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REV.	DATE	ALTERED	ANUPAM	REV.	DATE	ALTERED	REV.	DATE	ALTERED
01	02.09.20	CHECKED	K.N.B.R.			CHECKED			CHECKED
		APPROVED	M.S.S.N			APPROVED			APPROVED
-DOCUMENT HAS BEEN UPDATED AS PER BHEL CLARIFICATION TO MRPL/L&T-S&L COMMENTS.									
-UPDATES ARE MARKED WITH 									

PROJECT: NATURAL GAS FIRING PROVISION IN GTG 1 & GTG 2 OF MRPL CPP-3 UNIT

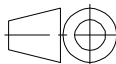
OWNER:  MANGALORE REFINERY & PETROCHEMICALS LTD
(SUBSIDIARY OF ONGC LIMITED)
KUTHETHOOR P.O. Via KATIPALLA, MOODAPADAV MANGALORE - 575030

PMC:  L&T - SARGENT & LUNDY LIMITED.



BHARAT HEAVY ELECTRICALS LTD.
HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	ANUPAM		07.07.20	
CHD.	K.N.B.R.		07.07.20	-N.A.-
APPD.	M.S.S.N		07.07.20	

DEPT. PE&SD	UNTOL. DIMS. GR.		SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
CODE. 450	C/M/F		NTS	-N.A.-	-N.A.-	-N.A.-	-N.A.-

TITLE
PIPING MATERIAL SPECIFICATION

CARD CODE	BHEL DRG NO.	REV.
N.A.	PY-AS-4-M161-1000-01	01
	CUST DRG NO.	
	MP405-380-07-1501	
	SHT. No 1	NO. OF SHT. 68

Rev No. B	Form No.		BHARAT HEAVY ELECTRICALS LIMITED Project Engineering & Systems Division (PE&SD) HYDERABAD – 32	PY-AS-4-M161-1000-01
				Rev No. 00
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COPYRIGHT AND CONFIDENTIAL

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Bolt:A193 GR B7(Galv)
Nut:A194GR 2H(Galv)

Bolt:A193 GR B7(Galv)
Nut:A194GR 2H(Galv)

Rev No. B

Form No.



BHARAT HEAVY ELECTRICALS LIMITED
Project Engineering & Systems Division (PE&SD)
HYDERABAD – 32

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Rev No. 00

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Additional PMS required for Project B1K, D1A

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 PE&SD-Mech.		PIPING MATERIAL SPECIFICATION							B1K	
Customer:		MRPL Gas Conversion								
ANSI CLASS:		# 300								
MATERIAL:		ASTM A 312 TP 304								
CORR.ALL.		0.0 mm								
Special req.		NON IBR								
ITEMS	TYPE	ENDS	DIA. RANGE (INCH)		SCH/ THK/ RATING	FACE FINISH / RADIUS	DIM / DESG. STD.	BASIC MATERIAL		NOTE
			LOW	HIGH				STAINLESS STEEL		
									DESCRIPTION	
PIPES	SEAMLESS	PE	½	¾	S 80S		B 36.19	ASTM A 312 TP 304		
	SEAMLESS	PE	1	1½	S 40S		B 36.19	ASTM A 312 TP 304		
	SEAMLESS	BE	2	2	S 40S		B 36.19	ASTM A 312 TP 304		
	SEAMLESS	BE	3	4	S 10S		B 36.19	ASTM A 312 TP 304		
	SEAMLESS	BE	6	6	S 10S		B 36.19	ASTM A 312 TP 304		
FLANGES	FLNG. SW	RF	½	1½	300	125AARH	B 16.5	ASTM A182 Gr. F304		
	FLNG. WN	RF	2	6	300	125AARH	B 16.5	ASTM A182 Gr. F304		
	BLIND	RF	½	6	300	125AARH	B 16.5	ASTM A182 Gr. F304		
	FIGURE '8' BLANK	RF	½	6	300	125AARH	B 16.48	ASTM A182 Gr. F304		
FITTINGS	ELBOWS 90 DEG	SW	½	1½	3000		B 16.11	ASTM A182 Gr. F304		
	ELBOWS 90 DEG	BW	2	6	M	R=1.5D	B 16.9	ASTM A403 Gr. WP304-S		3
	ELBOWS 45 DEG	SW	½	1½	3000		B 16.11	ASTM A182 Gr. F304		
	ELBOWS 45 DEG	BW	2	6	M	R=1.5D	B 16.9	ASTM A403 Gr. WP304-S		3
	EQ. TEE	SW	½	1½	3000		B 16.11	ASTM A182 Gr. F304		
	EQ. TEE	BW	2	6	M	R=1.5D	B 16.9	ASTM A403 Gr. WP304-S		3
	CON. RDCR	BW	2	6	M,M		B 16.9	ASTM A403 Gr. WP304-S		3
	FULL COUPLING (PE)	NPT/NPT	½	1½	3000		B 16.11	ASTM A182 Gr. F304		2
	FULL COUPLING (PE)	SW	½	1½	3000		B 16.11	ASTM A 182 Gr. F304		
	REDUCING COUPLING	SW	½	1½	3000		B 16.11	ASTM A 182 Gr. F304		
	VI (HALF CPLG)	SW	½	1½	3000		B 16.11	ASTM A 182 Gr. F304		
	NIPPLE (PE)	BW /NPT	½	¾	S 80S		B 36.19	ASTM A 312 TP304		2
	NIPPLE (PE)	BW /NPT	1	1½	S 40S		B 36.19	ASTM A 312 TP304		2
	NIPPLE (PE)	NPT/NPT	½	¾	S 80S		B 36.19	ASTM A 312 TP304		2
	NIPPLE (PE)	NPT/NPT	1	1½	S 40S		B 36.19	ASTM A 312 TP304		2
VALVES	GATE	SW	½	1½	800		API 602	B:A182GR.F304; T:St: S:SS304		
	GATE	FL	2	6	300	125AARH	API 600/ISO 10434	B:A351GR.CF8; T:SS304		
	GLOBE	SW	½	1½	800		BS 5352	B:A182GR.F304; T:St: S:SS304		
	GLOBE	FL	2	6	300	125AARH	BS 1873	B:A351GR.CF8; T:SS304		
	BALL	SW	½	1½	800	125AARH	BS 5351	B:A351GR.CF8/A182GR.F304; TRIM-SEAT:RPTFE		
	BALL	FL	2	6	300	125AARH	BS 5351			
	CHECK (PISTON LIFT)	SW	½	1½	800		BS 5352	B:A182GR.F304; T:St:		
	CHECK	FL	2	12	300	125AARH	BS 1868	B:A351GR.CF8; T:SS304		
B:BODY, T:TRIM, S:STEM, BB:BOLTED BONNET, St:STELLITED										
BOLT & GASKET	STUD + 2NUTS		½	6			B 18.2	A 193 GR B7 (GALV) / A194 2H (GALV)		
	GASKET		½	6	300		B 16.20/ ANSI B 16.5	SP.WND SS316+ GRAFIL		4
MISC	TEMP STRAINER	FL. FF	1½	6	300	125AARH	MFG. STD.	B:A240 TP304; INT: SS 304	CONE TYPE	
	Y-TYPE STRAINER	SW	½	1½	800		MFG. STD.	B: A182GR.F304; INT: SS 304		
	T-TYPE STRAINER	BW	2	6	300	M	MFG. STD.	B: A403 GR WP304-S; INT: SS 304		

PIPING MATERIAL SPECIFICATION

D1A

Special requirement	Non-IBR
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TEMP	-29	38	93	149	204	260	316	340								
PRESS.	104.05	104.05	96.50	92.09	88.92	84.71	79.79	77.33								

W	NATURAL GAS
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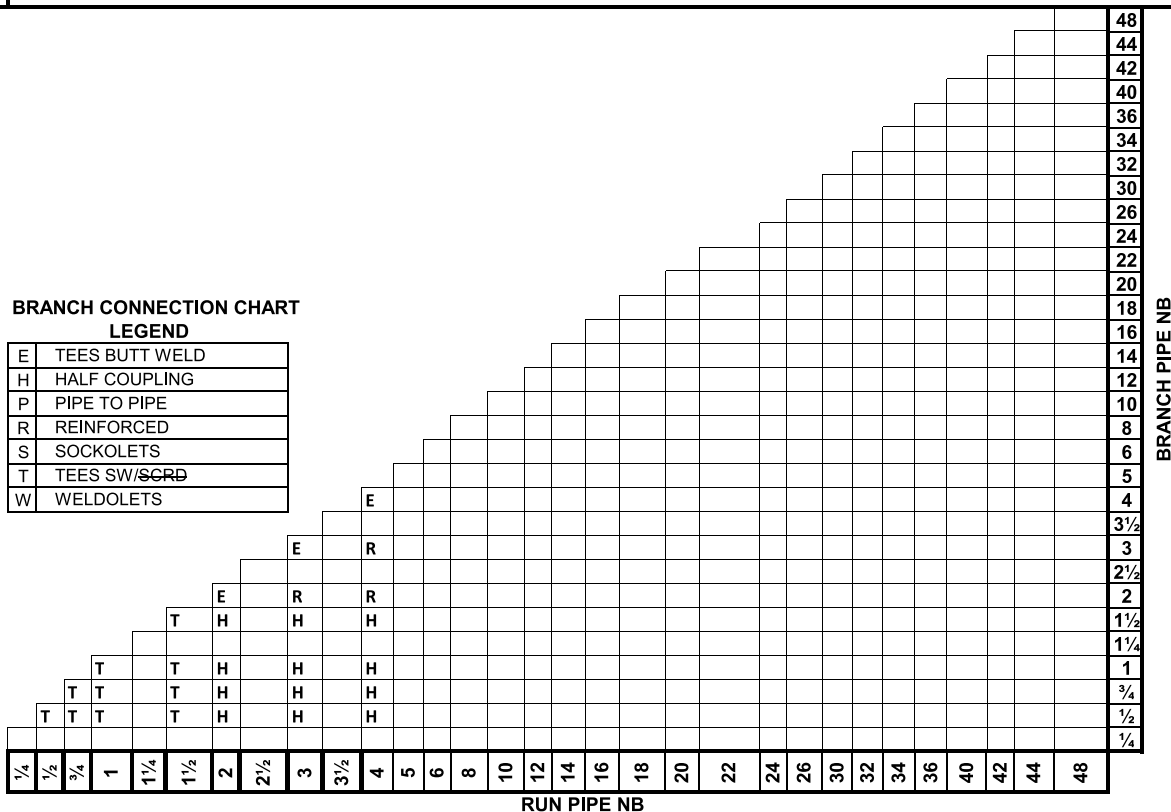
ITEM	SIZE	DESCRIPTION
MAINT. JOINTS	ALL	FLANGED (TO BE KEPT MINIMUM)
PIPE JOINTS	1½" AND BELOW	SW COUPLING
	2" AND ABOVE	BUTT WELDED AS PER ANSI B16.25
DRAINS	ALL	1" & AS PER BHEL STD DRAWING 4-38101-02488
VENTS	ALL	1" & AS PER BHEL STD DRAWING 4-38101-02488
TEMP. CONN.	1 1/2"	#600 FLANGED RF TYPE
PRESS. CONN.	3/4"	SW 6000 CLASS

NOTES

1. VENT & DRAIN ISOLATION VALVES SHALL BE GATE VALVES.
2. NPT CONNECTIONS ARE PERMITTED IN THERMAL RELIEF VALVES ONLY.
3. MINIMUM THICKNESS OF FITTING SHALL BE IN LINE WITH THE PIPE SCHEDULE/THICKNESS.
4. MSW GASKET SHALL BE SELF ALIGNING TYPE WITH INNER RING OF SPIRAL STRIP MATERIAL.

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



 PE&SD-Mech.			PIPING MATERIAL SPECIFICATION							D1A	
Customer/Project: MRPL Gas Conversion											
ANSI CLASS: 600 #											
MATERIAL: CS (A106 Gr. B)											
CORR.ALL. 1.5 mm											
Special requirement Non-IBR											
ITEMS	TYPE	ENDS	DIA. RANGE (INCH)		SCH/ THK/ RATING	FACE FINISH / RADIUS	DIM / DESG. STD.	BASIC MATERIAL CARBON STEEL		NOTE	Revision
			LOW	HIGH				DESCRIPTION			
PIPES	SEAMLESS	PE	½	¾	S 160		B 36.10	A106 GRB			
	SEAMLESS	PE	1	1½	XS		B 36.10	A106 GRB			
	SEAMLESS	BE	2	4	XS		B 36.10	A106 GRB			
FLANGES	SOCKET WELDED	RF	½	1½	600	125AARH	B 16.5	ASTM A 105			
	WELD NECK	RF	2	4	600	125AARH	B 16.5	ASTM A 105			
	BLIND	RF	½	4	600	125AARH	B 16.5	ASTM A 105			
	FIGURE'8' BLANK	FF	½	4	600	125AARH	B 16.48	ASTM A 105			
FITTINGS	ELBOWS 90 DEG	SW	½	¾	6000		B 16.11	ASTM A 105			
	ELBOWS 90 DEG	SW	1	1½	3000		B 16.11	ASTM A 105			
	ELBOWS 90 DEG	BW	2	4	M	R=1.5D	B 16.9	ASTM A 234 GR WPB		3	
	ELBOWS 45 DEG	SW	½	¾	6000		B 16.11	ASTM A 105			
	ELBOWS 45 DEG	SW	1	1½	3000		B 16.11	ASTM A 105			
	ELBOWS 45 DEG	BW	2	4	M	R=1.5D	B 16.9	ASTM A 234 GR WPB		3	
	EQ. TEE	SW	½	¾	6000		B 16.11	ASTM A 105			
	EQ. TEE	SW	1	1½	3000		B 16.11	ASTM A 105			
	EQ. TEE	BW	2	4	M		B 16.9	ASTM A 234 GR WPB		3	
	CON. RDCR	BW	2	4	M,M		B 16.9	ASTM A 234 GR WPB		3	
	FULL COUPLING (PE)	NPT/NPT	½	¾	6000		B 16.11	ASTM A 105		2	
	FULL COUPLING (PE)	NPT/NPT	1	1½	3000		B 16.11	ASTM A 105		2	
	FULL COUPLING (PE)	SW	½	¾	6000		B 16.11	ASTM A 105			
	FULL COUPLING (PE)	SW	1	1½	3000		B 16.11	ASTM A 105			
	VI (HALF CPLG)	SW	½	¾	6000		B 16.11	ASTM A 105			
	VI (HALF CPLG)	SW	1	1½	3000		B 16.11	ASTM A 105			
	NIPPLE (PE)	BW /NPT	½	¾	S 160		B 16.11	A106 GRB		2	
	NIPPLE (PE)	BW /NPT	1	1½	S 80		B 16.11	A106 GRB		2	
	NIPPLE (PE)	NPT/NPT	½	¾	S 160		B 16.11	A106 GRB		2	
	NIPPLE (PE)	NPT/NPT	1	1½	S 80		B 16.11	A106 GRB		2	
VALVES	GATE	SW	½	1½	800		API 602 / ISO 15761	B:A 105; T:St; S:13% Cr			
	GATE	FL	2	4	600	125AARH	API 600/ ISO 10434	B:A 216 GR WCB; T:St; S:13% Cr			
	GLOBE	SW	½	1½	800		BS EN ISO 15761	B:A 105; T:St; S:13% Cr			
	GLOBE	FL	2	4	600	125AARH	BS-1873	B:A 216 GR WCB; T:St; S:13% Cr			
	Reg GLOBE VLV	SW	½	1½	800		BS EN ISO 15761	B:A 105; T:St; S:13% Cr			
	Reg GLOBE VLV	FL	2	4	600	125AARH	BS-1873	B:A 216 GR WCB; T:St; S:13% Cr			
	CHECK (PISTON LIFT)	SW	½	1½	800		BS EN ISO 15761	B:A 105; T:St			
	CHECK	FL	2	4	600	125AARH	BS-1868	B:A 216 GR WCB; T:St			
	BALL	FL	½	4	600	125AARH	BS EN ISO 17292	B:A 105/A216GRWCB; TRIM-SEAT:RPTFE			
B:BODY, T:TRIM, S:STEM, BB:BOLTED BONNET, St:STELLITED											
BOLT & GASK	STUD + 2NUTS		½	4			B 18.2	A 193 GR B7/ A194 2H			
	GASKET		½	4	600		B 16.20/ ANSI B 16.5	SP. WND SS316+ GRAFOIL		4	
MISC	TEMP. STRAINER	FL. FF	1½	4	600	125AARH	MNF. STD.	B:A 516 GR70; INT: SS 304	CONE TYPE		
	Y-TYPE STRAINER	SW	½	1½	800		MNF. STD.	B:A 105; INT: SS 304			
	Y-TYPE STRAINER	BW	2	4	M		MNF. STD.	B:A 234 Gr WPB; INT: SS 304			

B:BODY, T:TRIM, S:STEM, BB:BOLTED BONNET, St:STELLITED

BHEL clarification to MRPL Comments on "Piping Material Specifications"

Doc No : PY-IT-3-M161-1000-01

S.No	M/s. MRPL Comments dt. 05.08.20	BHEL Replies dtd. 02.09.20
1.	M1. Correct the title block	Noted & updated in revised document.
2.	M2. General clarification for Pipe Classes: 1. Standard numbers referred in the document are EIL standards. Relevant standard numbers applicable for this project may please be specified so that the same can be shared to MRPL . 2. Higher Rating Flanges are for special valves / Equipment Mating flanges that come with higher rating like Control valve / Pump / Pressure Vessel etc. Higher rating flanges to be used where required else flange rating as per PMS in the P&ID to be followed. 3. If additional sizes are to be used in the project, same to be provided.	1. Please note that apart from B1K specification, all PMS sheets were furnished by MRPL/PMC as part of specification. Hence, relevant standard numbers have to be furnished by MRPL/PMC. 2. Please note that no such requirement is furnished in specification of this project which stipulates that flanges of Control valve / Pump / Pressure Vessel shall be of higher rating than respective PMS class. Hence, flange rating of all the items are considered as per rating of applicable PMS. However, minimum rating for control valve has been considered as #300 in line with specification requirement. 3. Noted. BHEL confirms that if additional sizes are used, the same shall be updated in PMS document.
3.	M3.General clarification for flange tables: 1. Higher Rating Flanges are for special valves / Equipment Mating flanges that come with higher rating like Control valve / Pump / Pressure Vessel etc. Higher rating flanges to be used where required else flange rating as per PMS in the P&ID to be followed. 2. End connections for flanges shall be in line with SPECIAL NOTES. General clarifications for fitting tables: 3. End connections for fittings shall be in line with SPECIAL NOTES. General clarifications for gasket tables: 4. Each Pipe Class shall include gaskets with corresponding pressure rating only.	1. Please note that no such requirement is furnished in specification of this project which stipulates that flanges of Control valve / Pump / Pressure Vessel shall be of higher rating than respective PMS class. Hence, flange rating of all the items are considered as per rating of applicable PMS. However, minimum rating for control valve has been considered as #300 in line with specification requirement. 2. Noted & confirmed by BHEL. 3. Noted & confirmed by BHEL. 4. Noted & confirmed by BHEL.

S.No	M/s. MRPL Comments dt. 05.08.20	BHEL Replies dtd. 02.09.20
4	M5. BGGTS need not to consider this information consider as deleted. Update document accordingly	Please note that apart from B1K specification, all PMS sheets were furnished by MRPL/PMC as part of specification. Hence, BHEL can not update this document. MRPL/PMC is requested to update this document, if necessary. However, BHEL confirms that if any item is not applicable for this project, the same item shall not be considered.
5	M6. Please consider it as 0.50. Update accordingly	
6	M7. Socket weld (SW) fitting to be considered instead of Screwed fitting. Document to be updated accordingly	
7	M8. Higher Rating Flanges are for special valves / Equipment Mating flanges that come with higher rating like Control valve / Pump / Pressure Vessel etc. Higher rating flanges to be used where required else flange rating as per PMS in the P&ID to be followed.	Please note that no such requirement is furnished in specification of this project which stipulates that flanges of Control valve / Pump / Pressure Vessel shall be of higher rating than respective PMS class. Hence, rating of all the items are considered as per rating of applicable PMS. However, minimum rating for control valve has Been considered as #300 in line with specification requirement.
8	M9. If Weld neck flanges are used for this PMS, same to be considered and updated.	BHEL confirms that Weld neck flanges shall be used for A1K PMS in line with Piping Material Specification Document. The same is already mentioned under 'Item Type' in PMS sheet.
9	M10: With 300°C & 10.44 kg/ cm2(g), pressure class as per valve B16.34 is 300#. With 300°C & 10.4 kg/ cm2(g), pressure class as per valve B16.34 is 150#. Please update pressure to 10.4 kg/ cm2(g). Flange Rating (ASME B16.5, 16.47-B) & Valve rating (ASME B16.34) shall govern the Table.	Please note that apart from B1K specification, all PMS sheets were furnished by MRPL/PMC as part of specification. Hence, BHEL can not update this document. MRPL/PMC is requested to update this document, if necessary.
10	M11. Higher Rating Flanges are for special valves / Equipment Mating flanges that come with higher rating like Control valve / Pump / Pressure Vessel etc. Higher rating flanges to be used where required else flange rating as per PMS in the P&ID to be followed.	Please refer clarification provided in point no. 7.
11	M12.: If D1A class is required as per projects, same to be included in updated document.	Noted & updated in revised document.

S.No	M/s. MRPL Comments dt. 05.08.20	BHEL Replies dtd. 02.09.20
12	M13.Schedule as per PMS to be used. If provided schedule (thickness) is not sufficient for the line conditions, shall inform MRPL.	Noted & confirmed by BHEL.
13	M14.BGGTS has to refer below clause for piping design basis provided with tender:	Please note that both PMS and piping design basis are part of specification requirement. As these two are contradictory to each other, please clarify which document to follow. In addition, it may be noted that 8" or 10" pipe or fittings are not applicable in this project for B1A PMS.
14	M15 Details to be provided	This document is internal to BHEL and can not be shared.
15	M16. BGGTS to include insulation gasket between CS and SS flange at outlet of the filter separator where piping material is changed	Please note that the fluid that is being handled in present case is 'Natural Gas' which non-electrolytic in nature. Hence, chances of galvanic corrosion will be very minimal. Moreover, BHEL has executed several similar projects without using insulation gasket at interface of dissimilar metals and all of them are working satisfactorily with out any corrosion issues. Hence, insulation gaskets need not to be provided.
16	M17. PE	Noted & updated in revised document.
17	M18. PE	
18	M19 : Data sheet for valves to be provided and VMS for same to be provided.	Please note that valve data sheet shall be part of valve GAD and not a separate document. Valve GAD shall be submitted after ordering of valves. VMS shall be submitted separately by 30.09.20.
19	M20. Typical : BGGTS to use insulation gasket wherever piping material changes.	Please note that the fluid that is being handled in present case is 'Natural Gas' which non-electrolytic in nature. Hence, chances of galvanic corrosion will be very minimal. Moreover, BHEL has executed several similar projects without using insulation gasket at interface of dissimilar metals and all of them are working satisfactorily with out any corrosion issues. Hence, insulation gaskets need not to be provided.
20	M21 : Details to be provided	Noted & updated as 'Manufacturar standard' in revised document.
21	M22.: Finish 125AARH	Noted & updated in revised document.
22	M23 : 300#	Noted & updated in revised document.
23	M24 : Flange Face Type	Noted & updated in revised document.