

Annexure-3

PIPING MATERIAL SPECIFICATION

(Bidder to note that this PMS is preliminary only. Final PMS shall be provided during detail Engineering stage.)

**PROJECT: 1X370 MW YELAHANKA COMBINED CYCLE
POWER PLANT**



PE&SD

PIPING MATERIAL SPECIFICATION

11A

Customer: KPCL YELHANKA

ANSI CLASS: 150

MATERIAL: CARBON STEEL

CORR.ALL: 1.0 mm

Special requirement: NON IBR

DRAFT

Rev.00

23.02.16

TEMPERATURE (Deg.C) & PRESSURE (kg/cm² g) RATINGS

TEMP	-29	38	50	100	150	200	250	300	325	350	375	400			
PRESS.	19.99	19.99	19.58	18.05	16.11	14.07	12.34	10.40	9.48	8.57	7.55	6.63			

SERVICE

NATURAL GAS, VENTS, CONDENSATE, MAKE-UP WATER, WATER WASH, UTILITY LINES, NITROGEN, SERVICE AIR.

ITEM	SIZE	DESCRIPTION
MAINT. JOINTS	ALL	FLANGED (TO BE KEPT MINIMUM)
PIPE JOINTS	2" AND BELOW	SW COUPLING (REF NOTE-3)
	ABOVE 2"	BUTT WELDED AS PER ANSI B16.25
DRAINS	ALL	1" & AS PER BHEL STD. DRG. NO.4-38101-02488 (Refer Note-10)
VENTS	ALL	1" & AS PER BHEL STD. DRG. NO.4-38101-02488 (Refer Note-10)
TEMP. CONN.	M33X2	INSTALLATION AS PER BHEL STD. DWG.NO 4-38101-02488
PRESS. CONN.	1/2"	INSTALLATION AS PER BHEL STD. DWG.NO 4-38101-02488 (Refer Note-9)

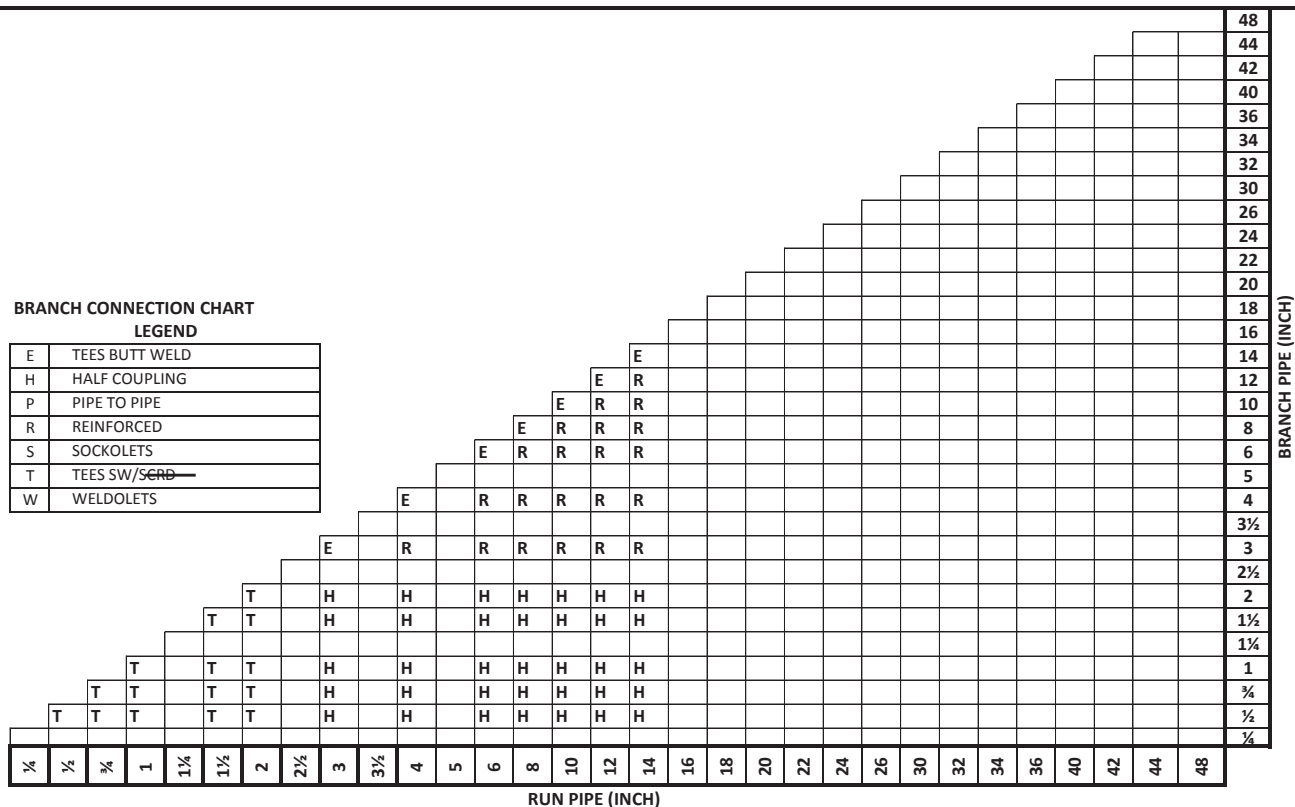
NOTES

1. WELDED PIPE SHALL HAVE ONLY LONGITUDINAL WELD MADE BY EMPLOYING AUTOMATIC WELDING.
2. MINIMUM THICKNESS OF FITTING SHALL BE IN LINE WITH THE PIPE SCHEDULE/THICKNESS.
3. NPT CONNECTIONS ARE PERMITTED IN THERMAL RELIEF VALVES ONLY.
4. MSW GASKET SHALL BE SELF ALIGNING TYPE WITH INNER RING OF SPIRAL STRIP MATERIAL.
5. BALL VALVES SHALL NOT BE USED BEYOND 200 DEG CEN & PR. 7.03 KG/CM2(G)
6. NDT REQUIREMENTS AS PER BHEL STD. DOC. NO. GT 57124
7. FORGED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.11. FOR ITEMS NOT COVERED UNDER B16.11, REFERENCE MAY BE MADE TO BS 3799 OR MSS-SP-STD.
8. BUTT WELDED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.9. FOR ITEMS NOT COVERED UNDER B16.9, REFERENCE MAY BE MADE TO MSS-SP-STD.
9. FOR FUEL SERVICE LINES MEASUREMENT STUB SHALL BE WITH 2 NOS. ROOT VALVES.
10. DRAIN AND VENT LINES FOR FUEL SERVICE SHALL BE WITH DOUBLE ISOLATION VALVES.

BRANCH CONNECTION CHART

LEGEND

E	TEES BUTT WELD
H	HALF COUPLING
P	PIPE TO PIPE
R	REINFORCED
S	SOCKOLETS
T	TEES SW/SCRD
W	WELDOLETS



RUN PIPE (INCH)

BRANCH PIPE (INCH)

11A

PE&SD

Customer: KPCL YELHANKA

ANSI CLASS: 150

MATERIAL:	CARBON STEEL
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CORR.ALL.	1.0 mm
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Special requirement	NON IBR
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DRAFT


Rev.00


23.02.16

ITEMS	TYPE	ENDS	DIA. RANGE (INCH)		SCH/ THK/	FACE FINISH /	DIM /	BASIC MATERIAL		NOTE	Revision	
			LOW	HIGH	RATING	RADIUS	DESG. STD.	CARBON STEEL				
								DESCRIPTION	BHEL SPEC			
PIPES	SEAMLESS	PE	½	2	S80		B 36.10	A106 GRB	AA10455			
	SEAMLESS	BE	3	14	STD.		B 36.10	A106 GRB	AA10455			
FLANGES	WELD NECK	RF	½	1½	300	125AARH	B 16.5	ASTM A 105	AA7246306			
	WELD NECK	RF	2	14	150	125AARH	B 16.5	ASTM A 105	HY7246361			
	BLIND	RF	½	1½	300	125AARH	B 16.5	ASTM A 105	HY7246772			
	BLIND	RF	2	14	150	125AARH	B 16.5	ASTM A 105	HY7246166			
	FIGURE8 BLANK	RF	½	1½	300	125AARH	B 16.48	ASTM A 105	GT57083-06			
	FIGURE8 BLANK	RF	2	8	150	125AARH	B 16.48	ASTM A 105	GT57083-06			
	SPACER & BLIND	RF	10	14	150	125AARH	B 16.48	ASTM A 105	GT57083-06			
FITTINGS	ELBOWS 90 DEG	SW	½	¾	3000		B 16.11	ASTM A 105	AA7242501			
	ELBOWS 90 DEG	SW	1	2	3000		B 16.11	ASTM A 105	AA7242501			
	ELBOWS 90 DEG	BW	3	14	M	R=1.5D	B 16.9	ASTM A 234 GR WPB	HY7242695	2		
	ELBOWS 90 DEG	BW	16	24	M	R=1.5D	B 16.9	ASTM A 234 GR WPB-W	HY7242695	2		
	ELBOWS 45 DEG	SW	2	2	3000	R=1.5D	B 16.11	ASTM A 105	HY7242566	2		
	ELBOWS 45 DEG	BW	3	14	M	R=1.5D	B 16.9	ASTM A 234 GR WPB	HY7242566	2		
	ELBOWS 45 DEG	BW	16	24	M	R=1.5D	B 16.9	ASTM A 234 GR WPB-W	HY7242566	2		
	EQ. TEE	SW	½	¾	3000		B 16.11	ASTM A 105	AA7242510			
	EQ. TEE	SW	1	2	3000		B 16.11	ASTM A 105	AA7242510			
	EQ. TEE	BW	3	14	M		B 16.9	ASTM A 234 GR WPB	AA7242511	2		
	EQ. TEE	BW	16	24	M		B 16.9	ASTM A 234 GR WPB-W	AA7242511	2		
	CON. RDCR	BW	2	14	M,M		B 16.9	ASTM A 234 GR WPB	HY7242692	2		
	CON. RDCR	BW	16	24	M,M		B 16.9	ASTM A 234 GR WPB-W	HY7242692	2		
	CAP	SW	2	2	M		B 16.11	ASTM A 105	HY7242570			
	CAP	BW	3	24	M		B 16.9	ASTM A 234 GR WPB	HY7242570			
	FULL COUPLING	NPT/NPT	½	¾	3000		B 16.11	ASTM A 105	HY7242595	3		
	FULL COUPLING	NPT/NPT	1	2	3000		B 16.11	ASTM A 105	HY7242595	3		
FULL COUPLING	SW	½	¾	3000		B 16.11	ASTM A 105	AA7242520				
FULL COUPLING	SW	1	2	3000		B 16.11	ASTM A 105	AA7242520				
VI (HALF CPLG)	SW	½	¾	3000		B 16.11	ASTM A 105	TC56213				
VI (HALF CPLG)	SW	1	2	3000		B 16.11	ASTM A 105	TC56213				
VALVES	GATE	SW	½	1½	800		API 602	ASTM A 105	AA7521468			
	GATE	SW	2	2	800		API 600	ASTM A 105	AA7521468			
	GATE	BW	3	14	150		API 600	ASTM A 216 GR. WCB	AA7521408			
	GLOBE	SW	½	1½	800		BS 5352	ASTM A 105	AA7501468			
	GLOBE	SW	2	2	800		BS 1873	ASTM A 105	AA7501468			
	GLOBE	BW	3	14	150		BS 1873	ASTM A 216 GR. WCB	AA7501408			
	Reg GLOBE VLV	SW	½	1½	800		BS 5352	ASTM A 105	HY7511943			
	Reg GLOBE VLV	SW	2	2	800		BS 1873	ASTM A 105	HY7511943			
	Reg GLOBE VLV	BW	3	12	150		BS 1873	ASTM A 216 GR. WCB	AA7511408			
	CHECK (PISTON LIFT)	SW	½	1½	800		BS 5352	ASTM A 105	AA7531468			
	CHECK (PISTON LIFT)	SW	2	2	800		BS 1868	ASTM A 105	AA7531468			
	CHECK	BW	3	14	150		BS 1868	ASTM A 216 GR. WCB	AA7541408			
	BALL	FL	½	2	300		BS 5351	ASTM A 105	GT57066-06			
	BALL	FL	3	14	150		BS 5351	ASTM A 216 GR. WCB	GT57066-06			
	BOLT & GASKET	STUD + 2NUTS		M12	M27			B 18.2	A 193 GR B7/ A194 2H	HY7142198		
		STUD + 2NUTS		M30	M70			B 18.2	A 193 GR B7/ A194 2H	HY7142299		
GASKET			½	1½	300		B 16.20	NAB MSW (SS316)+ GRAFOIL FILL	HY7240363	4		
GASKET			2	24	150		B 16.20	NAB MSW (SS316)+ GRAFOIL FILL	HY7240362	4		
MISC	STEAM TRAP	RF	1	1	300	THERMODYNAMIC	MNF. STD.	B: A 105; INT: SS 304	GT57278-00			
	Y-TYPE STRAINER	SW	½	2	800	B 16.11	MNF. STD.	B: A 105; INT: SS 304	HY7577468			
	Y-TYPE STRAINER	FL	3	24	150	B 16.5	MNF. STD.	B: A 216 WCB; INT: SS 304	HY7577408			
	B : BODY; INT : INTERNALS											

 		PIPING MATERIAL SPECIFICATION		11D							
PE&SD-Mech.		DRAFT		Customer: KPCL YELHANKA							
ANSI CLASS: 150				Rev.00 23.03.16							
MATERIAL: CARBON STEEL											
CORR.ALL. 1.0 mm											
Special requirement NON IBR											
TEMPERATURE (Deg.C) & PRESSURE (kg/cm² g) RATINGS											
TEMP		38	50	100							
PRESS.		7.00	7.00	7.00							
SERVICE	COOLING WATER LINES										
	ITEM	SIZE	DESCRIPTION								
	MAINT. JOINTS	ALL	FLANGED (TO BE KEPT MINIMUM)								
	PIPE JOINTS	ALL	SW COUPLING (REF NOTE-3)								
			BUTT WELDED AS PER ANSI B16.25								
	DRAINS	ALL	1" OR AS PER BHEL STD. DRG. NO.4-38101-02488								
	VENTS	ALL	1" OR AS PER BHEL STD. DRG. NO.4-38101-02488								
	TEMP. CONN.	M33X2	INSTALLATION AS PER BHEL STD. DWG.NO 4-38101-02488								
	PRESS. CONN.	1/2"	INSTALLATION AS PER BHEL STD. DWG.NO 4-38101-02488								
NOTES	1. WELDED PIPE SHALL HAVE ONLY LONGITUDINAL WELD MADE BY EMPLOYING AUTOMATIC WELDING.										
	2. MINIMUM THICKNESS OF FITTING SHALL BE IN LINE WITH THE PIPE SCHEDULE/THICKNESS.										
	3. NPT CONNECTIONS ARE PERMITTED IN THERMAL RELIEF VALVES ONLY.										
	4. MSW GASKET SHALL BE SELF ALIGNING TYPE WITH INNER RING OF SPIRAL STRIP MATERIAL.										
	5. DELETED.										
	6. NDT REQUIREMENTS AS PER BHEL STD. DOC. NO. GT 57124										
	7. ALL FLANGED VALVES ABOVE 24" SIZE SHALL HAVE FLANGED END AS PER AWWA C207 CL D.										
	8. USE BUTTERFLY VALVES INSTEAD OF GATE VALVE FROM 10" ON WARDS IN WATER SERVICE UP TO 70 DEG CEN. BUTTER FLY VALVE SHALL BE OF PN 10 RATED WITH DESIGN PRESSURE OF 10 KG/CM ² (g).										
	9. FORGINGS ARE ACCEPTABLE IN LIEU OF PLATE MATERIAL FOR BLIND FLANGES AND SPACER & BLINDS.										
	10. NDT REQUIREMENTS AS PER BHEL STD DOC NO GT 57124										
	11. FORGED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.11. FOR ITEMS NOT COVERED UNDER B16.11, REFERENCE MAY BE MADE TO BS 3799 OR MSS-SP-STD.										
	12. BUTT WELDED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.9. FOR ITEMS NOT COVERED UNDER B16.9, REFERENCE MAY BE MADE TO MSS-SP-STD.										
ITEMS	TYPE	ENDS	DIA. RANGE (INCH)		SCH/THK/ RATING	FACE FINISH / RADIUS	DIM / DESG. STD.	BASIC MATERIAL CARBON STEEL		NOTE	Revision
			LOW	HIGH				DESCRIPTION	BHEL SPEC		
PIPES	WELDED PIPE	PE	½	2	HVY		IS 1239	IS 1239 PART 1	AA10152	1	
	WELDED PIPE	BE	3	6	HVY		IS 1239	IS 1239 PART 1	AA10152	1	
	WELDED PIPE	BE	8	14	7.0		IS 3589	IS 3589 Gr FE330	GT57880	1	
FLANGES	SLIP ON	RF	½	1½	300	125AARH	B 16.5	ASTM A 105	AA7246106		
	SLIP ON	RF	2	14	150	125AARH	B 16.5	ASTM A 105	AA7246101		
	BLIND	RF	½	1½	300	125AARH	B 16.5	ASTM A 105	HY7246772		
	BLIND	RF	2	14	150	125AARH	B 16.5	ASTM A 105	HY7246166		
	FIGURE8 BLANK	FF	½	1½	300	125AARH	B 16.48	ASTM A 105	GT57083		
	FIGURE8 BLANK	FF	2	8	150	125AARH	B 16.48	ASTM A 105	GT57083		
	SPACER & BLIND	FF	10	14	150	125AARH	B 16.48	ASTM A 105	GT57083		
NGS	ELBOWS 90 DEG	SW	½	2	3000		B 16.11	ASTM A 105			
	ELBOWS 90 DEG	BW	3	14	M	R=1.5D	B 16.9	ASTM A 234 GR WPB	HY7242695	2	
	ELBOWS 45 DEG	SW	2	2	3000	R=1.5D	B 16.11	ASTM A 105		2	
	ELBOWS 45 DEG	BW	3	14	M	R=1.5D	B 16.9	ASTM A 234 GR WPB		2	

<div><div><div>50</div><div>Years</div></div><div><div>Golden Jubilee</div><div>1970-2020</div></div></div> <div>Maharaja Company</div>		PIPING MATERIAL SPECIFICATION						11D			
Customer: KPCL YELHANKA						DRAFT		Rev.0023.03.16			
ANSI CLASS: 150											
MATERIAL: CARBON STEEL											
CORR.ALL. 1.0 mm											
Special requirementNON IBR											
FITTINGS	TYPE	ENDS	DIA. RANGE (INCH)		SCH/THK/ RATING	FACE FINISH / RADIUS	DIM / DESG. STD.	BASIC MATERIAL CARBON STEEL		NOTE	
			LOW	HIGH				DESCRIPTION	BHEL SPEC		
	EQ. TEE	SW	½	2	3000		B 16.11	ASTM A 105	AA7242510		
	EQ. TEE	BW	3	14	M		B 16.9	ASTM A 234 GR WPB	AA7242511	2	
	CON. RDCR	BW	2	14	M,M		B 16.9	ASTM A 234 GR WPB		2	
	ECC. RDCR	BW	2	14	M,M		B 16.9	ASTM A 234 GR WPB		2	
	CAP	NPT(F)	½	1½	3000		B 16.11	ASTM A 105	HY7242579		
	CAP	SW	2	2	M		B 16.11	ASTM A 105	HY7242570		
	CAP	BW	3	14	M		B 16.9	ASTM A 234 GR WPB	HY7242570		
	FULL COUPLING	NPT/NPT	½	2	3000		B 16.11	ASTM A 105	HY7242595	3	
	FULL COUPLING	SW	½	2	3000		B 16.11	ASTM A 105	AA7242520	3	
	VI (HALF CPLG)	SW	½	2	3000		B 16.11	ASTM A 105			
	VALVES	GATE	SW	½	1½	800		API 602	A 105	AA7521468	
		GATE	SW	2	2	800	B16.5	API 600	A 216 GR. WCB	AA7521408	
GATE		FL	3	6	150	B16.5	API 600	A 216 GR. WCB	AA7521408		
GLOBE		SW	½	1½	800		BS 5352	A 105	AA7501468		
GLOBE		SW	2	2	800	B16.5	BS 1873	A 216 GR. WCB	AA7501408		
GLOBE		FL	3	6	150	B16.5	BS 1873	A 216 GR. WCB	AA7501408		
CHECK (PISTON LIFT)		SW	½	2	800		BS 5352	A 105	AA7531468		
DUEL PLATE CHECK		FF	3	14	150			A 216 GR. WCB			
BUTTER FLY		WAFER WITH LUGS	8	14	150	AWWA-C504	BS 5155	A 216 GR. WCB	GT57213-07		
BOLT & GASKET	STUD + 2NUTS		M12	M27			B 18.2	A 193 GR B7/ A194 2H	HY7142198		
	STUD + 2NUTS		M30	M70			B 18.2	A 193 GR B7/ A194 2H	HY7142299		
	GASKET		½	1½	300		B 16.20	NAB MSW (SS316)+ PTFE FILL	AA7240358	4	
	GASKET		2	14	150		B 16.20	NAB MSW (SS316)+ PTFE FILL	AA7240345	4	
	Y-TYPE STRAINER	SW	½	2	800	B16.11	MNF. STD	B: A 105; INT: SS 304			
	Y-TYPE STRAINER	FL	3	14	150	B16.5	MNF. STD	B: A 234 WPB, INT. SS304			
	RE JOINT	FL	2	14	150		MNF. STD	IS 2062, NEOPRENE RUBBER			
MISC.	AIR RELEASE VALVE	FL	1½	8	150		IS14845	IS 216 WCB			

<div><div>50 Years</div><div>Golden Jubilee</div></div> <div>PE&SD-Mech.</div>		PIPING MATERIAL SPECIFICATION		11E																										
Customer: KPCL YELHANAKA		<div>DRAFT</div>																												
ANSI CLASS: 150																														
MATERIAL: IS:1239(GALV)				Rev.00 22.03.16																										
CORR.ALL. 0.0 mm																														
Special requirement NON IBR																														
TEMPERATURE (Deg.C) & PRESSURE (kg/cm ² g) RATINGS																														
TEMP		0 65																												
PRESS.		10.55 10.55																												
SERVICE		INSTRUMENT AIR																												
ITEM		SIZE		DESCRIPTION																										
MAINT. JOINTS		ALL		COUPLINGS (SCRF)																										
PIPE JOINTS		ALL		SCREWED COUPLING																										
DRAINS		ALL		1" & AS PER BHEL STD. DRG. NO.4-38101-02488																										
VENTS		ALL		1" & AS PER BHEL STD. DRG. NO.4-38101-02488																										
TEMP. CONN.		M33X2		INSTALLATION AS PER BHEL STD. DWG.NO 4-38101-02488																										
PRESS. CONN.		1/2"		INSTALLATION AS PER BHEL STD. DWG.NO 4-38101-02488																										
NOTES		<div>1. THREADED JOINTS SHALL BE MADE WITH 1" WIDE PTFE JOINING TAPE.</div> <div>2. SURFACE WHERE GALVANIZATION HAS BEEN BURNED OFF, SHALL BE WIRE BRUSHED & COLD GALVANIZED WITH ZINC COATING COMPOUND.</div> <div>3. NO FIELD TEST IS REQUIRED FOR INSTRUMENT AIR SERVICE.</div> <div>4. MSW GASKET SHALL BE SELF ALIGNING TYPE WITH INNER RING OF SPIRAL STRIP MATERIAL.</div> <div>5. NDT REQUIREMENTS AS PER BHEL STD DOC. NO. GT 57124.</div> <div>6. FORGED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.11. FOR ITEMS NOT COVERED UNDER B16.11, REFERENCE MAY BE MADE TO BS 3799 OR MSS-SP-STD.</div> <div>7. BUTT WELDED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.9. FOR ITEMS NOT COVERED UNDER B16.9, REFERENCE MAY BE MADE TO MSS-SP-STD.</div>																												
BRANCH CONNECTION CHART																														
LEGEND																														
E	TEES BUTT WELD																													
H	HALF COUPLING																													
P	PIPE TO PIPE																													
R	REINFORCED																													
S	SOCKLETS																													
T	TEES SW/SCRD																													
W	WELDOLETS																													
		BRANCH PIPE (INCH)																												
		48																												
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		¾																												
		½																												
		¼																												
RUN PIPE (INCH)																														
¼	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	22	24	26	30	32	34	36	40	42	44	48

 <p>PE&SD-Mech.</p>		<h2 style="text-align: center;">PIPING MATERIAL SPECIFICATION</h2>						<h1 style="text-align: center;">11E</h1>			
Customer: KPCL YELHANAKA ANSI CLASS: 150 MATERIAL: IS:1239(GALV) CORR.ALL. 0.0 mm Special requirement NON IBR		<h1 style="font-size: 4em; color: #4F81BD; opacity: 0.5;">DRAFT</h1>						Rev.00 22.03.16			
ITEMS	TYPE	ENDS	DIA. RANGE (INCH)		SCH/THK/ RATING	FACE FINISH / RADIUS	DIM / DESG. STD.	BASIC MATERIAL CARBON STEEL		NOTE	Revision
			LOW	HIGH				DESCRIPTION	BHEL SPEC		
PIPES	WELDED	SCRD-M	½	1½	HVY	SCRD	IS 1239 (GALV)	IS 1239 PART-1 (SAW)	AA10152		
	WELDED	SCRD-M	2	3	HVY	SCRD	IS 1239 (GALV)	IS 1239 PART-1 (SAW)	AA10152		
FLANGES	FLNG SCREWED	SCRD.	½	2	150		B 16.5	ASTM A 105			
	FLNG SCREWED	SCRD.	3	3	150		B 16.5	ASTM A 105			
FITTINGS	ELBOWS 90 DEG	SCRD-F	½	2	3000		B 16.11	ASTM A 105			
	ELBOWS 90 DEG	SCRD-F	3	3	M		B 16.11	ASTM A 234 GR WPB			
	EQ. TEE	SCRD-F	½	2	3000		B 16.11	ASTM A 105			
	EQ. TEE	SCRD-F	3	3	M		B 16.11	ASTM A 234 GR WPB			
	UNEQ. TEE	SCRD-F	½	2	3000		B 16.11	ASTM A 105			
	UNEQ. TEE	SCRD-F	3	3	M		B 16.11	ASTM A 234 GR WPB			
	STRT. COUPLING	SCRD-F	½	2	3000		B 16.11	ASTM A 105			
	STRT. COUPLING	SCRD-F	3	3	M		B 16.11	ASTM A 234 GR WPB			
	RED. COUPLING	SCRD-F	½	2	3000		B 16.11	ASTM A 105			
	RED. COUPLING	SCRD-F	3	3	M		B 16.11	ASTM A 234 GR WPB			
	HEX HEAD PLG	SCRD-M	½	2	3000		B 16.11	ASTM A 105			
	HEX HEAD PLG	SCRD-M	3	3	M		B 16.11	ASTM A 234 GR WPB			
	FLAT CAPS	SCRD-F	½	2				ASTM A 105			
	FLAT CAPS	SCRD-F	3	3				ASTM A 234 GR WPB			
VALVES	GATE	SCRD-F	½	1½	800		API 602	A105			
	GATE	SCRD-F	2	2	800		API 600	A105			
	GATE	FL	3	3	150		API 600	A216 WCB			
	GLOBE	SCRD-F	½	1½	800		BS 5352	A105			
	GLOBE	SCRD-F	2	2	800		BS 1873	A105			
	GLOBE	FL	3	3	150		BS 1873	A216WCB			
	CHECK (PISTON LIFT)	SCRD-F	½	1½	800		BS 5352	A105			
	CHECK (PISTON LIFT)	SCRD-F	2	2	800		BS 1868	A105			
	CHECK	FL	3	3	150		BS 1868	A216WCB			
BOLT & GASKET	STUD + 2NUTS		M12	M27			B 18.2	A 193 GR B7/ A194 2H	HY7142198		
	GASKET		½	1½	300		B 16.20	NAB MSW (SS316)+ PTFE FILL	HY7240363	4	
	GASKET		2	3	150		B 16.20	NAB MSW (SS316)+ PTFE FILL	HY7240362	4	
MISC	Y-TYPE STRAINER	SCRD	½	1½	800	B 16.11	MNF. STD.	B: A 105; INT: SS 304	HY7577468		
	Y-TYPE STRAINER	SCRD	2	2	150	B 16.11	MNF. STD.	B: A 105; INT: SS 304	HY7577408		
	Y-TYPE STRAINER	FL	3	3	150	B 16.5	MNF. STD.	B: A 216 WCB; INT: SS 304	HY7577408		
B: BODY; INT: INTERNALS											



PE&SD-Mech.

PIPING MATERIAL SPECIFICATION

31A

Customer:	KPCL YELHANKA
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ANSI CLASS: 600

MATERIAL:	CARBON STEEL
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CORR.ALL.	1.0 mm
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Special requirement	Non-IBR
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DRAFT

Rev.00

23.03.16

TEMPERATURE (Deg.C) & PRESSURE (kg/cm2 g) RATINGS

TEMP	-29	38	50	100	150	200	225									
PRESS.	45.70	45.70	45.70	45.70	45.70	45.70	45.70									

SERVICE

NATURAL GAS

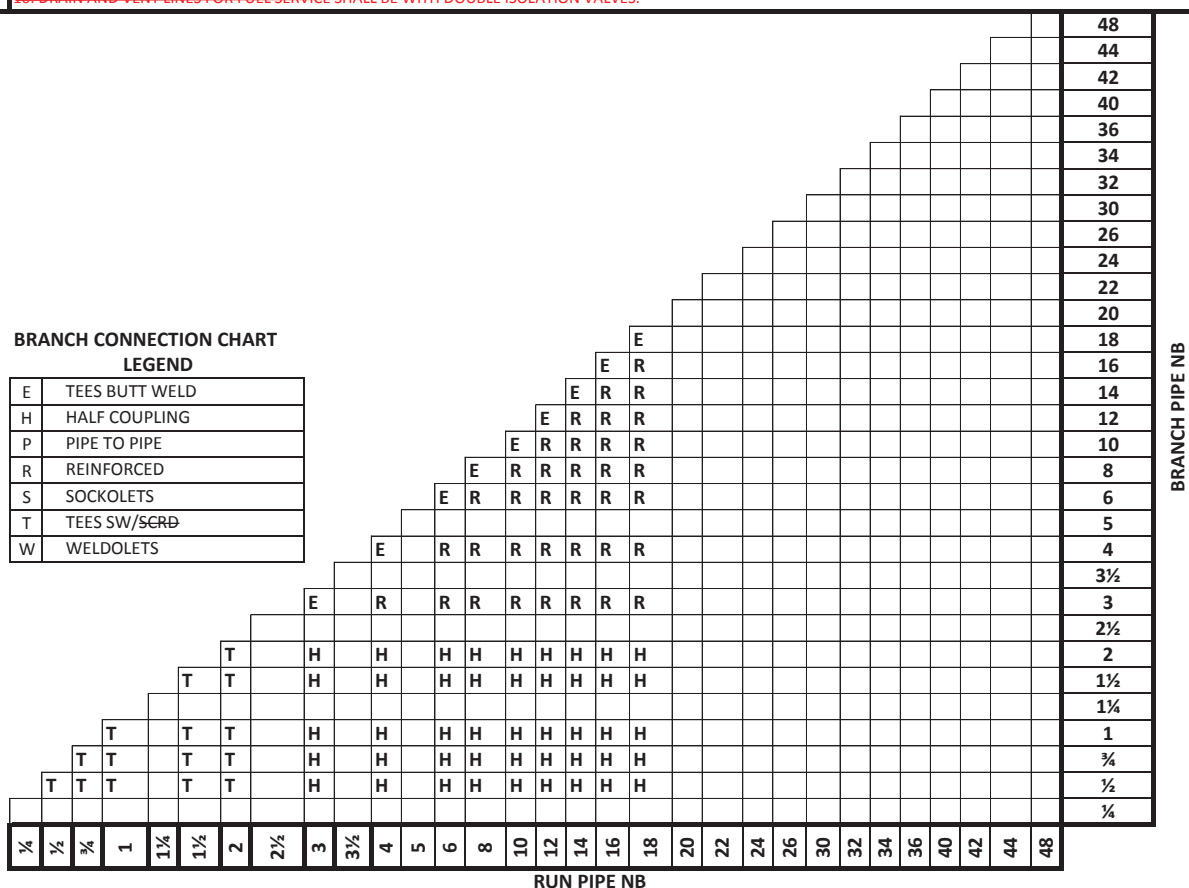
ITEM	SIZE	DESCRIPTION
MAINT. JOINTS	ALL	FLANGED (TO BE KEPT MINIMUM)
PIPE JOINTS	2" AND BELOW	SW COUPLING (REF NOTE-3)
	ABOVE 2"	BUTT WELDED AS PER ANSI B16.25
DRAINS	ALL	1" & AS PER BHEL STD DRG NO.4-38101-02488 (Refer Note-10)
VENTS	ALL	1" & AS PER BHEL STD DRG NO.4-38101-02488 (Refer Note-10)
TEMP. CONN.	M33X2	INSTALLATION AS PER BHEL STD. DWG. NO. 4-38101-02488
PRESS. CONN.	1/2"	INSTALLATION AS PER BHEL STD. DWG. NO. 4-38101-02488 (Refer Note-9)

NOTES

1. WELDED PIPE SHALL HAVE ONLY LONGITUDINAL WELD MADE BY EMPLOYING AUTOMATIC WELDING.
2. MINIMUM THICKNESS OF FITTING SHALL BE IN LINE WITH THE PIPE SCHEDULE/THICKNESS.
3. NPT CONNECTIONS ARE PERMITTED IN THERMAL RELIEF VALVES ONLY.
4. MSW GASKET SHALL BE SELF ALIGNING TYPE WITH INNER RING OF SPIRAL STRIP MATERIAL.
5. DELETED
6. NDT REQUIREMENTS AS PER BHEL STD. DOC. NO. GT 57124
7. FORGED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.11. FOR ITEMS NOT COVERED UNDER B16.11, REFERENCE MAY BE MADE TO BS 3799 OR MSS-SP-STD.
8. BUTT WELDED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.9. FOR ITEMS NOT COVERED UNDER B16.9, REFERENCE MAY BE MADE TO MSS-SP-STD.
- ~~9. FOR FUEL SERVICE LINES MEASUREMENT STUB SHALL BE WITH 2 NOS. ROOT VALVES~~
- ~~10. DRAIN AND VENT LINES FOR FUEL SERVICE SHALL BE WITH DOUBLE ISOLATION VALVES~~

BRANCH CONNECTION CHART LEGEND

E	TEES BUTT WELD
H	HALF COUPLING
P	PIPE TO PIPE
R	REINFORCED
S	SOCKLETS
T	TEES SW/SCRD
W	WELDOLETS





PE&SD-Mech.

PIPING MATERIAL SPECIFICATION

31A

Customer: KPCL YELHANKA

ANSI CLASS: 600

MATERIAL: CARBON STEEL

CORR.ALL. 1.0 mm

Special requirement Non-IBR


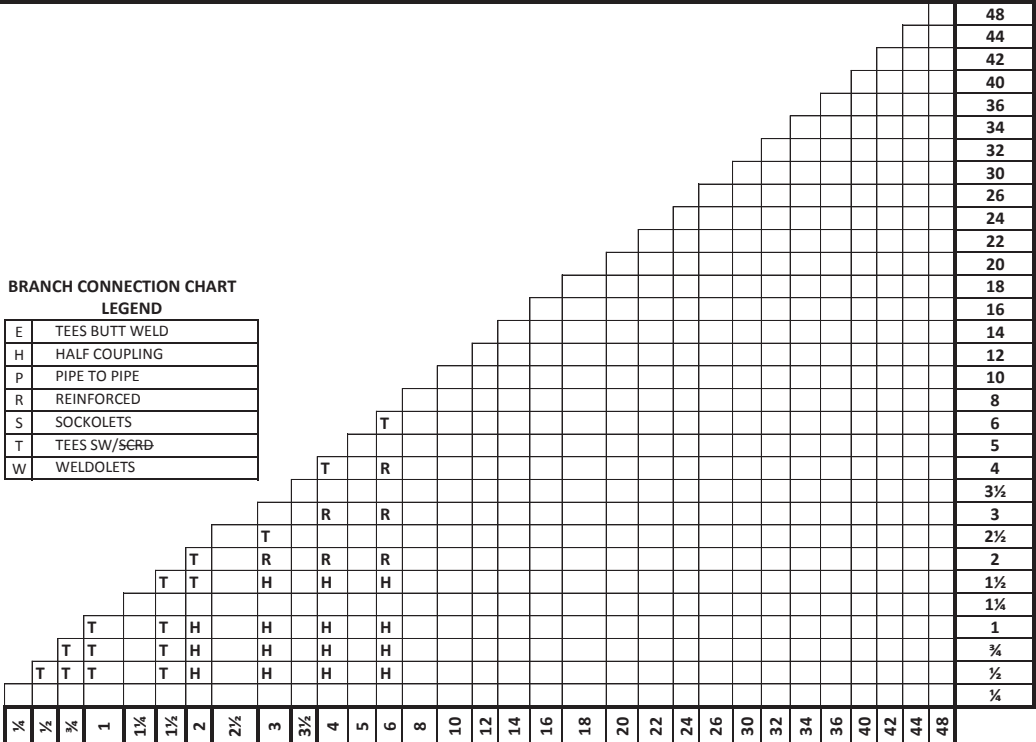
DRAFT


Rev.00

23.03.16

ITEMS	TYPE	ENDS	DIA. RANGE (INCH)		SCH/ THK/ RATING	FACE FINISH / RADIUS	DIM / DESG. STD.	BASIC MATERIAL		NOTE	Revision
								CARBON STEEL			
			LOW	HIGH				DESCRIPTION	BHEL SPEC		
PIPES	SEAMLESS	PE	½	2	S 80		B 36.10	A106 GRB	AA10455		
	SEAMLESS	BE	3	10	S 40		B 36.10	A106 GRB	AA10455		
	SEAMLESS	BE	12	12	S STD		B 36.10	A106 GRB	AA10455		
FLANGES	WELD NECK	RF	½	12	600	125AARH	B 16.5	ASTM A 105	AA7246306		
	BLIND	RF	½	12	600	125AARH	B 16.5	ASTM A 105	HY7246772		
	FIGURE8 BLANK	RF	½	8	600	125AARH	B 16.48	ASTM A 105	GT57083		
	SPACER & BLIND	RF	10	12	600	125AARH	B 16.48	ASTM A 105	GT57083		
FITTINGS	ELBOWS 90 DEG	SW	½	¾	3000		B 16.11	ASTM A 105	AA7242501		
	ELBOWS 90 DEG	SW	1	2	3000		B 16.11	ASTM A 105	AA7242501		
	ELBOWS 90 DEG	BW	3	12	M	R=1.5D	B 16.9	ASTM A 234 GR WPB	HY7242695	2	
	ELBOWS 45 DEG	SW	2	2	3000	R=1.5D	B 16.11	ASTM A 105	HY7242566	2	
	ELBOWS 45 DEG	BW	3	12	M	R=1.5D	B 16.9	ASTM A 234 GR WPB	HY7242566	2	
	EQ. TEE	SW	½	¾	3000		B 16.11	ASTM A 105	AA7242510		
	EQ. TEE	SW	1	2	3000		B 16.11	ASTM A 105	AA7242510		
	EQ. TEE	BW	3	12	M		B 16.9	ASTM A 234 GR WPB	AA7242511	2	
	CON. RDCR	BW	2	12	M,M		B 16.9	ASTM A 234 GR WPB	HY7242692	2	
	CAP	SW	2	2	3000		B 16.11	ASTM A 105	HY7242570	2	
	CAP	BW	3	12	M		B 16.9	ASTM A 234 GR WPB	HY7242570	2	
	FULL COUPLING	NPT/NPT	½	¾	3000		B 16.11	ASTM A 105	HY7242595	3	
	FULL COUPLING	NPT/NPT	1	2	3000		B 16.11	ASTM A 105	HY7242595	3	
	FULL COUPLING	SW	½	¾	3000		B 16.11	ASTM A 105	AA7242520		
	FULL COUPLING	SW	1	2	3000		B 16.11	ASTM A 105	AA7242520		
	VI (HALF CPLG)	SW	½	¾	3000		B 16.11	ASTM A 105	TC56213		
	VI (HALF CPLG)	SW	1	2	3000		B 16.11	ASTM A 105	TC56213		
VALVES	GATE	SW	½	1½	800		API 602	A 105;	AA7521468		
	GATE	SW	2	2	800		API 600	A 216 GR. WCB;	AA7521428		
	GATE	BW	3	12	600		API 600	A 216 GR. WCB;	AA7521428		
	GLOBE	SW	½	1½	800		BS 5352	A 105;	AA7501468		
	GLOBE	SW	2	2	800		BS 1873	A 216 GR. WCB;	AA7501428		
	GLOBE	BW	3	12	600		BS 1873	A 216 GR. WCB;	AA7501428		
	Reg GLOBE VLV	SW	½	1½	800		BS 5352	A 105;	HY7511943		
	Reg GLOBE VLV	SW	2	2	800		BS 1873	A 216 GR. WCB;	AA7511428		
	Reg GLOBE VLV	BW	3	12	600		BS 1873	A 216 GR. WCB;	AA7511428		
	CHECK (PISTON LIFT)	SW	½	1½	800		BS 5352	A 105;	AA7531468		
CHECK (PISTON LIFT)	SW	2	2	800		BS 1868	A 216 GR. WCB;	AA7541428			
CHECK	BW	3	12	600		BS 1868	A 216 GR. WCB;	AA7541428			
BOLT & GASKET	STUD + 2NUTS		M12	M27			B 18.2	A 193 GR B7/ A194 2H	HY7142198		
	STUD + 2NUTS		M30	M70			B 18.2	A 193 GR B7/ A194 2H	HY7142299		
	GASKET		½	12	600		B 16.20	NAB MSW (SS316)+ PTFE FILLER	HY7240363	4	
MISC	Y-TYPE STRAINER	SW	½	2	800	B 16.11	MNF. STD.	B: A 105; INT: SS 304			
	Y-TYPE STRAINER	FL	3	8	600	B 16.5	MNF. STD.	B: A 216 WCB; INT: SS 304			
B: BODY; INT: INTERNALS											

B: BODY; INT: INTERNALS

 PE&SD-Mech.		PIPING MATERIAL SPECIFICATION		32A											
Customer: KPCL YELHANKA ANSI CLASS: 600 MATERIAL: STAINLESS STEEL CORR.ALL: 0.0 mm Special requirement: NON IBR		DRAFT		Rev.00 23.03.16											
TEMPERATURE (Deg.C) & PRESSURE (kg/cm2 g) RATINGS															
TEMP	-29	38	93	149	204	260	316	343	371	399	427	454			
PRESS.	101.2	101.2	84.4	75.9	70.0	65.4	61.5	60.5	59.76	58.35	56.59	55.5			
SERVICE NATURAL GAS AFTER FINE FILTERS, CHEMICAL LINES IN HP DOSING															
ITEM		SIZE		DESCRIPTION											
MAINT. JOINTS		ALL		FLANGED (TO BE KEPT MINIMUM)											
PIPE JOINTS		2" AND BELOW		SW COUPLING (REF NOTE-3)											
		ABOVE 2"		BUTT WELDED AS PER ANSI B16.25											
DRAINS		ALL		1" & AS PER BHEL STD. DRG. NO.4-38101-02488 (Refer Note-10)											
VENTS		ALL		1" & AS PER BHEL STD. DRG. NO.4-38101-02488 (Refer Note-10)											
TEMP. CONN.		M33X2		INSTALLATION AS PER BHEL STD. DWG.NO 4-38101-02488											
PRESS. CONN.		1/2"		INSTALLATION AS PER BHEL STD. DWG.NO 4-38101-02488 (Refer Note-9)											
NOTES															
1. WELDED PIPE SHALL HAVE ONLY LONGITUDINAL WELD MADE BY EMPLOYING AUTOMATIC WELDING. 2. MINIMUM THICKNESS OF FITTING SHALL BE IN LINE WITH THE PIPE SCHEDULE/THICKNESS. 3. NPT CONNECTIONS ARE PERMITTED IN THERMAL RELIEF VALVES ONLY. 4. MSW GASKET SHALL BE SELF ALIGNING TYPE WITH INNER RING OF SPIRAL STRIP MATERIAL. 5. BALL VALVES SHALL NOT BE USED BEYOND 200 DEG CEN & PR. 7.03 KG/CM2(G) 6. NDT REQUIREMENTS AS PER BHEL STD. DOC. NO. GT 57124 7. ALL PIPES, FITTINGS, VALVES, FLANGES STRAINERS, ETC SHALL BE TESTED & TEST CERTIFICATES IN FORM IIIA FOR PIPES & FORM IIIC FOR OTHERS SHALL BE REQUIRED DULY COUNTER SIGNED BY IBR AUTHORITY OR THEIR APPROVED REPRESENTATIVE. 8. ALL ITEMS SHALL BE SUPPLIED IN SOLUTION ANNEALED CONDITION. 9. FORGED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.11. FOR ITEMS NOT COVERED UNDER B16.11, REFERENCE MAY BE MADE TO BS 3799 OR MSS-SP-STD. 10. BUTT WELDED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.9. FOR ITEMS NOT COVERED UNDER B16.9, REFERENCE MAY BE MADE TO MSS-SP-STD. 9. FOR FUEL SERVICE LINES MEASUREMENT STUB SHALL BE WITH 2 NOS. ROOT VALVES. 10. DRAIN AND VENT LINES FOR FUEL SERVICE SHALL BE WITH DOUBLE ISOLATION VALVES.															
BRANCH CONNECTION CHART															
LEGEND															
E	TEES BUTT WELD														
H	HALF COUPLING														
P	PIPE TO PIPE														
R	REINFORCED														
S	SOCKOLETS														
T	TEES SW/SGRD														
W	WELDOLETS														
															

<div><div><div>50</div><div>Years</div></div><div><div>Indian</div><div>Oil</div><div>Corporation</div></div></div> <div>PE&SD-Mech.</div>			PIPING MATERIAL SPECIFICATION							32A	
Customer: KPCL YELHANKA					<div>DRAFT</div>						
ANSI CLASS: 600											
MATERIAL: STAINLESS STEEL										Rev.00 23.03.16	
CORR.ALL. 0.0 mm											
Special requirement NON IBR											
ITEMS	TYPE	ENDS	DIA. RANGE (INCH)		SCH/ THK/ RATING	FACE FINISH / RADIUS	DIM / DESG. STD.	BASIC MATERIAL STAINLESS STEEL		NOTE	Revision
			LOW	HIGH				DESCRIPTION	BHEL SPEC		
PIPES	SEAMLESS	PE	½	1½	S 40S		B 36.19	A312TP321	AA10755		
	SEAMLESS	BE	2	12	S 40S		B 36.19	A312TP321	AA10755		
FLANGES	WELD NECK	RF	½	1½	600	12SAARH	B 16.5	A182F321			
			2	12	M						
	BLIND	RF	½	12	600	12SAARH	B 16.5	A182F321			
	FIGURE'8' BLANK	RF	½	12	600	12SAARH	B 16.48	A182F321			
FITTINGS	ELBOWS 90 DEG	SW	½	¾	3000		B 16.11	A182F321			
	ELBOWS 90 DEG	SW	1	1½	3000		B 16.11	A182F321			
	ELBOWS 90 DEG	BW	2	12	M	R=1.5D	B 16.9	A403 GR WP321-S		3	
	ELBOWS 45 DEG	BW	½	1½	3000		B 16.11	A403 GR WP321-S			
			2	12	M	R=1.5D	B 16.9	A403 GR WP321-S	HY7242558	3	
	EQ. TEE	SW	½	¾	3000		B 16.11	A 182F321			
	EQ. TEE	SW	1	1½	3000		B 16.11	A 182F321			
	EQ. TEE	BW	2	12	M		B 16.9	A403 GR WP321-S		3	
	CON. RDCR	BW	2	12	M,M		B 16.9	A403 GR WP321-S		3	
	FULL COUPLING	NPT/NPT	½	¾	3000		B 16.11	A 182F321	HY7242595	3	
	FULL COUPLING	NPT/NPT	1	1½	3000		B 16.11	A 182F321	HY7242595	3	
	FULL COUPLING	SW	½	¾	3000		B 16.11	A 182F321	AA7242520		
	FULL COUPLING	SW	1	1½	3000		B 16.11	A 182F321	AA7242520		
	VI (HALF CPLG)	SW	½	¾	3000		B 16.11	A 182F321			
	VI (HALF CPLG)	SW	1	1½	3000		B 16.11	A 182F321			
VALVES	GATE	SW	½	1½	800		API 602	A182GR.F316			
		BW	2	12	600		API 600				
	GLOBE	SW	½	1½	800		BS 5352	A182GR.F316			
		BW	2	12	600		API 600				
	BALL	SW	½	1½	800		BS 5351	A182GR.F316			
		BW	2	12	600		API 600				
CHECK (PISTON LIFT)	SW	½	1½	800		BS 5352	A182GR.F316				
	BW	2	12	600		API 600					
BOLT & GASKET	STUD + 2NUTS		M12	M27			B 18.2	A 193 GR B7/ A194 Gr 2H			
	STUD + 2NUTS		M30	M70			B 18.2	A 193 GR B7/ A194 Gr 2H			
	GASKET		½	24	900		B 16.20	NAB MSW (SS304)+ GRAPHITE		4	

41C

DRAFT

23.03.16

TEMP	-29	38	50	100	150	200	250	300	325	350	375	400	415		
PRESS.	156.2	156.2	153.4	142.6	137.9	134.0	128.3	121.9	118.4	114.9	111.3	106.3	91.7		

SERVIC

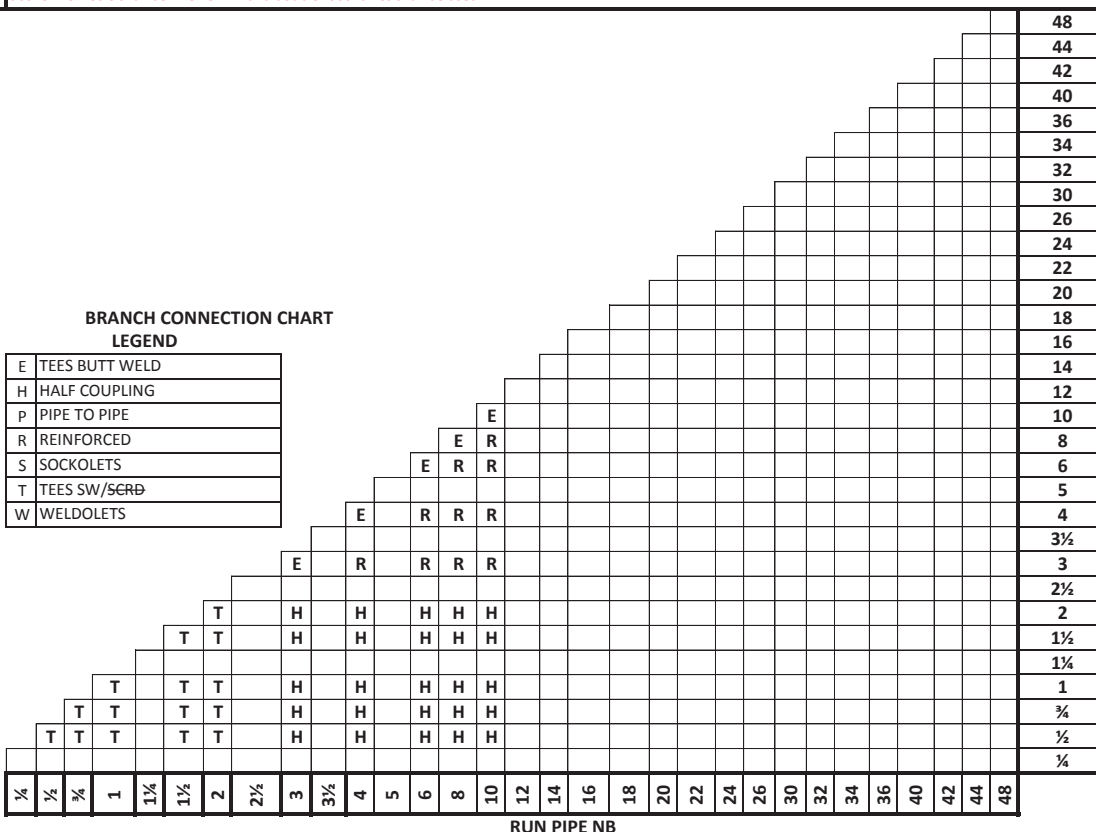
ITEM	SIZE	DESCRIPTION
MAINT. JOINTS	ALL	FLANGED (TO BE KEPT MINIMUM)
PIPE JOINTS	2" AND BELOW	SW COUPLING (REF NOTE-3)
	ABOVE 2"	BUTT WELDED AS PER ANSI B16.25
DRAINS	ALL	1" & AS PER BHEL STD DRG NO.4-38101-02488
VENTS	ALL	1" & AS PER BHEL STD DRG NO.4-38101-02488
TEMP. CONN.	M33X2	INSTALLATION AS PER BHEL STD. DWG.NO 4-38101-02488
PRESS. CONN.	1/2"	INSTALLATION AS PER BHEL STD. DWG.NO 4-38101-02488

NOTES

1. WELDED PIPE SHALL HAVE ONLY LONGITUDINAL WELD MADE BY EMPLOYING AUTOMATIC WELDING.
2. MINIMUM THICKNESS OF FITTING SHALL BE IN LINE WITH THE PIPE SCHEDULE/THICKNESS.
3. NPT CONNECTIONS ARE PERMITTED IN THERMAL RELIEF VALVES ONLY.
4. MSW GASKET SHALL BE SELF ALIGNING TYPE WITH INNER RING OF SPIRAL STRIP MATERIAL.
5. BALL VALVES SHALL NOT BE USED BEYOND 200 DEG CEN & PR. 7.03 KG/CM2(G)
6. NDT REQUIREMENTS AS PER BHEL STD. DOC. NO. GT 57124
7. ALL PIPES, FITTINGS, VALVES, FLANGES STRAINERS, ETC SHALL BE TESTED & TEST CERTIFICATES IN FORM IIIA FOR PIPES & FORM IIIC FOR OTHERS SHALL BE REQUIRED DULY COUNTER SIGNED BY IBR AUTHORITY OR THEIR APPROVED REPRESENTATIVE.
8. FORGED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.11. FOR ITEMS NOT COVERED UNDER B16.11, REFERENCE MAY BE MADE TO BS 3799 OR MSS-SP-STD.
9. BUTT WELDED STEEL FITTINGS SHALL BE IN ACCORDANCE WITH ANSI B 16.9. FOR ITEMS NOT COVERED UNDER B16.9, REFERENCE MAY BE MADE TO MSS-SP-STD.
10. DRAIN AND VENT LINES FOR FUEL SERVICE SHALL BE WITH DOUBLE ISOLATION VALVES.
11. All stubs for pressure or flow measurement for pipelines with a maximum working pressure equal to or above 62 kg/cm2(g) or with a maximum working temperature equal to or above 425 Deg C shall be NPS 25 mm and double root valves shall be used.

BRANCH CONNECTION CHART LEGEND

E	TEES BUTT WELD
H	HALF COUPLING
P	PIPE TO PIPE
R	REINFORCED
S	SOCKOLETS
T	TEES SW/SCRD
W	WELDOLETS



41C

DRAFT

23.03.16

ITEMS	TYPE	ENDS	DIA. RANGE (INCH)		SCH/ THK/ RATING	FACE FINISH / RADIUS	DIM / DESG. STD.	BASIC MATERIAL		NOTE	
			LOW	HIGH	CARBON STEEL						
					DESCRIPTION			BHEL SPEC			
PIPES	SEAMLESS	PE	½	2	S 80		B 36.10	A106 GRB	AA10455		
	SEAMLESS	BE	3	3	S 80		B 36.10	A106 GRB	AA10455		
FLANGES	WELD NECK	RJ	½	24	900	125AARH	B 16.5	ASTM A 105	AA7246321		
	BLIND	RJ	½	24	900	125AARH	B 16.5	ASTM A 105			
	FIGURE8 BLANK	RJ	½	8	900	125AARH	B 16.48	ASTM A 105	GT57083-08		
FITTINGS	ELBOWS 90 DEG	SW	½	¾	3000		B 16.11	ASTM A 105	AA7242501		
	ELBOWS 90 DEG	SW	1	2	3000		B 16.11	ASTM A 105	AA7242501		
	ELBOWS 90 DEG	BW	3	14	M	R=1.5D	B 16.9	ASTM A 234 GR WPB	HY7242695	2	
	ELBOWS 45 DEG	SW	2	2	3000	R=1.5D	B 16.11	ASTM A 105	HY7242566	2	
	ELBOWS 45 DEG	BW	3	14	M	R=1.5D	B 16.9	ASTM A 234 GR WPB	HY7242566	2	
	EQ. TEE	SW	½	¾	3000		B 16.11	ASTM A 105	AA7242510		
	EQ. TEE	SW	1	2	3000		B 16.11	ASTM A 105	AA7242510		
	EQ. TEE	BW	3	14	M		B 16.9	ASTM A 234 GR WPB	AA7242511	2	
	CON. RDCR	BW	2	14	M,M		B 16.9	ASTM A 234 GR WPB	HY7242692	2	
	CAP	SW	2	2	M		B 16.9	ASTM A 105	HY7242570	2	
	CAP	BW	3	24	M		B 16.9	ASTM A 234 GR WPB	HY7242570	2	
	FULL COUPLING	NPT/NPT	½	¾	3000		B 16.11	ASTM A 105	HY7242595	3	
	FULL COUPLING	NPT/NPT	1	2	3000		B 16.11	ASTM A 105	HY7242595	3	
	FULL COUPLING	SW	½	¾	3000		B 16.11	ASTM A 105	AA7242520		
	FULL COUPLING	SW	1	2	3000		B 16.11	ASTM A 105	AA7242520		
	VI (HALF CPLG)	SW	½	¾	3000		B 16.11	ASTM A 105			
	VI (HALF CPLG)	SW	1	2	3000		B 16.11	ASTM A 105			
	VALVES	GATE	SW	½	1½	1500	B16.11	API 602	A 105		
		GATE	SW	2	2	1500	B16.11	API 600	A 105		
		GATE	BW	3	10	900	B16.5	API 600	A 216 GR. WCB		
GLOBE		SW	½	1½	1500	B16.11	BS 5352	A 105			
GLOBE		SW	2	2	1500	B16.11	BS 1873	A 105			
GLOBE		BW	3	10	900	B16.5	BS 1873	A 216 GR. WCB			
Reg GLOBE VLV		SW	½	1½	1500	B16.11	BS 5352	A 105			
Reg GLOBE VLV		SW	2	2	1500	B16.11	BS 1873	A 105			
Reg GLOBE VLV		BW	3	10	900	B16.5	BS 1873	A 216 GR. WCB			
CHECK (PISTON LIFT)		SW	½	1½	1500	B16.11	BS 5352	A 105			
CHECK (PISTON LIFT)		SW	2	2	1500	B16.11	BS 1868	A 105			
CHECK		BW	2	10	900	B16.5	BS 1868	A 216 GR. WCB			
BOLT & GASKET	STUD + 2NUTS		M12	M27			B 18.2	A 193 GR B7/ A194 2H	HY7142198		
	STUD + 2NUTS		M30	M70			B 18.2	A 193 GR B7/ A194 2H	HY7142299		
	GASKET		½	3	900		B 16.20	NAB MSW (SS316)+ PTFE FILLER	HY7240367	4	
	GASKET		4	24	900		B 16.20	NAB MSW (SS316)+ PTFE FILLER	HY7240367	4	
MISC	Y-TYPE STRAINER	SW	½	2	1500	B 16.11	MNF. STD.	B: A 105; INT: SS 304			
	Y-TYPE STRAINER	FL	3	24	900	B 16.5	MNF. STD.	B: A 216 WCB; INT: SS 304			
B: BODY; INT: INTERNALS											