AGES-PH-08-001, AGES-SP-09-003) AND P&ID.
82. WELDED PIPES AND WELDED FITTINGS SHALL BE 100% RADIOGRAPHED. WALL THICKNESS NEGATIVE TOLERANCES OF WELDED FITTINGS SHALL NOT BE LESS THAN WELDED PIPE.
83. WHEN SMALL END OF REDUCER IS NPS 16 & BELOW THE REDUCER SHALL BE SEAMLESS.
85. SMALL BORE PIPE THE MINIMUM SCHEDULE SHALL BE AS PER AGES-SP-09-001 APPENDIX A1.
87. ALL BUTTERFLY VALVES IN HYDROCARBON & CRITICAL SERVICE SHALL BE TRIPLE OFFSET TYPE.FOR TRIPLE OFFSET BUTTERFLY VALVE , SHORT / LONG PATTERN SHALL BE DECIDED BASED ON LAYOUT REQUIREMENTS. FOR UTILITY SERVICES DOUBLE OFFSET BUTTERFLY CAN BE CONSIDERED.
97. FOR OPERATING TEMPERATURES ABOVE 441°C THE CONTRACTOR IS DIRECTED TO REVIEW THE CONTROLS FOR 1 1/4 Cr 1/2 Mo MATERIALS, TO PREVENT REHEAT CRACKING, AND TO REQUEST FROM SUPPLIERS SUCH EVIDENCE THAT DEMONSTRATES SATISFACTORY OPERATION ABOVE THIS TEMPERATURE.

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SECTION 3.0 – BRANCH TABLE

90^0 BRANCH CONNECTIONS

BRANCH PIPE (NPS)																	
	24															E	
	20														E	T	
	18													E	T	T	
	16												E	T	T	T	
	14											E	T	T	T	T	
	12										E	T	T	T	T	T	
	10									E	T	T	T	T	T	T	
	8								E	T	T	T	T	T	T	W	
	6							E	T	T	T	T	T	W	W	W	
	4						E	T	T	T	W	W	W	W	W	W	
	3					E	T	T	W	W	W	W	W	W	W	W	
	2				E	T	T	W	W	W	W	W	W	W	W	W	
	1 ½			E	T	T	W	W	W	W	W	W	W	W	W	W	
	1		E	T	T	T	W	W	W	W	W	W	W	W	W	W	
	3/4	E	T	T	T	TR	W	W	W	W	W	W	W	W	W	W	
	1/2	**1/2**	**3/4**	**1**	**1 ½**	**2**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**
		HEADER PIPE (NPS)															

LEGEND (STANDARD SYMBOLOGY)

C	CALCULATION IN ACCORDANCE WITH ASME B31.3
E	EQUAL TEE
T	REDUCING TEE
TR	REDUCING TEE + REDUCER
W	WELDOLET

PIPING CLASS: AG1A1L-FH

SECTION 4.0 – PIPING COMPONENTS

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD	NOTES
	FROM	TO					
PIPE							
PIPE	½	16	BE	SEAMLESS	B36.10	ASTM A335 GR. P11	1, 85
PIPE	18	24	BE	WELDED	B36.10	ASTM A691-1 1/4 Cr CL 22	82
NIPPLE	1	2	BE	AS PIPE, L=100mm	B36.10	ASTM A335 GR. P11	85
FITTINGS							
ELBOW	½	16	BE	90 DEGREE, LR, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP11 CL2	2
ELBOW	18	24	BE	90 DEGREE, LR, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP11-W CL2	2, 82
ELBOW	½	16	BE	45 DEGREE, LR, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP11 CL2	2
ELBOW	18	24	BE	45 DEGREE, LR, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP11-W CL2	2, 82
REDUCER	¾	16	BE	CONCENTRIC, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP11 CL2	2
REDUCER	18	24	BE	CONCENTRIC, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP11-W CL2	2,82,83
REDUCER	¾	16	BE	ECCENTRIC, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP11 CL2	2
REDUCER	18	24	BE	ECCENTRIC, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP11-W CL2	2,82,83
CAP	½	24	BE	WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP11 CL2	2
BRANCH FITTINGS							
TEE	½	16	BE	EQUAL, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP11 CL2	2
TEE	18	24	BE	EQUAL, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP11-W CL2	2, 82
TEE	¾	16	BE	REDUCING, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP11 CL2	2

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COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD	NOTES
	FROM	TO					
BRANCH FITTINGS – CONT'D							
TEE	18	24	BE	REDUCING, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP11-W CL2	2, 82
WELDOLET	½	8	BE	FORGED, SCH AS PIPE	MSS SP-97	ASTM A182 GR. F11 CL2	
FLANGES							
WELDNECK	½	24	RF	CL.150	B16.5	ASTM A182 GR. F11 CL2	2
WELDNECK	½	24	RF	CL.300	B16.5	ASTM A182 GR. F11 CL2	2,33
NIPOFLANGE	1	2	RF	CL.150, L=150 MM	B16.5	ASTM A182 GR. F11 CL2	2,73
BLIND	½	24	RF	CL.150	B16.5	ASTM A182 GR. F11 CL2	
BLIND	½	24	RF	CL.300	B16.5	ASTM A182 GR. F11 CL2	33
ORIFICE	2	24	RF	CL.300	B16.36	ASTM A182 GR. F11 CL2	2,54
LINE BLINDS							
LINE BLIND	½	10	RF	CL.150, SPECTACLE BLIND	B16.48	ASTM A387 GR.11 CL2	3
LINE BLIND	12	24	RF	CL.150, SPADE & SPACER	B16.48	ASTM A387 GR.11 CL2	3
GASKETS							
GASKET	½	24	-	CL.150, SPIRAL WOUND, 4.5MM THK.	B16.20/ B16.5	SP. WINDING + INNER RING: SS 347, FILLER: MICA & GRAPHITE, SS 316 OUTER RING, LOW STRESS	70
GASKET	½	24	-	CL.300, SPIRAL WOUND, 4.5MM THK.	B16.20/ B16.5	SP. WINDING + INNER RING: SS 347, FILLER: MICA & GRAPHITE, SS 316 OUTER RING	33
BOLTS							
STUD BOLT & NUTS	½	24	-	STUD BOLT C/W 2 HEAVY HEX. NUTS	B18.2.1/ B18.2.2	STUD: ASTM A193 GR. B16, ASTM A194 GR. 7	74

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SECTION 5.0 - VALVES

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD.	NOTES
	FROM	TO					
VALVES (NOTE -68, 81)							
CHECK	½	1 ½	RF	CL.150, RF FLGD TO B16.5, SPRING LOADED LIFT CHECK, BOLTED COVER	BS 1868 + ASME B16.34	BODY: ASTM A182-F11 CL 2 TRIM: AISI 321+HF	25
CHECK	2	24	RF	CL.150, DUAL PLATE, TYPE A, RF DOUBLE FLGD TO B16.5	API 594	BODY: ASTM A217-WC6 TRIM: AISI 321+HF	25
CHECK	2	24	RF	CL.150, SWING CHECK FLGD TO B16.5	API 6D	BODY: ASTM A217-WC6 TRIM: AISI 321+HF	25
GATE	½	1 ½	RF	CL.150, FLGD TO B16.5, SOLID WEDGE, STD PORT, OS & Y, HEAT DISSIPATION BOLTED BONNET, HANDWHEEL	API 602 + ASME B16.34	BODY: ASTM A182-F11 CL 2 TRIM: AISI 321+HF	16,25,68
GATE	2	24	RF	CL.150, FLGD TO B16.5, FLEXIBLE WEDGE, STD PORT, OS & Y, HEAT DISSIPATION BOLTED BONNET, HANDWHEEL / GEAR	API 600 + ASME B16.34	BODY: ASTM A217-WC6 TRIM: AISI 321+HF	16,25,68
GLOBE	½	1 ½	RF	CL.150, FLGD TO B16.5, SWIVEL PLUG DISC, OS & Y, HEAT DISSIPATION BOLTED BONNET,HANDWHEEL	API 602 + ASME B16.34	BODY: ASTM A182-F11 CL 2 TRIM: AISI 321+HF	16,25,68
GLOBE	2	12	RF	CL.150, FLGD TO B16.5, SWIVEL PLUG DISC, OS & Y, HEAT DISSIPATION BOLTED BONNET,HANDWHEEL / GEAR	API 623 + ASME B16.34	BODY: ASTM A217-WC6 TRIM: AISI 321+HF	16,25,68
BUTTERFLY	14	24	RF	CL.150, TRIPLE OFFSET, DOUBLE FLGD TO B16.5, GEAR	API 609, CAT.B	BODY: ASTM A217-WC6 TRIM & SEAT: AISI 321+HF	16,25,71 87

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COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD.	NOTES
	FROM	TO					
VALVES CONT,D (NOTE -68, 81)							
BALL	2	6	RF	CL.150, FLGD TO B16.5, REDUCED BORE, FLOATING BALL, LEVER /GEAR	API 6D	BODY: ASTM A217-WC6 TRIM & SEAT: AISI 321+HF	16,25
BALL	8	24	RF	CL.150, FLGD TO B16.5, REDUCED BORE, TRUNNION MOUNTED, GEAR	API 6D	BODY: ASTM A217-WC6 TRIM & SEAT: AISI 321+HF	16,25
BALL	½	1 ½	RF	CL.150, FLGD TO B16.5, FULL BORE, FLOATING BALL, LEVER	API 6D	BODY: ASTM A182-F11 CL 2 TRIM & SEAT: AISI 321+HF	16,25
BALL	2	4	RF	CL.150, FLGD TO B16.5, FULL BORE, FLOATING BALL, LEVER	API 6D	BODY: ASTM A217-WC6 TRIM & SEAT: AISI 321+HF	16,25,71
BALL	6	24	RF	CL.150, FLGD TO B16.5, FULL BORE, TRUNNION MOUNTED, GEAR	API 6D	BODY: ASTM A217-WC6 TRIM & SEAT: AISI 321+HF	16,25,71