



Offshore Design Section  
Engineering Services  
ISO-9001:2000

Piping Material Specification

Specification No. 2008


Revision No. 3

Discipline: Piping

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## PIPING MATERIAL SPECIFICATION

<i>Prepared by</i> PS <i>05/05/2016</i>			<i>Reviewed by</i> AKM <i>08/05/2016</i>			<i>Approved by</i> SJ <i>09/05/16</i>			124	09-05-2016	3
PS	AKM	SJ							94	22-07-2009	2
PS	GJ	GRP							78	07-08-2008	1
PS	GJ	GRP							78	04-08-2008	0
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Formate No.			Ref. Proce. No.			Issue Number			Revision No.		Revision Date
ODS/SOF/004A			ODS/SOP/008 to 015			3			0		12-02-2008


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Revision Status Record					
SL. No.	Material Specification	Revision No.	Date	Page No.	
				From	To
1	A1	2	15.01.16	7	8
2	B1	2	15.01.16	9	10
3	D1	2	15.01.16	11	12
4	E1	2	15.01.16	13	14
5	A2	1	15.01.16	15	16
6	B2	1	15.01.16	17	18
7	D2	1	15.01.16	19	20
8	E2	1	15.01.16	21	22
9	A1N	2	15.01.6	23	24
10	B1N	2	15.01.16	25	26
11	D1N	2	15.01.16	27	28
12	E1N	2	15.01.16	29	30
13	F1N	0	15.01.16	31	32
14	G1N	0	15.01.16	33	34
15	XG1	0	08.04.08	35	36
16	XG1N	0	08.04.08	37	38
17	A3	3	15.01.16	39	40
18	B3	3	15.01.16	41	42
19	D3	0	15.01.16	43	44
20	A4	0	08.04.08	45	46
21	A5	2	15.01.16	47	48
22	A6	1	15.01.16	49	50
23	A8	2	15.01.16	51	52
24	A9	1	22.07.09	53	54
25	B9	2	15.01.16	55	56
26	D9	0	15.01.16	57	58
27	E9	0	15.01.16	59	60
28	A10	0	08.04.08	61	62
29	B10	0	15.01.16	63	64
30	D10	0	15.01.16	65	66
31	E10	0	15.01.16	67	68
32	F10	1	03.05.16	69	70
33	A12	1	15.01.16	71	72
34	A13	1	15.01.16	73	74
35	A11N	0	22.07.09	75	76
36	A22	0	22.07.09	77	78
37	B22	1	22.07.09	79	80
38	D22	2	15.01.16	81	82
39	E22	0	15.01.16	83	84
40	A23	2	15.01.16	85	86
41	B23	2	15.01.16	87	88
42	D23	2	15.01.16	89	90
43	E23	3	15.01.16	91	92
44	F23	0	15.01.16	93	94
45	G23	0	15.01.16	95	96
46	A15	0	22.07.09	97	98
47	B15	0	22.07.09	99	100
48	D15	1	22.07.09	101	102
49	E15	1	15.01.16	103	104
50	XG15	1	08.04.08	105	106
51	XH15	1	08.04.08	107	108
52	A15A	0	08.04.08	109	110
53	B15A	0	08.04.08	111	112

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	<b>DESIGN DIVISION</b> <b>Engineering Services</b> <b>ISO-9001:2000</b>	<b>Piping Material Specification</b>	Specification No. 2008	
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Piping Specification Index				
Sl. No.	Material Specification	Class	Pipe Material	Corro.All. In mm
1	A1	# 150	Carbon steel-(CS)	3
2	B1	# 300	Carbon steel-(CS)	3
3	D1	# 600	Carbon steel-(CS)	3
4	E1	# 900	Carbon steel-(CS)	3
5	A2	# 150	Carbon steel-(CS)	1.5
6	B2	# 300	Carbon steel-(CS)	1.5
7	D2	# 600	Carbon steel-(CS)	1.5
8	E2	#900	Carbon steel-(CS)	1.5
9	A1N	# 150	Carbon steel NACE-(CS-NACE)	6
10	B1N	# 300	Carbon steel NACE-(CS-NACE)	6
11	D1N	# 600	Carbon steel NACE-(CS-NACE)	6
12	E1N	# 900	Carbon steel NACE-(CS-NACE)	6
13	F1N	#1500	Carbon steel NACE-(CS-NACE)	6
14	G1N	#2500	Carbon steel NACE-(CS-NACE)	6
15	XG1	API 5000	Carbon steel-(CS)	3
16	XG1N	API 5000	Carbon steel NACE-(CS-NACE)	6
17	A3	# 150	Carbon steel Galvanised-(CS-Galv.)/SS	1.5/Nil
18	B3	# 300	Carbon steel Galvanised-(CS-Galv.)/SS	1.5/Nil
19	D3	#600	Carbon steel Galvanised-(CS-Galv.)/SS	1.5/Nil
20	A4	# 150	Carbon steel Galvanised-(CS-Galv.)	1.5
21	A5	# 150	Copper Nickel(90/10 Cu-Ni)	Nil
22	A6	# 150	Stainless steel (SS 316L)	Nil
23	A8	# 150	Carbon steel Galvanised-(CS-Galv.)	3
24	A9	# 150	Stainless steel (SS 316)	Nil
25	B9	# 300	Stainless steel (SS 316)	Nil
26	D9	# 600	Stainless steel (SS 316)	Nil
27	E9	# 900	Stainless steel (SS 316)	Nil
28	A10	# 150	Stainless steel NACE(SS 316L-NACE)	1.5
29	B10	# 300	Stainless steel NACE(SS 316L-NACE)	1.5
30	D10	# 600	Stainless steel NACE(SS 316L-NACE)	1.5
31	E10	#900	Stainless steel NACE(SS 316L-NACE)	1.5
32	F10	# 2500	Stainless steel NACE(SS 316L-NACE)	1.5
33	A12	# 150	Titanium	Nil
34	A13	# 150	Copper(Cu)	Nil
35	A1LN	#150	LT CS - NACE	3mm
36	A22	# 150	Stainless steel (SS 316L)	Nil
37	B22	# 300	Stainless steel (SS 316L)	Nil
38	D22	# 600	Stainless steel (SS 316L)	Nil
39	E22	# 900	Stainless steel (SS 316L)	Nil
40	A23	# 150	Duplex Stainless steel-NACE (DSS-NACE)	Nil
41	B23	# 300	Duplex Stainless steel-NACE (DSS-NACE)	Nil
42	D23	# 600	Duplex Stainless steel-NACE (DSS-NACE)	Nil
43	E23	# 900	Duplex Stainless steel-NACE (DSS-NACE)	Nil
44	F23	#1500	Duplex Stainless steel-NACE (DSS-NACE)	Nil
45	G23	#2500	Duplex Stainless steel-NACE (DSS-NACE)	Nil

Note : During detail engineering, if it is observed that certain specification sheets are required as per approved P&ID but not included in this document, EPC contractor shall prepare the same based upon FS 2004A and submit it to company's review and approval.


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## Piping Specification Index


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Note : During detail engineering, if it is observed that certain specification sheets are required as per approved P&ID but not included in this document, EPC contractor shall prepare the same based upon FS 2004A and submit it to company's review and approval.


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	<b>Offshore Design Section</b> <b>Engineering Services</b> <b>ISO-9001:2000</b>	<b>Piping Material Specification</b>	<b>Specification No. 2008</b>	
			Revision No.	3
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<p><b>1 Introduction</b></p> <p>The piping material specification is prepared based upon Functional Specification FS 2004A and Piping Design Criteria. Datasheets attached here is minimum indicative piping thickness, Piping MOC, Fittings, gaskets and bolts etc. and EPC shall not construe it as firm piping material specification. The EPC contractor shall develop piping material specification and valve material specification and provide all supporting documents including piping wall thickness reports, material selection basis etc during detail engineering to company. Valve tag nos. indicated in the PMS is for reference only. Contractor shall prepare detail valve material specification based on FS 2004A and other relevant codes. Contractor shall reconfirm the tag nos. indicated in the Piping material Specification.</p> <p><b>1.1 Order of precedence</b></p> <p>The order of precedence for piping material specification shall be as follows in the order indicated:</p> <ul style="list-style-type: none"> <li>i) Piping Design Criteria</li> <li>ii) P&amp;ID</li> <li>iii) FS 2004 A (LATEST REV.)</li> <li>iv) This Specification -PMS</li> <li>v) Codes and standard</li> </ul> <p><b>1.2 General</b></p> <p>All material shall conform to ASTM or BS standard. Design and fabrication shall be as per ASME B 31.3 for process piping and ASME B 31.4/31.8 liquid and gas transmission pipeline respectively for the piping of top side beyond top of transition bend. The EPC contractor shall also ensure that API Recommended practices ( API 14E ) Design and installation of offshore production platform piping system is adhered. In case of any conflict between FS 2004A and this document, FS 2004A shall prevail.</p> <p><b>1.2.a</b> During detail engineering, if it is observed that certain specification sheets are required as per approved P&amp;ID but not included in this document, EPC contractor shall prepare the same based upon FS 2004A and submit it to company's review and approval. Piping and Valve material specification for non-metallic piping is not included in this document and contractor shall prepare the same based upon vendor information as per manufacturer standard.</p> <p><b>1.3 Contractor's Responsibility</b></p> <p>The piping and valve material specification prepared by EPC contractor shall necessarily include all the minimum information required by vendor for procurement of piping material. EPC shall prepare Piping material and valve material specification based on FS 2004A, FS 2004B, FS2004D and Piping Design Criteria.</p> <p>All the piping, piping component and piping speciality shall be painted in accordance with FS 2005 latest revision.</p> <p>All the piping, piping component and piping speciality shall be insulated in accordance with FS 2006 latest revision.</p> <p>All the piping, piping component and piping speciality shall be insulated in accordance with FS 2006 latest revision.</p> <p>All type of welding and NDT in piping, piping component, piping speciality and supports shall be in accordance with FS 2009 latest revision</p>				
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	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2						
			Piping Class				Material				C.A		Spec.No				Revision:2						
			A1		# 150		CS				3mm		2004A,Rev 9				Page No.		7				
			Design Code: ASME B 31.3																				
			Service: Vent Gas (VG), Blow Down(BD),Process Hydro Carbon Drain (DH),Nitrogen(N),Chemical (C), Water Injection(WI),Process Drain Water(DW),Diesel Fuel(DF), Hydrocarbon Liquid and Vapour with low CO2 AND H2S.																				
Pipe Data			ASME B 36.10																				
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24					
O.D.mm		21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6					
Sch.		XXS	160	160	160	XS	80	80	80	Std	Std	Std	Std	Std	Std	20	20	20					
WTmm		7.47	5.56	6.35	7.14	5.54	7.62	8.56	10.97	8.18	9.27	9.52	9.52	9.52	9.52	9.52	9.52	9.52					
M.T (%)		12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5										
TYPE		Seamless														LSAW with 100% Radiography, Note-7							
MOC		ASTM A 106 Gr. B														API 5L Gr. B							
Ends		PE				BE																	
Fittings Data																							
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24					
TYPE		Socket Weld				Butt Weld																	
Rating		# 9000	# 6000			XS	80	80	80	Std	Std	Std	Std	Std	Std	20	20	20					
MOC		ASTM A 105 U.N.O				ASTM A 234 Gr. WPB, Seamless U.N.O										ASTM A234 Gr.WPB,Welded U.N.O							
Elbow		ASMEB16.11				ASME B 16.9										ASME B 16.9							
Tee		ASMEB16.11				ASME B 16.9										ASME B 16.9							
Red.		ASMEB16.11				ASME B 16.9										ASME B 16.9							
Cap		ASMEB16.11				ASME B 16.9										ASME B 16.9							
Coupl		ASMEB16.11				ASME B 16.9										ASME B 16.9							
Plug		ASMEB16.11				ASME B 16.9										ASME B 16.9							
Union																							
Elbowlet		MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105							
Sockolet		MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105							
Weldolet		MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105							
Nipple		MSS SP 97,Same as pipe				MOC Same as pipe										MOC Same as pipe							
Swage		MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe										MSS SP 95,MOC Same as pipe							
Flange																							
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24					
TYPE		SW				WN																	
MOC		ASTM A 105				ASTM A 105																	
FACE		RF-Serrated Finished				RF, Serrated Finished																	
STD.		ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25																	
Spectacle Blind/Spacer Blinds																							
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24					
MOC		ASTM A 105																					
Spectacle		ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48									
Mechanical Joints																							
Stud Bolts		ASTM A 193 Gr. B7				ASTM A 193 Gr. B7																	
Hex Nuts		ASTM A 194 Gr. 2H				ASTM A 194 Gr. 2H																	
Gasket		ASME B 16.21,Flat Ring,1.58mm,CNAF				ASME B 16.21,Flat Ring,1.58mm,CNAF																	
Pressure-Temperature Rating																			Maximum Hydrostatic Pressure				
Temp.,Deg F		Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig			Pres.,Kg/cm2g						
(-) 4 to 100		285				(-) 20 to 38				20				450 psig			31.6 Kg/cm2						
200		260				93				18.3				Limited by Flange considering flange as the weakest joint in piping system.									
300		230				149				16.2													
400		200				204				14.1													
500		170				260				11.9													
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																							
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 4. All pipe thread shall be as per ASME B 1.20.0										5. PMS to be read in conjunction with FS 2004 A. 6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified spectacle blind assemblies. 7. Weld Joint Factor for welded pipe shall be as per ASME B 31.3													

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.		2 of 2																					
		Piping Class		Material		C.A		Spec.No																					
		A1		# 150		CS		3mm																					
		2004A,Rev 9		Page No.		8																							
		Design Code:		ASME B 31.3																									
Service:		Vent Gas (VG), Blow Down(BD),Process Hydro Carbon Drain (DH),Nitrogen(N),Chemical (C), Water Injection(WI),Process Drain Water(DW),Diesel Fuel(DF), Hydrocarbon Liquid and Vapour with low CO2 AND H2S.																											
Branch Table as per API RP 14E																													
Run Pipe	≤ 1	T																											
	1-1.5	T	T																										
	2	*	*	T																									
	3	*	*	T	T																								
	4	*	*	T	T	T																							
	6	*	*	W	T	T	T																						
	8	*	*	W	W	T	T	T																					
	10	*	*	W	W	W	T	T	T																				
	12	*	*	W	W	W	T	T	T	T																			
	14	*	*	W	W	W	W	T	T	T	T																		
	16	*	*	W	W	W	W	T	T	T	T	T																	
	18	*	*	W	W	W	W	W	T	T	T	T	T																
	20	*	*	W	W	W	W	W	T	T	T	T	T	T															
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T														
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T													
Branch Pipe																													
≤ 1		1-1.5		2		3		4		6		8		10		12		14		16		18		20		24		30	
Valve Data																													
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
Gate Valve																													
TAG		VG 42,SW				VG 60,FLANGED																							
Rating		# 800				# 150,RF																							
Plug Valve																													
TAG																													
Rating																													
Ball Valve																													
TAG		VB 44,SW				VB 61, Lever Operated				VB 63, Gear Operated																			
Rating		# 800				# 150, RF																							
Globe Valve																													
TAG		VGL 42,SW				VGL 60																							
Rating		# 800				# 150, RF																							
Check Valve																													
TAG		VC 42,SW,Lift Check				VC 60,Swing Check/ VC 81 (Wafer Check, Note -1)																							
Rating		# 800				# 150, RF																							
Needle Valve																													
TAG		VN 3,SW																											
Rating		# 800																											
Butter Fly Valve																													
TAG		VBF 1(WAFFER)																											
Rating		#150, RF																											
Notes Releted to Valve and Brach Connection																													
1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint.																													
2. Wafer type Butterfly Valve may be used only in fire water( Clean water) service.																													
3. PMS to be read in conjunction with FS 2004 A.																													
4. Maximum temperature limit for all Ball Valve shall be 121 Degree C																													
Revision:2		15.01.16		Issued For Bid										PS		AKM		SJ											
Revision		Date		Description										Prepared By		Reviewed By		Approved By											



	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2					
			Piping Class				Material				C.A		Spec.No		Revision:2					
			B1		# 300		CS				3mm		2004A,Rev 9		Page No., 9					
			Design Code: ASME B 31.3										Service: Vent Gas (VG), Blow Down(BD),Process Hydro Carbon Drain (DH),Nitrogen(N),Chemical (C), Water Injection(WI),Process Drain Water(DW),Diesel Fuel(DF), Hydrocarbon Liquid and Vapour with low CO2 AND H2S.							
Pipe Data			ASME B 36.10																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	XXS	XXS	160	160	XS	80	80	80	60	60	80	40	40	40	40	40	40			
Wt/mm	7.47	7.82	6.35	7.14	5.54	7.62	8.56	10.97	10.3	12.7	12.70	11.1	12.7	14.27	15.1	15.87	17.47			
M.T.(%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5							
TYPE	Seamless													LSAW with 100% Radiography, Note-7						
MOC	ASTM A 106 Gr. B													API 5L Gr. B						
Ends	PE				BE															
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weld															
Rating	# 9000 # 6000				XS	80	80	80	60	60	80	40	40	40	40	40	40	40		
MOC	ASTM A 105 U.N.O				ASTM A 234 Gr. WPB, Seamless U.N.O										ASTM A234 Gr. WPB, Welded U.N.O					
Elbow	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Tee	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Red.	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Cap	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Coupl	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Plug	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Union																				
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105					
Socketlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105					
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105					
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe										MOC Same as pipe					
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe										MSS SP 95,MOC Same as pipe					
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW				WN															
MOC	ASTM A 105				ASTM A 105															
FACE	RF-Smooth Finished				RF, Smooth Finished															
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25															
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM A 105																			
Spectacle	ASME B 16.48				ASME B 16.48						Spacer and blind as per ASME B 16.48									
Mechanical Joints																				
Stud Bolts	ASTM A 193 Gr. B7				ASTM A 193 Gr. B7															
Hex Nuts	ASTM A 194 Gr. 2H				ASTM A 194 Gr. 2H															
Gasket	B 16.20,4.5mm, SS Spiral wound with CNAF filler				ASME B 16.20,4.5mm, SS Spiral wound with CNAF filler															
Pressure-Temperature Rating																				
Maximum Hydrostatic Pressure																				
Temp.,Deg F	Pressure, PSI				Temp.Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
(- ) 4 to 100	740				(-) 20 to 38				52				1125 psig				79 Kg/cm2g			
200	675				93				47.5				Limited by Flange considering flange as the weakest joint in piping system							
300	655				149				46											
400	635				204				44.6											
500	600				260				44.2											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Welded fittings shall be 100% radiographed. 2. All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 4. All pipe thread shall be as per ASME B 1.20.1									5. PMS to be read in conjunction with FS 2004 A. 6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified spectacle blind assemblies. 7. Weld Joint Factor for welded pipe shall be as per ASME B 31.3.											

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Offshore Design Section  
Engineering Services  
ISO-9001:2000

PIPING MATERIAL SPECIFICATION

Sheet No.

2 of 2

Piping Class

B1

# 300

Material

CS

C.A

3mm

Spec.No

2004A,Rev 9

Revision:2

Page No.,

10

Design Code:

ASME B 31.3

Service:

Vent Gas (VG), Blow Down(BD),Process Hydro Carbon Drain (DH),Nitrogen(N),Chemical (C),  
Water Injection(WI),Process Drain Water(DW),Diesel Fuel(DF), Hydrocarbon Liquid and Vapour with low CO2 AND H2S.

Branch Table as per API RP 14E

Run Pipe

≤ 1	T																
1-1.5	T	T															
2	*	*	T														
3	*	*	T	T													
4	*	*	T	T	T												
6	*	*	W	T	T	T											
8	*	*	W	W	T	T	T										
10	*	*	W	W	W	T	T	T									
12	*	*	W	W	W	T	T	T	T								
14	*	*	W	W	W	W	T	T	T	T							
16	*	*	W	W	W	W	T	T	T	T	T						
18	*	*	W	W	W	W	T	T	T	T	T	T					
20	*	*	W	W	W	W	W	T	T	T	T	T	T				
24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T		
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30		

LEGEND

*	Sockolet
W	Weldolet
T	TEE

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																	
TAG	VG 42,SW				VG 62,FLANGED												
Rating	# 800				# 300,RF												
Plug Valve																	
TAG																	
Rating																	
Ball Valve																	
TAG	VB 44,SW				VB 64, Lever Operated				VB 66, Gear Operated								
Rating	# 800								# 300, RF								
Globe Valve																	
TAG	VGL 42,SW				VGL 62												
Rating	# 800				# 300, RF												
Check Valve																	
TAG	VC 42,SW, Lift Check				VC 62,Swing Check/ VC 83 (Wafer Check, Note -1)												
Rating	# 800				# 300, RF												
Needle Valve																	
TAG	VN 3,SW																
Rating	# 800																
Butter Fly Valve																	
TAG																	
Rating																	

Notes Related to Valve and Brach Connection


1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint.


2. Wafer type Butter Fly Valve may be used only in fire water( Clean water) service.


3. PMS to be read in conjunction with FS 2004 A.

4. Maximum temperature limit for all Ball Valve shall be 121 Degree C

Revision:2	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2			
			Piping Class				Material				C.A		Spec.No		Revision:2					
			D1 # 600				CS				3mm		2004A_Rev 9		Page No. 11					
			Design Code: ASME B 31.3																	
Service: Vent Gas (VG), Blow Down(BD),Process Hydro Carbon Drain (DH),Nitrogen(N),Chemical (C),																				
Water Injection(WI),Process Drain Water(DW),Diesel Fuel(DF),Hydrocarbon Liquid and Vapour with low CO2 And H2S																				
Pipe Data		ASME B 36.10																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	XXS	XXS	XXS	XXS	160	80	80	80	80	80	80	80	80	80	80	80	80			
W/mm	7.47	7.82	9.09	10.16	8.74	7.62	8.56	10.97	12.70	15.08	17.47	19.05	21.44	23.82	26.19	28.57	30.96			
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5							
TYPE	Seamless														LSAW with 100% Radiography, Note-7					
MOC	ASTM A 106 Gr. B														API 5L Gr. B					
Ends	PE							BE												
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weld															
Rating	# 9000				160	80	80	80	80	80	80	80	80	80	80	80	80	80		
MOC	ASTM A 105 U.N.O				ASTM A 234 Gr. WPB, Seamless U.N.O										ASTM A234 Gr WPB,Welded U.N.O					
Elbow	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Tee	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Red.	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Cap	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Coupl	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Plug	ASMEB16.11				ASME B 16.9										ASME B 16.9					
Union																				
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105					
Socketlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105					
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105					
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe										MOC Same as pipe					
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe										MSS SP 95,MOC Same as pipe					
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	WN																			
MOC	ASTM A 105																			
FACE	RF, Smooth Finished																			
STD.	ASME B 16.5																			
But welding ends as per ASME B 16.25																				
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM A 105																			
Spectacle	ASME B 16.48				ASME B 16.48						Spacer and blind as per ASME B 16.48									
Mechanical Joints																				
Stud Bolts	ASTM A 193 Gr. B7				ASTM A 193 Gr. B7															
Hex Nuts	ASTM A 194 Gr. 2H				ASTM A 194 Gr. 2H															
Gasket	B 16.20.4.5mm, SS Spiral wound with CNAF filler																			
ASME B 16.20.4.5mm, SS Spiral wound with CNAF filler																				
Pressure-Temperature Rating																				
Temp.,Deg F	Pressure, PSI				Temp.Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
(-) 4 to 100	1480				(-) 20 to 38				104				2225 psig				157 Kg/cm2			
200	1360				93				95.61				Limited by Flange considering flange as the weakest joint in piping system							
300	1310				149				92.1											
400	1265				204				88.94											
500	1205				260				84.72											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Welded fittings shall be 100% radiographed.									5. PMS to be read in conjunction with FS 2004 A.											
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.									6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange specified spectacle blind assemblies.											
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									7. Weld Joint Factor for welded pipe shall be as per ASME B 31.3.											
4. All pipe thread shall be as per ASME B 1.20.1																				

	Offshore Design Section Engineering Services ISO-9001:2000	<b>PIPING MATERIAL SPECIFICATION</b>				Sheet No.	<b>2 of 2</b>											
		Piping Class		Material	C.A	Spec.No	Revision:2											
		D1	# 600	CS	3mm	2004A,Rev 9	Page No. 12											
		<b>Design Code:</b>																
		<b>ASME B 31.3</b>																
<b>Service:</b>																		
Vent Gas (VG), Blow Down(BD),Process Hydro Carbon Drain (DH),Nitrogen(N),Chemical (C), Water Injection(WI),Process Drain Water(DW),Diesel Fuel(DF), Hydrocarbon Liquid and Vapour with low CO2 AND H2S.																		
Branch Table as per API RP 14E																		
Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	T	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	T	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	W	T	T	T	T	T					
	20	*	*	W	W	W	W	W	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T		
Branch Pipe																		
≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30				
Valve Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
Gate Valve																		
TAG	VG 42,SW				VG 66,FLANGED													
Rating	# 800				# 600,RF													
Plug Valve																		
TAG																		
Rating																		
Ball Valve																		
TAG	VB 44,SW				VB 76, Lever Operated				VB 77, Gear Operated									
Rating	# 800				# 600, RF													
Globe Valve																		
TAG	VGL 42,SW				VGL 67													
Rating	# 800				# 600, RF													
Check Valve																		
TAG	VC 42,SW Lift Check				VC 66,Swing Check/ VC 86 (Wafer Check, Note -1)													
Rating	# 800				# 600, RF													
Needle Valve																		
TAG	VN 3,SW																	
Rating	# 800																	
Butter Fly Valve																		
TAG																		
Rating																		
Notes Releted to Valve and Brach Connection																		
1. Wafer check valve to be avoided as far as possible; unless the avaiable space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint. 2. Wafer type Butter Fly Valve may be used only in fire water( Clean water) service. 3. PMS to be read in conjunction with FS 2004 A. 4. Maximum temperature limit for all Ball Valve shall be 121 Degree C																		
Revision:2	15.01.16	Issued For Bid								PS	AKM	SJ						
Revision	Date	Description								Prepared By	Reviewed By	Approved By						

	Offshore Design Section Engineering Services ISO-9001:2000														PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2	
															Piping Class				Material				C/A		Spec.No			
	E1 # 900				CS				3mm		2004A,Rev 9				Page No.[13]													
	<b>ASME B 31.3</b> <b>Design Code:</b> Vent Gas (VG), Blow Down(BD),Process Hydro Carbon Drain (DH),Nitrogen(N),Chemical (C), Water Injection(WI),Process Drain Water(DW),Diesel Fuel(DF), Hydrocarbon Liquid and Vapour with low CO2 AND H2S.																											
Pipe Data		ASME B 36.10																										
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14.00	16.00	18	20	22	24											
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114	168.3	219	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6											
Sch.	XXS	XXS	XXS	XXS	160	160	120	120	120	120	120	120	120	120	120	120	120											
Wtmm	7.47	7.82	9.09	10.16	8.7	11.12	11.1	14.27	18.3	21.44	25.40	27.79	30.96	34.92	38.10	41.27	46.02											
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5															
TYPE	Seamless													LSAW with 100% Radiography, Note-10														
MOC	ASTM A 106 Gr. B													API 5L Gr. B														
Ends	PE													BE														
Fittings Data																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
TYPE	Socket Weld				Butt Weld																							
Rating	# 9000				160	160	120	120	120	120	120	120	120	120	120	120	120	120										
MOC	ASTM A 105 U.N.O				ASTM A 234 Gr. WPB, Seamless U.N.O										ASTM A234 Gr WPB,Welded U.N.O													
Elbow	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Tee	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Red.	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Cap	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Coupl	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Plug	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Union																												
Elbowlet	MSS SP 97,ASTM A 105								MSS SP 97,ASTM A 105								MSS SP 97,ASTM A 105											
Socketlet	MSS SP 97,ASTM A 105								MSS SP 97,ASTM A 105								MSS SP 97,ASTM A 105											
Weldolet	MSS SP 97,ASTM A 105								MSS SP 97,ASTM A 105								MSS SP 97,ASTM A 105											
Nipple	MSS SP 97,Same as pipe								MOC Same as pipe								MOC Same as pipe											
Swage	MSS SP 95,Same as pipe								MSS SP 95,MOC Same as pipe								MSS SP 95,MOC Same as pipe											
Flange																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
TYPE	SW													WN														
MOC	ASTM A 105													ASTM A 105														
FACE	RTJ-Note 7													RTJ, Note 7														
STD.	ASME B 16.5													ASME B 16.5, But welding ends as per ASME B 16.25														
Spectacle Blind/Spacer Blinds																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
MOC	ASTM A 105																											
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48															
Mechanical Joints																												
Stud Bolts	ASTM A 193 Gr. B7				ASTM A 193 Gr. B7																							
Hex Nuts	ASTM A 194 Gr. 2H				ASTM A 194 Gr. 2H																							
Gasket	B 16.20,OCT ring of Soft Iron with Max. 90BHN																											
Pressure-Temperature Rating																												
Maximum Hydrostatic Pressure																												
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g											
(-)4 to 100	2220				(-) 20 to 38				156				3350 psig				236 Kg/cm2											
200	2035				93				143.07				Limited by Flange considering flange as the weakest joint in piping system															
300	1965				149				138.2																			
400	1900				204				133.6																			
500	1810				260				127.2																			
Notes Related to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																												
1. Welded fittings shall be 100% radiographed.													6. Gasket Contact Surface shall have maximum roughness of 63AARH															
2. All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.													7. Minimum RTJ groove hardness shall be 120BHN															
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard.													8. Octagonal (OCT) ring shall be Hot Dip Galvanized/electro galvanized.															
Design shall be submitted to company for review and approval.													9. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange, WN/RTJ flange 3" and above and specified spectacle blind assemblies.															
4. All pipe thread shall be as per ASME B 1.20.1													10. Weld Joint Factor for welded pipe shall be as per ASME B 31.3.															
5. PMS to be read in conjunction with FS 2004 A.																												

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Offshore Design Section  
Engineering Services  
ISO-9001:2000

PIPING MATERIAL SPECIFICATION

Sheet No. 2 of 2

E1

# 900

Piping Class

# 900

Material

CS

C.A

3mm

Spec No

2004A,Rev 9

Revision:2

Page No.14

Design Code:

ASME B 31.3

Service:

Vent Gas (VG), Blow Down(BD),Process Hydro Carbon Drain (DH),Nitrogen(N),Chemical (C),  
Water Injection(WI),Process Drain Water(DW),Diesel Fuel(DF), Hydrocarbon Liquid and Vapour with low CO2 AND H2S.

Branch Table as per API RP 14E

Run Pipe

≤ 1	T																		
1-1.5	T	T																	
2	*	*		T															
3	*	*	*	T	T														
4	*	*	*	T	T	T													
6	*	*	*	W	T	T	T												
8	*	*	*	W	W	T	T	T											
10	*	*	*	W	W	W	T	T	T										
12	*	*	*	W	W	W	T	T	T	T									
14	*	*	*	W	W	W	W	T	T	T	T								
16	*	*	*	W	W	W	W	T	T	T	T	T							
18	*	*	*	W	W	W	W	W	T	T	T	T	T						
20	*	*	*	W	W	W	W	W	T	T	T	T	T	T					
24	*	*	*	W	W	W	W	W	W	T	T	T	T	T	T				
30	*	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T			
	≤ 1	1-1.5		2	3	4	6	8	10	12	14	16	18	20	24	30			

LEGEND

*	Socket
W	Weldolet
T	TEE

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																	
TAG	VG 46,SW							VG 76,FLANGED									
Rating	# 1500							# 900,RTJ									
Plug Valve																	
TAG																	
Rating																	
Ball Valve																	
TAG	Use Gate Valve, VG 46					VB 84, L -		VB 85, Gear Operated									
Rating	# 1500							# 900, RTJ									
Globe Valve																	
TAG	VGL 44,SW							VGL 72									
Rating	# 1500							# 900, RTJ									
Check Valve																	
TAG	VC 44,SW, Lift Check							VC 68,Swing Check									
Rating	# 1500							# 900, RTJ									
Needle Valve																	
TAG	VN 4,SW																
Rating	# 1500																
Butter Fly Valve																	
TAG																	
Rating																	

Notes Related to Valve and Branch Connection

1. PMS to be read in conjunction with FS 2004 A.

2. Maximum temperature limit for all Ball Valve shall be 121 Degree C

Revision:2

15.01.16

Issued For Bid

PS

AKM

SJ

Revision


Date


Description

Prepared By


Reviewed By


Approved By


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2						
		Piping Class					Material			C.A	Spec.No			Revision:1						
		A2	# 150, Note-6				CS			1.5mm	2004A,Rev 9			Page No.	15					
		Design Code: ASME B 31.3					Service: Glycol/ Therminol/Hot Oil													
Pipe Data		ASME B 36.10																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.60			
Sch.	XS	XS	XS	XS	80	80	80	80	Std											
Wtmm	3.73	3.91	4.55	5.08	5.54	7.62	8.56	10.97	8.18											
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5											
TYPE	Seamless																			
MOC	ASTM A 106 Gr. B																			
Ends	PE					BE														
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weld															
Rating	# 3000				80	80	80	80	Std											
MOC	ASTM A 105 U.N.O				ASTM A 234 Gr. WPB, Seamless U.N.O															
Elbow	ASMEB16.11				ASME B 16.9															
Tee	ASMEB16.11				ASME B 16.9															
Red.	ASMEB16.11				ASME B 16.9															
Cap	ASMEB16.11				ASME B 16.9															
Coupl	ASMEB16.11				ASME B 16.9															
Plug	ASMEB16.11				ASME B 16.9															
Union																				
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105															
Sockolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105															
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105															
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe															
Swage	MSS SP 95,Same as pipe				MSS SP95,MOC Same as pipe															
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW				WN															
MOC	ASTM A 105				ASTM A 105															
FACE	RF-smooth Finished				RF, smooth Finished															
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25															
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC					ASTM A 105															
Spectacle	ASME B 16.48				ASME B 16.48				ASME B 16.48				Spacer and blind as per ASME B 16.48							
Mechanical Joints																				
Stud Bolts	ASTM A 193 Gr. B7				ASTM A 193 Gr. B7															
Hex Nuts	ASTM A 194 Gr. 2H				ASTM A 194 Gr. 2H															
Gasket	16.20,4.5mm, SS Spiral wound with CNAF filler				ASME B 16.20,4.5mm, SS Spiral wound with CNAF filler															
Pressure-Temperature Rating										Maximum Hydrostatic Pressure										
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
(-) 4 to 100	285				(-) 20 to 38				20				450 psig				31.6 Kg/cm2g			
200	260				93				18.3				Limited by Flange considering flange as the weakest joint in piping system. For design temperature higher than test temperature Test pressure, (Pt) shall be calculated as follows:Pt=1.5xPs/(St/S) where P=Internal Design Pressure,St=Allowable Stress at Test Temperature,S=Allowable Stress at Design Temperature.							
300	230				149				16.2											
400	200				204				14.1											
500	170				260				11.9											
600	140				316				9.84											
700	110				371				7.7											
Notes Related to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Welded fittings shall be 100% radiographed.									6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange											
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.									5. PMS to be read in conjunction with FS 2004 A.											
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									6. To minimize leakage all flanges used under this PMS shall be of #300 instead of #150											
4. All pipe thread shall be as per ASME B 1.20.1																				


	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION				Sheet No.		2 of 2																				
			Piping Class		Material		C.A		Spec.No																				
			A2		# 150, Note-6		CS		1.5mm																				
							2004A,Rev 9		Page No 16																				
			Design Code: ASME B 31.3																										
			Service: Glycol/ Therminol/Hot Oil																										
			0																										
Branch Table as per API RP 14E																													
Run Pipe	≤ 1	T																											
	1-1.5	T	T																										
	2	*	*	T																									
	3	*	*	T	T																								
	4	*	*	T	T	T																							
	6	*	*	W	T	T	T																						
	8	*	*	W	W	T	T	T																					
	10	*	*	W	W	W	T	T	T																				
	12	*	*	W	W	W	T	T	T	T																			
	14	*	*	W	W	W	W	T	T	T	T																		
	16	*	*	W	W	W	W	T	T	T	T	T																	
	18	*	*	W	W	W	W	W	T	T	T	T	T																
	20	*	*	W	W	W	W	W	T	T	T	T	T	T															
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T														
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T	T												
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30														
Branch Pipe																													
Valve Data																													
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24												
Gate Valve																													
TAG	VG 42,SW				Use Valve Indicated in B2 PMS																								
Rating	# 800				# 300,RF																								
Plug Valve																													
TAG																													
Rating																													
Ball Valve																													
TAG	VB 44,SW				Use Valve Indicated in B2 PMS																								
Rating	# 800				# 300,RF																								
Globe Valve																													
TAG	VGL 42,SW				Use Valve Indicated in B2 PMS																								
Rating	# 800				# 300,RF																								
Check Valve																													
TAG	VC 42,SW,Lift Check				Use Valve Indicated in B2 PMS																								
Rating	# 800				# 300,RF																								
Needle Valve																													
TAG	VN 107,SW																												
Rating	# 800																												
Butter Fly Valve																													
TAG																													
Rating																													
<p><b>Notes Related to Valve and Brach Connection</b></p> <p>1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint.</p> <p>3. PMS to be read in conjunction with FS 2004 A.</p> <p>4. Maximum temperature limit for all Ball Valve shall be 121 Degree C. For high temperature service use special Valves</p>																													
<table border="1"> <tr> <td>Revision:1</td> <td>15.01.16</td> <td>Issued For Bid</td> <td>PS</td> <td>AKM</td> <td>SJ</td> </tr> <tr> <td>Revision</td> <td>Date</td> <td>Description</td> <td>Prepared By</td> <td>Reviewed By</td> <td>Approved By</td> </tr> </table>																		Revision:1	15.01.16	Issued For Bid	PS	AKM	SJ	Revision	Date	Description	Prepared By	Reviewed By	Approved By
Revision:1	15.01.16	Issued For Bid	PS	AKM	SJ																								
Revision	Date	Description	Prepared By	Reviewed By	Approved By																								





	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2										
			Piping Class					Material			C.A		Spec.No			Revision : 1									
			B2					# 300			CS		1.5mm		2004A,Rev 9			Page No.   17							
			Design Code:					ASME B 31.3																	
			Service:					Glycol/ Therminol/Hot Oil																	
Pipe Data		ASME B 36.10																							
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24								
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273	324	355.6	406.4	457.2	508	558.8	609.6								
Sch.	160	160	XS	XS	80	80	80	80	Std																
WTmm	4.77	5.56	4.55	5.08	5.54	7.62	8.56	10.97	8.18																
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5												
TYPE	Seamless																								
MOC	ASTM A 106 Gr. B																								
Ends	PE					BE																			
Fittings Data																									
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24								
TYPE	Socket Weld					Butt Weld																			
Rating	# 6000		# 3000			80	80	80	80	Std															
MOC	ASTM A 105 U.N.O					ASTM A 234 Gr. WPB, Seamless U.N.O																			
Elbow	ASMEB16.11					ASME B 16.9																			
Tee	ASMEB16.11					ASME B 16.9																			
Red.	ASMEB16.11					ASME B 16.9																			
Cap	ASMEB16.11					ASME B 16.9																			
Coupl	ASMEB16.11					ASME B 16.9																			
Plug	ASMEB16.11					ASME B 16.9																			
Union																									
Elbowlet	MSS SP 97,ASTM A 105					MSS SP 97,ASTM A 105																			
Sockolet	MSS SP 97,ASTM A 105					MSS SP 97,ASTM A 105																			
Weldolet	MSS SP 97,ASTM A 105					MSS SP 97,ASTM A 105																			
Nipple	MSS SP 97,Same as pipe					MOC Same as pipe																			
Swage	MSS SP 95,Same as pipe					MSS SP95,MOC Same as pipe																			
Flange																									
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24								
TYPE	SW					WN																			
MOC	ASTM A 105					ASTM A 105																			
FACE	RF-Serrated Finished					RF, Serrated Finished																			
STD.	ASME B 16.5					ASME B 16.5, But welding ends as per ASME B 16.25																			
Spectacle Blind/Spacer Blinds																									
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24								
MOC	ASTM A 105																								
Spectacle	ASME B 16.48					ASME B 16.48							Spacer and blind as per ASME B 16.48												
Mechanical Joints																									
Stud Bolts	ASTM A 193 Gr. B7					ASTM A 193 Gr. B7																			
Hex Nuts	ASTM A 194 Gr. 2H					ASTM A 194 Gr. 2H																			
Gasket	16 20,4.5mm, SS Spiral wound with CNAF filler					ASME B 16.20,4.5mm, SS Spiral wound with CNAF filler																			
Pressure-Temperature Rating										Maximum Hydrostatic Pressure															
Temp.,Deg F	Pressure, PSI					Temp,Deg C					Pressure, Kg/cm2					Pressure, psig					Pres.,Kg/cm2g				
(-) 4 to 100	740					(-) 20 to 38					52					1125 psig					79 Kg/cm2g				
200	675					93					47.5					Limited by Flange considering flange as the weakest joint in piping system. For design temperature higher than test temperature, Test pressure, (Pt) shall be calculated as follows:Pt=1.5xPs(St/S) where P=Internal Design Pressure,St=Allowable Stress at Test Temperature,S=Allowable Stress at Design Temperature.									
300	655					149					46														
400	635					204					44.6														
500	600					260					44.2														
600	550					316					38.7														
700	535					371					37.6														
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																									
1. Welded fittings shall be 100% radiographed.										4. All pipe thread shall be as per ASME B 1.20.1															
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.										5. PMS to be read in conjunction with FS 2004 A.															
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.										6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange															


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.		2 of 2												
		Piping Class		Material		C.A	Spec.No		Revision : 1											
		B2	# 300	CS		1.5mm	2004A,Rev 9		Page No. 18											
		Design Code: ASME B 31.3																		
		Service: Glycol/ Therminol/Hot Oil																		
0																				
Branch Table as per API RP 14E																				
Run Pipe	≤ 1	T																		
	1-1.5	T	T																	
	2	*	*	T																
	3	*	*	T	T															
	4	*	*	T	T	T														
	6	*	*	W	T	T	T													
	8	*	*	W	W	T	T	T												
	10	*	*	W	W	W	T	T	T											
	12	*	*	W	W	W	T	T	T	T										
	14	*	*	W	W	W	W	T	T	T	T									
	16	*	*	W	W	W	W	T	T	T	T	T								
	18	*	*	W	W	W	W	W	T	T	T	T	T							
	20	*	*	W	W	W	W	W	T	T	T	T	T	T						
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T					
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T				
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30				
Branch Pipe																				
Valve Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
Gate Valve																				
TAG	VG 137,SW				VG 77,FLANGED															
Rating	# 800				# 300,RF															
Plug Valve																				
TAG																				
Rating																				
Ball Valve																				
TAG	VB 137,SW				VB 177 (Note-5)															
Rating	# 800				# 300, RF															
Globe Valve																				
TAG	VGL 137,SW				VGL 177															
Rating	# 800				# 300, RF															
Check Valve																				
TAG	VC 137,SW,Lift Check				VC 177,Swing Check															
Rating	# 800				# 300, RF															
Needle Valve																				
TAG	VN 107,SW																			
Rating	# 800																			
Butter Fly Valve																				
TAG																				
Rating																				
<b>Notes Related to Valve and Brach Connection</b> 1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint. 3. PMS to be read in conjunction with FS 2004 A. 4. Maximum temperature limit for all Ball Valve shall be 371 Degree C 5. Type of Valve metal seated or soft seated shall be firmed up based on service temperature.																				
Revision : 1	15.01.16	Issued For Bid				PS				AKM				SJ						
Revision	Date	Description				Prepared By				Reviewed By				Approved By						


	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2				
			Piping Class				Material			C.A		Spec.No		Revision: 1					
			D2		# 600		CS			1.5mm		2004A,Rev 9		Page No, 19					
			Design Code:					ASME B 31.3											
Service:					Glycol/ Therminol/Hot Oil														
ASME B 36.10																			
Pipe Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6		
Sch.	160	160	160	160	80	80	80	80	80										
Wtmm	4.77	5.56	6.35	7.14	5.54	7.62	8.56	10.97	12.7										
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5							
TYPE	Seamless																		
MOC	ASTM A 106 Gr. B																		
Ends	PE				BE														
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Socket Weld				Butt Weld														
Rating	# 6000				80	80	80	80	80										
MOC	ASTM A 105 U.N.O				ASTM A 234 Gr. WPB, Seamless U.N.O														
Elbow	ASMEB16.11				ASME B 16.9														
Tee	ASMEB16.11				ASME B 16.9														
Red.	ASMEB16.11				ASME B 16.9														
Cap	ASMEB16.11				ASME B 16.9														
Coupl	ASMEB16.11				ASME B 16.9														
Plug	ASMEB16.11				ASME B 16.9														
Union																			
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105														
Sockolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105														
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105														
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe														
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe														
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				WN														
MOC	ASTM A 105				ASTM A 105														
FACE	RF-Smooth Finished				RF, Smooth Finished														
STD.	ASME B 16.5				B 16.5, But welding ends as per B 16.25														
Spectacle Blind/Spacer Blinds																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC					ASTM A 105														
Spectacle	ASME B 16.48				ASME B 16.48														
Mechanical Joints																			
Stud Bolt	ASTM A 193 Gr. B7				ASTM A 193 Gr. B7														
Hex Nuts	ASTM A 194 Gr. 2H				ASTM A 194 Gr. 2H														
Gasket	B 16.20,4.5mm, SS Spiral wound with CNAF filler				B 16.20,4.5mm, SS Spiral wound CNAF filler														
Pressure-Temperature Rating										Maximum Hydrostatic Pressure									
Temp.,Deg F	Pressure, PSI				Temp.Deg C				Pressure, Kg/cm2				Pressure, psig			Pres.,Kg/cm2g			
(-) 4 to 100	1480				(-) 20 to 38				104				2225 psig			157 Kg/cm2			
200	1360				93				96				Limited by Flange considering flange as the weakest joint in piping system. For design temperature higher than test temperature, Test pressure, (Pt) shall be calculated as follows: Pt=1.5xPx(Su/S) where P=Internal Design Pressure,St=Allowable Stress at Test Temperature,S=Allowable Stress at Design Temperature.						
300	1310				149				92										
400	1265				204				89										
500	1205				260				85										
600	1135				316				78										
700	1060				371				75										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Welded fittings shall be 100% radiographed. 2. All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to companyv for review and approval.									4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A. 6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange										

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION						Sheet No.		2 of 2																			
		Piping Class		Material		C.A	Spec.No		Revision: 1																				
		D2		# 600		CS	1.5mm		2004A,Rev 9		Page No. 20																		
		Design Code:						ASME B 31.3																					
		Service:						Glycol/ Therminol/Hot Oil																					
0																													
Branch Table as per API RP 14E																													
Run Pipe	≤ 1	T																											
	1-1.5	T	T																										
	2	*	*	T																									
	3	*	*	T	T																								
	4	*	*	T	T	T																							
	6	*	*	W	T	T	T																						
	8	*	*	W	W	T	T	T																					
	10	*	*	W	W	T	T	T	T																				
	12	*	*	W	W	W	T	T	T	T																			
	14	*	*	W	W	W	W	T	T	T	T																		
	16	*	*	W	W	W	W	T	T	T	T	T																	
	18	*	*	W	W	W	W	W	T	T	T	T	T																
	20	*	*	W	W	W	W	W	T	T	T	T	T	T															
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T														
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T													
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30													
Branch Pipe																													
Valve Data																													
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24												
Gate Valve																													
TAG	VG 137,SW				VG 66,FLANGED																								
Rating	# 800				# 600,RF																								
Plug Valve																													
TAG																													
Rating																													
Ball Valve																													
TAG	VB 137,SW				VB 76,FLANGED (Note-4)																								
Rating	# 800				# 600,RF																								
Globe Valve																													
TAG	VGL 137,SW				VGL 67,FLANGED																								
Rating	# 800				# 600,RF																								
Check Valve																													
TAG	VC 137,SW,Lift Check				VC 66,Swing Check																								
Rating	# 800				# 600, RF																								
Needle Valve																													
TAG	VN 107,SW																												
Rating	# 800																												
Butter Fly Valve																													
TAG																													
Rating																													
<b>Notes Related to Valve and Brach Connection</b> 1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint. 2. PMS to be read in conjunction with FS 2004 A. 3. Maximum temperature limit for all Ball Valve shall be 371 Degree C 4. Type of Valve metal seated or soft seated shall be firmed up based on service temperature.																													
<table border="1"> <tr> <td>Revision: 1</td> <td>15.01.16</td> <td>Issued For Bid</td> <td>PS</td> <td>AKM</td> <td>SJ</td> </tr> <tr> <td>Revision</td> <td>Date</td> <td>Description</td> <td>Prepared By</td> <td>Reviewed By</td> <td>Approved By</td> </tr> </table>																		Revision: 1	15.01.16	Issued For Bid	PS	AKM	SJ	Revision	Date	Description	Prepared By	Reviewed By	Approved By
Revision: 1	15.01.16	Issued For Bid	PS	AKM	SJ																								
Revision	Date	Description	Prepared By	Reviewed By	Approved By																								


	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2										
					Piping Class					Material					C.A	Spec.No		Revision: 0									
					E2		# 900			CS					1.5mm	2004A,Rev 9		Page No 21									
					Design Code:					ASME B 31.3																	
					Service:		Glycol/ Therminol/Hot Oil																				
Pipe Data																		ASME B 36.10									
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273	323.9	356	406	457	508	558.8	609.6										
Sch.	XXS	XXS	XXS	XXS	160	160	120	120	120																		
WTmm	7.47	7.82	9.09	10.16	8.74	11.12	11.12	14.27	18.26																		
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5														
TYPE	Seamless																										
MOC	ASTM A 106 Gr. B																										
Ends	PE				BE																						
Fittings Data																											
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
TYPE	Socket Weld				Butt Weld																						
Rating	# 9000				160	160	120	120	120																		
MOC	ASTM A 105 U.N.O				ASTM A 234 Gr. WPB, Seamless U.N.O																						
Elbow	ASMEB16.11				ASME B 16.9																						
Tee	ASMEB16.11				ASME B 16.9																						
Red.	ASMEB16.11				ASME B 16.9																						
Cap	ASMEB16.11				ASME B 16.9																						
Coupl	ASMEB16.11				ASME B 16.9																						
Plug	ASMEB16.11				ASME B 16.9																						
Union																											
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105																						
Sockolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105																						
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105																						
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe																						
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe																						
Flange																											
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
TYPE	SW				WN																						
MOC	ASTM A 105				ASTM A 105																						
FACE	RTJ-Note 7				RTJ-Note 7																						
STD.	ASME B 16.5				B 16.5, But welding ends as per B 16.25																						
Spectacle Blind/Spacer Blinds																											
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
MOC	ASTM A 105																										
Spectacle	ASME B 16.48				ASME B 16.48																						
Mechanical Joints																											
Stud Bolt	ASTM A 193 Gr. B7				ASTM A 193 Gr. B7																						
Hex Nuts	ASTM A 194 Gr. 2H				ASTM A 194 Gr. 2H																						
Gasket	B 16.20,OCT ring of Soft Iron, Note-7				B 16.20,OCT ring of Soft Iron, Note-7																						
Pressure-Temperature Rating										Maximum Hydrostatic Pressure																	
Temp.,Deg F	Pressure, PSI				Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g													
(-) 4 to 100	2220				(-) 20 to 38			156			3350 psig			236 Kg/cm2													
200	2035				93			143.07			Limited by Flange considering flange as the weakest joint in piping system. For design tempaure higher than test temperature, Test pressure, (Pt) shall be calculated as follows:Pt=1.5xPx(St/S) where P=Internal Design Pressure,St=Allowable Stress at Test Temperature,S=Allowable Stress at Design Temperature.																
300	1965				149			138.2																			
400	1900				204			133.6																			
500	1810				260			127.2																			
600	1705				316			119.9																			
700	1590				371			111.8																			
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																											
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 4. All pipe thread shall be as per ASME B 1.20.1									5. PMS to be read in conjunction with FS 2004 A.																		
									6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange																		
									7. Minimum RTJ groove hardness shall be more than RTJ ring hardness and Octagonal (OCT) ring shall be Hot Dip Galvanized/electro galvanized.																		
									8. Gasket Contact Surface shall have maximum roughness of 63AARH																		


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2												
		Piping Class		Material	C.A	Spec.No	Revision: 0												
		E2	# 900	CS	1.5mm	2004A,Rev 9	Page No	22											
		Design Code: ASME B 31.3																	
		Service: Glycol/ Therminol/Hot Oil																	
0																			
Branch Table as per API RP 14E																			
Run Pipe	≤ 1	T							LEGEND * Sockolet W Weldolet T TEE										
	1-1.5	T	T																
	2	*	*	T															
	3	*	*	T	T														
	4	*	*	T	T	T													
	6	*	*	W	T	T	T												
	8	*	*	W	W	T	T	T											
	10	*	*	W	W	W	T	T	T										
	12	*	*	W	W	W	T	T	T	T									
	14	*	*	W	W	W	W	T	T	T	T								
	16	*	*	W	W	W	W	T	T	T	T	T							
	18	*	*	W	W	W	W	W	T	T	T	T	T						
	20	*	*	W	W	W	W	W	T	T	T	T	T	T					
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T				
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T			
	Branch Pipe																		
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30			
Valve Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
Gate Valve																			
TAG	VG 46,SW				VG 76,FLANGED														
Rating	# 1500				# 900,RTJ														
Plug Valve																			
TAG																			
Rating																			
Ball Valve																			
TAG	Use Gate Valve, VG 46				VB 84, L-Opted		VB 85, Gear Optd (Note-4)												
Rating	# 1500				# 900, RTJ														
Globe Valve																			
TAG	VGL 44,SW				VGL 72														
Rating	# 1500				# 900, RTJ														
Check Valve																			
TAG	VC 44,SW,Lift Check				VC 68,Swing Check														
Rating	# 1500				# 900, RTJ														
Needle Valve																			
TAG	VN 4,SW																		
Rating	# 1500																		
Butter Fly Valve																			
TAG																			
Rating																			
Notes Related to Valve and Brach Connection																			
1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint. 2. PMS to be read in conjunction with FS 2004 A. 3. Maximum temperature limit for all Ball Valve shall be 371 Degree C 4. Type of Valve metal seated or soft seated shall be firmed up based on service temperature.																			
Revision: 0	15.01.16	Issued For Bid						PS	AKM	SJ									
Revision	Date	Description						Prepared By	Reviewed By	Approved By									


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2			
		Piping Class				Material				C.A		Spec.No		Revision: 2					
		A1N		# 150		CS-NACE				6mm		2004A,Rev 9		Page No. 23					
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																	
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour. Instrument Gas Header including 1st Block Valve																	
Pipe Data		ASME B 36.10																	
Size (in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6		
Sch.	XXS	XXS	XXS	XXS	160	160	80	80	60	40	40	40	40	40	40	40	40		
WTmm	7.47	7.82	9.09	10.16	8.74	11.13	8.56	10.97	10.31	9.27	10.31	11.12	12.70	14.27	15.08	15.87	17.48		
M.T (%)	12.5	12.5	11.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5						
TYPE	Seamless													LSAW with 100% Radiography					
MOC	ASTM A 106 Gr. B													API 5L Gr. B					
Ends	PE				BE														
Fittings Data																			
Size (in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Socket Weld				Butt Weld														
Rating	# 9000				160	160	80	80	60	40	40	40	40	40	40	40	40	40	
MOC	ASTM A 105 U.N.O				ASTM A 234 Gr. WPB, Seamless U.N.O										ASTM A234 Gr.WPB, Welded U.N.O				
Elbow	ASMEB16.11				ASME B 16.9										ASME B 16.9				
Tee	ASMEB16.11				ASME B 16.9										ASME B 16.9				
Red.	ASMEB16.11				ASME B 16.9										ASME B 16.9				
Cap	ASMEB16.11				ASME B 16.9										ASME B 16.9				
Coupl	ASMEB16.11				ASME B 16.9										ASME B 16.9				
Plug	ASMEB16.11				ASME B 16.9										ASME B 16.9				
Union																			
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105				
Socketlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105				
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105				
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe										MOC Same as pipe				
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe										MSS SP 95,MOC Same as pipe				
Flange																			
Size (in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				WN														
MOC	ASTM A 105				ASTM A 105														
FACE	RF-Serrated Finished				RF, Serrated Finished														
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25														
Spectacle Blind/Spacer Blinds																			
Size (in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC	ASTM A 105																		
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48						
Mechanical Joints																			
Stud Bolts	ASTM A 193 Gr. B7M				ASTM A 193 Gr. B7M														
Hex Nuts	ASTM A 194 Gr. 2HM				ASTM A 194 Gr. 2HM														
Gasket	ASME B 16.21,Flat Ring, 1.58mm,CNAF				ASME B 16.21,Flat Ring, 1.58mm,CNAF														
Pressure-Temperature Rating																			
Temp.,Deg F	Pressure, PSI				Temp.Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g		
(-) 4 to 100	285				(-) 20 to 38				20				450 psig				31.6 Kg/cm2		
200	260				93				18.3				Limited by Flange considering flange as the weakest joint in piping system						
300	230				149				16.2										
400	200				204				14.1										
500	170				260				11.9										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Welded fittings shall be 100% radiographed.									6. PMS to be read in conjunction with FS 2004 A and all the requirement of MR-01-75/ISO-15156-1/2/3 to complied.										
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.																			
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									7. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified spectacle blinds.										
4. All pipe thread shall be as per ASME B 1.20.1									8. In instrument gas lines - Use this specification for main Header and SS316L piping for Sub Header. Pressure-temperature rating of SS316L shall compatible to this piping class and both shall comply all the requirement of MR-01-75/ISO-15156-1/2/3.										
5. Weld Joint Factor for welded pipe shall be as per ASME B 31.3									9. In cae calculated thickness is more than thickness of schedule of XXS for small bore piping (1/2"), reduce MT and use XXS only.										


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION										Sheet No. 2 of 2							
		Piping Class		Material		C.A		Spec.No		Revision: 2									
		A1N		# 150		CS-NACE		6mm		2004A,Rev 9		Page No. 24							
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																	
Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.																	
Instrument Gas Header including 1st Bolck Valve																			
Branch Table as per API RP 14E																			
Run Pipe	≤ 1	T												LEGEND					
	1-1.5	T	T										*	Sockolet					
	2	*	*	T									W	Weldolet					
	3	*	*	T	T								T	TEE					
	4	*	*	T	T	T													
	6	*	*	W	T	T	T												
	8	*	*	W	W	T	T	T											
	10	*	*	W	W	W	T	T	T										
	12	*	*	W	W	W	T	T	T	T									
	14	*	*	W	W	W	T	T	T	T	T								
	16	*	*	W	W	W	W	T	T	T	T	T							
	18	*	*	W	W	W	W	W	T	T	T	T	T						
	20	*	*	W	W	W	W	W	T	T	T	T	T	T					
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T				
30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T				
Branch Pipe																			
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30				
Valve Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
Gate Valve																			
TAG	VG 45,SW				VG 65,FLANGED														
Rating	# 800				# 150,RF														
Plug Valve																			
TAG																			
Rating																			
Ball Valve																			
TAG	VB 45,SW and VB 107,SW (Note-5)				VB 65, Lever Operated						VB **, Gear Operated								
Rating	# 800				# 150, RF														
Globe Valve																			
TAG	VGL 45,SW				VGL 65														
Rating	# 800				# 150, RF														
Check Valve																			
TAG	VC 45,SW,Lift Check				VC 65,Swing Check/ VC 82 (Wafer Check, Note -1)														
Rating	# 800				# 150, RF														
Needle Valve																			
TAG	VN 9,SW																		
Rating	# 800																		
Butter Fly Valve																			
TAG																			
Rating																			
Notes Releted to Valve and Brach Connection																			
1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve. The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint. 2. Wafer type Butter Fly Valve may be used only in fire water( Clean water) service. 3. PMS to be read in conjuction with FS 2004 A. 4. Maximum temperature limit for all Ball Valve shall be 121 Degree C									5. In instrument gas lines - Use VB -45 for main Header and VB-107 for Sub Header. The MOC of VB-107 shall be SS-316L as per VMS and comply all the requirement of MR-01-75/ISO-15156-1/2/3.										
Revision: 2		15.01.16		Issued For Bid						PS		AKM		SJ					
Revision		Date		Description						Prepared By		Reviewed By		Approved By					




	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2	
					Piping Class				Material			C.A		Spec.No			Revision: 2	
					B1N		# 300		CS-NACE			6mm		2004A,Rev 9			Page No, 25	
					Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3													
					Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.													
Pipe Data																		
ASME B 36.10																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6	
Sch.	XXS	XXS	XXS	XXS	160	160	120	XS	XS	60	60	60	60	60	60	60	60	
Wtmm	7.47	7.82	9.09	10.16	8.74	11.12	11.12	10.97	12.70	12.70	14.27	15.09	16.66	19.05	20.62	22.22	24.6	
M.T (%)	12.5	12.5	5.0	5.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5					
TYPE	Seamless													LSAW with 100% Radiography				
MOC	ASTM A 106 Gr. B													API 5L Gr. B				
Ends	PE				BE													
Fittings Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	Socket Weld				Butt Weld													
Rating	# 9000				160	160	120	XS	XS	60	60	60	60	60	60	60	60	
MOC	ASTM A 105 U.N.O				ASTM A 234 Gr. WPB, Seamless U.N.O										ASTM A234 Gr.WPB,Welded U.N.O			
Elbow	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Tee	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Red.	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Cap	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Coupl	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Plug	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Union																		
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105			
Sockolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105			
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105			
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe										MOC Same as pipe			
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe										MSS SP 95 or as applicable,MOC Same as pipe			
Flange																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW				WN													
MOC	ASTM A 105				ASTM A 105													
FACE	RF-Smooth Finished				RF, Smooth Finished													
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25													
Spectacle Blind/Spacer Blinds																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
MOC					ASTM A 105													
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48					
Mechanical Joints																		
Stud Bolts	ASTM A 193 Gr. B7M				ASTM A 193 Gr. B7M													
Hex Nuts	ASTM A 194 Gr. 2HM				ASTM A 194 Gr. 2HM													
Gasket	B 16.20,4.5mm, SS Spiral wound with CNAF filler				ASME B 16.20,4.5mm, SS Spiral wound with CNAF filler													
Pressure-Temperature Rating										Maximum Hydrostatic Pressure								
Temp.,Deg F		Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g				
(-) 4 to 100		740			(-) 20 to 38			52			1125 psig			79 Kg/cm2				
200		675			93			47.5			Limited by Flange considering flange as the weakest joint in piping system							
300		655			149			46										
400		635			204			44.6										
500		600			260			44.2										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																		
1. Welded fittings shall be 100% radiographed.									6. PMS to be read in conjunction with FS 2004 A and all the requirement of MR-01-75/ISO-15156-1/2/3 to complied.									
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.									7. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified spectacle blinds.									
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									8. In instrument gas lines - Use this specification for main Header and SS316L piping for Sub Header. Presssure-temperature rating of SS316L shall compatible to this piping class and both shall comply all the requirement of MR-01-75/ISO-15156-1/2/3.									
4. All pipe thread shall be as per ASME B 1.20.1									9. In cae calculated thickness is more than thickness of schedule of XXS for small bore piping (1/2"), reduce MT and use XXS only.									
5. Weld Joint Factor for welded pipe shall be as per ASME B 31.3																		


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION										Sheet No.		2 of 2			
		Piping Class					Material			C.A		Spec.No			Revision: 2		
		BIN		# 300			CS-NACE			6mm		2004A,Rev 9			Page No, 26		
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3															
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.															
0																	
Branch Table as per API RP 14E																	
Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	*	T	T											
	4	*	*	*	T	T	T										
	6	*	*	*	W	T	T	T									
	8	*	*	*	W	W	T	T	T								
	10	*	*	*	W	W	W	T	T	T							
	12	*	*	*	W	W	W	T	T	T	T						
	14	*	*	*	W	W	W	W	T	T	T	T					
	16	*	*	*	W	W	W	W	T	T	T	T	T				
	18	*	*	*	W	W	W	W	W	T	T	T	T	T			
	20	*	*	*	W	W	W	W	W	T	T	T	T	T	T		
	24	*	*	*	W	W	W	W	W	W	T	T	T	T	T	T	
30	*	*	*	W	W	W	W	W	W	W	T	T	T	T	T		
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30		
Branch Pipe																	
Valve Data																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																	
TAG	VG 45,SW					VG 69,FLANGED											
Rating	# 800					# 300,RF											
Plug Valve																	
TAG																	
Rating																	
Ball Valve																	
TAG	VB 45,SW and VB 107,SW (Note-5)					VB 69, Lever Operated					VB **, Gear Operated						
Rating	# 800					# 300, RF											
Globe Valve																	
TAG	VGL 45,SW					VGL 69											
Rating	# 800					# 300, RF											
Check Valve																	
TAG	VC 45,SW,Lift Check					VC 69,Swing Check/ VC 89 (Wafer Check, Note -1)											
Rating	# 800					# 300, RF											
Needle Valve																	
TAG	VN 9,SW																
Rating	# 800																
Butter Fly Valve																	
TAG																	
Rating																	
Notes Related to Valve and Brach Connection																	
1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint. 2. Wafer type Butter Fly Valve may be used only in fire water( Clean water) service. 3. PMS to be read in conjunction with FS 2004 A. 4. Maximum temperature limit for all Ball Valve shall be 121 Degree C									5. In instrument gas lines - Use VB -45 for main Header and VB-107 for Sub Header. The MOC of VB-107 shall be SS 316L as per VMS and comply all the requirement of MR-01-75/ISO-15156-1/2/3.								
Revision: 2		15.01.16		Issued For Bid						PS		AKM		SJ			
Revision		Date		Description						Prepared By		Reviewed By		Approved By			


	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2	
			Piping Class				Material				C.A		Spec.No		Revision: 2			
			D1N		# 600		CS-NACE				6mm		2004A,Rev 9		Page No. 27			
			Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3 Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour. Instrument Gas Header including 1st Bolck Valve															
Pipe Data																		
ASME B 36.10																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273	323.9	355.6	406.4	457.2	508	558.8	609.6	
Sch.	XXS	XXS	XXS	XXS	XXS	160	160	120	120	100	100	100	100	100	100	100	100	
WTmm	7.47	7.82	9.09	10.16	11.07	11.12	13.49	14.27	18.26	18.26	21.44	23.82	26.19	29.36	32.54	34.92	38.89	
M.T (%)	12.5	12.5	5.0	6.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5					
TYPE	Seamless													LSAW with 100% Radiography				
MOC	ASTM A 106 Gr. B													API 5L Gr. B				
Ends	PE				BE													
Fittings Data																		
Size(in)	0.5	0.75	1	1.5	XXS	160	160	120	120	100	100	100	100	18	20	22	24	
TYPE	Socket Weld				Butt Weld													
Rating	# 9000				XXS	160	160	120	120	120	100	100	100	100	100	100	100	
MOC	ASTM A 105 U.N.O				ASTM A 234 Gr. WPB, Seamless U.N.O										ASTM A234 Gr.WPB,Welded U.N.O			
Elbow	ASMEB 16.11				ASME B 16.9										ASME B 16.9			
Tee	ASMEB 16.11				ASME B 16.9										ASME B 16.9			
Red.	ASMEB 16.11				ASME B 16.9										ASME B 16.9			
Cap	ASMEB 16.11				ASME B 16.9										ASME B 16.9			
Coupl	ASMEB 16.11				ASME B 16.9										ASME B 16.9			
Plug	ASMEB 16.11				ASME B 16.9										ASME B 16.9			
Union																		
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105			
Sockolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105			
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105			
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe										MOC Same as pipe			
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe										MSS SP 95,MOC Same as pipe			
Flange																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW				WN													
MOC	ASTM A 105				ASTM A 105													
FACE	RF-Smooth Finished				RF, Smooth Finished													
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25													
Spectacle Blind/Spacer Blinds																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
MOC	ASTM A 105																	
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48					
Mechanical Joints																		
Stud Bolt	ASTM A 193 Gr. B7M				ASTM A 193 Gr. B7M													
Hex Nuts	ASTM A 194 Gr. 2HM				ASTM A 194 Gr. 2HM													
Gasket	B 16.20.4.5mm, SS Spiral wound with CNAF filler				ASME B 16.20.4.5mm, SS Spiral wound with CNAF filler													
Pressure-Temperature Rating																		
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Maximum Hydrostatic Pressure					
(-) 4 to 100	1480				(-) 20 to 38				104				Pressure, psig		Pres.,Kg/cm2g			
200	1360				93				95.61				Limited by Flange considereing flange as the weakest joint in piping system					
300	1310				149				92.1									
400	1265				204				88.94									
500	1205				260				84.72									
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																		
1. Welded fittings shall be 100% radiographed.								6. PMS to be read in conjunction with FS 2004 A and all the requirement of MR-01-75/ISO-15156-1/2/3 to complied.										
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.								7. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified spectacle blinds.										
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.								8. In instrument gas lines - Use this specification for main Header and SS316L piping for Sub Header. Presssure-temperature rating of SS316L shall compatible to this piping class and both shall comply all the requirement of MR-01-75/ISO-15156-1/2/3.										
4. Weld Joint Factor for welded pipe shall be as per ASME B 31.3								9. In cae calculated thickness is more than thickness of schedule of XXS for small bore piping (1/2"), reduce MT and use XXS only.										
5. All pipe thread shall be as per ASME B 1.20.1																		

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION						Sheet No.		2 of 2																																			
			Piping Class			Material		C.A		Spec.No		Revision: 2																																		
			D1N		# 600		CS-NACE		6mm		2004A,Rev 9		Page No. 28																																	
			Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3 Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.																																											
Branch Table as per API RP 14E																																														
Run Pipe	≤ 1	T																																												
	1-1.5	T	T																																											
	2	*	*	T																																										
	3	*	*	T	T																																									
	4	*	*	T	T	T																																								
	6	*	*	W	T	T	T																																							
	8	*	*	W	W	T	T	T																																						
	10	*	*	W	W	W	T	T	T																																					
	12	*	*	W	W	W	T	T	T	T																																				
	14	*	*	W	W	W	W	T	T	T	T																																			
	16	*	*	W	W	W	W	T	T	T	T	T																																		
	18	*	*	W	W	W	W	T	T	T	T	T	T																																	
	20	*	*	W	W	W	W	W	T	T	T	T	T	T																																
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T																															
30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T																															
Branch Pipe																																														
<table border="1"> <tr> <td>≤ 1</td> <td>1-1.5</td> <td>2</td> <td>3</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> <td>12</td> <td>14</td> <td>16</td> <td>18</td> <td>20</td> <td>24</td> <td>30</td> </tr> </table>																	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30															
≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30																																
Valve Data																																														
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24																													
Gate Valve																																														
TAG	VG 45,SW								VG 71,FLANGED																																					
Rating	# 800								# 600,RF																																					
Plug Valve																																														
TAG																																														
Rating																																														
Ball Valve																																														
TAG	B 45,SW and VB 107,SW (Note-								VB 71, Lever Operated				VB **, Gear Operated																																	
Rating	# 800								# 600, RF																																					
Globe Valve																																														
TAG	VGL 45,SW								VGL 71																																					
Rating	# 800								# 600, RF																																					
Check Valve																																														
TAG	VC 45,SW,Lift Check								VC 71,Swing Check																																					
Rating	# 800								# 600, RF																																					
Needle Valve																																														
TAG	VN 9,SW																																													
Rating	# 800																																													
Butter Fly Valve																																														
TAG																																														
Rating																																														
Notes Releted to Valve and Brach Connection																																														
1. Wafer check valve to be avoided as far as possible; unless the avaiable space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establshing the space constraint. 2. PMS to be read in conjunction with FS 2004 A. 3. Maximum temperature limit for all Ball Valve shall be 121 Degree C 4. In instrument gas lines - Use VB -45 for main Header and VB-107 for Sub Header. The MOC of VB-107 shall be SS 316L as per VMS and comply all the requirement of MR-01-75/ISO-15156-1/2/3.																																														
<table border="1"> <tr> <td>Revision: 2</td> <td>15.01.16</td> <td colspan="6">Issued For Bid</td> <td>PS</td> <td>AKM</td> <td colspan="5">SJ</td> </tr> <tr> <td>Revision</td> <td>Date</td> <td colspan="6">Description</td> <td>Prepared By</td> <td>Reviewed By</td> <td colspan="5">Approved By</td> </tr> </table>																	Revision: 2	15.01.16	Issued For Bid						PS	AKM	SJ					Revision	Date	Description						Prepared By	Reviewed By	Approved By				
Revision: 2	15.01.16	Issued For Bid						PS	AKM	SJ																																				
Revision	Date	Description						Prepared By	Reviewed By	Approved By																																				


	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2	
			Piping Class				Material				C.A		Spec.No				Revision: 2	
			EIN		# 900		CS-NACE				6mm		2004A,Rev 9				Page No. 29	
			Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3															
Service Corrosive HydroCarbon Service-Sour Liquid and Vapour.																		
Pipe Data			ASME B 36.10															
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6	
Sch.	XXS	XXS	XXS	XXS	XXS	XXS	XXS	160	140	140	140	140	140	120	120	120	120	
WTmm	7.47	7.82	9.09	10.16	11.07	15.24	17.12	18.26	20.63	25.40	28.57	31.75	36.53	34.92	38.10	41.27	46.02	
M.T (%)	12.5	12.5	5.0	6.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5					
TYPE	Seamless												LSAW with 100% Radiography					
MOC	ASTM A 106 Gr. B												API 5L Gr. B					
Ends	PE				BE													
Fittings Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	Socket Weld				Butt Weld													
Rating	# 9000				XXS	XXS	XXS	160	140	140	140	140	140	120	120	120	120	
MOC	ASTM A 105 U.N.O				ASTM A 234 Gr. WPB, Seamless U.N.O										ASTM A234 Gr. WPB, Welded U.N.O			
Elbow	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Tee	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Red.	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Cap	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Coupl	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Plug	ASMEB16.11				ASME B 16.9										ASME B 16.9			
Union																		
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105			
Sockolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105			
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105										MSS SP 97,ASTM A 105			
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe										MOC Same as pipe			
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe										MSS SP 95,MOC Same as pipe			
Flange																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW				WN													
MOC	ASTM A 105				ASTM A 105													
FACE	RTJ-Note 9				RTJ, Note 9													
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25													
Spectacle Blind/Spacer Blinds																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
MOC	ASTM A 105																	
Spectacle	ASME B 16.48				ASME B 16.48						Spacer and blind as per ASME B 16.48							
Mechanical Joints																		
Stud Bolt	ASTM A 193 Gr. B7M				ASTM A 193 Gr. B7M													
Hex Nuts	ASTM A 194 Gr. 2HM				ASTM A 194 Gr. 2HM													
Gasket	B 16.20,OCT ring of Soft Iron with Max. 90BHN				ASME B 16.20,OCT ring of Soft Iron with Max. Hardness of 90BHN													
Pressure-Temperature Rating																		
Temp.,Deg F		Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g				
(-) 4 to 100		2220			(-) 20 to 38			156			3350 psig			236 Kg/cm2				
200		2035			93			143.07			Limited by Flange considering flange as the weakest joint in piping system							
300		1965			149			138.2										
400		1900			204			133.6										
500		1810			260			127.2										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																		
1. Welded fittings shall be 100% radiographed.									6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and WNRTJ flanges above 3" size and specified spectacle blind assemblies.									
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.									7. Weld Joint Factor for welded pipe shall be as per ASME B 31.3									
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									8. Gasket Contact Surface shall have maximum roughness of 63AARH									
4. All pipe thread shall be as per ASME B 1.20.1									9. Minimum RTJ groove hardness shall be 120BHN									
5. PMS to be read in conjunction with FS 2004 A.									10. Octagonal (OCT) ring shall be Hot Dip Galvanized or electrogalvaized.									
									11. In cae calculated thickness is more than thickness of schedule of XXS for small bore piping (1/2"), reduce MT and use XXS only.									





	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2											
					Piping Class				Material		C.A	Spec.No		Revision: 0														
					F1N		# 1500		CS-NACE		6mm	2004A,Rev 9		Page No		31												
					Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/23																							
					Service		Corrosive HydroCarbon Service-Sour Liquid and Vapour.																					
Pipe Data																			ASME B 36.10									
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114	168	219	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6											
Sch.	XXS	XXS	XXS	XXS	XXS	XXS	XXS	XXS	160	160	160	160	160	160	160	160	160											
WTmm	7.47	7.82	9.09	10.16	11.07	15.24	17.12	21.95	23.01	28.57	33.32	35.71	40.49	45.24	50.01	53.97	59.54											
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	7.0	12.0	12.5	12.5	12.5	12.5															
TYPE	Seamless													LSAW with 100% Radiography														
MOC	API 5L Gr, X60 PSL-2													API 5L Gr, X60 PSL-2														
Ends	PE				BE																							
Fittings Data																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
TYPE	Socket Weld				Butt Weld																							
Rating	# 9000				XXS	XXS	XXS	XXS	XXS	XXS	160	160	160	160	160	160	160	160										
MOC	ASTM A 694 F60				ASTM A 860 WPHY 60, Seamless U.N.O										ASTM A860 WPHY 60,Welded U.N.O													
Elbow	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Tee	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Red.	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Cap	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Coupl	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Plug	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Union																												
Elbowlet	MSS SP 97,ASTM A 694 F60				MSS SP 97,ASTM A 694 F60										MSS SP 97,ASTM A 694 F60													
Sockolet	MSS SP 97,ASTM A 694 F60				MSS SP 97,ASTM A 694 F60										MSS SP 97,ASTM A 694 F60													
Weldolet	MSS SP 97,ASTM A 694 F60				MSS SP 97,ASTM A 694 F60										MSS SP 97,ASTM A 694 F60													
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe										MOC Same as pipe													
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe										MSS SP 95,MOC Same as pipe													
Flange																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
TYPE	SW				WN																							
MOC	ASTM A 694 F60				ASTM A 694 F60																							
FACE	RTJ-Note 7				RTJ, Note 7																							
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25																							
Spectacle Blind/Spacer Blinds																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
MOC	ASTM A 694 F60																											
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48															
Mechanical Joints																												
Stud Bolt	ASTM A 193 Gr. B7M				ASTM A 193 Gr. B7M																							
Hex Nuts	ASTM A 194 Gr. 2HM				ASTM A 194 Gr. 2HM																							
Gasket	B 16.20,OCT ring of Soft Iron with Max. 90BHN				ASME B 16.20,OCT ring of Soft Iron with Max. Hardness of 90BHN																							
Pressure-Temperature Rating																			Maximum Hydrostatic Pressure									
Temp.,Deg F		Pressure, PSI				Temp.,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g										
(-) 4 to 100		3702.81				(-) 20 to 38				260.33				5554.22 psig				390.50 Kg/cm2										
122		3634.65				50				255.54				Limited by Flange considereing flange as the weakest joint in piping system														
212		3379.38				100				237.6																		
302		3269.15				150				229.85																		
392		3176.33				200				223.32																		
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																												
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjuction with FS 2004 A.									6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and WNRTJ flanges above 3" size and specified spectacle 7. Weld Joint Factor for welded pipe shall be as per ASME B 31.3 8. Gasket Contact Surface shall have maximum roughness of 63AARH 9. Minimum RTJ groove hardness shall be 120BHN 10. Octagonal (OCT) ring shall be Hot Dip Galvanized or electrogalvaized. 11. In cae calculated thickness is more than thickness of schedule of XXS for small bore piping (1/2"), reduce MT and use XXS only.																			


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2										
		Piping Class		Material	C.A	Spec.No		Revision: 0									
		FIN	# 1500	CS-NACE	6mm	2004A,Rev 9		Page No	32								
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3															
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.															
Branch Table as per API RP 14E																	
Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	W	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T	
	Branch Pipe																
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30	
Valve Data																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																	
TAG	VG 67,SW				VG 273,FLANGED												
Rating	# 2500				# 1500,RF												
Plug Valve																	
TAG																	
Rating																	
Ball Valve																	
TAG	Use Gate Valve, VG 67				VB 273, Lever Operated						VB **, Gear Operated						
Rating	# 2500				# 1500, RTJ												
Globe Valve																	
TAG	VGL 67,SW				VGL 273												
Rating	# 2500				# 1500, RTJ												
Check Valve																	
TAG	VC 67,SW,Lift Check				VC 273,Swing Check												
Rating	# 2500				# 1500, RTJ												
Needle Valve																	
TAG	VN 20,SW																
Rating	# 2500																
Butter Fly Valve																	
TAG																	
Rating																	
Notes Releted to Valve and Brach Connection 1. PMS to be read in conjunction with FS 2004 A. 2. Maximum temperature limit for all Ball Valve shall be 121 Degree C																	
Revision: 0	15.01.16		Issued For Bid					PS		AKM		SJ					
Revision	Date		Description					Prepared By		Reviewed By		Approved By					



	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2											
					Piping Class				Material		C.A	Spec.No			Revision: 0													
					G1N	# 2500		CS-NACE		6mm	2004A,Rev 9			Page No.		33												
					Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/23																							
					Service Corrosive HydroCarbon Service-Sour Liquid and Vapour.																							
Pipe Data																			ASME B 36.10									
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114	168	219	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6											
Sch.	XXS	XXS	XXS	XXS	XXS	XXS	XXS	XXS	XXS	XXS	160	160	160	160	160	160	160											
WTmm	7.47	7.82	9.09	10.16	11.07	15.24	17.12	21.95	22.22	25.40	33.32	35.71	40.40	45.24	50.01	53.97	59.54											
M.T (%)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0																				
TYPE	Seamless													LSAW with 100% Radiography														
MOC	API 5L Gr, X60 PSL-2													API 5L Gr, X60 PSL-2														
Ends	PE				BE																							
Fittings Data																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
TYPE	Socket Weld				Butt Weld																							
Rating	# 9000				XXS	XXS	XXS	XXS	XXS	XXS	160	160	160	160	160	160	160											
MOC	ASTM A 694 F60				ASTM A 860 WPHY 60, Seamless U.N.O										ASTM A860 WPHY 60,Welded U.N.O													
Elbow	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Tee	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Red.	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Cap	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Coupl	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Plug	ASMEB16.11				ASME B 16.9										ASME B 16.9													
Union																												
Elbowlet	MSS SP 97,ASTM A 694 F60				MSS SP 97,ASTM A 694 F60										MSS SP 97,ASTM A 694 F60													
Sockolet	MSS SP 97,ASTM A 694 F60				MSS SP 97,ASTM A 694 F60										MSS SP 97,ASTM A 694 F60													
Weldolet	MSS SP 97,ASTM A 694 F60				MSS SP 97,ASTM A 694 F60										MSS SP 97,ASTM A 694 F60													
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe										MOC Same as pipe													
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe										MSS SP 95,MOC Same as pipe													
Flange																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
TYPE	SW				WN																							
MOC	ASTM A 694 F60				ASTM A 694 F60																							
FACE	RTJ-Note 7				RTJ, Note 7																							
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25																							
Spectacle Blind/Spacer Blinds																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
MOC	ASTM A 694 F60																											
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48															
Mechanical Joints																												
Stud Bolt	ASTM A 193 Gr. B7M				ASTM A 193 Gr. B7M																							
Hex Nuts	ASTM A 194 Gr. 2HM				ASTM A 194 Gr. 2HM																							
Gasket	B 16.20,OCT ring of Soft Iron with Max. 90BHN				ASME B 16.20,OCT ring of Soft Iron with Max. Hardness of 90BHN																							
Pressure-Temperature Rating																			Maximum Hydrostatic Pressure									
Temp.,Deg F		Pressure, PSI			Temp.,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g														
(-) 4 to 100		6171.5			(-) 20 to 38			433.9			9257.3 psig			650.85 Kg/cm2														
122		6057.7			50			425.9			Limited by Flange considering flange as the weakest joint in piping system																	
212		5632.4			100			396																				
302		5447.5			150			383																				
392		5293.9			200			372.2																				
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																												
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and WNRTJ flanges above 3" size and specified spectacle 7. Weld Joint Factor for welded pipe shall be as per ASME B 31.3 8. Gasket Contact Surface shall have maximum roughness of 63AARH 9. Minimum RTJ groove hardness shall be 120BHN 10. Octagonal (OCT) ring shall be Hot Dip Galvanized or electrogalvaized. 11. In cae calculated thickness is more than thickness of schedule of XXS for small bore piping (1/2"), reduce MT and use XXS only.																			

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.		2 of 2												
		Piping Class		Material		C.A	Spec.No		Revision: 0											
		G1N	# 2500	CS-NACE		6mm	2004A,Rev 9		Page No	34										
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																		
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.																		
0																				
Branch Table as per API RP 14E																				
Run Pipe	≤ 1	T																		
	1-1.5	T	T																	
	2	*	*	T																
	3	*	*	T	T															
	4	*	*	T	T	T														
	6	*	*	W	T	T	T													
	8	*	*	W	W	T	T	T												
	10	*	*	W	W	W	T	T	T											
	12	*	*	W	W	W	T	T	T	T										
	14	*	*	W	W	W	W	T	T	T	T									
	16	*	*	W	W	W	W	T	T	T	T	T								
	18	*	*	W	W	W	W	W	T	T	T	T	T							
	20	*	*	W	W	W	W	W	T	T	T	T	T	T						
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T					
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T				
	Branch Pipe																			
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30				
Valve Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
Gate Valve																				
TAG	VG 67,SW				VG 273,FLANGED															
Rating	# 2500				# 1500,RF															
Plug Valve																				
TAG																				
Rating																				
Ball Valve																				
TAG	Use Gate Valve, VG 67				VB 273, Lever Operated						VB **, Gear Operated									
Rating	# 2500				# 1500, RTJ															
Globe Valve																				
TAG	VGL 67,SW				VGL 273															
Rating	# 2500				# 1500, RTJ															
Check Valve																				
TAG	VC 67,SW,Lift Check				VC 273,Swing Check															
Rating	# 2500				# 1500, RTJ															
Needle Valve																				
TAG	VN 20,SW																			
Rating	# 2500																			
Butter Fly Valve																				
TAG																				
Rating																				
Notes Related to Valve and Brach Connection 1. PMS to be read in conjunction with FS 2004 A. 2. Maximum temperature limit for all Ball Valve shall be 121 Degree C																				
Revision: 0		15.01.16		Issued For Bid				PS		AKM		SJ								
Revision		Date		Description				Prepared By		Reviewed By		Approved By								

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2			
			Piping Class				Material		C.A	Spec.No		Revision: 0						
			XG1		API 5000		CS		3mm	2004A_Rev 9		Page No.	35					
			Design Code:				ASME B 31.3											
Service				Acidization														
Pipe Data																		
ASME B 36.10																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6	
Sch.	XXS	XXS	XXS	XXS	XXS	XXS												
Wtmm	7.47	7.82	9.09	10.16	11.07	15.24												
M.T (%)	8.0	12.5	5.0	12.5	11.0	12.5												
TYPE	Seamless																	
MOC	ASTM A 106 Gr. B																	
Ends	Threaded				BE													
Fittings Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	Threaded				Butt Weld													
Rating	# 9000				XXS	XXS												
MOC	ASTM A 105 U.N.O				A 234 Gr. WPB, Seamless													
Elbow	ASMEB16.11				ASME B 16.9													
Tee	ASMEB16.11				ASME B 16.9													
Red.	ASMEB16.11				ASME B 16.9													
Cap	ASMEB16.11				ASME B 16.9													
Coupl	ASMEB16.11				ASME B 16.9													
Plug	ASMEB16.11				ASME B 16.9													
Union	ASMEB16.11				BS 3799													
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105													
Sockolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105													
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105													
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe													
Swage	MSS SP 95,Same as pipe				MSSSP95,Same as pipe													
Flange																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	Threaded				WN,# 5000													
MOC	API 6A Type -2				API 6A Type-4													
FACE	RTJ-Note 7				RTJ, Note 7													
STD.	API 6A Type 6B				API 6A Type 6B													
Miscellaneous																		
Size(in)	Wing union each of forged steel male& female stubs.Forged steel nuts & replaceable resilient ring. Wing Union Shall be suitable to 5000 PSI CWP																	
Union	for sizes less than equal to 3"																	
Mechanical Joints																		
Stud Bolt	ASTM A 193 Gr. B7																	
Hex Nuts	ASTM A 194 Gr. 2H																	
Gasket	API 6A Type RX ,OCT ring of Soft Iron with Max. 90BHN																	
Pressure-Temperature Rating																		
Temp.,Deg F	Pressure, PSI				Temp.Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g				
60 to 100	5000				16 to 38			351.6			10000 psig			703.3 Kg/cm2				
											Limited by Flange considering flange as the weakest joint in piping system							
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																		
1. Welded fittings shall be 100% radiographed.									6. PMS to be read in conjunction with FS 2004 A.									
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.									7. Gasket Contact Surface shall have maximum roughness of 63AARH									
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									8. Minimum RTJ groove hardness shall be 120BHN									
4. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and WNRTJ flanges above 3" size									9. Octagonal (OCT) ring shall be Hot Dip Galvanized or electrogalvaized.									
5. All pipe thread shall be as per ASME B 1.20.1									10. Acidization lines to be designed without any pocket									
									11. All threaded joints shall be seal welded with full strength fillet weld.									
									12. Contractor to fulfill the requirement of category M- Fluid of ASME B 31.3									
									13. In cae calculated thickness is more than thickness of schedule of XXS for small bore piping (1/2"), reduce MT and use XXS only.									

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2	
		Piping Class		Material	C.A	Spec.No	Revision: 0	
		XG1	API 5000	CS	3mm	2004A,Rev 9	Page No,36	
		Design Code:				ASME B 31.3		
Service		Acidization						
0								

Branch Table as per API RP 14E

Run Pipe	0.5	T															
	0.75	T	T														
	1	T	T	T													
	1.5	T	T	T	T												
	2	*	*	*	*	T	T										
	3	*	*	*	*	*	T	T									
		0.5	0.75	1	1.5	2	3										
	Branch Pipe																


Valve Data


Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																	
TAG	VG 57,SCRD																
Rating	# API 5000																
Plug Valve																	
TAG																	
Rating																	
Ball Valve																	
TAG	Use Gate Valve, VG 57				VB 97, G.O.												
Rating	# API 5000				API 5000, RTJ												
Globe Valve																	
TAG																	
Rating																	
Check Valve																	
TAG					VC 97,Swing Check												
Rating					API 5000, RTJ												
Needle Valve																	
TAG																	
Rating																	
Butter Fly Valve																	
TAG																	
Rating																	

**Notes Related to Valve and Brach Connection**

- PMS to be read in conjunction with FS 2004 A.
- Maximum temperature limit for all Ball Valve shall be 121 Degree C

Revision: 0	04-08-2008	Issued For Bid	PS	GJ	GRP
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2				
			Piping Class				Material		C.A		Spec.No		Revision: 0						
			XGIN		API 5000		CS-NACE		6mm		2004A,Rev 9		Page No. 37						
			Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3 Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour and Acidization Service																
Pipe Data			ASME B 36.10																
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6		
Sch.	XXS	XXS	XXS	XXS	XXS	XXS													
WTmm	7.47	7.82	9.09	7.14	11.07	15.24													
M.T (%)	8.0	12.5	5.0	12.5															
TYPE	Seamless																		
MOC	ASTM A 106 Gr. B																		
Ends	Threaded				BE														
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Threaded				Butt Weld														
Rating	# 9000				XXS		XXS												
MOC	ASTM A 105 U.N.O				A 234 Gr. WPB, Seamless														
Elbow	ASMEB16.11				ASME B 16.9														
Tee	ASMEB16.11				ASME B 16.9														
Red.	ASMEB16.11				ASME B 16.9														
Cap	ASMEB16.11				ASME B 16.9														
Coupl	ASMEB16.11				ASME B 16.9														
Plug	ASMEB16.11				ASME B 16.9														
Union	ASMEB16.11				BS 3799														
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105														
Socketlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105														
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105														
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe														
Swage	MSS SP 95,Same as pipe				MSSSP95,MOC Same as pipe														
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Threaded				WN,# 5000														
MOC	API 6A Type -2				API 6A Type-4														
FACE	RTJ-Note 7				RTJ, Note 7														
STD.	API 6A Type 6B				API 6A Type 6B														
Miscellaneous																			
Size(in)	Wing union each of forged steel male& female stubs.Forged steel nuts & replaceble resielent ring. Wing Union Shall be suitable to 5000 PSI CWP																		
Union	for sizes less than equal to 3"																		
Mechanical Joints																			
Stud Bolt	ASTM A 193 Gr. B7M																		
Hex Nuts	ASTM A 194 Gr. 2HM																		
Gasket	API 6A Type RX ,OCT ring of Soft Iron with Max. 90BHN																		
Pressure-Temperature Rating																			
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Maximum Hydrostatic Pressure						
60 to 100	5000				16 to 38				351.6				Pressure, psig Pres.,Kg/cm2g						
													10000 psig 703.3 Kg/cm2						
													Limited by Flange considereing flange as the weakest joint in piping system						
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Welded fittings shall be 100% radiographed.									6. PMS to be read in conjunction with FS 2004 A.										
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.									7. Gasket Contact Surface shall have maximum roughness of 63AARH										
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									8. Minimum RTJ groove hardness shall be 120BHN										
4. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and WN flanges above 3" size									9. Octagonal (OCT) ring shall be Hot Dip Galvanized or electrogalvaized.										
5. All pipe thread shall be as per ASME B 1.20.1									10. Acidization lines to be designed without any pockect										
									11. All threaded jonts shall be seal welded with full strength fillet weld.										
									12. Contractor to fulfill the requirement of category M- Fluid of ASME B 31.3										
									13. In cae calculated thickness is more than thickness of schedule of XXS for small bore piping (1/2"), reduce MT and use XXS only.										

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2	
		Piping Class		Material	C.A	Spec.No	Revision: 0	
		XG1N	API 5000	CS-NACE	6mm	2004A,Rev 9	Page No.	38
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3						
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour and Acidization Service						
0								

Branch Table as per API RP 14E

Run Pipe	0.5	T																
	0.75	T	T															
	1	T	T	T														
	1.5	T	T	T	T													
	2	*	*	*	T	T												
	3	*	*	*	*	T	T											
		0.5	0.75	1	1.5	2	3											
Branch Pipe																		


Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																	
TAG	VG 58,SCRD																
Rating	# API 5000																
Plug Valve																	
TAG																	
Rating																	
Ball Valve																	
TAG	Use Gate Valve, VG 58 VB 98,G.O.																
Rating	# API 5000 API 5000, RTJ																
Globe Valve																	
TAG																	
Rating																	
Check Valve																	
TAG	VC 98,Swing Check																
Rating	API 5000, RTJ																
Needle Valve																	
TAG																	
Rating																	
Butter Fly Valve																	
TAG																	
Rating																	


**Notes Related to Valve and Brach Connection**

1. PMS to be read in conjunction with FS 2004 A.


2. Maximum temperature limit for all Ball Valve shall be 121 Degree C


Revision: 0	04-08-2008	Issued For Bid	PS	GJ	GRP
Revision	Date	Description	Prepared By	Reviewed By	Approved By


	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION											Sheet No.		1 of 2				
			Piping Class				Material				C.A(Nil for SS)			Spec.No		Revision: 3				
			A3		# 150		SS/CS-Galvanized-Note-8				1.5 mm			2004A_Rev 9		Page No. 39				
			Design Code: ASME B 31.3																	
Service			Instrument Air																	
Pipe Data																				
ASME B 36.10																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	80s	80s	80s	80s	80s	80	80	80	Std	Std	Std	Std	Std							
W.Tmm	3.73	3.91	4.55	5.08	5.54	7.62	8.56	10.97	8.18	9.27	9.53	9.53	9.53							
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5							
TYPE	Seamless																			
MOC	ASTM A 312 TP 316								ASTM A 106 Gr. B											
Ends	Screwed ( SCRD)								BE											
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Screwed ( SCRD)								Butt Weld											
Rating	#3000				80s	80	80	80	Std	Std	Std	Std	Std							
MOC	ASTM A 182 F 316 U.N.O								ASTM A 234 Gr. WPB, Seamless U.N.O											
Elbow	ASMEB16.11								ASME B 16.9											
Tee	ASMEB16.11								ASME B 16.9											
Red.	ASMEB16.11								ASME B 16.9											
Cap	ASMEB16.11								ASME B 16.9											
Coupl	ASMEB16.11								ASME B 16.9											
Plug	ASMEB16.11								ASME B 16.9											
Union	ASMEB16.11								BS 3799											
Elbowlet	MSS SP 97								MSS SP 97,ASTM A 105,Galvanized											
Socketlet	MSS SP 97								MSS SP 97,ASTM A 105,Galvanized											
Weldolet	MSS SP 97								MSS SP 97,ASTM A 105,Galvanized											
Nipple	MSS SP 97,Same as pipe								MOC Same as pipe											
Swage	MSS SP 95,Same as pipe								MSS SP 95, MOC Same as pipe											
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Screwed ( SCRD)								WN											
MOC	ASTM A 182 F 316								ASTM A 105											
FACE	RF-Serrated Finished								RF-Serrated Finished											
STD.	ASME B 16.5								ASME B 16.5, But welding ends as per ASME B 16.25											
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM A 182 F 316								ASTM A 105-Galvanized U.N.O											
Spectacle	ASME B 16.48											Spacer and blind as per ASME B 16.48								
Mechanical Joints																				
Stud Bolts	ASTM A 193 Gr. B7																			
Hex Nuts	ASTM A 194 Gr. 2H																			
Gasket	ASME B 16.21,Flat Ring,1.58mm,CNAF																			
Pressure-Temperature Rating is considered same as material group 2.2 of ASME B 16.5												Maximum Hydrostatic Pressure								
Temp.,Deg F		Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2			Pressure, psig				Pres.,Kg/cm2g					
60/100		275			16/38			19.33			425 psig				29.9 Kg/cm2					
200		235			93			16.52			Limited by Flange considering flange as the weakest joint in piping system									
300		215			149			15.11												
400		195			204			13.7												
Notes Related to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A. 6. Flanged galvanized spool to be used to minimize welding at site.								7. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified spectacle blind assemblies. 8. All pipe fittings other than SS piping shall be hot dip galvanized with a minimum of 763 gram of galvanizing material per square meter of surface area in accordance with ASTM A 123/ASTM A 153.Pipe spool requiring welding shall be galvanized after welding. Spool shall be of such shape and dimension to suite the size and shape that the galvanizing shop can accommodate. Contractor to ensure of the spools such that the can be thoroughly cleaned from inside out before galvanizing.												
								9. Exposed thread and piping assemblies etc . Shall be coated with zinc primer or epoxy coating after installation.												
								10. Connection between SS and GALVANIZED piping shall be flanged.												


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION						Sheet No.	2 of 2										
		Piping Class		Material		C.A(Nil for SS)	Spec.No	Revision: 3											
		A3	# 150	SS/CS-Galvanized-Note-8		1.5 mm	2004A,Rev 9	Page No.	40										
		Design Code:						ASME B 31.3											
		Service						Instrument Air											
0																			
Branch Table as per API RP 14E																			
Run Pipe	≤ 1	T									LEGEND								
	1-1.5	T	T									* Thredolet/Elbowlet							
	2	*	*	T								W Weldolet							
	3	*	*	T	T							T TEE							
	4	*	*	T	T	T													
	6	*	*	W	T	T	T												
	8	*	*	W	W	T	T	T											
	10	*	*	W	W	W	T	T	T										
	12	*	*	W	W	W	T	T	T	T									
	14	*	*	W	W	W	W	T	T	T	T								
	16	*	*	W	W	W	W	T	T	T	T	T							
	18	*	*	W	W	W	W	W	T	T	T	T	T						
	20	*	*	W	W	W	W	W	T	T	T	T	T	T					
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T				
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T			
Branch Pipe																			
Valve Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
Gate Valve																			
TAG	VG 51-A,SCRD				VG81	VG 60,FLANGED													
Rating	# 800				# 150,RF														
Plug Valve																			
TAG																			
Rating																			
Ball Valve																			
TAG	VB 51-A,SCRD				VB91	VB 60, Lev. Op													
Rating	# 800				# 150, RF														
Globe Valve																			
TAG	VGL 51-A,SCRD				VGL81	VGL 60													
Rating	# 800				# 150, RF														
Check Valve																			
TAG	VC 51-A,SCRD,Lift Check				VC91	VC 60,Swing Check/ VC 81 (Wafer Check, Note -1)													
Rating	# 800				# 150, RF														
Needle Valve																			
TAG																			
Rating																			
Butter Fly Valve																			
TAG																			
Rating																			
<b>Notes Related to Valve and Brach Connection</b> 1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint. 2. PMS to be read in conjunction with FS 2004 A. 3. For instrument main header use CS valves but for instrument sub header and braches use SS 316 Valves. 4. Valve for sizes 1/2" to 1.5" shall be screwed and valve material shall be SS316 same as A9 piping class. 5. Valve for size 2" shall be flanged and valve material shall be SS316 same as A9 Piping Class. 6. Valve for size 3" and above shall be flanged and valve material shall be CS same as A1 Piping Class.																			
Revision: 3	15.01.16	Issued For Bid						PS	AKM	SJ									
Revision	Date	Description						Prepared By	Reviewed By	Approved By									





	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2					
			Piping Class				Material				C.A(Nil for SS)		Spec.No		Revision: 3					
			B3		# 300		SS/CS-Galvanized-Note-8				1.5 mm		2004A,Rev 9		Page No 41					
			<b>Design Code:</b> ASME B 31.3																	
<b>Service:</b>		Instrument Air																		
Pipe Data			ASME B 36.10																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	80s	80s	80s	80s	80s	80	80	80	Std	Std	40	40	XS							
WTmm	3.73	3.91	4.55	5.08	5.54	7.62	8.56	10.97	8.18	9.27	10.31	11.13	12.7							
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5							
TYPE	Seamless																			
MOC	ASTM A 312 TP 316					ASTM A 106 Gr. B														
Ends	Screwed ( SCRD)					BE														
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Screwed ( SCRD)					Butt Weld														
Rating	# 3000					80	80	80	Std	Std	40	40	XS							
MOC	ASTM A 182 F 316 U.N.O					ASTM A 234 Gr. WPB, Seamless U.N.O														
Elbow	ASMEB16.11					ASME B 16.9														
Tee	ASMEB16.11					ASME B 16.9														
Red.	ASMEB16.11					ASME B 16.9														
Cap	ASMEB16.11					ASME B 16.9														
Coupl	ASMEB16.11					ASME B 16.9														
Plug	ASMEB16.11					ASME B 16.9														
Union	ASMEB16.11					BS 3799														
Elbowlet	MSS SP 97					MSS SP 97,ASTM A 105,Galvanized														
Sockolet	MSS SP 97					MSS SP 97,ASTM A 105,Galvanized														
Weldolet	MSS SP 97					MSS SP 97,ASTM A 105,Galvanized														
Nipple	MSS SP 97,Same as pipe					MOC Same as pipe														
Swage	MSS SP 95,Same as pipe					MSS SP 95, MOC Same as pipe														
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Screwed ( SCRD)					WN														
MOC	ASTM A 182 F 316					ASTM A 105														
FACE	RF-Smooth Finished					RF-Smooth Finished														
STD.	ASME B 16.5					ASME B 16.5, But welding ends as per ASME B 16.25														
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM A 182 F 316					ASTM A 105-Galvanized U.N.O														
Spectacle	ASME B 16.48										Spacer and blind as per ASME B 16.48									
Mechanical Joints																				
Stud Bolts	ASTM A 193 Gr. B7																			
Hex Nuts	ASTM A 194 Gr. 2H																			
Gasket	ASME B 16.21,Flat Ring,1.58mm,CNAF																			
Pressure-Temperature Rating is considered same as material group 2.2 of ASME B 16.5												Maximum Hydrostatic Pressure								
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
	720				16/38				50.6				1100 psig				77 Kg/cm2			
	620				93				43.6				Limited by Flange considereing flange as the weakest joint in piping system							
	515				204				36.2											
	450				316				31.6											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Welded fittings shall be 100% radiographed.									7. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified spectacle blind assemblies.											
2. All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.									8. All pipe fittings other than SS piping shall be hot dip galvanized with a minimum of 763 gram of galvanizing material per square meter of surface area in accordance with ASTM A 123/ASTM A 153.Pipe spool requiring welding shall be galvanized after welding. Spool shall be of such shape and dimension to suite the size and shape that the galvanizing shop can accomodate. Contractor to ensure of the spools such that the can be thouroughly cleaned from inside out before galvanizing.											
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									9. Exposed thread and piping assemblies etc . Shall be coated with zinc primer or epoxy coating after installation.											
4. All pipe thread shall be as per ASME B 1.20.1																				
5. PMS to be read in conjunction with FS 2004 A.																				
6. Flanged galvanized spool to be used to minimized welding at site.																				

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2													
		Piping Class		Material	C.A(Nil for SS)	Spec.No	Revision: 3													
		B3	# 300	SS/CS-Galvanized-Note-8	1.5 mm	2004A,Rev 9	Page No	42												
		Design Code: ASME B 31.3 Service: Instrument Air 0																		
Branch Table as per API RP 14E																				
Run Pipe	≤ 1	T																		
	1-1.5	T	T																	
	2	*	*	T																
	3	*	*	T	T															
	4	*	*	T	T	T														
	6	*	*	W	T	T	T													
	8	*	*	W	W	T	T	T												
	10	*	*	W	W	T	T	T	T											
	12	*	*	W	W	W	T	T	T	T										
	14	*	*	W	W	W	W	T	T	T	T									
	16	*	*	W	W	W	W	T	T	T	T	T								
	18	*	*	W	W	W	W	W	T	T	T	T	T	T						
	20	*	*	W	W	W	W	W	T	T	T	T	T	T	T					
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T	T				
	30	*	*	W	W	W	W	W	W	W	W	W	T	T	T	T	T			
			≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30			
	Branch Pipe																			
Valve Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
Gate Valve																				
TAG	VG 51-A,SCRD				VG-82		VG 62,FLANGED													
Rating	# 800				# 300,RF															
Plug Valve																				
TAG																				
Rating																				
Ball Valve																				
TAG	VB 51-A,SCRD				VB-92		VB 64, Lever Operated													
Rating	# 800				# 300, RF															
Globe Valve																				
TAG	VGL 51-A,SCRD				VGL - 82		VGL 62													
Rating	# 800				# 300, RF															
Check Valve																				
TAG	VC 51-A,SCRD,Lift Check				VC - 92		VC-62,Swing Check/VC 86 (Wafer Check,Note-1)													
Rating	# 800				# 300, RF															
Needle Valve																				
TAG																				
Rating																				
Butter Fly Valve																				
TAG																				
Rating																				
<b>Notes Related to Valve and Brach Connection</b> 1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint. 2. PMS to be read in conjunction with FS 2004 A. 3. For instrument main header use CS valves but for instrument sub header and braches use SS 316 Valves. 4. Valve for sizes 1/2" to 1.5" shall be screwed and valve material shall be SS316 same as B9 piping class. 5. Valve for size 2" shall be flanged and valve material shall be SS316 same as B9 Piping Class. 6. Valve for size 3" and above shall be flanged and valve material shall be CS same as B1 Piping Class.																				
Revision: 3	15.01.16	Issued For Bid								PS		AKM		SJ						
Revision	Date	Description								Prepared By		Reviewed By		Approved By						

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION											Sheet No. <b>1 of 2</b>					
			Piping Class				Material				C.A(Nil for SS)			Spec.No		Revision: 0			
			D3		# 600		SS/CS-Galvanized-Note-8				1.5 mm			2004A,Rev 9		Page No 43			
			Design Code: <b>ASME B 31.3</b> Service: Instrument Air																
Pipe Data			ASME B 36.10																
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168	219.1	273.1	323.9	355.6	406.4	457	508	558.8	609.6		
Sch.	80s	80s	80s	80s	80s	80	80	80	80	80	80	80	80						
WTmm	3.73	3.9	4.6	5.08	5.54	7.62	8.56	10.97	12.7	15.08	17.47	19.05	21.4						
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5						
TYPE	Seamless																		
MOC	ASTM A 312 TP 316							ASTM A 106 Gr. B											
Ends	Screwed ( SCRD)							BE											
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Screwed ( SCRD)				Butt Weld														
Rating	# 3000					80	80	80	80	80	80	80	80						
MOC	ASTM A 182 F 316 U.N.O					ASTM A 234 Gr. WPB, Seamless U.N.O													
Elbow	ASMEB16.11					ASME B 16.9													
Tee	ASMEB16.11					ASME B 16.9													
Red.	ASMEB16.11					ASME B 16.9													
Cap	ASMEB16.11					ASME B 16.9													
Coupl	ASMEB16.11					ASME B 16.9													
Plug	ASMEB16.11					ASME B 16.9													
Union	ASMEB16.11					BS 3799													
Elbowlet	MSS SP 97					MSS SP 97,ASTM A 105,Galvanized													
Sockolet	MSS SP 97					MSS SP 97,ASTM A 105,Galvanized													
Weldolet	MSS SP 97					MSS SP 97,ASTM A 105,Galvanized													
Nipple	MSS SP 97,Same as pipe					MOC Same as pipe													
Swage	MSS SP 95,Same as pipe					MSS SP 95, MOC Same as pipe													
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Screwed ( SCRD)					WN													
MOC	ASTM A 182 F 316					ASTM A 105													
FACE	RF-Smooth Finished					RF-Smooth Finished													
STD.	ASME B 16.5					ASME B 16.5, But welding ends as per ASME B 16.25													
Spectacle Blind/Spacer Blinds																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC	ASTM A 182 F 316					ASTM A 105-Galvanized U.N.O													
Spectacle	ASME B 16.48										Spacer and blind as per ASME B 16.48								
Mechanical Joints																			
Stud Bolt	ASTM A 193 Gr. B7																		
Hex Nuts	ASTM A 194 Gr. 2H																		
Gasket	ASME B 16.20 , 4.5mm thick SS Spiral wound gasket with CNAF filler																		
Pressure-Temperature Rating is considered same as material group 2.2 of ASME B 16.5											Maximum Hydrostatic Pressure								
Temp.,Deg F	Pressure, PSI				Temp.,Deg C				Pressure, Kg/cm2				Pressure, psig			Pres.,Kg/cm2g			
60/100	1440				16/38				101.2				2160 psig			151.9 Kg/cm2g			
200	1240				93				87.2				Limited by Flange considering flange as the weakest joint in piping system						
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A. 6. Flanged galvanized spool to be used to minimized welding at site.									7. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified spectacle blind assemblies. 8. All pipe fittings other that SS piping shall be hot dip galvanized with a minimum of 763 gram of galvanizing material per square meter of surface area in accordance with ASTM A 123/ASTM A 153.Pipe spool requiring welding shall be galvanized after welding. Spool shall be of such shape and dimension to suite the size and shape that the galvanizing shop can accomodate. Contractor to ensure of the spools such that the can be thouroughly cleaned from inside out before galvanizing. 9. Exposed thread and piping assemblies etc . Shall be coated with zinc primer or epoxy coating after installation.										

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2											
		Piping Class		Material	C.A(Nil for SS)	Spec.No	Revision: 0											
		D3	# 600	SS/CS-Galvanized-Note-8	1.5 mm	2004A,Rev 9	Page No	44										
		Design Code: ASME B 31.3																
		Service:		Instrument Air														
0																		
Branch Table as per API RP 14E																		
Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	W	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	W	T	T	T	T	T					
	20	*	*	W	W	W	W	W	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T		
	Branch Pipe																	
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30			
Valve Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
Gate Valve																		
TAG	VG 51-A,SCRD				VG-92		VG 72,FLANGED											
Rating	# 800				# 600,RF													
Plug Valve																		
TAG																		
Rating																		
Ball Valve																		
TAG	VB 51-A,SCRD				VB-292		/B 264, Lever Operated											
Rating	# 800				# 600, RF													
Globe Valve																		
TAG	VGL 51-A,SCRD				VGL - 9		VGL 67											
Rating	# 800				# 600, RF													
Check Valve																		
TAG	VC 51-A,SCRD,Lift Check				VC - 29		VC-72,Swing Check/VC 96 (Wafer Check,Note-1)											
Rating	# 800				# 600, RF													
Needle Valve																		
TAG																		
Rating																		
Butter Fly Valve																		
TAG																		
Rating																		
Notes Related to Valve and Brach Connection																		
1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint. 2. PMS to be read in conjunction with FS 2004 A. 3. For instrument main header use CS valves but for instrument sub header and braches use SS 316 Valves. 4. Valve for sizes 1/2" to 1.5" shall be screwed and valve material shall be SS316 same as D9 piping class. 5. Valve for size 2" shall be flanged and valve material shall be SS316 same as D9 Piping Class. 6. Valve for size 3" and above shall be flanged and valve material shall be CS same as D1 Piping Class.																		
Revision: 0	15.01.16	Issued For Bid						PS	AKM	SJ								
Revision	Date	Description						Prepared By	Reviewed By	Approved By								

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2				
			Piping Class					Material			C.A		Spec.No		Revision: 1				
			A4		# 150			CS-Galvanized-Note-8			1.5mm		2004A,Rev 9		Page No. 45				
			Design Code: ASME B 31.3 Service: Potable Water (For non-drinking use)																
Pipe Data			ASME B 36.10																
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6		
Sch.	80	80	80	80	80	80	80												
WTmm	3.73	3.91	4.55	5.08	5.54	7.62	8.56												
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5												
TYPE	Seamless																		
MOC	ASTM A 106 Gr. B-Galvanized					ASTM A106Gr.B													
Ends	Screwed ( SCRD)					BE													
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Screwed ( SCRD)					Butt Weld													
Rating	# 3000					80	80												
MOC	ASTM A 105-Galvanized U.N.O					ASTM A 234 Gr. WPB, Seamless U.N.O													
Elbow	ASMEB16.11					ASME B 16.9													
Tee	ASMEB16.11					ASME B 16.9													
Red.	ASMEB16.11					ASME B 16.9													
Cap	ASMEB16.11					ASME B 16.9													
Coupl	ASMEB16.11					ASME B 16.9													
Plug	ASMEB16.11					ASME B 16.9													
Union	ASMEB16.11					BS 3799													
Elbowlet	MSS SP 97,ASTM A 105,Galvanized					MSS SP 97,ASTM A 105,Galvanized													
Sockolet	MSS SP 97,ASTM A 105,Galvanized					MSS SP 97,ASTM A 105,Galvanized													
Weldolet	MSS SP 97,ASTM A 105,Galvanized					MSS SP 97,ASTM A 105,Galvanized													
Nipple	MSS SP 97,Same as pipe,Galvanized					MOC Same as pipe													
Swage	MSS SP 95,Same as pipe,Galvanized					MSS SP 95,MOC Same as pipe													
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Screwed ( SCRD)					WN													
MOC	ASTM A 105-Galvanized U.N.O					ASTM A 105													
FACE	FF-Serrated Finished					FF-Serrated Finished-When connecte to Valves use FF flange													
STD.	ASME B 16.5					ASME B 16.5, But welding ends as per ASME B 16.25													
Spectacle Blind/Spacer Blinds																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC	ASTM A 105-Galvanized U.N.O																		
Spectacle	ASME B 16.48												Spacer and blind as per ASME B 16.48						
Mechanical Joints																			
Stud Bolt	ASTM A 307 Gr. B																		
Hex Nuts	ASTM A 307 Gr. B																		
Gasket	3.175mm Ribber with Maximum 60 Shore Durometer Flat ring as per ASME B 16.21. Use full face gaskets for Valves																		
Pressure-Temperature Rating																			
Temp.,Deg F	Pressure, PSI					Temp,Deg C					Pressure, Kg/cm2					Maximum Hydrostatic Pressure			
(-) 4 to 100	230					(-) 20 to 38					16.3					Pressure, psig		Pres.,Kg/cm2g	
																350 psig		24.5 Kg/cm2	
																Limited by Flange considering flange as the weakest joint in piping system			
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Welded fittings shall be 100% radiographed.									7. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange										
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.									8. All pipe fittings galvanized shall be hot dip galvanized with a minimum of 763 gram of galvanizing material per square meter of surface area in accordance with ASTM A 123/ASTM A 153.Pipe spool requiring welding shall be welded after welding. Spool shall be of such shape and dimension to suite the size and shape that the galvanizing shop can accomodate. Contractor to ensure of the spools such that the can be thouroughly cleaned from inside out before galvanizing.										
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.																			
4. All pipe thread shall be as per ASME B 1.20.1																			
5. PMS to be read in conjunction with FS 2004 A.																			
6. Flanged galvanized spool to be used to minimized welding at site.									9. Exposed thread and piping assemblies etc . Shall be coated with zinc primer or epoxy coating after installation										

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2	
		Piping Class		Material	C.A	Spec.No	Revision: 1	
		A4	# 150	CS-Galvanized-Note-8	1.5mm	2004A,Rev 9	Page No	46
		Design Code: ASME B 31.3						
		Service: Potable Water (For non-drinking use)						
		0						

Branch Table as per API RP 14E

Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	T	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	T	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	T	T	T	T	T	T	T	T

LEGEND	
*	Thredolet/Elbowlet
W	Weldolet
T	TEE

Branch Pipe																
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30	

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VG 50,SCRD	VG 80,FLANGED	
Rating	# 800	# 150,FF	

Plug Valve

TAG		
Rating		

Ball Valve

TAG	VB 50,SCRD	VB 86, Lever Operated	
Rating	# 800	# 150, FF,Flanged	

Globe Valve

TAG	VGL 50,SCRD	VGL 80	
Rating	# 800	# 150, FF,Flanged	

Check Valve

TAG	VC 50,SCRD,Lift Check	VC 80,Swing Check	
Rating	# 800	# 150, FF,Flanged	

Needle Valve

TAG	VN 11,SCRD	
Rating	# 800	

Butter Fly Valve


TAG		
Rating		


Notes Releted to Valve and Brach Connection

1. Wafer check valve to be avoided as far as possible; unless the avaliable space constraint does not allow normal check valve . The contractor to take approval for use of wafer check Valve during pipe routing after extablishing the space constraint.

2. PMS to be read in conjunction with FS 2004 A.

Revision: 1	04-02-2016	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION											Sheet No.		1 of 2	
			Piping Class				Material				C.A		Spec.No		Revision: 2		
			A5		# 150		90-10 Cu/Ni				Nil		2004A,Rev 9		Page No. 47		
			Design Code: ASME B 31.3														
Service:			Fire Water and Raw Sea Water														
Pipe Data																	
EEMUA 144 Range																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
O.D.mm	16	25	30	44.5	57	88.9	108	159	219.1	267	323.9	368	419	457.2	508	558.8	609.6
Sch.																	
W Tmm	2	2	2.5	2.5	2.5	2.5	3	3	4	4.5	5.5	6.5	7				
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5				
TYPE	Seamless													Welded with 100% Radiography			
MOC	Annealed tube as per ASTM B 466 Copper Alloy No. 706 or BS 2871 CN 102																
Ends	PE																
Fittings Data																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
TYPE	Brazed					Butt Weld											
Rating						2.5	3	3	4	4.5	5.5	6.5	7				
MOC	Forged 90-10 Cu-Ni					90-10Cu-Ni											
Elbow																	
Tee																	
Red.																	
Cap																	
Coupl																	
Plug																	
Union																	
Elbowlet																	
Sockolet																	
Weldolet																	
Nipple																	
Swage																	
Flange																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
TYPE	Slip-On Composite Flange					WN Composite Flange/S.O. Bossed flange ( Suitable for welding),											
MOC	Outer flange- A 105(Galv.) to # 150 of B-16.5 upto 24" and B 16.47A for 22" and 28" AND Inner Flange -90-10Ci-Ni																
FACE						FF											
STD.	EEMUA 145																
Blind Flange																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
MOC	ASTM A 105 with 3mm 90-10 CuNi weld deposite.																
Mechanical Joints																	
Stud Bolts	ASTM A 193 Gr. B7 to be used with insulating gasket/Sleeves																
Hex Nuts	ASTM A 194 Gr. 2H to be used with insulating gasket/Sleeves																
Gasket	3mm thick flat ring of neoprine rubber as ASME B 16.21																
Pressure-Temperature Rating																	
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Maximum Hydrostatic Pressure				
up to 167	230				Up to 75				16				345 psig				
													24 Kg/cm2				
													Limited by Flange considereing flange as the weakest joint in piping system				
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																	
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. For flanged valves full face gaskets to be used and S.O. Bossed flage. 4. PMS to be read in conjunction with FS 2004 A. 5. For joints with material other than Cu-Ni Sacrificial spool and insulating gaskets are to used as indicated in design criteria.									6. Threading on Cu-Ni piping is not allowed.However, screwed fittings may be used for vent and drain connections only with company's approval.								

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION			Sheet No.	2 of 2			
		Piping Class		Material	C.A	Spec.No	Revision: 2		
		A5	# 150	90-10 Cu/Ni	Nil	2004A,Rev 9	Page No	48	
		Design Code: ASME B 31.3							
		Service: Fire Water and Raw Sea Water							
0									

Branch Table as per API RP 14E

Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	T	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	W	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T	
			≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30

Branch Pipe

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VG 54,Brazing union end as per BS 1952 Series B Cl. 200	VG 87,FLANGED
Rating	# 150	# 150, FF

Plug Valve

TAG		
Rating		

Ball Valve

TAG	VB 54,Brazing union end as per BS 1952 Series B Cl. 200	VB 87,FLANGED
Rating	# 150	# 150, FF

Globe Valve

TAG	VGL 54,Brazing union end as per BS 1952 Series B Cl. 200	VGL 87,FLANGED
Rating	# 150	# 150, FF

Check Valve

TAG	VC 54,Brazing union end as per BS 1952 Series B Cl. 200	VC 87,FLANGED
Rating	# 150	# 150, FF

Needle Valve

TAG	VN 5,Brazing union end as per BS 1952 Series B Cl. 200	
Rating	# 150	# 150, FF

Butter Fly Valve


TAG		VBF-22
Rating		# 150, FF


Notes Related to Valve and Brach Connection

1. Wafer type Butterfly Valve may be used only in fire water( Clean water) service.
2. PMS to be read in conjunction with FS 2004 A.
3. Maximum temperature limit for all Ball Valve shall be 121 Degree C

Revision: 2	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By



	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2					
			Piping Class					Material			C.A	Spec.No			Revision: 1					
			A6		# 150			SS 316L			Nil	2004A,Rev 9			Page No	49				
			Design Code:					ASME B 31.3												
Service		Gas Turbine and Engine exhaust																		
Pipe Data		ASME B 36.19																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	40s	40s	40s	40s	10s	10s	10s	10s	10s											
WTmm	2.77	2.87	3.38	3.68	2.77	3.05	3.05	3.4	3.76	4mm	4mm	4mm	4mm	4mm	4mm	4.8mm	4.8mm			
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5			
TYPE	Seamless										EFW with 100% Radiography									
MOC	ASTM A 312 TP 316L										ASTM A 358 Gr. 316L Cl.1									
Ends	SW					BE														
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW					Butt Weld														
Rating	# 3000					10s	10s	10s	10s	10s	4mm	4mm	4mm	4mm	4mm	4mm	4.8mm	4.8mm		
MOC	ASTM A 182 F 316L U.N.O					ASTM A 403 Gr. WP 316 L, Seamless U.N.O					ASTM A 403 Gr. WP 316 L, Welded with Joint Factor -1, U.N.O									
Elbow	ASMEB16.11					ASME B 16.9					ASME B 16.9									
Tee	ASMEB16.11					ASME B 16.9					ASME B 16.9									
Red.	ASMEB16.11					ASME B 16.9					ASME B 16.9									
Cap	ASMEB16.11					ASME B 16.9					ASME B 16.9									
Coupl	ASMEB16.11					ASME B 16.9					ASME B 16.9									
Plug	ASMEB16.11					ASME B 16.9					ASME B 16.9									
Union																				
Elbowlet	MSS SP 97					MSS SP 97,ASTM A 182 F316L					MSS SP 97,ASTM A 182 F316L									
Sockolet	MSS SP 97					MSS SP 97,ASTM A 182 F316L					MSS SP 97,ASTM A 182 F316L									
Weldolet	MSS SP 97					MSS SP 97,ASTM A 182 F316L					MSS SP 97,ASTM A 182 F316L									
Nipple	MSS SP 97,Same as pipe					MOC Same as pipe					MOC Same as pipe									
Swage	MSS SP 95,Same as pipe					MSS SP 95,MOC Same as pipe					MSS SP 95,MOC Same as pipe									
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW					FF Lap Joint (LJ)														
MOC	ASTM A 182 F 316L					Stub end SS 316L + ASTM A 105 Backing flange (While connecting to FF flange use Slip -on(SO),FF, SS 316L flange														
FACE	RF-Serrated Finished-125 AARH					FF, Serrated Finished,Stub end and FF shall have 125AARH														
STD.	ASME B 16.5					ASME B 16.5, But welding ends as per ASME B 16.25														
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14.00	16.00	18	20	22	24			
MOC	ASTM A 182 F 316L																			
Spectacle	ASME B 16.48											Spacer and blind as per ASME B 16.48								
Mechanical Joints																				
Stud Bolts	ASTM A 193 Gr. B8M																			
Hex Nuts	ASTM A 194 Gr. 8M																			
Gasket	ASME B 16.21,Flat Ring,1.58mm,CNAF																			
Pressure-Temperature Rating										Maximum Hydrostatic Pressure										
Temp.,Deg F	Pressure, PSI				Temp.,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
446	99.6				230				7				25 psig (Air)				Kg/cm2			
850	65				454				4.5				Limited by Flange considering flange as the weakest joint in piping system							
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Welded fittings shall be 100% radiographed. 2. All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Flanged galvanized spool to be used to minimize welding at site. 7. Weld Joint Factor for welded pipe shall be as per ASME B 31.3											

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2	
		Piping Class		Material	C.A	Spec.No	Revision: 1	
		A6	# 150	SS 316L	Nil	2004A,Rev 9	Page No	50
		Design Code: ASME B 31.3						
Service		Gas Turbine and Engine exhaust						
0								

Branch Table as per API RP 14E


Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	T	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T		
30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T		
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30	
Branch Pipe																	


Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																	
TAG																	
Rating																	
Plug Valve																	
TAG																	
Rating																	
Ball Valve																	
TAG																	
Rating																	
Globe Valve																	
TAG																	
Rating																	
Check Valve																	
TAG																	
Rating																	
Needle Valve																	
TAG																	
Rating																	
Butter Fly Valve																	
TAG																	
Rating																	


**Notes Related to Valve and Brach Connection**


1. PMS to be read in conjunction with FS 2004 A.

Revision: 1	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2	
			Piping Class				Material				C.A		Spec.No				Revision:2	
			A8		# 150		CS- Galvanized				3mm		2004A,Rev 9				Page No. 51	
			Design Code: ASME B 31.3															
Service: Over Board Lines																		
Pipe Data																		
ASME B 36.10																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6	
Sch.	XXS	160	160	160	160	80	80	80	Std	Std	Std	Std	Std	Std	20	20	20	
WTmm	7.47	5.56	6.35	7.14	8.74	7.62	8.56	10.97	8.18	9.27	9.52	9.52	9.52	9.52	9.52	9.52	9.52	
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5						
TYPE	Seamless													LSAW with 100% Radiography				
MOC	ASTM A 106 Gr. B-Galvanized					ASTM A 106 Gr. B								API 5L Gr. B				
Ends	Screwed ( SCRD)					BE								BE				
Fittings Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	Screwed ( SCRD)					Butt Weld												
Rating	# 9000	# 6000			160	80	80	80	Std	Std	Std	Std	Std	Std	20	20	20	
MOC	ASTM A 105-Galvanized U.N.O					ASTM A 234 Gr. WPB, Seamless U.N.O								ASTM A234 Gr. WPB,Welded U.N.O				
Elbow	ASMEB16.11					ASME B 16.9								ASME B 16.9				
Tee	ASMEB16.11					ASME B 16.9								ASME B 16.9				
Red.	ASMEB16.11					ASME B 16.9								ASME B 16.9				
Cap	ASMEB16.11					ASME B 16.9								ASME B 16.9				
Coupl	ASMEB16.11					ASME B 16.9								ASME B 16.9				
Plug	ASMEB16.11					ASME B 16.9								ASME B 16.9				
Union	ASMEB16.11					BS 3799								BS 3799				
Elbowlet	MSS SP 97,ASTM A 105,Galvanized					MSS SP 97,ASTM A 105,Galvanized								MSS SP 97,ASTM A 105,Galvanized				
Socketlet	MSS SP 97,ASTM A 105,Galvanized					MSS SP 97,ASTM A 105,Galvanized								MSS SP 97,ASTM A 105,Galvanized				
Weldolet	MSS SP 97,ASTM A 105,Galvanized					MSS SP 97,ASTM A 105,Galvanized								MSS SP 97,ASTM A 105,Galvanized				
Nipple	MSS SP 97,Same as pipe,Galvanized					MOC Same as pipe								MOC Same as pipe				
Swage	MSS SP 95,Same as pipe,Galvanized					MSS SP95,MOC Same as pipe								MOC Same as pipe				
Flange																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	Screwed ( SCRD)					WN												
MOC	ASTM A 105					ASTM A 105												
FACE	RF-Serrated Finished					RF, Serrated Finished												
STD.	ASME B 16.5					ASME B 16.5, But welding ends as per ASME B 16.25												
Spectacle Blind/Spacer Blinds																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
MOC	ASTM A 105																	
Spectacle	ASME B 16.48					ASME B 16.48					Spacer and blind as per ASME B 16.48							
Mechanical Joints																		
Stud Bolt	ASTM A 193 Gr. B7					ASTM A 193 Gr. B7												
Hex Nuts	ASTM A 194 Gr. 2H					ASTM A 194 Gr. 2H												
Gasket	ASME B 16.21,Flat Ring,1.58mm,CNAF					ASME B 16.21,Flat Ring,1.58mm,CNAF												
Pressure-Temperature Rating																		
Temp.,Deg F		Pressure, PSI			Temp,Deg C		Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g					
(-) 4 to 100		285			(-) 20 to 38		20			450 psig			31.6 Kg/cm2					
200		260			93		18.3			Limited by Flange considering flange as the weakest joint in piping system								
300		230			149		16.2											
400		200			204		14.1											
500		170			260		11.9											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																		
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange									
									7. Weld Joint Factor for welded pipe shall be as per ASME B 31.3									

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION					Sheet No.		2 of 2																		
			Piping Class		Material		C.A	Spec.No		Revision:2																		
			A8	# 150	CS- Galvanized		3mm	2004A,Rev 9		Page No.	52																	
			Design Code: ASME B 31.3																									
Service			Over Board Lines																									
0																												
Branch Table as per API RP 14E																												
Run Pipe	≤ 1	T																										
	1-1.5	T	T																									
	2	*	*	T																								
	3	*	*	T	T																							
	4	*	*	T	T	T																						
	6	*	*	W	T	T	T																					
	8	*	*	W	W	T	T	T																				
	10	*	*	W	W	W	T	T	T																			
	12	*	*	W	W	W	T	T	T	T																		
	14	*	*	W	W	W	W	T	T	T	T																	
	16	*	*	W	W	W	W	T	T	T	T																	
	18	*	*	W	W	W	W	T	T	T	T																	
	20	*	*	W	W	W	W	W	T	T	T																	
	24	*	*	W	W	W	W	W	W	T	T																	
	30	*	*	W	W	W	W	W	W	W	T																	
Branch Pipe											≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30			
Valve Data																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14.00	16.00	18	20	22	24											
Gate Valve																												
TAG	VG 41, SCRD										VG 61, FLANGED																	
Rating	# 800										# 150, RF																	
Plug Valve																												
TAG																												
Rating																												
Ball Valve																												
TAG	VB 42, SCRD										VB 61, Lever Operated					VB 63, Gear Operated												
Rating	# 800															# 150, RF												
Globe Valve																												
TAG	VGL 42, SW										VGL 60																	
Rating	# 800										# 150, RF																	
Check Valve																												
TAG	VC 41, SCRD, Lift Check										VC 85 (Wafer Check, Note -1)																	
Rating	# 800										# 150, RF																	
Needle Valve																												
TAG	VN 8, SCRD																											
Rating	# 800																											
Butter Fly Valve																												
TAG											VBF 1(WAFFER)																	
Rating											# 150, RF																	
Notes Related to Valve and Brach Connection																												
1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve. The contractor to take approval for use of wafer check Valve during pipe routing after establisishing the space constraint. 2. Wafer type Butterfly Valve may be used only in fire water( Clean water) service. 3. PMS to be read in conjunction with FS 2004 A. 4. Maximum temperature limit for all Ball Valve shall be 121 Degree C 5. Exposed thread and piping assemblies etc . Shall be coated with zinc primer or epoxy coating after installation. 6. Flanged galvanized spool to be used to minimized welding at site.														7. All pipe fittings galvanized shall be hot dip galvanized with a minimum of 763 gram of galvanizing material per square meter of surface area in accordance with ASTM A 123/ASTM A 153. Pipe spool requiring welding shall be welded after welding. Spool shall be of such shape and dimenssion to suite the size and shape that the galvanizing shop can accomodate. Contractor to ensure of the spools such that the can be thouroughly cleaned from inside out before galvanizing.														
Revision:2	15.01.16	Issued For Bid										PS	AKM	SJ														
Revision	Date	Description										Prepared By	Reviewed By	Approved By														

	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2											
					Piping Class				Material			C.A	Spec.No			Revision: 1												
					A9		# 150		SS 316			Nil	2004A_Rev 9			Page No. 53												
					Design Code:				ASME B 31.3																			
Service:				Lub Oil, Seal Oil and Chemical																								
Pipe Data																			ASME B 36.19									
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
O.D.mm		21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6										
Sch.		40s	40s	40s	40s	10s	10s	10s	10s																			
WTmmr		2.77	2.87	3.38	3.68	2.77	3.05	3.05	3.4																			
M.T (%)		12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5																			
TYPE		Seamless																										
MOC		ASTM A 312 TP 316										ASTM A 358 TP 316 with 100% Radiography.																
Ends		PE					BE																					
Fittings Data																												
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
TYPE		SW					Butt Weld																					
Rating		# 3000					10s	10s	10s	10s																		
MOC		ASTM A 182 F 316 U.N.O					ASTM A 403 Gr. WP 316 , Seamless																					
Elbow		ASMEB16.11					ASME B 16.9																					
Tee		ASMEB16.11					ASME B 16.9																					
Red.		ASMEB16.11					ASME B 16.9																					
Cap		ASMEB16.11					ASME B 16.9																					
Coupl		ASMEB16.11					ASME B 16.9																					
Plug		ASMEB16.11					ASME B 16.9																					
Union																												
Elbowlet		MSS SP 97					MSS SP 97,ASTM A 182 F316																					
Socketlet		MSS SP 97					MSS SP 97,ASTM A 182 F316																					
Weldolet		MSS SP 97					MSS SP 97,ASTM A 182 F316																					
Nipple		MSS SP 97,Same as pipe					MOC Same as pipe																					
Swage		MSS SP 95,Same as pipe					MSS SP 95MOC Same as pipe																					
Flange																												
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
TYPE		SW					FF Lap Joint (LJ)																					
MOC		ASTM A 182 F 316					Stub end A 182 F316 + ASTM A 105 Backing flange (While connecting to FF flange use Slip -on(SO),FF, 316 flange																					
FACE		RF-Serrated Finished					FF, Serrated Finished																					
STD.		ASME B 16.5					ASME B 16.5, But welding ends as per ASME B 16.25																					
Spectacle Blind/Spacer Blinds																												
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
MOC		ASTM A 182 F 316																										
Spectacle		ASME B 16.48												Spacer and blind as per ASME B 16.48														
Mechanical Joints																												
Stud Bolts		ASTM A 193 Gr. B7																										
Hex Nuts		ASTM A 194 Gr. 2H																										
Gasket		ASME B 16.20,5mm, SS Spiral wound with CNAF filler																										
Pressure-Temperature Rating																			Maximum Hydrostatic Pressure									
Temp.,Deg F		Pressure, PSI				Temp.,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g										
60/100		275				16/38				19.3				425 psig				29.9 Kg/cm2										
200		240				93				16.87				Limited by Flange considering flange as the weakest joint in piping system														
400		195				204				13.7																		
600		140				454				4.6																		
850		65																										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																												
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.										6. Contractor use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings.  7. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange.																		

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION			Sheet No.	2 of 2		
		Piping Class		Material	C.A	Spec.No	Revision: 1	
		A9	# 150	SS 316	Nil	2004A,Rev 9	Page No	54
		Design Code: ASME B 31.3 Service: Lub Oil, Seal Oil and Chemical 0						

Branch Table as per API RP 14E

Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	T	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T	T
	Branch Pipe																
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30		

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
----------	-----	------	---	-----	---	---	---	---	---	----	----	----	----	----	----	----	----

Gate Valve

TAG	VG-51		VG-81															
Rating	# 800, SW		# 150, RF															

Plug Valve

TAG																	
Rating																	

Ball Valve

TAG	VB-51		VB-91															
Rating	# 800, SW		# 150, RF															

Globe Valve

TAG	VGL - 51		VGL - 81															
Rating	# 800, SW		# 150, RF															

Check Valve

TAG	VC - 51, Lift Check		VC - 91, Swing Check															
Rating	# 800, SW		# 150, RF															

Needle Valve

TAG																	
Rating																	


Butter Fly Valve

TAG																	
Rating																	

Notes Related to Valve and Brach Connection


1. PMS to be read in conjunction with FS 2004 A.


Revision: 1	22/7/2009	Issued For Bid	PS	GJ	GRP
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2			
			Piping Class				Material		C.A		Spec.No		Revision: 2					
			B9		# 300		SS 316		Nil		2004A,Rev 9		Page No. 55					
			<b>Design Code:</b> ASME B 31.3 <b>Service:</b> Lub Oil, Seal Oil and Chemical															
Pipe Data																		
ASME B 36.19																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6	
Sch.	40s	40s	40s	40s	10s	10s	10s	40s										
Wtmm	2.77	2.87	3.38	3.68	2.77	3.05	3.05	7.11										
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5										
TYPE	Seamless																	
MOC	ASTM A 312 TP 316								ASTM A 358 TP 316 with 100% Radiography.									
Ends	PE				BE													
Fittings Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW				Butt Weld													
Rating	# 3000				10s	10s	10s	40s										
MOC	ASTM A 182 F 316 U.N.O				ASTM A 403 Gr. WP 316 , Seamless													
Elbow	ASMEB16.11				ASME B 16.9													
Tee	ASMEB16.11				ASME B 16.9													
Red.	ASMEB16.11				ASME B 16.9													
Cap	ASMEB16.11				ASME B 16.9													
Coupl	ASMEB16.11				ASME B 16.9													
Plug	ASMEB16.11				ASME B 16.9													
Union																		
Elbowlet	MSS SP 97				MSS SP 97,ASTM A 182 F316													
Sockolet	MSS SP 97				MSS SP 97,ASTM A 182 F316													
Weldolet	MSS SP 97				MSS SP 97,ASTM A 182 F316													
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe													
Swage	MSS SP 95,Same as pipe				MSS SP 95MOC Same as pipe													
Flange																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW				FF Lap Joint (LJ)													
MOC	ASTM A 182 F 316				Stub end A 182 F316 + ASTM A 105 Backing flange (While connecting to FF flange use Slip -on(SO),FF, 316 flange													
FACE	RF-Smooth Finished				FF, Smooth Finished													
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25													
Spectacle Blind/Spacer Blinds																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
MOC	ASTM A 182 F 316																	
Spectacle	ASME B 16.48										Spacer and blind as per ASME B 16.48							
Mechanical Joints																		
Stud Bolt	ASTM A 193 Gr. B7																	
Hex Nuts	ASTM A 194 Gr. 2H																	
Gasket	ASME B 16.20,5mm, SS Spiral wound with CNAF filler																	
Pressure-Temperature Rating										Maximum Hydrostatic Pressure								
Temp.,Deg F	Pressure, PSI				Temp.Deg C				Pressure, Kg/cm2				Pressure, psig		Pres.,Kg/cm2g			
60/100	720				16/38				50.6				1100 psig		77 Kg/cm2			
200	620				93				43.6				Limited by Flange considering flange as the weakest joint in piping system					
400	515				204				36.2									
600	450				316				31.6									
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																		
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Contractor use Schedule 80s for sizes less than 1/1/2" for threaded pipe and fittings. 7. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange.									

[illegible]



	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION											Sheet No.		1 of 2			
			Piping Class				Material				C.A			Spec.No		Revision: 0			
			D9		# 600		SS 316				Nil			2004A,Rev 9		Page No 57			
			Design Code: ASME B 31.3																
			Service: Lub Oil, Seal Oil and Chemical																
Pipe Data			ASME B 36.19																
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168	219	273	324	355.6	406	457	508	558.8	609.6		
Sch.	80s	80s	80s	80s	80s	80s	80s	80s											
WTmm	3.73	3.9	4.6	5.08	5.54	7.62	8.56	11											
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5												
TYPE	Seamless																		
MOC	ASTM A 312 TP 316								ASTM A 358 TP 316 with 100% Radiography.										
Ends	PE				BE														
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				Butt Weld														
Rating	# 3000				80s	80s	80s	80s											
MOC	ASTM A 182 F 316 U.N.O				STM A 403 Gr. WP 316 , Seamless														
Elbow	ASMEB16.11				ASME B 16.9														
Tee	ASMEB16.11				ASME B 16.9														
Red.	ASMEB16.11				ASME B 16.9														
Cap	ASMEB16.11				ASME B 16.9														
Coupl	ASMEB16.11				ASME B 16.9														
Plug	ASMEB16.11				ASME B 16.9														
Union																			
Elbowlet	MSS SP 97				SS SP 97,ASTM A 182 F316														
Sockolet	MSS SP 97				SS SP 97,ASTM A 182 F316														
Weldolet	MSS SP 97				SS SP 97,ASTM A 182 F316														
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe														
Swage	MSS SP 95,Same as pipe				ISS SP 95MOC Same as pipe														
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				WN														
MOC	ASTM A 182 F 316				ASTM A 182 F316														
FACE	RF-Smooth Finished				RF-Smooth Finish														
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25														
Spectacle Blind/Spacer Blinds																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC	ASTM A 182 F 316																		
Spectacle	ASME B 16.48										Spacer and blind as per ASME B 16.48								
Mechanical Joints																			
Stud Bolt	ASTM A 193 Gr. B7																		
Hex Nuts	ASTM A 194 Gr. 2H																		
Gasket	ASME B 16.20,5mm, SS 316 Spiral wound with CNAF filler																		
Pressure-Temperature Rating																			
Temp.,Deg F		Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g					
60/100		1440			16/38			101.2			2160 psig			151.9 Kg/cm2					
200		1240			93			87.2			Limited by Flange considereing flange as the weakest joint in piping system								
400		1025			204			72.06											
600		900			316			63,28											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Welded fittings shall be 100% radiographed. 2. All alloy steel stud bolts and nuts shall be not cup galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Contractor use Schedule 80s for sizes less than 1/1/2" for threaded pipe and fittings. 7. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange.										

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.		2 of 2		
		Piping Class		Material		C.A	Spec.No		Revision: 0	
		D9	# 600	SS 316		Nil	2004A,Rev 9		Page No	58
		Design Code:				ASME B 31.3				
		Service		Lub Oil, Seal Oil and Chemical						
				0						

Branch Table as per API RP 14E

Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	W	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T	
			≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30
	Branch Pipe																

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VG-51	VG-92	
Rating	# 800, SW	# 600, RF	

Plug Valve

TAG		
Rating		

Ball Valve

TAG	VB-51	VB-92	
Rating	# 800, SW	# 600, RF	

Globe Valve

TAG	VGL - 51	VGL - 92	
Rating	# 800, SW	# 600, RF	

Check Valve

TAG	VC - 51, Lift Check	VC - 92, Swing Check	
Rating	# 800, SW	# 600, RF	

Needle Valve

TAG		
Rating		


Butter Fly Valve


TAG		
Rating		

Notes Related to Valve and Brach Connection

1. PMS to be read in conjunction with FS 2004 A.

Revision: 0	15.01.16	Issued For Bid	PS	AKM	GJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION											Sheet No.		1 of 2			
			Piping Class				Material				C.A		Spec.No			Revision: 0			
			E9		# 900		SS 316				Nil		2004A,Rev 9			Page No 59			
			Design Code: ASME B 31.3 Service: Lub Oil, Seal Oil and Chemical																
Pipe Data			ASME B 36.19																
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168	219	273	324	355.6	406	457	508	558.8	609.6		
Sch.	80S	80s	80s	160	80s	80s	80s	80s											
WTmm	3.73	3.9	4.6	7.14	5.54	7.62	8.56	11											
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5											
TYPE	Seamless																		
MOC	ASTM A 312 TP 316																		
Ends	PE																		
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW																		
Rating	# 3000																		
MOC	ASTM A 182 F 316 U.N.O																		
Elbow	ASME B 16.9																		
Tee	ASME B 16.9																		
Red.	ASME B 16.9																		
Cap	ASME B 16.9																		
Coupl	ASME B 16.9																		
Plug	ASME B 16.9																		
Union																			
Elbowlet	MSS SP 97,ASTM A 182 F316																		
Sockolet	MSS SP 97,ASTM A 182 F316																		
Weldolet	MSS SP 97,ASTM A 182 F316																		
Nipple	MSS SP 97,Same as pipe																		
Swage	MSS SP 95,Same as pipe																		
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	WN																		
MOC	ASTM A 182 F 316																		
FACE	RTJ-Note 8																		
STD.	ASME B 16.5, But welding ends as per ASME B 16.25																		
Spectacle Blind/Spacer Blinds																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC	ASTM A 182 F 316																		
Spectacle	ASME B 16.48																		
Mechanical Joints																			
Stud Bolt	ASTM A 193 Gr. B7																		
Hex Nuts	ASTM A 194 Gr. 2H																		
Gasket	ASME B 16.20,OCT ring of SS316 with Max. Hardness of 120 BHN																		
Pressure-Temperature Rating																			
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g		
60/100	2160				16/38				151.9				3240 psig				227.8 Kg/cm2		
200	1860				93				130.8				Limited by Flange considereing flange as the weakest joint in piping system						
400	1540				204				108.3										
600	1355				316				95.3										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Welded fittings shall be 100% radiographed. 2. All alloy steel stud bolts and nuts shall be not cup galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Contractor use Schedule 80s for sizes less than 1/1/2" for threaded pipe and fittings. 7. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange. 8. RTJ Groove hardness shall be 140 BHN										

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.		2 of 2		
		Piping Class		Material		C.A	Spec.No		Revision: 0	
		E9	# 900	SS 316		Nil	2004A,Rev 9		Page No	60
		Design Code: ASME B 31.3								
		Service: Lub Oil, Seal Oil and Chemical								
0										

Branch Table as per API RP 14E

Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	W	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	W	T	T	T	T	T					
	20	*	*	W	W	W	W	W	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T		
			≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30	
	Branch Pipe																	

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VG-61	VG-102	
Rating	# 1500, SW	# 900, RTJ	

Plug Valve

TAG		
Rating		

Ball Valve

TAG	VB-61	VB-102	
Rating	# 1500, SW	# 900, RTJ	

Globe Valve

TAG	VGL - 61	VGL - 102	
Rating	# 1500, SW	# 900, RTJ	

Check Valve

TAG	VC - 51, Lift Check	VC - 102, Swing Check	
Rating	# 1500, SW	# 900, RTJ	

Needle Valve

TAG		
Rating		


Butter Fly Valve

TAG		
Rating		


Notes Related to Valve and Brach Connection


1. PMS to be read in conjunction with FS 2004 A.

Revision: 0	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2		
					Piping Class					Material			C.A		Spec.No			Revision: 0	
					A 10		# 150			SS 316 L			1.5mm		2004A,Rev 9			Page No. 61	
					<b>Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3</b> <b>Service:</b> Corrosive HydroCarbon Service-Sour Liquid and Vapour. Instrument Gas Header including 1st Bolck Valve														
Pipe Data					ASME B 36.19														
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6		
Sch.	80s	80s	80s	80s	40s	40s	40s	40s	40s										
WTmm	3.73	3.91	4.55	5.04	3.91	5.49	6.02	7.11	8.18										
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5										
TYPE	Seamless																		
MOC	ASTM A 312 TP 316L									ASTM A 358 TP 316L with 100% Radiography.									
Ends	PE				BE														
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14.00	16.00	18	20	22	24		
TYPE	SW				Butt Weld														
Rating	# 3000				40s	40s	40s	40s	40s										
MOC	ASTM A 182 F 316L U.N.O				ASTM A 403 Gr. WP 316L , Seamless														
Elbow	ASMEB16.11				ASME B 16.9														
Tee	ASMEB16.11				ASME B 16.9														
Red.	ASMEB16.11				ASME B 16.9														
Cap	ASMEB16.11				ASME B 16.9														
Coupl	ASMEB16.11				ASME B 16.9														
Plug	ASMEB16.11				ASME B 16.9														
Union																			
Elbowlet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L														
Sockolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L														
Weldolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L														
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe														
Swage	MSS SP 95,Same as pipe				MSS SP 95,Same as pipe														
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				FF Lap Joint (LJ)														
MOC	ASTM A 182 F 316 L				Stub end A 182 F316L + ASTM A 105 Backing flange (While connecting to FF flange use Slip-on(SO),FF, 316L flange														
FACE	RF-Serrated Finished				FF, Serrated Finished														
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25														
Spectacle Blind/Spacer Blinds																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC	ASTM A 182 F 316 L																		
Spectacle	ASME B 16.48											Spacer and blind as per ASME B 16.48							
Mechanical Joints																			
Stud Bolt	ASTM A 193 Gr. B7M																		
Hex Nuts	ASTM A 194 Gr. 2HM																		
Gasket	ASME B 16.20,5mm, SS Spiral wound with CNAF filler																		
Pressure-Temperature Rating																			
Temp.,Deg F	Pressure, PSI				Temp.,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g		
60/100	230				16/38				16.17				350 psig				25 Kg/cm2		
200	195				93				13.7				Limited by Flange considering flange as the weakest joint in piping system						
300	160				149				12.3										
400	145				204				11.25										
500	65				260				10.2										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Welded fittings shall be 100% radiographed. 2. All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Contractor use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings.  7. Minimum sizes shall be 0.75 inch for piping other than air,instrument water and manufacturer's standard piping.										

[illegible]

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION											Sheet No.		1 of 2											
			Piping Class				Material			C.A		Spec.No			Revision: 0												
			B 10		# 300		SS 316 L			1.5mm		2004A,Rev 9			Page No. 63												
			Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																								
			Service	Corrosive HydroCarbon Service-Sour Liquid and Vapour.																							
Pipe Data																		ASME B 36.19									
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273	323.9	355.6	406.4	457.2	508	558.8	609.6										
Sch.	160	160	160	160	40s	40s	40s	40s	40s																		
WTmm	4.77	5.6	6.4	7.14	3.91	5.49	6.02	7.11	8.18																		
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5																		
TYPE	Seamless																										
MOC	ASTM A 312 TP 316L										ASTM A 358 TP 316L with 100% Radiography.																
Ends	PE				BE																						
Fittings Data																											
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14.00	16.00	18	20	22	24										
TYPE	SW				Butt Weld																						
Rating	# 6000				40s	40s	40s	40s	40s																		
MOC	ASTM A 182 F 316L U.N.O				ASTM A 403 Gr. WP 316L , Seamless																						
Elbow	ASMEB16.11				ASME B 16.9																						
Tee	ASMEB16.11				ASME B 16.9																						
Red.	ASMEB16.11				ASME B 16.9																						
Cap	ASMEB16.11				ASME B 16.9																						
Coupl	ASMEB16.11				ASME B 16.9																						
Plug	ASMEB16.11				ASME B 16.9																						
Union																											
Elbowlet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L																						
Sockolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L																						
Weldolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L																						
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe																						
Swage	MSS SP 95,Same as pipe				MSS SP 95,Same as pipe																						
Flange																											
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
TYPE	SW				WN																						
MOC	ASTM A 182 F 316 L				A 182 F316L																						
FACE	RF-Smooth Finished				RF, Smooth Finished																						
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25																						
Spectacle Blind/Spacer Blinds																											
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
MOC	ASTM A 182 F 316 L																										
Spectacle	ASME B 16.48											Spacer and blind as per ASME B 16.48															
Mechanical Joints																											
Stud Bolt	ASTM A 193 Gr. B7M																										
Hex Nuts	ASTM A 194 Gr. 2HM																										
Gasket	ASME B 16.20,5mm, SS 316L Spiral wound with CNAF filler																										
Pressure-Temperature Rating																		Maximum Hydrostatic Pressure									
Temp.,Deg F		Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g													
60/100		600			16/38			42.19			900 psig			63.3 Kg/cm2													
200		505			93			35.51			Limited by Flange considereing flange as the weakest joint in piping system																
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																											
1. Welded fittings shall be 100% radiographed. 2. All alloy steel stud bolts and nuts shall be not cup galvanized or electrogalvanized with minimum coating as per 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Contractor use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings. 7. Minimum sizes shall be 0.75 inch for piping other than air,instrument water and manufacturer's standard piping.																		

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.		2 of 2		
		Piping Class		Material		C.A	Spec.No		Revision: 0	
		B 10	# 300	SS 316 L		1.5mm	2004A,Rev 9		Page No.	64
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3								
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.								
0										

Branch Table as per API RP 14E

Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	W	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T	T
	Branch Pipe																
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30		

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VB-151	
Rating	# 800, SW	# 300, RF

Plug Valve

TAG	
Rating	

Ball Valve

TAG	VB-107	VB-152
Rating	# 800, SW	# 300, RF

Globe Valve

TAG	VGL - 107	VGL - 154
Rating	# 800, SW	# 300, RF

Check Valve

TAG	VC - 107, Lift Check	VC - 154, Swing Check
Rating	# 800, SW	# 300, RF

Needle Valve

TAG	
Rating	

Butter Fly Valve


TAG	
Rating	


Notes Related to Valve and Brach Connection

1. PMS to be read in conjunction with FS 2004 A.

Revision: 0	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By



	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION											Sheet No.		1 of 2	
			Piping Class				Material			C.A		Spec.No			Revision:0		
			D 10		# 600		SS 316 L			1.5mm		2004A,Rev 9			Page No 65		
			Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3														
			Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.												
Pipe Data ASME B 36.19																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6
Sch.	XXS	160	160	160	80s	80s	80s	80s	80s								
WTmm	7.47	5.6	6.4	7.14	5.54	7.62	8.56	10.97	12.7								
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5								
TYPE	Seamless																
MOC	ASTM A 312 TP 316L																
Ends	PE				BE												
Fittings Data																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
TYPE	SW				Butt Weld												
Rating	# 9000	# 6000			80s	80s	80s	80s	80s								
MOC	ASTM A 182 F 316L U.N.O				ASTM A 403 Gr. WP 316L , Seamless												
Elbow	ASMEB16.11				ASME B 16.9												
Tee	ASMEB16.11				ASME B 16.9												
Red.	ASMEB16.11				ASME B 16.9												
Cap	ASMEB16.11				ASME B 16.9												
Coupl	ASMEB16.11				ASME B 16.9												
Plug	ASMEB16.11				ASME B 16.9												
Union																	
Elbowlet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L												
Sockolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L												
Weldolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L												
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe												
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe												
Flange																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
TYPE	SW				WN												
MOC	ASTM A 182 F 316 L				ASTM A 182 F 316 L												
FACE	RF-Smooth Finished				RF, Smooth Finished												
STD.	ASME B 16.5				B 16.5, But welding ends as per B 16.25												
Spectacle Blind/Spacer Blinds																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
MOC	ASTM A 182 F 316 L																
Spectacle	ASME B 16.48																
Mechanical Joints																	
Stud Bolt	ASTM A 193 Gr. B7M																
Hex Nuts	ASTM A 194 Gr. 2HM																
Gasket	ASME B 16.20,5mm, SS 361L Spiral wound with CNAF filler																
Pressure-Temperature Rating																	
Maximum Hydrostatic Pressure																	
Temp.,Deg F	Pressure, PSI				Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g			
60/100	1200				16/38			84.4			1800 psig			126.6 Kg/cm2			
200	1015				93			71.38			Limited by Flange considereing flange as the weakest joint in piping system						
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																	
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be not dip galvanized or electrogalvanized with minimum coating as per enpas 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Contractor use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings. 7. Minimum sizes shall be 0.75 inch for piping other than air,instrument water and manufacturer's standard piping.								

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2	
		Piping Class		Material	C.A	Spec.No	Revision:0	
		D 10	# 600	SS 316 L	1.5mm	2004A_Rev 9	Page No	66
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3						
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.						
0								

Branch Table as per API RP 14E

Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	W	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	W	T	T	T	T	T					
	20	*	*	W	W	W	W	W	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T		
	Branch Pipe																	
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30			

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VG-132	VB-255	
Rating	# 1500, SW	# 900, RTJ FLGD	

Plug Valve

TAG		
Rating		

Ball Valve

TAG	VB-131	VB-258	
Rating	# 800, SW	# 600, RF	

Globe Valve

TAG	VGL - 131	VGL - 255	
Rating	# 800, SW	# 600, RF	

Check Valve

TAG	VC - 131, Lift Check	VC - 255, Swing Check	
Rating	# 800, SW	# 600, RF	

Needle Valve

TAG	VN-111	
Rating	# 800, SW	


Butter Fly Valve


TAG		
Rating		

Notes Related to Valve and Brach Connection

1. PMS to be read in conjunction with FS 2004 A.

Revision:0	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2		
			Piping Class				Material				C.A		Spec.No				Revision:0		
			E 10		# 900		SS 316 L				1.5mm		2004A_Rev 9				Page No 67		
			Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																
			Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.														
Pipe Data			ASME B 36.19																
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6		
Sch.	XXS	160	160	160	160	80s	120	120	100										
WTmm	7.47	5.6	6.4	7.14	8.74	7.62	11.12	14.27	15.1										
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5										
TYPE	Seamless																		
MOC	ASTM A 312 TP 316L																		
Ends	PE				BE														
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				Butt Weld														
Rating	# 9000	# 6000			160	80s	120	120	100										
MOC	ASTM A 182 F 316L U.N.O				ASTM A 403 Gr. WP 316L , Seamless														
Elbow	ASMEB16.11				ASME B 16.9														
Tee	ASMEB16.11				ASME B 16.9														
Red.	ASMEB16.11				ASME B 16.9														
Cap	ASMEB16.11				ASME B 16.9														
Coupl	ASMEB16.11				ASME B 16.9														
Plug	ASMEB16.11				ASME B 16.9														
Union																			
Elbowlet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L														
Sockolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L														
Weldolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L														
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe														
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe														
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				WN														
MOC	ASTM A 182 F 316 L				ASTM A 182 F 316 L														
FACE	RTJ-Note 8				RTJ-Note 8														
STD.	ASME B 16.5				B 16.5, But welding ends as per B 16.25														
Spectacle Blind/Spacer Blinds																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC	ASTM A 182 F 316 L																		
Spectacle	ASME B 16.48																		
Mechanical Joints																			
Stud Bolt	ASTM A 193 Gr. B7M																		
Hex Nuts	ASTM A 194 Gr. 2HM																		
Gasket	ASME B 16.20,OCT ring of SS316 with Max. Hardness of 120 BHN																		
Pressure-Temperature Rating										Maximum Hydrostatic Pressure									
Temp.,Deg F		Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g					
- 20/100		1799.96			-28.8/38			126.55			2700 psig			189.83					
200		1534.98			93			107.92			Limited by Flange considereing flange as the weakest joint in piping system								
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Welded fittings shall be 100% radiographed. 2. All alloy steel stud bolts and nuts shall be not cup galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Contractor use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings. 7. Minimum sizes shall be 0.75 inch for piping other than air,instrument water and manufacturer's standard piping. 8. RTJ groove hardness shall be 140 BHN										

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2	
		Piping Class		Material	C.A	Spec.No	Revision:0	
		E 10	# 900	SS 316 L	1.5mm	2004A_Rev 9	Page No	68
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3						
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.						
0								

Branch Table as per API RP 14E

Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	W	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T	
	Branch Pipe																
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30		

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VB-131	VB-251	
Rating	# 1500, SW	# 900, RF	

Plug Valve

TAG		
Rating		

Ball Valve

TAG	Use Gate Valve	VB-258	
Rating	# 1500, SW	# 900, RTJ FLGD	

Globe Valve

TAG	VGL - 132	VGL - 254	
Rating	# 1500, SW	# 900, RTJ, FLGD	

Check Valve

TAG	VC - 132, Lift Check	VC - 255, Swing Check	
Rating	# 1500, SW	# 900, RTJ, FLGD	

Needle Valve

TAG	VN-112	
Rating	# 1500, SW	

Butter Fly Valve

TAG		
Rating		


  


Notes Related to Valve and Brach Connection

1. PMS to be read in conjunction with FS 2004 A.

Revision:0	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2	
			Piping Class				Material				C.A		Spec.No				Revision:0	
			F 10		# 1500		SS 316 L				1.5mm		2004A_Rev 9				Page No 69	
			Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3															
			Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.													
Pipe Data			ASME B 36.19															
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6	
Sch.	XXS	XXS	XXS	XXS	160	160	160	160	160									
WTmm	7.47	7.8	9.1	10.16	8.74	11.1	13.49	18.26	23									
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5									
TYPE	Seamless																	
MOC	ASTM A 312 TP 316L																	
Ends	PE				BE													
Fittings Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW				Butt Weld													
Rating	# 9000				160	160	160	160	160									
MOC	ASTM A 182 F 316L U.N.O				ASTM A 403 Gr. WP 316L , Seamless													
Elbow	ASMEB16.11				ASME B 16.9													
Tee	ASMEB16.11				ASME B 16.9													
Red.	ASMEB16.11				ASME B 16.9													
Cap	ASMEB16.11				ASME B 16.9													
Coupl	ASMEB16.11				ASME B 16.9													
Plug	ASMEB16.11				ASME B 16.9													
Union																		
Elbowlet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L													
Sockolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L													
Weldolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L													
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe													
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe													
Flange																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW				WN													
MOC	ASTM A 182 F 316 L				ASTM A 182 F 316 L													
FACE	RTJ-Note 8				RTJ-Note 8													
STD.	ASME B 16.5				B 16.5, But welding ends as per B 16.25													
Spectacle Blind/Spacer Blinds																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
MOC	ASTM A 182 F 316 L																	
Spectacle	ASME B 16.48																	
Mechanical Joints																		
Stud Bolt	ASTM A 193 Gr. B7M																	
Hex Nuts	ASTM A 194 Gr. 2HM																	
Gasket	ASME B 16.20,OCT ring of SS316 with Max. Hardness of 120 BHN																	
Pressure-Temperature Rating										Maximum Hydrostatic Pressure								
Temp.,Deg F		Pressure, PSI			Temp.,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g				
- 20/100		2999.7			-28.8/38			210.9			4499.5 psig			316.35				
122		2901.6			50			204			Limited by Flange considereing flange as the weakest joint in piping system							
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																		
1. Welded fittings shall be 100% radiographed. 2. All alloy steel stud bolts and nuts shall be not cup galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Contractor use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings. 7. Minimum sizes shall be 0.75 inch for piping other than air,instrument water and manufacturer's standard piping. 8. RTJ groove hardness shall be 140 BHN									

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2	
		Piping Class		Material	C.A	Spec.No	Revision:0	
		F 10	# 1500	SS 316 L	1.5mm	2004A_Rev 9	Page No	70
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3						
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.						
0								

Branch Table as per API RP 14E

Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	W	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T	
	Branch Pipe																
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30		

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VB-231	VB-351	
Rating	# 2500, SW	# 2500, RF	

Plug Valve

TAG		
Rating		

Ball Valve

TAG	Use Gate Valve	VB-358	
Rating	# 2500, SW	# 2500, RTJ FLGD	

Globe Valve

TAG	VGL - 232	VGL - 354	
Rating	# 2500, SW	# 2500, RTJ, FLGD	

Check Valve

TAG	VC - 232, Lift Check	VC - 355, Swing Check	
Rating	# 2500, SW	# 2500, RTJ, FLGD	

Needle Valve

TAG	VN-212	
Rating	# 2500, SW	

Butter Fly Valve

TAG		
Rating		


  


Notes Related to Valve and Brach Connection

1. PMS to be read in conjunction with FS 2004 A.

Revision:0	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2				
			Piping Class					Material		C.A	Spec.No		Revision : 1						
			A12		# 150			Titanium		Nil	2004A,Rev 9		Page No.	71					
			Design Code:					ASME B 31.3											
Service:		Chemical ( Ferric Chloride),Coagulant																	
Pipe Data			ASME B 36.19 ( BS-1600)																
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3											
Sch.	40	40	40	40	40	40	10	10											
WTmm	2.77	2.87	3.88	3.68	3.91	5.49	3.05	3.4											
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5											
TYPE	Seamless																		
MOC	ASTM B 861 Gr. 2																		
Ends	BE																		
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Butt Welded																		
Rating	2.77	2.87	3.88	3.68	3.91	5.49	3.05	3.4											
MOC	ASTM B 363 Gr. WPT 2																		
Elbow	ASME B 16.9 and ASME B 16.28 for short radius elbow and returns																		
Tee	ASME B 16.9																		
Red.	ASME B 16.9																		
Cap	ASME B 16.9																		
Coupl	ASME B 16.9																		
Plug	ASME B 16.9																		
Union																			
Elbowlet	ASME B 16.9																		
Sockolet																			
Weldolet	MSS SP 97																		
Nipple	MOC Same as pipe																		
Swage	MSS SP95, MOC Same as pipe																		
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Lap Joint Flange / WN Flange																		
MOC	LJ=Inner Flange-B 363 WPT2, Outer Flange A 105 and WN= B 381 Gr. F2																		
FACE	RF																		
STD.	ASME B 16.5																		
Blind Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC	ASTM B 381 Gr. F 2 as per ASME B 16.5																		
Mechanical Joints																			
Stud Bolts	ASTM A 193 Gr. B7 to be used with insulating gasket																		
Hex Nuts	ASTM A 194 Gr. 2H to be used with insulating gasket																		
Gasket	ASME B 16.21,Flat Ring,1.58mm,CNAF																		
Pressure-Temperature Rating			Maximum Hydrostatic Pressure																
Temp.,Deg F	Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g						
347	199			175			14			300 psig			21 Kg/cm2						
										Limited by Flange considering flange as the weakest joint in piping system									
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Pulled cold worked bend shall not be used.																			
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.																			
3. PMS to be read in conjunction with FS 2004 A.																			
4. All flanges are to be epoxy coated for corrosion protection.																			

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2	
		Piping Class		Material	C.A	Spec.No	Revision : 1	
		A12	# 150	Titanium	Nil	2004A,Rev 9	Page No.	72
		Design Code:		ASME B 31.3				
		Service:		Chemical ( Ferric Chloride),Coagulant				
		0						

Branch Table as per API RP 14E

Run Pipe	≤ 1	T													
	1-1.5	T	T												
	2	T	T	T											
	3	W	W	T	T										
	4	W	W	T	T	T									
	6	W	W	W	T	T	T								
		≤ 1	1-1.5	2	3	4	6								
Branch Pipe															


Valve Data	Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																		
TAG																		
Rating																		
Plug Valve																		
TAG																		
Rating																		
Ball Valve																		
TAG						VB-99												
Rating						# 150, RF												
Globe Valve																		
TAG						VGL-99												
Rating						# 150, RF												
Check Valve																		
TAG						VC-99												
Rating						# 150, RF												
Needle Valve																		
TAG						VN-111												
Rating																		
Butter Fly Valve																		
TAG						VN-111												
Rating																		

**Notes Related to Valve and Brach Connection**


- Valve body and seat test pressure shall be as per BS-5146.
- PMS to be read in conjunction with FS 2004 A.


Revision : 1	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By





	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2					
			Piping Class				Material		C.A	Spec.No			Revision: 1							
			A 13		# 150		Copper		Nil	2004A,Rev 9			Page No,	73						
			Design Code: ASME B 31.3																	
		Service: Potable Water - Hot and Cold																		
Pipe Data			ASME B 36.19 ( BS-1600)																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3													
Sch.																				
WTmm	2.72	2.9	3.2	3.81	3.96	5.56	6.35													
M.T (%)																				
TYPE	Seamles Hard Drawn H 80(Regular)				Seamless light Drawn H55(Regular)															
MOC	ASTM B 42 UNS C1 2200				ASTM B 42 UNS C1 2200															
Ends	BE																			
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Brazed Fittings					Butt Welded														
Rating	2.72	2.9	3.2	3.81	3.96	5.56	6.35													
MOC	ASTM B 124 UNS C1 1000					ASTM B 42 UNS C1 2200														
Elbow																				
Tee																				
Red.																				
Cap																				
Coupl																				
Plug																				
Union																				
Elbowlet																				
Sockolet																				
Weldolet																				
Nipple																				
Swage																				
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Slip on composite					WN Composite														
MOC	Innner Flange B 61, Outer Flange A 105(Galv.Epoxy coated)																			
FACE	FF																			
STD.	ISO-7005-3																			
Blind Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM A 105 With 3mm copper over lay																			
Mechanical Joints																				
Stud Bolt	ASTM A 193 Gr. B7 to be used with insulating gasket																			
Hex Nuts	ASTM A 194 Gr. 2H to be used with insulating gasket																			
Gasket	ASME B 16.21,Flat Ring,2mm,CNAF																			
Pressure-Temperature Rating																				
Temp.,Deg F		Pressure, PSI			Temp.,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g						
194		227			90			16			340			24 Kg/cm2						
											Limited by Flange considering flange as the weakest joint in piping system									
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Threading on piping is not allowed. Only screwed fittings shall be used for vents and drains. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. PMS to be read in conjunction with FS 2004 A. 4. Whereever there is connection between CS and copper,scrficial spool and electrical isolation kit i.e. insulating gaskets shall be used.									5. For flanged valves FF valves are to be used for sizes 2" and above. FF solid slip on # 150 flanges conforming to ASTM B 124 shall be used.											


[illegible]

	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2		
					Piping Class				Material			C.A	Spec.No			Revision : 0			
					AILN		# 150		LTCS-NACE			3mm	2004A_Rev 9			Page No,	75		
					Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3														
Service:					Corrosive HydroCarbon Service-Sour Liquid and Vapour (Low temperature).														
Pipe Data																			
ASME B 36.10																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6		
Sch.	XXS	160	160	160	80	80	80	80	Std.	Std.	Std.	Std.	Std.						
WTmm	7.47	5.56	6.35	7.14	5.54	7.62	8.56	10.97	8.18	9.27	9.52	9.52	9.52						
M.T (%)	12.5	12.5	11.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5						
TYPE	Seamless																		
MOC	ASTM A 333 Gr.6																		
Ends	PE							BE											
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Socket Weld				Butt Weld														
Rating	# 9000	# 6000			80	80	80	80	Std.	Std.	Std.	Std.	Std.						
MOC	ASTM A 350 Gr. LF2 U.N.O				ASTM A 420 Gr. WPL6, Seamless U.N.O														
Elbow	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Tee	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Red.	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Cap	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Coupl	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Plug	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Union																			
Elbowlet	MSS SP 97,ASTM A 350 Gr. LF2				MSS SP 97,ASTM A 350 Gr. LF2								MSS SP 97,ASTM A 350 Gr. LF2						
Sockolet	MSS SP 97,ASTM A 350 Gr. LF2				MSS SP 97,ASTM A 350 Gr. LF2								MSS SP 97,ASTM A 350 Gr. LF2						
Weldolet	MSS SP 97,ASTM A 350 Gr. LF2				MSS SP 97,ASTM A 350 Gr. LF2								MSS SP 97,ASTM A 350 Gr. LF2						
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe								MOC Same as pipe						
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe								MSS SP 95,MOC Same as pipe						
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				WN														
MOC	ASTM A 350 Gr. LF2				ASTM A 350 Gr. LF2														
FACE	RF-Serrated Finished				RF, Serrated Finished														
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25														
Spectacle Blind/Spacer Blinds																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC	ASTM A 350 Gr. LF2																		
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48						
Mechanical Joints																			
Stud Bolts	ASTM A 320 Gr. L7				ASTM A 320 Gr. L7														
Hex Nuts	ASTM A 194 Gr. 4				ASTM A 194 Gr.4														
Gasket	ASME B 16.21,Flat Ring,1.58mm,CNAF				ASME B 16.21,Flat Ring,1.58mm,CNAF														
Pressure-Temperature Rating																			
Maximum Hydrostatic Pressure																			
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g		
(-) 50 to 100	285				(-) 45 to 38				20				450 psig				31.6 Kg/cm2		
200	260				93				18.3				Limited by Flange considereing flange as the weakest joint in piping system						
300	230				149				16.2										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Welded fittings shall be 100% radiographed.								5. PMS to be read in conjunction with FS 2004 A and all the requirement of MR-01-75/ISO-15156-1/2/3 to complied. 6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified spectacle blinds. 7. In instrument gas lines - Use this specification for main Header and SS316L piping for Sub Header. Presssure-temperature rating of SS316L shall compatible to this piping class and both shall comply all the requirement of MR-01-75/ISO-15156-1/2/3											
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.																			
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.																			
4. All pipe thread shall be as per ASME B 1.20.1																			

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No. <b>2 of 2</b>											
		Piping Class		Material	C.A	Spec.No	Revision : 0										
		AILN	# 150	LTCS-NACE	3mm	2004A,Rev 9	Page No, 76										
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3 Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour (Low temperature). 0															
Branch Table as per API RP 14E																	
Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*														
	3	*	*		T	T											
	4	*	*		T	T	T										
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	T	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T	
	Branch Pipe																
Valve Data Size(in) 0.5 0.75 1 1.5 2 3 4 6 8 10 12 14 16 18 20 22 24 Gate Valve TAG VG 45N,SW VG 65N,FLANGED Rating # 800 # 150,RF Plug Valve TAG Rating Ball Valve TAG VB 45N,SW and VB 107N,SW (Note-5) VB 65N, Lever Operated VB **, Gear Operated Rating # 800 # 150, RF Globe Valve TAG VGL 45N,SW VGL 65N Rating # 800 # 150, RF Check Valve TAG VC 45N,SW,Lift Check VC 65N,Swing Check/ VC 82N (Wafer Check, Note -1) Rating # 800 # 150, RF Needle Valve TAG VN 9N,SW Rating # 800 Butter Fly Valve TAG Rating																	
Notes Related to Valve and Brach Connection 1. Wafer check valve to be avoided as far as possible; unless the available space constraint does not allow normal check valve. The contractor to take approval for use of wafer check Valve during pipe routing after establishing the space constraint. 2. Wafer type Butter Fly Valve may be used only in fire water( Clean water) service. 3. PMS to be read in conjunction with FS 2004 A. 4. Maximum temperature limit for all Ball Valve shall be 121 Degree C 5. In instrument gas lines - Use VB -45 for main Header and VB-107 for Sub Header. The MOC of VB-107 shall be SS-316L as per VMS and comply all the requirement of MR-01-75/ISO-15156-1/2/3																	
Revision : 0	22/7/2009	Issued For Bid				PS	GJ	GRP									
Revision	Date	Description				Prepared By	Reviewed By	Approved By									


	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2					
			Piping Class				Material				C.A		Spec.No		Revision: 0							
			A 22		# 150		SS 316 L		Nil		2004A,Rev 9		Page No.		77							
			Design Code:				ASME B 31.3															
Service:				Chemical																		
Pipe Data			ASME B 36.19																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24					
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6					
Sch.	40s	40s	40s	40s	10s	10s	10s	10s														
WTmm	2.77	2.87	3.38	3.68	2.77	3.05	3.05	3.4														
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5														
TYPE	Seamless																					
MOC	ASTM A 312 TP 316L																					
Ends	PE				BE																	
Fittings Data																						
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24					
TYPE	PE				Butt Weld																	
Rating	# 3000				10s	10s	10s	10s														
MOC	ASTM A 182 F 316L U.N.O				ASTM A 403 Gr. WP 316L., Seamless																	
Elbow	ASMEB16.11				ASME B 16.9																	
Tee	ASMEB16.11				ASME B 16.9																	
Red.	ASMEB16.11				ASME B 16.9																	
Cap	ASMEB16.11				ASME B 16.9																	
Coupl	ASMEB16.11				ASME B 16.9																	
Plug	ASMEB16.11				ASME B 16.9																	
Union																						
Elbowlet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L																	
Sockolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L																	
Weldolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L																	
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe																	
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe																	
Flange																						
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24					
TYPE	SW				Lap Joint (LJ)																	
MOC	ASTM A 182 F 316 L				Stub end A 182 F316L. + ASTM A 105 Backing flange (While connecting to FF flange use Slip -on(SO),FF, F 316L flange																	
FACE	RF-Serrated Finished				RF, Serrated Finished																	
STD.	ASME B 16.5				B 16.5, But welding ends as per B 16.25																	
Spectacle Blind/Spacer Blinds																						
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24					
MOC	ASTM A 182 F 316 L																					
Spectacle	ASME B 16.48																					
Mechanical Joints																						
Stud Bolts	ASTM A 193 Gr. B7																					
Hex Nuts	ASTM A 194 Gr. 2H																					
Gasket	ASME B 16.20,5mm, SS Spiral wound with CNAF filler																					
Pressure-Temperature Rating																						
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Maximum Hydrostatic Pressure									
60/100	230				16/38				16.17				Pressure, psig									
200	195				93				13.7				Pres.,Kg/cm2g									
300	160				149				12.3				350 psig									
400	145				204				11.25				25 Kg/cm2									
500	65				260				10.2				Limited by Flange considereing flange as the weakest joint in piping system									
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																						
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Contractor use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings. 7. Minimum sizes shall be 0.75 inch for piping other than air,instrument water and manufacturer's standard piniping.													


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.		2 of 2									
		Piping Class		Material		C.A		Spec.No									
		A 22		# 150		Nil		2004A,Rev 9									
		Design Code:		ASME B 31.3													
		Service:		Chemical													
0																	
Branch Table as per API RP 14E																	
Run Pipe	≤ 1	T									LEGEND * Sockolet W Weldolet T TEE						
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	T	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T	
Branch Pipe																	
Valve Data																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																	
TAG	VB-131				VB-151												
Rating	# 800, SW				# 150, RF												
Plug Valve																	
TAG																	
Rating																	
Ball Valve																	
TAG	VB-131				VB-151												
Rating	# 800, SW				# 150, RF												
Globe Valve																	
TAG	VGL - 131				VGL - 151												
Rating	# 800, SW				# 150, RF												
Check Valve																	
TAG	VC - 131, Lift Check				VC - 151, Swing Check												
Rating	# 800, SW				# 150, RF												
Needle Valve																	
TAG	VN-111																
Rating	# 800, SW																
Butter Fly Valve																	
TAG																	
Rating																	
Notes Related to Valve and Brach Connection 1. PMS to be read in conjunction with FS 2004 A.																	
Revision: 0		04-08-2008		Issued For Bid				PS		GJ		GRP					
Revision		Date		Description				Prepared By		Reviewed By		Approved By					

	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2		
					Piping Class				Material		C.A		Spec.No		Revision: 1				
					B 22		# 300		SS 316 L		Nil		2004A,Rev 9		Page No. 79				
					Design Code: ASME B 31.3														
				Service: Chemical															
Pipe Data					ASME B 36.19														
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6		
Sch.	40s	40s	40s	40s	10s	10s	10s	40s											
WTmm	2.77	2.87	3.38	3.68	2.77	3.05	3.05	7.11											
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5											
TYPE	Seamless																		
MOC	ASTM A 312 TP 316L																		
Ends	PE				BE														
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				Butt Weld														
Rating	# 3000				10s	10s	10s	40s											
MOC	ASTM A 182 F 316L U.N.O				ASTM A 403 Gr. WP 316L, Seamless														
Elbow	ASMEB16.11				ASME B 16.9														
Tee	ASMEB16.11				ASME B 16.9														
Red.	ASMEB16.11				ASME B 16.9														
Cap	ASMEB16.11				ASME B 16.9														
Coupl	ASMEB16.11				ASME B 16.9														
Plug	ASMEB16.11				ASME B 16.9														
Union																			
Elbowlet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L														
Socketlet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L														
Weldolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L														
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe														
Swage	MSS SP 95,Same as pipe				MSS SP 95,MOC Same as pipe														
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				Lap Joint (LJ)														
MOC	ASTM A 182 F 316 L				Stub end A182 F 316L + ASTM A 105 Backing flange (While connecting to FF flange use Slip -on(SO),FF, F 316L flange														
FACE	RF-Smooth Finished				RF, Smooth Finished														
STD.	ASME B 16.5				B 16.5, But welding ends as per B 16.25														
Spectacle Blind/Spacer Blinds																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC					ASTM A 182 F 316 L														
Spectacle					ASME B 16.48														
Mechanical Joints																			
Stud Bolts					ASTM A 193 Gr. B7														
Hex Nuts					ASTM A 194 Gr. 2H														
Gasket					ASME B 16.20,5mm, SS Spiral wound with CNAF filler														
Pressure-Temperature Rating																			
Temp.,Deg F		Pressure, PSI		Temp.,Deg C		Pressure, Kg/cm2		Pressure, psig		Pres.,Kg/cm2g									
60/100		600		16/38		42.19		900 psig		63.3 Kg/cm2									
200		505		93		35.51		Limited by Flange considering flange as the weakest joint in piping system											
Notes Related to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.								6. Contractor use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings. 7. Minimum sizes shall be 0.75 inch for piping other than air,instrument water and manufacturer's standard piping.											





	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2					
		Piping Class				Material				C.A		Spec.No		Revision:2							
		D 22		# 600		SS 316 L				Nil		2004A,Rev 9		Page No. 81							
		Design Code:				ASME B 31.3															
Service:				Chemical																	
Pipe Data		ASME B 36.19																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24				
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6				
Sch.	40s	40s	40s	80s	40s	40s	40s	80s													
WTmm	2.77	2.87	3.38	5.08	3.91	5.49	6.02	10.97													
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5													
TYPE	Seamless																				
MOC	ASTM A 312 TP 316L																				
Ends	PE				BE																
Fittings Data																					
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24				
TYPE	SW				Butt Weld																
Rating	# 3000		# 6000		40s	40s	40s	80s													
MOC	ASTM A 182 F 316L U.N.O				ASTM A 403 Gr. WP 316L , Seamless																
Elbow	ASMEB16.11				ASME B 16.9																
Tee	ASMEB16.11				ASME B 16.9																
Red.	ASMEB16.11				ASME B 16.9																
Cap	ASMEB16.11				ASME B 16.9																
Coupl	ASMEB16.11				ASME B 16.9																
Plug	ASMEB16.11				ASME B 16.9																
Union																					
Elbowlet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L																
Socketlet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L																
Weldolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L																
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe																
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe																
Flange																					
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24				
TYPE	SW				WN																
MOC	ASTM A 182 F 316 L				ASTM A 182 F 316 L																
FACE	RF-Smooth Finished				RF, Smooth Finished																
STD.	ASME B 16.5				B 16.5, But welding ends as per B 16.25																
Spectacle Blind/Spacer Blinds																					
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24				
MOC	ASTM A 182 F 316 L																				
Spectacle	ASME B 16.48																				
Mechanical Joints																					
Stud Bolt	ASTM A 193 Gr. B7																				
Hex Nuts	ASTM A 194 Gr. 2H																				
Gasket	ASME B 16.20,5mm, SS Spiral wound with CNAF filler																				
Pressure-Temperature Rating																					
Temp.,Deg F	Pressure, PSI				Temp.Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g				
60/100	1200				16/38				84.4				1800 psig				126.6 Kg/cm2				
200	1015				93				71.38				Limited by Flange considering flange as the weakest joint in piping system								
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																					
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Contractor use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings. 7. Minimum sizes shall be 0.75 inch for piping other than air,instrument water and manufacturer's standard piping.												

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION						Sheet No.		2 of 2		
		Piping Class			Material		C.A	Spec.No		Revision:2		
		D 22		# 600		SS 316 L		Nil	2004A,Rev 9		Page No. 82	
		Design Code:						ASME B 31.3				
		Service:						Chemical				
0												

Branch Table as per API RP 14E

Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	W	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	W	T	T	T	T	T					
	20	*	*	W	W	W	W	W	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T		
	Branch Pipe																	
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30			


Valve Data


Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																	
TAG	VB-131				VB-251												
Rating	# 800, SW				# 600, RF												
Plug Valve																	
TAG																	
Rating																	
Ball Valve																	
TAG	VB-131				VB-258												
Rating	# 800, SW				# 600, RF												
Globe Valve																	
TAG	VGL - 131				VGL - 255												
Rating	# 800, SW				# 600, RF												
Check Valve																	
TAG	VC - 131, Lift Check				VC - 255, Swing Check												
Rating	# 800, SW				# 600, RF												
Needle Valve																	
TAG	VN-111																
Rating	# 800, SW																
Butter Fly Valve																	
TAG																	
Rating																	

Notes Related to Valve and Brach Connection

1. PMS to be read in conjunction with FS 2004 A.

Revision:2	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2	
			Piping Class				Material				C.A		Spec.No				Revision:0	
			E 22		#900		SS 316 L				Nil		2004A_Rev 9				Page No 83	
			Design Code: ASME B 31.3															
			Service: Chemical															
Pipe Data																		
ASME B 36.19																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6	
Sch.	80s	80s	80s	160	80s	80s	80s	80s										
WTmm	3.73	3.9	4.6	7.14	5.54	7.62	8.56	10.97										
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5										
TYPE	Seamless																	
MOC	ASTM A 312 TP 316L																	
Ends	PE				BE													
Fittings Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW				Butt Weld													
Rating	# 3000		# 6000		80s	80s	80s	80s										
MOC	ASTM A 182 F 316L U.N.O				ASTM A 403 Gr. WP 316L , Seamless													
Elbow	ASMEB16.11				ASME B 16.9													
Tee	ASMEB16.11				ASME B 16.9													
Red.	ASMEB16.11				ASME B 16.9													
Cap	ASMEB16.11				ASME B 16.9													
Coupl	ASMEB16.11				ASME B 16.9													
Plug	ASMEB16.11				ASME B 16.9													
Union																		
Elbowlet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L													
Sockolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L													
Weldolet	MSS SP 97				MSS SP 97,ASTM A 182 F 316L													
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe													
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe													
Flange																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW				WN													
MOC	ASTM A 182 F 316 L				ASTM A 182 F 316 L													
FACE	RTJ-Note 8				RTJ-Note 8													
STD.	ASME B 16.5				6.5, But welding ends as per B 16.25													
Spectacle Blind/Spacer Blinds																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
MOC	ASTM A 182 F 316 L																	
Spectacle	ASME B 16.48																	
Mechanical Joints																		
Stud Bolt	ASTM A 193 Gr. B7																	
Hex Nuts	ASTM A 194 Gr. 2H																	
Gasket	ME B 16.20,OCT ring of SS316L with Max. Hardness of 120 BHN																	
Pressure-Temperature Rating																		
Temp.,Deg F		Pressure, PSI		Temp,Deg C		Pressure, Kg/cm2		Pressure, psig		Pres.,Kg/cm2g								
- 20/100		1799.96		-28.8/38		126.55		2700 psig		189.83								
200		1534.98		93		107.92		Limited by Flange considereing flange as the weakest joint in piping system										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																		
1. Welded fittings shall be 100% radiographed. 2. All alloy steel stud bolts and nuts shall be not cup galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for approval. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A.									6. Contractor use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings. 7. Minimum sizes shall be 0.75 inch for piping other than air,instrument water and manufacturer's standard piping. 8. RTJ groove hardness shall be 140 BHN									

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2		
		Piping Class		Material	C.A	Spec.No		Revision:0	
		E 22	#900	SS 316 L	Nil	2004A,Rev 9		Page No	84
		Design Code:				ASME B 31.3			
		Service:	Chemical						
		0							

Branch Table as per API RP 14E

Run Pipe	≤1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	W	T	T	T	T	T	T			
	20	*	*	W	W	W	W	W	T	T	T	T	T	T	T		
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T	T	
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T	T
	≤1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30		
Branch Pipe																	

LEGEND	
*	Sockolet
W	Weldolet
T	TEE


Valve Data


Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																	
TAG	VG-132				VB-255												
Rating	# 1500, SW				# 900, RTJ FLGD												
Plug Valve																	
TAG																	
Rating																	
Ball Valve																	
TAG	Use Gate Valve				VB-258												
Rating	# 1500, SW				# 900, RTJ FLGD												
Globe Valve																	
TAG	VGL - 132				VGL - 254												
Rating	# 1500, SW				# 900, RTJ, FLGD												
Check Valve																	
TAG	VC - 132, Lift Check				VC - 255, Swing Check												
Rating	# 1500, SW				# 900, RTJ, FLGD												
Needle Valve																	
TAG	VN-112																
Rating	# 1500, SW																
Butter Fly Valve																	
TAG																	
Rating																	

#### Notes Related to Valve and Brach Connection

1. PMS to be read in conjunction with FS 2004 A.

Revision:0	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2			
			Piping Class				Material				C.A		Spec.No				Revision: 2			
			A23		# 150		DSS-NACE				Nil		2004A,Rev 9				Page No  85			
			Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																	
Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.																		
Pipe Data			ASME B 36.10																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	40s	40s	40s	40s	10s	10s	10s	10s	10s	10s	10s	10s	10s	10s	10s	10s	10s			
WTmm	2.77	2.87	3.38	3.68	2.77	3.05	3.05	3.4	3.76	4.19	4.57	4.77	4.77	4.77	5.54	5.54	6.35			
M.T (%)	12.5	12.5	5.0	6.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5			
TYPE	Seamless									Welded (Longitudinally) with 100% radiography										
MOC	ASTM A 790 Gr. S 32205									ASTM A 790 Gr. 32205										
Ends	PE				BE															
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weld															
Rating	# 3000				10s	10s	10s	10s	10s	10s	10s	10s	10s	10s	10s	10s	10s			
MOC	ASTM A 182 Gr. F60				ASTM A 815 Gr.WP-S U.N.S 32205					ASTM A 815 Gr.WP-WX U.N.S 32205										
Elbow	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Tee	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Red.	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Cap	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Coupl	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Plug	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Union																				
Elbowlet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Sockolet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Weldolet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60										
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60										
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW				WN															
MOC	ASTM A 182 Gr. F60				ASTM A 182 Gr. F60															
FACE	RF,Serrated Finished				RF,Serrated Finished															
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25															
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM A 182 Gr. F60																			
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48							
Mechanical Joints																				
Stud Bolts	ASTM A 453 Gr. 660 CL A																			
Hex Nuts	ASTM A 453 Gr. 660 CL A																			
Gasket	ASME B 16.20 , 5mm thick Duplex SS Spiral wound gasket with CNAF filler																			
Pressure-Temperature Rating			Maximum Hydrostatic Pressure																	
Temp.,Deg F		Pressure, PSI			Temp.Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g						
60 to 100		290			16 to 38			20.4			435 psig			30.6 Kg/cm2						
200		260			93			18.3			Limited by Flange considereing flange as the weakest joint in piping system									
250		245			121			17.2												
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to comnany for review and annoval 2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange, specified spectacle blinds and 3. All pipe thread shall be as per ASME B 1.20.1 4. PMS to be read in conjunction with FS 2004 A. 5. Weld Joint Factor for welded pipe shall be as per ASME B 31.3					6. Contractor to use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings.  7. Material shall comply heat treatment requirement of NACE MR 01 75/ISO-15156-3 inadditon to the requirement of this material standard. 8. Allowable stress considered for this material shall be based on testing and actual evaluation of allowable stress of the material within the temperature range for which this material is to be used.. 9. Thickness indicated is for reference only. To be finalized based on Note- 7,8 above.															

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION										Sheet No.		2 of 2	
		Piping Class				Material			C.A	Spec.No			Revision: 2		
		A23		# 150		DSS-NACE			Nil	2004A,Rev 9			Page No	86	
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3													
Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.													
0															

Branch Table as per API RP 14E																		
Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T	T								
	12	*	*	W	W	W	T	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T	T					
	18	*	*	W	W	W	W	W	T	T	T	T	T	T				
	20	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
24	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T			
30	*	*	W	W	W	W	W	W	W	W	W	T	T	T	T	T	T	
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30		
Branch Pipe																		


Valve Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
Gate Valve																		
TAG	VG 133,SW				VG 158,FLANGED													
Rating	# 800				# 150,RF													
Plug Valve																		
TAG																		
Rating																		
Ball Valve																		
TAG	VB 133,SW				VB 165, Lever Operated													
Rating	# 800				# 150,RF													
Globe Valve																		
TAG	VGL 133,SW				VGL 158													
Rating	# 800				# 150,RF													
Check Valve																		
TAG	VC 133,SW,Lift Check				VC 159,Swing Check													
Rating	# 800				# 150,RF													
Needle Valve																		
TAG	VN 103,SW																	
Rating	# 800																	
Butter Fly Valve																		
TAG																		
Rating																		


Notes Releted to Valve and Brach Connection

1. PMS to be read in conjunction with FS 2004 A.


2. Maximum temperature limit for all Ball Valve shall be 121 Degree C


Revision: 2	15.01.16	Issued For Bid										PS		AKM		SJ	
Revision	Date	Description										Prepared By		Reviewed By		Approved By	


	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2	
					Piping Class				Material		C.A	Spec.No		Revision: 2				
					B23		# 300		DSS-NACE		Nil	2004A,Rev 9		Page No.	87			
					Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3													
Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.																
ASME B 36.19																		
Pipe Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6	
Sch.	40s	40s	40s	40s	40s	10s	10s	10s	10s	10s	20	10	10	20	20	20	20	
WTmm	2.77	2.87	3.38	3.68	3.91	3.05	3.05	3.4	3.76	4.19	6.35	6.35	6.35	7.92	9.52	9.52	9.53	
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	
TYPE	Seamless										Welded (Longitudinally) with 100% radiography							
MOC	ASTM A 790 Gr. S 32205										ASTM A 790 Gr. 32205			ASTM A 928 Class 1 ,Gr. 32205(Note-6,7,8)				
Ends	PE					BE												
Fittings Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	Socket Weld					Butt Weld												
Rating	# 3000					10s	10s	10s	10s	10s	10s	20	10	10	20	20	20	
MOC	ASTM A 182 Gr. F60					ASTM A 815 Gr.WP-S U.N.S 32205					ASTM A 815 Gr.WP-WX U.N.S 32205							
Elbow	ASMEB16.11					ASME B 16.9					ASME B 16.9							
Tee	ASMEB16.11					ASME B 16.9					ASME B 16.9							
Red.	ASMEB16.11					ASME B 16.9					ASME B 16.9							
Cap	ASMEB16.11					ASME B 16.9					ASME B 16.9							
Coupl	ASMEB16.11					ASME B 16.9					ASME B 16.9							
Plug	ASMEB16.11					ASME B 16.9					ASME B 16.9							
Union																		
Elbowlet	MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60							
Sockolet	MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60							
Weldolet	MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60							
Nipple	MSS SP 97,Same as pipe					MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60							
Swage	MSS SP 95,Same as pipe					MSS SP 95, MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60							
Flange																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW					WN												
MOC	ASTM A 182 Gr. F60					ASTM A 182 Gr. F60												
FACE	RF,Smooth Finished					RF,Smooth Finished												
STD.	ASME B 16.5					ASME B 16.5, But welding ends as per ASME B 16.25												
Spectacle Blind/Spacer Blinds																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
MOC	ASTM A 182 Gr. F60																	
Spectacle	ASME B 16.48					ASME B 16.48					Spacer and blind as per ASME B 16.48							
Mechanical Joints																		
Stud Bolts	ASTM A 453 Gr. 660 CL A																	
Hex Nuts	ASTM A 453 Gr. 660 CL A																	
Gasket	ASME B 16.20 , 5mm thick Duplex SS Spiral wound gasket with CNAF filler																	
Pressure-Temperature Rating																		
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g	
60 to 100	750				16 to 38				52.74				1125 psig				79.1 Kg/cm2	
200	720				93				50.63				Limited by Flange considereing flange as the weakest joint in piping system					
250	692.5				121				48.69									
302	664				150				46.69									
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																		
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									6. Contractor to use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings.									
2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange, specified spectacle blinds and flanges.									7. Material shall comply heat treatment requirement of NACE MR 01 75/ISO-15156-3 inadditon to the requirement of this material standard.									
3. All pipe thread shall be as per ASME B 1.20.1									8. Allowable stress considered for this material shall be based on testing and actual evaluation of allowable stress of the material within the temperature range for which this material is to be used..									
4. PMS to be read in conjunction with FS 2004 A.									9. Thickness indicated is for reference only. To be finalized based on Note- 7,8 above.									
5. Weld Joint Factor for welded pipe shall be as per ASME B 31.3																		


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2											
		Piping Class		Material		C.A	Spec.No											
		B23	# 300	DSS-NACE		Nil	2004A,Rev 9											
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.																
Branch Table as per API RP 14E																		
Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	W	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	T	T	T	T	T	T					
	20	*	*	W	W	W	W	T	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	T	T	T	T	T	T	T			
	30	*	*	W	W	W	W	W	W	T	T	T	T	T	T	T		
Branch Pipe																		
Valve Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
Gate Valve																		
TAG	VG 133,SW				VG 159,FLANGED													
Rating	# 800				# 300,RF													
Plug Valve																		
TAG																		
Rating																		
Ball Valve																		
TAG	VB 133,SW				VB 166													
Rating	# 800				# 300,RF													
Globe Valve																		
TAG	VGL 133,SW				VGL 159													
Rating	# 800				# 300,RF													
Check Valve																		
TAG	VC 133,SW,Lift Check				VC 159,Swing Check													
Rating	# 800				# 300,RF													
Needle Valve																		
TAG	VN 103,SW																	
Rating	# 800																	
Butter Fly Valve																		
TAG																		
Rating																		
Notes Releted to Valve and Brach Connection 1. PMS to be read in conjunction with FS 2004 A. 2. Maximum temperature limit for all Ball Valve shall be 121 Degree C																		
Revision: 2		15.01.16		Issued For Bid				PS		AKM		SJ						
Revision		Date		Description				Prepared By		Reviewed By		Approved By						





	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2						
					Piping Class				Material			C.A		Spec.No			Revision: 2						
					D23		# 600		DSS-NACE			Nil		2004A,Rev 9			Page No 89						
					Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																		
Service:					Corrosive HydroCarbon Service-Sour Liquid and Vapour.																		
Pipe Data																							
ASME B 36.19																							
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24						
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6						
Sch.	40s	40s	40s	40s	10s	10s	40s	40s	40s	40s	40s	40	40	40	40	60	60						
WTmm	2.77	2.87	3.38	3.68	2.77	3.05	6.02	7.11	8.18	9.27	9.52	11.12	12.7	14.27	15.08	22.22	24.61						
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5						
TYPE	Seamless										Welded (Longitudinally) with 100% radiography												
MOC	ASTM A 790 Gr. S 32205										ASTM A 928 Class 1,Gr. 32205 (Note-6,7,8)												
Ends	PE					BE																	
Fittings Data																							
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24						
TYPE	Socket Weld										Butt Weld												
Rating	# 3000										10s	10s	40s	40s	40s	40s	40s	40	40	40	40	60	60
MOC	ASTM A 182 Gr. F60				ASTM A 815 Gr.WP-S U.N.S 32205					ASTM A 815 Gr.WP-WX U.N.S 32205													
Elbow	ASMEB16.11				ASME B 16.9					ASME B 16.9													
Tee	ASMEB16.11				ASME B 16.9					ASME B 16.9													
Red.	ASMEB16.11				ASME B 16.9					ASME B 16.9													
Cap	ASMEB16.11				ASME B 16.9					ASME B 16.9													
Coupl	ASMEB16.11				ASME B 16.9					ASME B 16.9													
Plug	ASMEB16.11				ASME B 16.9					ASME B 16.9													
Union																							
Elbowlet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60													
Sockolet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60													
Weldolet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60													
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60													
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60													
Flange																							
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24						
TYPE	SW				WN																		
MOC	ASTM A 182 Gr. F60				ASTM A 182 Gr. F60																		
FACE	RF,Smooth Fininished				RF,Smooth Fininished																		
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25																		
Spectacle Blind/Spacer Blinds																							
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24						
MOC	ASTM A 182 Gr. F60																						
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48										
Mechanical Joints																							
Stud Bolt	ASTM A 453 Gr. 660 CL A																						
Hex Nuts	ASTM A 453 Gr. 660 CL A																						
Gasket	ASME B 16.20 , 5mm thick Duplex SS Spiral wound gasket with CNAF filler																						
Pressure-Temperature Rating																							
Maximum Hydrostatic Pressure																							
Temp.,Deg F		Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g									
60 to 100		1500			16 to 38			105.5			2250 psig			158.2 Kg/cm2									
200		1440			93			101.24			Limited by Flange considereing flange as the weakest joint in piping system												
250		1385			121			97.38															
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																							
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.										5. Contractor to use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings.													
2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange, specified spectacle blinds and flanges.										6. Material shall comply heat treatment requirement of NACE MR 01 75/ISO-15156-3 inaddition to the requirement of this material standard.													
3. All pipe thread shall be as per ASME B 1.20.1										7. Allowable stress considered for this material shall be based on testing and actual evaluation of allowable stress of the material within the temperature range for which this material is to be used..													
4. PMS to be read in conjunction with FS 2004 A.										8. Thickness indicated is for reference only. To be finalized based on Note- 7 above.													
5. Weld Joint Factor for welded pipe shall be as per ASME B 31.3																							

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2																				
		Piping Class		Material		C.A	Spec.No																				
		D23	# 600	DSS-NACE		Nil	2004A,Rev 9																				
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																									
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.																									
Branch Table as per API RP 14E																											
Run Pipe	≤ 1	T								LEGEND * Sockolet W Weldolet T TEE																	
	1-1.5	T	T																								
	2	*	*	T																							
	3	*	*	T	T																						
	4	*	*	T	T	T																					
	6	*	*	W	T	T	T																				
	8	*	*	W	W	T	T	T																			
	10	*	*	W	W	W	T	T	T																		
	12	*	*	W	W	W	T	T	T	T																	
	14	*	*	W	W	W	W	T	T	T	T																
	16	*	*	W	W	W	W	T	T	T	T	T															
	18	*	*	W	W	W	W	W	T	T	T	T	T														
	20	*	*	W	W	W	W	W	T	T	T	T	T	T													
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T												
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T											
	Branch Pipe																										
	Valve Data																										
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
Gate Valve																											
TAG	VG 133,SW							VG 160,FLANGED																			
Rating	# 800							# 600,RF																			
Plug Valve																											
TAG																											
Rating																											
Ball Valve																											
TAG	VB 133,SW							VB 167																			
Rating	# 800							# 600,RF																			
Globe Valve																											
TAG	VGL 133,SW							VGL 160																			
Rating	# 800							# 600,RF																			
Check Valve																											
TAG	VC 133,SW Lift Check							VC 160,Swing Check																			
Rating	# 800							# 600,RF																			
Needle Valve																											
TAG	VN 103,SW																										
Rating	# 800																										
Butter Fly Valve																											
TAG																											
Rating																											
Notes Related to Valve and Brach Connection 1. PMS to be read in conjunction with FS 2004 A. 2. Maximum temperature limit for all Ball Valve shall be 121 Degree C																											
Revision: 2      15.01.16      Issued For Bid      PS      AKM      SJ Revision      Date      Description      Prepared By      Reviewed By      Approved By																											

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2				
		Piping Class				Material				C.A		Spec.No				Revision:3				
		E23		# 900		DSS-NACE				Nil		2004A,Rev 9				Page No, 91				
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																		
		Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.																
ASME B 36.19																				
Pipe Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	40s	40s	80s	80s	80s	40s	40s	40s	60	80s	60	60	80	60	80	80	80			
Wtmm	2.77	2.87	4.55	5.08	5.54	5.49	6.02	7.11	10.31	12.7	14.27	15.09	21.44	19.05	26.19	28.57	30.96			
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5			
TYPE	Seamless									Welded (Longitudinally) with 100% radiography										
MOC	ASTM A 790 Gr. S 32205									ASTM A 928 Class 1,Gr. 32205 (Note-9,10,11)										
Ends	PE				BE															
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weld															
Rating	# 3000		# 6000		80s	40s	40s	40s	60	80s	60	60	80	80	80	80	80			
MOC	ASTM A 182 Gr. F60				ASTM A 815 Gr.WP-S U.N.S 32205					ASTM A 815 Gr.WP-WX U.N.S 32205										
Elbow	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Tee	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Red.	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Cap	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Coupl	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Plug	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Union																				
Elbowlet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Sockolet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Weldolet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60										
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60										
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW																			
MOC	ASTM A 182 Gr. F60																			
FACE	RTJ-Note 7																			
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25															
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM A 182 Gr. F60																			
Spectacle	ASME B 16.48				ASME B 16.48					Spacer and blind as per ASME B 16.48										
Mechanical Joints																				
Stud Bolts	ASTM A 453 Gr. 660 CL A																			
Hex Nuts	ASTM A 453 Gr. 660 CL A																			
Gasket	ASTM B 16.20,OCT ring of UNS S 32205 with Max. Hardness of 22 HRC																			
Pressure-Temperature Rating									Maximum Hydrostatic Pressure											
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
60 to 100	2250				16 to 38				158.2				3375 psig				237.3 Kg/cm2			
200	2160				93				151.9				Limited by Flange considereing flange as the weakest joint in piping system							
250	2077.5				121				146.1											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Welded fittings shall be 100% radiographed. 2. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 3. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and WNRTJ flanges above 3" size and specified spectacle blind. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A. 6. Gasket Contact Surface shall have maximum roughness of 63AARH 7. RTJ groove hardness shall be 24 -25 HRC									8. Octagonal (OCT) ring shall be of UNS S 32205. 9. Material shall comply heat treatment requirement of NACE MR 01 75/ISO-15156-3 inaddition to the requirement of this material standard. 10. Allowable stress considered for this material shall be based on testing and actual evaluation of allowable stress of the material within the temperature range for which this material is to be used.. 11. Thickness indicated is for reference only. To be finalized based on Note- 10 above. 12. To use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings. 13. Weld Joint Factor for welded pipe shall be as per ASME B 31.3											

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2																						
		Piping Class		Material	C.A	Spec.No	Revision:3																						
		E23	# 900	DSS-NACE	Nil	2004A,Rev 9	Page No. 92																						
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3 Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour. 0																											
Branch Table as per API RP 14E																													
Run Pipe	≤ 1	T																											
	1-1.5	T	T																										
	2	*	*	T																									
	3	*	*	T	T																								
	4	*	*	T	T	T																							
	6	*	*	W	T	T	T																						
	8	*	*	W	W	T	T	T																					
	10	*	*	W	W	W	T	T	T																				
	12	*	*	W	W	W	T	T	T	T																			
	14	*	*	W	W	W	W	T	T	T	T																		
	16	*	*	W	W	W	W	T	T	T	T	T																	
	18	*	*	W	W	W	W	W	T	T	T	T	T																
	20	*	*	W	W	W	W	W	T	T	T	T	T	T															
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T														
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T	T												
	Branch Pipe																												
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30													
Valve Data																													
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24												
Gate Valve																													
TAG	VG 134,SW				VG 161,FLANGED																								
Rating	# 1500				# 900,RTJ																								
Plug Valve																													
TAG																													
Rating																													
Ball Valve																													
TAG	Use VG 134,SW				VB 168																								
Rating	# 1500				# 900,RTJ																								
Globe Valve																													
TAG	VGL 134,SW				VGL 161																								
Rating	# 1500				# 900,RTJ																								
Check Valve																													
TAG	VC 134,SW,Lift Check				VC 161,Swing Check																								
Rating	# 1500				# 900,RTJ																								
Needle Valve																													
TAG	VN 104,SW																												
Rating	# 1500																												
Butter Fly Valve																													
TAG																													
Rating																													
<b>Notes Related to Valve and Brach Connection</b> 1. PMS to be read in conjunction with FS 2004 A. 2. Maximum temperature limit for all Ball Valve shall be 121 Degree C																													
<table border="1"> <tr> <td>Revision:3</td> <td>15.01.16</td> <td>Issued For Bid</td> <td>PS</td> <td>AKM</td> <td>SJ</td> </tr> <tr> <td>Revision</td> <td>Date</td> <td>Description</td> <td>Prepared By</td> <td>Reviewed By</td> <td>Approved By</td> </tr> </table>																		Revision:3	15.01.16	Issued For Bid	PS	AKM	SJ	Revision	Date	Description	Prepared By	Reviewed By	Approved By
Revision:3	15.01.16	Issued For Bid	PS	AKM	SJ																								
Revision	Date	Description	Prepared By	Reviewed By	Approved By																								

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION											Sheet No.		1 of 2				
			Piping Class				Material				C.A		Spec.No			Revision:0				
			F23		# 1500		DSS-NACE				Nil		2004A,Rev 9			Page No. 93				
			Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																	
			Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.																	
ASME B 36.19																				
Pipe Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	80s	80s	80s	160	80s	80s	80s	120	120	120	120	120	120	120	120	120	120			
Wtmm	3.73	3.91	4.55	7.14	5.54	7.62	8.56	14.27	18.26	21.44	25.4	27.7	30.96	34.92	38.1	41.27	46.02			
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5			
TYPE	Seamless									Welded (Longitudinally) with 100% radiography										
MOC	ASTM A 790 Gr. S 32205									ASTM A 928 Class 1,Gr. 32205 (Note-9,10,11)										
Ends	PE				BE															
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weld															
Rating	# 3000		# 6000		80s	80s	80s	120	120	120	120	120	120	120	120	120	120			
MOC	ASTM A 182 Gr. F60				ASTM A 815 Gr.WP-S U.N.S 32205					ASTM A 815 Gr.WP-WX U.N.S 32205										
Elbow	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Tee	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Red.	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Cap	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Coupl	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Plug	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Union																				
Elbowlet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Sockolet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Weldolet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60										
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60										
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW				WN															
MOC	ASTM A 182 Gr. F60				ASTM A 182 Gr. F60															
FACE	RTJ-Note 7				RTJ, Note 7															
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25															
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM A 182 Gr. F60																			
Spectacle	ASME B 16.48				ASME B 16.48						Spacer and blind as per ASME B 16.48									
Mechanical Joints																				
Stud Bolts	ASTM A 453 Gr. 660 CL A																			
Hex Nuts	ASTM A 453 Gr. 660 CL A																			
Gasket	ASME B 16.20,OCT ring of UNS S 32205 with Max. Hardness of 22 HRC																			
Pressure-Temperature Rating									Maximum Hydrostatic Pressure											
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
60 to 100	3750.7				16 to 38				263.7				5626.8 psig				395.6 Kg/cm2			
122	3750.7				50				263.7				Limited by Flange considering flange as the weakest joint in piping system							
212	3673.9				100				258.3											
302	3329.7				150				234.1											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Welded fittings shall be 100% radiographed.									8. Octagonal (OCT) ring shall be of UNS S 32205.											
2. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									9. Material shall comply heat treatment requirement of NACE MR 01 75/ISO-15156-3 in addition to the requirement of this material standard.											
3. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and WNRTJ flanges above 3" size and specified sneetacle blind.									10. Allowable stress considered for this material shall be based on testing and actual evaluation of allowable stress of the material within the temperature range for which this material is to be used..											
4. All pipe thread shall be as per ASME B 1.20.1									11. Thickness indicated is for reference only. To be finalized based on Note- 10 above.											
5. PMS to be read in conjunction with FS 2004 A.									12. To use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings.											
6. Gasket Contact Surface shall have maximum roughness of 63AARH									13. Weld Joint Factor for welded pipe shall be as per ASME B 31.3											
7. RTJ groove hardness shall be 24 -25 HRC																				

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2	
		Piping Class		Material	C.A	Spec.No	Revision:0	
		F23	# 1500	DSS-NACE	Nil	2004A,Rev 9	Page No.	94
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3 Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour. 0						

Branch Table as per API RP 14E

Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	W	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	W	T	T	T	T	T					
	20	*	*	W	W	W	W	W	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T	T	T

LEGEND	
*	Sockolet
W	Weldolet
T	TEE

	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30
	Branch Pipe														

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VG 144,SW	VG 171,FLANGED
Rating	# 2500	#1500,RTJ

Plug Valve

TAG		
Rating		

Ball Valve

TAG	Use VG 144,SW	VB 178
Rating	# 2500	# 1500,RTJ

Globe Valve

TAG	VGL 144,SW	VGL 171
Rating	# 2500	# 1500,RTJ

Check Valve

TAG	VC 144,SW,Lift Check	VC 171,Swing Check
Rating	# 2500	# 1500,RTJ

Needle Valve

TAG	VN 204,SW	
Rating	# 2500	


Butter Fly Valve


TAG		
Rating		

Notes Related to Valve and Brach Connection


1. PMS to be read in conjunction with FS 2004 A.
2. Maximum temperature limit for all Ball Valve shall be 121 Degree C


Revision:0	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By


	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2			
			Piping Class				Material				C.A		Spec.No		Revision:0					
			G23		# 2500		DSS-NACE				Nil		2004A,Rev 9		Page No. 95					
			Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																	
			Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.																	
Pipe Data																				
ASME B 36.19																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	160	160	160	XXS	160	160	160	XXS	160	160	160	160	160	160	160	160	160			
Wtmm	4.77	5.56	6.35	10.16	8.74	11.12	13.49	21.95	23.01	28.57	33.32	35.71	40.49	45.24	50.01	53.97	59.54			
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	5.0	4.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0			
TYPE	Seamless									Welded (Longitudinally) with 100% radiography										
MOC	ASTM A 790 Gr. S 32205									ASTM A 928 Class 1,Gr. 32205 (Note-9,10,11)										
Ends	PE				BE															
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weld															
Rating	# 6000		# 9000		160	160	160	XXS	160	160	160	160	160	160	160	160	160			
MOC	ASTM A 182 Gr. F60				ASTM A 815 Gr.WP-S U.N.S 32205					ASTM A 815 Gr.WP-WX U.N.S 32205										
Elbow	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Tee	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Red.	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Cap	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Coupl	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Plug	ASMEB16.11				ASME B 16.9					ASME B 16.9										
Union																				
Elbowlet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Sockolet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Weldolet	MSS SP 97,ASTM A 182 Gr. F60				MSS SP 97,ASTM A 182 Gr. F60					MSS SP 97,ASTM A 182 Gr. F60										
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60										
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe					MSS SP 97,ASTM A 182 Gr. F60										
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW				WN															
MOC	ASTM A 182 Gr. F60				ASTM A 182 Gr. F60															
FACE	RTJ-Note 7				RTJ, Note 7															
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25															
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM A 182 Gr. F60																			
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48							
Mechanical Joints																				
Stud Bolts	ASTM A 453 Gr. 660 CL A																			
Hex Nuts	ASTM A 453 Gr. 660 CL A																			
Gasket	ASME B 16.20,OCT ring of UNS S 32205 with Max. Hardness of 22 HRC																			
Pressure-Temperature Rating										Maximum Hydrostatic Pressure										
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
60 to 100	6249.7				16 to 38				439.4				9374.6 psig				659.1 Kg/cm2			
122	6249.7				50				439.4				Limited by Flange considereing flange as the weakest joint in piping system							
212	6123.1				100				430.5											
302	5549.9				150				390.2											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Welded fittings shall be 100% radiographed. 2. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 3. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and WNRTJ flanges above 3" size and specified spectacle blind. 4. All pipe thread shall be as per ASME B 1.20.1 5. PMS to be read in conjunction with FS 2004 A. 6. Gasket Contact Surface shall have maximum roughness of 63AARH 7. RTJ groove hardness shall be 24 -25 HRC										8. Octagonal (OCT) ring shall be of UNS S 32205. 9. Material shall comply heat treatment requirement of NACE MR 01 75/ISO-15156-3 inaddition to the requirement of this material standard. 10. Allowable stress considered for this material shall be based on testing and actual evaluation of allowable stress of the material within the temperature range for which this material is to be used.. 11. Thickness indicated is for reference only. To be finalized based on Note- 10 above. 12. To use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings. 13. Weld Joint Factor for welded pipe shall be as per ASME B 31.3										


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2																																									
		Piping Class		Material	C.A	Spec.No	Revision:0																																									
		G23	# 2500	DSS-NACE	Nil	2004A,Rev 9	Page No.	96																																								
		Design Code: ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																																														
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.																																														
0																																																
Branch Table as per API RP 14E																																																
Run Pipe	≤ 1	T																																														
	1-1.5	T	T																																													
	2	*	*	T																																												
	3	*	*	T	T																																											
	4	*	*	T	T	T																																										
	6	*	*	W	T	T	T																																									
	8	*	*	W	W	T	T	T																																								
	10	*	*	W	W	W	T	T	T																																							
	12	*	*	W	W	W	T	T	T	T																																						
	14	*	*	W	W	W	W	T	T	T	T																																					
	16	*	*	W	W	W	W	T	T	T	T	T																																				
	18	*	*	W	W	W	W	W	T	T	T	T	T																																			
	20	*	*	W	W	W	W	W	T	T	T	T	T	T																																		
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T																																	
	30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T	T	T																														
	<div style="float: right; border: 1px solid black; padding: 5px;"> LEGEND  * Sockolet  W Weldolet  T TEE </div>																																															
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>≤ 1</td> <td>1-1.5</td> <td>2</td> <td>3</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> <td>12</td> <td>14</td> <td>16</td> <td>18</td> <td>20</td> <td>24</td> <td>30</td> </tr> <tr> <td colspan="15">Branch Pipe</td> </tr> </table>																			≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30	Branch Pipe													
≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30																																		
Branch Pipe																																																
Valve Data																																																
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24																															
Gate Valve																																																
TAG	VG 144,SW				VG 381,FLANGED																																											
Rating	# 2500				#2500,RTJ																																											
Plug Valve																																																
TAG																																																
Rating																																																
Ball Valve																																																
TAG	Use VG 144,SW				VB 388																																											
Rating	# 2500				# 2500,RTJ																																											
Globe Valve																																																
TAG	VGL 144,SW				VGL 381																																											
Rating	# 2500				# 2500,RTJ																																											
Check Valve																																																
TAG	VC 144,SW,Lift Check				VC 381,Swing Check																																											
Rating	# 2500				# 2500,RTJ																																											
Needle Valve																																																
TAG	VN 204,SW																																															
Rating	# 2500																																															
Butter Fly Valve																																																
TAG																																																
Rating																																																
<b>Notes Related to Valve and Brach Connection</b> 1. PMS to be read in conjunction with FS 2004 A. 2. Maximum temperature limit for all Ball Valve shall be 121 Degree C																																																
Revision:0	15.01.16	Issued For Bid							PS	AKM			SJ																																			
Revision	Date	Description							Prepared By	Reviewed By			Approved By																																			



	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION										Sheet No.	1 of 2						
		Piping Class				Material				C.A	Spec.No	Revision: 0							
		A15		# 150		Incoloy 825				Nil	2004A, Rev 9	Page No.	97						
		Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/23																	
Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.																	
Pipe Data																			
ASME B 36.10																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6		
Sch.	40s	40s	40s	40s	10s	10s	10s	10s											
W/Tmm	2.77	2.87	3.38	3.68	2.77	3.05	3.05	3.40											
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	5.0	5.0	5.0	5.0	5.0	5.0		
TYPE	Seamless											Welded pipe from clad plate. Note -5							
MOC	ASTM B 423 UNSN08825 Cold finished Annealed											ASTM B 423 UNSN8825						API 5L Gr.B Pipe with Incoly cladding. Note 7	
Ends	PE														BE				
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Socket Weld				Butt Weld														
Rating	# 3000				10s	10s	10s	10s											
MOC	ASTM B 564 UNS N08825				ASTM B 366 WP NIC MC S UNS N08825								ASTM A 234 WPB with cladding min. 3mm. Note 8						
Elbow	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Tee	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Red.	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Cap	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Coupl	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Plug	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Union																			
Elbowlet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note8						
Socketlet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note8						
Weldolet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note8						
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe								MOC Same as pipe						
Swage Flange	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe								MSS SP 95, MOC Same as pipe						
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				WN								WN						
MOC	ASTM B 564 UNS N08825				ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note8						
FACE	RF,Serrated Finished				RF,Serrated Finished														
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25														
Spectacle Blind/Spacer Blinds																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC	ASTM B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48						
Mechanical Joints																			
Stud Bolt	ASTM A 453 Gr. 660 CL A																		
Hex Nuts	ASTM A 453 Gr. 660 CL A																		
Gasket	ASME B 16.20 , 5mm thick Duplex SS Spiral wound gasket with CNAF filler																		
Pressure-Temperature Rating																			
Temp.,Deg F	Pressure, PSI				Temp.,Deg C				Pressure, Kg/cm2				Maximum Hydrostatic Pressure Pressure, psig				Pres.,Kg/cm2g		
(-) 20 to 100	290				(-) 29 to 38				20.3				435psig				31 Kg/cm2		
200	260				93				18.3				Limited by Flange considering flange as the weakest joint in piping system						
300	230				149				16.2										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.																			
2. Two jackcrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified flange and spectacle blind.																			
3. All pipe thread shall be as per ASME B 1.20.1																			
4. PMS to be read in conjunction with FS 2004 A.																			
5. Only the base material thickness shall be considered.																			
6. Pipe sizes 8" to 12" shall be hotfinished annealed ( Solution annealed), pickled and end shall be bevelled. Allwable stress to be established for the temperature range based on actual evaluation after testing .																			
7. For sizes 14" and above welded pipe of clad plate with 100% radiography to be used. Cladding of minimum 3mm shall be done with Incoloy 825 or Inconell 625 on API 5L Gr. B pipe.																			
8. Cladding shall be weld over lay type with Incoly 825 or Inconel 625 of min. 3mm																			
9. To use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings.																			

		Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		2 of 2		
				Piping Class		Material		C.A		Spec.No		Revision: 0						
				A15		# 150		Incoloy 825		Nil		2004A,Rev 9		Page No. 98				
				Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3														
				Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.												
0																		
Branch Table as per API RP 14E																		
Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	W	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	W	T	T	T	T	T					
	20	*	*	W	W	W	W	W	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T			
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30			
Valve Data																		
Branch Pipe																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
Gate Valve																		
TAG	VG 105,SW				VG 111,FLANGED													
Rating	# 800				# 150,RF													
Plug Valve																		
TAG																		
Rating																		
Ball Valve																		
TAG	VB 105,SW				VB 111, Flanged													
Rating	# 800				# 150,RF													
Globe Valve																		
TAG	VGL 104,SW				VGL 111,flanged													
Rating	# 800				# 150,RF													
Check Valve																		
TAG	VC 104,SW,Lift Check				VC 111,Swing Check													
Rating	# 800				# 150,RF													
Needle Valve																		
TAG	VN 105,SW																	
Rating	# 800																	
Butter Fly Valve																		
TAG																		
Rating																		
Notes Releted to Valve and Brach Connection																		
1. PMS to be read in conjunction with FS 2004 A.																		
2. Maximum temperature limit for all Ball Valve shall be suitable to maximum temperature of the project.																		

	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2											
					Piping Class				Material			C.A		Spec.No			Revision: 0											
					B15		# 300		Incoloy 825			Nil		2004A,Rev 9			Page No  99											
					Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																							
					Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.																							
Pipe Data																			ASME B 36.10									
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6											
Sch.	40s	40s	40s	40s	10s	10s	10s	10s																				
WTmm	2.77	2.87	3.38	3.68	2.77	3.05	3.05	3.40																				
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	5.0	5.0	5.0	5.0	5.0	5.0											
TYPE	Seamless											Welded pipe from clad plate. Note -5																
MOC	ASTM B 423 UNSN08825 Cold fininished Annealed								ASTM B 423 UNSN8825			API 5L Gr.B Pipe with Incoly cladding, Note 7																
Ends	PE				BE																							
Fittings Data																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
TYPE	Socket Weld				Butt Weld																							
Rating	# 3000				10s	10s	10s	10s																				
MOC	ASTM B 564 UNS N08825				ASTM B 366 WP NIC MC S UNS N08825							ASTM A 234 WPB with cladding min. 3mm. Note 8																
Elbow	ASMEB16.11				ASME B 16.9							ASME B 16.9																
Tee	ASMEB16.11				ASME B 16.9							ASME B 16.9																
Red.	ASMEB16.11				ASME B 16.9							ASME B 16.9																
Cap	ASMEB16.11				ASME B 16.9							ASME B 16.9																
Coupl	ASMEB16.11				ASME B 16.9							ASME B 16.9																
Plug	ASMEB16.11				ASME B 16.9							ASME B 16.9																
Union																												
Elbowlet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note8																
Socketlet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note8																
Weldolet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note8																
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe							MOC Same as pipe																
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe							MSS SP 95, MOC Same as pipe																
Flange																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
TYPE	SW				WN							WN																
MOC	ASTM B 564 UNS N08825				ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note8																
FACE	RF,Smooth Finished				RF,Smooth Finished																							
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25																							
Spectacle Blind/Spacer Blinds																												
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24											
MOC	ASTM B 564 UNS N08825																											
Spectacle	ASME B 16.48				ASME B 16.48							Spacer and blind as per ASME B 16.48																
Mechanical Joints																												
Stud Bolt	ASTM A 453 Gr. 660 CL A																											
Hex Nuts	ASTM A 453 Gr. 660 CL A																											
Gasket	ASME B 16.20 , 5mm thick Duplex SS Spiral wound gasket with CNAF filler																											
Pressure-Temperature Rating										Maximum Hydrostatic Pressure																		
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig			Pres.,Kg/cm2g												
(-) 20 to 100	750				(-) 29 to 38				52.8				1125psig			80 Kg/cm2												
200	750				93				52.8				Limited by Flange considering flange as the weakest joint in piping system															
300	730				149				51.3																			
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																												
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									6. Pipe sizes 8" to 12" shall be hotfininished annealed ( Solution annealed), pickled and end shall be bevelled. Allwable stress to be established for the temperature range based on actual evaluation after testing .																			
2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified flange and spectacle blind.									7. For sizes 14" and above welded pipe of clad plate with 100% radio graphy to be used. Cladding of minimum 3mm shall be done with Incoloy 825 or Inconell 625 on API 5L Gr. B pipe.																			
3. All pipe thread shall be as per ASME B 1.20.1																												
4. PMS to be read in conjunction with FS 2004 A.									8. Cladding shall be weld over lay type with Incoly 825 or Inconel 625 of min. 3mm																			
5. Only the base material thickness shall be considered.									9. To use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings.																			

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2	
		Piping Class		Material	C.A	Spec.No	Revision: 0	
		B15	# 300	Incoloy 825	Nil	2004A,Rev 9	Page No.	100
		Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3						
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.						
0								

Branch Table as per API RP 14E

Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T	T								
	12	*	*	W	W	W	T	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T	T						
	16	*	*	W	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	W	T	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T	T	

LEGEND	
*	Sockolet
W	Weldolet
T	TEE

	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30
Branch Pipe															

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VG 105,SW	VG 113,FLANGED
Rating	# 800	# 300,RF

Plug Valve

TAG		
Rating		

Ball Valve

TAG	VB 105,SW	VB 113,
Rating	# 800	# 300,RF

Globe Valve

TAG	VGL 104,SW	VGL 113
Rating	# 800	# 300,RF

Check Valve

TAG	VC 104,SW,Lift Check	VC 113,Swing Check
Rating	# 800	# 300,RF

Needle Valve

TAG	VN 105,SW	
Rating	# 800	


Butter Fly Valve


TAG		
Rating		

Notes Releted to Valve and Brach Connection

1. PMS to be read in conjunction with FS 2004 A.
2. Maximum temperature limit for all Ball Valve shall be suitable to maximum temperature of the project.

Revision: 0	22/7/2009	Issued For Bid	PS	GJ	GRP
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2					
			Piping Class				Material				C.A		Spec.No		Revision:1					
			D15		# 600		Incoloy 825				Nil		2004A,Rev 9		Page No. 101					
			Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																	
			Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.																	
ASME B 36.10																				
Pipe Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	40s	40s	40s	80s	10s	30	30	40s												
WTmm	2.77	2.87	3.38	5.08	2.77	4.78	4.78	7.11												
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	5.0	5.0	5.0	5.0	5.0	5.0			
TYPE	Seamless											Welded pipe from clad plate. Note -5								
MOC	ASTM B 423 UNSN08825 Cold finished Annealed								ASTM B 423 UNSN8825		API 5L Gr.B Pipe with Incoly cladding. Note 7									
Ends	PE				BE															
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weld															
Rating	# 3000				10s	30	30	40s												
MOC	ASTM B 564 UNS N08825				ASTM B 366 WP NIC MC S UNS N08825								ASTM A 234 WPB with cladding min. 3mm. Note 8							
Elbow	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Tee	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Red.	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Cap	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Coupl	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Plug	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Union																				
Elbowlet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note8							
Sockolet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note8							
Weldolet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note8							
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe								MOC Same as pipe							
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe								MSS SP 95, MOC Same as pipe							
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW				WN								WN							
MOC	ASTM B 564 UNS N08825				ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note8							
FACE	RF,Smooth Finished				RF,Smooth Finished															
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25															
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM B 564 UNS N08825																			
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48							
Mechanical Joints																				
Stud Bolts	ASTM A 453 Gr. 660 CL A																			
Hex Nuts	ASTM A 453 Gr. 660 CL A																			
Gasket	ASME B 16.20 , 5mm thick Duplex SS Spiral wound gasket with CNAF filler																			
Pressure-Temperature Rating																				
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
(-) 20 to 100	1500				(-) 29 to 38				105.4				2250psig				158.2 Kg/cm2			
200	1500				93				105.4				Limited by Flange considereing flange as the weakest joint in piping system							
300	1455				149				102.3											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified flange and spectacle blind. 3. All pipe thread shall be as per ASME B 1.20.1 4. PMS shall be read in conjunction with FS 2004 A. 5. Only the base material thickness shall be considered.								6. Pipe sizes 8" to 12" shall be hotfurnished annealed ( Solution annealed), pickled and end shall be bevelled. Allwable stress to be established for the temperature range based on actual evaluation after testing . 7. For sizes 14" and above welded pipe of clad plate with 100% radiography to be used. Cladding of minimum 3mm shall be done with Incoloy 825 or Inconell 625 on API 5L Gr. B pipe. 8. Cladding shall be weld over lay type with Incoly 825 or Inconel 625 of min. 3mm 9. To use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings.												

	Offshore Design Section Engineering Services ISO-9001:2000	<b>PIPING MATERIAL SPECIFICATION</b>				Sheet No.	<b>2 of 2</b>			
		Piping Class		Material		C.A	Spec.No		Revision:1	
		D15	# 600	Incoloy 825		Nil	2004A,Rev 9		Page No.	102
		<b>Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3</b>								
Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.								
0										

Branch Table as per API RP 14E

Run Pipe	≤ 1	T															
	1-1.5	T	T														
	2	*	*	T													
	3	*	*	T	T												
	4	*	*	T	T	T											
	6	*	*	W	T	T	T										
	8	*	*	W	W	T	T	T									
	10	*	*	W	W	W	T	T	T								
	12	*	*	W	W	W	T	T	T	T							
	14	*	*	W	W	W	W	T	T	T	T						
	16	*	*	W	W	W	W	T	T	T	T	T					
	18	*	*	W	W	W	W	W	T	T	T	T	T				
	20	*	*	W	W	W	W	W	T	T	T	T	T	T			
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T		
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T	
			≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30

Branch Pipe

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VG 105,SW	VG 115,FLANGED
Rating	# 800	# 600,RF

Plug Valve

TAG		
Rating		

Ball Valve

TAG	VB 105,SW	VB 115,
Rating	# 800	# 600,RF

Globe Valve

TAG	VGL 104,SW	VGL 115
Rating	# 800	# 600,RF

Check Valve

TAG	VC 104,SW,Lift Check	VC 115,Swing Check
Rating	# 800	# 600,RF

Needle Valve

TAG	VN 105,SW	
Rating	# 800	

Butter Fly Valve

TAG		
Rating		


**Notes Related to Valve and Brach Connection**


1. PMS to be read in conjunction with FS 2004 A.

2. Maximum temperature limit for all Ball Valve shall be suitable to maximum temperature of the project.

Revision:1	22/7/2009	Issued For Bid	PS	GJ	GRP
Revision	Date	Description	Prepared By	Reviewed By	Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2					
			Piping Class				Material			C.A	Spec.No		Revision: 1							
			E15		# 900		Incoloy 825			Nil	2004A,Rev 9		Page No.	103						
			Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3 Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.																	
Pipe Data																				
ASME B 36.10																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	80s	80s	80s	80s	40s	40s	Std.	80s												
WTmm	3.73	3.91	4.55	5.08	3.91	5.49	6.02	10.97												
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	5.0	5.0	5.0	5.0	5.0	5.0			
TYPE	Seamless											Welded pipe from clad plate. Note -5								
MOC	ASTM B 423 UNSN08825 Cold finished Annealed								ASTM B 423 UNSN8825			API 5L Gr.B Pipe with Incoly cladding, Note 7								
Ends	PE				BE															
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weld															
Rating	# 9000				40s	40s	Std.	80s												
MOC	ASTM B 564 UNS N08825				ASTM B 366 WP NIC MC S UNS N08825							ASTM A 234 WPB with cladding min. 3mm. Note 8								
Elbow	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Tee	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Red.	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Cap	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Coupl	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Plug	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Union																				
Elbowlet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note8								
Sockolet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note8								
Weldolet	MSS SP 97,B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note8								
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe							MOC Same as pipe								
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe							MSS SP 95, MOC Same as pipe								
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW				WN							WN								
MOC	ASTM B 564 UNS N08825				ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note8								
FACE	RTJ-Note 8				RTJ-Note 8															
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25															
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM B 564 UNS N08825																			
Spectacle	ASME B 16.48				ASME B 16.48							Spacer and blind as per ASME B 16.48								
Mechanical Joints																				
Stud Bolts	ASTM A 453 Gr. 660 CL A																			
Hex Nuts	ASTM A 453 Gr. 660 CL A																			
Gasket	ASME B 16.20,OCT ring of UNS S 32205 with Max. Hardness of 22 HRC. Gasket contact surface roughness max. 63 AARH.																			
Pressure-Temperature Rating																				
Maximum Hydrostatic Pressure																				
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
(- ) 20 to 100	2250				(-) 29 to 38				158.1				3375psig				237.2 Kg/cm2			
200	2250				93				158.1				Limited by Flange considering flange as the weakest joint in piping system							
300	2185				149				153.6											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and 2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified flange and spectacle blind. 3. All pipe thread shall be as per ASME B 1.20.1 4. PMS to be read in conjunction with FS 2004 A. 5. Only the base material thickness shall be considered.								6. Pipe sizes 8" to 12" shall be hotfurnished annealed ( Solution annealed), pickled and end shall be bevelled. Allwable stress to be established for the temperature range based on actual evaluation after testing . 7. For sizes 14" and above welded pipe of clad plate with 100% radiography shall be used. Cladding of minimum 3mm shall be done with Incoloy 825 or Inconell 625 on API 5L Gr. B pipe. 8. RTJ groove hardness shall be 35 HRC. 9. Cladding shall be weld over lay type with Incoly 825 or Inconel 625 of min. 3mm												

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION										Sheet No.		2 of 2	
		Piping Class				Material				C.A		Spec.No		Revision: 1	
		E15		# 900		Incoloy 825				Nil		2004A,Rev 9		Page No. 104	
		Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3													
Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.													
		0													

Branch Table as per API RP 14E																			
Run Pipe	≤ 1	T																	
	1-1.5	T	T																
	2	*	*	T															
	3	*	*	T	T														
	4	*	*	T	T	T													
	6	*	*	W	T	T	T												
	8	*	*	W	W	T	T	T											
	10	*	*	W	W	T	T	T											
	12	*	*	W	W	T	T	T	T										
	14	*	*	W	W	W	W	T	T	T	T								
	16	*	*	W	W	W	W	T	T	T	T	T							
	18	*	*	W	W	W	W	W	T	T	T	T	T						
	20	*	*	W	W	W	W	W	T	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T	T			
30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T	T			

LEGEND																	
*	Sockolet																
W	Weldolet																
T	TEE																

Branch Pipe																	
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30		

Valve Data																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24

Gate Valve																	
TAG	VG 107,SW				VG 117,FLANGED												
Rating	# 1500				# 900,RTJ												

Plug Valve																	
TAG																	
Rating																	

Ball Valve																	
TAG	VB 107,SW				VB 117,												
Rating	# 1500				# 900,RTJ												

Globe Valve																	
TAG	VGL 106,SW				VGL 117												
Rating	# 1500				# 900,RTJ												

Check Valve																	
TAG	VC 106,SW,Lift Check				VC 117,Swing Check												
Rating	# 1500				# 900,RTJ												

Needle Valve																	
TAG	VN 107,SW																
Rating	# 1500																

Butter Fly Valve																	
TAG																	
Rating																	


Notes Releted to Valve and Brach Connection


1. PMS to be read in conjuction with FS 2004 A.


2. Maximum temperature limit for all Ball Valve shall be suitable to maximum temperature of the project.


Revision: 1	15.01.16	Issued For Bid										PS		AKM		SJ	
Revision	Date	Description										Prepared By		Reviewed By		Approved By	



	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2					
			Piping Class				Material				C.A		Spec.No		Revision: 1					
			XG15		# 5000 API		Incoloy 825				Nil		2004A, Rev 9		Page No. 105					
			Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3,API 6A																	
			Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.															
ASME B 36.10																				
Pipe Data																				
Size(in)	0.5	0.75	1	1.5	2 1/16	3 1/8	4 1/16	7 1/16	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	80s	80s	80s	160	160	160	160	XXS												
WTmm	3.73	3.91	4.55	7.14	8.74	11.13	13.49	10.97												
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	5.0	5.0	5.0	5.0	5.0	5.0			
TYPE	Seamless											Welded pipe from clad plate. Note -5								
MOC	ASTM B 423 UNSN08825 Cold finished Annealed								ASTM B 423 UNSN8825				API 5L Gr.B Pipe with Incoly cladding, Note 7							
Ends	PE				BE															
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld							Butt Weld												
Rating	# 9000																			
MOC	ASTM B 564 UNS N08825				ASTM B 366 WP NIC MC S UNS N08825								ASTM A 234 WPB with cladding min. 3mm. Note 9							
Elbow	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Tee	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Red.	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Cap	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Coupl	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Plug	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Union																				
Elbowlet	MSS SP 97, B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note9							
Socketlet	MSS SP 97, B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note9							
Weldolet	MSS SP 97, B 564 UNS N08825				MSS SP 97,ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note9							
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe								MOC Same as pipe							
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe								MSS SP 95, MOC Same as pipe							
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW				WN								WN							
MOC	ASTM B 564 UNS N08825				ASTM B 564 UNS N08825								MSSSP 97,ASTMA105 ,cladding min.3mm.Note9							
FACE	RTJ-Note 8				RTJ-Note 8															
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25															
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM B 564 UNS N08825																			
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48							
Mechanical Joints																				
Stud Bolts	ASTM A 453 Gr. 660 CL A																			
Hex Nuts	ASTM A 453 Gr. 660 CL A																			
Gasket	ASME B 16.20,OCT ring of UNS S 32205 with Max. Hardness of 22 HRC. Gasket contact surface roughness max. 63 AARH.																			
Pressure-Temperature Rating																				
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
60 to 100	5000				16 to 38				352				10000psig				704 Kg/cm2			
													Limited by Flange considering flange as the weakest joint in piping system							
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									6. Pipe sizes 8" to 12" shall be hotfinished annealed ( Solution annealed), pickled and end shall be bevelled. Allwable stress to be established for the temperature range based on actual evaluation after testing .											
2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and WNRTJ flanges above 3" size and specified spectacle blind.									7. For sizes 14" and above welded pipe of clad plate with 100% radiography shall be used. Cladding of minimum 3mm shall be done with Incoloy 825 or Inconell 625 on API 5L Gr. B pipe.											
3. All pipe thread shall be as per ASME B 1.20.1									8. RTJ groove hardness shall be 35 HRC.											
4. PMS to be read in conjunction with FS 2004 A.									9. Cladding shall be weld over lay type with Incoly 825 or Inconel 625 of min. 3mm											
5. Only the base material thickness shall be considered.																				

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.	2 of 2											
		Piping Class		Material		C.A	Spec.No											
		XG15	# 5000 API	Incoloy 825	Nil	2004A,Rev 9		Revision: 1										
		Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3,API 6A																
		Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.														
0																		
Branch Table as per API RP 14E																		
Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	W	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	W	T	T	T	T	T					
	20	*	*	W	W	W	W	W	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T		
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30	Branch Pipe	
Valve Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
Gate Valve																		
TAG	VG 108,SW				VG 118,FLANGED													
Rating	# 5000				# 5000,RTJ													
Plug Valve																		
TAG																		
Rating																		
Ball Valve																		
TAG	VB 108,SW				VB 118,													
Rating	# 5000				# 5000,RTJ													
Globe Valve																		
TAG	VGL 108,SW				VGL 118													
Rating	# 5000				# 5000,RTJ													
Check Valve																		
TAG	VC 108,SW,Lift Check				VC 118,Swing Check													
Rating	# 5000				# 5000,RTJ													
Needle Valve																		
TAG	VN 108,SW																	
Rating	# 5000																	
Butter Fly Valve																		
TAG																		
Rating																		
<b>Notes Releted to Valve and Brach Connection</b> 1. PMS to be read in conjunction with FS 2004 A. 2. Maximum temperature limit for all Ball Valve shall be suitable to maximum temperature of the project. 3. Groove hardness for DSS flange shall be 25HRC and 35 HRC for Incoloy flange.																		
Revision: 1	22/7/2009				Issued For Bid				PS				GJ				GRP	
Revision	Date				Description				Prepared By				Reviewed By				Approved By	

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2								
		Piping Class				Material				C.A		Spec.No		Revision: 1								
		XH15		# 10000 API		Incoloy 825				Nil		2004A,Rev 9		Page No. 107								
		Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3,API 6A																				
Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.																				
ASME B 36.10																						
Pipe Data	0.5	0.75	1	1.5	2	1/16	3	1/8	4	1/16	7	1/16	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6					
Sch.	160	XXS	XXS	XXS																		
WTmm	4.78	7.82	9.09	10.15																		
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	5.0	5.0	5.0	5.0	5.0	5.0					
TYPE	Seamless												Welded pipe from clad plate. Note -5									
MOC	ASTM B 423 UNSN08825 Cold finished Annealed										ASTM B 423 UNSN8825		API 5L Gr.B Pipe with Incoloy cladding. Note 7									
Ends	PE					BE																
Fittings Data																						
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24					
TYPE	Socket Weld										Butt Weld											
Rating	# 9000																					
MOC	ASTM B 564 UNS N08825					ASTM B 366 WP NIC MC S UNS N08825							ASTM A 234 WPB with cladding min. 3mm. Note 9									
Elbow	ASMEB16.11					ASME B 16.9							ASME B 16.9									
Tee	ASMEB16.11					ASME B 16.9							ASME B 16.9									
Red.	ASMEB16.11					ASME B 16.9							ASME B 16.9									
Cap	ASMEB16.11					ASME B 16.9							ASME B 16.9									
Coupl	ASMEB16.11					ASME B 16.9							ASME B 16.9									
Plug	ASMEB16.11					ASME B 16.9							ASME B 16.9									
Union																						
Elbowlet	MSS SP 97,B 564 UNS N08825					MSS SP 97,ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note9									
Sockolet	MSS SP 97,B 564 UNS N08825					MSS SP 97,ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note9									
Weldolet	MSS SP 97,B 564 UNS N08825					MSS SP 97,ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note9									
Nipple	MSS SP 97,Same as pipe					MOC Same as pipe							MOC Same as pipe									
Swage	MSS SP 95,Same as pipe					MSS SP 95, MOC Same as pipe							MSS SP 95, MOC Same as pipe									
Flange																						
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24					
TYPE	SW					WN							WN									
MOC	ASTM B 564 UNS N08825					ASTM B 564 UNS N08825							MSSSP 97,ASTMA105 ,cladding min.3mm.Note9									
FACE	RTJ-Note 8					RTJ-Note 8																
STD.	ASME B 16.5					ASME B 16.5, But welding ends as per ASME B 16.25																
Spectacle Blind/Spacer Blinds																						
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24					
MOC	ASTM B 564 UNS N08825																					
Spectacle	ASME B 16.48					ASME B 16.48							Spacer and blind as per ASME B 16.48									
Mechanical Joints																						
Stud Bolts	ASTM A 453 Gr. 660 CL A																					
Hex Nuts	ASTM A 453 Gr. 660 CL A																					
Gasket	ASME B 16.20,OCT ring of UNS S 32205 with Max. Hardness of 22 HRC. Gasket contact surface roughness max. 63 AARH.																					
Pressure-Temperature Rating											Maximum Hydrostatic Pressure											
Temp.,Deg F		Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g						
60 to 100		10000			16 to 38			704				15000psig				1055 Kg/cm2						
												Limited by Flange considereing flange as the weakest joint in piping system										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																						
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.											6. Pipe sizes 8" to 12" shall be hotfinished annealed ( Solution annealed), pickled and end shall be bevelled. Allwable stress to be established for the temperature range based on actual evaluation after testing .											
2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and WNRTJ flanges above 3" size and specified spectacle blind.											7. For sizes 14" and above welded pipe of clad plate 100% radiography shall be used. Cladding of minimum 3mm shall be done with Incoloy 825 or Inconell 625 on API 5L Gr. B pipe.											
3. All pipe thread shall be as per ASME B 1.20.1											8. RTJ groove hardness shall be 35 HRC.											
4. PMS to be read in conjunction with FS 2004 A.											9. Cladding shall be weld over lay type with Incoly 825 or Inconel 625 of min. 3mm											
5. Only the base material thickness shall be considered.																						

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION										Sheet No.		2 of 2	
		Piping Class		Material		C.A		Spec.No		Revision: 1					
		XH15		# 10000 API		Incoloy 825		Nil		2004A,Rev 9		Page No. 108			
		Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3,API 6A													
		Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.											
		0													

Branch Table as per API RP 14E																		
Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	W	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	W	T	T	T	T	T					
	20	*	*	W	W	W	W	W	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T			
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30		
Branch Pipe																		

Valve Data																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Gate Valve																	
TAG	VG 106,SW				VG 116,FLANGED												
Rating	# 10000				# 10000,RTJ												
Plug Valve																	
TAG																	
Rating																	
Ball Valve																	
TAG	VB 106,SW				VB 116,												
Rating	# 10000				# 10000,RTJ												
Globe Valve																	
TAG	VGL 106,SW				VGL 116												
Rating	# 10000				# 10000,RTJ												
Check Valve																	
TAG	VC 106,SW,Lift Check				VC 116,Swing Check												
Rating	# 10000				# 10000,RTJ												
Needle Valve																	
TAG	VN 106,SW																
Rating	# 10000																
Butter Fly Valve																	
TAG																	
Rating																	


Notes Releted to Valve and Brach Connection

1. PMS to be read in conjuction with FS 2004 A.


2. Maximum temperature limit for all Ball Valve shall be suitable to maximum temperature of the project.


3. Groove hardness for DSS flange shall be 25HRC and 35 HRC for Incoloy flange.

Revision: 1	22/7/2009	Issued For Bid		PS	GJ
Revision	Date	Description		Prepared By	Reviewed By
					GRP
					Approved By

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2					
			Piping Class				Material				C.A	Spec.No		Revision: 0						
			A15A		# 150		Inconel 625				Nil	2004A,Rev 9		Page No.	109					
			Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																	
			Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.																	
Pipe Data																				
ASME B 36.10																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	40s	40s	40s	40s	10s	10s	10s	10s	10s	10s	10s									
WTmm	2.77	2.87	3.38	3.68	2.77	3.05	3.05	3.40	3.76	4.19	4.57									
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	5.0	5.0	5.0	5.0	5.0	5.0			
TYPE	Seamless											Welded pipe from clad plate. Note -5								
MOC	ASTM B 444 UNSN06625 Gr. 1											API 5L Gr.B Pipe with Inconel cladding, Note 6								
Ends	PE				BE															
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weld															
Rating	# 3000				10s	10s	10s	10s	10s	10s	10s									
MOC	ASTM B 564 UNS N06625				ASTM B 366 WP NC MC S UNS N06625							ASTM A 234 WPB with cladding min. 3mm. Note 7								
Elbow	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Tee	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Red.	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Cap	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Coupl	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Plug	ASMEB16.11				ASME B 16.9							ASME B 16.9								
Union																				
Elbowlet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625							MSSSP 97,ASTMA105 ,cladding min.3mm.Note7								
Sockolet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625							MSSSP 97,ASTMA105 ,cladding min.3mm.Note7								
Weldolet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625							MSSSP 97,ASTMA105 ,cladding min.3mm.Note7								
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe							MOC Same as pipe								
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe							MSS SP 95, MOC Same as pipe								
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW				WN							WN								
MOC	ASTM B 564 UNS N06625				ASTM B 564 UNS N06625							MSSSP 97,ASTMA105 ,cladding min.3mm.Note7								
FACE	RF,Serrated Finished				RF,Serrated Finished															
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25															
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM B 564 UNS N06625																			
Spectacle	ASME B 16.48				ASME B 16.48							Spacer and blind as per ASME B 16.48								
Mechanical Joints																				
Stud Bolt	ASTM A 453 Gr. 660 CL A																			
Hex Nuts	ASTM A 453 Gr. 660 CL A																			
Gasket	ASME B 16.20 , 5mm thick Duplex SS Spiral wound gasket with CNAF filler																			
Pressure-Temperature Rating																				
Maximum Hydrostatic Pressure																				
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
(-) 20 to 100	290				(-) 29 to 38				20.3				435psig				31 Kg/cm2			
200	260				93				18.3				Limited by Flange considereing flange as the weakest joint in piping system							
300	230				149				16.2											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval								6. For sizes 14" and above welded pipe of clad plate with 100% radiography shall be used. Cladding of minimum 3mm shall be done with Inconel 625 on API 5L Gr. B pipe.												
2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified flange and spectacle blind.								7. Cladding shall be weld over lay type with Inconel 625 of min. 3mm												
3. All pipe thread shall be as per ASME B 1.20.1								8. To use Schedule 80 for sizes less than 1/1/2" for threaded pipe and fittings.												
4. PMS to be read in conjunction with FS 2004 A.																				
5. Only the base material thickness shall be considered.																				

[illegible]

	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2			
					Piping Class				Material			C.A	Spec.No			Revision: 0				
					B15A		# 300		Inconel 625			Nil	2004A,Rev 9			Page No.	111			
					Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3															
Service:					Corrosive HydroCarbon Service-Sour Liquid and Vapour.															
Pipe Data																				
ASME B 36.10																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	80s	80s	80s	80s	10s	10s	10s	10s	10s	10s	10s									
WTmm	3.73	3.91	4.55	5.08	2.77	3.05	3.05	3.40	3.76	4.19	4.57									
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	5.0	5.0	5.0	5.0	5.0	5.0			
TYPE	Seamless											Welded pipe from clad plate. Note -5								
MOC	ASTM B 444 UNSN06625 Gr.1											API 5L Gr.B Pipe with Inconel cladding, Note 6								
Ends	PE				BE															
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weld															
Rating	# 3000				10s	10s	10s	10s	10s	10s	10s									
MOC	ASTM B 564 UNS N06625				ASTM B 366 WP NC MC S UNS N06625								ASTM A 234 WPB with cladding min. 3mm. Note 7							
Elbow	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Tee	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Red.	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Cap	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Coupl	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Plug	ASMEB16.11				ASME B 16.9								ASME B 16.9							
Union																				
Elbowlet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note7							
Sockolet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note7							
Weldolet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note7							
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe								MOC Same as pipe							
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe								MSS SP 95, MOC Same as pipe							
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW				WN								WN							
MOC	ASTM B 564 UNS N06625				ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note7							
FACE	RF,Smooth Finnished				RF,Smooth Finnished															
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25															
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM B 564 UNS N06625																			
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48							
Mechanical Joints																				
Stud Bolt	ASTM A 453 Gr. 660 CL A																			
Hex Nuts	ASTM A 453 Gr. 660 CL A																			
Gasket	ASME B 16.20 , 5mm thick Duplex SS Spiral wound gasket with CNAF filler																			
Pressure-Temperature Rating																				
Maximum Hydrostatic Pressure																				
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g			
(-) 20 to 100	750				(-) 29 to 38				52.8				1125psig				80 Kg/cm2			
200	750				93				52.8				Limited by Flange considereing flange as the weakest joint in piping system							
300	730				149				51.3											
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval									6. For sizes 14" and above welded pipe of clad plate with 100% radiography shall be used. Cladding of minimum 3mm shall be done with Inconel 625 on API 5L Gr. B pipe.											
2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified flange and spectacle blind.									7. Cladding shall be weld over lay type with Inconel 625 of min. 3mm											
3. All pipe thread shall be as per ASME B 1.20.1																				
4. PMS to be read in conjunction with FS 2004 A.																				
5. Only the base material thickness shall be considered.																				

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION										Sheet No.		2 of 2	
		Piping Class				Material		C.A		Spec.No		Revision: 0			
		B15A		# 300		Inconel 625		Nil		2004A,Rev 9		Page No.		112	
		Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3													
		Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.													
0															

Branch Table as per API RP 14E

Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T											
	10	*	*	W	W	W	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	W	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	W	T	T	T	T	T					
	20	*	*	W	W	W	W	W	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T		
	Branch Pipe																	
	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30			

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VG 105-1,SW	VG 113-1,FLANGED
Rating	# 800	# 300,RF

Plug Valve

TAG		
Rating		

Ball Valve

TAG	VB 105-1,SW	VB 113-1,
Rating	# 800	# 300,RF

Globe Valve

TAG	VGL 104-1,SW	VGL 113-1
Rating	# 800	# 300,RF

Check Valve

TAG	VC 104-1,SW,Lift Check	VC 113-1,Swing Check
Rating	# 800	# 300,RF

Needle Valve

TAG	VN 105-1,SW	
Rating	# 800	

Butter Fly Valve

TAG		
Rating		


Notes Releted to Valve and Brach Connection


1. PMS to be read in conjunction with FS 2004 A.


2. Maximum temperature limit for all Ball Valve shall be suitable to maximum temperature of the project.


Revision: 0	22/7/2009	Issued For Bid	PS	GJ	GRP
Revision	Date	Description	Prepared By	Reviewed By	Approved By





	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2		
					Piping Class					Material			C.A		Spec.No			Revision: 0	
					D15A		# 600			Inconel 625			Nil		2004A,Rev 9			Page No. 113	
					Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3														
					Service: Corrosive HydroCarbon Service-Sour Liquid and Vapour.														
Pipe Data																			
ASME B 36.10																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6		
Sch.	80s	80s	80s	80s	10s	40s	40s	40s	40s	40s	40s								
WTmm	3.73	3.91	4.55	5.08	2.77	5.49	6.02	7.11	8.18	9.27	9.52								
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	5.0	5.0	5.0	5.0	5.0	5.0		
TYPE	Seamless											Welded pipe from clad plate. Note -5,							
MOC	ASTM B 444 UNSN06625 Gr.1											API 5L Gr.B Pipe with Inconel cladding, Note 6							
Ends	PE					BE													
Fittings Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	Socket Weld				Butt Weld														
Rating	# 3000				10s	40s	40s	40s	40s	40s	40s								
MOC	ASTM B 564 UNS N06625				ASTM B 366 WP NC MC S UNS N06625								ASTM A 234 WPB with cladding min. 3mm. Note 7						
Elbow	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Tee	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Red.	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Cap	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Coupl	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Plug	ASMEB16.11				ASME B 16.9								ASME B 16.9						
Union																			
Elbowlet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note7						
Sockolet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note7						
Weldolet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note						
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe								MOC Same as pipe						
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe								MSS SP 95, MOC Same as pipe						
Flange																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
TYPE	SW				WN								WN						
MOC	ASTM B 564 UNS N06625				ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note7						
FACE	RF,Smooth Finnished				RF,Smooth Finnished														
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25														
Spectacle Blind/Spacer Blinds																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
MOC	ASTM B 564 UNS N06625																		
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48						
Mechanical Joints																			
Stud Bolt	ASTM A 453 Gr. 660 CL A																		
Hex Nuts	ASTM A 453 Gr. 660 CL A																		
Gasket	ASME B 16.20 , 5mm thick Duplex SS Spiral wound gasket with CNAF filler																		
Pressure-Temperature Rating										Maximum Hydrostatic Pressure									
Temp.,Deg F	Pressure, PSI				Temp,Deg C				Pressure, Kg/cm2				Pressure, psig				Pres.,Kg/cm2g		
(-) 20 to 100	1500				(-) 29 to 38				105.4				2250psig				158.2 Kg/cm2		
200	1500				93				105.4				Limited by Flange considering flange as the weakest joint in piping system						
300	1455				149				102.3										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																			
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval									6. For sizes 14" and above welded pipe of clad plate with100% radiography shall be used. Cladding of minimum 3mm shall be done with Inconel 625 on API 5L Gr. B pipe.										
2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified flange and spectacle blind.									7. Cladding shall be weld over lay type with Inconel 625 of min. 3mm										
3. All pipe thread shall be as per ASME B 1.20.1																			
4. PMS to be read in conjunction with FS 2004 A.																			
5. Only the base material thickness shall be considered.																			


	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION										Sheet No.	2 of 2																																
		Piping Class				Material		C.A	Spec.No		Revision: 0																																		
		D15A		# 600		Inconel 625		Nil	2004A,Rev 9		Page No. 114																																		
		Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																																											
		Service:				Corrosive HydroCarbon Service-Sour Liquid and Vapour.																																							
0																																													
Branch Table as per API RP 14E																																													
Run Pipe	≤ 1	T																																											
	1-1.5	T	T																																										
	2	*	*	*	T																																								
	3	*	*	*	T	T																																							
	4	*	*	*	T	T	T																																						
	6	*	*	*	W	T	T	T																																					
	8	*	*	*	W	W	T	T	T																																				
	10	*	*	*	W	W	W	T	T	T																																			
	12	*	*	*	W	W	W	T	T	T	T																																		
	14	*	*	*	W	W	W	W	T	T	T	T																																	
	16	*	*	*	W	W	W	W	T	T	T	T	T																																
	18	*	*	*	W	W	W	W	W	T	T	T	T	T																															
	20	*	*	*	W	W	W	W	W	T	T	T	T	T	T																														
	24	*	*	*	W	W	W	W	W	W	T	T	T	T	T	T																													
	30	*	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T																												
	Branch Pipe																																												
	<table border="1"> <tr> <td>≤ 1</td> <td>1-1.5</td> <td>2</td> <td>3</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> <td>12</td> <td>14</td> <td>16</td> <td>18</td> <td>20</td> <td>24</td> <td>30</td> </tr> </table>																		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30												
≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30																															
Valve Data																																													
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24																												
Gate Valve																																													
TAG	VG 105-1,SW							VG 115-1,FLANGED																																					
Rating	# 800							# 600,RF																																					
Plug Valve																																													
TAG																																													
Rating																																													
Ball Valve																																													
TAG	VB 105-1,SW							VB 115-1,																																					
Rating	# 800							# 600,RF																																					
Globe Valve																																													
TAG	VGL 104-1,SW							VGL 115-1																																					
Rating	# 800							# 600,RF																																					
Check Valve																																													
TAG	VC 104-1,SW,Lift Check							VC 115-1,Swing Check																																					
Rating	# 800							# 600,RF																																					
Needle Valve																																													
TAG	VN 105-1,SW																																												
Rating	# 800																																												
Butter Fly Valve																																													
TAG																																													
Rating																																													
<b>Notes Related to Valve and Brach Connection</b> 1. PMS to be read in conjunction with FS 2004 A. 2. Maximum temperature limit for all Ball Valve shall be suitable to maximum temperature of the project.																																													
<table border="1"> <tr> <td>Revision: 0</td> <td>22/7/2009</td> <td colspan="6">Issued For Bid</td> <td colspan="2">PS</td> <td colspan="2">GJ</td> <td colspan="2">GRP</td> </tr> <tr> <td>Revision</td> <td>Date</td> <td colspan="6">Description</td> <td colspan="2">Prepared By</td> <td colspan="2">Reviewed By</td> <td colspan="2">Approved By</td> </tr> </table>																		Revision: 0	22/7/2009	Issued For Bid						PS		GJ		GRP		Revision	Date	Description						Prepared By		Reviewed By		Approved By	
Revision: 0	22/7/2009	Issued For Bid						PS		GJ		GRP																																	
Revision	Date	Description						Prepared By		Reviewed By		Approved By																																	


	Offshore Design Section Engineering Services ISO-9001:2000				PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2	
					Piping Class				Material		C.A	Spec.No			Revision: 0			
					E15A		# 900		Inconel 625		Nil	2004A,Rev 9			Page No.	115		
					Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3													
Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.																
Pipe Data																		
ASME B 36.10																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6	
Sch.	80s	80s	80s	80s	40s	40s	40s	80s	80s	80	80							
WTmm	3.73	3.91	4.55	5.08	3.91	5.49	6.02	10.97	12.7	15.1	17.47							
M.T (%)	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	5.0	5.0	5.0	5.0	5.0	5.0	
TYPE	Seamless											Welded pipe from clad plate. Note -5,						
MOC	ASTM B 444 UNSN06625 Gr.1											API 5L Gr.B Pipe with Inconel cladding, Note 6						
Ends	PE				BE													
Fittings Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	Socket Weld				Butt Weld													
Rating	# 3000				40s	40s	40s	80s	80s	80	80							
MOC	ASTM B 564 UNS N06625				ASTM B 366 WP NC MC S UNS N06625								ASTM A 234 WPB with cladding min. 3mm. Note 7					
Elbow	ASMEB16.11				ASME B 16.9								ASME B 16.9					
Tee	ASMEB16.11				ASME B 16.9								ASME B 16.9					
Red.	ASMEB16.11				ASME B 16.9								ASME B 16.9					
Cap	ASMEB16.11				ASME B 16.9								ASME B 16.9					
Coupl	ASMEB16.11				ASME B 16.9								ASME B 16.9					
Plug	ASMEB16.11				ASME B 16.9								ASME B 16.9					
Union																		
Elbowlet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note7					
Sockolet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note7					
Weldolet	MSS SP 97,B 564 UNS N06625				MSS SP 97,ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note					
Nipple	MSS SP 97,Same as pipe				MOC Same as pipe								MOC Same as pipe					
Swage	MSS SP 95,Same as pipe				MSS SP 95, MOC Same as pipe								MSS SP 95, MOC Same as pipe					
Flange																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW				WN								WN					
MOC	ASTM B 564 UNS N06625				ASTM B 564 UNS N06625								MSSSP 97,ASTMA105 ,cladding min.3mm.Note7					
FACE	RTJ-Note 8				RTJ-Note 8													
STD.	ASME B 16.5				ASME B 16.5, But welding ends as per ASME B 16.25													
Spectacle Blind/Spacer Blinds																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
MOC	ASTM B 564 UNS N06625																	
Spectacle	ASME B 16.48				ASME B 16.48								Spacer and blind as per ASME B 16.48					
Mechanical Joints																		
Stud Bolt	ASTM A 453 Gr. 660 CL A																	
Hex Nuts	ASTM A 453 Gr. 660 CL A																	
Gasket	ASME B 16.20,OCT ring of UNS S 32205 with Max. Hardness of 22 HRC. Gasket contact surface roughness max. 63 AARH.																	
Pressure-Temperature Rating																		
Temp.,Deg F		Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g				
(-) 20 to 100		2250			(-) 29 to 38			158.1			3375psig			237.2 Kg/cm2				
200		2250			93			158.1			Limited by Flange considereing flange as the weakest joint in piping system							
300		2185			149			153.6										
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																		
1. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									6. For sizes 14" and above welded pipe of clad plate with 100% radiography shall be used. Cladding of minimum 3mm shall be done with Inconel 625 on API 5L Gr. B pipe.									
2. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified flange and spectacle blind.																		
3. All pipe thread shall be as per ASME B 1.20.1																		
4. PMS to be read in conjunction with FS 2004 A.																		
5. Only the base material thickness shall be considered.																		
7. For sizes 14" and above welded pipe of clad plate with joint efficiency 1 shall be used. Cladding of minimum 3mm shall be done with Inconell 625 on API 5L Gr. B pipe.																		
8. RTJ groove hardness shall be 35 HRC.																		
9. Cladding shall be weld over lay type with Inconel 625 of min. 3mm																		

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION										Sheet No.		2 of 2					
		Piping Class					Material					C.A	Spec.No		Revision: 0				
		E15A		# 900			Inconel 625					Nil	2004A,Rev 9		Page No.	116			
		Code:ASME B 31.3 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																	
		Service:		Corrosive HydroCarbon Service-Sour Liquid and Vapour.															
0																			
Branch Table as per API RP 14E																			
Run Pipe	≤ 1	T																	
	1-1.5	T	T																
	2	*	*	T															
	3	*	*	T	T														
	4	*	*	T	T	T													
	6	*	*	W	T	T	T												
	8	*	*	W	W	T	T	T											
	10	*	*	W	W	W	T	T	T										
	12	*	*	W	W	W	T	T	T	T									
	14	*	*	W	W	W	W	T	T	T	T								
	16	*	*	W	W	W	W	T	T	T	T	T							
	18	*	*	W	W	W	W	W	T	T	T	T	T						
	20	*	*	W	W	W	W	W	T	T	T	T	T	T					
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T				
30	*	*	W	W	W	W	W	W	W	W	T	T	T	T	T				
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30			
Branch Pipe																			
Valve Data																			
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24		
Gate Valve																			
TAG	VG 107-1,SW					VG 117-1,FLANGED													
Rating	# 1500					# 900,RTJ													
Plug Valve																			
TAG																			
Rating																			
Ball Valve																			
TAG	VB 107-1,SW					VB 117-1,													
Rating	# 1500					# 900,RTJ													
Globe Valve																			
TAG	VGL 106-1,SW					VGL 117-1													
Rating	# 1500					# 900,RTJ													
Check Valve																			
TAG	VC 106-1,SW,Lift Check					VC 117-1,Swing Check													
Rating	# 1500					# 900,RTJ													
Needle Valve																			
TAG	VN 107-1,SW																		
Rating	# 1500																		
Butter Fly Valve																			
TAG																			
Rating																			
Notes Releted to Valve and Brach Connection																			
1. PMS to be read in conjunction with FS 2004 A.																			
2. Maximum temperature limit for all Ball Valve shall be suitable to maximum temperature of the project.																			
Revision: 0		22/7/2009		Issued For Bid						PS		GJ		GRP					
Revision		Date		Description						Prepared By		Reviewed By		Approved By					

	Offshore Design Section Engineering Services ISO-9001:2000					PIPING MATERIAL SPECIFICATION										Sheet No.		1 of 2										
						Piping Class					Material			C.A		Spec.No			Revision: 1									
						PE1		# 900			CS			3mm		2004A,Rev 9			Page No. 117									
						Design Code: ASME B 31.4/31.8 Service: Hydro Carbon Liquid and Vapour, Injection Water ( Piping from transition bend to Hinged closers Only)																						
Pipe Data																	ASME B 36.10											
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
O.D.mm		21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6										
Sch.		XXS	XXS	XXS	XXS	160	160	120	Thickness shall be same as that of Pipe line for smooth Piggig																			
WTmm		7.47	7.82	9.09	10.16	8.74	11.12	11.12	Thickness shall be same as that of Pipe line for smooth Piggig																			
M.T (%)																												
TYPE		Seamless													LSAW with 100% Radiography													
MOC		ASTM A 106 Gr. B							API 5L Gr. X 60 or Same as Pipeline							API 5L Gr. 60 or same as pipeline												
Ends		PE					BE																					
Fittings Data																												
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
TYPE		Socket Weld				Butt Weld, Seamless			Butt Welded, Seamless							Welded with 100% Radiography												
Rating		# 9000				160 160 120																						
MOC		ASTM A 105 U.N.O				A 234 Gr. WPB, Seamless			MSS SP -75 Gr. WPHY rest portion of grade designation shall be compatible to pipe. U.N.O																			
Elbow		ASMEB16.11				ASME B 16.9			MSS SP -75 and for piggable portion only 5D bends shall be used UNO.																			
Tee		ASMEB16.11				ASME B 16.9			MSS SP -75																			
Red.		ASMEB16.11				ASME B 16.9			MSS SP-75																			
Cap		ASMEB16.11				ASME B 16.9			MSS SP-75																			
Coupl		ASMEB16.11				ASME B 16.9			MSS SP-75																			
Plug		ASMEB16.11				ASME B 16.9			MSS SP-75																			
Elbowlet		MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105			ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O. MSS SP 97																			
Sockolet		MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105			ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O. MSS SP 97																			
Weldolet		MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105			ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O. MSS SP 97																			
Nipple		MSS SP 95,Same as pipe				MSS SP 95MOC Same as pipe			MSS SP 95 MOC Same as pipe																			
Swage		MSS SP 95,Same as pipe				MSS SP 95MOC Same as pipe			MSS SP 95 MOC Same as pipe																			
Flange																												
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
TYPE		SW				WN			WN																			
MOC		ASTM A 105				ASTM A 105			ASTM A 694 Grade designation shall be compatible to pipe. U.N.O																			
FACE		RTJ-Note 7				RTJ, Note 7			RTJ, Note 7																			
STD.		ASME B 16.5				B 16.5, But welding ends B 16.25			ASME B 16.5 with Butt Welding end as per ASME B 16.25																			
Spectacle Blind/Spacer Blinds																												
Size(in)		0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24										
MOC						ASTM A 105																						
Spectacle		ASME B 16.48				ASME B 16.48							Spacer and blind as per ASME B 16.48															
Mechanical Joints																												
Stud Bolts		ASTM A 193 Gr. B7				ASTM A 193 Gr. B7																						
Hex Nuts		ASTM A 194 Gr. 2H				ASTM A 194 Gr. 2H																						
Gasket		B 16.20,OCT ring of Soft Iron with Max. 90BHN				ASME B 16.20,OCT ring of Soft Iron with Max. Hardness of 90BHN																						
Pressure-Temperature Rating																			Maximum Hydrostatic Pressure									
Temp.,Deg F		Pressure, PSI				Temp.,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g													
(-) 4 to 100		2220				(-) 20 to 38			156			3350 psig			236 Kg/cm2													
200		2035				93			143.07			Limited by Flange considering flange as the weakest joint in piping system																
300		1965				149			138.2																			
400		1900				204			133.6																			
500		1810				260			127.2																			
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																												
1. Welded fittings shall be 100% radiographed. 2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec. 3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval. 4. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified flange and spectacle blind.									5. All pipe thread shall be as per ASME B 1.20.1																			
									6. PMS to be read in conjunction with FS 2004 A.																			
									7. Gasket Contact Surface shall have maximum roughness of 63AARH																			
									8. Minimum RTJ groove hardness shall be 120BHN																			
									9. Octagonal (OCT) ring shall be Hot Dip Galvanized or electro galvanized.																			
									10.Piggable portion of piping shall be critically checked for passage of pigs with respect to internal diameter of each segment of pipeline.																			
									11. Weld Joint Factor for welded pipe shall be as per ASME B 31.4/31.8																			

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION						Sheet No.		2 of 2																																
		Piping Class		Material		C.A	Spec.No		Revision: 1																																	
		PE1	# 900	CS		3mm	2004A,Rev 9		Page No.	118																																
		Design Code: ASME B 31.4/31.8 Service: Hydro Carbon Liquid and Vapour, Injection Water ( Piping from transition bend to Hinged closers Only)																																								
Branch Table as per API RP 14E																																										
Run Pipe	≤ 1	T																																								
	1-1.5	T	T																																							
	2	*	*	T																																						
	3	*	*	T	T																																					
	4	*	*	T	T	T																																				
	6	*	*	W	T	T	T																																			
	8	*	*	W	W	T	T	T																																		
	10	*	*	W	W	W	T	T	T																																	
	12	*	*	W	W	W	T	T	T	T																																
	14	*	*	W	W	W	W	T	T	T	T																															
	16	*	*	W	W	W	W	T	T	T	T	T																														
	18	*	*	W	W	W	W	W	T	T	T	T	T																													
	20	*	*	W	W	W	W	W	T	T	T	T	T	T																												
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T																											
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T																										
	Branch Pipe																																									
<table border="1"> <tr> <td>≤ 1</td> <td>1-1.5</td> <td>2</td> <td>3</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> <td>12</td> <td>14</td> <td>16</td> <td>18</td> <td>20</td> <td>24</td> <td>30</td> </tr> </table>																	≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30											
≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30																												
Valve Data																																										
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24																									
Gate Valve																																										
TAG	VG 46,SW				VG 78,FLANGED																																					
Rating	# 1500				# 900,RTJ																																					
Plug Valve																																										
TAG																																										
Rating																																										
Ball Valve																																										
TAG	Use Gate Valve, VG 46				VB 84,LO	VB 85, Gear Operated																																				
Rating	# 1500				# 900, RTJ																																					
Globe Valve																																										
TAG	VGL 44,SW				VGL 72																																					
Rating	# 1500				# 900, RTJ																																					
Check Valve																																										
TAG	VC 44,SW,Lift Check				VC 68,Swing Check				VCS - 4 Full Port Swing Check																																	
Rating	# 1500								# 900, RTJ																																	
Needle Valve																																										
TAG	VN 4,SW																																									
Rating	# 1500																																									
Butter Fly Valve																																										
TAG																																										
Rating																																										
Notes Related to Valve and Brach Connection 1. PMS to be read in conjunction with FS 2004 A. 2. Maximum temperature limit for all Ball Valve shall be 121 Degree C																																										
<table border="1"> <tr> <td>Revision: 1</td> <td>15.01.16</td> <td colspan="4">Issued For Bid</td> <td colspan="2">PS</td> <td colspan="2">AKM</td> <td colspan="3">SJ</td> </tr> <tr> <td>Revision</td> <td>Date</td> <td colspan="4">Description</td> <td colspan="2">Prepared By</td> <td colspan="2">Reviewed By</td> <td colspan="3">Approved By</td> </tr> </table>																	Revision: 1	15.01.16	Issued For Bid				PS		AKM		SJ			Revision	Date	Description				Prepared By		Reviewed By		Approved By		
Revision: 1	15.01.16	Issued For Bid				PS		AKM		SJ																																
Revision	Date	Description				Prepared By		Reviewed By		Approved By																																

	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION											Sheet No.		1 of 2																	
			Piping Class				Material			C.A		Spec.No		Revision: 0																			
			PB1N		# 300		CS-NACE			6mm		2004A,Rev 9		Page No.		119																	
			Design Code: ASME B 31.4/31.8 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																														
			Service		Corrosive Hydro Carbon Liquid and Vapour, Injection Water ( Piping from from transition bend to Hinged closers Only)																												
Pipe Data																	ASME B 36.10																
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24																
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6																
Sch.	XXS	XXS	XXS	XXS	160	160	120	Thickness shall be same as that of Pipe line for smooth Piggig																									
WTmm	7.47	7.8	9.09	10.16	8.74	9.52	11.12	Thickness shall be same as that of Pipe line for smooth Piggig																									
M.T (%)																																	
TYPE	Seamless													LSAW with 100% Radiography																			
MOC	ASTM A 106 Gr. B							API 5L Gr. X 60 or Same as Pipeline							API 5L Gr. 60 or same as pipeline																		
Ends	PE				BE																												
Fittings Data																																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24																
TYPE	Socket Weld				Butt Weld, Seamless			Butt Welded, Seamless						Welded with 100% Radiography																			
Rating	# 9000				160	160	120																										
MOC	ASTM A 105 U.N.O				A 234 Gr. WPB, Seamless			MSS SP -75 Gr. WPHY rest portion of grade designation shall be compatible to pipe. U.N.O																									
Elbow	ASMEB16.11				ASME B 16.9			MSS SP -75 and for piggable portion only 5D bends shall be used UNO.																									
Tee	ASMEB16.11				ASME B 16.9			MSS SP -75																									
Red.	ASMEB16.11				ASME B 16.9			MSS SP-75																									
Cap	ASMEB16.11				ASME B 16.9			MSS SP-75																									
Coupl	ASMEB16.11				ASME B 16.9			MSS SP-75																									
Plug	ASMEB16.11				ASME B 16.9			MSS SP-75																									
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105			ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O, MSS SP 97																									
Sockolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105			ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O, MSS SP 97																									
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105			ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O, MSS SP 97																									
Nipple	MSS SP 95,Same as pipe				MSS SP 95MOC Same as pipe			MSS SP 95 MOC Same as pipe																									
Swage	MSS SP 95,Same as pipe				MSS SP 95MOC Same as pipe			MSS SP 95 MOC Same as pipe																									
Flange																																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24																
TYPE	SW				WN			WN																									
MOC	ASTM A 105				ASTM A 105			ASTM A 694 Grade designation shall be compatible to pipe. U.N.O																									
FACE	RF, Smooth Finnished				RF, Smooth Finnished			RF, Smooth Finnished																									
STD.	ASME B 16.5				B 16.5, But welding ends B 16.25			ASME B 16.5 with Butt Welding end as per ASME B 16.25																									
Spectacle Blind/Spacer Blinds																																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24																
MOC	ASTM A 105																																
Spectacle	ASME B 16.48				ASME B 16.48				Spacer and blind as per ASME B 16.48																								
Mechanical Joints																																	
Stud Bolt	ASTM A 193 Gr. B7M				ASTM A 193 Gr. B7M																												
Hex Nuts	ASTM A 194 Gr. 2HM				ASTM A 194 Gr. 2HM																												
Gasket	B 16.20,4.5mm, SS Spiral wound with CNAF filler				ASME B 16.20,4.5mm, SS Spiral wound with CNAF filler																												
Pressure-Temperature Rating																																	
Temp.,Deg F		Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g																			
(-) 4 to 100		740			(-) 20 to 38			52			1125 psig			79 Kg/cm2																			
200		675			93			47.5			Limited by Flange considereing flange as the weakest joint in piping system																						
300		655			149			46																									
400		635			204			44.6																									
500		600			260			44.2																									
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																																	
1. Welded fittings shall be 100% radiographed.								5. PMS to be read in conjunction with FS 2004 A and all the requirement of MR-01-75/ISO-15156-1/2/3 to complied.																									
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.								6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified flange and spectacle blind.																									
3. Spectacie blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval								7.Piggable portion of piping shall be critically checked for passage of pigs with respect to internal diameter of each segment of pipeline.																									
4. All pipe thread shall be as per ASME B 1.20.1								8. Weld Joint Factor for welded pipe shall be as per ASME B 31.4/31.8																									

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.		2 of 2		
		Piping Class		Material		C.A	Spec.No		Revision: 0	
		PB1N	# 300	CS-NACE		6mm	2004A,Rev 9		Page No.	120
		Design Code: ASME B 31.4/31.8 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3								
		Service	Corrosive Hydro Carbon Liquid and Vapour, Injection Water ( Piping from from transition bend to Hinged closers Only)							

Branch Table as per API RP 14E

Run Pipe	≤ 1	T																
	1-1.5	T	T															
	2	*	*	T														
	3	*	*	T	T													
	4	*	*	T	T	T												
	6	*	*	W	T	T	T											
	8	*	*	W	W	T	T	T										
	10	*	*	W	W	W	T	T	T									
	12	*	*	W	W	W	T	T	T	T								
	14	*	*	W	W	W	W	T	T	T	T							
	16	*	*	W	W	W	W	T	T	T	T	T						
	18	*	*	W	W	W	W	W	T	T	T	T	T					
	20	*	*	W	W	W	W	W	T	T	T	T	T	T				
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T			
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T		
	Branch Pipe																	
		≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24	30		

Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
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Gate Valve

TAG	VG 45,SW	VG 69,FLANGED
Rating	# 800	# 300,RF

Plug Valve

TAG	
Rating	

Ball Valve

TAG	45,SW and VB 107,SW (Note-5)	VB 69, Lever Operated	VB **, Gear Operated
Rating	# 800	# 300, RF	

Globe Valve

TAG	VGL 45,SW	VGL 69
Rating	# 800	# 300, RF

Check Valve

TAG	VC 45,SW,Lift Check	VC 69,Swing Check/ VC 89 (Wafer Check, Note -1)
Rating	# 800	# 300, RF

Needle Valve

TAG	VN 9,SW
Rating	# 800

Butter Fly Valve


TAG	
Rating	


Notes Related to Valve and Brach Connection


- PMS to be read in conjunction with FS 2004 A.
- Maximum temperature limit for all Ball Valve shall be 121 Degree C


Revision: 0	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By



	Offshore Design Section Engineering Services ISO-9001:2000		PIPING MATERIAL SPECIFICATION														Sheet No.		1 of 2	
			Piping Class				Material				C.A		Spec.No				Revision: 1			
			PD1N		# 600		CS-NACE				6mm		2004A,Rev 9				Page No.		121	
			Design Code: ASME B 31.4/31.8 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3 Service: Corrosive Hydro Carbon Liquid and Vapour, Injection Water ( Piping from from transition bend to Hinged closers Only)																	
Pipe Data			ASME B 36.10																	
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6			
Sch.	XXS	XXS	XXS	XXS	160	160	120	Thickness shall be same as that of Pipe line for smooth Piggig												
WTmm	7.47	7.82	9.09	10.16	8.74	9.52	11.12	Thickness shall be same as that of Pipe line for smooth Piggig												
M.T (%)																				
TYPE	Seamless														LSAW with 100% Radiography					
MOC	ASTM A 106 Gr. B							API 5L Gr. X 60 or Same as Pipeline							API 5L Gr. 60 or same as pipeline					
Ends	PE				BE															
Fittings Data																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	Socket Weld				Butt Weldt, Seamless				Butt Welded, Seamless						Welded with 100% Radiography					
Rating	# 9000				160 160 120															
MOC	ASTM A 105 U.N.O				A 234 Gr. WPB, Seamless				MSS SP -75 Gr. WPHY rest portion of grade designation shall be compatible to pipe. U.N.O											
Elbow	ASMEB16.11				ASME B 16.9				MSS SP -75 and for piggable portion only 5D bends shall be used UNO.											
Tee	ASMEB16.11				ASME B 16.9				MSS SP -75											
Red.	ASMEB16.11				ASME B 16.9				MSS SP-75											
Cap	ASMEB16.11				ASME B 16.9				MSS SP-75											
Coupl	ASMEB16.11				ASME B 16.9				MSS SP-75											
Plug	ASMEB16.11				ASME B 16.9				MSS SP-75											
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105				ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O, MSS SP 97											
Sockolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105				ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O, MSS SP 97											
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105				ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O, MSS SP 97											
Nipple	MSS SP 95,Same as pipe				MSS SP 95MOC Same as pipe				MSS SP 95 MOC Same as pipe											
Swage	MSS SP 95,Same as pipe				MSS SP 95MOC Same as pipe				MSS SP 95 MOC Same as pipe											
Flange																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
TYPE	SW				WN				WN											
MOC	ASTM A 105				ASTM A 105				ASTM A 694 Grade designation shall be compatible to pipe. U.N.O											
FACE	RF, Smooth Finnished				RF, Smooth Finnished				RF, Smooth Finnished											
STD.	ASME B 16.5				B 16.5, But welding ends B 16.25				ASME B 16.5 with Butt Welding end as per ASME B 16.25											
Spectacle Blind/Spacer Blinds																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24			
MOC	ASTM A 105																			
Spectacle	ASME B 16.48				ASME B 16.48						Spacer and blind as per ASME B 16.48									
Mechanical Joints																				
Stud Bolt	ASTM A 193 Gr. B7M							ASTM A 193 Gr. B7M												
Hex Nuts	ASTM A 194 Gr. 2HM							ASTM A 194 Gr. 2HM												
Gasket	B 16.20.4.5mm, SS Spiral wound with CNAF filler							ASME B 16.20.4.5mm, SS Spiral wound with CNAF filler												
Pressure-Temperature Rating																				
Temp.,Deg F		Pressure, PSI			Temp.,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g						
(-) 4 to 100		1480			(-) 20 to 38			104			2225 psig			157 Kg/cm2						
200		1360			93			95.61			Limited by Flange considering flange as the weakest joint in piping system									
300		1310			149			92.1												
400		1265			204			88.94												
500		1205			260			84.72												
Notes Releted to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																				
1. Welded fittings shall be 100% radiographed.									5. PMS to be read in conjunction with FS 2004 A and all the requirement of MR-01-75/ISO-15156-1/2/3 to complied.											
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.									6. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and specified flange and spectacle blind.											
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									7.Piggable portion of piping shall be critically checked for passage of pigs with respect to internal diameter of each segment of pipeline.											
4. All pipe thread shall be as per ASME B 1.20.1									8. Weld Joint Factor for welded pipe shall be as per ASME B 31.4/31.8											

	Offshore Design Section Engineering Services ISO-9001:2000																PIPING MATERIAL SPECIFICATION										Sheet No.		2 of 2							
																	Piping Class					Material					C.A		Spec.No			Revision: 1				
	PD1N					# 600					CS-NACE					6mm		2004A,Rev 9			Page No. 122															
	Design Code: ASME B 31.4/31.8 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3																																			
	Service:		Corrosive Hydro Carbon Liquid and Vapour, Injection Water ( Piping from from transition bend to Hinged closers Only)																																	
Branch Table as per API RP 14E																																				
Run Pipe	≤ 1	T											LEGEND																							
	1-1.5	T	T											*	Sockolet																					
	2	*	*	*	T											W	Weldolet																			
	3	*	*	*	T	T											T	TEE																		
	4	*	*	*	T	T	T																													
	6	*	*	*	W	T	T	T																												
	8	*	*	*	W	W	T	T	T																											
	10	*	*	*	W	W	W	T	T	T																										
	12	*	*	*	W	W	W	T	T	T	T																									
	14	*	*	*	W	W	W	W	T	T	T	T																								
	16	*	*	*	W	W	W	W	T	T	T	T	T																							
	18	*	*	*	W	W	W	W	W	T	T	T	T	T																						
	20	*	*	*	W	W	W	W	W	T	T	T	T	T	T																					
	24	*	*	*	W	W	W	W	W	W	T	T	T	T	T	T																				
	30	*	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T																			
Branch Pipe																																				
Valve Data																																				
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24																			
Gate Valve																																				
TAG	VG 45,SW										VG 71,FLANGED																									
Rating	# 800										# 600,RF																									
Plug Valve																																				
TAG																																				
Rating																																				
Ball Valve																																				
TAG	VB 45,SW and VB 107,SW (Note-3)										VB 71, Lever Operated										VB **, Gear Operated															
Rating	# 800										# 600, RF																									
Globe Valve																																				
TAG	VGL 45,SW										VGL 71																									
Rating	# 800										# 600, RF																									
Check Valve																																				
TAG	VC 45,SW,Lift Check										VC 71,Swing Check										VCS - 8, Swing Check Full Port															
Rating	# 800										# 600, RF																									
Needle Valve																																				
TAG	VN 9,SW																																			
Rating	# 800																																			
Butter Fly Valve																																				
TAG																																				
Rating																																				
Notes Releted to Valve and Brach Connection																																				
1. PMS to be read in conjunction with FS 2004 A.																																				
2. Maximum temperature limit for all Ball Valve shall be 121 Degree C																																				

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION												Sheet No.		1 of 2		
		Piping Class				Material				C.A		Spec.No			Revision:1			
		PE1N		# 900		CS-NACE				6mm		2004A,Rev 9			Page No  123			
		Design Code:ASME B 31.4/31.8 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3 Service:Corrosive Hydro Carbon Liquid and Vapour, Injection Water ( Piping from transition bend to Hinged closers Only)																
ASME B 36.10																		
Pipe Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
O.D.mm	21.3	26.7	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.1	323.9	355.6	406.4	457.2	508	558.8	609.6	
Sch.	XXS	XXS	XXS	XXS	XXS	XXS	160	Thickness shall be same as that of Pipe line for smooth Piggig										
W/Tmm	7.47	7.82	9.09	10.16	11.07	15.24	13.49	Thickness shall be same as that of Pipe line for smooth Piggig										
M.T (%)																		
TYPE	Seamless													LSAW with 100% Radiography				
MOC	ASTM A 106 Gr. B							API 5L Gr. X 60 or Same as Pipeline						API 5L Gr. 60 or same as pipeline				
Ends	PE							BE										
Fittings Data																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	Socket Weld				Butt Weld, Seamless			Butt Welded, Seamless						Welded with 100% Radiography				
Rating	# 9000				XXS	XXS	160											
MOC	ASTM A 105 U.N.O				A 234 Gr. WPB, Seamless			MSS SP -75 Gr. WPHY rest portion of grade designation shall be compatible to pipe. U.N.O										
Elbow	ASMEB16.11				ASME B 16.9			MSS SP -75 and for piggable portion only 5D bends shall be used UNO.										
Tee	ASMEB16.11				ASME B 16.9			MSS SP -75										
Red.	ASMEB16.11				ASME B 16.9			MSS SP-75										
Cap	ASMEB16.11				ASME B 16.9			MSS SP-75										
Coupl	ASMEB16.11				ASME B 16.9			MSS SP-75										
Plug	ASMEB16.11				ASME B 16.9			MSS SP-75										
Elbowlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105			ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O, MSS SP 97										
Socketlet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105			ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O, MSS SP 97										
Weldolet	MSS SP 97,ASTM A 105				MSS SP 97,ASTM A 105			ASTM A 694 Gr. rest portion of grade designation shall be compatible to pipe. U.N.O, MSS SP 97										
Nipple	MSS SP 95,Same as pipe				MSS SP 95MOC Same as pipe			MSS SP 95 MOC Same as pipe										
Swage	MSS SP 95,Same as pipe				MSS SP 95MOC Same as pipe			MSS SP 95 MOC Same as pipe										
Flange																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
TYPE	SW				WN			WN										
MOC	ASTM A 105				ASTM A 105			ASTM A 694 Grade designation shall be compatible to pipe. U.N.O										
FACE	RTJ-Note 7				RTJ, Note 7			RTJ, Note 7										
STD.	ASME B 16.5				B 16.5, But welding ends B 16.25			ASME B 16.5 with Butt Welding end as per ASME B 16.25										
Spectacle Blind/Spacer Blinds																		
Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
MOC	ASTM A 105																	
Spectacle	ASME B 16.48				ASME B 16.48				Spacer and blind as per ASME B 16.48									
Mechanical Joints																		
Stud Bolt	ASTM A 193 Gr. B7M				ASTM A 193 Gr. B7M													
Hex Nuts	ASTM A 194 Gr. 2HM				ASTM A 194 Gr. 2HM													
Gasket	0,OCT ring of Soft Iron with Max. 9				ASME B 16.20,OCT ring of Soft Iron with Max. Hardness of 90BHN													
Pressure-Temperature Rating																		
Temp.,Deg F		Pressure, PSI			Temp,Deg C			Pressure, Kg/cm2			Pressure, psig			Pres.,Kg/cm2g				
(-) 4 to 100		2220			(-) 20 to 38			156			3350 psig			236 Kg/cm2g				
200		2035			93			143.07			Limited by Flange considering flange as the weakest joint in piping system							
300		1965			149			138.2										
400		1900			204			133.6										
500		1810			260			127.2										
Notes Related to Pipe,Fittings,Flanges,Gasket and Stud Bolts -Nuts																		
1. Welded fittings shall be 100% radiographed.									5. All pipe thread shall be as per ASME B 1.20.1									
2.All alloy steel stud bolts and nuts shall be hot dip galvanized or electrogalvanized with minimum coating as per spec.									6. PMS to be read in conjunction with FS 2004 A.									
3. Spectacle blinds and spacer sizes and rating that are not available in ASME B 16.48 shall be as per manufacturer standard. Design shall be submitted to company for review and approval.									7. Gasket Contact Surface shall have maximum roughness of 63AARH									
4. Two jackscrew, 180 degree apart shall be provided in one of the flanges for all orifice flange and WNRTJ flanges above 3" size and specified spectacle blind.									8. Minimum RTJ groove hardness shall be 120BHN									
									9. Octagonal (OCT) ring shall be Hot Dip Galvanized or electrogalvanized									
									10.Piggable portion of piping shall be critically checked for passage of pigs with respect to internal diameter of each segment of pipeline.									
									11. Weld Joint Factor for welded pipe shall be as per ASME B 31.3									

	Offshore Design Section Engineering Services ISO-9001:2000	PIPING MATERIAL SPECIFICATION				Sheet No.		2 of 2	
		Piping Class		Material		C.A		Spec.No	
		PE1N # 900		CS-NACE		6mm		2004A,Rev 9	
		Design Code:ASME B 31.4/31.8 and other applicable Code NACE-MR-01-75/ISO-15156-1/2/3 Service: Corrosive Hydro Carbon Liquid and Vapour, Injection Water ( Piping from transition bend to Hinged closers Only)							

  
Branch Table as per API RP 14E

Run Pipe	≤ 1	T														
	1-1.5	T	T													
	2	*	*	T												
	3	*	*	T	T											
	4	*	*	T	T	T										
	6	*	*	W	T	T	T									
	8	*	*	W	W	T	T	T								
	10	*	*	W	W	W	T	T	T							
	12	*	*	W	W	W	T	T	T	T						
	14	*	*	W	W	W	W	T	T	T	T					
	16	*	*	W	W	W	W	T	T	T	T	T				
	18	*	*	W	W	W	W	W	T	T	T	T	T			
	20	*	*	W	W	W	W	W	T	T	T	T	T	T		
	24	*	*	W	W	W	W	W	W	T	T	T	T	T	T	
	30	*	*	W	W	W	W	W	W	W	T	T	T	T	T	T
			≤ 1	1-1.5	2	3	4	6	8	10	12	14	16	18	20	24

  
Valve Data

Size(in)	0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24	
Gate Valve																		
TAG	VG 47,SW				VG 73,FLANGED													
Rating	# 1500				# 900,RTJ													
Plug Valve																		
TAG																		
Rating																		
Ball Valve																		
TAG	Use Gate Valve, VG 47				VB 73, Lever Operated						VB **, Gear Operated							
Rating	# 1500				# 900, RTJ													
Globe Valve																		
TAG	VGL 44,SW				VGL 72													
Rating	# 1500				# 900, RTJ													
Check Valve																		
TAG	VC 47,SW, Lift Check				VC 73,Swing Check				VCS - 9, Full Port Swing Check									
Rating	# 1500								# 900, RTJ									
Needle Valve																		
TAG	VN 10,SW																	
Rating	# 1500																	
Butter Fly Valve																		
TAG																		
Rating																		

  
Notes Related to Valve and Brach Connection

1. PMS to be read in conjunction with FS 2004 A.

2. Maximum temperature limit for all Ball Valve shall be 121 Degree C

Revision:1	15.01.16	Issued For Bid	PS	AKM	SJ
Revision	Date	Description	Prepared By	Reviewed By	Approved By