

## PIPING CLASS: AC1A3B-FJ

### SECTION 1.0 – GENERAL

<b>PIPE CLASS:</b>	<b>AC1A3B-FJ</b>	<b>DESIGN CODE:</b>	ASME B31.3
<b>RATING:</b>	150	<b>PWHT:</b>	NOTE 52
<b>FLANGE FACE:</b>	RF	<b>VALVE TRIM:</b>	13Cr+HF
<b>BASIC MATERIAL:</b>	CS, JACKETED (GROUP 1.1)	<b>SOUR:</b>	NO
<b>CORROSION ALLOWANCE:</b>	CORE: 3.0 MM JACKET: 1.5 MM	<b>SPECIAL REQUIREMENT:</b>	JACKETED SERVICE AND NOTE 128

### TEMPERATURE (DEG.C) AND PRESSURE (BARG) RATING (NOTE-55. 195)

<b>TEMP.</b>	-29	0	38	50	100	150	200	220
<b>PRESS.</b>	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)

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

<b>NPS</b>	14	16
<b>SCHEDULE</b>	20	20
<b>THICKNESS</b>	7.92	7.92

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

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

<b>NPS</b>	14	16	18
<b>SCHEDULE</b>	20	20	20
<b>THICKNESS</b>	7.92	7.92	7.92

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### **SECTION 2.0 – NOTES**

#### **GENERAL NOTES**

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.
29. DIAMETER IN PIPING CLASS USED IS OUTER DIAMETER.
52. PWHT SHALL BE BASED ON ASME B31.3 AND THE REQUIREMENTS OF SPECIFICATION AGES-SP-09-002 PIPING MATERIAL SPECIFICATION INDEX.
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 PIPING VALVE FLANGE SIZE SHALL MATCH THE CORE PIPE. PIPE CLASS TO BE UPDATED ACCORDINGLY.
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.

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### SECTION 3.0 – BRANCH TABLE

#### 90° 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)

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

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**SECTION 3.0 – BRANCH TABLE CONT,D**
**90° 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	T	
	8								E	T	T	T	T	T	T	
	6							E	T	T	T	T	T	T	P	
	4						E	T	T	T	P	P	P	P	P	
	3					E	T	T	P	P	P	P	P	P	P	
	2				E	T	T	P	P	P	P	P	P	P	P	
	1 ½			E	T	T	T	S	S	S	S	S	S	S	S	
	1		E	T	T	S	S	S	S	S	S	S	S	S	S	
	¾	E	T	T	T	S	S	S	S	S	S	S	S	S	S	
	½	E	T	T	T	TR	S	S	S	S	S	S	S	S	S	
HEADER PIPE (NPS)																
	1/2	¾	1	1 ½	2	3	4	6	8	10	12	14	16	18		

**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: AC1A3B-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	27,63,85
CORE PIPE	2	16	BE	SEAMLESS	B36.10	ASTM A106 GR B	27,60
JACKET PIPE	½	18	BE	SEAMLESS	B36.10	ASTM A106 GR B	27,60
NIPPLE	1	2	BE	AS PIPE, L=100MM	B36.10	ASTM A106 GR B	27,85
FITTINGS							
ELBOW	2	16	BE	90 DEGREE, LR, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	27,200
ELBOW	3	18	BE	90 DEGREE, SR, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S	27,200
ELBOW	2	16	BE	45 DEGREE, LR, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	27,200
ELBOW	3	18	BE	45 DEGREE, LR, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S	27,200
REDUCER	3	16	BE	CONCENTRIC, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	27,200
REDUCER	4	18	BE	CONCENTRIC, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S	27,200
REDUCER	3	16	BE	ECCENTRIC, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	27,200
REDUCER	4	18	BE	ECCENTRIC, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S	27,200
CAP	2	16	BE	WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	27,200
CAP	3	18	BE	WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S	27,200

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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	27,200
TEE	3	18	BE	EQUAL, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S	27,200
TEE	3	16	BE	REDUCING, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	27,200
TEE	4	18	BE	REDUCING, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S	27,200
TEE	2	16	BE	STRAIGHT CROSS TEE, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WPB-S	27,200
TEE	3	18	BE	STRAIGHT CROSS TEE, WROUGHT, SEAMLESS (SPLIT TYPE)	B16.9	ASTM A234 GR. WPB-S	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	27,63
WELDNECK	2	16	RF	CL.150	B16.5	ASTM A105N	27,125
SLIP ON REDUCING TYPE	2	18	RF	CL.150	B16.5	ASTM A105N	27,126
BLIND	2	18	RF	CL.150	B16.5	ASTM A105N	27
LINE BLINDS							
LINE BLIND	2	10	RF	CL.150, SPECTACLE BLIND	B16.48	ASTM A516 GR.70	3,27,29
LINE BLIND	12	16	RF	CL.150, SPADE & SPACER	B16.48	ASTM A516 GR.70	3,27,29

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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	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	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 CONDCTIONS	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. B7 ASTM A194 GR.2H	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 81,198)							
CHECK	½	1 ½	RF	CL.150, FLGD TO B16.5, SPRING LOADED LIFT CHECK, BOLTED COVER	BS1868 + ASME B16.34	BODY: ASTM A105N TRIM: 13Cr+HF	
CHECK	2	16	RF	CL.150, FLGD TO B16.5, SWING CHECK, BOLTED COVER, FULL JACKETED, OVERSIZE FLANGES TO SUIT JACKET PIPE	API 6D	BODY: ASTM A216 GR.WCB TRIM: 13Cr+HF	
CHECK	2	16	RF	CL.150, JACKETED DUAL PLATE CHECK, TYPE A, OVERSIZED RF DOUBLE FLGD TO B16.5	API 6D	BODY: ASTM A216 GR.WCB TRIM: 13Cr+HF	
GATE	½	1 ½	RF	CL.150, FLGD TO B16.5, SOLID WEDGE, STD PORT, OS&Y, BOLTED BONNET, HANDWHEEL	API 602 + ASME B16.34	BODY: ASTM A105N TRIM: 13Cr+HF	
GLOBE	½	1 ½	RF	CL.150, FLGD TO B16.5, SWIVEL PLUG DISC, OS&Y, BOLTED BONNET, HANDWHEEL	API 602 + ASME B16.34	BODY: ASTM A105N TRIM: 13Cr+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	API 599	BODY: ASTM A216 GR.WCB TRIM: 13Cr+HF SLEEVE: PTFE LINED	127
PLUG	2	2	RF	CL.150, RF FLGD REGULAR PATTERN, SLEEVED PLUG, LEVER	API 599	BODY: ASTM A216 GR.WCB TRIM: 13Cr+HF SLEEVE: PTFE LINED	127