PIPING CLASS: AG3S3B-FH

SECTION 1.0 – GENERAL

PIPE CLASS:	**AG3S3B-FH**	**DESIGN CODE:**	ASME B31.3
RATING:	150	**PWHT:**	NOTE 5
FLANGE FACE:	RF	**VALVE TRIM:**	13Cr+HF/ SS316+HF
BASIC MATERIAL:	9Cr - 1Mo (GROUP 1.14)	**SOUR:**	YES (NOTE 4 & 13)
CORROSION ALLOWANCE:	3.0 MM	**SPECIAL REQUIREMENT:**	NACE

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

TEMP.	-29	38	50	100	150	200	250	300	350	400	410
PRESS.	20.0	20.0	19.5	17.7	15.8	13.8	12.1	10.2	8.4	6.5	6.1

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	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	7.8	8.38

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: AG3S3B-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.
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 SPECIFICATION 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).

22. ALL PIPING COMPONENTS UP TO NPS 24 SHALL BE DESIGNED FOR VACUUM CONDITION AT AMBIENT TEMPERATURE. FOR HIGHER SIZES VACUUM DESIGN SHALL BE APPLICABLE IF INDICATED IN THE LINE LIST.

33. TO BE USED FOR FLANGED CLASS 300 RF CONNECTION.

43. THREADED JOINTS ARE NOT PERMITTED.

54. COMPLETE ORIFICE ASSEMBLY SHALL BE SUPPLIED WITH PAIR OF ORIFICE FLANGES EACH HAVING ONE NPS ½ FLANGED TAP (RATING SAME AS PIPE CLASS).

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) 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.

90. PIPING TO INSTRUMENT IDBB, FLANGED ON BOTH PROCESS SIDE AND INSTRUMENT SIDE.TO BE USED IN SOUR, TOXIC, SULPHURIC ACID AND VIBRATING SERVICE.

PIPING CLASS: AG3S3B-FH

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	T	W	W	W	W	W	W	W	W	W	
	1			E	T	T	W	W	W	W	W	W	W	W	W	W	W	
	3/4		E	T	T	T	W	W	W	W	W	W	W	W	W	W	W	
	1/2	E	T	T	T	TR	W	W	W	W	W	W	W	W	W	W	W	
		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: AG3S3B-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. P9, SOUR SERVICE	1,85
PIPE	18	24	BE	WELDED	B36.10	ASTM A691 GR. 9Cr CL 22, SOUR SERVICE	82
NIPPLE	2	2	BE	AS PIPE, L=100mm	B36.10	ASTM A335 GR. P9, SOUR SERVICE	85
FITTINGS							
ELBOW	½	16	BE	90 DEGREE, LR, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP9 CL3, SOUR SERVICE	2
ELBOW	18	24	BE	90 DEGREE, LR, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP9-W CL3, SOUR SERVICE	2,82
ELBOW	½	16	BE	45 DEGREE, LR, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP9 CL3, SOUR SERVICE	2
ELBOW	18	24	BE	45 DEGREE, LR, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP9-W CL3, SOUR SERVICE	2,82
REDUCER	¾	16	BE	CONCENTRIC, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP9 CL3, SOUR SERVICE	2
REDUCER	18	24	BE	CONCENTRIC, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP9-W CL3, SOUR SERVICE	2,82,83
REDUCER	¾	16	BE	ECCENTRIC, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP9 CL3, SOUR SERVICE	2
REDUCER	18	24	BE	ECCENTRIC, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP9-W CL3, SOUR SERVICE	2,82,83
CAP	½	24	BE	WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP9 CL3, SOUR SERVICE	2
BRANCH FITTINGS							
TEE	½	16	BE	EQUAL, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP9 CL3, SOUR SERVICE	2
TEE	18	24	BE	EQUAL, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP9-W CL3, SOUR SERVICE	2,82
TEE	¾	16	BE	REDUCING, WROUGHT, SEAMLESS	B16.9	ASTM A234 GR. WP9 CL3, SOUR SERVICE	2
TEE	18	24	BE	REDUCING, WROUGHT, WELDED	B16.9	ASTM A234 GR. WP9-W CL3, SOUR SERVICE	2,82
WELDOLET	½	8	BE	FORGED, SCH AS PIPE	MSS SP-97	ASTM A182 GR. F9, SOUR SERVICE	

PIPING CLASS: AG3S3B-FH

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD	NOTES
	FROM	TO					
FLANGES							
WELDNECK	½	24	RF	CL.150	B16.5	ASTM A182 GR. F9, SOUR SERVICE	2
WELDNECK	½	24	RF	CL.300	B16.5	ASTM A182 GR. F9, SOUR SERVICE	2,33
NIPOFLANGE	1	2	RF	CL.150, L=150 MM	B16.5	ASTM A182 GR. F9, SOUR SERVICE	2,73
BLIND	½	24	RF	CL.150	B16.5	ASTM A182 GR. F9, SOUR SERVICE	
ORIFICE	2	24	RF	CL.300	B16.36	ASTM A182 GR. F9, SOUR SERVICE	2,54
LINE BLINDS							
LINE BLIND	½	10	RF	CL.150, SPECTACLE BLIND	B16.48	ASTM A387 GR. 9 CL 2, SOUR SERVICE	3
LINE BLIND	12	24	RF	CL.150, SPADE & SPACER	B16.48	ASTM A387 GR. 9 CL 2, SOUR SERVICE	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, SOUR SERVICE	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, SOUR SERVICE	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

PIPING CLASS: AG3S3B-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	RF	CL.150, RF FLGD TO B16.5, SPRING LOADED LIFT CHECK, BOLTED COVER, SOUR SERVICE	BS 1868 + ASME B16.34	BODY: ASTM A182 F9 TRIM: 13Cr +HF	
CHECK	2	24	RF	CL.150, DUAL PLATE, TYPE A, RF DOUBLE FLGD TO B16.5, SOUR SERVICE	API 594	BODY: ASTM A217 C12 TRIM: 13Cr +HF	
CHECK	2	24	RF	CL.150, SWING CHECK FLGD TO B16.5, SOUR SERVICE	API 6D	BODY: ASTM A217 C12 TRIM: 13Cr +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 A182 F9 TRIM: 13Cr +HF	16
GATE	2	24	RF	CL.150, FLGD TO B16.5, FLEXIBLE WEDGE, STD PORT, OS & Y, BOLTED BONNET, HANDWHEEL / GEAR, SOUR SERVICE	API 600 + ASME B16.34	BODY: ASTM A217 C12 TRIM: 13Cr +HF	16
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 A182 F9 TRIM: 13Cr +HF	16
GLOBE	2	12	RF	CL.150, FLGD TO B16.5, SWIVEL PLUG DISC, OS & Y, BOLTED BONNET, HANDWHEEL / GEAR, SOUR SERVICE	API 623 + ASME B16.34	BODY: ASTM A217 C12 TRIM: 13Cr +HF	16
BUTTERFLY	14	24	RF	CL.150, TRIPLE OFFSET, DOUBLE FLGD TO B16.5, GEAR, SOUR SERVICE	API 609, CAT.B	BODY: ASTM A217 C12 TRIM & SEAT: 13Cr+HF	16,71,87

PIPING CLASS: AG3S3B-FH

COMPONENT (TYP)	NPS (INCH)		END	DESCRIPTION	DIM/ MFG STD.	MATERIAL STD.	NOTES
	FROM	TO					
VALVES CONT,D (NOTE 81)							
BALL	2	6	RF	CL.150, FLGD TO B16.5, REDUCED BORE, FLOATING BALL, LEVER / GEAR, SOUR SERVICE	API 6D	BODY: ASTM A182 F9 TRIM & SEAT: SS316+HF	16
BALL	8	24	RF	CL.150, FLGD TO B16.5, REDUCED BORE, TRUNNION MOUNTED, GEAR, SOUR SERVICE	API 6D	BODY: ASTM A217 C12 TRIM & SEAT: SS316+HF	16
BALL	½	1½	RF	CL.150, FLGD TO B16.5, FULL BORE, FLOATING BALL, LEVER, SOUR SERVICE	API 6D	BODY: ASTM A182 F9 TRIM & SEAT: SS316+HF	16
BALL	2	4	RF	CL.150, FLGD TO B16.5, FULL BORE, FLOATING BALL, LEVER, SOUR SERVICE	API 6D	BODY: ASTM A217 C12 TRIM & SEAT: SS316+HF	16,71
BALL	6	24	RF	CL.150, FLGD TO B16.5, FULL BORE, TRUNION MOUNTED, GEAR, SOUR SERVICE	API 6D	BODY: ASTM A217 C12 TRIM & SEAT: SS316+HF	16,71
IDBB VALVE (FLG X FLG)	¾	2	RF	CL. 150, BALL TYPE BLOCK, REDUCING BODY DESIGN , FLOATING BALL AND ½" NEEDLE TYPE BLEED VALVE, LEVER OPERATED, SOUR SERVICE MIN.14MM BORE	API 6D + MANF STD	BODY: ASTM A182 F9 / ASTM A217 C12 TRIM & SEAT: SS316+HF BLEED VALVE: BODY: ASTM A182 F9 TRIM: 13Cr +HF	16,90