PIPING CLASS: AC1A1B-FH

SECTION 1.0 – GENERAL

PIPE CLASS:	**AC1A1B-FH**	**DESIGN CODE:**	ASME B31.3
RATING:	150	**PWHT:**	NOTE-52
FLANGE FACE:	RF	**VALVE TRIM:**	13Cr+HF
BASIC MATERIAL:	CARBON STEEL (GROUP 1.1)	**SOUR:**	NO
CORROSION ALLOWANCE:	1.5 MM	**SPECIAL REQUIREMENT:**	NO

TEMPERATURE (DEG.C) AND PRESSURE (BARG) RATING – (NOTE-55)

TEMP.	-29	0	38	50	100	150	200	250	300	350	400	427
PRESS.	19.6	19.6	19.6	19.2	17.7	15.8	13.8	12.1	10.2	8.4	6.5	5.4

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	30	36	42	48	52	56
SCHEDULE	20	20	20	20	20	-	-	-	-	-	-
THICKNESS	7.92	7.92	7.92	9.53	9.53	CALC	CALC	CALC	CALC	CALC	CALC

NPS	60
SCHEDULE	-
THICKNESS	CALC

PIPING CLASS: AC1A1B-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.

27. CS PIPE AND PIPE COMPONENTS WITH NOMINAL THICKNESS GREATER THAN 5.08 MM SHALL BE IMPACT TESTED AT -29 ° C OR LTCS MATERIAL MAY BE USED INSTEAD.
33. TO BE USED FOR FLANGED CLASS 300 RF CONNECTION.
39. DELETED.
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).
55. ALL PIPING COMPONENTS UP TO PIPING CLASS RANGE SHALL BE DESIGNED FOR VACUUM CONDITION AT AMBIENT TEMPERATURE.
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.
86. DISSIMILAR FLANGE MATERIAL SHALL BE SEPERATED USING INSULATING GASKET, ONLY TO BE USED WHEN STATED IN CORROSION REPORT AND IN P&ID OR OTHERWISE WITH COMPANY APPROVAL. FOR HYDROCARBON SERVICE FIRE SAFE INSULATING GASKET IS MANDATORY (REFER AGES-SP-09-005 FOR INSULATING GASKET DETAILS).
91. TO BE USED FOR NON-HYDROCARBON UTILITY SERVICE AND NON-VIBRATING SERVICE ONLY.

PIPING CLASS: AC1A1B-FH

SECTION 3.0 – BRANCH TABLE

90^0 BRANCH CONNECTIONS

BRANCH PIPE (NPS)	HEADER PIPE (NPS)																						
		1/2	3/4	1	1 ½	2	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	52	56	60
60																								E
56																							E	T
52																						E	T	T
48																					E	T	T	T
42																				E	T	T	T	T
36																			E	T	T	T	T	T
30																		E	T	T	T	T	T	T
24																	E	T	T	T	T	T	T	TR
20																E	T	T	T	T	TR	TR	TR	TR
18															E	T	T	T	T	T	TR	TR	TR	TR
16														E	T	T	T	T	T	T	TR	TR	TR	TR
14													E	T	T	T	T	T	TR	TR	TR	TR	TR	TR
12												E	T	T	T	T	T	T	TR	TR	TR	TR	TR	TR
10											E	T	T	T	T	T	T	T	TR	TR	TR	TR	TR	TR
8										E	T	T	T	T	T	T	W	W	W	W	W	W	W	W
6									E	T	T	T	T	T	W	W	W	W	W	W	W	W	W	W
4								E	T	T	T	W	W	W	W	W	W	W	W	W	W	W	W	W
3							E	T	T	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
2						E	T	T	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1 ½					E	T	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
1				E	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
3/4			E	T	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
1/2		E	T	T	T	TR	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

LEGEND (STANDARD SYMBOLOGY)

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

PIPING CLASS: AC1A1B-FH

SECTION 4.0 – PIPING COMPONENTS

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD	NOTES
	FROM	TO					
PIPE							
PIPE	½	1 ½	PE	SEAMLESS	B36.10	ASTM A106 GR B	1,85
PIPE	2	16	BE	SEAMLESS	B36.10	ASTM A106 GR B	27
PIPE	18	60	BE	WELDED	B36.10	ASTM A672 GR.C65 CL.22	27,82
NIPPLE	1	2	PE	AS PIPE, L=100mm	B36.10	ASTM A106 GR B	85
ECC.SWAGE NIPPLE	¾	1 ½	PE	ECC. SWAGE NIPPLE, PBE	MSS-SP-95	ASTM A234 GR. WPB	85
CONC.SWAGE NIPPLE	¾	1 ½	PE	CONC. SWAGE NIPPLE, PBE	MSS-SP-95	ASTM A234 GR. WPB	85
FITTINGS							
ELBOW	½	1 ½	SW	90 DEGREE, LR, CL.3000,FORGED	B16.11	ASTM A105N	
ELBOW	2	16	BE	90 DEGREE, LR, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	2,27
ELBOW	18	48	BE	90 DEGREE, LR, WROUGHT, WELDED	B16.9	ASTM A234 GR. WPB-W	2,27,82
ELBOW	52	60	BE	90 DEGREE, LR, WROUGHT, WELDED	MSS SP 75	ASTM A234 GR. WPB-W	2,27, 82
ELBOW	½	1 ½	SW	45 DEGREE, LR, CL.3000,FORGED	B16.11	ASTM A105N	
ELBOW	2	16	BE	45 DEGREE, LR, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	2,27
ELBOW	18	48	BE	45 DEGREE, LR, WROUGHT, WELDED	B16.9	ASTM A234 GR. WPB-W	2,27,82
ELBOW	52	60	BE	45 DEGREE, LR, WROUGHT, WELDED	MSS SP 75	ASTM A234 GR. WPB-W	2,27,82
REDUCER COUPLING	¾	1 ½	SW	CL.3000,REDUCER COUPLING FORGED	B16.11	ASTM A105N	

PIPING CLASS: AC1A1B-FH

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD	NOTES
	FROM	TO					
FITTINGS -CONT,D							
REDUCER	2	16	BE	CONCENTRIC, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	2,27
REDUCER	18	48	BE	CONCENTRIC, WROUGHT, WELDED	B16.9	ASTM A234 GR. WPB-W	2,27, 82,83
REDUCER	52	60	BE	CONCENTRIC, WROUGHT, WELDED	MSS SP 75	ASTM A234 GR. WPB-W	2,27, 82
REDUCER	2	16	BE	ECCENTRIC, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	2,27
REDUCER	18	48	BE	ECCENTRIC, WROUGHT, WELDED	B16.9	ASTM A234 GR. WPB-W	2,27, 82,83
REDUCER	52	60	BE	ECCENTRIC, WROUGHT, WELDED	MSS SP 75	ASTM A234 GR. WPB-W	2,27,82
CAP	½	1 ½	SW	CL.3000,FORGED	B16.11	ASTM A105N	
CAP	2	48	BE	WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	2,27
CAP	52	60	BE	WROUGHT, SEAMLESS	MSS SP 75	ASTM A234 GR. WPB-S	2,27
FULL COUPLING	½	1 ½	SW	CL.3000,COUPLING FORGED	B16.11	ASTM A105N	
PLUG	½	1 ½	THD	HEXAGONAL HEADED PLUG, CL.3000,FORGED	B16.11	ASTM A105N	
BRANCH FITTINGS							
TEE	½	1 ½	SW	EQUAL, FORGED, CL.3000	B16.11	ASTM A105N	
TEE	2	16	BE	EQUAL, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	2,27
TEE	18	48	BE	EQUAL WROUGHT, WELDED	B16.9	ASTM A234 GR. WPB-W	2,27,82
TEE	52	60	BE	EQUAL WROUGHT, WELDED	MSS SP 75	ASTM A234 GR. WPB-W	2,27,82
TEE	¾	1 ½	SW	REDUCING,FORGED, CL.3000	B16.11	ASTM A105N	

PIPING CLASS: AC1A1B-FH

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD	NOTES
	FROM	TO					
BRANCH FITTINGS -CONT, D							
TEE	2	16	BE	REDUCING, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	2,27
TEE	18	48	BE	REDUCING, WROUGHT, WELDED	B16.9	ASTM A234 GR. WPB-W	2,27,82
TEE	52	60	BE	REDUCING, WROUGHT, WELDED	MSS SP 75	ASTM A234 GR. WPB-W	2,27,82
WELDOLET	2	8	BE	FORGED, SCH AS PIPE	MSS SP-97	ASTM A105N	27
SOCKOLET	½	1 ½	SW	FORGED, CL.3000	MSS-SP-97	ASTM A105N	
FLANGES							
SOCKETWELD	½	1 ½	RF	CL.150	B16.5	ASTM A105N	
WELDNECK	2	24	RF	CL.150	B16.5	ASTM A105N	2,27
WELDNECK	30	60	RF	CL.150	B16.47-A	ASTM A105N	2,27
SOCKETWELD	½	1 ½	RF	CL.300	B16.5	ASTM A105N	
WELDNECK	2	24	RF	CL.300	B16.5	ASTM A105N	2,27,33
WELDNECK	30	60	RF	CL.300	B16.47-A	ASTM A105N	2,27,33
SOCKETWELD	½	1 ½	RF	CL.600	B16.5	ASTM A105N	
NIPOFLANGE	1	2	RF	CL.150, L=150 MM	B16.5	ASTM A105N	2,27,73
FLANGES -CONT, D							
BLIND	½	24	RF	CL.150	B16.5	ASTM A105N	27

PIPING CLASS: AC1A1B-FH

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD	NOTES
	FROM	TO					
BLIND	30	60	RF	CL.150	B16.47 – A	ASTM A105N	27
ORIFICE	2	24	RF	CL.300	B16.36	ASTM A105N	2,27,54
LINE BLINDS							
LINE BLIND	½	10	RF	CL.150, SPECTACLE BLIND	B16.48	ASTM A516 GR.70	3
LINE BLIND	12	24	RF	CL.150, SPADE & SPACER	B16.48	ASTM A516 GR.70	3
LINE BLIND	30	60	RF	CL.150, SPADE & SPACER	MFG STD.	ASTM A516 GR.70	3
GASKETS							
GASKET	½	24	-	CL.150, SPIRAL WOUND, 4.5MM THK.	B16.20/ B16.5	SP. WINDING + INNER RING: SS316, FILLER: GRAPHITE, CS OUTER RING, LOW STRESS	70
GASKET	30	60	-	CL.150, SPIRAL WOUND, 4.5MM THK.	B16.20/ 16.47 – A	SP. WINDING + INNER RING: SS316, FILLER: GRAPHITE, CS OUTER RING, LOW STRESS	70
GASKET	½	24	-	CL.300, SPIRAL WOUND, 4.5MM THK.	B16.20/ B16.5	SP. WINDING + INNER RING: SS316, FILLER: GRAPHITE, CS OUTER RING	33
GASKET	30	60	-	CL.300, SPIRAL WOUND, 4.5MM THK.	B16.20/ 16.47 – A	SP. WINDING + INNER RING: SS316, FILLER: GRAPHITE, CS OUTER RING	33

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COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD	NOTES
	FROM	TO					
GASKETS -CONT,D							
INSULATING GASKET	2	24	-	CL.150, RF FLANGE INSULATING GASKET SET, FULL FACE	MANF. STD.	GASKETS AND WASHERS SS316 CORE LAMINATED WITH DIELECTRIC COATING SUITABLE FOR DESIGN CONDTIONS	86
BOLTS							
STUD BOLT & NUTS	½	60	-	STUD BOLT C/W 2 HEAVY HEX. NUTS	B18.2.1/ B18.2.2	STUD: ASTM A193 GR. B16 ASTM A194 GR. 7	74

PIPING CLASS: AC1A1B-FH

SECTION 5.0 - VALVES

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD.	NOTES
	FROM	TO					
VALVES(NOTE-81)							
CHECK	½	1 ½	SW	CL.800, SW TO B16.11, SPRING LOADED LIFT CHECK,BOLTED COVER	BS1868 + ASME B16.34	BODY: ASTM A105N TRIM:13Cr +HF	91
CHECK	2	48	RF	CL.150, DUAL PLATE, WAFER TYPE TO FIT BETWEEN B16.5 / B16.47-A FLANGES	API 594	BODY: ASTM A216 GR.WCB TRIM: 13Cr +HF	
CHECK	52	60	RF	CL.150, DUAL PLATE, TYPE A, RF DOUBLE FLGD TO B16.47-A	API 594 + MANU. STD	BODY: ASTM A216 GR.WCB TRIM: 13Cr +HF	
CHECK	2	24	RF	CL.150, SWING CHECK FLGD TO B16.5	API 6D	BODY: ASTM A216 GR.WCB TRIM: 13Cr +HF	
GATE	½	1 ½	SW	CL.800, SW TO B16.11, SOLID WEDGE, STD PORT, OS & Y, BOLTED BONNET,HANDWHEEL	API 602 + ASME B16.34	BODY: ASTM A105N TRIM: 13Cr +HF	91
GATE	2	42	RF	CL.150, FLGD TO B16.5 / B16.47-A, FLEXIBLE / PARALLEL SLIDE GATE, OS & Y, BOLTED BONNET, HANDWHEEL / GEAR	API 600 + ASME B16.34	BODY: ASTM A216 GR.WCB TRIM: 13Cr +HF	
GATE	48	60	RF	CL.150, FLGD TO B16.47-A, FLEXIBLE / PARALLEL SLIDE GATE, OS & Y, BOLTED BONNET, GEAR	API 600 + ASME B16.34 + MANU. STD	BODY: ASTM A216 GR.WCB TRIM: 13Cr +HF	
GLOBE	½	1 ½	SW	CL.800, SW TO B16.11, SWIVEL PLUG DISC, Y-PATTERN,BOLTED BONNET,HANDWHEEL	API 602 + ASME B16.34	BODY: ASTM A105N TRIM: 13Cr +HF	91

PIPING CLASS: AC1A1B-FH

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD.	NOTES
	FROM	TO					
VALVES CONT,D (NOTE-81)							
GLOBE	2	12	RF	CL.150, FLGD TO B16.5, Y-PATTERN, BOLTED BONNET, HANDWHEEL / GEAR	API 623 + ASME B16.34	BODY: ASTM A216 GR.WCB TRIM: 13Cr +HF	