PIPING CLASS: AC1S3A-FJ

SECTION 1.0 – GENERAL

PIPE CLASS:	**AC1S3A-FJ**	**DESIGN CODE:**	ASME B31.3
RATING:	150	**PWHT:**	NOTE 5
FLANGE FACE:	RF	**VALVE TRIM:**	SS316+HF
BASIC MATERIAL:	CS, JACKETED (GROUP 1.1)	**SOUR:**	YES (NOTE 4 & 13)
CORROSION ALLOWANCE:	CORE: 3.0 MM JACKET: 1.5 MM	**SPECIAL REQUIREMENT:**	NACE + JACKETED SERVICE AND NOTE 128

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

TEMP.	-29	0	38	50	100	150	200	220
PRESS.	19.6	19.6	19.6	19.2	17.7	15.8	13.8	13.12

SERVICE

REFER TO PIPING CLASS INDEX

SIZE RANGE, PIPE WALL THICKNESS (MM) TABLE (CORE PIPING) - (NOTE-80,195)

NPS	½	¾	1	1 ½	2	3	4	6	8	10	12
SCHEDULE	XXS	160	160	160	160	80	80	40	30	30	30
THICKNESS	7.47	5.56	6.35	7.14	8.74	7.62	8.56	7.11	7.04	7.80	8.38

NPS	14	16
SCHEDULE	20	20
THICKNESS	7.92	7.92

SIZE RANGE, PIPE WALL THICKNESS (MM) TABLE (JACKET PIPING) - (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
SCHEDULE	20	20	20
THICKNESS	7.92	7.92	7.92

PIPING CLASS: AC1S3A-FJ

SECTION 2.0 – NOTES

GENERAL NOTES

3. FOR SPECTACLE BLINDS (FIG-8 FLANGES) & BLINDS REFER TO SPECIFICATION AGES-SP-09-002.
4. ALL MATERIAL FOR SOUR SERVICE SHALL CONFORM TO THE REQUIREMENTS FOR MATERIAL SELECTION GUIDELINES AGES-GL-07-001, REQUIREMENTS FOR MATERIALS IN SEVERE SERVICE AGES-SP-07-003 AND NACE MR0175/ISO 15156 (FOR UPSTREAM) & NACE MR0103/ISO 17945 (FOR REFINERY SERVICE).
5. PWHT SHALL BE BASED ON ASME B31.3 AND THE REQUIREMENTS OF SPECIFICATION AGES-SP-09-002 PIPING MATERIAL SPECIFCATION INDEX. FOR SOUR SERVICE PWHT REQUIREMENT SHALL BE ALSO GOVERNED BY HARDNESS CRITERIA AS PER NACE MR0175 / ISO 15156 (FOR UPSTREAM) & NACE MR0103/ISO 17945 (FOR REFINERY SERVICE).
13. FOR SOUR/ LETHAL SERVICE 100%RT,100%MT/PT HAS TO BE CONSIDERED IRRESPECTIVE OF RATING IN LINE WITH REQUIREMENT FOR MATERIALS IN SEVERE SERVICE AGES-SP-07-003.
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).
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.
29. DIAMETER IN PIPING CLASS USED IS OUTER DIAMETER.
43. THREADED JOINTS ARE NOT PERMITTED.
55. ALL PIPING COMPONENTS UP TO PIPING CLASS RANGE SHALL BE DESIGNED FOR VACUUM CONDITION AT AMBIENT TEMPERATURE.
60. THE MIN. LINE SIZE IN THIS CLASS SHALL BE NPS 2 WITH NPS 3 JACKET. THE INNER AND OUTER PIPE SIZE COMBINATIONS SHALL BE NPS 2 X NPS 3, NPS 3 X NPS 4, NPS 4 X NPS6, NPS 6 X NPS 8, NPS 8 X NPS 10, NPS 10 X NPS12 AND NPS12 X NPS16.
63. THE LINE SIZE IN THIS CLASS UPTO NPS 1 1/2 ARE INCLUDED FOR INSTRUMENT CONNECTIONS ONLY.
70. LOW STRESS SPIRAL WOUND GASKET.
71. TO BE USED ONLY WHEN INDICATED ON THE P&ID.
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) AND P&ID.
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).
125. WELD NECK FLANGE TO BE USED ON PARTIAL JACKET ASSEMBLY.
126. REDUCING SLIP ON FLANGE TO BE USED ON FULL JACKET ASSEMBLY.
127. PLUG VALVES ARE NOT ALLOWED ABOVE 175 DEG C.
128. THIS PIPE CLASS SHALL BE USED FOR FULLY JACKETED PIPEWORK IN ACCORDANCE WITH AGES-SP-09-010.
195. THE CORE PIPE THICKNESS SHALL BE VERIFIED BASED ON PROJECT SPECIFIC STEAM SUPPLY PRESSURE AND TEMPERATURE CONDITIONS.
197. HEATING JACKET TO BE SUPPLIED WITH 2 SW NOZZLES.
198. VALVES TO BE DESIGNED WITH OVERSIZED FLANGES OF ONE DIAMETER OF NOMINAL SIZE FOR FULLY JACKETED PIPING.FOR PARTIAL JACKETED VALVE FLANGE SIZE SHALL MATCH THE CORE PIPE. PIPE CLASS TO BE UPDATED ACCORDINGLY.

PIPING CLASS: AC1S3A-FJ

199. THIS PIPING CLASS IS DESIGNED FOR STEAM JACKETED SYSTEM.

200. ALL BUTT-WELDED COMPONENT THICKNESSES SHALL MATCH THE CORRESPONDING RESPECTIVE CORE AND JACKET PIPE THICKNESS.

PIPING CLASS: AC1S3A-FJ

SECTION 3.0 – BRANCH TABLE

90^0 BRANCH CONNECTIONS (CORE PIPING)

BRANCH PIPE (NPS)											
	16									E	
	14								E	T	
	12							E	T	T	
	10						E	T	T	T	
	8					E	T	T	T	T	
	6				E	T	T	T	T	T	
	4			E	T	T	T	P	P	P	
	3		E	T	T	P	P	P	P	P	
	2	E	T	T	P	P	P	P	P	P	
		2	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	
		HEADER PIPE (NPS)									

LEGEND (STANDARD SYMBOLOGY)

C	CALCULATION IN ACCORDANCE WITH ASME B31.3
E	EQUAL TEE
P	SET-ON BRANCH (*RESTRICTED USE PER AGES AGES-SP-09-002. SECTION 12.8.1)*
R	SET-ON BRANCH WITH RF PAD *(PAD THICKNESS EQUALS RUN PIPE THICKNESS, PAD* WIDTH EQUALS x 2 BRANCH OD UNLESS SPECIFIED OTHERWISE BY STRESS ANALYSIS) (RESTRICTED USE PER AGES AGES-SP-09-002. SECTION 12.8.1)
S	SOCKOLET
T	REDUCING TEE
TR	REDUCING TEE + REDUCER
W	WELDOLET

PIPING CLASS: AC1S3A-FJ

SECTION 3.0 – BRANCH TABLE CONT,D

90^0 BRANCH CONNECTIONS (JACKET PIPING)

BRANCH PIPE (NPS)																
	18														E	
	16													E	T	
	14												E	T	T	
	12											E	T	T	T	
	10										E	T	T	T	T	
	8									E	T	T	T	T	T	
	6								E	T	T	T	T	T	P	
	4							E	T	T	T	P	P	P	P	
	3						E	T	T	P	P	P	P	P	P	
	2					E	T	T	P	P	P	P	P	P	P	
	1 ½				E	T	T	T	S	S	S	S	S	S	S	
	1			E	T	T	S	S	S	S	S	S	S	S	S	
	3/4		E	T	T	T	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	
		1/2	**3/4**	**1**	**1 ½**	**2**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	
		HEADER PIPE (NPS)														

LEGEND (STANDARD SYMBOLOGY)

C	CALCULATION IN ACCORDANCE WITH ASME B31.3
E	EQUAL TEE
P	SET-ON BRANCH (*RESTRICTED USE PER AGES AGES-SP-09-002. SECTION 12.8.1)*
R	SET-ON BRANCH WITH RF PAD *(PAD THICKNESS EQUALS RUN PIPE THICKNESS, PAD* WIDTH EQUALS x 2 BRANCH OD UNLESS SPECIFIED OTHERWISE BY STRESS ANALYSIS) (RESTRICTED USE PER AGES AGES-SP-09-002. SECTION 12.8.1)
S	SOCKOLET (FOR STEAM INLET / OUTLET CONNECTION)
T	REDUCING TEE
TR	REDUCING TEE + REDUCER
W	WELDOLET

PIPING CLASS: AC1S3A-FJ

SECTION 4.0 – PIPING COMPONENTS

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD.	NOTES
	FROM	TO					
PIPE							
PIPE	½	1½	PE	SEAMLESS	B36.10	ASTM A106 GR B, SOUR SERVICE	27,63,85
CORE PIPE	2	16	BE	SEAMLESS	B36.10	ASTM A106 GR B, SOUR SERVICE	27,60
JACKET PIPE	½	18	BE	SEAMLESS	B36.10	ASTM A106 GR B, SOUR SERVICE	27,60
NIPPLE	1	2	BE	AS PIPE, L=100MM	B36.10	ASTM A106 GR B, SOUR SERVICE	27,85
FITTINGS							
ELBOW	2	16	BE	90 DEGREE, LR, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
ELBOW	3	18	BE	90 DEGREE, SR, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
ELBOW	2	16	BE	45 DEGREE, LR, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
ELBOW	3	18	BE	45 DEGREE, LR, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
REDUCER	3	16	BE	CONCENTRIC, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
REDUCER	4	18	BE	CONCENTRIC, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
REDUCER	3	16	BE	ECCENTRIC, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
REDUCER	4	18	BE	ECCENTRIC, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
CAP	2	16	BE	WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
CAP	3	18	BE	WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200

PIPING CLASS: AC1S3A-FJ

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD.	NOTES
	FROM	TO					
BRANCH FITTINGS							
TEE	2	16	BE	EQUAL, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
TEE	3	18	BE	EQUAL, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
TEE	3	16	BE	REDUCING, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
TEE	4	18	BE	REDUCING, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
TEE	2	16	BE	STRAIGHT CROSS TEE, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
TEE	3	18	BE	STRAIGHT CROSS TEE, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S, SOUR SERVICE	27,200
SOCKOLET	½	1½	BE	FORGED, CL. 3000	MSS SP-97	ASTM A105N	27
FLANGES							
WELDNECK	½	1½	RF	CL.150	B16.5	ASTM A105N, SOUR SERVICE	27,63
WELDNECK	2	16	RF	CL.150	B16.5	ASTM A105N, SOUR SERVICE	27,125
SLIP ON REDUCING TYPE	2	18	RF	CL.150	B16.5	ASTM A105N, SOUR SERVICE	27,126
BLIND	2	18	RF	CL.150	B16.5	ASTM A105N, SOUR SERVICE	27
LINE BLINDS							
LINE BLIND	2	10	RF	CL.150, SPECTACLE BLIND	B16.48	ASTM A516 GR.70, SOUR SERVICE	3,27,29
LINE BLIND	12	16	RF	CL.150, SPADE & SPACER	B16.48	ASTM A516 GR.70, SOUR SERVICE	3,27,29

PIPING CLASS: AC1S3A-FJ

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD.	NOTES
	FROM	TO					
GASKETS							
GASKET	½	1½	-	CL.150, SPIRAL WOUND, 4.5MM THK.	B16.20/ B16.5	SP. WINDING + INNER RING: SS316, FILLER: GRAPHITE, CS OUTER RING, LOW STRESS, SOUR SERVICE	63,70
GASKET	2	18	-	CL.150, SPIRAL WOUND, 4.5MM THK.	B16.20/ B16.5	SP. WINDING + INNER RING: SS316, FILLER: GRAPHITE, CS OUTER RING, LOW STRESS, SOUR SERVICE	70
INSULATING GASKET	2	18	-	CL.150, RF FLANGE INSULATING GASKET SET, FULL FACE	MANF. STD.	GASKETS AND WASHERS SS316 CORE LAMINATED WITH DIELECTRIC COATING SUITABLE FOR DESIGN CONDTIONS, SOUR SERVICE	86
BOLTS							
STUD BOLT & NUTS	½	18	-	STUD BOLT C/W 2 HEAVY HEX. NUTS	B18.2.1/ B18.2.2	STUD: ASTM A193 GR. B7M ASTM A194 GR.2HM	74

PIPING CLASS: AC1S3A-FJ

SECTION 5.0 - VALVES

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD.	NOTES
	FROM	TO					
VALVES (NOTE 81,198)							
CHECK	½	1 ½	RF	CL.150, FLGD TO B16.5, SPRING LOADED LIFT CHECK, BOLTED COVER, SOUR SERVICE	BS1868 + ASME B16.34	BODY: ASTM A105N TRIM: SS316+HF	
CHECK	2	16	RF	CL.150, FLGD TO B16.5, SWING CHECK, BOLTED COVER, FULL JACKETED, OVERSIZE FLANGES TO SUIT JACKET PIPE, SOUR SERVICE	API 6D	BODY: ASTM A216 GR.WCB TRIM: SS316+HF	
CHECK	2	16	RF	CL.150, JACKETED DUAL PLATE CHECK, TYPE A, OVERSIZED RF DOUBLE FLGD TO B16.5, SOUR SERVICE	API 6D	BODY: ASTM A216 GR.WCB TRIM: SS316+HF	
GATE	½	1 ½	RF	CL.150, FLGD TO B16.5, SOLID WEDGE, STD PORT, OS&Y, BOLTED BONNET, HANDWHEEL, SOUR SERVICE	API 602 + ASME B16.34	BODY: ASTM A105N TRIM: SS316+HF	
GLOBE	½	1 ½	RF	CL.150, FLGD TO B16.5, SWIVEL PLUG DISC, OS&Y, BOLTED BONNET, HANDWHEEL, SOUR SERVICE	API 602 + ASME B16.34	BODY: ASTM A105N TRIM: SS316+HF	
PLUG	2	16	RF	CL.150, RF FLGD REGULAR PATTERN, SLEEVED PLUG, FULL JACKETED, OVERSIZE FLANGES TO SUIT JACKET PIPE, TWO FLANGE CONNECTIONS, LEVER / GEAR, SOUR SERVICE	API 599	BODY: ASTM A216 GR.WCB TRIM: SS316+HF SLEEVE: PTFE LINED	127
PLUG	2	2	RF	CL.150, RF FLGD REGULAR PATTERN, SLEEVED PLUG, LEVER , SOUR SERVICE	API 599	BODY: ASTM A216 GR.WCB TRIM: SS316+HF SLEEVE: PTFE LINED	127,198