MANGALORE REFINERY & PETROCHEMICALS LTD.
(A subsidiary of Oil & Natural Gas Corpn. Ltd – ONGC)
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Triune Energy Services

Addendum - 1

To

MRPL Tender No. 96750000C1A dated 31.05.2021

TENDER FOR CONSTRUCTION FOR CCR-1 REGENERATOR REVAMP PROJECT AT MRPL, MANGALURU, KARNATAKA

With reference to the above tender, bidders are requested to note the following:

The items, conditions, specification and stipulations of the Bidding Documents and modified to the extent indicated in Technical Addendum enclosed below:

The implications of the same, elsewhere in the tender shall be taken care of appropriately by the bidders. All other terms and conditions, stipulations and specifications of tender shall remain unaltered.

Bidders shall submit copy of these documents along with the technical-commercial bid, duly signed and stamped, as a token of having read and understood the same.

Technical Addendum

S.NO.	DOCUMENT TITLE	DOCUMENT NO./ REV NO.	EXISTING CLAUSE NO./ PAGE NO.	MODIFICATION
1	Technical Volume 7	9675-03-SOQ-001 Rev.1	Page 1116 of 1194	Bidder to refer enclosed SOQ-Piping-FIM (9675-03-SOQ-001 Rev.2) as Annexure-1
2	Technical Volume 7	9675-03-SOQ-002 Rev.1	Page 1124 of 1194	Bidder to refer enclosed SOQ-Piping-Bulk (9675-03-SOQ-002 Rev.2) as Annexure-2
3	Technical Volume 7	9675-03-SOQ-003 Rev.1	Page 1130 of 1194	Bidder to refer enclosed SOQ-Piping-Common (9675-03-SOQ-003 Rev.2) as Annexure-3
4	Technical Volume 7	9675-24-09-A4-9001 Rev.A	Page 999 of 1194	Bidder to refer enclosed Instrument Hookup drawings (9675-24-09-A4-9001 Rev.0) as Annexure-4
5	INSTRUMENT JUNCTION BOX WIRING DIAGRAM	9675-24-09-A4-9006 RevA	-	This document was not attached with Technical Bid Package. Attached as Annexure-5 below.
6	Technical Volume 7	9675-09-SOQ-003 Rev1	Page 1179 of 1194	Bidder to refer enclosed Instrumentation SOQ-FIM (9675-09-SOQ-003 Rev.2) as Annexure-6.
7	Technical Volume 7	9675-09-SOQ-001 Rev2	Page 1182 of 1194	Bidder to refer enclosed Instrumentation SOQ-Bulk items (9675-09-SOQ-001 Rev.3) as Annexure-7.
8	Technical Volume 7	9675-09-SOQ-002 Rev1	Page 1185 of 1194	Bidder to refer enclosed Instrumentation SOQ-Erection (9675-09-SOQ-002 Rev.2) as Annexure-8.

ANNEXURE-1

MANGALORE REFINERY AND PETROCHEMICALS LIMITED

CONTINUOUS CATALYST REGENERATOR
CCR-1 REGENERATOR REVAMP PROJECT
AT MRPL, MANGALURU

SCHEDULE OF QUANTITY-PIPING-FIM

Rev.	Date	Description	Prpd.	Chkd.	Appd.
2	23-06-2021	ISSUED FOR INVITING BID	GBJ	MKL	NKJ
1	20-05-2021	ISSUED FOR INVITING BID	GBJ	MKL	NKJ
0	13-05-2021	ISSUED FOR INVITING BID	GBJ	MKL	NKJ

Triune Energy Services Pvt. Ltd. New Delhi	SCHEDULE OF QUANTITY-PIPING (FIM)	Document Number	Rev.
		9675-03-SOQ-001	2
		Sheet 1 of 10	

Excel

SUPPLY MATERIAL

Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
	PIPING-UNITS			
1.0	**PIPE FITTINGS & VALVES**			
1.1	REFER ATTACHMENT-1 AND 3 FOR DETAILED QUANTITY OF PIPE FITTINGS & VALVE SUPPLY.			
2.0	**SPECIAL ITEMS:**			
2.1	DUR O LOK COUPLING (REFER DATA SHEET: UOP DRAWING 8-127-10)			
	NB 1.250 INCHES	Nos	14	
	NB 1.500 INCHES	Nos	12	
	NB 4.000 INCHES	Nos	2	
2.2	METALLIC EXPANSION BELLOW (REFER DATA SHEET: 9675-24-DS-EXJ-907)			
	NB 14.000 INCHES	Nos	1	
2.3	SAMPLE BOMB CYLINDERS (REFER DATA SHEET: UOP DRAWING 8-12-10 & 8-142-7)			
	NB 1.000 INCHES	Nos	2	
2.4	SPRINGS (REFER DATA SHEET: 9675-24-DS-SPR-908)			
	NB 1.250 INCHES	Nos	1	
	NB 6.000 INCHES	Nos	4	
	NB 8.000 INCHES	Nos	6	
	NB 14.000 INCHES	Nos	1	
	NB 16.000 INCHES	Nos	4	
	NB 12.000 INCHES	Nos	2	EQUIPMENT MOUNT
	NB 14.000 INCHES	Nos	2	EQUIPMENT MOUNT
2.6	STRAINER (REFER DATA SHEET: 9675-24-DS-STR-901)			
	NB 1.000 INCHES	Nos	5	
2.7	TAPER BORED FLANGE (REFER DATA SHEET: UOP DRAWING 8-130-7)			
	NB 2.000 INCHES	Nos	15	
2.8	STEAM TRAP (REFER DATA SHEET: 9675-DS-24-TR-902)			
	NB 1.000 INCHES	Nos	1	
	NB 0.75 INCHES	Nos	5	
	NB 0.500 INCHES	Nos	2	
2.9	VEE-BALL VALVES (REFER DATA SHEET: 9675-24-DS-VEB-904)			
	NB 1.000 INCHES	Nos	3	

General Notes:-

1. Contractor is advised to read this document of SOQ in conjunction with the Scope of Work (Ref doc no: 9675-03-SOW-001) specification, drawings and vendor drawings (submitted by the manufacturer) referred in tender document for complete understanding of his scope for supply, erection, installation and modification, rectification, replacement work (as applicable), mechanical completion, assistance in commissioning, PGTR and handing over of CCR-1 unit.

2. Quantity given above describes the system requirement for the purpose of progressive billing / Invoicing by the contractor for supply of bulk material / items, as stated in drawings and documents to perform construction, inspection, testing commissioning, and assistance in successful performance guarantee test run (by others) and facilitate handing over of acceptable system of CCR-1 to MRPL.

3. Construction may add for the margins as required in the quantity and supply it to site to meet the construction / modification, replacement & rectification requirement at site. Construction Contractor and / or his sub- contractor(s) will be permitted to take back the surplus material / item supplied by him or his sub contractor(s) post approval from MRPL and after due reconciliation of the material and meeting all contractual commitments at site.

4. Any other activity associated with respect to destruct & construct of CCR-1 not included in SOQ specifically, however, it is required to be performed by the construction contractor as defined in scope of work and the respective drawings included in the tender document".

5.Construction activity on inspection and testing as applicable to respective discipline referring to drawings, specification and standards included in tender document.

6. Contractor will provide assistance in commissioning and in successful performance guarantee test run of CCR-1 (by others) facilitate for handing over of acceptable system of CCR-1 to MRPL without any impact on quoted price and delivery.

ATTACHMENT-1- MRPL-CCR1-SOQ- PIPING SUPPLY SUMMARY

ITEM DESCRIPTION	Total Qty Pipe-meters others- numbers (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
PIPE, 0.25 INCH, ASTM A106 GR.B, ASME B36.10M, PE, SEAMLESS, S80,	1		1	
PIPE, 0.5 INCH, ASTM A 312 GR TP316, ASME B36.19M, PE, SEAMLESS, 80S, NOTE5	13		13	
PIPE, 0.5 INCH, ASTM A106 GR.B, ASME B36.10M, PE, SEAMLESS, S80,	191.1		191.1	
PIPE, 0.5 INCH, ASTM A312 GR. TP 316, ASME B36.19, PE, SEAMLESS, 80S,	7		7	
PIPE, 0.50 INCH, ASTM A106 GR.B, ASME B36.10, PE, SEAMLESS, S80,	1		1	
PIPE, 0.50 INCH, ASTM A106 GR.B, H2, ASME B36.10M, PE, SEAMLESS, S80, H2	1.5		1.5	
PIPE, 0.75 INCH, ASTM A 106 GR.B,H2, ASME B36.10, PE, SEAMLESS, S160, H2	0.2		0.2	
PIPE, 0.75 INCH, ASTM A 312 GR TP316, ASME B36.19M, PE, SEAMLESS, 80S, NOTE5	62.2		62.2	
PIPE, 0.75 INCH, ASTM A106 GR.B, ASME B36.10, PE, SEAMLESS, S80,	29.25		29.25	
PIPE, 0.75 INCH, ASTM A106 GR.B, ASME B36.10M, PE, SEAMLESS, S80,	117.55		117.55	
PIPE, 0.75 INCH, ASTM A106 GR.B, H2, ASME B36.10M, PE, SEAMLESS, S80, H2	105.5		105.5	
PIPE, 0.75 INCH, ASTM A106 GR.B,IBR, ASME B36.10M, PE, SEAMLESS, S80, IBR, NOTE2	27.5		27.5	
PIPE, 0.75 INCH, ASTM A312 GR. TP 316, ASME B36.19, PE, SEAMLESS, 80S,	2.65		2.65	
PIPE, 0.75 INCH, ASTM B167 N06600, ASME B36.19M, PE, SEAMLESS, 40S,	2.4		2.4	
PIPE, 1 INCH, ASTM A 312 GR TP316, ASME B36.19M, PE, SEAMLESS, 80S, NOTE5	0.2		0.2	
PIPE, 1 INCH, ASTM A 312 GR. TP 304, ASME B36.19, PE, SEAMLESS, 40S,	0.15		0.15	
PIPE, 1 INCH, ASTM A106 GR.B, ASME B36.10, PE, SEAMLESS, S80,	1.7		1.7	
PIPE, 1 INCH, ASTM A106 GR.B, ASME B36.10M, PE, SEAMLESS, S80,	14		14	
PIPE, 1 INCH, ASTM A106 GR.B, H2, ASME B36.10M, PE, SEAMLESS, S80, H2	21.2		21.2	
PIPE, 1 INCH, ASTM A106 GR.B,IBR, ASME B36.10M, PE, SEAMLESS, S80, IBR, NOTE2	50.25		50.25	
PIPE, 1 INCH, IS-1239 (GALV.), SCRM, WELDED, HVY,	20.9		20.9	
PIPE, 1.25 INCH, ASTM A 106 GR B, H2, ASME B36.10M, BE, SEAMLESS, S80, H2, NOTE20	71.5		71.5	
PIPE, 1.5 INCH, ASTM A 106 GR B, H2, ASME B36.10M, BE, SEAMLESS, S80, H2, NOTE20	56.1		56.1	
PIPE, 1.5 INCH, ASTM A 312 GR TP316, ASME B36.19M, PE, SEAMLESS, 80S, NOTE5	0.4		0.4	
PIPE, 1.5 INCH, ASTM A 312 GR TP316, ASME B36.19M, PE, SEAMLESS, 80S, NOTE5	0.4		0.4	
PIPE, 1.5 INCH, ASTM A106 GR.B, ASME B36.10, PE, SEAMLESS, S80,	28.9		28.9	
PIPE, 1.5 INCH, ASTM A106 GR.B, ASME B36.10M, PE, SEAMLESS, S80,	24.8		24.8	
PIPE, 1.5 INCH, ASTM A106 GR.B, H2, ASME B36.10M, PE, SEAMLESS, S80, H2	4.4		4.4	
PIPE, 1.5 INCH, ASTM A106 GR.B,IBR, ASME B36.10M, PE, SEAMLESS, S80, IBR, NOTE2	134.7		134.7	
PIPE, 1.5 INCH, IS-1239 (GALV.), IS-1239, SCRM, WELDED, HVY,	42.5		42.5	
PIPE, 10 INCH, ASTM A106 GR.B, ASME B36.10M, BE, SEAMLESS, S20,	2.4		2.4	
PIPE, 14 INCH, ASTM A106 GR.B, ASME B36.10M, BE, SEAMLESS, S20,	17.7		17.7	
PIPE, 16 INCH, ASTM B168 N06600, ASME B36.19M, BE, EFW, 10S,	13.7		13.7	
PIPE, 18 INCH, ASTM A 691 Grade 1 1/4 Cr Class 22, PWHT, ASME B36.19M, BE, WELDED, H2, NOTE	2		2	
PIPE, 2 INCH, ASTM A 312 GR TP316, ASME B36.19M, BE, SEAMLESS, 80S, NOTE4,5,13	50.1		50.1	
PIPE, 2 INCH, ASTM A106 GR.B, ASME B36.10, BE, SEAMLESS, S40,	1.2		1.2	
PIPE, 2 INCH, ASTM A106 GR.B, ASME B36.10, BE, SEAMLESS, S80,	0.1		0.1	
PIPE, 2 INCH, ASTM A106 GR.B, ASME B36.10M, BE, SEAMLESS, S80,	29.7		29.7	
PIPE, 2 INCH, ASTM A106 GR.B, H2, ASME B36.10M, BE, SEAMLESS, S80, H2	11.8		11.8	
PIPE, 2 INCH, ASTM B167 N06600, ASME B36.19M, BE, SEAMLESS, 40S, NOTE	0.2		0.2	
PIPE, 3 INCH, ASTM A106 GR.B, ASME B36.10M, BE, SEAMLESS, S40,	77.9		77.9	
PIPE, 3 INCH, ASTM A312 GR.TP304H, ASME B36.19M, BE, SEAMLESS, 40S,	0.5		0.5	
PIPE, 4 INCH, ASTM A 106 GR B, H2, ASME B36.10M, BE, SEAMLESS, S80, H2, NOTE20	1.9		1.9	
PIPE, 4 INCH, ASTM A106 GR.B, ASME B36.10, BE, SEAMLESS, S40,	1.2		1.2	
PIPE, 4 INCH, ASTM A106 GR.B, ASME B36.10M, BE, SEAMLESS, S40,	14.8		14.8	
PIPE, 6 INCH, ASTM A 106 GR B, H2, ASME B36.10M, BE, SEAMLESS, S80, H2, NOTE20	0.5		0.5	
PIPE, 6 INCH, ASTM A 312 GR TP316, ASME B36.19M, BE, SEAMLESS, 40S, NOTE5	7.8		7.8	
PIPE, 6 INCH, ASTM A106 GR.B, ASME B36.10, BE, SEAMLESS, S40,	1.2		1.2	
PIPE, 6 INCH, ASTM A106 GR.B, ASME B36.10M, BE, SEAMLESS, S40,	102.3		102.3	
PIPE, 6 INCH, ASTM A106 GR.B, H2, ASME B36.10M, BE, SEAMLESS, S40, H2, NOTE	2		2	
PIPE, 8 INCH, ASTM A 106 GR B, H2, ASME B36.10M, BE, SEAMLESS, S80, H2, NOTE20	1.8		1.8	
PIPE, 8 INCH, ASTM A 312 GR TP316, ASME B36.19M, BE, SEAMLESS, 40S, NOTE5	61.3		61.3	
PIPE, 8 INCH, ASTM A106 GR.B, ASME B36.10, BE, SEAMLESS, S20,	5.6		5.6	

ATTACHMENT-1- MRPL-CCR1-SOQ- PIPING SUPPLY SUMMARY

ITEM DESCRIPTION	Total Qty Pipe-meters others- numbers (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
PIPE, 8 INCH, ASTM A106 GR.B, ASME B36.10M, BE, SEAMLESS, S20,	30.4		30.4	
PIPE, 8 INCH, ASTM A106 GR.B, H2, ASME B36.10M, BE, SEAMLESS, S40, H2	26.5		26.5	
PIPE, 8 INCH, ASTM B168 N06600, ASME B36.19M, BE, EFW, 10S, NOTE	3.6		3.6	
CAP, 8 INCH, ASTM A 234 GR WPB, H2, ASME B16.9, BW, S80, H2	2		2	
ELBOW 45, 0.5 INCH, ASTM A182 GR. F316, ASME B16.11, SW, 3000,	1		1	
ELBOW 45, 0.75 INCH, ASTM A 182 GR F316, ASME B16.11, SW, 3000, NOTE5	1		1	
ELBOW 45, 0.75 INCH, ASTM A105, ASME B16.11, SW, 3000,	4		4	
ELBOW 45, 0.75 INCH, ASTM A182 GR. F316, ASME B16.11, SW, 3000,	1		1	
ELBOW 45, 1 INCH, ASTM A 105, H2, ASME B16.11, SW, 3000, H2, NOTE	1		1	
ELBOW 45, 1 INCH, ASTM A105, ASME B16.11, SW, 3000,	1		1	
ELBOW 45, 1 INCH, ASTM A106 GR.B, ASME B36.10M, PE, SEAMLESS, S80,	1		1	
ELBOW 45, 1.5 INCH, ASTM A 105, H2, ASME B16.11, SW, 3000, H2, NOTE	1		1	
ELBOW 45, 1.5 INCH, ASTM A 105, IBR, ASME B16.11, SW, 3000, IBR, NOTE2	3		3	
ELBOW 45, 1.5 INCH, ASTM A105 (GALV.), ASME B16.11, SCRF, 3000,	1		1	
ELBOW 45, 14 INCH, ASTM A 234 GR WPB, ASME B16.9, R=1.5D, BW, SEAMLESS, S20,	2		2	
ELBOW 45, 2 INCH, ASTM A 234 GR WPB, ASME B16.9, R=1.5D, BW, SEAMLESS, S40,	2		2	
ELBOW 45, 3 INCH, ASTM A 234 GR WPB, ASME B16.9, R=1.5D, BW, SEAMLESS, S40,	2		2	
ELBOW 45, 6 INCH, ASTM A 234 GR WPB, ASME B16.9, R=1.5D, BW, SEAMLESS, S40,	7		7	
ELBOW 45, 8 INCH, ASTM A 234 GR WPB, ASME B16.9, R=1.5D, BW, SEAMLESS, S20,	3		3	
ELBOW 45, 8 INCH, ASTM A 234 GR WPB, H2, ASME B16.9, R=1.5D, BW, S80, H2	1		1	
ELBOW 45, 8 INCH, ASTM A 234 GR WPB, H2, ASME B16.9, R=1.5D, BW, S80, H2, NOTE	1		1	
ELBOW 45, 8 INCH, ASTM A 234 GR WPB, H2, ASME B16.9, R=1.5D, BW, SEAMLESS, S40, H2	1		1	
ELBOW 45, 8 INCH, ASTM A 403 GR WP 316-S/WX/WU, ASME B16.9, R=1.5D, BW, 40S, NOTE5	3		3	
ELBOW45, 1.5 INCH, ASTM A 105, IBR, ASME B16.11, SW, 3000, IBR, NOTE2	1		1	
ELBOW 90, 0.25 INCH, ASTM A105, ASME B16.11, SW, 3000,	2		2	
ELBOW 90, 0.5 INCH, ASTM A 182 GR F316, ASME B16.11, SW, 3000, NOTE5	6		6	
ELBOW 90, 0.5 INCH, ASTM A106 GR.B, ASME B36.10M, PE, SEAMLESS, S80,	52		52	
ELBOW 90, 0.5 INCH, ASTM A182 GR. F316, ASME B16.11, SW, 3000,	4		4	
ELBOW 90, 0.75 INCH, ASTM A 105, H2, ASME B16.11, SW, 3000, H2, NOTE	20		20	
ELBOW 90, 0.75 INCH, ASTM A 105, IBR, ASME B16.11, SW, 3000, IBR, NOTE2	9		9	
ELBOW 90, 0.75 INCH, ASTM A 182 GR F316, ASME B16.11, SW, 3000, NOTE5	16		16	
ELBOW 90, 0.75 INCH, ASTM A105, ASME B16.11, SW, 3000,	42		42	
ELBOW 90, 0.75 INCH, ASTM A182 GR. F316, ASME B16.11, SW, 3000,	5		5	
ELBOW 90, 0.75 INCH, ASTM B366 GR.WPNCI, ASME B16.11, SW, 3000, NOTE	1	1	2	
ELBOW 90, 1 INCH, ASTM A 105, H2, ASME B16.11, SW, 3000, H2	18		18	
ELBOW 90, 1 INCH, ASTM A 105, IBR, ASME B16.11, SW, 3000, IBR, NOTE2	15		15	
ELBOW 90, 1 INCH, ASTM A105 (GALV.), ASME B16.11, SCRF, 3000,	16		16	
ELBOW 90, 1 INCH, ASTM A105, ASME B16.11, SW, 3000,	20		20	
ELBOW 90, 1.5 INCH, ASTM A 105, H2, ASME B16.11, SW, 3000, H2, NOTE	4		4	
ELBOW 90, 1.5 INCH, ASTM A 105, IBR, ASME B16.11, SW, 3000, IBR, NOTE2	31		31	
ELBOW 90, 1.5 INCH, ASTM A105 (GALV.), ASME B16.11, SCRF, 3000,	6		6	
ELBOW 90, 1.5 INCH, ASTM A105, ASME B16.11, SW, 3000,	20		20	
ELBOW 90, 14 INCH, ASTM A 234 GR WPB, ASME B16.9, R=1.5D, BW, SEAMLESS, S20,	4		4	
ELBOW 90, 16 INCH, ASTM B366 GR.WPNCI, ASME B16.9, R=1.5D, BW, WELDED, 10S,	6	1	7	
ELBOW 90, 2 INCH, ASTM A 234 GR WPB, ASME B16.9, R=1.5D, BW, SEAMLESS, S80,	17		17	
ELBOW 90, 2 INCH, ASTM A 234 GR WPB, H2, ASME B16.9, R=1.5D, BW, SEAMLESS, S80, H2	18		18	
ELBOW 90, 3 INCH, ASTM A 234 GR WPB, ASME B16.9, R=1.5D, BW, SEAMLESS, S40,	27		27	
ELBOW 90, 3 INCH, ASTM A 403GR.WP304H, ASME B16.9, R=1.5D, BW, SEAMLESS, 40S,	1		1	
ELBOW 90, 4 INCH, ASTM A 234 GR WPB, ASME B16.9, R=1.5D, BW, SEAMLESS, S40,	4		4	
ELBOW 90, 6 INCH, ASTM A 234 GR WPB, ASME B16.9, R=1.5D, BW, SEAMLESS, S40,	16		16	
ELBOW 90, 8 INCH, ASTM A 234 GR WPB, ASME B16.9, R=1.5D, BW, SEAMLESS, S20,	10		10	
ELBOW 90, 8 INCH, ASTM A 234 GR WPB, H2, ASME B16.9, R=1.5D, BW, SEAMLESS, S40, H2	7		7	

ATTACHMENT-1- MRPL-CCR1-SOQ- PIPING SUPPLY SUMMARY

ITEM DESCRIPTION	Total Qty Pipe-meters others- numbers (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
ELBOW 90, 8 INCH, ASTM A 403 GR WP 316-S/WX/WU, ASME B16.9, R=1.5D, BW, 40S, NOTE5	15		15	
ELBOW 90, 8 INCH, ASTM A234 GR. WPB, ASME B16.9, R=1.5D, BW, S20,	3		3	
FULL COUPLING, 0.5 INCH, ASTM A105, ASME B16.11, SW, 3000,	44		44	
FULL COUPLING, 0.75 INCH, ASTM A 105, H2, ASME B16.11, SW, 3000, H2, NOTE	6		6	
FULL COUPLING, 0.75 INCH, ASTM A105, ASME B16.11, SW, 3000,	6		6	
FULL COUPLING, 0.75 INCH, ASTM A105, ASME B16.11, SW, 3000,IBR	30		30	
FULL COUPLING, 1 INCH, ASTM A105, ASME B16.11, SW, 3000,	1		1	
FULL COUPLING, 1.5 INCH, ASTM A105 (GALV.), ASME B16.11, SCRF, 3000, NOTE	3		3	
BLIND FLANGE, 0.75 INCH, ASTM A 105, H2, ASME B16.5, RF, CL300, H2, NOTE	14		14	
BLIND FLANGE, 0.75 INCH, ASTM A 105, IBR, ASME B16.5, RF, CL150, IBR, NOTE2	1		1	
BLIND FLANGE, 0.75 INCH, ASTM A105, ASME B16.5, CL150, RF,	2		2	
BLIND FLANGE, 0.75 INCH, ASTM A105, ASME B16.5, RF, CL150,	19		19	
BLIND FLANGE, 0.75 INCH, ASTM A182 GR. F316, ASME B16.5, RF, CL150,	1		1	
BLIND FLANGE, 0.75 INCH, ASTM B564 UNS N06600, ASME B16.5, RF, CL150, NOTE29	3	1	4	
BLIND FLANGE, 1 INCH, ASTM A 105, H2, ASME B16.5, RF, CL300, H2, NOTE	2		2	
BLIND FLANGE, 1 INCH, ASTM A 105, IBR, ASME B16.5, RF, CL150, IBR, NOTE2	7		7	
BLIND FLANGE, 1 INCH, ASTM A 105, IBR, ASME B16.5, RF, CL300, IBR, NOTE2	1		1	
BLIND FLANGE, 1 INCH, ASTM A105 (GALV.), ASME B16.5, CL150, FF/125AARH,	6		6	
BLIND FLANGE, 1 INCH, ASTM A105, ASME B16.5, CL150, RF,	2		2	
BLIND FLANGE, 1 INCH, ASTM A105, ASME B16.5, RF, CL150,	2		2	
BLIND FLANGE, 1 INCH, ASTM A182 GR. F304, ASME B16.5, RF, CL150,	1		1	
BLIND FLANGE, 1.5 INCH, ASTM A 105, IBR, ASME B16.5, RF, CL300, IBR, NOTE2	5		5	
BLIND FLANGE, 1.5 INCH, ASTM A 182 GR F316, ASME B16.5, RF, CL300, NOTE5	2		2	
BLIND FLANGE, 1.5 INCH, ASTM A105 (GALV.), ASME B16.5, CL150, FF/125AARH,	1		1	
BLIND FLANGE, 1.5 INCH, ASTM A 182 GR F316, ASME B16.5, RF, CL300, NOTE5	2		2	
BLIND FLANGE, 1.5 INCH, ASTM A105 (GALV.), ASME B16.5, CL150, FF/125AARH,	1		1	
BLIND FLANGE, 1.5 INCH, ASTM A105, ASME B16.5, CL150, RF,	4		4	
BLIND FLANGE, 1.5 INCH, ASTM A105, ASME B16.5, RF, CL150,	6		6	
BLIND FLANGE, 2 INCH, ASTM A105, ASME B16.5, CL150, RF,	2		2	
BLIND FLANGE, 4 INCH, ASTM A 182 GR F316, ASME B16.5, RF, CL300, NOTE5	2		2	
BLIND FLANGE, 4 INCH, ASTM B564 UNS N06600, ASME B16.5, RF, CL150, NOTE29	1	1	2	
FIGURE 8, 2 INCH, ASTM A 182 GR F316, ASME B16.48, FF, CL300, NOTE5	2		2	
FIGURE 8, 2 INCH, ASTM A 182 GR.F11, H2, ASME B16.5, RF, CL300, H2	1		1	
FIGURE 8, 2 INCH, ASTM A105, ASME B16.48, RF, CL150,	2		2	
FLANGE, 0.5 INCH, ASTM A 182 GR F316, ASME B16.5, RF, CL300, SW, NOTE5	3		3	
FLANGE, 0.5 INCH, ASTM A105, ASME B16.5, RF, CL150, WN, S80,	12		12	
FLANGE, 0.5 INCH, ASTM A105, ASME B16.5, WN, CL150, RF, S80,	2		2	
FLANGE, 0.5 INCH, ASTM A105, ASME B16.5, WN, CL300, RF, S80,	2		2	
FLANGE, 0.5 INCH, ASTM A182 GR. F316, ASME B16.5, RF, CL150, WN, 80S,	1		1	
FLANGE, 0.75 INCH, ASTM A 105, H2, ASME B16.5, RF, CL300, SW, H2, NOTE	27		27	
FLANGE, 0.75 INCH, ASTM A 105, IBR, ASME B16.5, RF, CL150, WN, S80, IBR, NOTE2	11		11	
FLANGE, 0.75 INCH, ASTM A 105, IBR, ASME B16.5, RF, CL300, WN, S80, IBR, NOTE2	10		10	
FLANGE, 0.75 INCH, ASTM A 182 GR F316, ASME B16.5, RF, CL300, SW, NOTE5	8		8	
FLANGE, 0.75 INCH, ASTM A105, ASME B16.5, RF, CL150, WN, S80,	30		30	
FLANGE, 0.75 INCH, ASTM A105, ASME B16.5, RF, CL300, WN, S80,	8		8	
FLANGE, 0.75 INCH, ASTM A105, ASME B16.5, WN, CL150, RF, S80,	10		10	
FLANGE, 0.75 INCH, ASTM A105, ASME B16.5, WN, CL300, RF, S80,	2		2	
FLANGE, 0.75 INCH, ASTM A182 GR. F316, ASME B16.5, RF, CL150, WN, 80S,	8		8	
FLANGE, 0.75 INCH, ASTM B564 UNS N06600, ASME B16.5, RF, CL150, WN, 40S, NOTE29	3	1	4	
FLANGE, 1 INCH, ASTM A 105, H2, ASME B16.5, RF, CL150, SW, H2	2		2	
FLANGE, 1 INCH, ASTM A 105, H2, ASME B16.5, RF, CL300, SW, H2	16		16	
FLANGE, 1 INCH, ASTM A 105, IBR, ASME B16.5, RF, CL150, WN, S80, IBR, NOTE2	5		5	
FLANGE, 1 INCH, ASTM A 105, IBR, ASME B16.5, RF, CL300, WN, S80, IBR, NOTE2	10		10	
FLANGE, 1 INCH, ASTM A105 (GALV.), ASME B16.5, SCRD, CL150, FF/125AARH,	6		6	

ATTACHMENT-1- MRPL-CCR1-SOQ- PIPING SUPPLY SUMMARY

ITEM DESCRIPTION	Total Qty Pipe-meters others- numbers (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
FLANGE, 1 INCH, ASTM A105, ASME B16.5, RF, CL150, WN, S80,	5		5	
FLANGE, 1 INCH, ASTM A105, ASME B16.5, RF, CL300, WN, S80,	6		6	
FLANGE, 1 INCH, ASTM A105, ASME B16.5, WN, CL150, RF, S80,	3		3	
FLANGE, 1 INCH, ASTM A105, ASME B16.5, WN, CL300, RF, S80,	2		2	
FLANGE, 1 INCH, ASTM A182 GR F316, ASME B16.5, RF, CL300, WN, 80S, NOTE5	1		1	
FLANGE, 1 INCH, ASTM A182 GR. F304, ASME B16.5, RF, CL150, WN, 40S,	1		1	
FLANGE, 1.5 INCH, ASTM A 105, H2, ASME B16.5, RF, CL300, SW, H2	6		6	
FLANGE, 1.5 INCH, ASTM A 105, IBR, ASME B16.5, RF, CL150, WN, S80, IBR, NOTE2	5		5	
FLANGE, 1.5 INCH, ASTM A 105, IBR, ASME B16.5, RF, CL300, WN, S80, IBR, NOTE2	7		7	
FLANGE, 1.5 INCH, ASTM A 182 GR F316, ASME B16.5, RF, CL150, SW, NOTE5	1		1	
FLANGE, 1.5 INCH, ASTM A 182 GR F316, ASME B16.5, RF, CL300, SW, NOTE5	1		1	
FLANGE, 1.5 INCH, ASTM A105 (GALV.), ASME B16.5, SCRD, CL150, FF/125AARH,	2		2	
FLANGE, 1.5 INCH, ASTM A105, ASME B16.5, RF, CL150, WN, S80,	13		13	
FLANGE, 1.5 INCH, ASTM A105, ASME B16.5, RF, CL300, WN, S80,	15		15	
FLANGE, 1.5 INCH, ASTM A105, ASME B16.5, WN, CL150, RF, S80,	10		10	
FLANGE, 1.5 INCH, ASTM A105, ASME B16.5, WN, CL300, RF, S80,	2		2	
FLANGE, 10 INCH, ASTM A 182 GR F316, ASME B16.5, RF, CL300, WN, 40S, NOTE5	1		1	
FLANGE, 10 INCH, ASTM A105, ASME B16.5, RF, CL300, WN, S20,	2		2	
FLANGE, 14 INCH, ASTM A105, ASME B16.5, RF, CL150, WN, S20,	3		3	
FLANGE, 2 INCH, ASTM A 105, H2, ASME B16.5, RF, CL300, WN, S80, H2	12		12	
FLANGE, 2 INCH, ASTM A105, ASME B16.5, RF, CL150, WN, S40,	21		21	
FLANGE, 2 INCH, ASTM A105, ASME B16.5, RF, CL300, WN, S160,	1		1	
FLANGE, 2 INCH, ASTM A105, ASME B16.5, RF, CL300, WN, S40,	7		7	
FLANGE, 2 INCH, ASTM A105, ASME B16.5, WN, CL150, RF, S40,	3		3	
FLANGE, 2 INCH, ASTM A105, ASME B16.5, RF, CL300, WN, S40,	7		7	
FLANGE, 2 INCH, ASTM A105, ASME B16.5, WN, CL150, RF, S40,	3		3	
FLANGE, 2 INCH, ASTM A105, ASME B16.5, WN, CL150, RF, S80,	1		1	
FLANGE, 2 INCH, ASTM A182 GR F316, ASME B16.5, RF, CL150, WN, 80S, NOTE5	7		7	
FLANGE, 2 INCH, ASTM A182 GR F316, ASME B16.5, RF, CL300, WN, 80S, NOTE5	8		8	
FLANGE, 2.5 INCH, ASTM A105, ASME B16.5, RF, CL150, WN, S40,	2		2	
FLANGE, 3 INCH, ASTM A 182 GR.F11, H2, ASME B16.5, RF, CL300, WN, S80, H2	1		1	
FLANGE, 3 INCH, ASTM A105, ASME B16.5, RF, CL150, WN, S40,	16		16	
FLANGE, 3 INCH, ASTM A105, ASME B16.5, RF, CL300, WN, S40,	7		7	
FLANGE, 3 INCH, ASTM A105, ASME B16.5, WN, CL300, RF, S40,	1		1	
FLANGE, 4 INCH, ASTM A 182 GR F316, ASME B16.5, RF, CL300, WN, 40S, NOTE5	3		3	
FLANGE, 4 INCH, ASTM A105, ASME B16.5, RF, CL150, WN, S40,	4		4	
FLANGE, 4 INCH, ASTM A105, ASME B16.5, RF, CL300, WN, S40,	2		2	
FLANGE, 4 INCH, ASTM B564 UNS N06600, ASME B16.5, RF, CL300, WN, 10S, NOTE29	1	1	2	
FLANGE, 6 INCH, ASTM A105, ASME B16.5, RF, CL150, WN, S40,	15		15	
FLANGE, 6 INCH, ASTM A105, ASME B16.5, RF, CL300, WN, S40,	2		2	
FLANGE, 8 INCH, ASTM A 105, H2, ASME B16.5, RF, CL150, WN, S80, H2, NOTE	2		2	
FLANGE, 8 INCH, ASTM A 105, H2, ASME B16.5, RF, CL300, WN, S40, H2	1		1	
FLANGE, 8 INCH, ASTM A 105, H2, ASME B16.5, RF, CL300, WN, S80, H2, NOTE	2		2	
FLANGE, 8 INCH, ASTM A 182 GR F316, ASME B16.5, RF, CL300, WN, 40S, NOTE5	5		5	
FLANGE, 8 INCH, ASTM A105, ASME B16.5, RF, CL150, WN, S20,	2		2	
FLANGE, 8 INCH, ASTM A105, ASME B16.5, RF, CL300, WN, S20,	3		3	
FLANGE, 8 INCH, ASTM A105, ASME B16.5, WN, CL300, RF, S20,	1		1	
LETROLET, 2 INCH X 1 INCH, ASTM A182 GR F316, MSS SP-97, BW, 80SX80S, NOTE 5	1		1.00	
CONCENTRIC REDUCER, 14 INCH X 10 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S20XS20,	2		2	
CONCENTRIC REDUCER, 3 INCH X 2 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS80,	2		2	
CONCENTRIC REDUCER, 3 INCH X 2 INCH, ASTM A 234 GR.WP11, H2, ASME B16.9, S80XS80, H2	1		1	
CONCENTRIC REDUCER, 3 INCH X 2.5 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS80,	2		2	
CONCENTRIC REDUCER, 4 INCH X 2 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS80,	1		1	
CONCENTRIC REDUCER, 6 INCH X 3 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS40,	7		7	

ATTACHMENT-1- MRPL-CCR1-SOQ- PIPING SUPPLY SUMMARY

ITEM DESCRIPTION	Total Qty Pipe-meters others- numbers (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
CONCENTRIC REDUCER, 8 INCH X 4 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S20XS40,	1		1	
CONCENTRIC REDUCER, 8 INCH X 4 INCH, ASTM A 403 GR WP 316-S/WX/WU, ASME B16.9, BW, 40SX40S, NOTE 5	1		1	
ECCENTRIC REDUCER, 10 INCH X 8 INCH, ASTM A 403 GR WP 316-S/WX/WU, ASME B16.9, BW, 40SX40S, NOTE 5	1		1	
ECCENTRIC REDUCER, 2 INCH, ASTM A 234 GR WPB, H2, ASME B16.9, BW, S80xS80, H2, NOTE	1		1	
ECCENTRIC REDUCER, 3 INCH X 2 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS80,	3		3	
ECCENTRIC REDUCER, 4 INCH X 1.5 INCH, ASTM A 234 GR WPB, H2, ASME B16.9, BW, S80XS80, H2	1		1	
ECCENTRIC REDUCER, 4 INCH X 2 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS80,	1		1	
ECCENTRIC REDUCER, 4 INCH X 2 INCH, ASTM A 234 GR WPB, H2, ASME B16.9, BW, S80xS80, H2	1		1	
ECCENTRIC REDUCER, 4 INCH X 3 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS40,	1		1	
ECCENTRIC REDUCER, 6 INCH X 3 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS40,	1		1	
ECCENTRIC REDUCER, 6 INCH X 4 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS40,	2		2	
ECCENTRIC REDUCER, 8 INCH X 4 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S20XS40,	2		2	
ECCENTRIC REDUCER, 8 INCH X 4 INCH, ASTM A 234 GR WPB, H2, ASME B16.9, BW, S80XS80, H2	2		2	
ECCENTRIC REDUCER, 8 INCH X 6 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S20XS40,	1		1	
REDUCING COUPLING, 0.75 INCH, ASTM A105, ASME B16.11, SW, 3000, NOTE	2		2	
REDUCING FLANGE, 2 INCH X 1.25 INCH, ASTM A 105, H2, ASME B16.5, RF, CL300, H2	1		1	
REDUCING TEE, 1 INCH X 0.75 INCH, ASTM A 105, ASME B16.11, SW, 3000,	9		9	
REDUCING TEE, 1 INCH X 0.75 INCH, ASTM A 105, H2, ASME B16.11, SW, 3000, H2	11		11	
REDUCING TEE, 1.5 INCH X 0.75 INCH, ASTM A 105, ASME B16.11, SW, 3000,	1		1	
REDUCING TEE, 1.5 INCH X 0.75 INCH, ASTM A 105, IBR, ASME B16.11, SW, 3000, IBR, NOTE 2	12		12	
REDUCING TEE, 1.5 INCH X 0.75 INCH, ASTM A105, ASME B16.11, SW, 3000,	1		1	
REDUCING TEE, 1.5 INCH X 1 INCH, ASTM A 105, ASME B16.11, SW, 3000,	2		2	
REDUCING TEE, 1.5 INCH X 1 INCH, ASTM A 105, IBR, ASME B16.11, SW, 3000, IBR, NOTE 2	2		2	
REDUCING TEE, 1.5 INCH X 1 INCH, ASTM A105 (GALV.), ASME B16.11, SCRF, 3000,	6		6	
REDUCING TEE, 1.5 INCH, ASTM A 105, H2, ASME B16.11, SW, 3000, H2, NOTE	1		1	
REDUCING TEE, 1.5 INCH, ASTM A105, ASME B16.11, SW, 3000, NOTE	5		5	
REDUCING TEE, 14 INCH X 8 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S20XS20,	1		1	
REDUCING TEE, 2 INCH X 1.5 INCH, ASTM A 105, IBR, ASME B16.9, BW, S40XS80, IBR, NOTE 2	2		2	
REDUCING TEE, 2 INCH X 1.5 INCH, ASTM A234 GR. WPB, IBR, ASME B16.9, BW, S40XS80, IBR, NOTE 2	1		1	
REDUCING TEE, 3 INCH X 2 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS80,	1		1	
REDUCING TEE, 4 INCH X 3 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS40,	1		1	
REDUCING TEE, 6 INCH X 3 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40XS40,	2		2	
REDUCING TEE, 8 INCH X 4 INCH, ASTM A 403 GR WP 316-S/WX/WU, ASME B16.9, BW, 40SX40S, NOTE 5	2		2	
SOCKOLET, 16 INCH X 0.75 INCH, ASTM B564 UNS N06600, MSS SP-97, SW, 10Sx40S, NOTE 29	3	1	4	
SOCKOLET, 2 INCH X 0.75 INCH, ASTM A 105, H2, MSS SP-97, SW, 3000, H2, NOTE	6		6	
SOCKOLET, 2 INCH X 0.75 INCH, ASTM A105, MSS SP-97, SW, 3000,	3		3	
SOCKOLET, 2 INCH X 0.75 INCH, ASTM B564 UNS N06600, MSS SP-97, SW, 40SX40S, NOTE 29	1	1	2	
SOCKOLET, 3 INCH X 0.75 INCH, ASTM A105, MSS SP-97, SW, 3000,	13		13	
SOCKOLET, 4 INCH X 0.75 INCH, ASTM A105, MSS SP-97, SW, 3000,	3		3	
SOCKOLET, 4 INCH X 1.5 INCH, ASTM A105, MSS SP-97, SW, 3000,	1		1	
SOCKOLET, 6 INCH X 0.75 INCH, ASTM A105, MSS SP-97, SW, 3000,	8		8	
SOCKOLET, 6 INCH X 1.5 INCH, ASTM A105, MSS SP-97, SW, 3000,	4		4	
SOCKOLET, 8 INCH X 0.75 INCH, ASTM A 105, H2, MSS SP-97, SW, 3000, H2, NOTE	1		1	
SOCKOLET, 8 INCH X 0.75 INCH, ASTM A 182 GR F316, MSS SP-97, SW, 3000, NOTE 5,23	2		2	
SOCKOLET, 8 INCH X 0.75 INCH, ASTM A105, MSS SP-97, SW, 3000,	1		1	
SOCKOLET, 8 INCH X 1.5 INCH, ASTM A 105, H2, MSS SP-97, SW, 3000, H2, NOTE	1		1	
SOCKOLET, 8 INCH X 1.5 INCH, ASTM A 182 GR F316, MSS SP-97, SW, 3000, NOTE 5,23	2		2	
SOCKOLET, 8 INCH X 1.5 INCH, ASTM A105, MSS SP-97, SW, 3000,	3		3	
SPECIAL CHECK VALVE, 1 INCH, SPRING LOADED, BRASS BAR STOCK BODY WITH BUNA N SEAL. CIRCLE SEAL-249B-XPP, SCRF,3000	1	1	2	

ATTACHMENT-1- MRPL-CCR1-SOQ- PIPING SUPPLY SUMMARY

ITEM DESCRIPTION	Total Qty Pipe-meters others- numbers (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
CONCENTRIC SWAGE, 0.75 INCH X 0.25 INCH, ASTM A105, BS-3799, PBE, S80XS80,	1		1	
CONCENTRIC SWAGE, 0.75 INCH X 0.5 INCH, ASTM A 182 GR F316, BS-3799, PBE, , NOTE 5	4		4	
CONCENTRIC SWAGE, 1 INCH X 0.75 INCH, ASTM A105, BS-3799, PBE, S80XS80,	9		9	
CONCENTRIC SWAGE, 1 INCH, ASTM A 105, H2, BS-3799, PBE, S80XS80, H2, NOTE	9		9	
CONCENTRIC SWAGE, 1.5 INCH X 0.75 INCH, ASTM A105, BS-3799, PBE, S80XS80,	1		1	
CONCENTRIC SWAGE, 1.5 INCH X 0.75 INCH, ASTM A105, IBR, BS-3799, PBE, S80XS80, IBR, NOTE 2	1		1	
CONCENTRIC SWAGE, 1.5 INCH X 1 INCH, ASTM A105, BS-3799, PBE, S80XS80,	2		2	
CONCENTRIC SWAGE, 1.5 INCH X 1 INCH, ASTM A105, IBR, BS-3799, PBE, S80XS80, IBR, NOTE 2	2		2	
CONCENTRIC SWAGE, 2 INCH X 1.5 INCH, ASTM A105, BS-3799, PBE, S80XS80,	3		3	
CONCENTRIC SWAGE, 2 INCH, ASTM A 105, H2, BS-3799, PBE, S80XS80, H2, NOTE	4		4	
CONCENTRIC SWAGE, 2 INCH, ASTM A105, BS-3799, PBE, S40XS80, NOTE	2		2	
CONCENTRIC SWAGE, 3 INCH, ASTM A105, BS-3799, PBE, S40XS80, NOTE	1		1	
ECCENTRIC SWAGE, 0.75 INCH X 0.5 INCH, ASTM A105, BS-3799, PBE, S80XS80,	2		2	
ECCENTRIC SWAGE, 0.75 INCH X 0.5 INCH, ASTM A105, IBR, BS-3799, PBE, S80XS80, IBR, NOTE 2	2		2	
ECCENTRIC SWAGE, 0.75 INCH, ASTM A105, BS-3799, PBE, S80XS80, NOTE	2		2	
ECCENTRIC SWAGE, 0.75 INCH, ASTM A105, BS-3799, POEXTOE, S80XS80, NOTE	1		1	
ECCENTRIC SWAGE, 1 INCH, ASTM A105, BS-3799, PBE, S80XS80, NOTE	2		2	
ECCENTRIC SWAGE, 1.5 INCH X 1 INCH, ASTM A105, BS-3799, PBE, S80XS80,	2		2	
ECCENTRIC SWAGE, 1.5 INCH, ASTM A 105, H2, BS-3799, PBE, S80XS80, H2, NOTE	1		1	
ECCENTRIC SWAGE, 2 INCH X 1 INCH, ASTM A 105, H2, BS-3799, PBE, S80XS80, H2	1		1	
ECCENTRIC SWAGE, 2 INCH X 1.5 INCH, ASTM A105, BS-3799, PBE, S80XS80,	1		1	
ECCENTRIC SWAGE, 2 INCH, ASTM A 105, H2, BS-3799, PBE, S80XS80, H2, NOTE	1		1	
ECCENTRIC SWAGE, 3 INCH X 1.5 INCH, ASTM A105, BS-3799, PBE, S40XS80,	3		3	
EQUAL TEE, 0.5 INCH, ASTM A 182 GR F316, ASME B16.11, SW, 3000, NOTE5	2		2	
EQUAL TEE, 0.75 INCH X 0.75 INCH, ASTM A105, ASME B16.11, SW, 3000, S80,	11		11	
EQUAL TEE, 0.75 INCH, ASTM A 105, H2, ASME B16.11, SW, 3000, H2, NOTE	2		2	
EQUAL TEE, 0.75 INCH, ASTM A 105, IBR, ASME B16.11, SW, 3000, IBR, NOTE2	10		10	
EQUAL TEE, 0.75 INCH, ASTM A 182 GR F316, ASME B16.11, SW, 3000, NOTE5	6		6	
EQUAL TEE, 0.75 INCH, ASTM A105, ASME B16.11, SW, 3000,	3		3	
EQUAL TEE, 0.75 INCH, ASTM A182 GR. F316, ASME B16.11, SW, 3000,	2		2	
EQUAL TEE, 1 INCH X 1 INCH, ASTM A105 (GALV.), ASME B16.11, SCRF, 3000,	12		12	
EQUAL TEE, 1 INCH X 1 INCH, ASTM A105, ASME B16.11, SW, 3000, S80,	5		5	
EQUAL TEE, 1 INCH, ASTM A 105, H2, ASME B16.11, SW, 3000, H2	10		10	
EQUAL TEE, 1 INCH, ASTM A 105, IBR, ASME B16.11, SW, 3000, IBR, NOTE2	6		6	
EQUAL TEE, 1.5 INCH X 1.5 INCH, ASTM A105, ASME B16.11, SW, 3000, S80,	5		5	
EQUAL TEE, 1.5 INCH, ASTM A 105, IBR, ASME B16.11, SW, 3000, IBR, NOTE2	2		2	
EQUAL TEE, 1.5 INCH, ASTM A105, ASME B16.11, SW, 3000,	2		2	
EQUAL TEE, 2 INCH X 2 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40,	4		4	
EQUAL TEE, 3 INCH X 3 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40,	4		4	
EQUAL TEE, 4 INCH X 4 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40,	2		2	
EQUAL TEE, 6 INCH X 6 INCH, ASTM A 234 GR WPB, ASME B16.9, BW, SEAMLESS, S40,	3		3	
THREADOLET, 6 INCH X 1 INCH, ASTM A105, MSS SP-97, SCRD, 3000, NOTE 23	2		2	
THREADOLET, 8 INCH X 1 INCH, ASTM A 105, H2, MSS SP-97, SCRD, 3000, H2, NOTE	1		1	
THREADOLET, 8 INCH X 1 INCH, ASTM A 182 GR F316, MSS SP-97, SCRD, 3000, NOTE 5,23	4		4	
THREADOLET, 8 INCH X 1 INCH, ASTM A105, MSS SP-97, SCRD, 3000, NOTE 23	2		2	
BALL VALVE, 1 INCH, ASTM A351 GR CF8M,BODY/BONNET,TYPE 316 OR TYPE 317 STAINLESS STEEL BALL & SEAL,CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING, WITH BRAIDED ANTI-EXTRUSION RINGS PACKING,HANDWHEEL OPERATED (MANUAL),SHEET- 54404, ASME B16.34, RF, CL300, H2, NOTE8,16	1	1	2	

ATTACHMENT-1- MRPL-CCR1-SOQ- PIPING SUPPLY SUMMARY

ITEM DESCRIPTION	Total Qty Pipe-meters others- numbers (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
BALL VALVE, 1 INCH, ASTM A351 GR CF8M,BODY/BONNET,TYPE 316 OR TYPE 317 STAINLESS STEEL BALL & SEAL,CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING, WITH BRAIDED ANTI-EXTRUSION RINGS PACKING,HANDWHEEL OPERATED (MANUAL),SHEET- 54404, ASME B16.34, RF, CL300, FB , H2, NOTE8,16	1	1	2	
BALL VALVE, 1 INCH, ASTM A351/A351M GRADE CF8M, FULL PORT, STELLITE, OR 316 STAINLESS STEEL WITH STELLITE OVERLAY, OR 316 STAINLESS, SHEET-54490 STEEL WITH METALLURGICALLY BONDED ABRASION RESISTANT COATING., ASME B16.34, RF, CL300,	2	1	3	
BALL VALVE, 1.5 INCH, ASTM A105 /SH,BB,OS&Y, SHEET-54306, ASME B16.10, RF, CL150,	4	1	5	
BALL VALVE, 2 INCH, ASTM A351 GR CF8M BODY/BONNET, BALL : STELLITE, OR 316 STAINLESS STEEL WITH STELLITE OVERLAY, OR 316 STAINLESS STEEL WITH	1	1	2	
BALL VALVE, 2 INCH, ASTM A351/A351M GRADE CF8M, FULL PORT, STELLITE, OR 316 STAINLESS STEEL WITH STELLITE OVERLAY, OR 316 STAINLESS, SHEET-54490 STEEL WITH METALLURGICALLY BONDED ABRASION RESISTANT COATING., ASME B16.34, RF, CL300, NOTE	1	1	2	
CHECK VALVE, 0.75 INCH, ASTM A 105/13CR, BC, LIFT SHEET 53001, BS-5352, SW, 800,	2	1	3	
CHECK VALVE, 4 INCH, ASTM A216 GR.WCB/SH,BC,SWING, SHEET-53301, ASME B16.10, RF, CL150,	1	1	2	
GATE VALVE, 0.5 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51001, API 602, SW, 800,	4	1	5	
GATE VALVE, 0.5 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51004, API 602, SW, 800, H2	6	1	7	
GATE VALVE, 0.5 INCH, ASTM A105	8	1	9	
GATE VALVE, 0.75 INCH, ASTM A 105/13CR, BB, OS&Y.IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	1	1	2	
GATE VALVE, 0.75 INCH, ASTM A 182 GR F316 BODY/BONNET, 316 STAINLESS STEEL TRIM, HARDFACED SEATS,OS&Y, BOLTED BONNET, CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING WITH BRAIDED ANTI-EXTRUSION RINGS, SHEET-51061, API 602, SW, 800, NOTE5	10	1	11	
GATE VALVE, 0.75 INCH, ASTM A105 /13CR BB,OS&Y, IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	20	1	21	
GATE VALVE, 0.75 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51001, API 602, SW, 800,	11	1	12	
GATE VALVE, 0.75 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51004, API 602, SW, 800, H2	26	2	28	
GATE VALVE, 0.75 INCH, ASTM A105	64	4	68	
GATE VALVE, 0.75 INCH, ASTM A182 GR. F316/TRIM SH, SHEET 51061, API 602, SW, 800, NOTE	5	1	6	
GATE VALVE, 0.75 INCH, B166 N06600/HF ,BB, OS&Y, SHEET 51076, Copper Fig. No. 101X or equal , SW, 800,	4	1	5	
GATE VALVE, 1 INCH, ASTM A 105/13CR, BB, OS&Y.IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	5	1	6	
GATE VALVE, 1 INCH, ASTM A105 /13CR BB,OS&Y, IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	4	1	5	
GATE VALVE, 1 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51001, API 602, SW, 800,	1	1	2	
GATE VALVE, 1 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51004, API 602, SW, 800, H2	7	1	8	
GATE VALVE, 1 INCH, ASTM A105	4	1	5	
GATE VALVE, 1 INCH, ASTM A182 GR. F304/TRIM SS304, SHEET 51045, API 602, SW, 800,	1	1	2	
GATE VALVE, 1 INCH, BODY-ASTM A 105,TRIM-13% CR.STEEL,3000, B-	12	1	13	
GATE VALVE, 1.5 INCH, ASTM A 105/13CR, BB, OS&Y.IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	1	1	2	
GATE VALVE, 1.5 INCH, ASTM A 182 GR F316 BODY/BONNET, 316 STAINLESS STEEL TRIM, HARDFACED SEATS,OS&Y, BOLTED BONNET, CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING WITH BRAIDED ANTI-EXTRUSION RINGS, SHEET-51061, API 602, SW, 800, NOTE5	2	1	3	
GATE VALVE, 1.5 INCH, ASTM A105 /13CR BB,OS&Y, IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	1	1	2	
GATE VALVE, 1.5 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51001, API 602, SW, 800,	1	1	2	
GATE VALVE, 1.5 INCH, ASTM A105	9	1	10	
GATE VALVE, 2 INCH, ASTM A216 GR. WCB /SH BB,OS&Y, SHEET 51301, ASME B16.10, RF, CL150,	3	1	4	
GATE VALVE, 2 INCH, ASTM A216 GR.WCB/SH BB,OS&Y, SHEET 51404, ASME B16.10, RF, CL300, H2	2	1	3	
GATE VALVE, 2 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,	3	1	4	
GATE VALVE, 2 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150, FB, WITH LOCKING ARRANGEMENT	1	1	2	
GATE VALVE, 2 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,FB, WITH LOCKING ARRANGEMENT	2	1	3	
GATE VALVE, 3 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,	4	1	5	
GATE VALVE, 3 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,FB, WITH LOCKING ARRANGEMENT	1	1	2	
GATE VALVE, 6 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,	1	1	2	
GATE VALVE, 6 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,FB, WITH LOCKING ARRANGEMENT	5	1	6	

ATTACHMENT-1- MRPL-CCR1-SOQ- PIPING SUPPLY SUMMARY

ITEM DESCRIPTION	Total Qty Pipe-meters others- numbers (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
GATE VALVE, 8 INCH, ASTM A216 GR. WCB /SH BB,OS&Y, SHEET 51301, ASME B16.10, RF, CL150,	1	1	2	
GLOBE VALVE, 0.25 INCH, ASTM A105/SH,BB,OS&Y, SHEET-52001, BS-5352, SW, 800,	1	1	2	
GLOBE VALVE, 0.5 INCH, ASTM A 182 GR F316 BODY/BONNET, 316 STAINLESS STEEL TRIM, HARD FACED SEAT,OS&Y, BOLTED BONNET, CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING WITH BRAIDED ANTI-EXTRUSION RINGS, SHEET-52061, API 602, SW, 800, NOTE5	2	1	3	
GLOBE VALVE, 0.75 INCH, ASTM A 105/13CR, BB, OS&Y.IBR, SHEET 52002, BS-5352, SW, 800, IBR, NOTE2	5	1	6	
GLOBE VALVE, 0.75 INCH, ASTM A 182 GR F316 BODY/BONNET, 316 STAINLESS STEEL TRIM, HARD FACED SEAT,OS&Y, BOLTED BONNET, CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING WITH BRAIDED ANTI-EXTRUSION RINGS, SHEET-52061, API 602, SW, 800, NOTE5	2	1	3	
GLOBE VALVE, 0.75 INCH, ASTM A105 /13CR BB,OS&Y, IBR, SHEET 52002, API 602, SW, 800, IBR, NOTE2	5	1	6	
GLOBE VALVE, 0.75 INCH, ASTM A105 /SH BB,OS&Y, SHEET 52004, BS5352, SW, 800, H2, NOTE	3	1	4	
GLOBE VALVE, 0.75 INCH, ASTM A105/SH,BB,OS&Y, SHEET-52001, BS-5352, SW, 800,	2	1	3	
GLOBE VALVE, 1 INCH, ASTM A105 /13CR BB,OS&Y, IBR, SHEET 52002, API 602, SW, 800, IBR, NOTE2	1	1	2	
GLOBE VALVE, 1.5 INCH, ASTM A 105/13CR, BB, OS&Y.IBR, SHEET 52002, BS-5352, SW, 800, IBR, NOTE2	1	1	2	
GLOBE VALVE, 2 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-52001, ASME B16.10, RF,CL150	2	1	3	
NEEDLE VALVE, 0.25 INCH, ASTM A 182 GR F316 BODY, HOKE BAR STOCK NEEDLE VALVE MODEL NO. 2315F4Y OF EQUAL, HOKE 2315FY (EQUAL), NPTF, 800,	2	1	3	

ANNEXURE-2

MANGALORE REFINERY AND PETROCHEMICALS LIMITED

CONTINUOUS CATALYST REGENERATOR
CCR-1 REGENERATOR REVAMP PROJECT
AT MRPL, MANGALURU

SCHEDULE OF QUANTITY-PIPING (BULK)

(In Scope of Construction Tender)

Rev.	Date	Description	Prpd.	Chkd.	Appd.
2	23-06-2021	ISSUED FOR INVITING BID	GBJ	MKL	NKJ
1	20-05-2021	ISSUED FOR INVITING BID	GBJ	MKL	NKJ
0	13-05-2021	ISSUED FOR INVITING BID	GBJ	MKL	NKJ

		Document Number	Rev.
Triune Energy Services Pvt. Ltd. New Delhi	SCHEDULE OF QUANTITY-PIPING (BULK)	9675-03-SOQ-002	2
		Sheet 1 of 9	

Excel

SUPPLY MATERIAL

Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
	PIPING-UNITS			
1.0	**PIPE BULK QUANTITY**			
1.1	REFER ATTACHMENT-1 FOR DETAILED QUANTITY OF PIPING BULK (GASKET) SUPPLY.			
2.0	**PIPE SUPPORTS (CONTRACTOR SUPPLIED) :**			
2.1	SS & C.S STRUCTURAL STEEL [U bolts with nuts, Clamp, Clamp shoes,pipe guides, Cross Guid with rods,T-supports plate & channel, Lug Support etc as applicable, shim/Base plate] (LUMPSUM)	MT	4	
3.0	**LOW FRICTION PADS:**			
4.1	TEFLON PAD WITH COMPRESSIVE STRENGTH (0.25 OFFSET) :1870 PSI	Cu. Metres	1.1	
4.2	GRAPHITE PAD WITH COMPRESSIVE STRENGTH : 2877 PSI	Cu. Metres	1.5	
4.0	**BOLT AND NUTS**			
4.1	REFER ATTACHMENT-3 FOR DETAILED QUANTITY OF BOLT AND NUTS SUPPLY.			
5.0	**HOT INSULATION :** Providing thermal insulation including supply of all insulating and ancillary materials, vapour barrier, weather protective coverings, consumables and other necessary materials , testing of materials as required, including transportation of materials to work site, duly inspected by 3rd party(Llyods/BV/DNV or any other Client approved party)at manufacturer's shop & sample check/inspection at site by TES Construction inspector, applying insulation on surfaces as specified including all preparatory work there on, binding, tying, lacing, stitching and/or otherwise securing , finishing with sheet cladding as per spec. , providing bolts, rivets, and self tapping screws wherever specified , providing inspection windows, end seals for flanges etc., colour coding and identification. Providing steel scaffolding, all tools , tackles , equipments etc. , labour, supervision and completing the work in all respect, at all heights as per drawings , specifications and instructions of Engineer-in-charge. (Refer Legend for applicable TES 9675-03-TS-003)			
15.1	INSULATION TYPE : IH & IT ; SURFACE MATERIAL : CS,SS & AS; INSULATION MATERIAL : ROCKWOOL, 128 DensityKg / Cu. M			
	PIPE & COMPONENTS			
	NB 0.5 INCH: THICKNESS 25 MM	Metres	1.08	
	NB 0.75 INCH: THICKNESS 25 MM	Metres	1.91	
	NB 0.75 INCH: THICKNESS 30 MM	Metres	7.90	
	NB 0.75 INCH: THICKNESS 45 MM	Metres	7.46	
	NB 0.75 INCH: THICKNESS 85 MM	Metres	1.01	
	NB 0.75 INCH: THICKNESS 100 MM	Metres	1.70	
	NB 1 INCH: THICKNESS 25 MM	Metres	14.49	
	NB 1 INCH: THICKNESS 35 MM	Metres	1.00	
	NB 1 INCH: THICKNESS 50 MM	Metres	1.00	
	NB 1.5 INCH: THICKNESS 25 MM	Metres	50.36	
	NB 1.5 INCH: THICKNESS 35 MM	Metres	48.13	
	NB 1.5 INCH: THICKNESS 50 MM	Metres	49.37	
	NB 1.5 INCH: THICKNESS 100 MM	Metres	0.37	
	NB 2 INCH: THICKNESS 25 MM	Metres	1.00	
	NB 2 INCH: THICKNESS 35 MM	Metres	1.00	
	NB 2 INCH: THICKNESS 55 MM	Metres	1.00	
	NB 3 INCH: THICKNESS 40 MM	Metres	4.39	
	NB 3 INCH: THICKNESS 130 MM	Metres	1.00	
	NB 4 INCH: THICKNESS 120 MM	Metres	1.00	
	NB 6 INCH: THICKNESS 40 MM	Metres	3.02	
	NB 6 INCH: THICKNESS 130 MM	Metres	4.20	
	NB 8 INCH: THICKNESS 135 MM	Metres	38.28	
	NB 16 INCH: THICKNESS 150 MM	Metres	17.78	
	NB 16 INCH: THICKNESS 175 MM	Metres	3.84	
	NB 18 INCH: THICKNESS 75 MM	Metres	2.00	
	NB 0.5 INCH: THICKNESS 25 MM	Metres	82.95	
	NB 0.5 INCH: THICKNESS 55 MM	Metres	113.95	
	NB 0.75 INCH: THICKNESS 25 MM	Metres	1.00	
	NB 2 INCH: THICKNESS 25 MM	Metres	1.00	
	NB 18 INCH: THICKNESS 75 MM	Metres	2.00	
15.2	INSULATION TYPE : IE; SURFACE MATERIAL : CS,SS & AS; INNER INSULATION MATERIAL : ROCKWOOL, OUTER POLYURETHANE FOAM/ POLYISOCYANURATE			
	PIPE & COMPONENTS			
	NB 0.75 INCH: THICKNESS 65 MM	Metres	1.00	

Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
	NB 1 INCH: THICKNESS 65 MM	Metres	1.00	
	NB 1.5 INCH: THICKNESS 65 MM	Metres	1.00	
	NB 1.5 INCH: THICKNESS 75 MM	Metres	1.00	
	NB 2 INCH: THICKNESS 75 MM	Metres	50.84	
	NB 4 INCH: THICKNESS 85 MM	Metres	1.00	
	NB 6 INCH: THICKNESS 95 MM	Metres	3.60	
	NB 8 INCH: THICKNESS 85 MM	Metres	4.74	
	NB 8 INCH: THICKNESS 100 MM	Metres	38.51	
	NB 10 INCH: THICKNESS 100 MM	Metres	1.00	
15.3	INSULATION TYPE : IS ; SURFACE MATERIAL : CS,SS & AS; TEMPERATURE RANGE UPTO 350 DEG. C INSULATION MATERIAL : CELLULAR GLASS,			
	PIPE & COMPONENTS			
	NB 0.5 INCH: THICKNESS 25 MM	Metres	2.22	
	NB 0.75 INCH: THICKNESS 25 MM	Metres	7.86	
	NB 1 INCH: THICKNESS 25 MM	Metres	49.82	
	NB 1.5 INCH: THICKNESS 25 MM	Metres	70.25	
	NB 2 INCH: THICKNESS 25 MM	Metres	14.67	
	NB 2.5 INCH: THICKNESS 25 MM	Metres	0.20	
	NB 3 INCH: THICKNESS 25 MM	Metres	81.62	
	NB 4 INCH: THICKNESS 25 MM	Metres	10.55	
	NB 6 INCH: THICKNESS 25 MM	Metres	5.11	
	NB 8 INCH: THICKNESS 25 MM	Metres	33.70	
15.4	INSULATION TYPE : IS ; SURFACE MATERIAL : CS,SS & AS; TEMPERATURE RANGE UPTO 550 DEG. C INSULATION MATERIAL : ROCK WOOL			
	PIPE & COMPONENTS			
	NB 2 INCH: THICKNESS 75 MM	Metres	2	
6.0	**PAINTING:** Supply of paints and primers, preparation of surfaces and application of primer and finish paints, including rubdown and touch up of shop primer wherever required, providing scaffolding for all heights, labor, material, tools and tackles, consumables, supervision etc. to complete the work in all respects as per MRPL job specification, EDB 0014 drawings and directions of engineer-in-charge for all types of un insulated piping and insulated piping as specified including all pipes, fittings, flanges, supports, valves etc. Surface preparation by blast cleaning and . For insulated piping where ever blast cleaning with no primer application is specified , in such cases finish paints shall be applied in fabrication yard. The identification marks of the piping and joints shall be noted before blasting and the same shall be transferred on piping with polyurethane paint (F2)or as per the instructions of Engineer-in-charge.			
	NB 0.5 INCHES	SQ. Metres	13.95	
	NB 0.75 INCHES	SQ. Metres	30.57	
	NB 1 INCHES	SQ. Metres	11.56	
	NB 1.25 INCHES	SQ. Metres	9.48	
	NB 1.5 INCHES	SQ. Metres	31.70	
	NB 2 INCHES	SQ. Metres	12.15	
	NB 2.5 INCHES	SQ. Metres	0.22	
	NB 3 INCHES	SQ. Metres	26.51	
	NB 4 INCHES	SQ. Metres	7.62	
	NB 6 INCHES	SQ. Metres	65.58	
	NB 8 INCHES	SQ. Metres	57.48	
	NB 10 INCHES	SQ. Metres	2.38	
	NB 14 INCHES	SQ. Metres	27.66	
	NB 16 INCHES	SQ. Metres	27.60	
	NB 18 INCHES	SQ. Metres	2.87	
	PIPE SUPPORTS (LUMPSUM)	SQ. Metres	65.0	
6.1	Supply of primer, preparation of surfaces and application of primer, identification (Line numbering), lettering etc. as specified including rubdown and touch up of shop primer wherever required, labour, material, tools and tackles, consumables supervision etc. to complete the work in all respects as per Job spec., drawings and direction of Engineer-in-Charge for all types of insulated and un-insulated CS/LTCS/AS piping as specified including all pipes, fittings, flanges, supports, valves etc. Surface preparation by blast cleaning and application of first coat of primer (inorganic zinc silicate, F9) shall be done in fabrication yard prior to erection. The identification marks of the piping and joInts shall be noted before blasting and the same shall be transferred on primed surface with polyurethane paint (F2) or as per the instruction of Engineer-in-Charge.All joints (fabrication as well as erection joints) shall be left unpainted till hydro-testing.			

General Notes:-

1. Contractor is advised to read this document of SOQ in conjunction with the Scope of Work (Ref doc no: 9675-03-SOW-001) specification, drawings and vendor drawings (submitted by the manufacturer) referred in tender document for complete understanding of his scope for supply, erection, installation and modification, rectification, replacement work (as applicable), mechanical completion, assistance in commissioning, PGTR and handing over of CCR-1 unit.

Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
2. Quantity given above describes the system requirement for the purpose of progressive billing / Invoicing by the contractor for supply of bulk material / items, as stated in drawings and documents to perform construction, inspection, testing commissioning, and assistance in successful performance guarantee test run (by others) and facilitate handing over of acceptable system of CCR-1 to MRPL.				
3. Construction may add for the margins as required in the quantity and supply it to site to meet the construction / modification, replacement & rectification requirement at site. Construction Contractor and / or his sub- contractor(s) will be permitted to take back the surplus material / item supplied by him or his sub contractor(s) post approval from MRPL and after due reconciliation of the material and meeting all contractual commitments at site.				
4. Any other activity associated with respect to destruct & construct of CCR-1 not included in SOQ specifically, however, it is required to be performed by the construction contractor as defined in scope of work and the respective drawings included in the tender document".				
5.Construction activity on inspection and testing as applicable to respective discipline referring to drawings, specification and standards included in tender document.				
6. Contractor will provide assistance in commissioning and in successful performance guarantee test run of CCR-1 (by others) facilitate for handing over of acceptable system of CCR-1 to MRPL without any impact on quoted price and delivery.				
7.Gaskets for pre-commissioning and commissioning activities as required for the project is in scope of construction tender				
8.All bulk material supply by Construction Contractor.				

ATTACHMENT-1- MRPL-CCR1-SOQ- PIPING GASKET SUMMARY

ITEM DESCRIPTION	TOTAL QUANTITY (NOS.) (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
GASKET, 0.25 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER,TYPE 316 STAINLESS STEEL INNER RING, ASME B16.20, CL300, 4.5 MM THK,	2	4	6	
GASKET, 0.5 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20 , CL300, 4.5 MM THK, NOTE14	2	4	6	
GASKET, 0.5 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL150, 4.5 MM THK,	10	20	30	
GASKET, 0.5 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK,	2	4	6	
GASKET, 0.5 INCH, SPR.WND. SS 316 + Grafoil Filler , ASME B16.20 , RF, CL150, 4.5 MM THK,	1	2	3	
GASKET, 0.5 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK, NOTE5,15	2	4	6	
GASKET, 0.75 INCH, SPR.WND. + UNS N06600 WINDINGS, THERMICULITE® 835 FILLER, ASME B16.20, CL150, 4.5 MM THK, NOTE29	3	6	9	
GASKET, 0.75 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20 , CL300, 4.5 MM THK, NOTE14	27	54	81	
GASKET, 0.75 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL150, 4.5 MM THK,	41	82	123	
GASKET, 0.75 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK,	14	28	42	
GASKET, 0.75 INCH, SPR.WND. SS 316 + Grafoil Filler , ASME B16.20 , RF, CL150, 4.5 MM THK,	7	14	21	
GASKET, 0.75 INCH, SPR.WND. SS 316 + Grafoil Filler , ASME B16.20 , RF, CL150,WITH ISOLATION KIT , 4.5 MM THK,	1	2	3	
GASKET, 0.75 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK, NOTE5,15	6	12	18	
GASKET, 1 INCH, NONASBESTOS BS7531 GR X, ASME B16.21-ASME B16.5, CL150, FF, 2 MM THK,	6	12	18	
GASKET, 1 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20 , CL150, 4.5 MM THK, NOTE14	2	4	6	
GASKET, 1 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20 , CL300 , 4.5 MM THK, NOTE14	2	4	6	
GASKET, 1 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20 , CL300, 4.5 MM THK, NOTE14	22	44	66	
GASKET, 1 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20 , RF, , 4.5 MM THK,	1	2	3	
GASKET, 1 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL150, 4.5 MM THK,	29	58	87	
GASKET, 1 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK,	26	52	78	
GASKET, 1 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK, NOTE15,16	4	8	12	
GASKET, 1 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK, NOTE5,15	4	8	12	
GASKET, 1 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER,TYPE 316 STAINLESS STEEL INNER RING, ASME B16.20, CL300, 4.5 MM THK, NOTE	3	6	9	
GASKET, 1.5 INCH, NONASBESTOS BS7531 GR X, ASME B16.21-ASME B16.5, CL150, FF, 2 MM THK,	2	4	6	
GASKET, 1.5 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20 , CL300, 4.5 MM THK, NOTE14	14	28	42	
GASKET, 1.5 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL150, 4.5 MM THK,	34	68	102	
GASKET, 1.5 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK,	32	64	96	
GASKET, 1.5 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL150, 4.5 MM THK, NOTE5,15	1	2	3	
GASKET, 1.5 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK, NOTE5,15	1	2	3	
GASKET, 10 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK,	2	4	6	

ATTACHMENT-1- MRPL-CCR1-SOQ- PIPING GASKET SUMMARY

ITEM DESCRIPTION	TOTAL QUANTITY (NOS.) (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
GASKET, 10 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK, NOTE5,15	1	2	3	
GASKET, 14 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL150, 4.5 MM THK,	3	6	9	
GASKET, 16 INCH, SPR.WND. + UNS N06600 WINDINGS, THERMICULITE® 835 FILLER, ASME B16.20, CL150, 4.5 MM THK, NOTE29	2	4	6	
GASKET, 18 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER,TYPE 316 STAINLESS STEEL INNER RING, ASME B16.20, CL300, 4.5 MM THK, NOTE	2	4	6	
GASKET, 2 INCH, SPR.WND. + UNS N06600 WINDINGS, THERMICULITE® 835 FILLER, ASME B16.20, CL150, 4.5 MM THK, NOTE29	1	2	3	
GASKET, 2 INCH, SPR.WND. + UNS N06600 WINDINGS, THERMICULITE® 835 FILLER, ASME B16.20, CL150, 4.5 MM THK,WITH ISOLATION KIT , NOTE29	1	2	3	
GASKET, 2 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20 , CL300, 4.5 MM THK, NOTE14	16	32	48	
GASKET, 2 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL150, 4.5 MM THK,	35	70	105	
GASKET, 2 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK,	9	18	27	
GASKET, 2 INCH, SPR.WND. SS 316 + Grafoil Filler, ASME B16.20 , CL150, 4.5 MM THK,	2	4	6	
GASKET, 2 INCH, SPR.WND. SS 316 + Grafoil Filler, ASME B16.20 , CL300, WITH ISOLATION KIT, 4.5 MM THK,	1	2	3	
GASKET, 2 INCH, SPR.WND. SS 316 + Grafoil Filler, SS316 Inner ring, ASME B16.20, RF, CL150, 4.5 MM THK, NOTE	2	4	6	
GASKET, 2 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL150, 4.5 MM THK, NOTE3,5	1	2	3	
GASKET, 2 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL150, 4.5 MM THK, WITH ISOLATION KIT , NOTE3,5	1	2	3	
GASKET, 2 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL150, 4.5 MM THK, WITH ISOLATION KIT, NOTE3,5	4	8	12	
GASKET, 2 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK,	2	4	6	
GASKET, 2 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK, NOTE3,5	15	30	45	
GASKET, 2 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK, NOTE5,15	4	8	12	
GASKET, 2.5 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL150, 4.5 MM THK,	2	4	6	
GASKET, 20 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK, NOTE	1	2	3	
GASKET, 24 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK, NOTE	1	2	3	
GASKET, 3 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20 , CL300, 4.5 MM THK, NOTE14	16	32	48	
GASKET, 3 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL150, 4.5 MM THK,	15	30	45	
GASKET, 3 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK,	8	16	24	
GASKET, 3 INCH, SPR.WND. SS 316 + Grafoil Filler , ASME B16.20 , RF, CL300, 4.5 MM THK, NOTE	1	2	3	
GASKET, 3 INCH, SPR.WND. SS 316 + Grafoil Filler, ASME B16.20 , CL300, 4.5 MM THK,	2	4	6	
GASKET, 3 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20 , CL300, 4.5 MM THK, NOTE15	6	12	18	
GASKET, 3 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK,	1	2	3	
GASKET, 4 INCH, SPR.WND. + UNS N06600 WINDINGS, THERMICULITE® 835 FILLER, ASME B16.20, CL300, 4.5 MM THK,WITH ISOLATION KIT , NOTE29	2	4	6	
GASKET, 4 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL150, 4.5 MM THK,	5	10	15	

ATTACHMENT-1- MRPL-CCR1-SOQ- PIPING GASKET SUMMARY

ITEM DESCRIPTION	TOTAL QUANTITY (NOS.) (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
GASKET, 4 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK,	2	4	6	
GASKET, 4 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK, NOTE5,15	3	6	9	
GASKET, 6 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL150, 4.5 MM THK,	13	26	39	
GASKET, 6 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK,	2	4	6	
GASKET, 8 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20 , CL300, 4.5 MM THK, NOTE14	1	2	3	
GASKET, 8 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL150, 4.5 MM THK,	4	8	12	
GASKET, 8 INCH, SPR.WND. SS 304 + Grafoil Filler , ASME B16.20, CL300, 4.5 MM THK,	4	8	12	
GASKET, 8 INCH, SPR.WND. SS 316 + Grafoil Filler, ASME B16.20, RF, CL150, 4.5 MM THK, NOTE	1	2	3	
GASKET, 8 INCH, SPR.WND. SS 316 + Grafoil Filler, SS316 Inner ring, ASME B16.5, RF, CL300, 4.5 MM THK, NOTE	1	2	3	
GASKET, 8 INCH, SPR.WND. SS 316+VERMICULITE FILLER OR AMORPHOUS POLYSILICIC ACID FIBERS WITH TALC FILLER, ASME B16.20, CL300, 4.5 MM THK, NOTE5,15	4	8	12	

PMS NOTES-

3	Spiral wound gaskets used with taper bored flanges shall be furnished without inner rings.
5	All 316 stainless steel material shall have a 0.04% minimum carbon content
14	SS 304 Stainless Steel inner ring for all sizes
15	S 316 Stainless Steel inner ring for all sizes.
16	Fillet welds to pressure retaining components shall be ground to a smooth, concave contour.
29	All Alloy UNS N06600 material shall be supplied in annealed condition.

INSTRUMENTATION GASKET SUMMARY

ITEM DESCRIPTION	TOTAL QUANTITY (NOS.)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
GASKET, 0.50 INCH, SPR.WND. SS 304 + Grafoil Filler, ASME B16.20, CL.300#, 4.5 MM THK	30	60	90	
GASKET, 0.75 INCH, SPR.WND. + UNS N06600 WINDINGS, THERMICULITE® 835 FILLER, ASME B16.20, CL.150#, 4.5 MM THK	5	10	15	

GENERAL NOTES

NOTE 1-	ABOVE MENTIONED QUANTITIES ARE ON ACTUAL BASIS. CONSTRUCTION CONTRACTOR TO CONSIDER ADDITIONAL QUANTITY FOR ANY TYE OF TEMPERORY WORK INCLUDING HYDROTESTING

ATTACHMENT - 2 GENERAL NOTES (PMS)	
NOTE NO.	DETAIL
3	Spiral wound gaskets used with taper bored flanges shall be furnished without inner rings.
5	All 316 stainless steel material shall have a 0.04% minimum carbon content
14	SS 304 Stainless Steel inner ring for all sizes
15	S 316 Stainless Steel inner ring for all sizes.
16	Fillet welds to pressure retaining components shall be ground to a smooth, concave contour.
29	All Alloy UNS N06600 material shall be supplied in annealed condition.

ATTACHMENT - 3-SOQ (STUD BOLT) FOR MRPL-CCR1	DOCUMENT NUMBER	Rev
	9675-03-SOQ-002	2

S. NO.	DESCRIPTION	UNIT	QUANTITY (A)	SPARE (B)	TOTAL QUANTITY (C=A+B)	REMARKS
1	**STUD BOLT- PIPING**					
	M/C BOLT, BOLT:A307 GR.B, NUT:A563 GR.B, ASME B18.2, 0.5 X 65 MM LONG	Nos.	24	12	36	
	M/C BOLT, BOLT:A307 GR.B, NUT:A563 GR.B, ASME B18.2, 0.5 X 70 MM LONG		4	2	6	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B16/ A 194 GR.4, ASME B18.2, 0.5 X 65 MM LONG		12	6	18	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B16/ A 194 GR.4, ASME B18.2, 0.625 X 85 MM LONG		8	4	12	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B16/ A 194 GR.4, ASME B18.2, 0.75 X 110 MM LONG		48	24	72	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B16/ A 194 GR.4, ASME B18.2, 0.75 X 115 MM LONG		16	8	24	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B16/ A 194 GR.4, ASME B18.2, 1 X 135 MM LONG		16	8	24	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.5 X 55 MM LONG		108	54	162	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.5 X 65 MM LONG		288	144	432	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.5 X 70 MM LONG		80	40	120	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.5 X 80 MM LONG		8	4	12	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.625 X 110 MM LONG		8	4	12	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.625 X 75 MM LONG		336	168	504	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.625 X 85 MM LONG		136	68	204	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.625 X 90 MM LONG		304	152	456	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.625 X 95 MM LONG		8	4	12	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.75 X 100 MM LONG		108	54	162	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.75 X 110 MM LONG		244	122	366	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.75 X 115 MM LONG		16	8	24	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.75 X 120 MM LONG		12	6	18	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.75 X 90 MM LONG		152	76	228	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 0.875 X 140 MM LONG		72	36	108	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 1 X 135 MM LONG		36	18	54	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 1 X 160 MM LONG		32	16	48	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 1.25 X 205 MM LONG		24	12	36	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 GR.B7/ A 194 GR.2H, ASME B18.2, 1.5 X 230 MM LONG		24	12	36	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B16 / ASTM A 194 Grade 7, ASME B18.2, 0.5 X 65 MM LONG		8	4	12	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B16 / ASTM A 194 Grade 7, ASME B18.2, 0.625 X 75 MM LONG		12	6	18	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B16 / ASTM A 194 Grade 7, ASME B18.2, 1.25 X 195 MM LONG		48	24	72	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B8M Class 2/ ASTM A 194 Grade 8MA, ASME B18.2, 0.5 X 65 MM LONG		8	4	12	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B8M Class 2/ ASTM A 194 Grade 8MA, ASME B18.2, 0.5 X 70 MM LONG		4	2	6	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B8M Class 2/ ASTM A 194 Grade 8MA, ASME B18.2, 0.625 X 110 MM LONG		8	4	12	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B8M Class 2/ ASTM A 194 Grade 8MA, ASME B18.2, 0.625 X 75 MM LONG		24	12	36	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B8M Class 2/ ASTM A 194 Grade 8MA, ASME B18.2, 0.625 X 90 MM LONG		16	8	24	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B8M Class 2/ ASTM A 194 Grade 8MA, ASME B18.2, 0.75 X 115 MM LONG		24	12	36	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B8M Class 2/ ASTM A 194 Grade 8MA, ASME B18.2, 0.75 X 90 MM LONG		8	4	12	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B8M Class 2/ ASTM A 194 Grade 8MA, ASME B18.2, 0.875 X 140 MM LONG		48	24	72	
	STUD BOLTS WITH 2 NUTS, ASTM A 193 Grade B8M Class 2/ ASTM A 194 Grade 8MA, ASME B18.2, 1 X 230 MM LONG		16	8	24	
	STUD BOLTS WITH 2 NUTS, ASTM A193 Grade B16/ ASTM A194 Grade 7, ASME B18.2, 0.625 X 75 MM LONG		16	8	24	
	STUD BOLTS WITH 2 NUTS, ASTM A193 Grade B8M Class 2 / A194 Grade 8MA, ASME B18.2, 0.625 X 75 MM LONG		16	8	24	
	STUD BOLTS WITH 2 NUTS, ASTM A193 Grade B8M Class 2 / A194 Grade 8MA, ASME B18.2, 0.625 X 85 MM LONG		24	12	36	
	STUD BOLTS WITH 2 NUTS, ASTM A193 Grade B8M Class 2 / A194 Grade 8MA, ASME B18.2, 0.625 X 90 MM LONG		128	64	192	
2	**STUD BOLT- INSTRUMENTATION**					
	STUD BOLT WITH 2 NUTS, ASTM A193 GR.B7 / ASTM A194 GR.2H, ASME B18.2, 0.50 INCH X 65MM LONG	Nos.	30	15	45	
	STUD BOLT WITH 2 NUTS, ASTM A193 GR.B16 / ASTM A194 GR.4, ASME B18.2, 0.50 INCH X 65 MM LONG		10	5	15	

GENERAL NOTE

NOTE 1 - ABOVE MENTIONED QUANTITIES ARE ON ACTUAL BASIS. CONSTRUCTION CONTRACTOR TO CONSIDER ADDITIONAL QUANTITY FOR ANY TYE OF TEMPERORY WORK INCLUDING HYDROTESTING

ANNEXURE-3

MANGALORE REFINERY AND PETROCHEMICALS LIMITED

CONTINUOUS CATALYST REGENERATOR
CCR-1 REGENERATOR REVAMP PROJECT
AT MRPL, MANGALURU

SCHEDULE OF QUANTITY-PIPING (COMMON)

(Installation & Erection)

Rev.	Date	Description	Prpd.	Chkd.	Appd.
2	23-06-2021	ISSUED FOR INVITING BID	GBJ	MKL	NKJ
1	20-05-2021	ISSUED FOR INVITING BID	GBJ	MKL	NKJ
0	13-05-2021	ISSUED FOR INVITING BID	GBJ	MKL	NKJ

INSTALLATION SCOPE OF WORK
(Erection, Construction, Testing & Mechanical Completion)

Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
	PIPING-UNITS			
1.0	**PIPING (ABOVE GROUND) :** Taking delivery of all piping items (free issue material) from client warehouse to work site/work shop; spool fabrication including cleaning, cutting, edge preparation, (inclusive of grinding the edges of pipe, fittings, flanges etc. to match with the mating edges of uneven/different thickness wherever required); fitup, (health check of existing corroded pipe wall thickness for fitup with existing piping) bending, preheating wherever required, welding, threading, and laying of pipes of all types and thickness with supports over overhead on racks and at all elevations in existing structure of CCR-1 unit, connecting with existing / new equipment nozzles, inline valves, strainers, steam traps, line instruments, orifice assemblies, spray nozzles, rotameters, tappings for pressure gauges, thermowells, sample connections, springs etc. as per drawings / PIDs including fixing of gaskets, bolts, nuts wherever required & all other -fittings, like elbows, reducers, tees,vents, drains (but excluding reinforcing pads),construction & installation of rain caps at pipe ends, valves size upto 40 NB for drain & vent, alignment, cleaning & flushing by water/compressed air, hydrostatic, pneumatic, vacuum, and any other type of testing as specified draining, drying by compressed air, completing all such works in all respects, arranging tools & tackles, fabrication & manufacturing equipments, testing equipments, as required to carryout the above modification cum new piping fabrication & installation work as specified in Special Conditions of Contract) as per the specifications, drawings and instructions of Engineer-in-Charge. Contractor to return the surplus free issue materials and scrap etc to owner's storage points after reconciliation. Contractor shall refer Isometric drawing for the Butt Weld details. Rates for tubing (if any) shall include rates for valves, fittings, all in line instruments and testing etc. Carbon steel piping includes LTCS piping also.			
1.1	CARBON STEEL PIPING ;NON IBR			
	REFER ATTACHMENT- B FOR PIPE QUANTITY			
	FABRICATION (BUTT WELD)			
	NB UPTO 1.5 INCH	Inch Dia	769	
	NB 2 INCH - 6 INCH	Inch Dia	1664	
	NB 8 INCH TO 14 INCH	Inch Dia	850	
1.2	CARBON STEEL PIPING ; IBR			
	REFER ATTACHMENT- B FOR PIPE QUANTITY			
	FABRICATION (BUTT WELD)			
	NB UPTO 1.5 INCH	Inch Dia	338	
	NB 2 INCH - 6 INCH	Inch Dia	18	
1.3	CARBON STEEL PIPING ; H2			
	REFER ATTACHMENT- B FOR PIPE QUANTITY			
	FABRICATION (BUTT WELD)			
	NB UPTO 1.5 INCH	Inch Dia	319	
	NB 2 INCH - 6 INCH	Inch Dia	172	
	NB 8 INCH - 14 INCH	Inch Dia	307	
1.4	STAINLESS STEEL PIPING			
	REFER ATTACHMENT- B FOR PIPE QUANTITY			
	FABRICATION (BUTT WELD)			
	NB UPTO 1.5 INCH	Inch Dia	228	
	NB 2 INCH - 6 INCH	Inch Dia	68	
	NB 8 INCH - 14 INCH	Inch Dia	598	
1.5	LOW ALLOY STEEL PIPING ; H2			
	REFER ATTACHMENT- B FOR PIPE QUANTITY			
	FABRICATION (BUTT WELD)			
	NB UPTO 1.5 INCH	Inch Dia	3	
	NB 2 INCH - 6 INCH	Inch Dia	3	
	NB 18 INCH	Inch Dia	72	FOR PACKINOX
1.6	CARBON STEEL GALVANIZED			
	REFER ATTACHMENT- B FOR PIPE QUANTITY			
	FABRICATION (BUTT WELD)			
	NB UPTO 1.5 INCH	Inch Dia	134	

INSTALLATION SCOPE OF WORK
(Erection, Construction, Testing & Mechanical Completion)

Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
1.7	INCONEL PIPING			
	REFER ATTACHMENT- B FOR PIPE QUANTITY			
	FABRICATION (BUTT WELD)			
	NB UPTO 1.5 INCH	Inch Dia	12	
	NB UPTO 2 INCH	Inch Dia	8	
	NB 16 INCH - 24 INCH	Inch Dia	321	
2.0	**ERECTION & WELDING HOOK UP JOINTS:** Transportation of all piping items/pre-fabricated piping hook up spool from Owner's store/Contractor's work shop; erection of piping items/ prefabricated piping spool, including cutting (if reqd.),providing isolation blinds on existing line on both sides of the hook-up, making the line hydrocarbon free for welding, edge preparation of both ends of joint of hook up (inclusive of grinding the edges of pipe, fitting, flanges etc. to match with the mating edges of uneven/different thickness wherever required); alignment, fitup, preheating wherever reqd., welding, threading and providing hook up on existing line of all types and thickness at all elevation and fixing of proper gaskets, bolts, nuts including application of torque wherever reqd., performing Positive Material Identification (PMI) using alloy analysers wherever reqd., completing all hook up works in all respects as per specifications, drawings and instructions of Engineer-in-charge.			
2.1	For Utility Lines (Nitrogen, Instrument Air)			
	0.750 INCHES	Nos	8	
	1.000 INCHES	Nos	5	
	1.500 INCHES	Nos	2	
2.2	For Utility Lines (IBR)			
	1.000 INCHES	Nos	1	
	1.500 INCHES	Nos	2	
3.0	**VALVES :** Transportation of all types of valves (Including special & motor operated valves) from Owner's storage points to contractor's stores/worksite and installation of valves for all rating including assembly of valves accessories, if any, fixing of gaskets bolts/nuts wherever required and performing Positive Material Identification (PMI) using alloy analysers as per specification, drawings and directions of Engineer-in-Charge.			
	REFER ATTACHMENT- B FOR VALVE QUANTITY			
3.2	CONTROL VALVES (UPTO 600#)			
	REFER ATTACHMENT-A FOR THE CONTROL VALVES			
3.3	PRESS. RELIEF/ SAFETY VALVES, PILOT OP. SAFETY VALVES (UPTO 600#)(Size are valve inlet size)			
	REFER ATTACHMENT-A FOR THE PRESSURE SAFETY VALVES			
4.0	**EXPANSION JOINTS/BELLOWS :** Transportation of all types of Expansion Joints/Bellows from owner's storage points to contractor's stores/work site and installation/ assembly of expansion joints and fixing of gaskets, bolts&nuts wherever requiredas per drawings, specifications and directions of Engineer-in-charge. Contractor shall take precautions in unpacking the vendor supplied free issue items & its contractor responsibility to clean/remove dirt from items. Contractor shall notify the damage items/product to the Owner.			
4.1	METALLIC EXPANSION JOINTS			
	NB 14.000 INCHES	Nos	1	
5.0	**SPRING SUPPORT ASSEMBLIES :** Transportation of all types of spring support assemblies from Owner's storage points to contractor's stores/worksite and installation of spring support assemblies for all rating including assembly, if any, fixing of gaskets bolts/nuts, welding attachments wherever required and performing Positive Material Identification(PMI) using alloy analysers as per specification, drawings and directions of Engineer-in-Charge. Contractor to ensure that travel stops are removed and spring is locked in cold load position for Hydrotest. It shall be ensured that locking devices are removed and springs are properly set at hot load position during commissioning. Contractor shall take precautions in unpacking the vendor supplied free issue items & its contractor responsibility to clean/remove dirt from items. Contractor shall notify the damage items/product to the Owner.			
	NB 1.250 INCHES	Nos	1	
	NB 6.000 INCHES	Nos	4	
	NB 8.000 INCHES	Nos	6	
	NB 14.000 INCHES	Nos	1	
	NB 16.000 INCHES	Nos	4	

INSTALLATION SCOPE OF WORK
(Erection, Construction, Testing & Mechanical Completion)

Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
6.0	**REINFORCING PADS FOR PIPES :** Fabrication of reinforcing pads or wear pad for pipe connection wherever required shall cut from the parrent pipe and erection, fitup, welding & testing (including DP/MP) if required of the same as per the specifications, drawings and instructions of the Engineer-in-Charge. Note: Sizes mentioned for Reinforcing Pads are for pipe support or pipe branch			
6.1	C.S REINFORCING PADS			
	NB 2.000 INCHES	Nos	8	
	NB 3.000 INCHES	Nos	5	
	NB 4.000 INCHES	Nos	6	
	NB 6.000 INCHES	Nos	8	
	NB 8.000 INCHES	Nos	2	
	NB 14.000 INCHES	Nos	5	
6.2	S.S REINFORCING PADS			
	NB 2.000 INCHES	Nos	4	
	NB 8.000 INCHES	Nos	7	
6.3	INCONEL REINFORCING PADS			
	NB16.000 INCHES	Nos	4	
7.0	**ERECTION OF BLINDS/SPECTACLE BLINDS/SPACER & BLINDS ETC. :** Transportation from owner's storage point to work site, erection of blinds, spectacle blinds, spacers & blinds of all ratings from plate material of all thicknesses supplied by owner as free issue; cleaning, testing , wherever required bolts nuts & gaskets including supply of necessary equipment, consumables, labour etc as per standards / specifications, drawings and directions of Engineer-in-charge.			
7.1	CS 150# SPECTACLE BLINDS			
	NB 2.000 INCHES	Nos	2	
7.2	SS 300# SPECTACLE BLINDS			
	NB 2.000 INCHES	Nos	2	
7.3	LOW ALLOY 300# SPECTACLE BLINDS (H2)			
	NB 2.000 INCHES	Nos	1	
8.0	**REMOVAL AND MODIFICATION OF ERECTED PIPING(ABOVE GROUND) :** Removal of piping existing/ erected including SW valves for modification as required as per drawings/P&IDs/instructions of Engineer-in-charge at all elevations, including providing assistance to owner for draining, cleaning and purging of the lines to be removed, unbolting of flanged joints /cutting of pipe lines wherever required, installation of flanges and blind flanges, removal of insulation from insulated lines, removing supports, steam tracers, all fittings and flanges, instruments etc, cutting of pipes in appropriate length for transporting purposes, cleaning, flushing, drying and transporting all materials to storage point(within the complex battery limits) designated by Owner/TES including stacking of material and disposing of waste etc as instructed by Engineer-in-charge.			
8.1	C.S/A.S PIPING			
	NB 0.500 INCHES	Metres	3	
	NB 0.750 INCHES	Metres	46	
	NB 1.000 INCHES	Metres	66	
	NB 1.250 INCHES	Metres	80	
	NB 1.500 INCHES	Metres	40	
	NB 2.000 INCHES	Metres	63	
	NB 3.000 INCHES	Metres	65	
	NB 4.000 INCHES	Metres	160	
	NB 8.000 INCHES	Metres	4	
	NB14.000 INCHES	Metres	18	
8.2	S.S PIPING			
	NB 0.750 INCHES	Metres	21	
	NB 1.000 INCHES	Metres	50	
	NB 1.500 INCHES	Metres	4	
	NB 2.000 INCHES	Metres	40	
8.3	INCONEL PIPING			
	NB 1.000 INCHES	Metres	4	
	NB 2.000 INCHES	Metres	12	
	NB 4.000 INCHES	Metres	12	
	NB 6.000 INCHES	Metres	10	
	NB 16.000 INCHES	Metres	6	
9.0	**REMOVAL AND MODIFICATION OF ERECTED VALVES (ABOVE GROUND) :** Removal of all types and ratings of valves by unbolting, cutting etc. as required, cleaning by flushing with water/air etc. as required and transportation of the same to Owner's storage point (within thecomplex battery limits) and stacking as per drawings, demolish P&ID and directions of Engineer-in-charge.			

INSTALLATION SCOPE OF WORK
(Erection, Construction, Testing & Mechanical Completion)

Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
9.1	VALVES OTHER THAN CONTROL VALVES			
	NB 0.500 INCHES	Nos	6	
	NB 0.750 INCHES	Nos	72	
	NB 1.000 INCHES	Nos	27	
	NB 1.500 INCHES	Nos	9	
	NB 2.000 INCHES	Nos	13	
	NB 3.000 INCHES	Nos	13	
	NB 4.000 INCHES	Nos	5	
	NB 8.000 INCHES	Nos	1	
9.2	CONTROL VALVES (INCLUDING PSV)			
	REFER ATTACHMENT-A FOR THE CONTROL VALVE AND PSVs			
10.0	**STEAM TRACING WORKS** Scope of work includes the following, but not limited to the same. Contractor to erect or modify existing tracers, provide new steam tracing/condensate manifold or modify existing steam tracing/condensate manifold. Existing steam tracing/condensate manifold wherever parent lines are getting dismantled, contractor to isolate or modify all such lines to ensure connectivity of steam/condensate within the circuit. All such modification, blinding, hook-up with new/existing circuits is part of his scope. Lines wherever condensate manifolds are connected to condensate headers, all such line modifications, replacement or laying new line is part of this contract. In addition to this, all steam/condensate tracers connected to instruments and pipes having services like fuel gas, fuel oil, slurry circuits, main column bottoms etc wherever such modifications are envisaged, the same has to be made good and to suit to site has to be done. Contractor to refer drawings as a standard for supply & installation of tracer.			
10.1	SUPPLY			
10.2	PIPES (IBR)			
	1.5 INCHES AND BELOW	Metres	52	
10.3	FABRICATION			
	1.5 INCHES AND BELOW	Inch Dia	15	
10.1	SUPPLY			
10.2	PIPES (NON IBR)			
	0.500 INCH	Metres	190	
10.3	FABRICATION			
	0.500 INCH	Inch Dia	25	
11.0	**PIPE SUPPORTS :** Fabrication, erection (at all elevations) of pipe supports like shoes, cradles, Trunion and Wear pad (cut from pipe), Spring hangers, clamps(of all sizes/thicknesses manufactured by forming method using die), turn buckles, saddles, guides, special supports, pads(including corrosion pads & protection shields), providing and welding of stiffeners as per drawings, T post etc. of all types including supply and application one coat of primer, all necessary equipments, consumables, labour, and completing work as per drawings, specifications and instructions of Engineer-in-charge. Modifications/rectifications, if required; and adjustment/ alignment during precommisioning, commisioning as per the instructions of Engineer-in-charge.			
11.1	SS & C.S STRUCTURAL STEEL [U bolts with nuts, Clamp, Clamp shoes,pipe guides, Cross Guid with rods,T-supports plate & channel, Lug Support etc as applicable, shim/Base plate] (LUMPSUM)	MT	4	
12.0	**LOW FRICTION PADS:** Supply, fabrication and fixing of low friction pads with suitable bonding materials / fasteners, as specified in Drawings / Isometrics / Support Standard/ Special support sketches.			
12.1	TEFLON PAD WITH COMPRESSIVE STRENGTH (0.25 OFFSET) :1870 PSI	Cu. Metres	1.1	
12.2	GRAPHITE PAD WITH COMPRESSIVE STRENGTH : 2877 PSI	Cu. Metres	1.3	
13.0	**SCAFFOLDING :** Supply, installation of Scaffolding pipes of 40mm dia , clamps of sound construction and adequate strength at all elevations at all heights to make the work location safely accessible for carrying out the work , NDT inspection , make rigid platforms by installing gratings and secure firmly with wires to the scaffold pipes for the workers to work safely for dismantling activities, removal of insulation and to facilitate inspectors to carry out necessary inspection at various spots and locations as decided by EIC including installation of Aluminium ladders for the workers/inspectors to climb safely , removal of scaffolding and complete all works in all respects. Note: Contractor may have to retain the scaffolding till completion of visual inspection and NDT activities during shut down of the plant and till such time no extra payment will be made for retaining the scaffolding and removal of scaffolding also included in this item and no extra rate will be paid.	Cu. Metres	Lump Sum	

INSTALLATION SCOPE OF WORK
(Erection, Construction, Testing & Mechanical Completion)

Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
14.0	**PAINTING:** Supply of paints and primers, preparation of surfaces and application of primer and finish paints, including rubdown and touch up of shop primer wherever required, providing scaffolding for all heights, labor, material, tools and tackles, consumables, supervision etc. to complete the work in all respects as per MRPL job specification, EDB 0014 drawings and directions of engineer-in-charge for all types of un insulated piping and insulated piping as specified including all pipes, fittings, flanges, supports, valves etc. Surface preparation by blast cleaning and application of first coat of primer (inorganic zinc silicate,F9) shall be done in fabrication yard prior to erection. For insulated piping whereever blast cleaning with no primer application is specified , in such cases finish paints shall be applied in fabrication yard. The identification marks of the piping and joints shall be noted before blasting and the same shall be transferred on piping with polyurethane paint (F2)or as per the instructions of Engineer-in-charge.			
	NB 0.5 INCHES	SQ. Metres	13.95	
	NB 0.75 INCHES	SQ. Metres	30.57	
	NB 1 INCHES	SQ. Metres	11.56	
	NB 1.25 INCHES	SQ. Metres	9.48	
	NB 1.5 INCHES	SQ. Metres	31.70	
	NB 2 INCHES	SQ. Metres	12.15	
	NB 2.5 INCHES	SQ. Metres	0.22	
	NB 3 INCHES	SQ. Metres	26.51	
	NB 4 INCHES	SQ. Metres	7.62	
	NB 6 INCHES	SQ. Metres	65.58	
	NB 8 INCHES	SQ. Metres	57.48	
	NB 10 INCHES	SQ. Metres	2.38	
	NB 14 INCHES	SQ. Metres	27.66	
	NB 16 INCHES	SQ. Metres	27.60	
	NB 18 INCHES	SQ. Metres	2.87	
	PIPE SUPPORTS (LUMPSUM)	SQ. Metres	65.0	
14.1	Supply of primer, preparation of surfaces and application of primer, identification (Line numbering), lettering etc. as specified including rubdown and touch up of shop primer wherever required, labour, material, tools and tackles, consumables supervision etc. to complete the work in all respects as per Job spec., drawings and direction of Engineer-in-Charge for all types of insulated and un-insulated CS/LTCS/AS piping as specified including all pipes, fittings, flanges, supports, valves etc. Surface preparation by blast cleaning and application of first coat of primer (inorganic zinc silicate, F9) shall be done in fabrication yard prior to erection. The identification marks of the piping and joInts shall be noted before blasting and the same shall be transferred on primed surface with polyurethane paint (F2) or as per the instruction of Engineer-in-Charge.All joints (fabrication as well as erection joints) shall be left unpainted till hydro-testing.			
15.0	**HOT INSULATION :** Providing thermal insulation including supply of all insulating and ancillary materials, vapour barrier, weather protective coverings, consumables and other necessary materials , testing of materials as required, including transportation of materials to work site, duly inspected by 3rd party(Llyods/BV/DNV or any other Client approved party)at manufacturer's shop & sample check/inspection at site by TES Construction inspector, applying insulation on surfaces as specified including all preparatory work there on, binding, tying, lacing, stitching and/or otherwise securing , finishing with sheet cladding as per spec. , providing bolts, rivets, and self tapping screws wherever specified , providing inspection windows, end seals for flanges etc., colour coding and identification. Providing steel scaffolding, all tools , tackles , equipments etc. , labour, supervision and completing the work in all respect, at all heights as per drawings , specifications and instructions of Engineer-in-charge. (Refer Legend for applicable TES 9675-03-TS-003)			
15.1	INSULATION TYPE : IH & IT ; SURFACE MATERIAL : CS,SS & AS; INSULATION MATERIAL : ROCKWOOL, 128 DensityKg / Cu. M			
	PIPE & COMPONENTS			
	NB 0.5 INCH: THICKNESS 25 MM	Metres	1.08	
	NB 0.75 INCH: THICKNESS 25 MM	Metres	1.91	
	NB 0.75 INCH: THICKNESS 30 MM	Metres	7.90	
	NB 0.75 INCH: THICKNESS 45 MM	Metres	7.46	
	NB 0.75 INCH: THICKNESS 85 MM	Metres	1.01	
	NB 0.75 INCH: THICKNESS 100 MM	Metres	1.70	
	NB 1 INCH: THICKNESS 25 MM	Metres	14.49	
	NB 1 INCH: THICKNESS 35 MM	Metres	1.00	
	NB 1 INCH: THICKNESS 50 MM	Metres	1.00	
	NB 1.5 INCH: THICKNESS 25 MM	Metres	50.36	
	NB 1.5 INCH: THICKNESS 35 MM	Metres	48.13	
	NB 1.5 INCH: THICKNESS 50 MM	Metres	49.37	
	NB 1.5 INCH: THICKNESS 100 MM	Metres	0.37	
	NB 2 INCH: THICKNESS 25 MM	Metres	1.00	
	NB 2 INCH: THICKNESS 35 MM	Metres	1.00	
	NB 2 INCH: THICKNESS 55 MM	Metres	1.00	

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Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
	NB 3 INCH: THICKNESS 40 MM	Metres	4.39	
	NB 3 INCH: THICKNESS 130 MM	Metres	1.00	
	NB 4 INCH: THICKNESS 120 MM	Metres	1.00	
	NB 6 INCH: THICKNESS 40 MM	Metres	3.02	
	NB 6 INCH: THICKNESS 130 MM	Metres	4.20	
	NB 8 INCH: THICKNESS 135 MM	Metres	38.28	
	NB 16 INCH: THICKNESS 150 MM	Metres	17.78	
	NB 16 INCH: THICKNESS 175 MM	Metres	3.84	
	NB 18 INCH: THICKNESS 75 MM	Metres	2.00	
	NB 0.5 INCH: THICKNESS 25 MM	Metres	82.95	
	NB 0.5 INCH: THICKNESS 55 MM	Metres	113.95	
	NB 0.75 INCH: THICKNESS 25 MM	Metres	1.00	
	NB 2 INCH: THICKNESS 25 MM	Metres	1.00	
	NB 18 INCH: THICKNESS 75 MM	Metres	2.00	
15.2	INSULATION TYPE : IE; SURFACE MATERIAL : CS,SS & AS; INNER INSULATION MATERIAL : ROCKWOOL, OUTER POLYURETHANE FOAM/ POLYISOCYANURATE			
	PIPE & COMPONENTS			
	NB 0.75 INCH: THICKNESS 65 MM	Metres	1.00	
	NB 1 INCH: THICKNESS 65 MM	Metres	1.00	
	NB 1.5 INCH: THICKNESS 65 MM	Metres	1.00	
	NB 1.5 INCH: THICKNESS 75 MM	Metres	1.00	
	NB 2 INCH: THICKNESS 75 MM	Metres	50.84	
	NB 4 INCH: THICKNESS 85 MM	Metres	1.00	
	NB 6 INCH: THICKNESS 95 MM	Metres	3.60	
	NB 8 INCH: THICKNESS 85 MM	Metres	4.74	
	NB 8 INCH: THICKNESS 100 MM	Metres	38.51	
	NB 10 INCH: THICKNESS 100 MM	Metres	1.00	
15.3	INSULATION TYPE : IS ; SURFACE MATERIAL : CS,SS & AS; TEMPERATURE RANGE UPTO 350 DEG. C INSULATION MATERIAL : CELLULAR GLASS,			
	PIPE & COMPONENTS			
	NB 0.5 INCH: THICKNESS 25 MM	Metres	2.22	
	NB 0.75 INCH: THICKNESS 25 MM	Metres	7.86	
	NB 1 INCH: THICKNESS 25 MM	Metres	49.82	
	NB 1.5 INCH: THICKNESS 25 MM	Metres	70.25	
	NB 2 INCH: THICKNESS 25 MM	Metres	14.67	
	NB 2.5 INCH: THICKNESS 25 MM	Metres	0.20	
	NB 3 INCH: THICKNESS 25 MM	Metres	81.62	
	NB 4 INCH: THICKNESS 25 MM	Metres	10.55	
	NB 6 INCH: THICKNESS 25 MM	Metres	5.11	
	NB 8 INCH: THICKNESS 25 MM	Metres	33.70	
15.4	INSULATION TYPE : IS ; SURFACE MATERIAL : CS,SS & AS; TEMPERATURE RANGE UPTO 550 DEG. C INSULATION MATERIAL : ROCK WOOL			
	PIPE & COMPONENTS			
	NB 2 INCH: THICKNESS 75 MM	Metres	2	
16.0	**RESTRICTION ORIFICE :** Installation, testing and commissioning of Restriction Orifice including transportation to worksite & fixing in position at all columns and at other locations as per drawings specifications and direction of Engineer-InCharge. Replace Orifice plate Refer Instrument Hookup drawing (9675-24-09-A4-9001) and fabrication Isometrics for replacement of Orifice plate and retaining existing flanges			
	REFER ATTACHMENT-A FOR THE RESTRICTION ORIFICE			
16.1	Replace Orifice plate and retain existing flanges			
	REFER ATTACHMENT-A FOR THE ORIFICE PLATE REPLACEMENT			

INSTALLATION SCOPE OF WORK
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Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
17.0	**NDE EXAMINATION:** Performance of NDE inspection (AS PER NDE SPECIFICATION 9675-03-TS-006) on piping of all types & thicknesses including providing or hiring of all necessary equipment and whatever else even though not expressly mentioned but required to perform the work as per specifications and instructions of Engineer-in-Charge. Radiographs shall be submitted to the Engineer-in-charge. (Repeat Radiography due to defective radiograph on repaired joints due to Contractor's fault and for additional radiography necessitated due to poor performance of contractor's welders shall be done at contractor's cost) Note: Unit for radiography quantity is 'Nos of circumferencial weld joints'.			
	Refer the quantity of piping mentioned in Clause 1.0		LUMP SUM	
18.0	**HYDROTESTING :** Hydrotesting of the Piping System as per test pressure mentioned in Isometrics. Piping material as required for temporary work for hydro testing to perform as per instructions of Engineer-in-Charge.			
	Refer the quantity of piping mentioned in Clause 1.0		LUMP SUM	
19.0	**STRESS RELIEVING :** Carrying out stress relieving of weld joints on all types of piping as called for on shop/site fabricated already erected system including supply of all materials, consumables recording devices, insulation materials, instruments etc., providing all normal & special equipment and gadgets, skilled/unskilled labour, specialist, supervisory staff and completing the work in all respects as per specifications and instructions of Engineer-in-Charge. Repeat performace due to defective stress relieving or any other account shall be on Contractor's cost (Payment shall be done only after submission and approval of charts. Stress relieving shall be followed by measurement of hardness and no separate payment shall be made for this). Note: Unit for stress relieving quantity is 'Nos of circumferencial weld joints' Required for Hydrogen Service Alloy Steel (Cr-Mo)			
	NB 1.000 INCHES	Nos	4	
	NB 2.000 INCHES	Nos	4	
	NB 3.000 INCHES	Nos	2	
	NB 18.000 INCHES	Nos	4	FOR PACKINOX
20.0	**CHEMICAL CLEANING/PICKLING :** Cleaning and pickling of equipment/pipeline includng preparation of circulation loop, supply of temporary piping, pumps, heater coils, gaskets, thermometer, hydrometer, valve, test coupon, spares, laboratory facilities, with all accessories for conducting test, chemicals, safety accessories and also providing or hiring all necessary equipment and whatever else even though not expressly mentioned herein and in specificaions but required to perform the work as per specifications and instructions of Engineer-in-Charge.			
	Refer the quantity of SS & Alloy pipe mentioned in Clause 1.0			
21.0	**PRE-COMMISSIONING / COMMISSIONING ASSISTANCE :** Carrying out Pre-commissioning / Commissioning activities such as dropping the valves, control valves and spool pieces, air and water flushing and air-blasting, steam blowing, air drying, re-installing the valves, control valves and spool pieces, leak testing etc. as per pre-commissioning / commissioning specification/ procedure and instruction of Engineer-in-charge including supply of necessary hand tools, equipments/ machinery, consumables (electrodes, filler wire, gas, card board, target plate, scaffolding etc. wherever required) and with single point responsibility of Contractor's supervision.□			
	SKILLED	LUMPSUM		
	SEMI-SKILLED	LUMPSUM		
	UNSKILLED	LUMPSUM		
22.0	**COMMISSIONING AND POST COMMISSIONING:** Carrying out activities required during commissioning and post commissioning such as opening and box up of valves, instrumented valves & spool pieces wherever necessary, Attending leaks by tightening to the required torque/replacement of faulty gaskets where necessary, cleaning strainers/ filters in the pump/piping circuits, Topping up of bearing oil/seal oil in rotary equipments, hose connections/removal, opening and box-up of piping for connection & disconnection of Additive drums and their unloading into the system, replacement of burst rupture disks, Rechecking the alignment of rotating equipments, Providing assistance to Vendor's representative for equipment preparation/repair and any other similar activity as per the commissioning requirement as per the instruction of Engineer-in-charge including supply of necessary hand tools, equipment, consumable (scaffolding, electrodes, gas) and with single point responsibility of contractor's supervision.			
	SKILLED	LUMPSUM		
	SEMI-SKILLED	LUMPSUM		
	UNSKILLED	LUMPSUM		

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Sl. No.	DESCRIPTION	UOM	Quantity	Remarks
23.0	**HYDRO JET CLEANING :** Hydro jet cleaning of mill scale, rust, foreign material, grease etc from inside of the erected piping with 20000 PSI Hydro jetting machine, power lance and other accessories as per requirement. All the works required for carrying out the hydro jetting like dropping of valves, plugging of open ends, dewatering to nearest storm water drain etc, complete as per drawings, specifications and Instructions of Engineer In-charge.	LUMPSUM		

General Notes:-

1. Contractor is advised to read this document of SOQ in conjunction with the Scope of Work (Ref doc no: 9675-03-SOW-001) specification, drawings and vendor drawings (submitted by the manufacturer) referred in tender document for complete understanding of his scope for supply, erection, installation and modification, rectification, replacement work (as applicable), mechanical completion, assistance in commissioning, PGTR and handing over of CCR-1 unit.

2. Quantity given above describes the system requirement for the purpose of progressive billing / Invoicing by the contractor for supply of bulk material / items, as stated in drawings and documents to perform construction, inspection, testing commissioning, and assistance in successful performance guarantee test run (by others) and facilitate handing over of acceptable system of CCR-1 to MRPL.

3. Construction may add for the margins as required in the quantity and supply it to site to meet the construction / modification, replacement & rectification requirement at site. Construction Contractor and / or his sub- contractor(s) will be permitted to take back the surplus material / item supplied by him or his sub contractor(s) post approval from MRPL and after due reconciliation of the material and meeting all contractual commitments at site.

4. Any other activity associated with respect to destruct & construct of CCR-1 not included in SOQ specifically, however, it is required to be performed by the construction contractor as defined in scope of work and the respective drawings included in the tender document".

5.Construction activity on inspection and testing as applicable to respective discipline referring to drawings, specification and standards included in tender document.

6. Contractor will provide assistance in commissioning and in successful performance guarantee test run of CCR-1 (by others) facilitate for handing over of acceptable system of CCR-1 to MRPL without any impact on quoted price and delivery.

7. Piping material as required for temporary work such as hydro testing and purging loops etc during pre commissioning shall be supplied by the Construction Contractor

ATTACHMENT-A-INSTRUMENT TYPE LIST						
S.NO.	INSTRUMENT TYPE	TAG NUMBER	LINE NUMBER	STATUS	DATASHEET	REMARKS
1	CONTROL VALVE	FV-24909	1-1/2"P-242327-B1A1(A1A1)-IS	NEW	9675-09-DS-CV-9003	
2	CONTROL VALVE	FV-24379	2"IA-24005-PR8-IT	REPLACE	9675-09-DS-CV-9003	
3	CONTROL VALVE	FV-24380	1-1/2"IA-242003-PR8	REPLACE	9675-09-DS-CV-9003	
4	CONTROL VALVE	FV-24482	1"IA-242006-PR8	REPLACE	9675-09-DS-CV-9003	
5	CONTROL VALVE	TV-24373	TBA	REPLACE	9675-09-DS-CV-9003	
6	CONTROL VALVE	FV-24922	1"-P-242307-B2A1-IH	NEW	9675-09-DS-CV-9003	
7	CONTROL VALVE	FV-24914	1"LC-242301-MS-11(A2A)-IS	NEW	9675-09-DS-CV-9003	
8	CONTROL VALVE	FV-24915	3"P-242310-B1A1(A1A1)-IS	NEW	9675-09-DS-CV-9003	
9	CONTROL VALVE	TV-24922	8"P-242302-B1A1(A1A1)-IH	NEW	9675-09-DS-CV-9003	
10	CONTROL VALVE	TV-24926	3"P-242330-B1A1(A1A1)-IH	NEW	9675-09-DS-CV-9003	
11	CONTROL VALVE	FV-24396	2"-P-242339-B1A1(A1A1)-IS	NEW	9675-09-DS-CV-9003	
12	CONTROL VALVE	PDV-24354	3/4"NG-242025-PR8	REPLACE	9675-09-DS-CV-9003	
13	CONTROL VALVE	PV-24390	3"P-242323-B1A1(A1A1)-IS	REPLACE	9675-09-DS-CV-9003	
14	PRESSURE SAFETY VALVE	PSV-24052	1"P-242005-B2A1-IT	REPLACE	9675-09-DS-PSV-9002	
15	PRESSURE SAFETY VALVE	PSV-24059	TBA	REPLACE	TBA	
16	PRESSURE SAFETY VALVE	PSV-24063	TBA	REPLACE	TBA	
17	PRESSURE SAFETY VALVE	PSV-24921	HOLD	NEW	TBA	
18	PRESSURE SAFETY VALVE	PSV-24922	HOLD	NEW	TBA	
19	PRESSURE SAFETY VALVE	PSV-24057	6"P-242308-B1A1(A1A1)-IS	REPLACE	9675-09-DS-PSV-9002	
20	PRESSURE SAFETY VALVE	PSV-24056A	2"P-242318-B1A1(A1A1)-IS	REPLACE	9675-09-DS-PSV-9002	
21	PRESSURE SAFETY VALVE	PSV-24056B	2"P-242360-B1A1(A1A1)-IS	NEW	9675-09-DS-PSV-9002	
22	PRESSURE SAFETY VALVE	PSV-24062A	3"(H)P-242325-B1A1(A1A1)	NEW	TBA	
23	PRESSURE SAFETY VALVE	PSV-24062B	3"(H)P-242357-B1A1(A1A1)-IS	NEW	TBA	
24	PRESSURE SAFETY VALVE	PSV-24901A	6"(H)P-242351-B1A1(A1A1)	NEW	TBA	
25	PRESSURE SAFETY VALVE	PSV-24901B	6"(H)P-242353-B1A1(A1A1)	NEW	TBA	
26	FLOW ELEMENT - ORIFICE	FE-24395	TBA	REPLACE	9675-09-DS-FE-9019A	
27	RESTRICTION ORIFICE	FO-24003	1-1/2"P-242005-B2A1-IT	REPLACE	9675-09-DS-RO-9019B	
28	RESTRICTION ORIFICE	FO-24004	1"NG-242003-PR8	REPLACE	9675-09-DS-RO-9019B	
29	RESTRICTION ORIFICE	FO-24005	1"P-242002-B1A1-IT	REPLACE	9675-09-DS-RO-9019B	
30	RESTRICTION ORIFICE	FO-24017	3/4"P-242004-B2A1-IT	REPLACE	9675-09-DS-RO-9019B	
31	RESTRICTION ORIFICE	FO-24019A	1"P-242329-B1A1(A1A1)	REPLACE	9675-09-DS-RO-9019B	
32	RESTRICTION ORIFICE	FO-24019B	1"P-242326-B1A1(A1A1)	REPLACE	9675-09-DS-RO-9019B	
33	RESTRICTION ORIFICE	FO-24022	1"P-242068-B2A1-IT	REPLACE	9675-09-DS-RO-9019B	
34	FLOW ELEMENT - ORIFICE	FE-24304	1-1/2"NG-242003-PR8	REPLACE	9675-09-DS-FE-9019A	
35	FLOW ELEMENT - ORIFICE	FE-24308	1"P-242014-PR8	REPLACE	9675-09-DS-FE-9019A	
36	FLOW ELEMENT - ORIFICE (WITH FLANGES)	FE-24313	2"P-242003-B2A1-IT	REPLACE	9675-09-DS-FE-9019A	
37	FLOW ELEMENT - ORIFICE	FE-24318	1"P-242011-PR8	REPLACE	9675-09-DS-FE-9019A	
38	FLOW TRANSMITTER - ORIFICE METER RUN	FT-24480	1"P-242068-B2A1-IT	REPLACE	9675-09-DS-FT-9024	
39	FLOW ELEMENT - ORIFICE (WITH METER RUN)	FE-24909	1-1/2"P-242327-B1A1(A1A1)-IS	NEW	9675-09-DS-FT-9024	
40	FLOW ELEMENT - ORIFICE (WITH FLANGES)- DUAL TAP	FE-24910	1-1/2"P-242066-PR8-IS	NEW	9675-09-DS-FE-9019A	
41	RESTRICTION ORIFICE	FO-24025	16"P-242022-PR5-IH	REPLACE	9675-09-DS-RO-9019B	
42	FLOW TRANSMITTER - ORIFICE METER RUN	FT-24397	3/4"NG-242008-PR8	REPLACE	9675-09-DS-FT-9024	
43	RESTRICTION ORIFICE	RO-24921	1.5"PA-4249762-A1A1	NEW	TBA	
44	FLOW ELEMENT - ORIFICE	FE-24379	2"IA-24005-PR8-IT	REPLACE	9675-09-DS-FE-9019A	
45	FLOW ELEMENT - ORIFICE	FE-24380	1-1/2"IA-242003-PR8	REPLACE	9675-09-DS-FE-9019A	
46	FLOW ELEMENT - ORIFICE	FE-24482	1-1/2"IA-242006-PR8	REPLACE	9675-09-DS-FE-9019A	
47	RESTRICTION ORIFICE	FO-24011	1-1/2"P-242046-B2A1-~~IT~~	REPLACE	9675-09-DS-RO-9019B	
48	RESTRICTION ORIFICE	FO-24012	1"NG-242021-PR8	REPLACE	9675-09-DS-RO-9019B	
49	RESTRICTION ORIFICE	FO-24013	1"P-242047-B2A1-IT	REPLACE	9675-09-DS-RO-9019B	
50	RESTRICTION ORIFICE	FO-24014	1"P-242067-B2A1-IH	REPLACE	9675-09-DS-RO-9019B	
51	RESTRICTION ORIFICE	FO-2430A	FA-2455	REPLACE	9675-09-DS-RO-9019B	
52	RESTRICTION ORIFICE	FO-2430B	FA-2455	REPLACE	9675-09-DS-RO-9019B	
53	FLOW TRANSMITTER - ORIFICE METER RUN	FT-24341	3/4"NG-242018-PR8	REPLACE	9675-09-DS-FT-9024	
54	FLOW ELEMENT - ORIFICE	FE-24342	1"P-242045-PR8	REPLACE	9675-09-DS-FE-9019A	
55	FLOW ELEMENT - ORIFICE	FE-24344	1-1/2"NG-242020-PR8	REPLACE	9675-09-DS-FE-9019A	
56	FLOW ELEMENT - ORIFICE (WITH FLANGES)- DUAL TAP	FE-24346	1-1/2"P-242067-B2A1-IH	REPLACE	9675-09-DS-FE-9019A	
57	FLOW ELEMENT - ORIFICE	FE-24348	1"P-242053-PR8	REPLACE	9675-09-DS-FE-9019A	

ATTACHMENT-A-INSTRUMENT TYPE LIST						
S.NO.	INSTRUMENT TYPE	TAG NUMBER	LINE NUMBER	STATUS	DATASHEET	REMARKS
58	FLOW TRANSMITTER - ORIFICE METER RUN	FT-24394	3/4"NG-242022-PR8	REPLACE	9675-09-DS-FT-9024	
59	FLOW ELEMENT - ORIFICE (WITH METER RUN)	FE-24922	1"-P-242307-B2A1-IH	NEW	9675-09-DS-FT-9024	
60	FLOW ELEMENT - ORIFICE (WITH FLANGES)	FE-24915	3"P-242310-B1A1(A1A1)-IS	NEW	9675-09-DS-FE-9019A	
61	RESTRICTION ORIFICE	FO-24024A	1"P-242301-B2A1(B2A1)	REPLACE	9675-09-DS-RO-9019B	
62	RESTRICTION ORIFICE	FO-24024B	1"P-242328-B2A1(B2A1)	REPLACE	9675-09-DS-RO-9019B	
63	FLOW ELEMENT - ORIFICE (WITH FLANGES)	FE-24396	4"P-242339-B1A1(A1A1)-IS	REPLACE	9675-09-DS-FE-9019A	

ATTACHMENT- B- QUANTITY FOR PIPE AND VALVES		
ITEM DESCRIPTION	**Total Qty Pipe-meters others- numbers**	**REMARKS**
PIPE, 0.25 INCH, ASTM A106 GR.B, ASME B36.10M, PE, , SEAMLESS, S80,	1	
PIPE, 0.5 INCH, ASTM A 312 GR TP316, ASME B36.19M, PE, , SEAMLESS, 80S, , NOTE5	13	
PIPE, 0.5 INCH, ASTM A106 GR.B, ASME B36.10M, PE, , SEAMLESS, S80,	191.1	
PIPE, 0.5 INCH, ASTM A312 GR. TP 316, ASME B36.19, PE, , SEAMLESS, 80S,	7	
PIPE, 0.50 INCH, ASTM A106 GR.B, ASME B36.10, PE, , SEAMLESS, S80,	1	
PIPE, 0.50 INCH, ASTM A106 GR.B, H2, ASME B36.10M, PE, , SEAMLESS, S80, H2	1.5	
PIPE, 0.75 INCH, ASTM A 106 GR.B,H2, ASME B36.10, PE, , SEAMLESS, S160, H2	0.2	
PIPE, 0.75 INCH, ASTM A 312 GR TP316, ASME B36.19M, PE, , SEAMLESS, 80S, , NOTE5	62.2	
PIPE, 0.75 INCH, ASTM A106 GR.B, ASME B36.10, PE, , SEAMLESS, S80,	29.25	
PIPE, 0.75 INCH, ASTM A106 GR.B, ASME B36.10M, PE, , SEAMLESS, S80,	117.55	
PIPE, 0.75 INCH, ASTM A106 GR.B, H2, ASME B36.10M, PE, , SEAMLESS, S80, H2	105.5	
PIPE, 0.75 INCH, ASTM A106 GR.B,IBR, ASME B36.10M, PE, , SEAMLESS, S80, IBR, NOTE2	27.5	
PIPE, 0.75 INCH, ASTM A312 GR. TP 316, ASME B36.19, PE, , SEAMLESS, 80S,	2.65	
PIPE, 0.75 INCH, ASTM B167 N06600, ASME B36.19M, PE, , SEAMLESS, 40S,	2.4	
PIPE, 1 INCH, ASTM A 312 GR TP316, ASME B36.19M, PE, , SEAMLESS, 80S, , NOTE5	0.2	
PIPE, 1 INCH, ASTM A 312 GR. TP 304, ASME B36.19, PE, , SEAMLESS, 40S,	0.15	
PIPE, 1 INCH, ASTM A106 GR.B, ASME B36.10, PE, , SEAMLESS, S80,	1.7	
PIPE, 1 INCH, ASTM A106 GR.B, ASME B36.10M, PE, , SEAMLESS, S80,	14	
PIPE, 1 INCH, ASTM A106 GR.B, H2, ASME B36.10M, PE, , SEAMLESS, S80, H2	21.2	
PIPE, 1 INCH, ASTM A106 GR.B,IBR, ASME B36.10M, PE, , SEAMLESS, S80, IBR, NOTE2	50.25	
PIPE, 1 INCH, IS-1239 (GALV.), , SCRM, , WELDED, HVY,	20.9	
PIPE, 1.25 INCH, ASTM A 106 GR B, H2, ASME B36.10M, BE, , SEAMLESS, S80, H2, NOTE20	71.5	
PIPE, 1.5 INCH, ASTM A 106 GR B, H2, ASME B36.10M, BE, , SEAMLESS, S80, H2, NOTE20	56.1	
PIPE, 1.5 INCH, ASTM A 312 GR TP316, ASME B36.19M, PE, , SEAMLESS, 80S, , NOTE5	0.4	
PIPE, 1.5 INCH, ASTM A106 GR.B, ASME B36.10, PE, , SEAMLESS, S80,	28.9	
PIPE, 1.5 INCH, ASTM A106 GR.B, ASME B36.10M, PE, , SEAMLESS, S80,	24.8	
PIPE, 1.5 INCH, ASTM A106 GR.B, H2, ASME B36.10M, PE, , SEAMLESS, S80, H2	4.4	
PIPE, 1.5 INCH, ASTM A106 GR.B,IBR, ASME B36.10M, PE, , SEAMLESS, S80, IBR, NOTE2	134.7	
PIPE, 1.5 INCH, IS-1239 (GALV.), IS-1239, SCRM, , WELDED, HVY,	42.5	

ATTACHMENT- B- QUANTITY FOR PIPE AND VALVES		
ITEM DESCRIPTION	**Total Qty Pipe- meters others- numbers**	**REMARKS**
PIPE, 10 INCH, ASTM A106 GR.B, ASME B36.10M, BE, , SEAMLESS, S20,	2.4	
PIPE, 14 INCH, ASTM A106 GR.B, ASME B36.10M, BE, , SEAMLESS, S20,	17.7	
PIPE, 16 INCH, ASTM B168 N06600, ASME B36.19M, BE, , EFW, 10S,	13.7	
PIPE, 18 INCH, ASTM A 691 Grade 1 1/4 Cr Class 22, PWHT, ASME B36.19M, BE, , WELDED, , H2, NOTE	2	
PIPE, 2 INCH, ASTM A 312 GR TP316, ASME B36.19M, BE, , SEAMLESS, 80S, , NOTE4,5,13	50.1	
PIPE, 2 INCH, ASTM A106 GR.B, ASME B36.10, BE, , SEAMLESS, S40,	1.2	
PIPE, 2 INCH, ASTM A106 GR.B, ASME B36.10, BE, , SEAMLESS, S80,	0.1	
PIPE, 2 INCH, ASTM A106 GR.B, ASME B36.10M, BE, , SEAMLESS, S80,	29.7	
PIPE, 2 INCH, ASTM A106 GR.B, H2, ASME B36.10M, BE, , SEAMLESS, S80, H2	11.8	
PIPE, 2 INCH, ASTM B167 N06600, ASME B36.19M, BE, , SEAMLESS, 40S, , NOTE	0.2	
PIPE, 3 INCH, ASTM A106 GR.B, ASME B36.10M, BE, , SEAMLESS, S40,	77.9	
PIPE, 3 INCH, ASTM A312 GR.TP304H, ASME B36.19M, BE, , SEAMLESS, 40S,	0.5	
PIPE, 4 INCH, ASTM A 106 GR B, H2, ASME B36.10M, BE, , SEAMLESS, S80, H2, NOTE20	1.9	
PIPE, 4 INCH, ASTM A106 GR.B, ASME B36.10, BE, , SEAMLESS, S40,	1.2	
PIPE, 4 INCH, ASTM A106 GR.B, ASME B36.10M, BE, , SEAMLESS, S40,	14.8	
PIPE, 6 INCH, ASTM A 106 GR B, H2, ASME B36.10M, BE, , SEAMLESS, S80, H2, NOTE20	0.5	
PIPE, 6 INCH, ASTM A 312 GR TP316, ASME B36.19M, BE, , SEAMLESS, 40S, , NOTE5	7.8	
PIPE, 6 INCH, ASTM A106 GR.B, ASME B36.10, BE, , SEAMLESS, S40,	1.2	
PIPE, 6 INCH, ASTM A106 GR.B, ASME B36.10M, BE, , SEAMLESS, S40,	102.3	
PIPE, 6 INCH, ASTM A106 GR.B, H2, ASME B36.10M, BE, , SEAMLESS, S40, H2, NOTE	2	
PIPE, 6 INCH, ASTM A106 GR.B, H2, ASME B36.10M, BE, , SEAMLESS, S40, H2, NOTE	2	
PIPE, 8 INCH, ASTM A 106 GR B, H2, ASME B36.10M, BE, , SEAMLESS, S80, H2, NOTE20	1.8	
PIPE, 8 INCH, ASTM A 312 GR TP316, ASME B36.19M, BE, , SEAMLESS, 40S, , NOTE5	61.3	
PIPE, 8 INCH, ASTM A106 GR.B, ASME B36.10, BE, , SEAMLESS, S20,	5.6	
PIPE, 8 INCH, ASTM A106 GR.B, ASME B36.10M, BE, , SEAMLESS, S20,	30.4	
PIPE, 8 INCH, ASTM A106 GR.B, H2, ASME B36.10M, BE, , SEAMLESS, S40, H2	26.5	
PIPE, 8 INCH, ASTM B168 N06600, ASME B36.19M, BE, , EFW, 10S, , NOTE	3.6	
SPECIAL CHECK VALVE, 1 INCH, SPRING LOADED, BRASS BAR STOCK BODY WITH BUNA N SEAL. CIRCLE SEAL-249B-XPP, SCRF,3000	1	
BALL VALVE, 1 INCH, ASTM A351 GR CF8M,BODY/BONNET,TYPE 316 OR TYPE 317 STAINLESS STEEL BALL & SEAL,CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING, WITH BRAIDED ANTI-EXTRUSION RINGS PACKING,HANDWHEEL OPERATED (MANUAL),SHEET- 54404, ASME B16.34, RF, CL300, H2, NOTE8,16	1	

ATTACHMENT- B- QUANTITY FOR PIPE AND VALVES		
ITEM DESCRIPTION	**Total Qty Pipe-meters others- numbers**	**REMARKS**
BALL VALVE, 1 INCH, ASTM A351 GR CF8M,BODY/BONNET,TYPE 316 OR TYPE 317 STAINLESS STEEL BALL & SEAL,CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING, WITH BRAIDED ANTI-EXTRUSION RINGS PACKING,HANDWHEEL OPERATED (MANUAL),SHEET- 54404, ASME B16.34, RF, CL300, FB , H2, NOTE8,16	1	
BALL VALVE, 1 INCH, ASTM A351/A351M GRADE CF8M, FULL PORT, STELLITE, OR 316 STAINLESS STEEL WITH STELLITE OVERLAY, OR 316 STAINLESS, SHEET-54490 STEEL WITH METALLURGICALLY BONDED ABRASION RESISTANT COATING., ASME B16.34, RF, CL300,	2	
BALL VALVE, 1.5 INCH, ASTM A105/SH,BB,OS&Y, SHEET-54306, ASME B16.10, RF, CL150,	4	
BALL VALVE, 2 INCH, ASTM A351 GR CF8M BODY/BONNET, BALL : STELLITE, OR 316 STAINLESS STEEL WITH STELLITE OVERLAY, OR 316 STAINLESS STEEL WITH METALLURGICALLY BONDED ABRASION RESISTANT COATING, SEATS: STELLITE, OR 316 STAINLESS STEEL WITH STELLITE OVERLAY (1/16 INCH (1.6 MM) THICK MINIMUM) OR 316 STAINLESS STEEL WITH METALLURGICALLY BONDED ABRASION	1	
BALL VALVE, 2 INCH, ASTM A351/A351M GRADE CF8M, FULL PORT, STELLITE, OR 316 STAINLESS STEEL WITH STELLITE OVERLAY, OR 316 STAINLESS, SHEET-54490 STEEL WITH METALLURGICALLY BONDED ABRASION RESISTANT COATING., ASME B16.34, RF, CL300, NOTE	1	
CHECK VALVE, 0.75 INCH, ASTM A 105/13CR, BC, LIFT SHEET 53001, BS-5352, SW, 800,	2	
CHECK VALVE, 4 INCH, ASTM A216 GR.WCB/SH,BC,SWING, SHEET-53301, ASME B16.10, RF, CL150,	1	
GATE VALVE, 0.5 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51001, API 602, SW, 800,	4	
GATE VALVE, 0.5 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51004, API 602, SW, 800, H2	6	
GATE VALVE, 0.5 INCH, ASTM A105/SH,BB,OS&Y, SHEET-51001, API 602, SW, 800,	8	
GATE VALVE, 0.75 INCH, ASTM A 105/13CR, BB, OS&Y.IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	1	
GATE VALVE, 0.75 INCH, ASTM A 182 GR F316 BODY/BONNET, 316 STAINLESS STEEL TRIM, HARDFACED SEATS,OS&Y, BOLTED BONNET, CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING WITH BRAIDED ANTI-EXTRUSION RINGS, SHEET-51061, API 602, SW, 800, NOTE5	10	
GATE VALVE, 0.75 INCH, ASTM A105 /13CR BB,OS&Y, IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	20	
GATE VALVE, 0.75 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51001, API 602, SW, 800,	11	
GATE VALVE, 0.75 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51004, API 602, SW, 800, H2	26	
GATE VALVE, 0.75 INCH, ASTM A105/SH,BB,OS&Y, SHEET-51001, API 602, SW, 800,	64	
GATE VALVE, 0.75 INCH, ASTM A182 GR. F316/TRIM SH, SHEET 51061, API 602, SW, 800, NOTE	5	
GATE VALVE, 0.75 INCH, B166 N06600/HF ,BB, OS&Y, SHEET 51076, Copper Fig. No. 101X or equal , SW, 800,	4	
GATE VALVE, 1 INCH, ASTM A 105/13CR, BB, OS&Y.IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	5	
GATE VALVE, 1 INCH, ASTM A105 /13CR BB,OS&Y, IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	4	
GATE VALVE, 1 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51001, API 602, SW, 800,	1	
GATE VALVE, 1 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51004, API 602, SW, 800, H2	7	
GATE VALVE, 1 INCH, ASTM A105/SH,BB,OS&Y, SHEET-51001, API 602, SW, 800,	4	

ATTACHMENT- B- QUANTITY FOR PIPE AND VALVES		
ITEM DESCRIPTION	**Total Qty Pipe-meters others- numbers**	**REMARKS**
GATE VALVE, 1 INCH, ASTM A182 GR. F304/TRIM SS304, SHEET 51045, API 602, SW, 800,	1	
GATE VALVE, 1 INCH, BODY-ASTM A 105,TRIM-13% CR.STEEL,3000, B-1.20.1, SHT NO.- 51024, API 602/ ISO 15761, SCRF, 800,	12	
GATE VALVE, 1.5 INCH, ASTM A 105/13CR, BB, OS&Y.IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	1	
GATE VALVE, 1.5 INCH, ASTM A 182 GR F316 BODY/BONNET, 316 STAINLESS STEEL TRIM, HARDFACED SEATS,OS&Y, BOLTED BONNET, CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING WITH BRAIDED ANTI-EXTRUSION RINGS, SHEET-51061, API 602, SW, 800, NOTE5	2	
GATE VALVE, 1.5 INCH, ASTM A105 /13CR BB,OS&Y, IBR, SHEET 51002, API 602, SW, 800, IBR, NOTE2	1	
GATE VALVE, 1.5 INCH, ASTM A105 /SH BB,OS&Y, SHEET 51001, API 602, SW, 800,	1	
GATE VALVE, 1.5 INCH, ASTM A105/SH,BB,OS&Y, SHEET-51001, API 602, SW, 800,	9	
GATE VALVE, 2 INCH, ASTM A216 GR. WCB /SH BB,OS&Y, SHEET 51301, ASME B16.10, RF, CL150,	3	
GATE VALVE, 2 INCH, ASTM A216 GR.WCB/SH BB,OS&Y, SHEET 51404, ASME B16.10, RF, CL300, H2	2	
GATE VALVE, 2 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,	3	
GATE VALVE, 2 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150, FB, WITH LOCKING ARRANGEMENT	1	
GATE VALVE, 2 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,FB, WITH LOCKING ARRANGEMENT	2	
GATE VALVE, 3 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,	4	
GATE VALVE, 3 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,FB, WITH LOCKING ARRANGEMENT	1	
GATE VALVE, 6 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,	1	
GATE VALVE, 6 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-51301, ASME B16.10, RF, CL150,FB, WITH LOCKING ARRANGEMENT	5	
GATE VALVE, 8 INCH, ASTM A216 GR. WCB /SH BB,OS&Y, SHEET 51301, ASME B16.10, RF, CL150,	1	
GLOBE VALVE, 0.25 INCH, ASTM A105/SH,BB,OS&Y, SHEET-52001, BS-5352, SW, 800,	1	
GLOBE VALVE, 0.5 INCH, ASTM A 182 GR F316 BODY/BONNET, 316 STAINLESS STEEL TRIM, HARD FACED SEAT,OS&Y, BOLTED BONNET, CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING WITH BRAIDED ANTI-EXTRUSION RINGS, SHEET-52061, API 602, SW, 800, NOTE5	2	
GLOBE VALVE, 0.75 INCH, ASTM A 105/13CR, BB, OS&Y.IBR, SHEET 52002, BS-5352, SW, 800, IBR, NOTE2	5	
GLOBE VALVE, 0.75 INCH, ASTM A 182 GR F316 BODY/BONNET, 316 STAINLESS STEEL TRIM, HARD FACED SEAT,OS&Y, BOLTED BONNET, CORROSION-INHIBITED DIE-FORMED FLEXIBLE GRAPHITE PACKING WITH BRAIDED ANTI-EXTRUSION RINGS, SHEET-52061, API 602, SW, 800, NOTE5	2	
GLOBE VALVE, 0.75 INCH, ASTM A105 /13CR BB,OS&Y, IBR, SHEET 52002, API 602, SW, 800, IBR, NOTE2	5	
GLOBE VALVE, 0.75 INCH, ASTM A105 /SH BB,OS&Y, SHEET 52004, BS5352, SW, 800, H2, NOTE	3	
GLOBE VALVE, 0.75 INCH, ASTM A105/SH,BB,OS&Y, SHEET-52001, BS-5352, SW, 800,	2	

ATTACHMENT- B- QUANTITY FOR PIPE AND VALVES		
ITEM DESCRIPTION	**Total Qty Pipe- meters others- numbers**	**REMARKS**
GLOBE VALVE, 1 INCH, ASTM A105 /13CR BB,OS&Y, IBR, SHEET 52002, API 602, SW, 800, IBR, NOTE2	1	
GLOBE VALVE, 1.5 INCH, ASTM A 105/13CR, BB, OS&Y.IBR, SHEET 52002, BS-5352, SW, 800, IBR, NOTE2	1	
GLOBE VALVE, 2 INCH, ASTM A216 GR.WCB/SH,BB,OS&Y, SHEET-52001, ASME B16.10, RF,CL150	2	
NEEDLE VALVE, 0.25 INCH, ASTM A 182 GR F316 BODY, HOKE BAR STOCK NEEDLE VALVE MODEL NO. 2315F4Y OF EQUAL, HOKE 2315FY (EQUAL), NPTF, 800,	2	

ANNEXURE-4

INSTRUMENT HOOK UP DRAWINGS

(CCR1–REGENERATOR REVAMP PROJECT)

Rev.	Date	Description	Prpd.	Chkd.	Appd.
			Pooja Chauhan	Vishal Gupta	Sujit Ghosh
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

MRPL

Honeywell UOP
UOP ENGINEERING DEPARTMENT

TRIUNE

INSTRUMENT HOOK UP DRAWINGS
COVER SHEET

Doc. Number	Rev.
9675-24-09-A4-9001	0
Sheet 1 of 45	

AutoCAD : C:\STANDARDS\CS\9675-24-09-A4-9001.DWG

INDEX SHEET

SHEET NO.	DESCRIPTION	REVISION INDEX			
		A	0		
1	COVER SHEET	X	X		
2	INDEX SHEET	X	X		
3	LEGENDS & ABBREVIATION	X	X		
4	GENERAL NOTES	X	X		
5	LIST OF ITEM	X	X		
6	LIST OF ITEM	X	X		
7	LIST OF ITEM	X	X		
8	PRESSURE GAUGE	X	X		
9	PRESSURE GAUGE	X	X		
10	PRESSURE GAUGE WITH PULSATION DAMPNER	X	X		
11	PRESSURE GAUGE WITH PURGE SYSTEM FOR GB-2452, GB-2453	X	X		
12	PRESSURE TRANSMITTER FOR GAS SERVICE	X	X		
13	DIFFERENTIAL PRESSURE TRANSMITTER DRAUGHT MEASUREMENT	X	X		
14	DIFFERENTIAL PRESSURE TRANSMITTER WITH PURGE CONNECTION (DISENGAGING HOPPER)	X	X		
15	DIFFERENTIAL PRESSURE TRANSMITTER WITH PURGE CONNECTION (REGENERATION TOWER)	X	X		
16	DIFFERENTIAL PRESSURE TRANSMITTER (DUST COLLECTOR)	X	X		
17	DIFFERENTIAL PRESSURE TRANSMITTER FOR GAS SERVICE	X	X		
18	DIFFERENTIAL PRESSURE TRANSMITTER FOR GAS SERVICE	X	X		
19	DIFFERENTIAL PRESSURE TRANSMITTER FOR GAS SERVICE	X	X		
20	DUAL FLOW TRANSMITTER – DP TYPE FOR GAS SERVICE	X	X		
21	DUAL FLOW TRANSMITTER – DP TYPE FOR GAS SERVICE	X	X		
22	FLOW TRANSMITTER – DP TYPE FOR GAS SERVICE	X	X		
23	FLOW TRANSMITTER – DP TYPE FOR GAS SERVICE	X	X		
24	ORIFICE METER RUN ASSEMBLY	X	X		
25	CORIOLIS FLOW METER ASSEMBLY	X	X		
26	ROTAMETER ASSEMBLY	X	X		
27	ROTAMETER ASSEMBLY	X	X		
28	ORIFICE PLATE DETAIL	X	X		
29	RESTRICTION ORIFICE PLATE	X	X		
30	LEVEL GAUGE – REFLEX TYPE (RECYCLE GAS CAOLESCER)	X	X		
31	LEVEL GAUGE – REFLEX TYPE (BOOSTER GAS CAOLESCER)	X	X		
32	LEVEL SWITCH – TUNING FORK TYPE ON PIPE	X	X		
33	LEVEL SWITCH – TUNING FORK TYPE ON VESSEL NOZZLE	X	X		
34	TEMPERATURE GAUGE ASSEMBLY	X	X		
35	THERMOCOUPLE – THERMOWELL ASSEMBLY DETAIL	X	X		
36	RTD – THERMOWELL ASSEMBLY DETAIL	X	X		
37	RTD – THERMOWELL ASSEMBLY DETAIL	X	X		
38	RTD – THERMOWELL ASSEMBLY DETAIL	X	X		
39	CONTROL VALVE	X	X		
40	CONTROL VALVE	X	X		
41	ON/OFF VALVE	X	X		
42	ON/OFF VALVE	X	X		
43	ON/OFF VALVE	X	X		
44	HYDROGEN HYDROCARBON ANALYZER	X	X		
45	PRESSURE SAFETY VALVE – BALANCED BELLOWS TYPE	X	X		

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TRIUNE

INSTRUMENT HOOK UP DRAWINGS
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LEGENDS


GATE VALVE


GLOBE VALVE


BALL VALVE


EXISTING

ABBREVIATIONS

1. PE – PLAIN END
2. BE – BEVEL END
3. BW – BUTT WELD
4. SW – SOCKET WELD
5. TH – THREADED
6. WN – WELD NECK
7. FL – FLANGED
8. OD – OUTSIDE DIAMETER

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INSTRUMENT HOOK UP DRAWINGS
LEGENDS & ABBREVIATIONS

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GENERAL NOTES:-

1. FOR INSTRUMENT WHICH WILL BE REPLACED, IT IS CONSTRUCTION CONTRACTOR'S PURVIEW TO EITHER USE EXISTING IMPULSE LINES OR REPLACE WITH NEW IMPULSE LINES BASED ON SITE CONDITIONS.
2. DIRECTION OF THE SLOPE SHALL BE DOWNWARD FROM THE PROCESS CONNECTION FOR LIQUID SERVICE APPLICATION AND UPWARD FOR GAS SERVICE APPLICATION.
3. IMPULSE LINES LENGTH ARE INDICATED FOR PROCUREMENT PURPOSE ONLY, HENCE ALL PIPE AND TUBE LENGTH TO BE VERIFIED AT SITE BEFORE CUTTING. CUT END SHALL BE SQUARE AND DE-BURRED. ALL PIPE & TUBE SHALL BE THOROUGHLY CLEANED BEFORE INSTALLING.
4. ALL PIPE AND PIPE FITTING IN C.S SHALL BE PAINTED AS PER PROJECT SPECIFICATION FOR PAINTING DOC. NO. 9675-03-TS-003.
5. INSTRUMENT TAPPING SHALL BE AT ACCESSIBLE LEVEL.
6. ALL THREADED CONNECTION SHALL BE IN NPT.
7. LENGTH OF NIPPLE SHALL BE 100mm.
8. REFER INSTRUMENT INSTALLATION DRAWINGS (DWG NO. 9675-24-09-A4-9002) FOR SUPPORT DETAIL.

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INSTRUMENT HOOK UP DRAWINGS
GENERAL NOTES

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LIST OF ITEMS

PIPE & PIPE FITTINGS				
ITEM NO.	DESCRIPTION	SIZE & END CONNECTION	MATERIAL	REMARKS
P01	PIPE SCH. 80	1/2" PE	ASTM A106 GR.B, ASME B36.10M, PE, SEAMLESS, S80, H2	
P02	PIPE SCH. 80	1/2" PE	ASTM A106 GR.B, ASME B36.10M, PE, SEAMLESS, S80	
P03	PIPE SCH. 80	1/2" PE	ASTM A312 GR TP316, ASME B36.19M, PE, SEAMLESS, S80	
P04	PIPE SCH. 40	1/2" PE	ASTM B167 N06600, ASME B36.19M, PE, SEAMLESS, S40	
P05	SPARE			
P06	SPARE			
P07	SPARE			
P08	SPARE			
P09	NIPPLE	1/2" PE x 1/2" PE	ASTM A105, ASME B16.11, CL. 3000#, S80	
P10	SPARE			
P11	SPARE			
P12	NIPPLE	1/2" PE x 1/2" PE	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, H2	
P13	SPARE			
P14	SPARE			
P15	SPARE			
P16	SPARE			
P17	NIPPLE	1/2" PE x 1/2" NPT(M)	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, H2	
P18	NIPPLE	1/2" PE x 1/2" NPT(M)	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	
P19	NIPPLE	1/2" PE x 1/2" NPT(M)	ASTM A182 GR F316, ASME B16.11, SEAMLESS, CL. 3000#, S80	
P20	NIPPLE	1/2" PE x 1/2" NPT(M)	ASTM B366 GR.WPNCI, ASME B16.11, SEAMLESS CL. 3000#, S40	
P21	NIPPLE	1/4" PE x 1/4" NPT(M)	ASTM B366 GR.WPNCI, ASME B16.11, SEAMLESS, CL. 3000#, S40	
P22	NIPPLE	1/4" PE x 1/4" NPT(M)	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	
P23	SPARE			
P24	SWAGE NIPPLE SCH. 80	3/4" PE x 1/2" PE	ASTM A182 GR F316, ASME B16.11, SEAMLESS, CL. 3000#, S80	
P25	SWAGE NIPPLE SCH. 80	3/4" PE x 1/2" NPT(M)	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, H2	
P26	SWAGE NIPPLE SCH. 80	3/4" PE x 1/2" NPT(M)	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	
P27	SWAGE NIPPLE SCH. 80	3/4" PE x 1/2" PE	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	
P28	SWAGE NIPPLE SCH. 80	3/4" PE x 1/2" PE	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, H2	
P29	PIPE ELBOW (90 DEG)	1/2" SW	ASTM A105, ASME B16.11, SW, CL. 3000#, S80	
P30	SPARE			
P31	PIPE ELBOW (90 DEG)	1/2" SW	ASTM B366 GR.WPNCI, ASME B16.11, SW, CL. 3000#	
P32	PIPE ELBOW (90 DEG)	1/2" SW	ASTM A105, ASME B16.11, SW, CL. 3000#, S80, H2	
P33	PIPE ELBOW (135 DEG)	1/2" SW	ASTM B366 GR.WPNCI, ASME B16.11, SW, CL. 3000#	
P34	SPARE			
P35	PIPE ELBOW (135 DEG)	1/2" SW	ASTM A105, ASME B16.11, SW, CL. 3000#, S80	
P36	PIPE ELBOW (135 DEG)	1/2" SW	ASTM A105, ASME B16.11, SW, CL. 3000#, S80, H2	
P37	PIPE ELBOW (90 DEG)	1/2" SW	ASTM A182 GR F316, ASME B16.11, SW, CL. 3000#, S80	
P38	SPARE			
P39	SPARE			
P40	REDUCING TEE	1/2" SW x 1/2" SW x 1/4" SW	ASTM B366 GR.WPNCI, ASME B16.11, SW, CL. 3000#	
P41	LATERAL TEE	1/2" SW	ASTM A105, ASME B16.11, SW, CL. 3000#, S80	
P42	LATERAL TEE	1/2" SW	ASTM A105, ASME B16.11, SW, CL. 3000#, S80, H2	
P43	SPARE			
P44	SPARE			
P45	PIPE CAP	1/2" NPT(F)	ASTM A105, ASME B16.11, NPT(F), CL. 3000#, S80	
P46	SPARE			
P47	PIPE CAP	1/2" NPT(F)	ASTM A105, ASME B16.11, NPT(F), CL. 3000#, S80, H2	
P48	SPARE			
P49	SPARE			
P50	SPARE			
P51	SPARE			
P52	SPARE			

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TRIUNE

INSTRUMENT HOOK UP DRAWINGS
LIST OF ITEM

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LIST OF ITEMS

PIPE & PIPE FITTINGS				
ITEM NO.	DESCRIPTION	SIZE & END CONNECTION	MATERIAL	REMARKS
P53	GLOBE VALVE 800#	1/2" SW	ASTM A105/SH, BB, OS&Y, SHEET-52001, BS-5352, SW, CL. 800#	
P54	SPARE			
P55	SPARE			
P56	SPARE			
P57	SPARE			
P58	GATE VALVE 800#	1/2" SW	ASTM A105/SH, BB, OS&Y, SHEET-51001, API 602, SW, CL. 800#	
P59	GATE VALVE 150#	1/2" SW	ASTM B166 N06600/HF ,BB, OS&Y, SHEET-51076, SW, CL. 150#	
P60	GATE VALVE 800#	1/2" SW	ASTM A105 /SH, BB,OS&Y, SHEET-51004, API 602, SW, CL. 800#, H2	
P61	SPARE			
P62	SPARE			
P63	SPARE			
P64	SPARE			
P65	FLANGE 300#	1/2" SW	ASTM A105, ASME B16.5, RF, CL. 300#, SW, S80, H2	
P66	SPARE			
P67	SPARE			
P68	SPARE			
P69	SPARE			
P70	SPARE			
P71	FLANGE 300#	1/2" SW	ASTM A105, ASME B16.5, RF, CL. 300#, SW, S80	
P72	FLANGE 300#	1/2" WN	ASTM B564 UNS N06600, ASME B16.5, RF, CL. 150#, WN, S40	
P73	SPARE			
P74	SPARE			
P75	SPARE			
P76	SPARE			
P77	SPARE			
P78	GASKET	FOR 1/2" FLANGE	SPR.WND. SS 304 + Grafoil Filler, ASME B16.20, CL.300#, 4.5 MM THK	
P79	SPARE			
P80	GASKET	FOR 1/2" FLANGE	SPR.WND. + UNS N06600 WINDINGS, THERMICULITE 835 FILLER, ASME B16.20, CL.150#, 4.5 MM THK	
P81	SPARE			
P82	SPARE			
P83	SPARE			
P84	SPARE			
P85	STUDS & NUTS	FOR 1/2" FLANGE	STUD BOLT WITH 2 NUTS, ASTM A193 GR.B7 / ASTM A194 GR.2H, ASME B18.2, 0.50 INCH X 65MM LONG	
P86	STUDS & NUTS	FOR 1/2" FLANGE	STUD BOLT WITH 2 NUTS, ASTM A193 GR.B16 / ASTM A194 GR.4, ASME B18.2, 0.50 INCH X 65 MM LONG	
P87	SPARE			
P88	ADAPTOR	3/4" SW x 1/4" NPT(F)	ASTM B366 GR.WPNCI, ASME B16.11, SEAMLESS CL. 3000#, S40	
P89	SPARE			
P90	ADAPTOR	3/4" SW x 1/2" SW	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, H2	
P91	ADAPTOR	3/4" SW x 1/2" NPT(F)	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	
P92	ADAPTOR	3/4" SW x 1/4" NPT(F)	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	
P93	ADAPTOR	3/4" SW x 1/2" SW	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	
P94	SPARE			
P95	ADAPTOR	3/4" SW x 1/4" NPT(F)	ASTM A182 GR F316, ASME B16.11, SEAMLESS, CL. 3000#, S80	
P96	SPARE			
P97	ADAPTOR	3/4" SW x 1/2" SW	ASTM B366 GR.WPNCI, ASME B16.11, SEAMLESS CL. 3000#, S40	
P98	ADAPTOR	1" NPT(M) x 1/2" NPT(F)	SS316, SEAMLESS, CL. 3000#	
P99	ADAPTOR	2" SW x 1/2" NPT(F)	ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	
P100	SPARE			

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INSTRUMENT HOOK UP DRAWINGS
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LIST OF ITEMS

TUBE & TUBE FITTINGS				
ITEM NO.	DESCRIPTION	SIZE & END CONNECTION	MATERIAL	REMARKS
T01	TUBE	1/4" OD (0.049" THK)	SS316	
T02	TUBE	1/2" OD (0.049" THK)	SS316	
T03	TUBE	6mm OD (0.8mm THK)	SS316	
T04	TUBE	12mm OD (1mm THK)	SS316	
T05	SPARE			
T06	SPARE			
T07	SPARE			
T08	SPARE			
T09	MALE TUBE CONNECTOR	1/2" NPT(M) x 1/2" OD	SS316	
T10	MALE TUBE CONNECTOR	1/4" NPT(M) x 1/4" OD	SS316	
T11	MALE TUBE CONNECTOR	1/2" NPT(M) x 6mm OD	SS316	
T12	SPARE			
T13	MALE TUBE CONNECTOR	1/4" NPT(M) x 12mm OD	SS316	
T14	MALE TUBE CONNECTOR	1/4" NPT(M) x 6mm OD	SS316	
T15	SPARE			
T16	SPARE			
T17	SPARE			
T18	REDUCING UNION	1/2" OD x 1/4" OD	SS316	
T19	SPARE			
T20	SPARE			
T21	SPARE			
T22	SPARE			
T23	UNION TEE	1/4" OD	SS316	
T24	SPARE			
T25	SPARE			
T26	SPARE			
T27	SPARE			
T28	TUBE UNION	6mm OD	SS316	
T29	TUBE UNION	12mm OD	SS316	
T30	TUBE UNION	1/2" OD	SS316	
T31	TUBE UNION	1/4" OD	SS316	
T32	SPARE			
T33	SPARE			
T34	FEMALE TUBE CONNECTOR	1/4" NPT(F) x 1/4" OD	SS316	
T35	SPARE			
T36	SPARE			
T37	SPARE			
T38	SPARE			
T39	SPARE			
T40	SPARE			

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INSTRUMENT HOOK UP DRAWINGS
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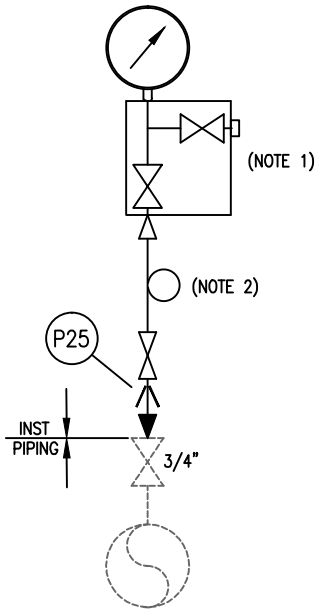
PIPING CLASS
B2A1

TAG NO.
1. PI-24310
2. PI-24350
3. PI-24968



NOTES:-

1. PRESSURE GAUGE WITH SS316 2-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. FOR PRESSURE GAUGE PI-24968, SIPHON (1/2" NPT(F) x 1/2" NPT(M)) SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P25	SWAGE NIPPLE SCH. 80	3/4" PE x 1/2" NPT(M)	A105	1					

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INSTRUMENT HOOK UP DRAWINGS
PRESSURE GAUGE FOR GAS SERVICE

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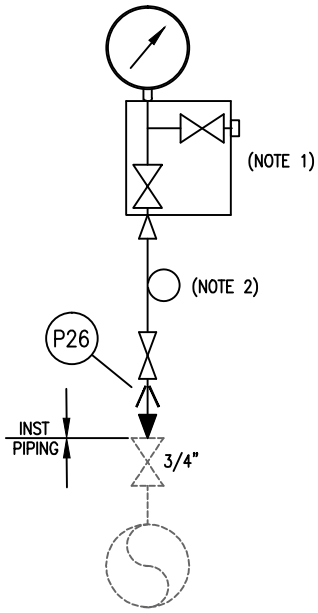
PIPING CLASS
B1A1 (A1A1)

TAG NO.
1. PI-24970
2. PI-24971



NOTES:-

1. PRESSURE GAUGE WITH SS316 2-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. FOR PRESSURE GAUGE PI-24970, SIPHON (1/2" NPT(F) x 1/2" NPT(M)) SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P26	SWAGE NIPPLE SCH. 80	3/4" PE x 1/2" NPT(M)	A105	1					

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PRESSURE GAUGE FOR GAS SERVICE

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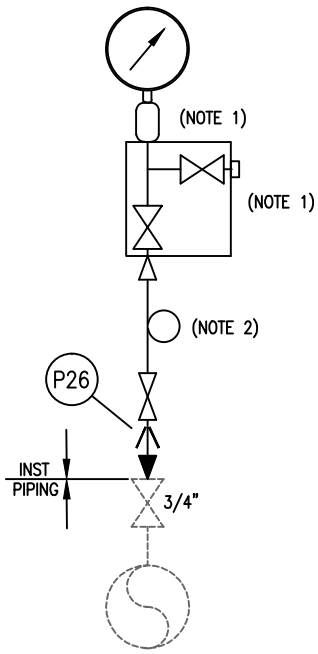
PIPING CLASS
B1A1 (A1A1)

TAG NO.
1. PI-24391
2. PI-24393



NOTES:-

1. PRESSURE GAUGE WITH SS316 2-WAY INTEGRAL MANIFOLD, VENT/DRAIN PLUG & PULSATION DAMPNER SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. FOR PRESSURE GAUGE PI-24391, SIPHON (1/2" NPT(F) x 1/2" NPT(M)) SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P26	SWAGE NIPPLE SCH. 80	3/4" PE x 1/2" NPT(M)	A105	1					

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INSTRUMENT HOOK UP DRAWINGS
PRESSURE GAUGE WITH
PULSATION DAMPENER

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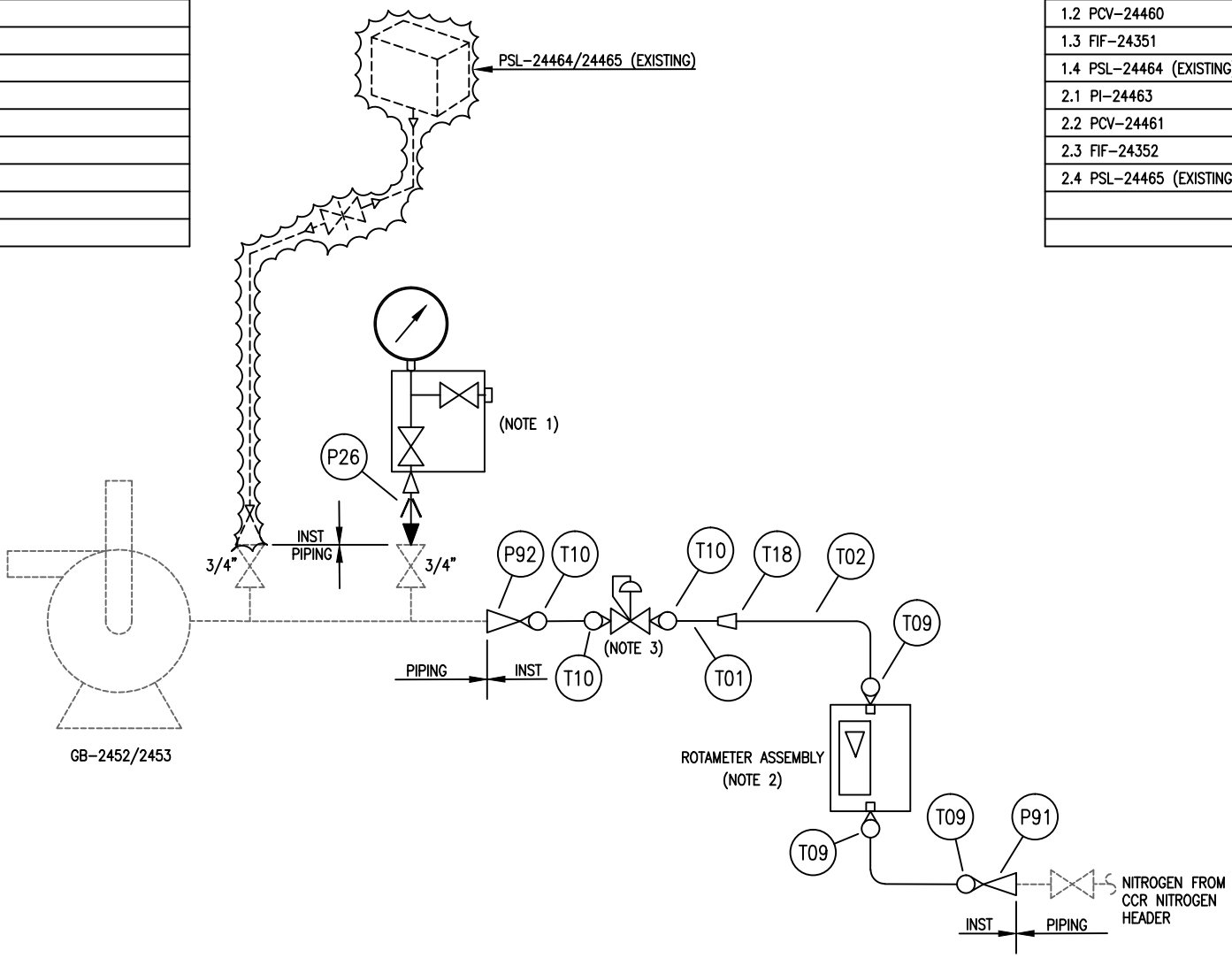
PIPING CLASS
A3A

TAG NO.
1.1 PI-24462
1.2 PCV-24460
1.3 FIF-24351
1.4 PSL-24464 (EXISTING)
2.1 PI-24463
2.2 PCV-24461
2.3 FIF-24352
2.4 PSL-24465 (EXISTING)



NOTES:-

1. PRESSURE GAUGE WITH SS316 2-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. ROTAMETER WITH NEEDLE VALVE AT OUTLET HAVING 1/2" NPT(F) CONNECTION SHALL BE BY INSTRUMENT SUPPLIER.
3. SELF ACTUATING PRESSURE REGULATOR SHALL BE SUPPLIED BY INSTRUMENT VENDOR.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P26	SWAGE NIPPLE SCH. 80	3/4" PE x 1/2" NPT(M)	A105	1					
P91	ADAPTOR	3/4" SW x 1/2" NPT(F)	A105	1					
P92	ADAPTOR	3/4" SW x 1/4" NPT(F)	A105	1					
T01	TUBE	1/4" OD (0.049" THK)	SS316	5m					
T02	TUBE	1/2" OD (0.049" THK)	SS316	5m					
T09	MALE TUBE CONNECTOR	1/2" NPT(M) x 1/2" OD	SS316	3					
T10	MALE TUBE CONNECTOR	1/4" NPT(M) x 1/4" OD	SS316	3					
T18	REDUCING UNION	1/2" OD x 1/4" OD	SS316	1					

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INSTRUMENT HOOK UP DRAWINGS
PRESSURE GAUGE WITH PURGE SYSTEM FOR
GB-2452, GB-2453

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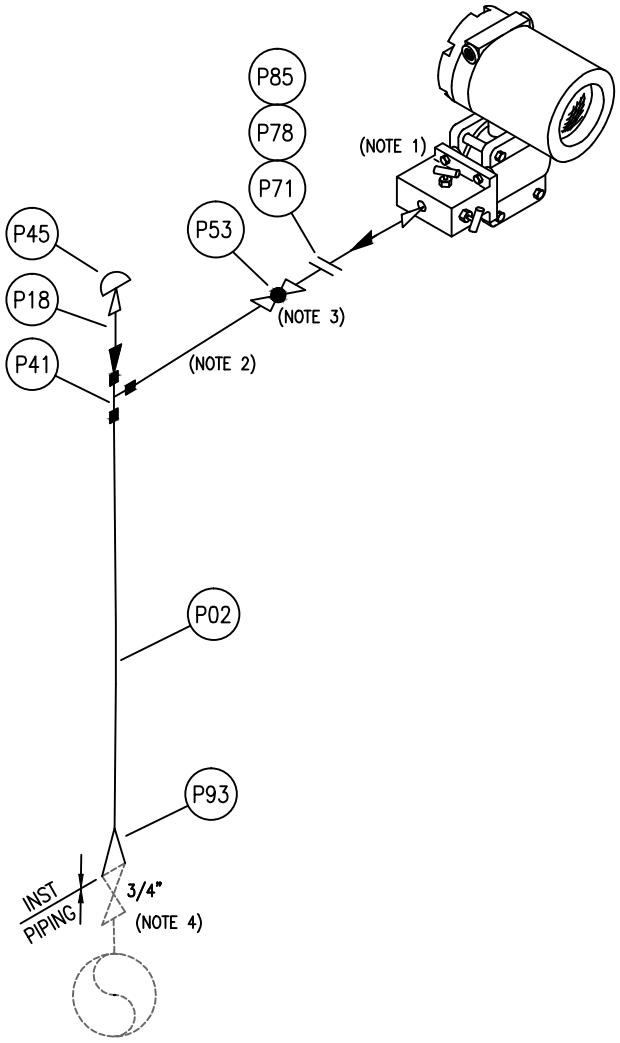
PIPING CLASS
B1A1 (A1A1)

TAG NO.
1. PT-24390
2. PT-24962
3. PT-24966
4. PT-24969



NOTES:-

1. PRESSURE TRANSMITTER WITH SS316 2-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. SLOPE THE IMPULSE LINE DOWN TO THE PROCESS CONNECTION AT 45° MINIMUM. NO HORIZONTAL RUNS ARE PERMITTED.
3. INSTRUMENT GLOBE VALVE FOR PT-24390 MAY BE ELIMINATED IF FIRST BLOCK VALVE (BY PIPING) IS ACCESSIBLE ON THE SAME PLATFORM AS THE TRANSMITTER.
4. PROCESS CONNECTION SHOULD BE ON TOP OF HORIZONTAL LINE.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P02	PIPE SCH. 80	1/2" PE	A106	10m					
P18	NIPPLE	1/2" PE x 1/2" NPT(M)	A105	2					
P41	LATERAL TEE	1/2" SW	A105	1					
P45	PIPE CAP	1/2" NPT(F)	A105	1					
P53	GLOBE VALVE 800#	1/2" SW	A105	1					
P71	FLANGE 300#	1/2" SW	A105	2					
P78	GASKET	FOR 1/2" FLANGE	–	1 SET					
P85	STUDS & NUTS	FOR 1/2" FLANGE	A193/A194	1 SET					
P93	ADAPTOR	3/4" SW x 1/2" SW	A105	1					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
PRESSURE TRANSMITTER
FOR GAS SERVICE

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9675-24-09-A4-9001	0
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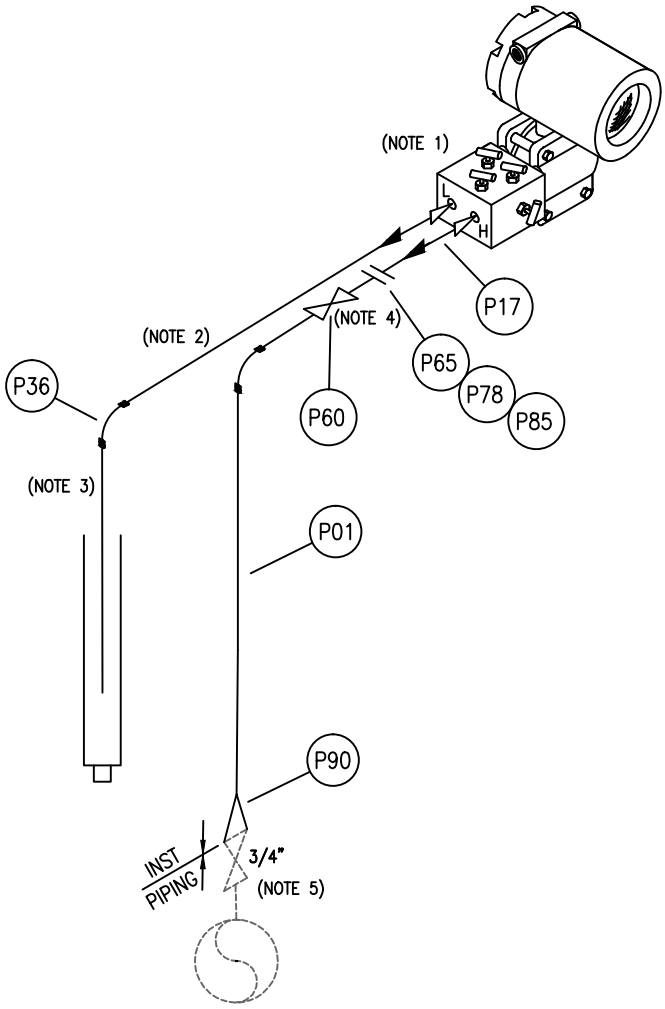
AutoCAD : C:\STANDARDS\CS\9675-24-09-A4-9001.DWG

PIPING CLASS
B2A1

TAG NO.
1. PT-24305
2. PT-24345



NOTES:-

1. PRESSURE DIFFERENTIAL TRANSMITTER WITH SS316 5-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. SLOPE THE IMPULSE LINE DOWN TO THE PROCESS CONNECTION AT 45° MINIMUM. NO HORIZONTAL RUNS ARE PERMITTED.
3. VENT LOW TAP TO ATMOSPHERE AND PROTECT FROM WIND, RAIN AND INSECTS.
4. INSTRUMENT GATE VALVE MAY BE ELIMINATED IF FIRST BLOCK VALVE (BY PIPING) IS ACCESSIBLE ON THE SAME PLATFORM AS THE TRANSMITTER.
5. PROCESS CONNECTION SHOULD BE ON TOP OF HORIZONTAL LINE.
6. REFER UOP PROJECT SPECIFICATION 9045932-604D SKETCH-H FOR THIS DRAWING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P01	PIPE SCH. 80	1/2" PE	A106	20m					
P17	NIPPLE	1/2" PE x 1/2" NPT(M)	A105	2					
P36	PIPE ELBOW (135 DEG)	1/2" SW	A105	2					
P60	GATE VALVE 800#	1/2" SW	A105	1					
P65	FLANGE 300#	1/2" SW	A105	2					
P78	GASKET	FOR 1/2" FLANGE	-	1 SET					
P85	STUDS & NUTS	FOR 1/2" FLANGE	A193/A194	1 SET					
P90	ADAPTOR	3/4" SW x 1/2" SW	A105	1					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
DIFFERENTIAL PRESSURE TRANSMITTER
DRAUGHT MEASUREMENT

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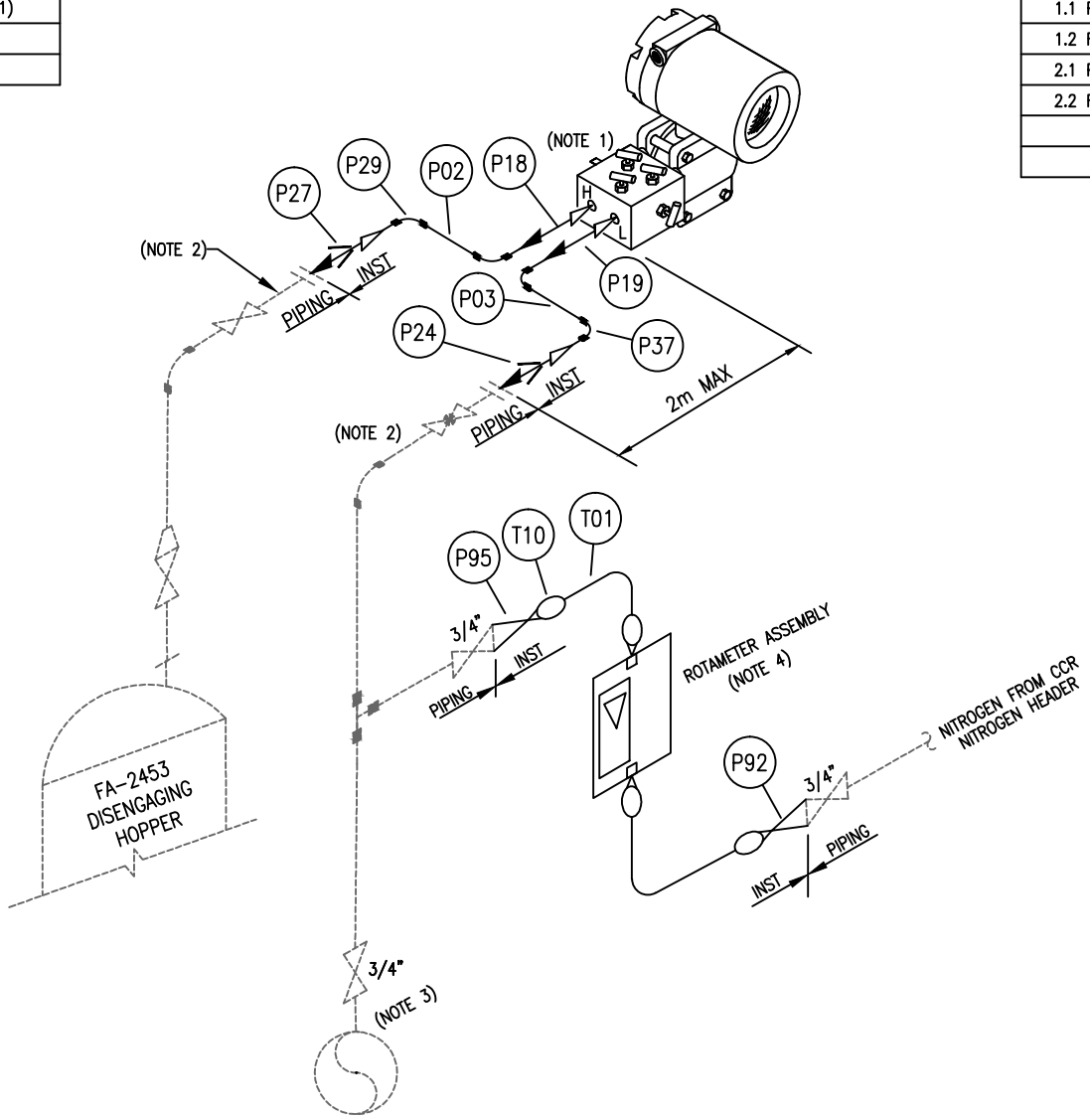
PIPING CLASS
H : B1A1(A1A1)
L : PR-36

TAG NO.
1.1 PDT-24354
1.2 FIF-24911
2.1 PDT-24918
2.2 FIF-24912



NOTES:-

1. PRESSURE DIFFERENTIAL TRANSMITTER WITH SS316 5-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. SLOPE THE IMPULSE LINE DOWN TO THE PROCESS AT 45° MINIMUM. NO HORIZONTAL RUNS ARE PERMITTED.
3. PROCESS CONNECTION SHOULD BE ON TOP OF HORIZONTAL LINE.
4. ROTAMETER ASSEMBLY WITH FLOW CONTROL VALVE AT INLET, CHECK VALVE AT OUTLET AND 1/4" NPT(F) END CONNECTION SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
5. REFER UOP PROJECT SPECIFICATION 9045932-604D SKETCH-B FOR THIS DRAWING.
6. CONSTRUCTION CONTRACTOR TO REFER PIPING ISOMETRIC DRAWING NO. XXXXX FOR DETAILS.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P02	PIPE SCH. 80	1/2" PE	A106	2m	T10	MALE CONNECTOR	1/4" NPT(M) x 1/4" OD	SS316	4
P03	PIPE SCH. 80	1/2" PE	A312	2m					
P18	NIPPLE	1/2" PE x 1/2" NPT(M)	A105	1					
P19	NIPPLE	1/2" PE x 1/2" NPT(M)	A182	1					
P24	SWAGE NIPPLE	3/4" PE x 1/2" PE	A182	1					
P27	SWAGE NIPPLE	3/4" PE x 1/2" PE	A105	1					
P29	PIPE ELBOW (90 DEG)	1/2" SW	A105	2					
P37	PIPE ELBOW (90 DEG)	1/2" SW	A182	2					
P92	ADAPTOR	3/4" SW x 1/4" NPT(F)	A105	1					
P95	ADAPTOR	3/4" SW x 1/4" NPT(F)	A182	1					
T01	TUBE	1/4" OD (0.049" THK)	SS316	10m					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
DIFFERENTIAL PRESSURE TRANSMITTER
WITH PURGE CONNECTION
(DISENGAGING HOPPER)

Doc. Number: 9675-24-09-A4-9001
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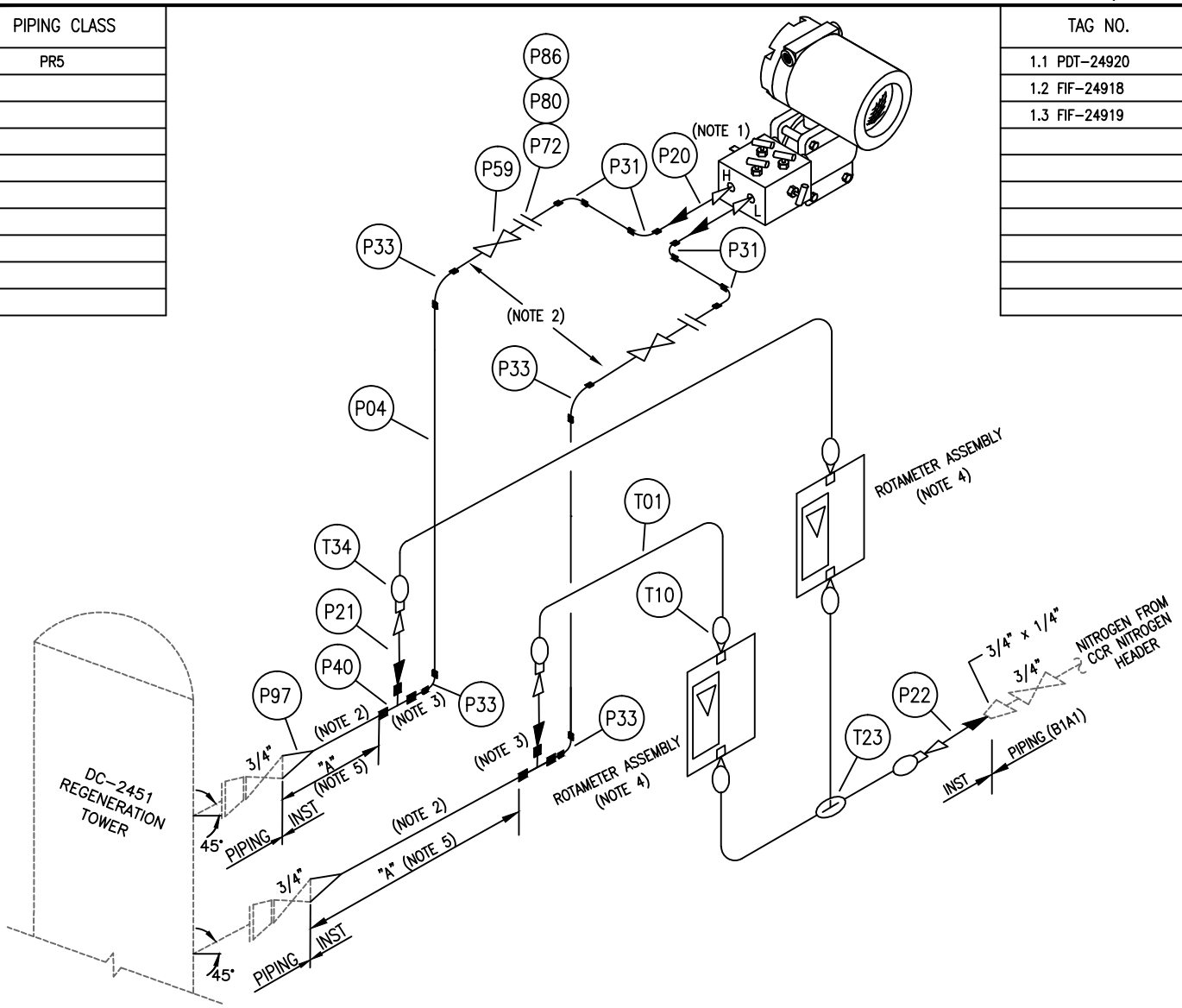
PIPING CLASS
PR5

TAG NO.
1.1 PDT-24920
1.2 FIF-24918
1.3 FIF-24919



NOTES:-

1. PRESSURE DIFFERENTIAL TRANSMITTER WITH SS316 5-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. SLOPE THE IMPULSE LINE DOWN TO THE PROCESS CONNECTION AT 45° MINIMUM. NO HORIZONTAL RUNS ARE PERMITTED.
3. TUBING CONNECTION SHOULD BE ON TOP OF IMPULSE LINE.
4. ROTAMETER ASSEMBLY WITH FLOW CONTROL VALVE AT INLET, CHECK VALVE AT OUTLET AND 1/4" NPT(F) END CONNECTION SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
5. LENGTH "A" SHALL BE 6 FEET +/- 1 FOOT (2000mm +/- 300mm).
6. REFER UOP PROJECT SPECIFICATION 9045932-604D SKETCH-E FOR THIS DRAWING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P04	PIPE SCH. 40	1/2" PE	B167	20m	P86	STUDS & NUTS	FOR 1/2" FLANGE	A193/A194	2 SET
P20	NIPPLE	1/2" PE x 1/2" NPT(M)	B366	2	P97	ADAPTOR	3/4" SW x 1/2" SW	B366	2
P21	NIPPLE	1/4" PE x 1/4" NPT(M)	B366	2	T01	TUBE	1/4" OD (0.049" THK)	SS316	10m
P22	NIPPLE	1/4" PE x 1/4" NPT(M)	A105	1	T10	MALE CONNECTOR	1/4" NPT(M) x 1/4" OD	SS316	4
P31	PIPE ELBOW (90 DEG)	1/2" SW	B366	4	T34	FEMALE CONNECTOR	1/4" NPT(F) x 1/4" OD	SS316	3
P33	PIPE ELBOW (135 DEG)	1/2" SW	B366	4	T23	UNION TEE	1/4" OD	SS316	1
P40	REDUCING TEE	1/2" SW x 1/2" SW x 1/4" SW	B366	2					
P59	GATE VALVE 150#	1/2" SW	B166	2					
P72	FLANGE SCH. 40 300#	1/2" WN	B564	4					
P80	GASKET	FOR 1/2" FLANGE	-	2 SET					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
DIFFERENTIAL PRESSURE TRANSMITTER
WITH PURGE CONNECTION
(REGENERATION TOWER)

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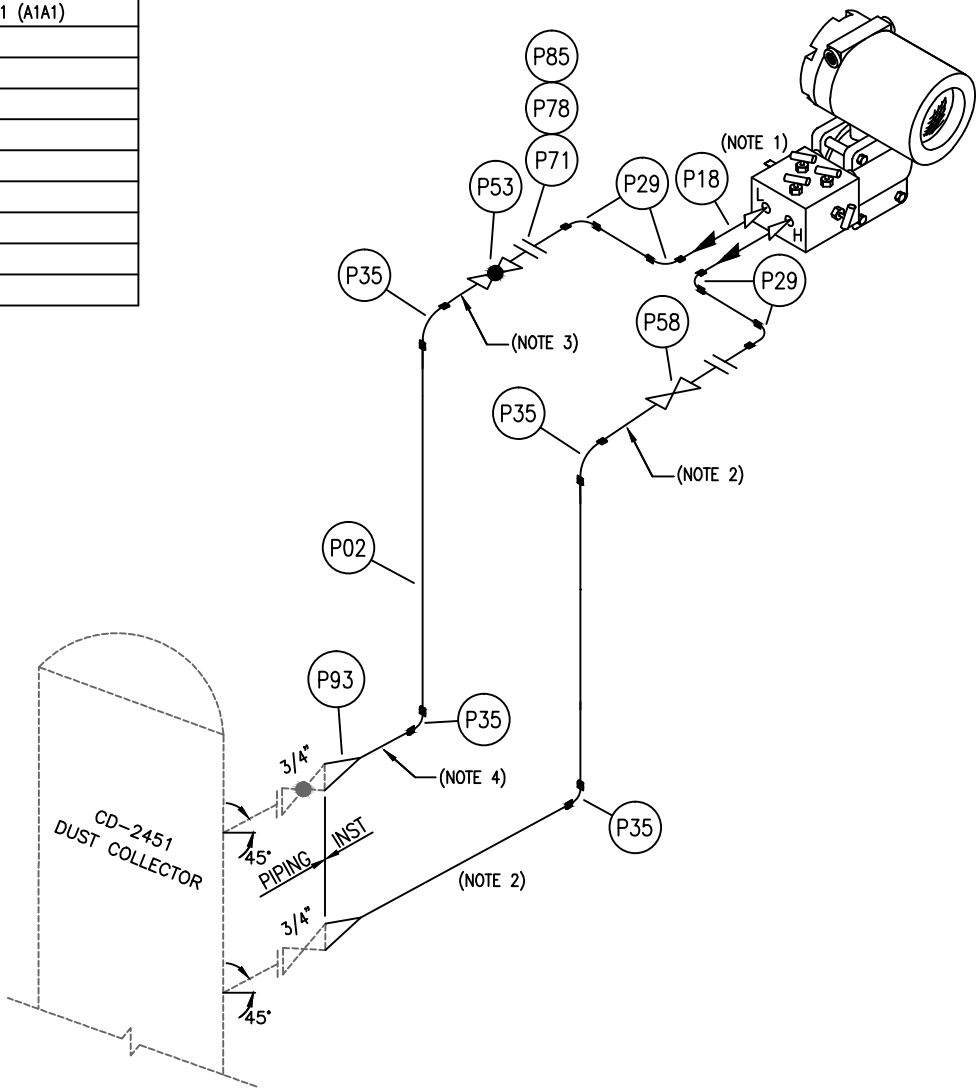
PIPING CLASS
B1A1 (A1A1)

TAG NO.
1. PDT-24919



NOTES:-

1. PRESSURE DIFFERENTIAL TRANSMITTER WITH SS316 5-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. SLOPE THE IMPULSE LINE DOWN TO THE PROCESS AT 45° MINIMUM. NO HORIZONTAL RUNS ARE PERMITTED.
3. SLOPE IMPULSE LINES A MINIMUM OF 1 INCH/FOOT (8%) TOWARDS PROCESS CONNECTIONS.
4. REFER UOP PROJECT SPECIFICATION 9045932-604D SKETCH-G FOR THIS DRAWING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P02	PIPE SCH. 80	1/2" PE	A106	20m					
P18	NIPPLE	1/2" PE x 1/2" NPT(M)	A105	2					
P29	PIPE ELBOW (90 DEG)	1/2" SW	A105	4					
P35	PIPE ELBOW (135 DEG)	1/2" SW	A105	4					
P53	GLOBE VALVE 800#	1/2" SW	A105	1					
P58	GATE VALVE 800#	1/2" SW	A105	1					
P71	FLANGE SCH. 80 300#	1/2" SW	A105	4					
P78	GASKET	FOR 1/2" FLANGE	-	2 SET					
P85	STUDS & NUTS	FOR 1/2" FLANGE	A193/A194	2 SET					
P93	ADAPTOR	3/4" SW x 1/2" SW	A105	2					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
DIFFERENTIAL PRESSURE TRANSMITTER
(DUST COLLECTOR)

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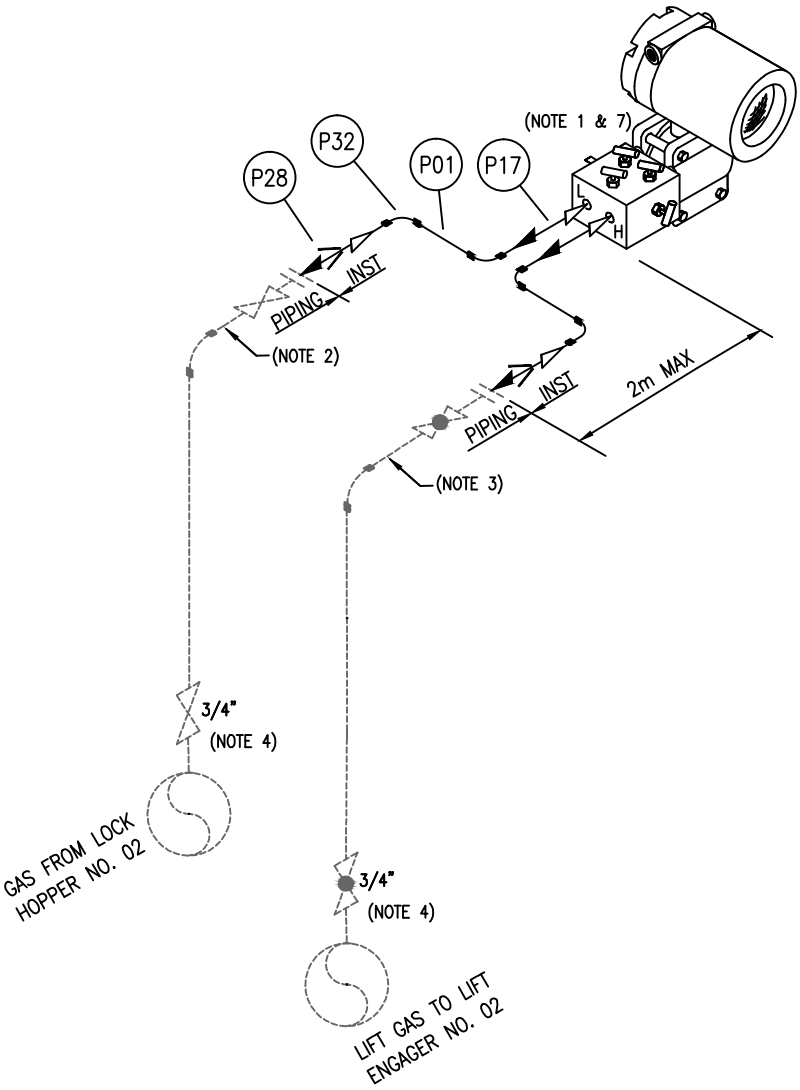
PIPING CLASS
H : B2A1
L : B2A1

TAG NO.
1. PDT-24343



NOTES:-

1. PRESSURE DIFFERENTIAL TRANSMITTER WITH SS316 5-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. SLOPE THE IMPULSE LINE DOWN TO THE PROCESS AT 45° MINIMUM. NO HORIZONTAL RUNS ARE PERMITTED.
3. SLOPE IMPULSE LINES A MINIMUM OF 1 INCH/FOOT (8%) TOWARDS PROCESS CONNECTIONS.
4. PROCESS CONNECTION SHOULD BE ON TOP OF HORIZONTAL LINE.
5. REFER UOP PROJECT SPECIFICATION 9045932-604D SKETCH-D FOR THIS DRAWING.
6. CONSTRUCTION CONTRACTOR TO REFER PIPING ISOMETRIC DRAWING NO. XXXXX FOR DETAILS.
7. CONSTRUCTION CONTRACTOR SHALL REMOVE THE HANDLE OF EQUALIZING VALVE TO PREVENT EQUALIZING OF HP & LP CONNECTION AS PER UOP RECOMMENDATION.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P01	PIPE SCH. 80	1/2" PE	A106	4m					
P17	NIPPLE	1/2" PE x 1/2" NPT(M)	A105	2					
P28	SWAGE NIPPLE	3/4" PE x 1/2" PE	A105	2					
P32	PIPE ELBOW (90 DEG)	1/2" SW	A105	4					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
DIFFERENTIAL PRESSURE TRANSMITTER
FOR GAS SERVICE

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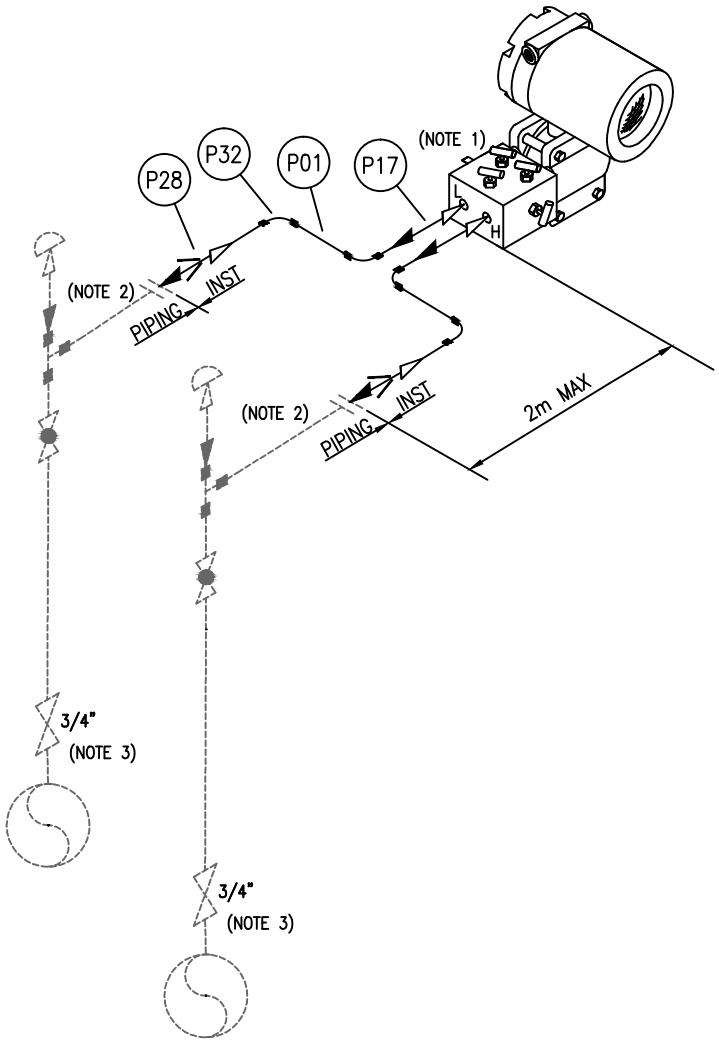
PIPING CLASS
H : B2A1
L : B2A1

TAG NO.
1. PDT-24433



NOTES:-

1. PRESSURE DIFFERENTIAL TRANSMITTER WITH SS316 5-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. SLOPE IMPULSE LINES A MINIMUM OF 1 INCH/FOOT (80mm PER METER) TOWARDS PROCESS CONNECTIONS.
3. PROCESS CONNECTION SHOULD BE ON TOP OF HORIZONTAL LINE.
4. REFER UOP STANDARD DRAWING 6-159 DETAIL-A FOR THIS DRAWING.
5. CONSTRUCTION CONTRACTOR TO REFER PIPING ISOMETRIC DRAWING NO. XXXXX FOR DETAILS.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P01	PIPE SCH. 80	1/2" PE	A106	4m					
P17	NIPPLE	1/2" PE x 1/2" NPT(M)	A105	2					
P28	SWAGE NIPPLE	3/4" PE x 1/2" PE	A105	2					
P32	PIPE ELBOW (90 DEG)	1/2" SW	A105	4					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
DIFFERENTIAL PRESSURE TRANSMITTER
FOR GAS SERVICE

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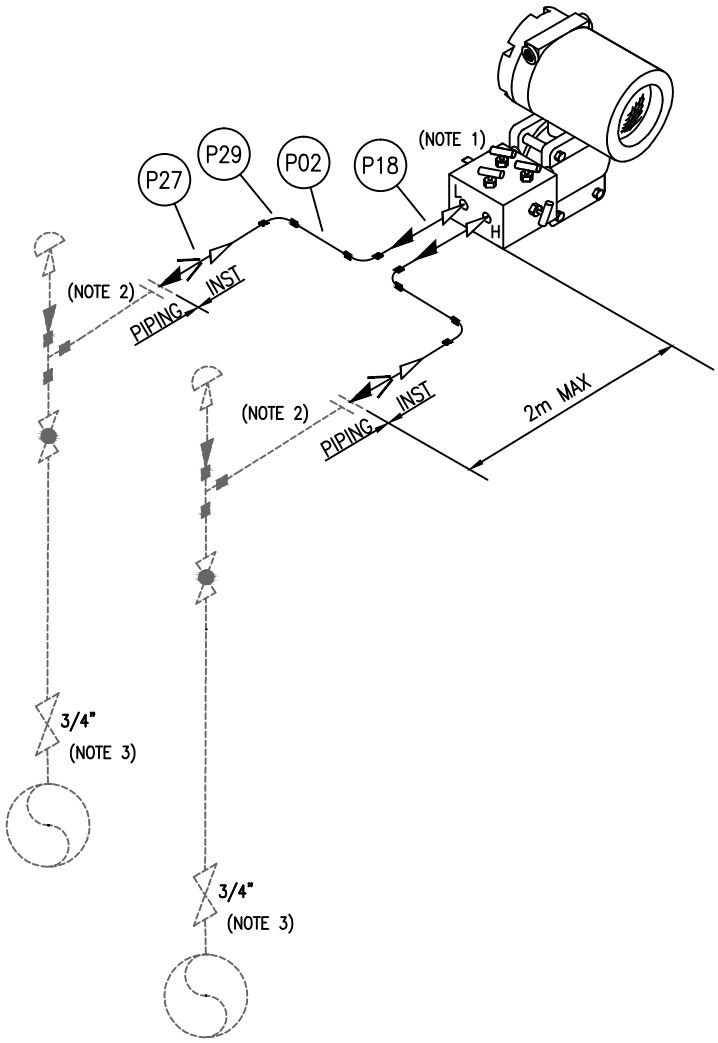
PIPING CLASS
H : B1A1(A1A1)
L : B1A1(A1A1)

TAG NO.
1. PDT-24955



NOTES:-

1. PRESSURE DIFFERENTIAL TRANSMITTER WITH SS316 5-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. SLOPE IMPULSE LINES A MINIMUM OF 1 INCH/FOOT (80mm PER METER) TOWARDS PROCESS CONNECTIONS.
3. PROCESS CONNECTION SHOULD BE ON TOP OF HORIZONTAL LINE.
4. REFER UOP STANDARD DRAWING 6-159 DETAIL-A FOR THIS DRAWING.
5. CONSTRUCTION CONTRACTOR TO REFER PIPING ISOMETRIC DRAWING NO. XXXXX FOR DETAILS.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P02	PIPE SCH. 80	1/2" PE	A106	4m					
P18	NIPPLE	1/2" PE x 1/2" NPT(M)	A105	2					
P27	SWAGE NIPPLE	3/4" PE x 1/2" PE	A105	2					
P29	PIPE ELBOW (90 DEG)	1/2" SW	A105	4					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
DIFFERENTIAL PRESSURE TRANSMITTER
FOR GAS SERVICE

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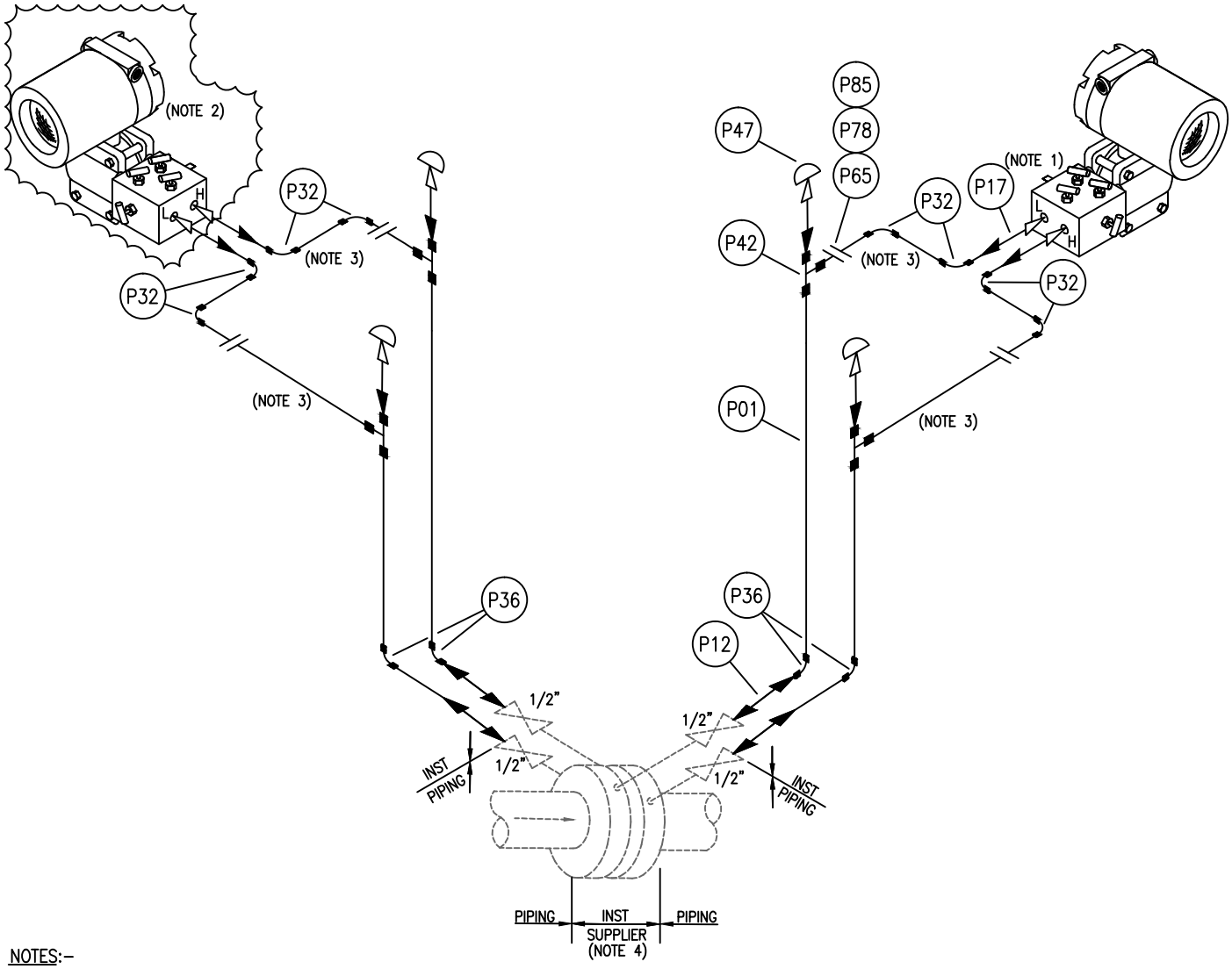
PIPING CLASS
B2A1

TAG NO.
1. FT-24921 &
FT-24346_EXISTING (NOTE-2)



NOTES:-

1. FLOW TRANSMITTER WITH SS316 5-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. EXISTING FLOW TRANSMITTER WITH MANIFOLD TO BE RETAINED FOR REINSTALLATION.
3. SLOPE IMPULSE LINES A MINIMUM OF 1"/FOOT (80 MM PER MTR) TOWARDS PROCESS CONNECTIONS.
4. ORIFICE PLATE ASSEMBLY (FE-24346) SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P01	PIPE SCH. 80	1/2" PE	A106	40m					
P12	NIPPLE	1/2" PE x 1/2" PE	A105	4					
P17	NIPPLE	1/2" PE x 1/2" NPT(M)	A105	8					
P32	PIPE ELBOW (90 DEG)	1/2" SW	A105	8					
P36	PIPE ELBOW (135 DEG)	1/2" SW	A105	4					
P42	LATERAL TEE	1/2" SW	A105	4					
P47	PIPE CAP	1/2" NPT(F)	A105	4					
P65	FLANGE 300#	1/2" SW	A105	8					
P78	GASKET	FOR 1/2" FLANGE	-	4 SET					
P85	STUDS & NUTS	FOR 1/2" FLANGE	A193/A194	4 SET					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
FLOW TRANSMITTER - DP TYPE
FOR GAS SERVICE

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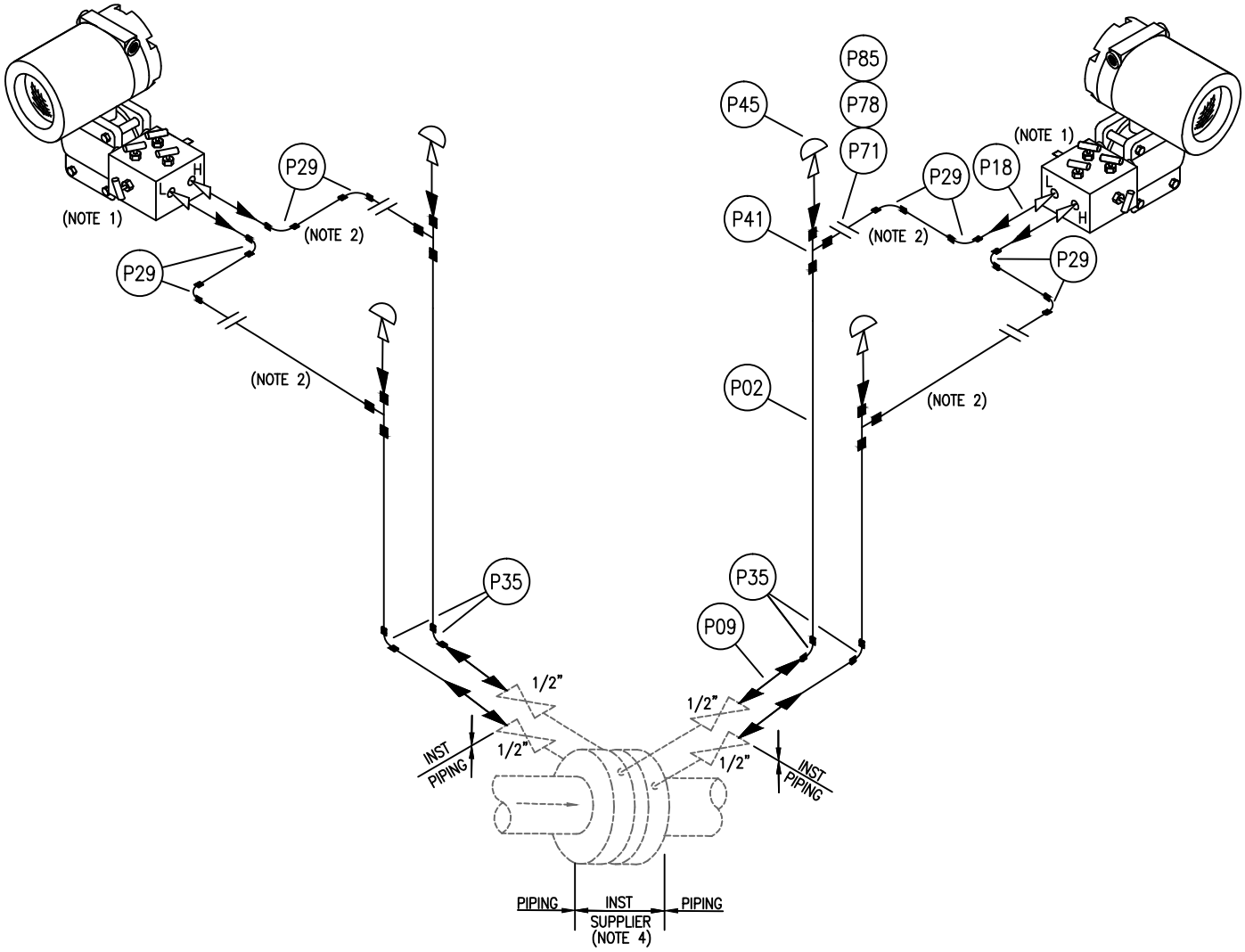
PIPING CLASS
PR8

TAG NO.
1. FT-24306 &
FT-24910



NOTES:-

1. FLOW TRANSMITTER WITH SS316 5-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. SLOPE IMPULSE LINES A MINIMUM OF 1"/FOOT (80 MM PER MTR) TOWARDS PROCESS CONNECTIONS.
3. ORIFICE PLATE ASSEMBLY (FE-24910) SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P02	PIPE SCH. 80	1/2" PE	A106	40m					
P09	NIPPLE	1/2" PE x 1/2" PE	A105	4					
P18	NIPPLE	1/2" PE x 1/2" NPT(M)	A105	8					
P29	PIPE ELBOW (90 DEG)	1/2" SW x 1/2" SW	A105	8					
P35	PIPE ELBOW (135 DEG)	1/2" SW x 1/2" SW	A105	4					
P41	LATERAL TEE	1/2" SW	A105	4					
P45	PIPE CAP	1/2" NPT(F)	A105	4					
P71	FLANGE 300#	1/2" SW	A105	8					
P78	GASKET	FOR 1/2" FLANGE	-	4 SET					
P85	STUDS & NUTS	FOR 1/2" FLANGE	A193/A194	4 SET					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
DUAL FLOW TRANSMITTER - DP TYPE
FOR GAS SERVICE

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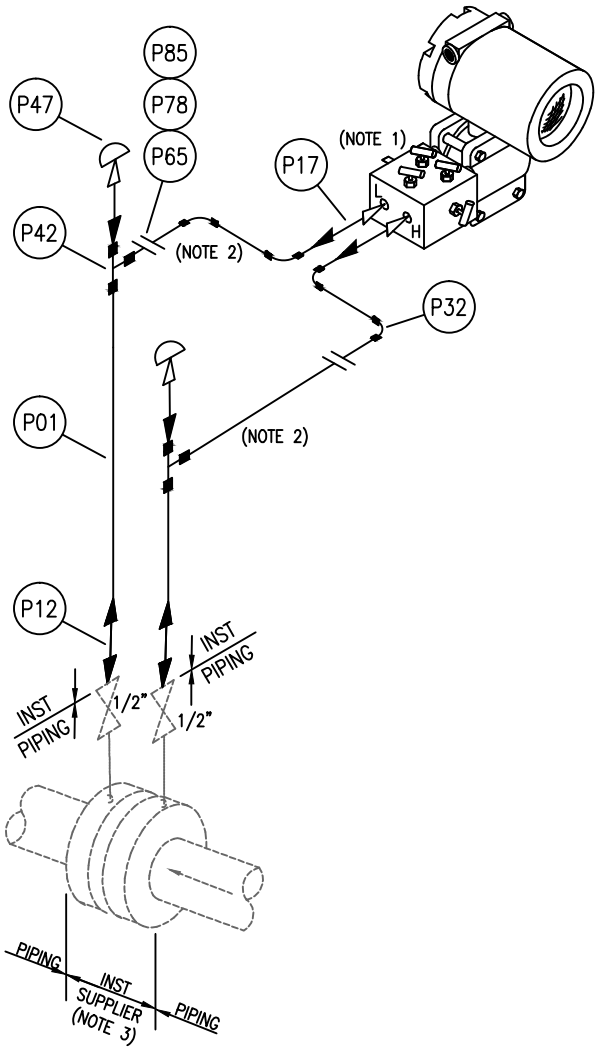
AutoCAD : C:\STANDARDS\CS\9675-24-09-A4-9001.DWG

PIPING CLASS
B2A1

TAG NO.
1. FT-24313



NOTES:–

1. FLOW TRANSMITTER WITH SS316 5–WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. SLOPE IMPULSE LINES A MINIMUM OF 1"/FOOT (80 MM PER MTR) TOWARDS PROCESS CONNECTIONS.
3. ORIFICE PLATE ASSEMBLY (FE–24313) SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P01	PIPE SCH. 80	1/2" PE	A106	20m					
P12	NIPPLE	1/2" PE x 1/2" PE	A105	2					
P17	NIPPLE	1/2" PE x 1/2" NPT(M)	A105	4					
P32	PIPE ELBOW (90 DEG)	1/2" SW	A105	4					
P42	EQUAL TEE	1/2" SW	A105	2					
P47	PIPE CAP	1/2" NPT(F)	A105	2					
P65	FLANGE 300#	1/2" SW	A105	4					
P78	GASKET	FOR 1/2" FLANGE	–	2 SET					
P85	STUDS & NUTS	FOR 1/2" FLANGE	A193/A194	2 SET					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
FLOW TRANSMITTER – DP TYPE
FOR GAS SERVICE

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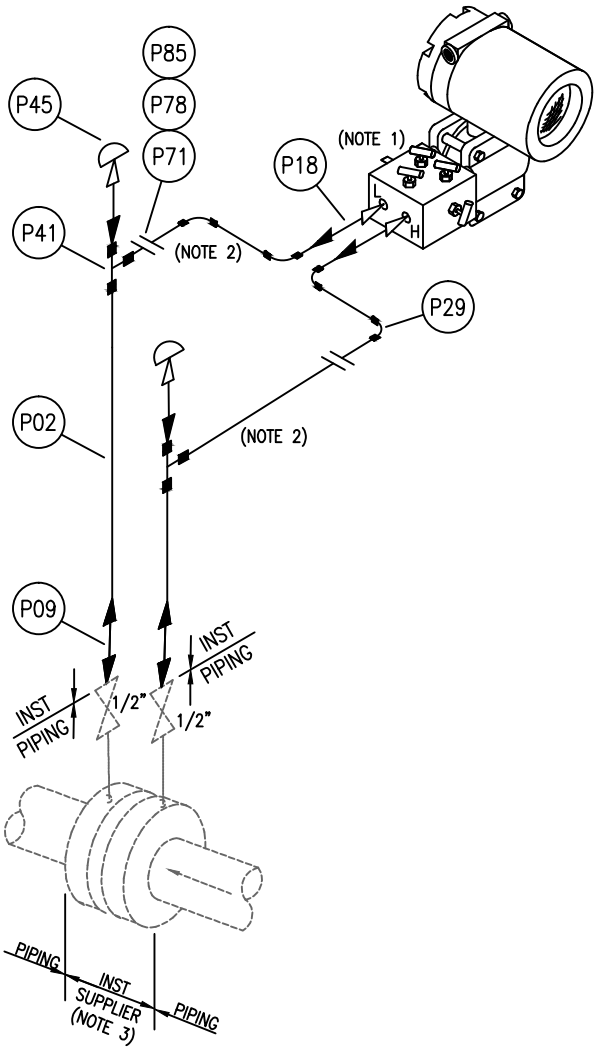
PIPING CLASS
B1A1 (A1A1)

TAG NO.
1. FT-24915
2. FT-24396 (NOTE-4)



NOTES:-

1. FLOW TRANSMITTER WITH SS316 5-WAY INTEGRAL MANIFOLD & VENT/DRAIN PLUG SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
2. SLOPE IMPULSE LINES A MINIMUM OF 1"/FOOT (80 MM PER MTR) TOWARDS PROCESS CONNECTIONS.
3. ORIFICE PLATE ASSEMBLY (FE-24915 & FE-24396) SHALL BE IN INSTRUMENT SUPPLIER'S SCOPE.
4. EXISTING FLOW TRANSMITTER WITH MANIFOLD TO BE RETAINED FOR REINSTALLATION.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P02	PIPE SCH. 80	1/2" PE	A106	20m					
P09	NIPPLE	1/2" PE x 1/2" PE	A105	2					
P18	NIPPLE	1/2" PE x 1/2" NPT(M)	A105	4					
P29	PIPE ELBOW (90 DEG)	1/2" SW	A105	4					
P41	LATERAL TEE	1/2" SW	A105	2					
P45	PIPE CAP	1/2" NPT(F)	A105	2					
P71	FLANGE 300#	1/2" SW	A105	4					
P78	GASKET	FOR 1/2" FLANGE	-	2 SET					
P85	STUDS & NUTS	FOR 1/2" FLANGE	A193/A194	2 SET					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
FLOW TRANSMITTER - DP TYPE
FOR GAS SERVICE

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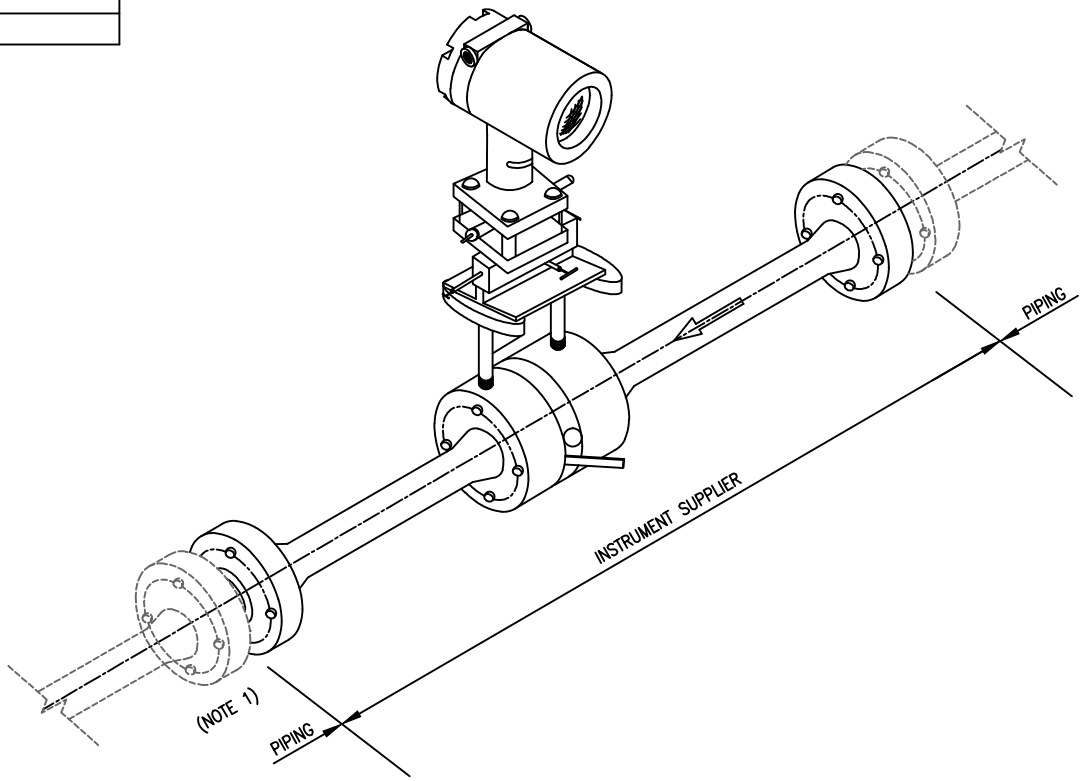
PIPING CLASS

TAG NO.
1. FT-24341
2. FT-24394
3. FT-24397
4. FT-24480
5. FT-24909
6. FT-24922



NOTES:-

1. GASKET, STUDS & NUTS SHALL BE BY PIPING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT

TRIUNE

INSTRUMENT HOOK UP DRAWINGS
ORIFICE METER RUN ASSEMBLY

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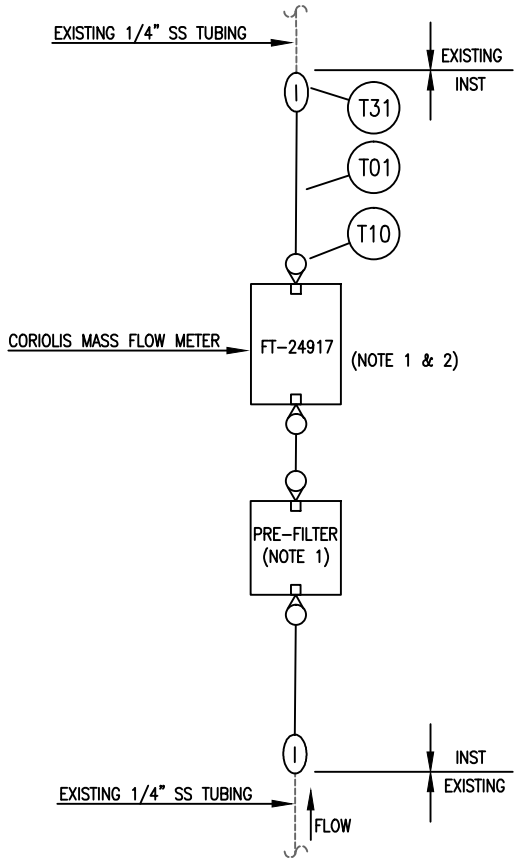
PIPING CLASS
M1A1

TAG NO.
1. FT-24917



NOTES:-

1. CORIOLIS FLOW METER ALONG WITH PRE-FILTER HAVING 1/2" NPT(F) CONNECTION SHALL BE BY INSTRUMENT SUPPLIER.
2. FLOW METER TO BE LOCATED IN VERTICAL PIPE. PIPING TO CONSIDER SAME TO UPDATE EXISTING ISOMETRIC DRAWING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
T01	TUBE	1/4" OD (0.049" THK)	SS 316	5m					
T10	MALE TUBE CONNECTOR	1/4" NPT(M) x 1/4" OD	SS 316	4					
T31	TUBE UNION	1/4" OD	SS 316	2					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
CORIOLIS FLOW METER ASSEMBLY

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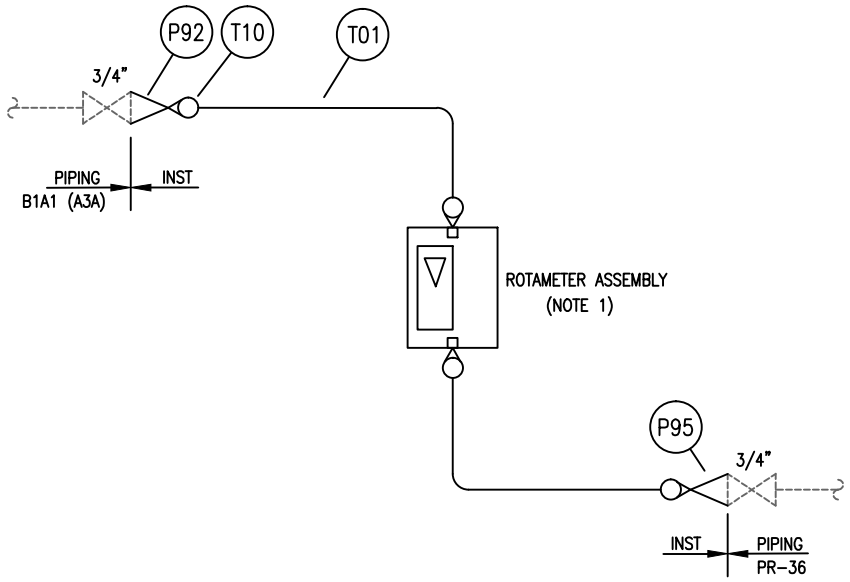
PIPING CLASS
MS-7

TAG NO.
1. FIF-24913
2. FIF-24916



NOTES:-

1. ROTAMETER ASSEMBLY WITH FLOW CONTROL VALVE AT INLET & CHECK VALVE ON OUTLET AND SHALL BE IN ROTAMETER SUPPLIER'S SCOPE. THE FINAL CONNECTION SHALL BE 1/4" NPT(F).

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P92	ADAPTOR	3/4" SW x 1/4" NPT(F)	A105	1					
P95	ADAPTOR	3/4" SW x 1/4" NPT(F)	A182	1					
T01	TUBE	1/4" OD (0.049" THK)	SS316	10m					
T10	MALE TUBE CONNECTOR	1/4" NPT(M) x 1/4" OD	SS316	4					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
ROTAMETER ASSEMBLY

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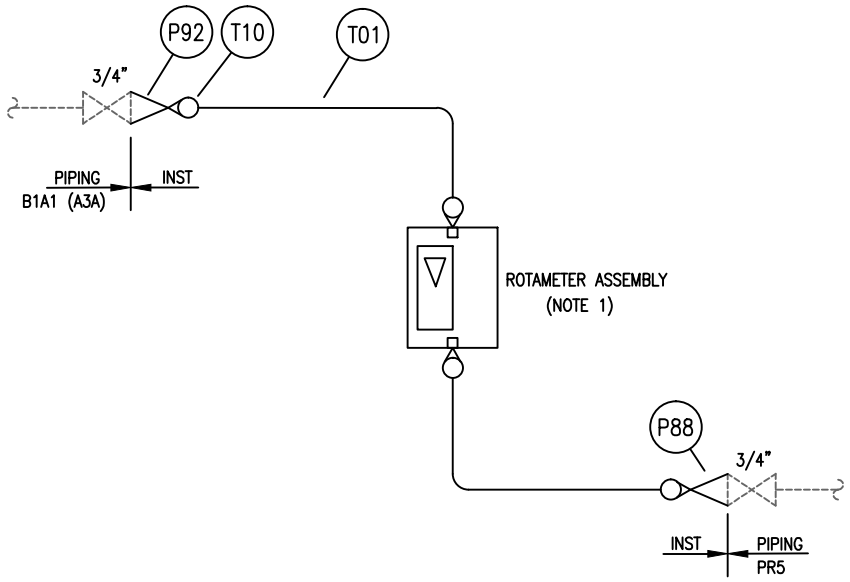
PIPING CLASS
MS-7

TAG NO.
1. FIF-24959



NOTES:-

1. ROTAMETER ASSEMBLY WITH FLOW CONTROL VALVE AT INLET & CHECK VALVE ON OUTLET AND SHALL BE IN ROTAMETER SUPPLIER'S SCOPE. THE FINAL CONNECTION SHALL BE 1/4" NPT(F).

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P88	ADAPTOR	3/4" SW x 1/4" NPT(F)	B366	1					
P92	ADAPTOR	3/4" SW x 1/4" NPT(F)	A105	1					
T01	TUBE	1/4" OD (0.049" THK)	SS316	10m					
T10	MALE TUBE CONNECTOR	1/4" NPT(M) x 1/4" OD	SS316	4					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
ROTAMETER ASSEMBLY

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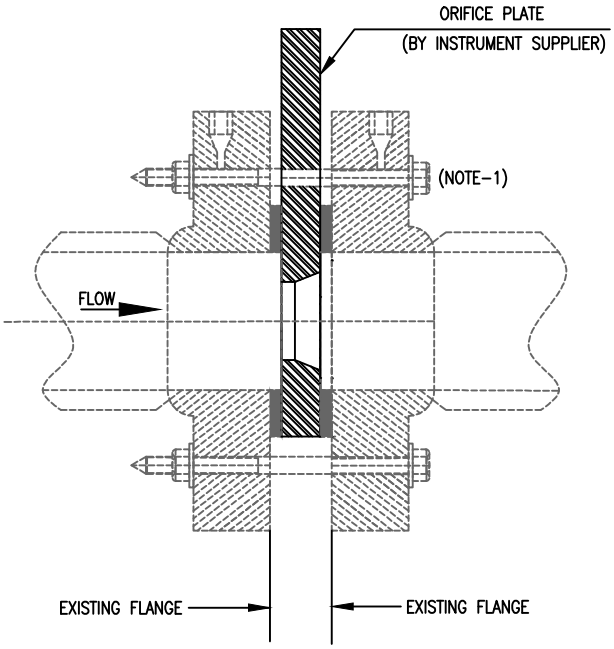
PIPING CLASS

TAG NO.
1. FE-24304
2. FE-24308
3. FE-24318
4. FE-24342
5. FE-24344
6. FE-24348
7. FE-24379
8. FE-24380
9. FE-24395
10. FE-24482



NOTES:-

1. GASKET, STUDS & NUTS SHALL BE BY PIPING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT

TRIUNE

INSTRUMENT HOOK UP DRAWINGS
ORIFICE PLATE DETAIL

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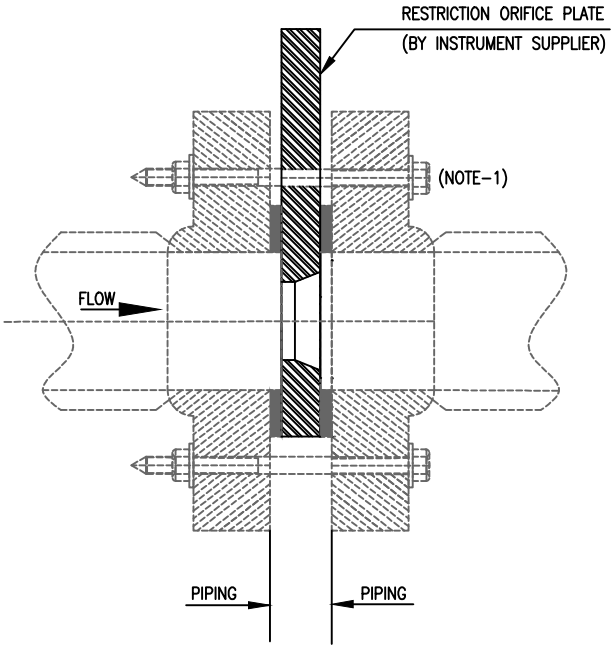
PIPING CLASS

TAG NO.
1. FO-24003
2. FO-24004
3. FO-24005
4. FO-24011
5. FO-24012
6. FO-24013
7. FO-24014
8. FO-24017
9. FO-24019A
10. FO-24019B
11. FO-24022
12. FO-24024A
13. FO-24024B
14. FO-24025
15. FO-2430A
16. FO-2430B



NOTES:-

1. GASKET, STUDS & NUTS SHALL BE BY PIPING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
RESTRICTION ORIFICE PLATE

Doc. Number	Rev.
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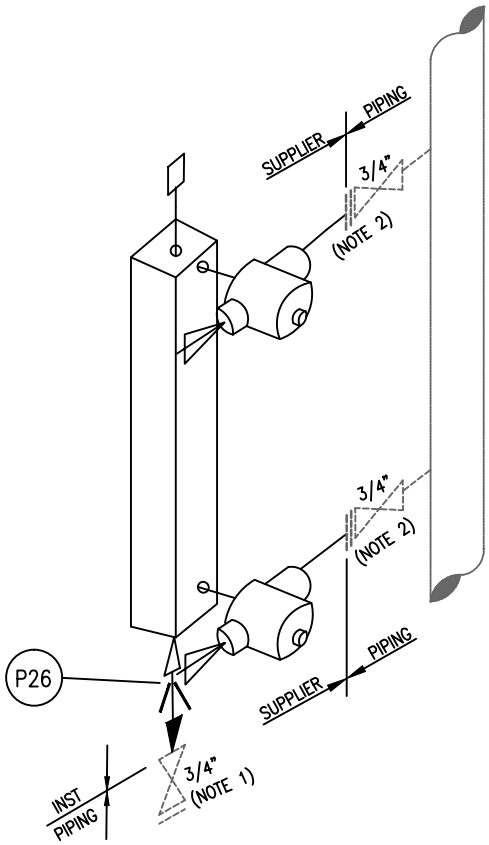
PIPING CLASS
B1A1 (A1A1)

TAG NO.
1. LG-24901A
2. LG-24901B



NOTES:-

1. 3/4" ISOLATION VALVE WITH BLIND FLANGE, GASKET, STUDS AND NUTS SHALL BE BY PIPING.
2. GASKET, STUDS AND NUTS SHALL BE BY PIPING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P26	SWAGE NIPPLE	3/4" PE x 1/2" NPT(M)	A 105	1					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
LEVEL GAUGE - REFLEX TYPE
(RECYCLE GAS CAOLESCER)

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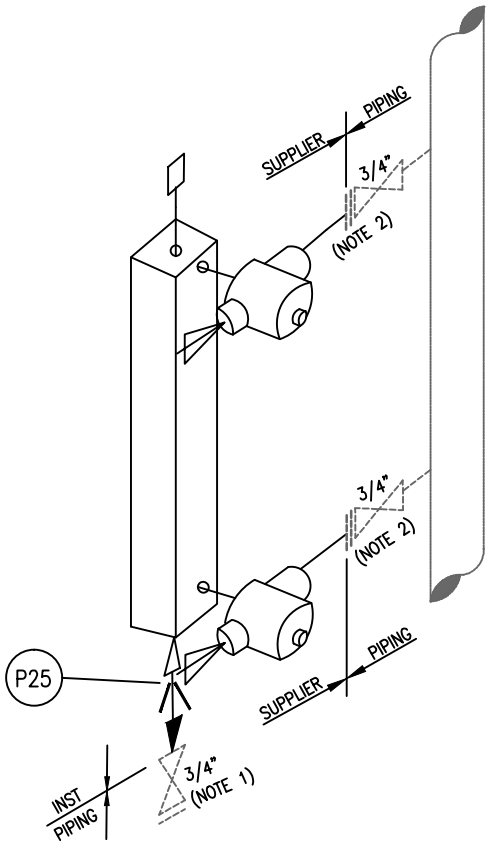
PIPING CLASS
B2A1

TAG NO.
1. LG-24902A
2. LG-24902B



NOTES:-

1. 3/4" ISOLATION VALVE WITH BLIND FLANGE, GASKET, STUDS AND NUTS SHALL BE BY PIPING.
2. GASKET, STUDS AND NUTS SHALL BE BY PIPING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P25	SWAGE NIPPLE	3/4" PE x 1/2" NPT(M)	A 105	1					A/R

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
LEVEL GAUGE - REFLEX TYPE
(BOOSTER GAS CAOLESCER)

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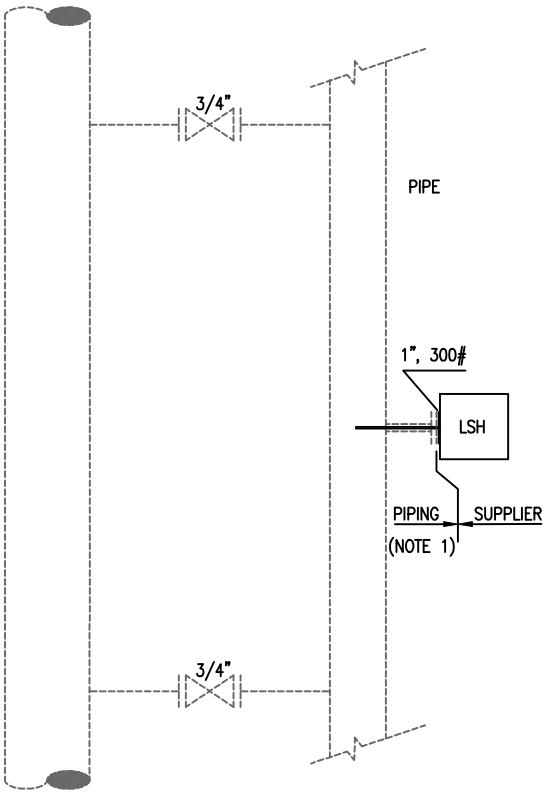
PIPING CLASS

TAG NO.
1. LSH-24953A
2. LSH-24953B
3. LSH-24954A
4. LSH-24954B



NOTES:-

1. GASKET, STUDS AND NUTS SHALL BE BY PIPING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
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INSTRUMENT HOOK UP DRAWINGS
LEVEL SWITCH – TUNING FORK TYPE
ON PIPE

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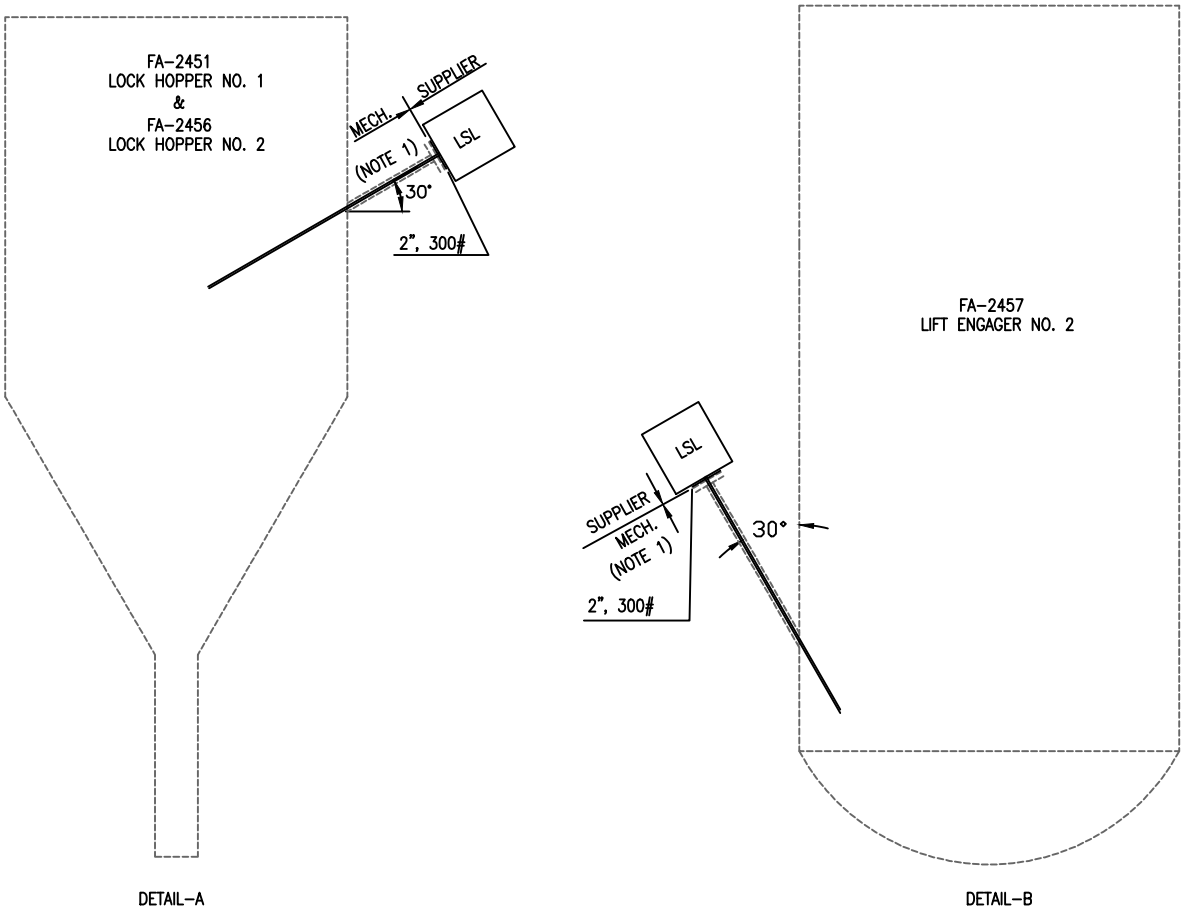
PIPING CLASS

TAG NO.
1. LSL-24951 (DETAIL-A)
2. LSL-24952 (DETAIL-A)
3. LSL-24957 (DETAIL-B)



NOTES:-

1. GASKET, STUDS AND NUTS SHALL BE BY PIPING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
LEVEL SWITCH - TUNING FORK TYPE
ON VESSEL NOZZLE

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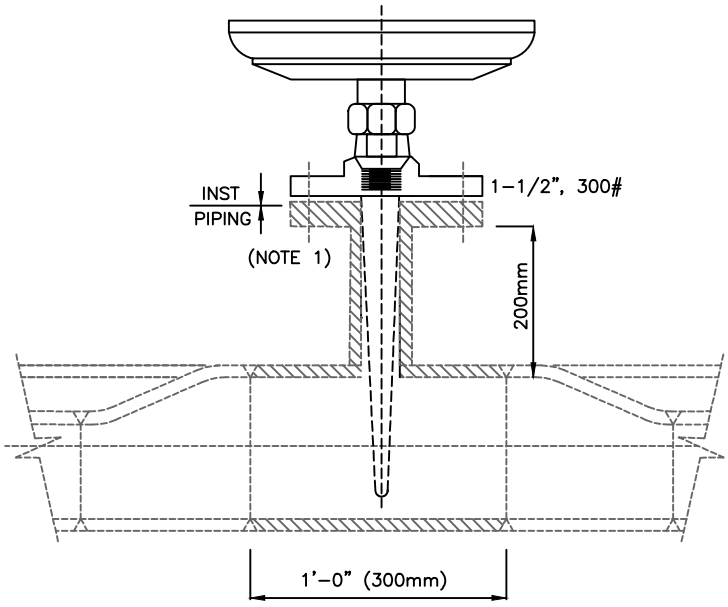
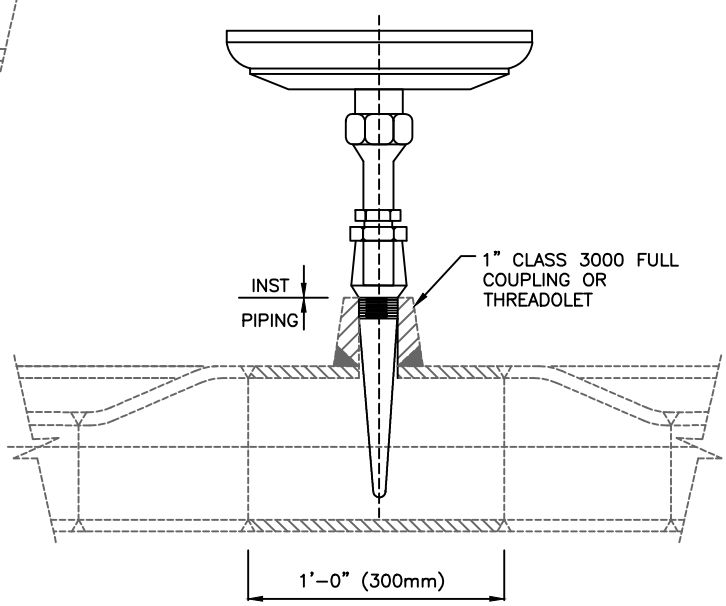
PIPING CLASS

TAG NO.
1. TI/TW-24968 (DETAIL-A)
2. TI/TW-24970 (DETAIL-B)
3. TI/TW-24971 (DETAIL-A)



TEMPERATURE GAUGE ASSEMBLY WITH FLANGED TYPE THERMOWELL

DETAIL-A



TEMPERATURE GAUGE ASSEMBLY WITH SCREWED TYPE THERMOWELL

DETAIL-B

NOTES:-

1. GASKET, STUDS AND NUTS (4 NOS. S.BOLT/HEX NUT) SHALL BE BY PIPING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
TEMPERATURE GAUGE ASSEMBLY

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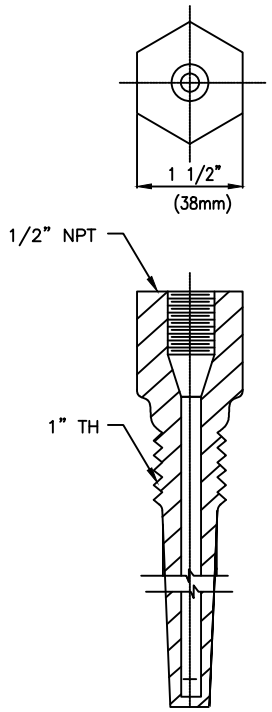
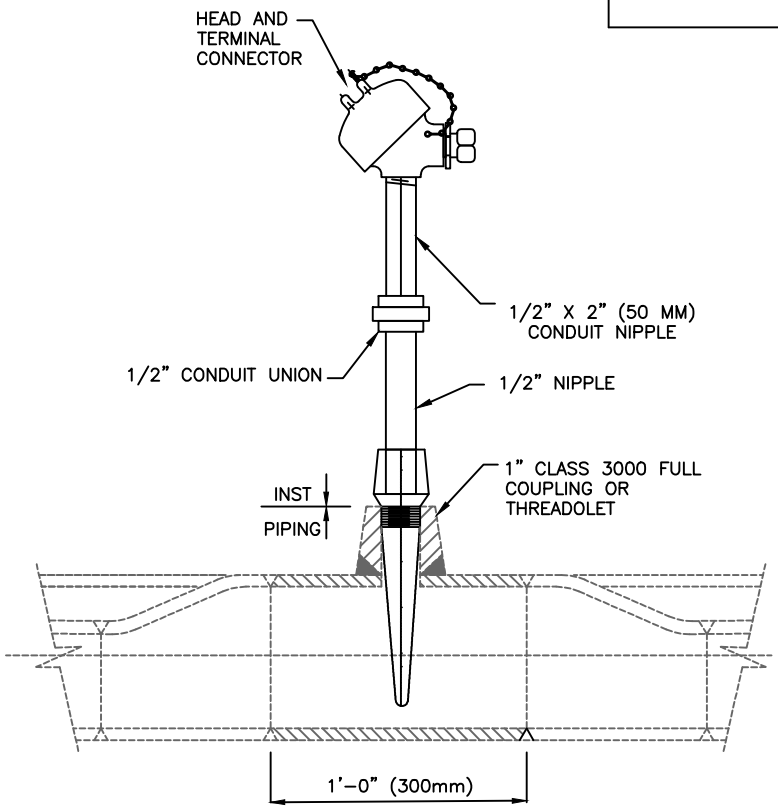
PIPING CLASS

TAG NO.
1. TE/TW-24922
2. TE/TW-24923
3. TE/TW-24926
4. TE/TW-24927



SCREWED THERMOWELL DETAIL



THERMOWELL & HEAD TERMINAL ASSEMBLY INSTALLATION

NOTES:-

1. MINIMUM OF 3'-0" (915mm) CLEAR SPACE FOR REMOVAL OF TEMPERATURE SENSOR.
2. REFER UOP PROJECT SPECIFICATION 9045932-606D SKETCH-D FOR THIS DRAWING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
THERMOCOUPLE-THERMOWELL
ASSEMBLY DETAIL

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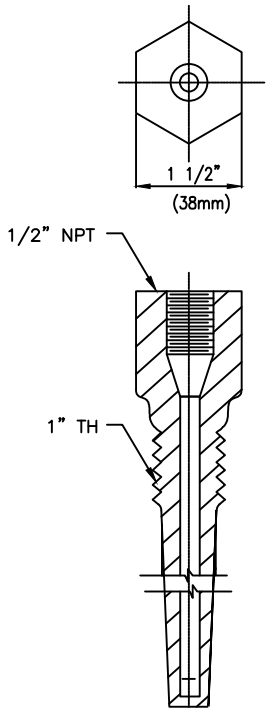
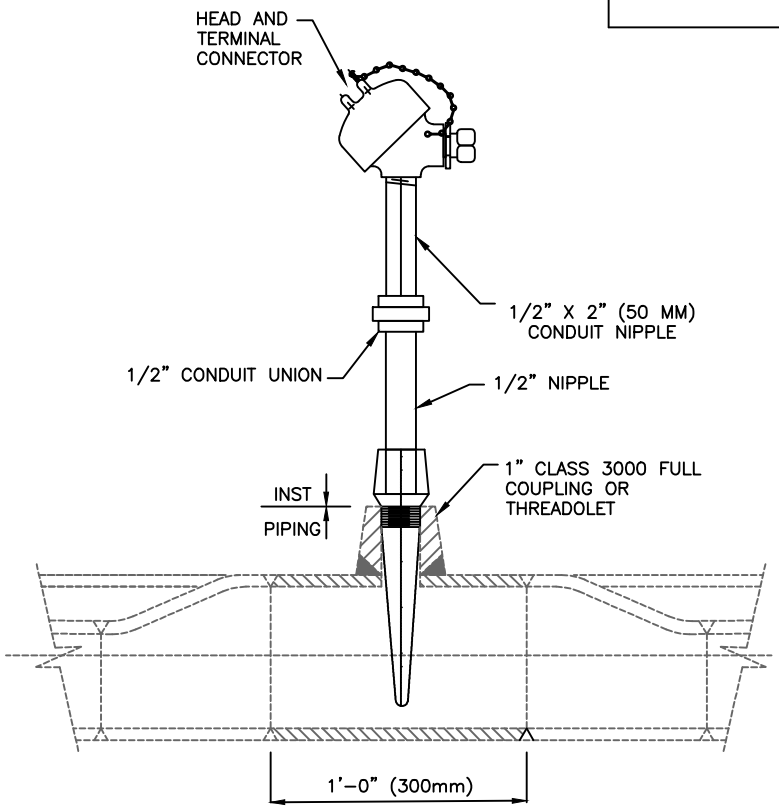
PIPING CLASS

TAG NO.
1. TE/TW-24921
2. TE/TW-24942
3. TE/TW-24962



SCREWED THERMOWELL DETAIL



THERMOWELL & HEAD TERMINAL ASSEMBLY INSTALLATION

NOTES:-

1. MINIMUM OF 3'-0" (915mm) CLEAR SPACE FOR REMOVAL OF TEMPERATURE SENSOR.
2. REFER UOP PROJECT SPECIFICATION 9045932-606D SKETCH-D FOR THIS DRAWING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
RTD-THERMOWELL ASSEMBLY DETAIL

Doc. Number	Rev.
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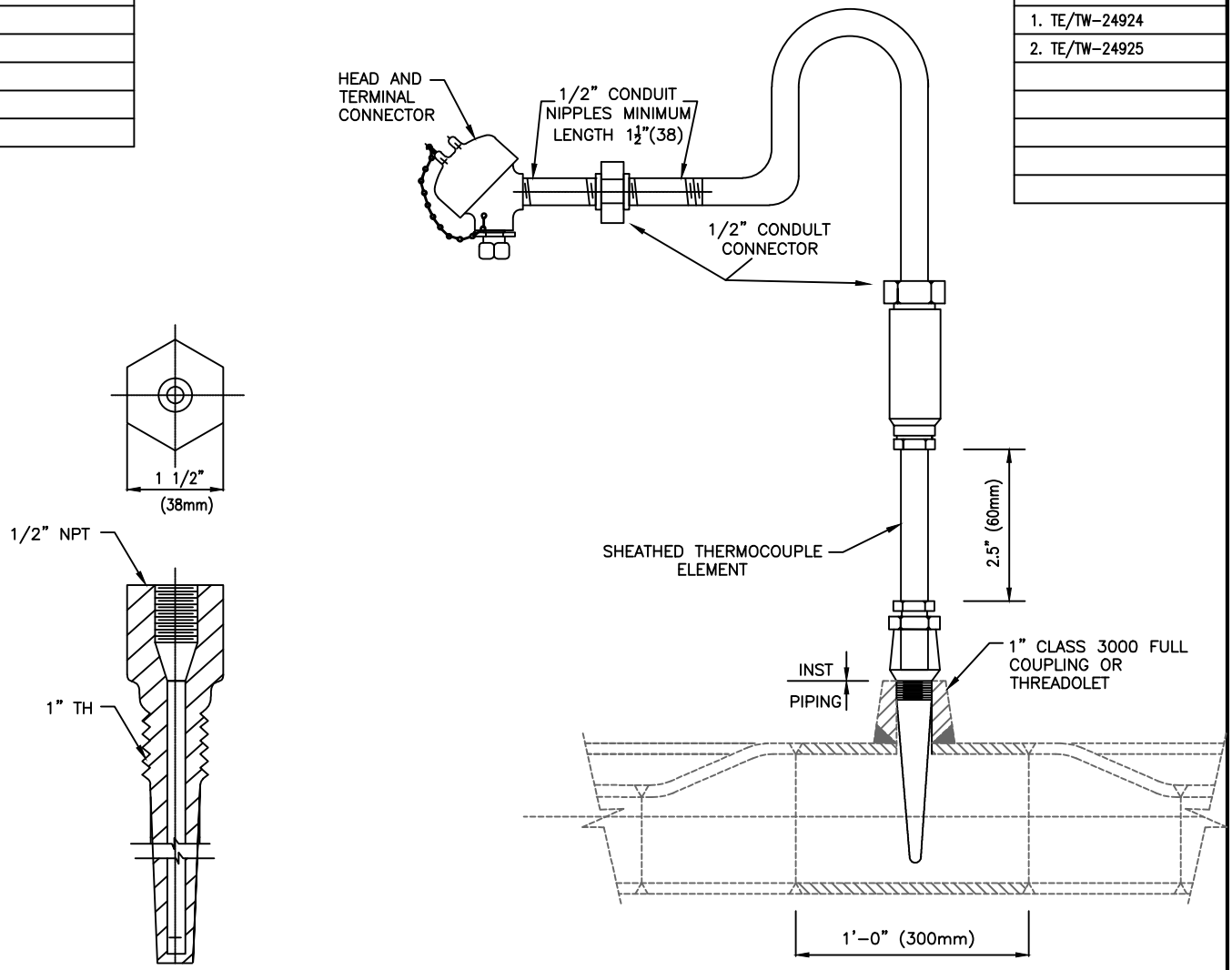
AutoCAD : C:\STANDARDS\CS\9675-24-09-A4-9001.DWG

PIPING CLASS

TAG NO.
1. TE/TW-24924
2. TE/TW-24925



SCREWED THERMOWELL DETAIL

THERMOWELL & HEAD TERMINAL ASSEMBLY INSTALLATION

NOTES:-

1. MINIMUM OF 3'-0" (915mm) CLEAR SPACE FOR REMOVAL OF TEMPERATURE SENSOR.
2. REFER UOP PROJECT SPECIFICATION 9045932-606D SKETCH-A FOR THIS DRAWING.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
RTD-THERMOWELL ASSEMBLY DETAIL

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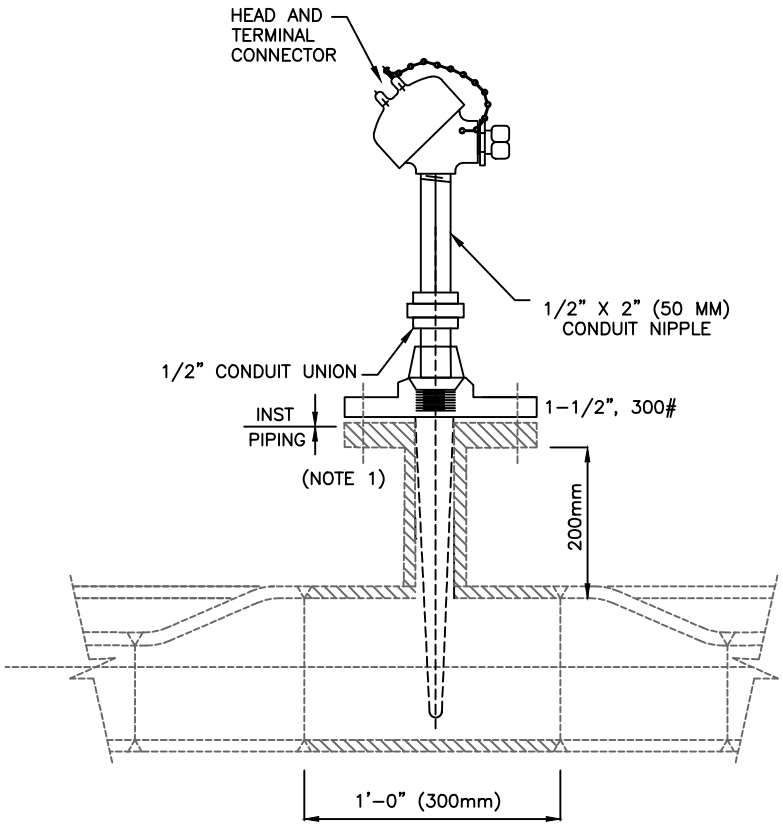
PIPING CLASS

TAG NO.
1. TE/TW-24966
2. TE/TW-24969



THERMOWELL & HEAD TERMINAL
ASSEMBLY INSTALLATION

NOTES:-

1. GASKET, STUDS AND NUTS (4 NOS. S.BOLT/HEX NUT) SHALL BE BY PIPING.
2. MINIMUM OF 3'-0" (915mm) CLEAR SPACE FOR REMOVAL OF TEMPERATURE SENSOR.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT

TRIUNE

INSTRUMENT HOOK UP DRAWINGS
RTD-THERMOWELL ASSEMBLY DETAIL

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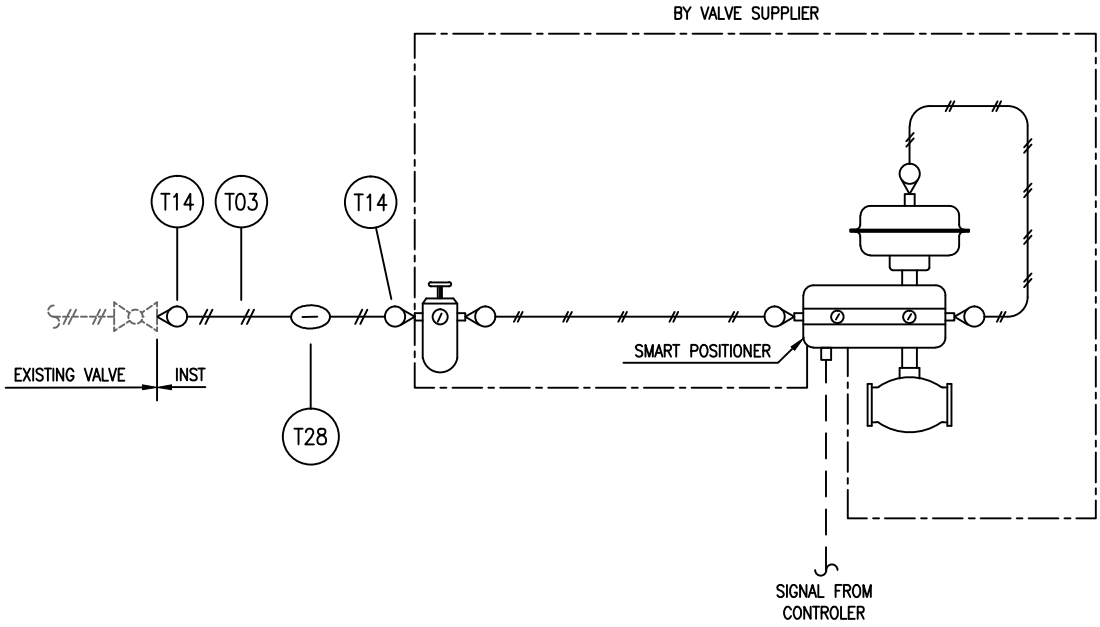
PIPING CLASS

TAG NO.
1. FV-24379
2. FV-24380
3. FV-24482
4. PV-24390
5. PDV-24354
6. TV-24373



NOTES:-

1. –

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
T03	TUBE	6mm OD (0.8mm THK)	SS 316	10m					
T14	MALE CONNECTOR	1/4" NPT(M) X 6mm OD	SS 316	2					
T28	TUBE UNION	6mm OD	SS 316	2					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT
TRIUNE

INSTRUMENT HOOK UP DRAWINGS
CONTROL VALVE

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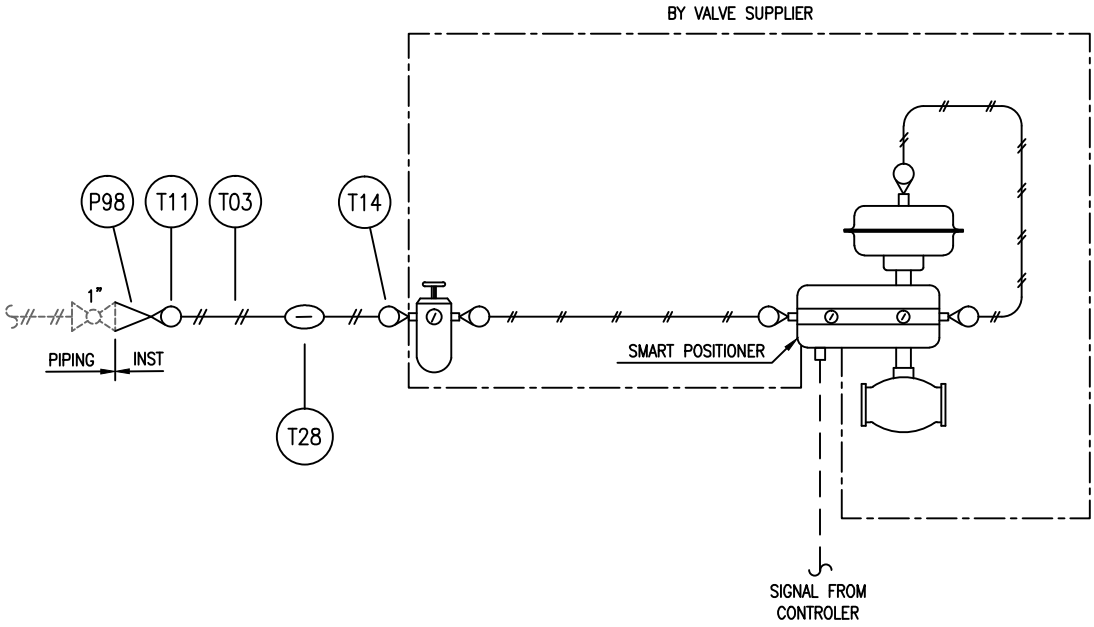
PIPING CLASS

TAG NO.
1. FV-24396
2. FV-24909
3. FV-24914
4. FV-24915
5. FV-24922
6. TV-24922
7. TV-24926



NOTES:-

1. -

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P98	ADAPTOR	1" NPT(M) x 1/2" NPT(F)	SS 316	1					
T03	TUBE	6mm OD (0.8mm THK)	SS 316	10m					
T11	MALE CONNECTOR	1/2" NPT(M) X 6mm OD	SS 316	1					
T14	MALE CONNECTOR	1/4" NPT(M) X 6mm OD	SS 316	1					
T28	TUBE UNION	6mm OD	SS 316	2					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT

TRIUNE

INSTRUMENT HOOK UP DRAWINGS
CONTROL VALVE

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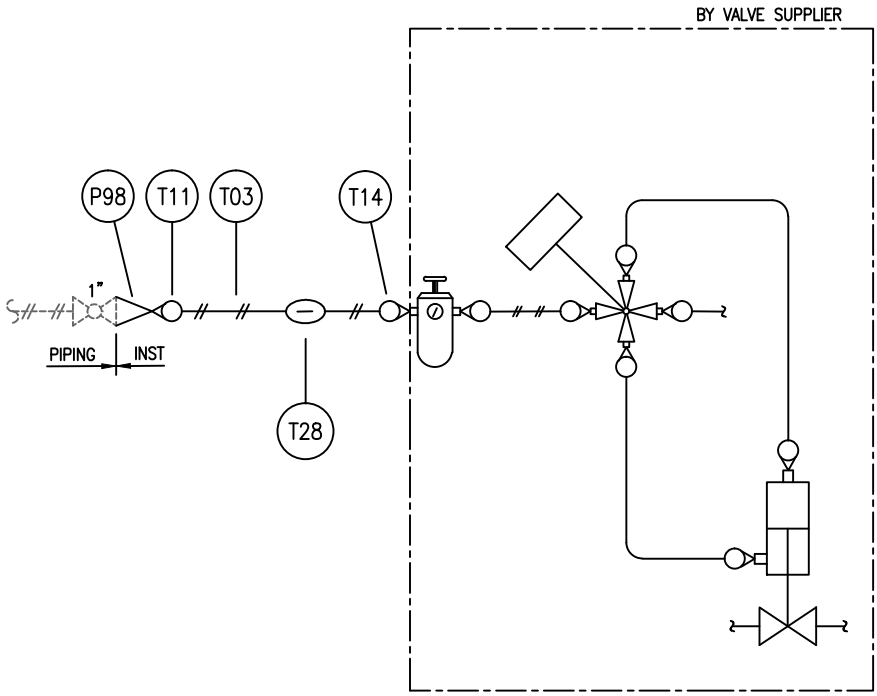
PIPING CLASS

TAG NO.
1. XV-24905



NOTES:-

1. –

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
P98	ADAPTOR	1" NPT(M) x 1/2" NPT(F)	SS 316	1					
T03	TUBE	6mm OD (0.8mm THK)	SS 316	10m					
T11	MALE CONNECTOR	1/2" NPT(M) X 6mm OD	SS 316	1					
T14	MALE CONNECTOR	1/4" NPT(M) X 6mm OD	SS 316	1					
T28	TUBE UNION	6mm OD	SS 316	2					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT

TRIUNE

INSTRUMENT HOOK UP DRAWINGS
ON/OFF VALVE

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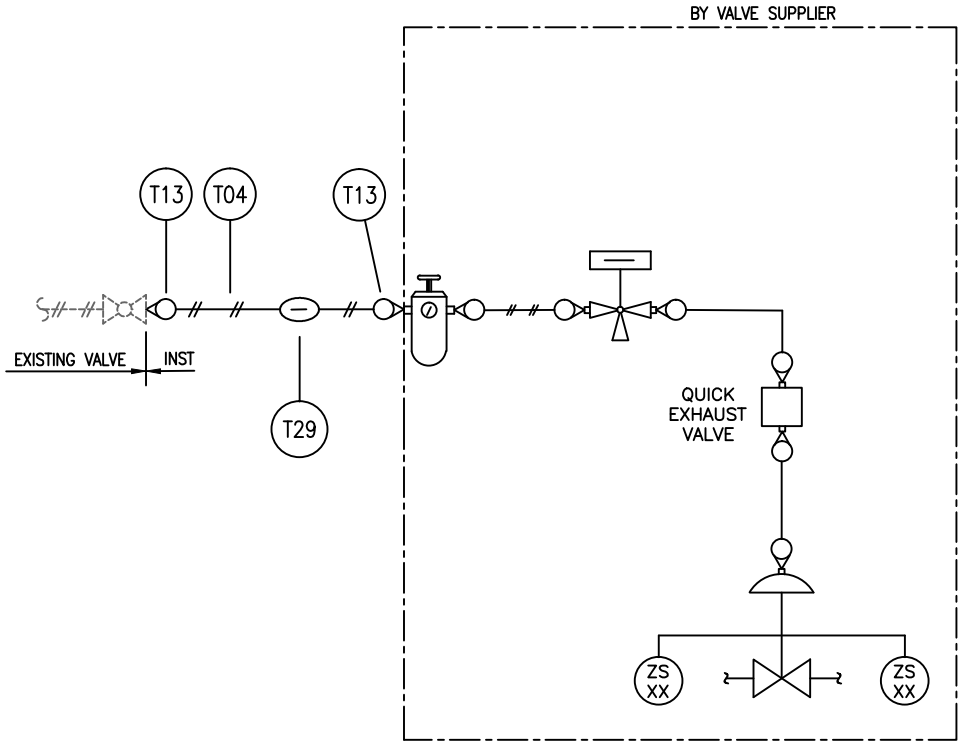
PIPING CLASS

TAG NO.
1. XV-24002
2. XV-24013
3. XV-24042
4. XV-24053
5. XV-24075
6. XV-24076



NOTES:-

1. –

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
T04	TUBE	12mm OD (1mm THK)	SS 316	10m					
T13	MALE CONNECTOR	1/4" NPT(M) X 12mm OD	SS 316	2					
T29	TUBE UNION	12mm OD	SS 316	2					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT

TRIUNE

INSTRUMENT HOOK UP DRAWINGS
ON/OFF VALVE

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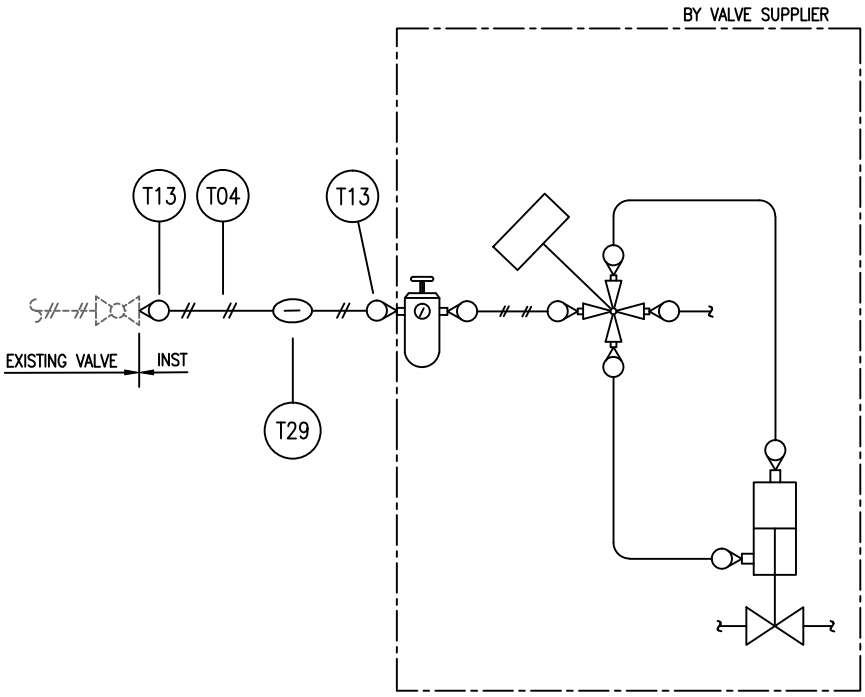
PIPING CLASS

TAG NO.
1. XV-24003
2. XV-24005
3. XV-24014
4. XV-24016
5. XV-24043
6. XV-24045
7. XV-24054
8. XV-24056



NOTES:-

1. -

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
T04	TUBE	12mm OD (1mm THK)	SS 316	10m					
T13	MALE CONNECTOR	1/4" NPT(M) X 12mm OD	SS 316	2					
T29	TUBE UNION	12mm OD	SS 316	2					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT

TRIUNE

INSTRUMENT HOOK UP DRAWINGS
ON/OFF VALVE

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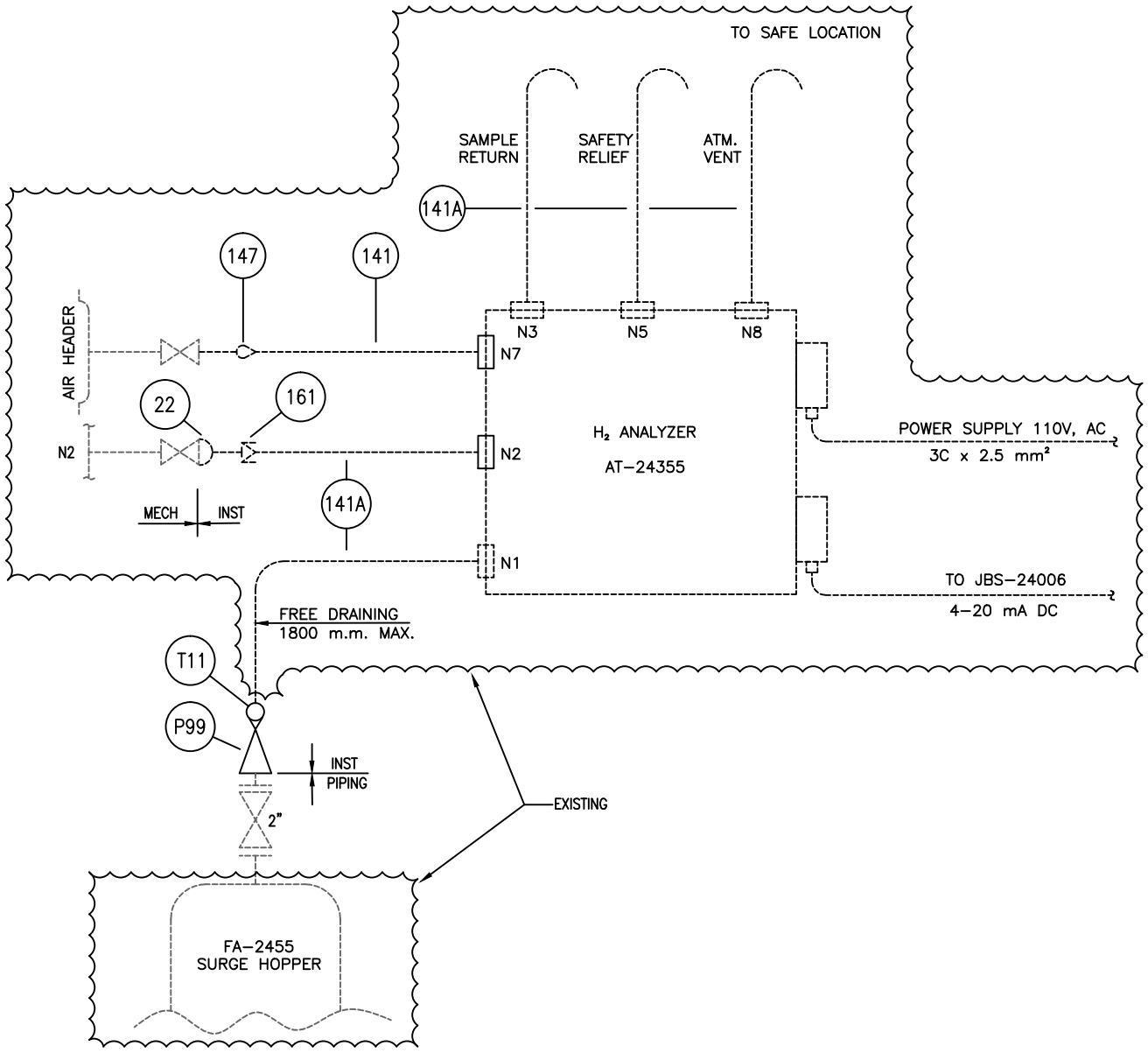
PIPING CLASS

TAG NO.
1. AT-24355_EXISTING



NOTES:-

1. -

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
N1	BULK HEAD	6mm OD	SS 316	1	147	MALE CONNECTOR	1/4" NPT(M) X 6mm OD	NI PLTD BRASS	1
N2	BULK HEAD	6mm OD	SS 316	1	161	FEMALE CONNECTOR	1/4" NPT(F) X 6mm OD	NI PLTD BRASS	2
N3	BULK HEAD	6mm OD	SS 316	1					
N5	BULK HEAD	6mm OD	SS 316	1	P99	ADAPTOR	2" SW x 1/2" NPT(F)	A105	1
N7	BULK HEAD	6mm OD	SS 316	1	T11	MALE CONNECTOR	1/2" NPT(M) X 6mm OD	SS316	1
N8	BULK HEAD	6mm OD	SS 316	1					
22	SWAGE NIPPLE	3/4" PL x 1/2" NPT(M)	SS 316	1					
25A	SWAGE NIPPLE	1" PL x 1/2" NPT(M)	SS 316	1					
141	TUBE (PVC COATED CU)	6mm OD	CU	A/R					
141A	TUBE (PVC COATED CU)	6mm OD	SS 316	A/R					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
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Honeywell UOP
UOP ENGINEERING DEPARTMENT

TRIUNE

INSTRUMENT HOOK UP DRAWINGS
HYDROGEN HYDROCARBON ANALYZER

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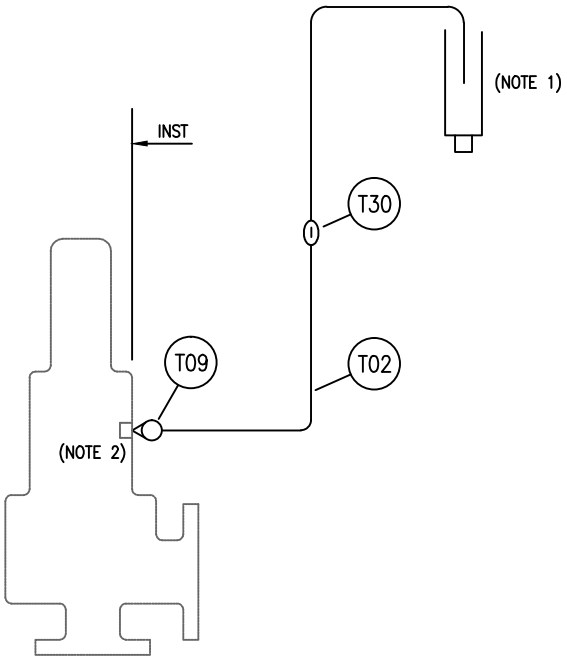
PIPING CLASS

TAG NO.
1. PSV-24052



NOTES:-

1. TO SAFE LOCATION AND PROTECT FROM WIND, RAIN AND INSECTS.
2. 1/2" NPT(F) BONNET VENT CONNECTION SHALL BE BY INSTRUMENT VENDOR.

BILL OF MATERIALS

ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.	ITEM NO.	DESCRIPTION	SIZE & END CONN.	MATERIAL	QTY.
T02	TUBE	1/2" OD (0.049" THK)	SS316	10MTR.					
T09	MALE CONNECTOR	1/2" NPT(M) x 1/2" OD	SS316	1 NO.					
T30	TUBE UNION	1/2" OD	SS316	2 NO.					

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	21.06.21	ISSUED FOR APPROVAL	PCN	VPA	SGS
A	01.03.21	ISSUED FOR REVIEW	PCN	VPA	SGS

Honeywell UOP
UOP ENGINEERING DEPARTMENT

TRIUNE

INSTRUMENT HOOK UP DRAWINGS
SAFETY VALVE – BALANCED BELLOW TYPE

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ANNEXURE-5

MANGALORE REFINERY AND PETROCHEMICALS LIMITED

LICENSOR:

Honeywell UOP

UOP ENGINEERING DEPARTMENT

CCR-1 REGENERATOR REVAMP PROJECT AT MRPL, MANGALURU

INSTRUMENT JUNCTION BOX WIRING DIAGRAM

A	28.06.21	ISSUED FOR REVIEW	PCN	VPA	SGS
Rev.	**Date**	**Description**	**Prpd.**	**Chkd.**	**Appd.**

Triune Energy Services Pvt. Ltd. **New Delhi**	**INSTRUMENT JUNCTION BOX WIRING DIAGRAM** **COVER SHEET**	**Document Number** / **Rev.** **9675-24 -09-A4-9006** / **A** **Sheet 1 of 27**

Excel

INDEX

SH NO.	DESCRIPTION	REVISON		SH NO.	DESCRIPTION	REVISON	
		A				A	
01	COVER SHEET	X		23	24-JBT-1001	X	
02	INDEX SHEET	X		24	24-JBT-1002	X	
03	GENERAL NOTES & REFERENCES	X		25	24-JBT-1003	X	
04	TAG NUMBER PHILOSPHY & ABBREVIATIONS	X		26	T/C-TRANSMITTER WIRING DETAIL	X	
				27	RTD-TRANSMITTER WIRING DETAIL	X	
05	24-JBA-1101	X					
06	24-JBA-1102	X					
07	24-JBA-1103	X					
08	24-JBA-1104	X					
09	24-JBA-1105	X					
10	24-JBA-1106	X					
11	24-JBA-1107	X					
12	24-JBA-1201	X					
13	24-JBA-1202	X					
14	24-JBA-2101	X					
15	24-JBA-2102	X					
16	24-JBA-2103	X					
17	24-JBA-2104	X					
18	24-JBA-2201	X					
19	24-JBD-1201	X					
20	24-JBD-2101	X					
21	24-JBD-2201	X					
22	24-JBS-2201	X					

GENERAL NOTES:

1) This wiring diagram is prepared for new instruments wired to new junction boxes. For instruments which will be replaced in this project shall utilize existing junction boxes and existing wiring scheme. Construction contractor to refer existing wiring drawing for such cases, obtaining the same from MRPL.

2) For Air Drier Package, Electric Air Heater Package and Signals between DCS/ LHCS and MCC, this document shall be further updated after receipt of wiring details from respective packages.

3) Marshalling Rack details shall be further updated after receipt of DCS and Lock Hopper Control System details.

4) 110V UPS power supply shall be fed to individual instruments from existing UPS PDB in SRR#7. Refer Dwg xxxx for outgoing feeder details to individual instrument. Power cable by Electrical.

5) Local Indicator FI-24917A shall be wired to transmitter FT-24917 as per wiring scheme.

6) All shield (SH) terminals are internally connected to Overall Shield (OS) terminal in junction Box.

REFERENCES

1) Cable schedule : 9675-09-CSC-001

2) I/O List - DCS : 9675-09-LT-001

3) I/O List - LHCS : 9675-09-LT-002

TAG NUMBER PHILOSPHY

1) JB NUMBER

24-JBX-ABYY

- YY : SEQUENCE NO. FROM (00 TO 99)
- B : "0" FOR TEMP ELEMENT JB
  "1" FOR IS TYPE JB
  "2" FOR NON-IS TYPE JB
- A : "1" FOR DCS JB
  "2" FOR LHCS JB
- X : "A" FOR ANALOG JB
  "D" FOR DIGITAL JB
  "T" FOR T/C JB
  "S" FOR SOLENOID JB

E.g. 24-JBA-1101 : ANALOG-DCS, IS TYPE, JUNCTION BOX

2) CABLE NUMBER

I-XXXX

- XXXX : INSTRUMENT / JB TAG NO.
- I : INSTRUMENTATION CABLE

ABBREVIATIONS

TYPE	DESC
BK	BLACK
WH	WHITE
RD	RED
GN	GREEN
SH	SHIELD
OS	OVER ALL SHIELD
C&T	CUT AND TAPE

CABLE DETAIL

TYPE	DESC
I	1 Pair x 1.5mm2 signal cable, OS, IS Type
II	1 Pair x 1.5mm2 signal cable, OS, Non-IS Type
III	2 Triad X 1.5mm2 signal cable, OS, IS Type
IV	2 Pair x 1.5mm2 K-Type T/C Cable, IS/OS, Non-IS Type
V	2 Pair x 1.5mm2 signal cable, OS, IS Type
VI	6 Pair x 1.5mm2 signal cable, IS/OS, IS Type
VII	6 Pair x 1.5mm2 signal cable, IS/OS, Non-IS Type
VIII	12 Pair x 1.5mm2 signal cable, IS/OS, IS Type
IX	12 Pair x 1.5mm2 signal cable, IS/OS, Non-IS Type
X	12 Pair x 1.5mm2 K-Type T/C Cable, IS/OS, Non-IS Type

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
FT-24909	+	BK	I-FT-24909 / TYPE-I (1P X 1.5 mm2)	1	BK-1	I-24-JBA-1101 / TYPE-VIII (12P X 1.5 mm2)	NEW DCS CAB.			
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
FV-24909	+	BK	I-FV-24909 / TYPE-I (1P X 1.5 mm2)	4	BK-2		NEW DCS CAB.			
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
FZT-24909	+	BK	I-FZT-24909 / TYPE-I (1P X 1.5 mm2)	7	BK-3		NEW DCS CAB.			
	-	WH		8	WH-3					
	C&T	OS		9	SH-3					
FT-24910	+	BK	I-FT-24910 / TYPE-I (1P X 1.5 mm2)	10	BK-4		NEW DCS CAB.			
	-	WH		11	WH-4					
	C&T	OS		12	SH-4					
FT-24922	+	BK	I-FT-24922 / TYPE-I (1P X 1.5 mm2)	13	BK-5		NEW DCS CAB.			
	-	WH		14	WH-5					
	C&T	OS		15	SH-5					
FV-24922	+	BK	I-FV-24922 / TYPE-I (1P X 1.5 mm2)	16	BK-6		NEW DCS CAB.			
	-	WH		17	WH-6					
	C&T	OS		18	SH-6					
FZT-24922	+	BK	I-FZT-24922 / TYPE-I (1P X 1.5 mm2)	19	BK-7		NEW DCS CAB.			
	-	WH		20	WH-7					
	C&T	OS		21	SH-7					
FV-24396	+	BK	I-FV-24396 / TYPE-I (1P X 1.5 mm2)	22	BK-8		NEW DCS CAB.			
	-	WH		23	WH-8					
	C&T	OS		24	SH-8					
FZT-24396	+	BK	I-FZT-24396 / TYPE-I (1P X 1.5 mm2)	25	BK-9		NEW DCS CAB.			
	-	WH		26	WH-9					
	C&T	OS		27	SH-9					
SPARE				28	BK-10					
				29	WH-10					
				30	SH-10					
SPARE				31	BK-11					
				32	WH-11					
				33	SH-11					
SPARE				34	BK-12					
				35	WH-12					
				36	SH-12					
				37						
				38						
				39						
				40	OS					

ONGC MRPL

TRIUNE

INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-1101

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

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FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
FV-24914	+	BK	I-FV-24914 / TYPE-I (1P X 1.5 mm2)	1	BK-1		NEW DCS CAB.			
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
FZT-24914	+	BK	I-FZT-24914 / TYPE-I (1P X 1.5 mm2)	4	BK-2		NEW DCS CAB.			
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
PDT-24920	+	BK	I-PDT-24920 / TYPE-I (1P X 1.5 mm2)	7	BK-3		NEW DCS CAB.			
	-	WH		8	WH-3					
	C&T	OS		9	SH-3					
SPARE				10	BK-4					
				11	WH-4					
				12	SH-4					
SPARE				13	BK-5					
				14	WH-5					
				15	SH-5					
SPARE				16	BK-6					
				17	WH-6					
				18	SH-6					
				19						
				20	OS	I-24-JBA-1102 / TYPE-VI (6P X 1.5 mm2)				

TRIUNE

INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-1102

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
FT-24915	+	BK	I-FT-24915 / TYPE-I (1P X 1.5 mm2)	1	BK-1	I-24-JBA-1103 / TYPE-VIII (12P X 1.5 mm2)	NEW DCS CAB.			
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
FV-24915	+	BK	I-FV-24915 / TYPE-I (1P X 1.5 mm2)	4	BK-2		NEW DCS CAB.			
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
FZT-24915	+	BK	I-FZT-24915 / TYPE-I (1P X 1.5 mm2)	7	BK-3		NEW DCS CAB.			
	-	WH		8	WH-3					
	C&T	OS		9	SH-3					
TT-24922	+	BK	I-TT-24922 / TYPE-I (1P X 1.5 mm2)	10	BK-4		NEW DCS CAB.			
	-	WH		11	WH-4					
	C&T	OS		12	SH-4					
TV-24922	+	BK	I-TV-24922 / TYPE-I (1P X 1.5 mm2)	13	BK-5		NEW DCS CAB.			
	-	WH		14	WH-5					
	C&T	OS		15	SH-5					
TZT-24922	+	BK	I-TZT-24922 / TYPE-I (1P X 1.5 mm2)	16	BK-6		NEW DCS CAB.			
	-	WH		17	WH-6					
	C&T	OS		18	SH-6					
TT-24924	+	BK	I-TT-24924 / TYPE-I (1P X 1.5 mm2)	19	BK-7		NEW DCS CAB.			
	-	WH		20	WH-7					
	C&T	OS		21	SH-7					
TT-24942	+	BK	I-TT-24942 / TYPE-I (1P X 1.5 mm2)	22	BK-8		NEW DCS CAB.			
	-	WH		23	WH-8					
	C&T	OS		24	SH-8					
SPARE				25	BK-9					
				26	WH-9					
				27	SH-9					
SPARE				28	BK-10					
				29	WH-10					
				30	SH-10					
SPARE				31	BK-11					
				32	WH-11					
				33	SH-11					
SPARE				34	BK-12					
				35	WH-12					
				36	SH-12					
				37						
				38						
				39						
				40	OS					

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-1103

DOCUMENT NO.	REV
9675-24-09-A4-9006	A
SHEET 7 OF 27	

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
FZT-24379	+	BK	I-FZT-24379 / TYPE-I (1P X 1.5 mm2)	1	BK-1	I-24-JBA-1104 / TYPE-VIII (12P X 1.5 mm2)	NEW DCS CAB.			
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
FZT-24380	+	BK	I-FZT-24380 / TYPE-I (1P X 1.5 mm2)	4	BK-2		NEW DCS CAB.			
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
FZT-24482	+	BK	I-FZT-24482 / TYPE-I (1P X 1.5 mm2)	7	BK-3		NEW DCS CAB.			
	-	WH		8	WH-3					
	C&T	OS		9	SH-3					
TZT-24373	+	BK	I-TZT-24373 / TYPE-I (1P X 1.5 mm2)	10	BK-4		NEW DCS CAB.			
	-	WH		11	WH-4					
	C&T	OS		12	SH-4					
PDI-24918	+	BK	I-PDI-24918 / TYPE-I (1P X 1.5 mm2)	13	BK-5		NEW DCS CAB.			
	-	WH		14	WH-5					
	C&T	OS		15	SH-5					
PDZT-24354	+	BK	I-PDZT-24354 / TYPE-I (1P X 1.5 mm2)	16	BK-6		NEW DCS CAB.			
	-	WH		17	WH-6					
	C&T	OS		18	SH-6					
PZT-24390	+	BK	I-PZT-24390 / TYPE-I (1P X 1.5 mm2)	19	BK-7		NEW DCS CAB.			
	-	WH		20	WH-7					
	C&T	OS		21	SH-7					
PDT-24919	+	BK	I-PDT-24919 / TYPE-I (1P X 1.5 mm2)	22	BK-8		NEW DCS CAB.			
	-	WH		23	WH-8					
	C&T	OS		24	SH-8					
SPARE				25	BK-9					
				26	WH-9					
				27	SH-9					
SPARE				28	BK-10					
				29	WH-10					
				30	SH-10					
SPARE				31	BK-11					
				32	WH-11					
				33	SH-11					
SPARE				34	BK-12					
				35	WH-12					
				36	SH-12					
				37						
				38						
				39						
				40	OS					

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-1104

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

SHEET 8 OF 27

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
PDT-24918	+	BK	I-PDT-24918 / TYPE-I (1P X 1.5 mm2)	1	BK-1	I-24-JBA-1105 / TYPE-VIII (12P X 1.5 mm2)	NEW DCS CAB.			
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
PDT-24955	+	BK	I-PDT-24955 / TYPE-I (1P X 1.5 mm2)	4	BK-2		NEW DCS CAB.			
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
PT-24962	+	BK	I-PT-24962 / TYPE-I (1P X 1.5 mm2)	7	BK-3		NEW DCS CAB.			
	-	WH		8	WH-3					
	C&T	OS		9	SH-3					
PT-24966	+	BK	I-PT-24966 / TYPE-I (1P X 1.5 mm2)	10	BK-4		NEW DCS CAB.			
	-	WH		11	WH-4					
	C&T	OS		12	SH-4					
TT-24926	+	BK	I-TT-24926 / TYPE-I (1P X 1.5 mm2)	13	BK-5		NEW DCS CAB.			
	-	WH		14	WH-5					
	C&T	OS		15	SH-5					
TV-24926	+	BK	I-TV-24926 / TYPE-I (1P X 1.5 mm2)	16	BK-6		NEW DCS CAB.			
	-	WH		17	WH-6					
	C&T	OS		18	SH-6					
TZT-24926	+	BK	I-TZT-24926 / TYPE-I (1P X 1.5 mm2)	19	BK-7		NEW DCS CAB.			
	-	WH		20	WH-7					
	C&T	OS		21	SH-7					
TT-24962	+	BK	I-TT-24962 / TYPE-I (1P X 1.5 mm2)	22	BK-8		NEW DCS CAB.			
	-	WH		23	WH-8					
	C&T	OS		24	SH-8					
SPARE				25	BK-9					
				26	WH-9					
				27	SH-9					
SPARE				28	BK-10					
				29	WH-10					
				30	SH-10					
SPARE				31	BK-11					
				32	WH-11					
				33	SH-11					
SPARE				34	BK-12					
				35	WH-12					
				36	SH-12					
				37						
				38						
				39						
				40	OS					

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-1105

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

SHEET 9 OF 27

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
PT-24969	+	BK	I-PT-24969 / TYPE-I (1P X 1.5 mm2)	1	BK-1		NEW DCS CAB.			
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
TT-24966	+	BK	I-TT-24966 / TYPE-I (1P X 1.5 mm2)	4	BK-2		NEW DCS CAB.			
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
TT-24969	+	BK	I-TT-24969 / TYPE-I (1P X 1.5 mm2)	7	BK-3		NEW DCS CAB.			
	-	WH		8	WH-3					
	C&T	OS		9	SH-3					
SPARE				10	BK-4					
				11	WH-4					
				12	SH-4					
SPARE				13	BK-5					
				14	WH-5					
				15	SH-5					
SPARE				16	BK-6					
				17	WH-6					
				18	SH-6					
				19						
				20	OS	I-24-JBA-1106 / TYPE-VI				
						(6P X 1.5 mm2)				

INSTRUMENT JUNCTION BOX WIRING DIAGRAM	DOCUMENT NO.	REV
JB NO. 24-JBA-1106	9675-24-09-A4-9006	A
	SHEET 10 OF 27	

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FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
PT-241003A	+	BK	I-PT-241003A / TYPE-I (1P X 1.5 mm2)	1	BK-1	I-24-JBA-1107 / TYPE-VI (6P X 1.5 mm2)	NEW DCS CAB.			
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
PT-241003B	+	BK	I-PT-241003B / TYPE-I (1P X 1.5 mm2)	4	BK-2		NEW DCS CAB.			
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
SPARE				7	BK-3					
				8	WH-3					
				9	SH-3					
SPARE				10	BK-4					
				11	WH-4					
				12	SH-4					
SPARE				13	BK-5					
				14	WH-5					
				15	SH-5					
SPARE				16	BK-6					
				17	WH-6					
				18	SH-6					
				19						
				20	OS					

INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-1107

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

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FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
AT-24956	+	BK	I-AT-24956 / TYPE-II (1P X 1.5 mm2)	1	BK-1		NEW DCS CAB.			NOTE-4
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
SPARE				4	BK-2					
				5	WH-2					
				6	SH-2					
SPARE				7	BK-3					
				8	WH-3					
				9	SH-3					
SPARE				10	BK-4					
				11	WH-4					
				12	SH-4					
SPARE				13	BK-5					
				14	WH-5					
				15	SH-5					
SPARE				16	BK-6					
				17	WH-6					
				18	SH-6					
				19						
				20	OS	I-24-JBA-1201 / TYPE-VII (6P X 1.5 mm2)				

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-1201

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLIN G RACK NO.	STRIP NO.	TM. NO.	
FT-24914	+	BK	I-FT-24914 / TYPE-II (1P X 1.5 mm2)	1	BK-1		NEW DCS CAB.			NOTE-4
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
SPARE				4	BK-2					
				5	WH-2					
				6	SH-2					
SPARE				7	BK-3					
				8	WH-3					
				9	SH-3					
SPARE				10	BK-4					
				11	WH-4					
				12	SH-4					
SPARE				13	BK-5					
				14	WH-5					
				15	SH-5					
SPARE				16	BK-6					
				17	WH-6					
				18	SH-6					
				19						
				20	OS	I-24-JBA-1202 / TYPE-VII (6P X 1.5 mm2)				

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-1202

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
PDT-24354	+	BK	I-PDT-24354 / TYPE-I (1P X 1.5 mm2)	1	BK-1	I-24-JBA-2101 / TYPE-VIII (12P X 1.5 mm2)	EXISTING LHCS CAB.			
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
TT-24921	+	BK	I-TT-24921 / TYPE-I (1P X 1.5 mm2)	4	BK-2		EXISTING LHCS CAB.			
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
TT-24923	+	BK	I-TT-24923 / TYPE-I (1P X 1.5 mm2)	7	BK-3		EXISTING LHCS CAB.			
	-	WH		8	WH-3					
	C&T	OS		9	SH-3					
TT-24925	+	BK	I-TT-24925 / TYPE-I (1P X 1.5 mm2)	10	BK-4		EXISTING LHCS CAB.			
	-	WH		11	WH-4					
	C&T	OS		12	SH-4					
TT-24927	+	BK	I-TT-24927 / TYPE-I (1P X 1.5 mm2)	13	BK-5		EXISTING LHCS CAB.			
	-	WH		14	WH-5					
	C&T	OS		15	SH-5					
SPARE				16	BK-6					
				17	WH-6					
				18	SH-6					
SPARE				19	BK-7					
				20	WH-7					
				21	SH-7					
SPARE				22	BK-8					
				23	WH-8					
				24	SH-8					
SPARE				25	BK-9					
				26	WH-9					
				27	SH-9					
SPARE				28	BK-10					
				29	WH-10					
				30	SH-10					
SPARE				31	BK-11					
				32	WH-11					
				33	SH-11					
SPARE				34	BK-12					
				35	WH-12					
				36	SH-12					
				37						
				38						
				39						
				40	OS					

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-2101

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

SHEET 14 OF 27

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
PDT-24433	+	BK	I-PDT-24433 / TYPE-I (1P X 1.5 mm2)	1	BK-1	I-24-JBA-2102 / TYPE-VIII (12P X 1.5 mm2)	EXISTING LHCS CAB.			
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
TXT-24934	+	BK	I-TXT-24934 / TYPE-I (1P X 1.5 mm2)	4	BK-2		EXISTING LHCS CAB.			
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
TXT-24936	+	BK	I-TXT-24936 / TYPE-I (1P X 1.5 mm2)	7	BK-3		EXISTING LHCS CAB.			
	-	WH		8	WH-3					
	C&T	OS		9	SH-3					
TXT-24938	+	BK	I-TXT-24938 / TYPE-I (1P X 1.5 mm2)	10	BK-4		EXISTING LHCS CAB.			
	-	WH		11	WH-4					
	C&T	OS		12	SH-4					
TXT-24940	+	BK	I-TXT-24940 / TYPE-I (1P X 1.5 mm2)	13	BK-5		EXISTING LHCS CAB.			
	-	WH		14	WH-5					
	C&T	OS		15	SH-5					
SPARE				16	BK-6					
				17	WH-6					
				18	SH-6					
SPARE				19	BK-7					
				20	WH-7					
				21	SH-7					
SPARE				22	BK-8					
				23	WH-8					
				24	SH-8					
SPARE				25	BK-9					
				26	WH-9					
				27	SH-9					
SPARE				28	BK-10					
				29	WH-10					
				30	SH-10					
SPARE				31	BK-11					
				32	WH-11					
				33	SH-11					
SPARE				34	BK-12					
				35	WH-12					
				36	SH-12					
				37						
				38						
				39						
				40	OS					

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-2102

DOCUMENT NO.	REV
9675-24-09-A4-9006	A
SHEET 15 OF 27	

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
	+	BK	I-FT-24921 / TYPE-I	1	BK-1		EXISTING LHCS			
FT-24921	-	WH	(1P X 1.5 mm2)	2	WH-1		CAB.			
	C&T	OS		3	SH-1					
				4	BK-2					
SPARE				5	WH-2					
				6	SH-2					
				7	BK-3					
SPARE				8	WH-3					
				9	SH-3					
				10	BK-4					
SPARE				11	WH-4					
				12	SH-4					
				13	BK-5					
SPARE				14	WH-5					
				15	SH-5					
				16	BK-6					
SPARE				17	WH-6					
				18	SH-6					
				19						
				20	OS	I-24-JBA-2103 / TYPE-VI				
						(6P X 1.5 mm2)				

TRIUNE

INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-2103

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

SHEET 16 OF 27

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
TT-24369A	+	BK	I-TT-24369A / TYPE-I (1P X 1.5 mm2)	1	BK-1	I-24-JBA-2104 / TYPE-VIII (12P X 1.5 mm2)	EXISTING LHCS CAB.			
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
TT-24369B	+	BK	I-TT-24369B / TYPE-I (1P X 1.5 mm2)	4	BK-2		EXISTING LHCS CAB.			
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
TT-24369C	+	BK	I-TT-24369C / TYPE-I (1P X 1.5 mm2)	7	BK-3		EXISTING LHCS CAB.			
	-	WH		8	WH-3					
	C&T	OS		9	SH-3					
TT-24369D	+	BK	I-TT-24369D / TYPE-I (1P X 1.5 mm2)	10	BK-4		EXISTING LHCS CAB.			
	-	WH		11	WH-4					
	C&T	OS		12	SH-4					
TT-24369E	+	BK	I-TT-24369E / TYPE-I (1P X 1.5 mm2)	13	BK-5		EXISTING LHCS CAB.			
	-	WH		14	WH-5					
	C&T	OS		15	SH-5					
TT-24369F	+	BK	I-TT-24369F / TYPE-I (1P X 1.5 mm2)	16	BK-6		EXISTING LHCS CAB.			
	-	WH		17	WH-6					
	C&T	OS		18	SH-6					
TT-24455A	+	BK	I-TT-24455A / TYPE-I (1P X 1.5 mm2)	19	BK-7		EXISTING LHCS CAB.			
	-	WH		20	WH-7					
	C&T	OS		21	SH-7					
TT-24455B	+	BK	I-TT-24455B / TYPE-I (1P X 1.5 mm2)	22	BK-8		EXISTING LHCS CAB.			
	-	WH		23	WH-8					
	C&T	OS		24	SH-8					
TT-24455C	+	BK	I-TT-24455C / TYPE-I (1P X 1.5 mm2)	25	BK-9		EXISTING LHCS CAB.			
	-	WH		26	WH-9					
	C&T	OS		27	SH-9					
SPARE				28	BK-10					
				29	WH-10					
				30	SH-10					
SPARE				31	BK-11					
				32	WH-11					
				33	SH-11					
SPARE				34	BK-12					
				35	WH-12					
				36	SH-12					
				37						
				38						
				39						
				40	OS					

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-2104

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

SHEET 17 OF 27

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
FT-24917	+	BK	I-FT-24917 / TYPE-II (1P X 1.5 mm2)	1	BK-1		EXISTING LHCS CAB.			NOTE-4
	-	WH		2						
	C&T	OS		3	SH-1					
FI-24917A	+	BK	I-FI-24917A / TYPE-II (1P X 1.5 mm2)	4						NOTE-5
	-	WH		5	WH-1					
	C&T	OS		6						
SPARE				7	BK-2					
				8	WH-2					
				9	SH-2					
SPARE				10	BK-3					
				11	WH-3					
				12	SH-3					
SPARE				13	BK-4					
				14	WH-4					
				15	SH-4					
SPARE				16	BK-5					
				17	WH-5					
				18	SH-5					
				19						
				20	OS	I-24-JBA-2201 / TYPE-VII (6P X 1.5 mm2)				

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TRIUNE

INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBA-2201

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
LSH-24953A	+	BK	I-LSH-24953A / TYPE-II (1P X 1.5 mm2)	1	BK-1		NEW DCS CAB.			NOTE-4
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
LSH-24953B	+	BK	I-LSH-24953B / TYPE-II (1P X 1.5 mm2)	4	BK-2		NEW DCS CAB.			NOTE-4
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
LSH-24954A	+	BK	I-LSH-24954A / TYPE-II (1P X 1.5 mm2)	7	BK-3		NEW DCS CAB.			NOTE-4
	-	WH		8	WH-3					
	C&T	OS		9	SH-3					
LSH-24954B	+	BK	I-LSH-24954B / TYPE-II (1P X 1.5 mm2)	10	BK-4		NEW DCS CAB.			NOTE-4
	-	WH		11	WH-4					
	C&T	OS		12	SH-4					
SPARE				13	BK-5					
				14	WH-5					
				15	SH-5					
SPARE				16	BK-6					
				17	WH-6					
				18	SH-6					
				19						
				20	OS	I-24-JBD-1201 / TYPE-VII (6P X 1.5 mm2)				

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBD-1201

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

SHEET 19 OF 27

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	**TM NO.**	**WIRE IDEN.**	**CABLE NO. / CABLE TYPE (SPEC)**	**TM. NO.**	**WIRE IDEN.**	**CABLE NO. / CABLE TYPE (SPEC)**	**MARSHALLING RACK NO.**	**STRIP NO.**	**TM. NO.**	
ZS-24905A	+	BK-1		1	BK-1		EXISTING LHCS CAB.			
	-	WH-1		2	WH-1					
			I-ZS-24905A/B / TYPE-V (2P X 1.5 mm2)	3	SH-1					
ZS-24905B	+	BK-2		4	BK-2		EXISTING LHCS CAB.			
	-	WH-2		5	WH-2					
	C&T	OS		6	SH-2					
SPARE				7	BK-3					
				8	WH-3					
				9	SH-3					
SPARE				10	BK-4					
				11	WH-4					
				12	SH-4					
SPARE				13	BK-5					
				14	WH-5					
				15	SH-5					
SPARE				16	BK-6					
				17	WH-6					
				18	SH-6					
				19						
				20	OS	I-24-JBD-2101 / TYPE-VI (6P X 1.5 mm2)				

TRIUNE

INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBD-2101

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
LSL-24951	+	BK	I-LSL-24951 / TYPE-II (1P X 1.5 mm2)	1	BK-1		EXISTING LHCS CAB.			NOTE-4
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
LSL-24952	+	BK	I-LSL-24952 / TYPE-II (1P X 1.5 mm2)	4	BK-2		EXISTING LHCS CAB.			NOTE-4
	-	WH		5	WH-2					
	C&T	OS		6	SH-2					
LSL-24957	+	BK	I-LSL-24957 / TYPE-II (1P X 1.5 mm2)	7	BK-3		EXISTING LHCS CAB.			NOTE-4
	-	WH		8	WH-3					
	C&T	OS		9	SH-3					
SPARE				10	BK-4					
				11	WH-4					
				12	SH-4					
SPARE				13	BK-5					
				14	WH-5					
				15	SH-5					
SPARE				16	BK-6					
				17	WH-6					
				18	SH-6					
				19						
				20	OS	I-24-JBD-2201 / TYPE-VII (6P X 1.5 mm2)				

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBD-2201

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
XY-24905	+	BK	I-XY-24905 / TYPE-II (1P X 1.5 mm2)	1	BK-1		EXISTING LHCS CAB.			
	-	WH		2	WH-1					
	C&T	OS		3	SH-1					
SPARE				4	BK-2					
				5	WH-2					
				6	SH-2					
SPARE				7	BK-3					
				8	WH-3					
				9	SH-3					
SPARE				10	BK-4					
				11	WH-4					
				12	SH-4					
SPARE				13	BK-5					
				14	WH-5					
				15	SH-5					
SPARE				16	BK-6					
				17	WH-6					
				18	SH-6					
				19						
				20	OS	I-24-JBS-2201 / TYPE-VII (6P X 1.5 mm2)				

TRIUNE

INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBS-2201

DOCUMENT NO.	REV
9675-24-09-A4-9006	A
SHEET 22 OF 27	

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
TXE-24935A,B	+	GN-1	I-TXE-24935A,B / TYPE-IV (2P X 1.5 mm2)	1	GN-1	I-24-JBT-1001 / TYPE-X (12P X 1.5 mm2)	NEW DCS CAB.			
	-	WH-1		2	WH-1					
	C&T	SH-1		3	SH-1					
	+	GN-2		4	GN-2					
	-	WH-2		5	WH-2					
	C&T	SH-2/OS		6	SH-2					
TXE-24937A,B	+	GN-1	I-TXE-24937A,B / TYPE-IV (2P X 1.5 mm2)	7	GN-3		NEW DCS CAB.			
	-	WH-1		8	WH-3					
	C&T	SH-1		9	SH-3					
	+	GN-2		10	GN-4					
	-	WH-2		11	WH-4					
	C&T	SH-2/OS		12	SH-4					
TXE-24939A,B	+	GN-1	I-TXE-24939A,B / TYPE-IV (2P X 1.5 mm2)	13	GN-5		NEW DCS CAB.			
	-	WH-1		14	WH-5					
	C&T	SH-1		15	SH-5					
	+	GN-2		16	GN-6					
	-	WH-2		17	WH-6					
	C&T	SH-2/OS		18	SH-6					
TXE-24941A,B	+	GN-1	I-TXE-24941A,B / TYPE-IV (2P X 1.5 mm2)	19	GN-7		NEW DCS CAB.			
	-	WH-1		20	WH-7					
	C&T	SH-1		21	SH-7					
	+	GN-2		22	GN-8					
	-	WH-2		23	WH-8					
	C&T	SH-2/OS		24	SH-8					
SPARE				25	GN-9					
				26	WH-9					
				27	SH-9					
SPARE				28	GN-10					
				29	WH-10					
				30	SH-10					
SPARE				31	GN-11					
				32	WH-11					
				33	SH-11					
SPARE				34	GN-12					
				35	WH-12					
				36	SH-12					
				37						
				38						
				39						
				40	OS					

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBT-1001

DOCUMENT NO.	REV
9675-24-09-A4-9006	A
SHEET 23 OF 27	

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
TXE-24928	+	GN-1	I-TXE-24928 / TYPE-IV (2P X 1.5 mm2)	1	GN-1	I-24-JBT-1002 / TYPE-X (12P X 1.5 mm2)	NEW DCS CAB.			
	-	WH-1		2	WH-1					
	C&T	SH-1		3	SH-1					
	+	GN-2		4	GN-2					
	-	WH-2		5	WH-2					
	C&T	SH-2/OS		6	SH-2					
TXE-24929	+	GN-1	I-TXE-24929 / TYPE-IV (2P X 1.5 mm2)	7	GN-3		NEW DCS CAB.			
	-	WH-1		8	WH-3					
	C&T	SH-1		9	SH-3					
	+	GN-2		10	GN-4					
	-	WH-2		11	WH-4					
	C&T	SH-2/OS		12	SH-4					
TXE-24930	+	GN-1	I-TXE-24930 / TYPE-IV (2P X 1.5 mm2)	13	GN-5		NEW DCS CAB.			
	-	WH-1		14	WH-5					
	C&T	SH-1		15	SH-5					
	+	GN-2		16	GN-6					
	-	WH-2		17	WH-6					
	C&T	SH-2/OS		18	SH-6					
SPARE				19	GN-7					
				20	WH-7					
				21	SH-7					
SPARE				22	GN-8					
				23	WH-8					
				24	SH-8					
SPARE				25	GN-9					
				26	WH-9					
				27	SH-9					
SPARE				28	GN-10					
				29	WH-10					
				30	SH-10					
SPARE				31	GN-11					
				32	WH-11					
				33	SH-11					
SPARE				34	GN-12					
				35	WH-12					
				36	SH-12					
				37						
				38						
				39						
				40	OS					

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBT-1002

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

SHEET 24 OF 27

FIELD INSTRUMENT		BRANCH CABLE		JB	MULTI PAIR CABLE		SRR #7			REMARKS
TAG NO.	TM NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	TM. NO.	WIRE IDEN.	CABLE NO. / CABLE TYPE (SPEC)	MARSHALLING RACK NO.	STRIP NO.	TM. NO.	
TXE-24931	+	GN-1	I-TXE-24931 / TYPE-IV (2P X 1.5 mm2)	1	GN-1	I-24-JBT-1003 / TYPE-X (12P X 1.5 mm2)	NEW DCS CAB.			
	-	WH-1		2	WH-1					
	C&T	SH-1		3	SH-1					
	+	GN-2		4	GN-2					
	-	WH-2		5	WH-2					
	C&T	SH-2/OS		6	SH-2					
TXE-24932	+	GN-1	I-TXE-24932 / TYPE-IV (2P X 1.5 mm2)	7	GN-3		NEW DCS CAB.			
	-	WH-1		8	WH-3					
	C&T	SH-1		9	SH-3					
	+	GN-2		10	GN-4					
	-	WH-2		11	WH-4					
	C&T	SH-2/OS		12	SH-4					
TXE-24933	+	GN-1	I-TXE-24933 / TYPE-IV (2P X 1.5 mm2)	13	GN-5		NEW DCS CAB.			
	-	WH-1		14	WH-5					
	C&T	SH-1		15	SH-5					
	+	GN-2		16	GN-6					
	-	WH-2		17	WH-6					
	C&T	SH-2/OS		18	SH-6					
SPARE				19	GN-7					
				20	WH-7					
				21	SH-7					
SPARE				22	GN-8					
				23	WH-8					
				24	SH-8					
SPARE				25	GN-9					
				26	WH-9					
				27	SH-9					
SPARE				28	GN-10					
				29	WH-10					
				30	SH-10					
SPARE				31	GN-11					
				32	WH-11					
				33	SH-11					
SPARE				34	GN-12					
				35	WH-12					
				36	SH-12					
				37						
				38						
				39						
				40	OS					

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

JB NO. 24-JBT-1003

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

SHEET 25 OF 27

WIRING SCHEME FOR T/C TO TRANSMITTER (TYPICAL)

T/C TM NO.* (A)		WIRE IDENTIFICATION	TE-TT CABLE* (B)	TRANSMITTER* (C)
SENSOR-1	+	GN-1	TYPE-IV (2P X 1.5 mm2)	1
	-	WH-1		2
	C&T	SH-1		3 (C&T)
SENSOR-2	+	GN-2		6
	-	WH-2		5
	C&T	SH-2/OS		4 (C&T)

* REFER BELOW TABLE FOR TAG NOS.

T/C TAG NO. (A)	CABLE NO. (B)	TT TAG NO. (C)
TE-24922	I-TE-24922	TT-24922
TE-24923	I-TE-24923	TT-24923
TE-24926	I-TE-24926	TT-24926
TE-24927	I-TE-24927	TT-24927

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INSTRUMENT JUNCTION BOX WIRING DIAGRAM

T/C-TRANSMITTER WIRING DETAIL

DOCUMENT NO.	REV
9675-24-09-A4-9006	A

SHEET 26 OF 27

WIRING SCHEME FOR RTD TO TRANSMITTER (TYPICAL)

RTD TM NO.* (A)		WIRE IDENTIFICATION	TE-TT CABLE* (B)	TRANSMITTER* (C)
SENSOR-1	B	BK-1	TYPE-III (2T X 1.5 mm2)	1
	B	WH-1		2
	Y	RD-1		3
SENSOR-2	R	BK-2		6
	R	WH-2		5
	W	RD-2		4
C&T		OS		C&T

* REFER BELOW TABLE FOR TAG NOS.

T/C TAG NO. (A)	CABLE NO. (B)	TT TAG NO. (C)
TE-24921	I-TE-24921	TT-24921
TE-24924	I-TE-24924	TT-24924
TE-24925	I-TE-24925	TT-24925
TE-24942	I-TE-24942	TT-24942
TE-24962	I-TE-24962	TT-24962
TE-24966	I-TE-24966	TT-24966
TE-24969	I-TE-24969	TT-24969

ANNEXURE-6

MANGALORE REFINERY AND PETROCHEMICALS LIMITED

LICENSOR:

UOP ENGINEERING DEPARTMENT

CCR-1 REGENERATOR REVAMP PROJECT AT MRPL, MANGALURU

INSTRUMENTATION-
SCHEDULE OF QUANTITY : SUPPLY-FREE ISSUED MATERIAL

Rev.	Date	Description	Prpd.	Chkd.	Appd.
2	02.07.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
1	11.05.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
0	16.03.21	ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS

Triune Energy Services Pvt. Ltd. New Delhi	Project : CCR-1 REGENERATOR REVAMP PROJECT AT MRPL, MANGALURU Customer : MRPL / Job No. : 9675	INSTRUMENTATION- SCHEDULE OF QUANTITY : SUPPLY-FREE ISSUED MATERIAL	Document Number: 9675-09-SOQ-003 / Rev.: 2 Sheet 1 of 4

Excel

NOTES:

1) Contractor is advised to read this document of SOQ in conjunction with the Scope of Work (Ref doc no: 9675-09-SOW-001) specification, drawings and vendor drawings (submitted by the manufacturer) referred in tender document for complete understanding of his scope for supply, erection, installation and modification, rectification, replacement work (as applicable), mechanical completion, assistance in commissioning, PGTR and handing over of CCR-1 unit.

2) Construction activity on inspection and testing as applicable referring to Scope of Work (Ref doc no: 9675-09-SOW-001), drawings, specification and standards included in tender document shall be included in Contractor's scope.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
2	02.07.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
1	11.05.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
0	16.03.21	ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS

Triune Energy Services Pvt. Ltd. New Delhi	INSTRUMENTATION- SCHEDULE OF QUANTITY : SUPPLY-FREE ISSUED MATERIAL	Standard Number	Rev.	
		9675-09-SOQ-003	2	
S.No.	**Item Description**	**Units**	**Quantity**	**Remarks**
1	DCS CABINETS		As per MR	
2	PRESSURE SAFETY VALVES		As per MR	
3	CONTROL VALVES		As per MR	
4	PRESSURE REGULATORS		As per MR	
5	ACTUATED ON-OFF VALVE- LHCS		As per MR	
6	CORIOLIS MASS FLOWMETER		As per MR	
7	LEVEL SWITCH TUNING FORK		As per MR	
8.0	**FIELD INSTRUMENTS**			
8.1	FIELD TRANSMITTERS		As per MR	Rev. 2
8.2	FLOW ELEMENT ORIFICE & RESTRICTION ORIFICE		As per MR	Rev. 2
8.3	ROTAMETERS		As per MR	Rev. 2
8.4	LEVEL GAUGES		As per MR	Rev. 2
8.5	PRESSURE GAUGES & TEMPERATURE GAUGES WITH THERMOWELLS		As per MR	Rev. 2
8.6	TEMPERATURE ELEMENTS (RTD/TC) WITH THERMOWELLS		As per MR	Rev. 2
8.7	ORIFICE METER RUN ASSEMBLY		As per MR	Rev. 2
9	NUCLEAR LEVEL INSTRUMENT PARTS		As per MR	
10	SPECIAL THERMOCOUPLE ELEMENTS WITH ASSEMBLY		As per MR	
11	I/O HARDWARE FOR LOCK HOPPER CONTROL SYSTEM		As per MR	
12	ACTUATED ON-OFF VALVES - VEE-PORT BALL TYPE		As per MR	
13	JUNCTION BOXES		As per MR	
14	INSTRUMENT CABLES		As per MR	
15.0	**BULK ITEMS : Free-issued Pipe & pipe fittings** items in Steel of various types and specifications			Rev. 2
15.1	ADAPTOR, 0.75 INCH PE X 0.50 INCH SW, ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, H2	Nos.	5	Rev. 2
15.2	ADAPTOR, 0.75 INCH PE X 0.50 INCH NPT(F), ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	Nos.	5	Rev. 2
15.3	ADAPTOR, 0.75 INCH PE X 0.25 INCH NPT(F), ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	Nos.	10	Rev. 2
15.4	ADAPTOR, 0.75 INCH PE X 0.50 INCH SW, ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	Nos.	10	Rev. 2
15.5	ADAPTOR, 0.75 INCH PE X 0.25 INCH NPT(F), ASTM A182 GR F316, ASME B16.11, SEAMLESS, CL. 3000#, S80	Nos.	10	Rev. 2
15.6	ADAPTOR, 0.75 INCH PE X 0.50 INCH SW, ASTM B366 GR.WPNCI, ASME B16.11, SEAMLESS CL. 3000#, S40	Nos.	5	Rev. 2
15.7	ADAPTOR, 1 INCH NPT(M) X 0.50 INCH NPT(F), SS316, SEAMLESS, CL. 3000#	Nos.	15	Rev. 2
15.8	ADAPTOR, 2 INCH BW X 0.50 INCH NPT(F), ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80	Nos.	5	Rev. 2
15.9	ADAPTOR, 0.75 INCH PE X 0.25 INCH NPT(F), ASTM B366 GR.WPNCI, ASME B16.11, SEAMLESS CL. 3000#, S40	Nos.	5	Rev. 2
15.10	CAP, 0.50 INCH, ASTM A105, ASME B16.11, NPT(F), CL. 3000#, S80	Nos.	20	Rev. 2
15.11	CAP, 0.50 INCH, ASTM A105, ASME B16.11, NPT(F), CL. 3000#, S80, H2	Nos.	10	Rev. 2
15.12	ELBOW 135 DEG, 0.50 INCH, ASTM B366 GR.WPNCI, ASME B16.11, SW, CL. 3000#	Nos.	10	Rev. 2
15.13	ELBOW 135 DEG, 0.50 INCH, ASTM A105, ASME B16.11, SW, CL. 3000#, S80	Nos.	15	Rev. 2
15.14	ELBOW 135 DEG, 0.50 INCH, ASTM A105, ASME B16.11, SW, CL. 3000#, S80, H2	Nos.	15	Rev. 2
15.15	ELBOW 90 DEG, 0.50 INCH, ASTM A182 GR F316, ASME B16.11, SW, CL. 3000#, S80	Nos.	10	Rev. 2
15.16	ELBOW 90 DEG, 0.50 INCH, ASTM A105, ASME B16.11, SW, CL. 3000#, S80	Nos.	40	Rev. 2
15.17	ELBOW 90 DEG, 0.50 INCH, ASTM B366 GR.WPNCI, ASME B16.11, SW, CL. 3000#	Nos.	10	Rev. 2
15.18	ELBOW 90 DEG, 0.50 INCH, ASTM A105, ASME B16.11, SW, CL. 3000#, S80, H2	Nos.	30	Rev. 2
15.19	FLANGE, 0.50 INCH, ASTM A105, ASME B16.5, RF, CL. 300#, SW, S80, H2	Nos.	25	Rev. 2
15.20	FLANGE, 0.50 INCH, ASTM A105, ASME B16.5, RF, CL. 300#, SW, S80	Nos.	40	Rev. 2

Triune Energy Services Pvt. Ltd. New Delhi	INSTRUMENTATION- SCHEDULE OF QUANTITY : SUPPLY-FREE ISSUED MATERIAL	Standard Number	Rev.	
		9675-09-SOQ-003	2	
S.No.	**Item Description**	**Units**	**Quantity**	**Remarks**
15.21	FLANGE, 0.50 INCH, ASTM B564 UNS N06600, ASME B16.5, RF, CL. 150#, WN, S40	Nos.	10	Rev. 2
15.22	GASKET, 0.50 INCH, SPR.WND. SS 304 + Grafoil Filler, ASME B16.20, CL.300#, 4.5 MM THK	Nos.	30 SET	Rev. 2
15.23	GASKET, 0.75 INCH, SPR.WND. + UNS N06600 WINDINGS, THERMICULITE® 835 FILLER, ASME B16.20, CL.150#, 4.5 MM THK	Nos.	5 SET	Rev. 2
15.24	GATE VALVE, 0.50 INCH, ASTM A105/SH, BB, OS&Y, SHEET-51001, API 602, SW, CL. 800#	Nos.	5	Rev. 2
15.25	GATE VALVE, 0.50 INCH, ASTM B166 N06600/HF ,BB, OS&Y, SHEET-51076, SW, CL. 150#	Nos.	5	Rev. 2
15.26	GATE VALVE, 0.50 INCH, ASTM A105 /SH, BB,OS&Y, SHEET-51004, API 602, SW, CL. 800#, H2	Nos.	5	Rev. 2
15.27	GLOBE VALVE, 0.50 INCH, ASTM A105/SH, BB, OS&Y, SHEET-52001, BS-5352, SW, CL. 800#	Nos.	10	Rev. 2
15.28	LATERAL TEE, 0.50 INCH, ASTM A105, ASME B16.11, SW, CL. 3000#, S80	Nos.	20	Rev. 2
15.29	LATERAL TEE, 0.50 INCH, ASTM A105, ASME B16.11, SW, CL. 3000#, S80, H2	Nos.	10	Rev. 2
15.30	NIPPLE, 0.50 INCH PE X 0.50 INCH PE, ASTM A105, ASME B16.11, CL. 3000#, S80, 100MM LONG	Nos.	15	Rev. 2
15.31	NIPPLE, 0.50 INCH PE X 0.50 INCH PE, ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, 100MM LONG, H2	Nos.	10	Rev. 2
15.32	NIPPLE, 0.50 INCH PE X 0.50 INCH NPT(M), ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, 100MM LONG, H2	Nos.	30	Rev. 2
15.33	NIPPLE, 0.50 INCH PE X 0.50 INCH NPT(M), ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, 100MM LONG	Nos.	40	Rev. 2
15.34	NIPPLE, 0.50 INCH PE X 0.50 INCH NPT(M), ASTM A182 GR F316, ASME B16.11, SEAMLESS, CL. 3000#, S80, 100MM LONG	Nos.	5	Rev. 2
15.35	NIPPLE, 0.50 INCH PE X 0.50 INCH NPT(M), ASTM B366 GR.WPNCI, ASME B16.11, SEAMLESS CL. 3000#, S40, 100MM LONG	Nos.	5	Rev. 2
15.36	NIPPLE, 0.25 INCH PE X 0.25 INCH NPT(M), ASTM B366 GR.WPNCI, ASME B16.11, SEAMLESS, CL. 3000#, S40, 100MM LONG	Nos.	5	Rev. 2
15.37	NIPPLE, 0.25 INCH PE X 0.25 INCH NPT(M), ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, 100MM LONG	Nos.	5	Rev. 2
15.38	PIPE, 0.50 INCH, ASTM A106 GR.B, ASME B36.10M, PE, SEAMLESS, S80, H2	Meter	150	Rev. 2
15.39	PIPE, 0.50 INCH, ASTM A106 GR.B, ASME B36.10M, PE, SEAMLESS, S80	Meter	200	Rev. 2
15.40	PIPE, 0.50 INCH, ASTM A312 GR TP316, ASME B36.19M, PE, SEAMLESS, S80	Meter	10	Rev. 2
15.41	PIPE, 0.50 INCH, ASTM B167 N06600, ASME B36.19M, PE, SEAMLESS, S40	Meter	30	Rev. 2
15.42	REDUCING TEE, 0.50 INCH X 0.25 INCH, ASTM B366 GR.WPNCI, ASME B16.11, SW, CL. 3000#	Nos.	5	Rev. 2
15.43	STUD BOLT WITH 2 NUTS, ASTM A193 GR.B7 / ASTM A194 GR.2H, ASME B18.2, 0.50 INCH X 65MM LONG	Nos.	30 SET	Rev. 2
15.44	STUD BOLT WITH 2 NUTS, ASTM A193 GR.B16 / ASTM A194 GR.4, ASME B18.2, 0.50 INCH X 65 MM LONG	Nos.	5 SET	Rev. 2
15.45	SWAGE NIPPLE, 0.75 INCH PE X 0.50 INCH NPT(M), ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, 100MM LONG, H2	Nos.	10	Rev. 2
15.46	SWAGE NIPPLE, 0.75 INCH PE X 0.50 INCH NPT(M), ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, 100MM LONG	Nos.	15	Rev. 2
15.47	SWAGE NIPPLE, 0.75 INCH PE X 0.50 INCH PE, ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, 100MM LONG	Nos.	10	Rev. 2
15.48	SWAGE NIPPLE, 0.75 INCH PE X 0.50 INCH PE, ASTM A105, ASME B16.11, SEAMLESS, CL. 3000#, S80, 100MM LONG, H2	Nos.	10	Rev. 2
15.49	SWAGE NIPPLE, 0.75 INCH PE X 0.50 INCH PE, ASTM A182 GR F316, ASME B16.11, SEAMLESS, CL. 3000#, S80, 100MM LONG	Nos.	5	Rev. 2

ANNEXURE-7

MANGALORE REFINERY AND PETROCHEMICALS LIMITED

LICENSOR:

Honeywell UOP
UOP ENGINEERING DEPARTMENT

CCR-1 REGENERATOR REVAMP PROJECT AT MRPL, MANGALURU

INSTRUMENTATION-
SCHEDULE OF QUANTITY : SUPPLY BULK ITEMS
(BY CONTRACTOR)

Rev.	Date	Description	Prpd.	Chkd.	Appd.
3	02.07.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
2	21.05.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
1	11.05.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
0	16.03.21	ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS

Triune Energy Services Pvt. Ltd. New Delhi	Project : CCR-1 REGENERATOR REVAMP PROJECT AT MRPL, MANGALURU Customer : MRPL	Job No. : 9675	INSTRUMENTATION- SCHEDULE OF QUANTITY : SUPPLY BULK ITEMS

Document Number	Rev.
9675-09-SOQ-001	3
Sheet 1 of 3	

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NOTES:

1) Contractor is advised to read this document of SOQ in conjunction with the Scope of Work (Ref doc no: 9675-09-SOW-001) specification, drawings and vendor drawings (submitted by the manufacturer) referred in tender document for complete understanding of his scope for supply, erection, installation and modification, rectification, replacement work (as applicable), mechanical completion, assistance in commissioning, PGTR and handing over of CCR-1 unit.

2) Quantity given in this document describes the system requirement for the purpose of progressive billing / Invoicing by the contractor for supply of bulk material / items, as stated in drawings and documents to perform construction, inspection, testing commissioning, and assistance in successful performance guarantee test run (by others) and facilitate handing over of acceptable system of CCR-1 to MRPL.

3) Contractor may add for the margins as required in the quantity and supply it to site to meet the construction / modification, replacement & rectification requirement at site. Construction Contractor and / or his sub- contractor(s) will be permitted to take back the surplus material / item supplied by him or his sub contractor(s) post approval from MRPL and after due reconciliation of the material and meeting all contractual commitments at site.

4) All consumables required to destruct & construct of CCR-1 not included in SOQ specifically, however, it is required to be provided by the construction contractor as defined in scope of work and the respective drawings included in the tender document".

5) Inspection and testing of bulk material shall be as per Inspection Requirement Table available in Tender document.

6) Instrument/ Junction Box installation material is not listed in this document. However, Contractor shall consider the bulk items like stanchion, base plate, flat bars and others as per Instrument Installation Drawing No. 9675-24-09-A4-9002 included in Tender Document.

Rev.	Date	Description	Prpd.	Chkd.	Appd.
3	02.07.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
2	21.05.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
1	11.05.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
0	16.03.21	ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS

Triune Energy Services Pvt. Ltd. New Delhi	**Project : CCR-1 REGENERATOR REVAMP PROJECT AT MRPL, MANGALURU** **Customer : MRPL** / **Job No. : 9675**	**INSTRUMENTATION- SCHEDULE OF QUANTITY : SUPPLY BULK ITEMS**	**Document Number** 9675-09-SOQ-001 / **Rev.** 3 Sheet 2 of 3

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Triune Energy Services Pvt. Ltd. New Delhi	INSTRUMENTATION- SCHEDULE OF QUANTITY : SUPPLY BULK ITEMS	Standard Number	Rev.	
		9675-09-SOQ-001	3	
		Sheet 3 of 3		

S.No.	Long description	Units	Quantity	Remarks
	BULK SUPPLY ITEMS			
1.0	**Contractor shall supply Cable Glands of various types and specifications**			
1.1	M20 Double compression type Cable gland, weatherproof, Exe, SS316 material with PVC shroud	Nos.	150	Rev. 3
1.2	M20 Double compression type Cable gland, Flameproof, Exd, SS316 material with PVC shroud	Nos.	70	Rev. 3
1.3	M25 Double compression type Cable gland, weatherproof, Exe, SS316 material with PVC shroud	Nos.	150	Rev. 3
1.4	M25 Double compression type Cable gland, Flameproof, Exd, SS316 material with PVC shroud	Nos.	25	Rev. 3
1.5	M32 Double compression type Cable gland, weatherproof, Exe, SS316 material with PVC shroud	Nos.	75	Rev. 3
1.6	M32 Double compression type Cable gland, Flameproof, Exd, SS316 material with PVC shroud	Nos.	10	
2.0	**Contractor shall supply compression tube, tube fittings, piping items in Stainless Steel of various types and specifications**			
2.1	TUBE, 1/4" OD (0.049" THK), SS316	Meter	100	
2.2	TUBE, 1/2" OD (0.049" THK), SS316	Meter	25	Rev. 3
2.3	TUBE, 6mm OD (0.8mm THK), SS316	Meter	180	
2.4	TUBE, 12mm OD (1mm THK), SS316	Meter	180	
2.5	MALE TUBE CONNECTOR, 1/2" NPT(M) x 1/2" OD, SS316	Nos.	10	Rev. 3
2.6	MALE TUBE CONNECTOR, 1/4" NPT(M) x 1/4" OD, SS316	Nos.	45	
2.7	MALE TUBE CONNECTOR, 1/2" NPT(M) x 6mm OD, SS316	Nos.	15	
2.8	~~MALE TUBE CONNECTOR, 1/2" NPT(M) x 12mm OD, SS316~~	~~Nos.~~		Deleted, Rev. 3
2.9	MALE TUBE CONNECTOR, 1/4" NPT(M) x 12mm OD, SS316	Nos.	35	Rev. 3
2.10	MALE TUBE CONNECTOR, 1/4" NPT(M) x 6mm OD, SS316	Nos.	30	Rev. 3
2.11	REDUCING UNION, 1/2" OD x 1/4" OD, SS316	Nos.	5	
2.12	UNION TEE, 1/4" OD , SS316	Nos.	5	
2.13	TUBE UNION, 6mm OD , SS316	Nos.	45	Rev. 3
2.14	TUBE UNION, 12mm OD , SS316	Nos.	45	Rev. 3
2.15	FEMALE TUBE CONNECTOR, 1/4" NPT(F) x 1/4" OD, SS316	Nos.	5	
2.16	~~FEMALE TUBE CONNECTOR, 1/2" NPT(F) x 1/2" OD, SS316~~	~~Nos.~~		Deleted, Rev. 3
2.17	TUBE UNION, 1/2" OD , SS316	Nos.	5	Rev. 3
2.18	TUBE UNION, 1/4" OD , SS316	Nos.	5	Rev. 3
3.0	**Contractor shall supply prefabricated Galvanised Iron, 2mm thick perforated trays with cover including tray fittings (Tees, Bends, Elbows, Cross, Reducers) and Assembly Hardware (Splice Plates, Adjustable Horizontal / Vertical Splice Plates, Stud & Nuts). Straight sections of cable tray shall be provided in standard lengths of 3 Mtrs.**			
3.1	150mm width Perforated type cable tray, 100 mm collar height	Meter	150	
3.2	100mm width Perforated type cable tray, 50 mm collar height	Meter	100	
3.3	50mm width Perforated type cable tray, 50 mm collar height	Meter	500	
4.0	**Contractor shall supply prefabricated Galvanised Iron, 2mm thick Ladder trays with cover including tray fittings (Tees, Bends, Elbows, Cross, Reducers) and Assembly Hardware (Splice Plates, Adjustable Horizontal / Vertical Splice Plates, Stud & Nuts). Straight sections of cable tray shall be provided in standard lengths of 3 Mtrs.**			
4.1	300mm width ladder type cable tray, 150 mm collar height	Meter	50	
4.2	INSTRUMENT CABLE DUCT			
5.0	**Contractor shall supply prefabricated Galvanised Iron cable ducts with cover including duct fitting (tees, bends and elbows) and Assembly Hardware (Clamp, Coupler plate and Stud & Nuts). Duct configurations include Duct Equal Tee, Duct Expander Tee, Duct Reducer Tee, Duct Offset Bend, Duct Width Reducer, Vertical Plane Tee, Vertical Plane Elbow, Duct Bridge (Jump-Over), sleeves. Straight portion of duct shall be Pre-Fabricated however duct fitting like Tees, Bends, Reducers etc. may be site fabricated as per actual site condition. Straight sections of cable tray shall be provided in standard lengths of 2.5 Mtrs.**			
5.1	Cable Duct 400 mm (W) x 200 mm (H)	Meter	200	

ANNEXURE-8

MANGALORE REFINERY AND PETROCHEMICALS LIMITED

LICENSOR:

Honeywell UOP
UOP ENGINEERING DEPARTMENT

CCR-1 REGENERATOR REVAMP PROJECT AT MRPL, MANGALURU

INSTRUMENTATION-
SCHEDULE OF QUANTITY : ERECTION

Rev.	Date	Description	Prpd.	Chkd.	Appd.
2	02.07.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
1	11.05.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
0	16.03.21	ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS

Triune Energy Services Pvt. Ltd. New Delhi	**Project : CCR-1 REGENERATOR REVAMP PROJECT AT MRPL, MANGALURU** **Customer : MRPL** / **Job No. : 9675**	**INSTRUMENTATION- SCHEDULE OF QUANTITY : ERECTION**	**Document Number** 9675-09-SOQ-002 / **Rev.** 2 Sheet 1 of 6

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NOTES:

1) Contractor is advised to read this document of SOQ in conjunction with the Scope of Work (Ref doc no: 9675-09-SOW-001) specification, drawings and vendor drawings (submitted by the manufacturer) referred in tender document for complete understanding of his scope for supply, erection, installation and modification, rectification, replacement work (as applicable), mechanical completion, assistance in commissioning, PGTR and handing over of CCR-1 unit.

2) Quantity given in this document describes the system requirement for the purpose of progressive billing / Invoicing by the contractor for destruction/ installation scope, as stated in drawings and documents to perform construction, inspection, testing commissioning, and assistance in successful performance guarantee test run (by others) and facilitate handing over of acceptable system of CCR-1 to MRPL. Contractor may add for the margins as required in the quantity for Installation, demolition, calibration, loop checking, etc.

3) Any other activity associated with respect to destruct & construct of CCR-1 not included in this SOQ specifically, however, it is required to be performed by the construction contractor as defined in scope of work and the respective drawings included in the tender document".

4) Construction activity related to site inspection and testing as applicable referring to Scope of Work (Ref doc no: 9675-09-SOW-001) specification, drawings, specification and standards included in tender document shall be by Contractor.

5) Contractor shall make arrangement for access, scaffolding, platform, lifting arrangement as required for erection, modification, rectification, replacement, construction and testing work etc for all heights including but not limited to labour, tools & tackles, construction material, consumables etc for the execution of work included in this document.

3) Contractor may add for the margins as required in the quantity and supply it to site to meet the construction / modification, replacement & rectification requirement at site. Construction

Rev.	Date	Description	Prpd.	Chkd.	Appd.
2	02.07.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
1	11.05.21	RE-ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS
0	16.03.21	ISSUED FOR ENQUIRY/TENDER	PCN	VPA	SGS

Triune Energy Services Pvt. Ltd. New Delhi	INSTRUMENTATION- SCHEDULE OF QUANTITY : ERECTION	Standard Number	Rev.	
		9675-09-SOQ-002	2	
S.No.	Long description	Units	Quantity	Remarks
1	DISMANTLING OF EXISTING INSTRUMENTS			
2	Disconnection, Dismantling, removal of existing instruments with associated accessories presently installed on the equipment, associated pipe fittings, tubes, tube fittings, accessories, supports, trays, cables, cable glands, etc., stand, etc. and transportation of the same as per job specifications as per approved drawings and instruction of Engineer-in-charge.			
3	Field Instruments	Nos	60	Rev-2
4	Control Valves / On-Off valves/ Pressure Regulator	Nos	25	Rev-2
5	Multipoint-thermocouple assemblies	Sets	3	
6	Rotameters	Nos	2	Rev-2
7	Nuclear Level Detectors / Transmitter	Nos	5	Rev-2
8	Nuclear Level Source (To be retained for re-installation)	Nos	3	Rev-2
~~9~~	~~Pressure Safety Valves~~	~~Nos~~	~~10~~	Deleted in Rev-2
10	I/P Positioner for Control Valves	Nos	9	Rev-2
11	INSTALLATION OF INSTRUMENTS			
12	PRESSURE GAUGES, ACCESSORIES			
13	Installation of Line mounted Pressure gauge with manifolds including installation of Pulsation Dampener/ Syphon/ Over-range Protector as per project Hook Up drawing 9675-24-09-A4-9001. Pressure gauge, manifold, Pulsation Dampener/ Syphon/ Over-range Protector will be free issue items.	Nos	9	Rev-2
14	PRESSURE INSTRUMENTS			
15	Installation of Pressure Transmitters on stanchion (Supply, fabrication of stanchion and its associated support items for mounting on platform/ structure) along with manifold, impulse lines, Prefabricated FRP canopy (To cover the instrument from all sides with a front window & openable shutter for terminal side) as per project Hook Up drawing 9675-24-09-A4-9001 & Installation Drawing 9675-24-09-A4-9002. Scope also includes supply and erection of supports for impulse lines (wherever required) and painting of stanchion/ supports. Transmitter, manifold, pipe mounting kit, canopy will be free issue items.	Nos	4	Rev-2
16	DIFFERENTIAL PRESSURE INSTRUMENTS			
17	Installation of Differential Pressure Transmitters on stanchion (Supply, fabrication of stanchion and its associated support items for mounting on platform/ structure) along with manifold, impulse lines, Prefabricated FRP canopy (To cover the instrument from all sides with a front window & openable shutter for terminal side) as per project Hook Up drawing 9675-24-09-A4-9001 & Installation Drawing 9675-24-09-A4-9002. Scope also includes supply and erection of supports for impulse lines (wherever required) and painting of stanchion/ supports. Transmitter, manifold, pipe mounting kit, canopy will be free issue items.	Nos	9	Rev-2
18	DIFFERENTIAL PRESSURE (FLOW) TRANSMITTERS			
19	Installation of Differential Pressure Flow Transmitters on stanchion (Supply, fabrication of stanchion and its associated support items for mounting on platform/ structure) along with manifold, impulse lines, Prefabricated FRP canopy (To cover the instrument from all sides with a front window & openable shutter for terminal side) as per project Hook Up drawing 9675-24-09-A4-9001 & Installation Drawing 9675-24-09-A4-9002. Scope also includes supply and erection of supports for impulse lines (wherever required) and painting of stanchion/ supports. Transmitter, manifold, pipe mounting kit, canopy will be free issue items.	Nos	7	Rev-2
20	~~PRE-FABRICATED HOOK-UP ASSEMBLY: Installation of prefabricated hook-up on pipe/ orifice assembly/ flow-meter. Material of Pre-fabricated hook-ups shall be SS (316/316L/304/321). Transmitter, Manifold with plug, Isolation valve & nipple are part of prefabricated hook-up assembly.~~			Deleted in Rev-2
21	~~Flow assembly with 1/2" TH/SW connection~~	~~Nos~~		Deleted in Rev-2
22	~~Pressure assembly with 3/4" TH/SW connection~~	~~Nos~~		Deleted in Rev-2
23	CORIOLIS MASS FLOWMETERS			
24	Installation of Coriolis Meter in line, including laying and termiation of inter connection cables. Scope also includes supply and erection of supports for cables (wherever required) and painting of cable supports. Coriolis mass flow assembly including filter will be free issue items.	Nos	2	
25	LEVEL GAUGES			
26	Installation of Level Gauge on vessel / Piping / Standpipe with minor modification wherever required, installation of drain vave / vent valve assembly as per project Hook Up drawing 9675-24-09-A4-9001. Scope also includes hydraulic testing of gauge, installation of illuminators / Non-frosting extension if required. Level Gauges and Illuminators (If Required) will be free issue item.	Nos	4	
27	NUCLEONIC TYPE LEVEL INSTRUMENT (GAMMA RAY/ BACKSCATTER ETC)			
28	Installation of Nucleonic type Level Instrument along with the source (with isolation Pad / screwed/ flanged type connection on equipment), Detector/Receiver (screwed/ flanged type connection on equipment), connection of water cooled jacket (if required), Installation of electronic Transmitter/unit (if required) on stanchion (Supply, fabrication of stanchion and its associated support items for mounting on platform/ structure) along with laying and termination of interconnecting cables between detector and electronics. Scope also includes supply and erection of supports for cables (wherever required) and painting of stanchion/ supports, supply and installation of warning signs. Instruments/ Source, detectors/electronics & Optional item i.e Test kit, Portable beta gamma survey meter, Lead sheets etc. will be free issue items.			
29	Nucleonic Source	Nos	3	Rev-2
30	Nucleonic Detector	Nos	5	Rev-2
31	TUNING FORK TYP LEVEL INSTRUMENTS			
32	Installation of tuning fork type level switch, including laying and termiation of inter connection cables and setting of switch. Scope also includes supply and erection of supports for cables (wherever required) and painting of cable supports. Level Instrument assembly will be free issue items.	Nos	7	

Triune Energy Services Pvt. Ltd. New Delhi	INSTRUMENTATION- SCHEDULE OF QUANTITY : ERECTION	Standard Number	Rev.	
		9675-09-SOQ-002	2	
S.No.	Long description	Units	Quantity	Remarks
33	TEMPERATURE TRANSMITTERS (REMOTE MOUNTED) □			
34	Installation of Thermocouple/ RTD element with thermowell along with Temperature Transmitter remote mounted on stanchion (Supply, fabrication of stanchion and its associated support items for mounting on platform/ structure), intallation of Prefabricated FRP canopy (To cover the instrument from all sides with a front window & openable shutter for terminal side) as per project Hook Up drawing 9675-24-09-A4-9001 & Installation Drawing 9675-24-09-A4-9002 and laying of extension/RTD cable upto thermocouple, termination of cables at both ends. Scope also includes supply and erection of supports for cables (wherever required) and painting of stanchion/ supports. . Transmitter, pipe mounting kit, canopy will be free issue items.			
35	Temperature Transmitter and Thermocouple with screwed well □	Nos	4	
36	Temperature Indicator/ Gauges (Bimetallic Type) with thermowell on flanged/screwed wells □	Nos	3	
37	Temperature Transmitter and RTD with flanged/screwed well □	Nos	8	Rev-2
37.1	Temperature Transmitter only	Nos	4	Rev-2
38	Installation of Multipoint-thermocouple assemblies (up to 6 Nos. dual flexible thermocouples per assembly) on Flanged thermocouple wells of regenerator column including welding to support inside reactor along with installation of head mounted junction box along with Temperature Transmitter remote mounted on stanchion (Supply, fabrication of stanchion and its associated support items for mounting on platform/ structure) including intallation of cables and Prefabricated FRP canopy (To cover the instrument from all sides with a front window & openable shutter for terminal side) as per project Installation Drawing 9675-24-09-A4-9002 and laying of extension cable upto thermocouple, termination of cables at both ends. Scope also includes supply and erection of supports for cables (wherever required) and painting of stanchion/ supports. Transmitter, Junction Box, Guide tubes, all fittings and accessories required for complete installation will be free issue items.	Sets	3	
39	EQUIPMENT SKIN/ WALL THERMOCOUPLES			
40	Installation of thermocouple element on the support, fixing with nuts/check nuts and fixing up the thermocouple head including laying of extension cable upto thermocouple, termination of cables at both ends. Scope also includes supply and erection of supports for cables (wherever required) and painting of cable supports. Skin type thermocouple assembly will be free issue items.	Nos	6	
41	MOISTURE ANALYZER			
42	Installation of Aluminium Oxide/ Moisture on Chip (MOC)/TDLS type Analyzer including probe with monitor/ sample cell/ sampling system, pressure reducing valve, pressure relief valve, needle valve etc., and transmitter/ preamplifier with/ without pre-assembled assembly on yoke/ fabricated rack including installation / assembly of cell, sampling system, pre-amplifier/ transmitter, interconnecting tubing/ piping/ cabling, laying and interconnection of all cables/ tubes/ pipes, fabrication and installation of manifolds/ impulse lines with supports, supply and installation of supports for impulse lines, hydraulic testing of impulse lines.Scope also includes supply and erection of supports for impulse lines (wherever required) and painting of stanchion/ supports. Analyser and its accessories & interconnecting piping/ tubing materials will be free issue items.	Nos	1	
43	MISCELLANEOUS ITEMS AND DEVICES □			
44	Installation of Miscellaneous instrument items as listed below on on stanchion (Supply, fabrication of stanchion and its associated support items for mounting on platform/ structure)along with Tubing and canopy as per project Hook Up drawing 9675-24-09-A4-9001 & Installation Drawing 9675-24-09-A4-9002. Scope also includes supply and erection of supports for tubing (wherever required) and painting of stanchion/ supports. Instrument, Local Indicator, Purge Meter, pipe mounting kit, canopy will be free issue items.			
45	Electronic Local Indicator □	Nos	2	Rev-2
46	Purge Variable_Area_Flowmeter (i.e. Purge Rotameter) on tubing □	Nos	9	Rev-2
46.1	Self Actuated Pressure reducing valves on tubing □	Nos	2	Rev-2
47	CALIBRATION/ TESTING OF INSTRUMENTS □			
48	Cleaning, adjusting stroke/ positioner, stroke speed checking of Control and On-off (Shutdown) valves. Providing equipments, necessary test jig, Instrument Air, Nitrogen Cylinders, test reports and all consumable. Excludes flow calibration.			
49	Control Valves	Nos	13	Rev-2
50	On-off valves (SDV/ ROV)	Nos	15	Rev-2
51	Self Actuated Pressure reducing valves	Nos	3	Rev-2
52	Cleaning, set pressure tests of Pressure Relief and Pilot Operated Relief Valves. Providing equipment, necessary test jig, Instrument Air, Nitrogen Cylinders, test reports, all consumable. Excludes flow calibration.			
53	PRV/ PORV Inlet Sizes upto 2" flanged, rating 150# to 2500# □	Nos	5	Rev-2
54	PORV Inlet Size 6" flanged, rating 150# to 600# □	Nos	1	Rev-2
55	Cleaning, ckecking and functional tests for special Level Instruments. Providing equipments, necessary test jig, Instrument Air, test reports and all consumable except for special imported test equipments for electronic instruments to be supplied by owner if available. Excludes level calibration with actual fulid level. □			
56	Nuclear Level Detectors	Nos	5	Rev-2
57	Cleaning, checking and functional tests for flowmeters. Providing equipments, necessary test jig, Instrument Air, test reports, all consumable, except for special imported test equipments for electronic instruments to be supplied by owner if available. Excludes flow calibration.			
58	Variable Area flowmeter □	Nos	9	Rev-2
59	Coriolis Mass flowmeters □	Nos	2	
60	Cleaning, calibration of the instruments listed below including collection of instrument from warehouse/ package skids/ panels/ etc. and fixing them back in respective places, providing equipments, necessary test jig, Instrument Air, Nitrogen Cylinders, test reports, all consumable, except for special imported test equipments for electronic instruments to be supplied by owner if available.			
61	Pressure gauges □	Nos	9	Rev-2
62	Pressure transmitters □	Nos	8	Rev-2
63	Differential Pressure Transmitters for Flow, Level and D.P. □	Nos	20	
64	Temperature gauges □	Nos	3	

Triune Energy Services Pvt. Ltd. New Delhi	INSTRUMENTATION- SCHEDULE OF QUANTITY : ERECTION	Standard Number	Rev.	
		9675-09-SOQ-002	2	
S.No.	Long description	Units	Quantity	Remarks
65	Temperature Transmitters □	Nos	25	
66	Electronic Local Indicator □	Nos	2	Rev-2
67	Tuning Fork type Level Switch	Nos	7	
68	Moisture Analyzer	Nos	1	
69	LOOP CHECKING			
70	Loop checking (excluding calibration/ testing) of the instruments listed below including verifying the functional performance of all elements comprising the loop, thereby ensuring proper interconnections and operation, inline with job specification of erection tender.			
71	Pressure transmitters	Nos	10	
72	Differential Pressure Transmitters for Flow, Level and D.P.	Nos	20	
73	Temperature Transmitters	Nos	27	
74	Mulitipoint Temperature Element - Thermocouple	Nos	3	
75	Electronic Local Indicator	Nos	4	
76	Position Transmitter (Integral to Control Valve Positioner)	Nos	15	
77	Control valve positioner	Nos	15	
78	Miscellaneous Instruments / Interconnections	Nos	60	
79	Temperature Element - Skin Thermocouple	Nos	6	
80	Tuning Fork Level Switch	Nos	7	
81	Moisture Analyzer	Nos	1	
82	Coriolis Mass flowmeters	Nos	2	
83	Nuclear Level Instruments	Nos	5	
84	On-Off Valves Solenoid	Nos	16	
85	On-Off Valves Limit Switches	Nos	32	
86	JUNCTION BOX INSTALLATION □			
87	Installation of weatherproof junction boxes with Prefabricated FRP canopy (Canopy to cover junction box from all sides with a front openable shutter) and stanchion (Supply, fabrication of stanchion and its associated support items for mounting on platform/ structure) as per project Installation Drawing 9675-24-09-A4-9002. Scope also includes supply, laying and Connection of 14 SWG GI wire (max. length 10 m per Junction Box), screwing plugs for unused entries and painting of stanchion/ supports.			
88	For 6P cable size (20 Terminals, cage clamp type terminals), Exe as per IEC 60079, IP65, For Signal/Alarm/ Control	Nos	8	Rev-2
89	For 12P cable size (40 Terminals, cage clamp type terminals), Exe as per IEC 60079, IP65, For Signal/Alarm/ Control	Nos	7	Rev-2
90	For 12P cable size (40 Terminals, cage clamp type terminals, material - K Type Chromel- Alumel), Exe as per IEC 60079, IP65, For T/C (K-Type) Signal/Alarm	Nos	3	
91	Installation of flameproof junction boxes with Prefabricated FRP canopy (Canopy to cover junction box from all sides with a front openable shutter) and stanchion (Supply, fabrication of stanchion and its associated support items for mounting on platform/ structure) as per project Installation Drawing 9675-24-09-A4-9002. Scope also includes supply, laying and Connection of 14 SWG GI wire (max. length 10 m per Junction Box), screwing plugs for unused entries and painting of stanchion/ supports.			
92	For 6P cable size (20 Terminals, cage clamp type terminals), Exd as per IEC 60079, IP65, For Interlock Signal	Nos	7	Rev-2
93	LAYING OF CABLES □			
94	Laying of instrumentation cables (armoured) for alarm, shutdown, control and signal cable on cable ducts, ladder trays, perforated trays, angle trays, trenches (including opening of cable duct/ trench covers if required) including clamping, glanding the cables, termination at both ends including shield/ drain/ communication wire, providing and fixing identifying tags and megger testing but exclusive of erection of ducts, main tray, perforated tray/ angle trays and preparation of cable trench. □			
95	For Signal/ Alarm/ Control Cables of 1P x 1.5mm² cable size, LSLH, Flame Retardant for IS / NIS type	Meter	3500	Rev-2
96	For T/C Cables of 2 Pair, 1.5mm² cable size, K Type T/C cable as per IEC 60584, LSLH, Flame Retardant	Meter	1000	Rev-2
97	For RTD Cables of 2 Triad, 1.5mm² cable size, LSLH, Flame Retardant	Meter	300	Rev-2
98	For Signal/ Alarm/ Control Cables of 2P x 1.5mm² cable size, LSLH, Flame Retardant for IS type	Meter	500	Rev-2
99	For Signal/ Alarm/ Control Cables of 6P x 1.5mm² cable size, LSLH, Flame Retardant for IS / NIS type	Meter	5750	Rev-2
100	For Signal/ Alarm/ Control Cables of 12P x 1.5mm² cable size, LSLH, Flame Retardant for IS / NIS type	Meter	2000	Rev-2
101	For T/C Cables of 12 Pair, 1.5mm² cable size, K Type T/C cable as per IEC 60584, LSLH, Flame Retardant	Meter	750	Rev-2
102	Laying of earthing cables and termination both ends of earthing cables from earth grid pit to the DCS/ Local panels/ Barrier/ Instrument stand earth bus bars in trays/ conduits/ trenches as required. □	Meter	1000	
103	LAYING OF IMPULSE TUBING □			
104	Laying of impluse tubing / pipe with fittings on perforated trays including clamping, termination at both ends, providing identifying tags at both ends and testing			
105	Impulse Tube / Pipe, 1/2" OD / PE	Meter	475	Rev-2
106	Impulse Tube, 1/4" OD	Meter	100	
107	Laying of Pneumatic tubing with fittings for Control valves/ Solenoid Valves on perforated trays including clamping, termination at both ends, providing identifying tags at both ends and testing			
108	Pnematic Tube, 6mm O.D.	Meter	180	
109	Pnematic Tube, 12mm O.D.	Meter	180	

Triune Energy Services Pvt. Ltd. New Delhi	INSTRUMENTATION- SCHEDULE OF QUANTITY : ERECTION	Standard Number	Rev.	
		9675-09-SOQ-002	2	
S.No.	Long description	Units	Quantity	Remarks
110	INSTALLATION OF INSTRUMENT CABLE DUCT			
111	Erection of prefabricated Galvanised Iron cable ducts with cover including duct fitting (tees, bends and elbows) and Assembly Hardware (Clamp, Coupler plate and Stud & Nuts). Duct configurations include Duct Equal Tee, Duct Expander Tee, Duct Reducer Tee, Duct Offset Bend, Duct Width Reducer, Vertical Plane Tee, Vertical Plane Elbow, Duct Bridge (Jump-Over), sleeves.Duct fitting like Tees, Bends, Reducers etc. may be site fabricated as per actual site condition. Ducts shall be complete with Painting, having one coat of primer as per IS 2074 and two coats of finished paint including supply of paints.			
112	Cable Duct 400 mm (W) x 200 mm (H)	Meter	200	
113	INSTALLATION OF INSTRUMENT CABLE TRAY			
114	Erection of prefabricated Galvanised Iron Perforated trays with cover including tray fittings (Tees, Bends, Elbows, Cross, Reducers) and Assembly Hardware (Splice Plates, Adjustable Horizontal / Vertical Splice Plates, Stud & Nuts) as per standard drawing and including supply and installation of all supports as required.			
115	150mm width Perforated type cable tray, 100 mm collar height	Meter	150	
116	100mm width Perforated type cable tray, 50 mm collar height	Meter	100	
117	50mm width Perforated type cable tray, 50 mm collar height	Meter	500	
118	Erection of prefabricated Galvanised Iron Ladder trays with cover including tray fittings (Tees, Bends, Elbows, Cross, Reducers) and Assembly Hardware (Splice Plates, Adjustable Horizontal / Vertical Splice Plates, Stud & Nuts) as per standard drawing and including supply and installation of all supports as required.			
119	300mm width ladder type cable tray, 150 mm collar height	Meter	50	