



Energising Quality

PROJECT NUMBER:C221052



**CABLE SCHEDULE FOR NORTH EAST GAS GRID OF IGGL
PART D1 & D2**

Total
Sheets

8

Document no.

C221052

SGPL

IN

SCH

5002

Indradhanush Gas Grid Limited



NORTH EAST GAS GRID PHASE-III OF IGGL Part D1 & D2

D1	13.12.2022	Issued for Bid	VK	DGM	KNC
A1	08.12.2022	Issued for Internal Review	VK	DGM	KNC
REV	DATE	DESCRIPTION	PREP	CHKD	APPR



SILIGURI-GANGTOK PIPELINE SECTION(SGPL)					
Sr.No.	CABLE TYPE & SIZE	SV		IP	TOTAL
		One SV	3 SV		
1	1P X 1.5 Sq.mm (IS)	75	225	200	425
2	1P X 1.5 Sq.mm (OS)	25	75	100	175
3	4P X 1.5 Sq.mm (OS)	220	660	220	880
4	6P X 1.5 Sq.mm (OS & IS)	285	855	380	1235
5	6P X 1.5 Sq.mm (OS)	0	0	125	125
6	12P X 1.5 Sq.mm (OS)	185	1480	500	1055
7	12P X 1.5 Sq.mm (OS & IS)	0	0	30	30
8	24P X 1.5 Sq.mm (OS)	0	0	60	60
9	1T X 1.5 Sq.mm (IS)	80	240	400	640
10	6T X 1.5 Sq.mm (OS & IS)	125	375	0	375
11	8T X 1.5 Sq.mm (OS & IS)	0	0	0	0
12	12T X 1.5 Sq.mm (OS & IS)	0	0	125	125
13	2CX 1.5 Sq.mm (OS)	60	180	60	240
14	8C X 1.5 Sq.mm (OS)	125	375	125	500



JUNCTION BOX SUMMARY					
Sr.No.	JB TYPE	SV		IP	TOTAL
		One SV	3 SV		
1	AJB	1	3	2	5
2	DJB	1	3	1	4
3	AFJB	1	3	1	4
4	DFJB	1	3	1	4

These I/O's shall be considered in RTU of SV station 04.
* This I/O is applicable for Spread-2C.

<div><div><div>Energising Quality</div></div><div><div>IGGL</div></div></div>					INDRADHANUSH GAS GRID LIMITED																	Job No.: C221052																															
					NORTH EAST GAS GRID LIMITED PHASE-III OF IGGL																	Doc.No.: C221052-SGPL-IN-SCH-5002																															
					SILIGURI-GANGTOK PIPELINE SECTION(SGPL)																																																
					CABLE SCHEDULE FOR FOR IP STATION (UNIT 16) AT LAVA (WEST BENGAL)																	REV.		D1																													
																					RTU																																
Sr.No	Cable Tag No.	Cable Details			Instrument/Description	I/O	Gland	Local		Terminal Details						Multi Pair Cable								Terminal Details																													
		Pair / Core No	Type x Size	Length (mts)				From	To (Junction Box)	+	-	SCR	OSCR	IS / NIS	Pair No.	Cable No.	Length (mts)	Type x Size	Gland	Marshalling Cabinet Tag No.	Group TB No.	+	-	I/O Card No.	Remarks																												
Field Instruments																																																					
1	C221052-SGPL-PIT-1601	1	1P X 1.5 Sq.mm IS	25	Pressure Indicating Transmitter	AI	1/2 NPT	Field	C221052-SGPL-AJB-1601	1	2	3	-	IS	1	C221052-SGPL-AJB-1601	125	6P X 1.5 sq.mm(IS & OS)	3/4"NPT	TIC	Hold	Hold	Hold	Hold	Hold	Hold																											
2	C221052-SGPL-PIT-1602	1	1P X 1.5 Sq.mm IS	25	Pressure Indicating Transmitter	AI	1/2 NPT	Field		4	5	6	-	IS	2																																						
3	C221052-SGPL-PIT-1603	1	1P X 1.5 Sq.mm IS	25	Pressure Indicating Transmitter	AI	1/2 NPT	Field		7	8	9	-	IS	3																																						
4	C221052-SGPL-PIT-1642	1	1P X 1.5 Sq.mm IS	25	Pressure Indicating Transmitter	AI	1/2 NPT	Field		10	11	12	-	IS	4																																						
5	C221052-SGPL-TIT-1602	1	1P X 1.5 Sq.mm IS	25	Temperature Indicating Transmitter	AI	1/2 NPT	Field		13	14	15	-	IS	5																																						
6	Spare	-	-	-	-	-	-	-		-	-	-	-	-	6																																						
1	C221052-SGPL-PIT-1605	1	1P X 1.5 Sq.mm IS	25	Pressure Indicating Transmitter	AI	1/2 NPT	Field	C221052-SGPL-AJB-1602	1	2	3	-	IS	1	C221052-SGPL-AJB-1602	125	6P X 1.5 sq.mm(IS & OS)	3/4"NPT	TIC	Hold	Hold	Hold	Hold	Hold	Hold																											
2	C221052-SGPL-PIT-1606	1	1P X 1.5 Sq.mm IS	25	Pressure Indicating Transmitter	AI	1/2 NPT	Field		4	5	6	-	IS	2																																						
3	C221052-SGPL-TIT-1601	1	1P X 1.5 Sq.mm IS	25	Pressure Indicating Transmitter	AI	1/2 NPT	Field		7	8	9	-	IS	3																																						
4	C221052-SGPL-CP-1601	1	1P X 1.5 Sq.mm IS	25	Corrosion Probe	AI	1/2 NPT	Field		10	11	12	-	IS	4																																						
5	C221052-SGPL-TIT-1603	1	1P X 1.5 Sq.mm IS	25	Temperature Indicating Transmitter	AI	1/2 NPT	Field		13	14	15	-	IS	5																																						
6	Spare	-	-	-	-	-	-	-		-	-	-	-	-	6																																						
9	C221052-SGPL-XXS-1601	1	1P X 1.5 Sq.mm OS	25	Pig Signaller (Intrusive Type)	DI	1/2 NPT	Field	C221052-SGPL-DJB-1601	1	2	-	-	NIS	1	C221052-SGPL-DJB-1601	125	6P X 1.5 sq.mm (OS)	3/4"NPT	TIC	Hold	Hold	Hold	Hold	Hold	Hold																											
10	C221052-SGPL-XXS-1602	1	1P X 1.5 Sq.mm OS	25	Pig Signaller (Non-Intrusive Type)	DI	1/2 NPT	Field		4	5	-	-	NIS	2																																						
11	C221052-SGPL-XXS-1605	1	1P X 1.5 Sq.mm OS	25	Pig Signaller (Non-Intrusive Type)	DI	1/2 NPT	Field		7	8	-	-	NIS	3																																						
12	C221052-SGPL-XXS-1604	1	1P X 1.5 Sq.mm OS	25	Pig Signaller (Non-Intrusive Type)	DI	1/2 NPT	Field		10	11	-	-	NIS	-																																						
13	Spare	-	-	-	-	-	-	-		-	-	-	-	-	-																																						
14	Spare	-	-	-	-	-	-	-		-	-	-	-	-	-																																						
16	-	-	-	-	-	-	-	-		-		22																																									
17	C221052-SGPL-GOOV-1601																																																				
18	C221052-SGPL-HSH-1601	1,2	-	-	Valve Open Command	DO	1" NPT	Field	From valve Actuator box	HOLD	HOLD	-	-	NIS	1	C221052-SGPL-GOOV-1601	125	12P X 1.5 sq.mm(OS)	1" NPT	TIC	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD																											
19	C221052-SGPL-HSL-1601	3,4			Valve Close Command	DO				HOLD	HOLD	-	-	NIS	2																																						
20	C221052-SGPL-ZSH-1601	5,6			Valve Open Feed back	DI				HOLD	HOLD	-	-	NIS	3																																						
21	C221052-SGPL-ZSL-1601	7,8			Valve Close Feed back	DI				HOLD	HOLD	-	-	NIS	4																																						
22	C221052-SGPL-DPSH-1601	9,10			DP High Across the valve	DO				HOLD	HOLD	-	-	NIS	5																																						
23	C221052-SGPL-XL-1601A	11,12			Valve Remote selected	DI				HOLD	HOLD	-	-	NIS	6																																						
24	C221052-SGPL-XL-1601B	13,14			Valve Local selected	DI				HOLD	HOLD	-	-	NIS	7																																						
25	C221052-SGPL-HSH-1601	15,16			Valve Open Command from Local Control Panel	DI				HOLD	HOLD	-	-	NIS	8																																						
26	C221052-SGPL-HSL-1601	17,18			Valve Close Command from Local Control Panel	DI				HOLD	HOLD	-	-	NIS	9																																						
27	-	19,20			-	-				-	-	-	-	-	-																																						
28	-	21,22			-	-				-	-	-	-	-	-																																						
29	-	23,24			-	-				-	-	-	-	-	-																																						
17	C221052-SGPL-GOOV-1602																																																				
31	C221052-SGPL-HSH-1602	1,2	-	-	Valve Open Command	DO	1" NPT	Field	From valve Actuator box	HOLD	HOLD	-	-	NIS	1	C221052-SGPL-GOOV-1602	125	12P X 1.5 sq.mm(OS)	1" NPT	TIC	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD																											
32	C221052-SGPL-HSL-1602	3,4			Valve Close Command	DO				HOLD	HOLD	-	-	NIS	2																																						
33	C221052-SGPL-ZSH-1602	5,6			Valve Open Feed back	DI				HOLD	HOLD	-	-	NIS	3																																						
34	C221052-SGPL-ZSL-1602	7,8			Valve Close Feed back	DI				HOLD	HOLD	-	-	NIS	4																																						
35	C221052-SGPL-DPSH-1602	9,10			DP High Across the valve	DO				HOLD	HOLD	-	-	NIS	5																																						
36	C221052-SGPL-XL-1602A	11,12			Valve Remote selected	DI				HOLD	HOLD	-	-	NIS	6																																						
37	C221052-SGPL-XL-1602B	13,14			Valve Local selected	DI				HOLD	HOLD	-	-	NIS	7																																						
38	C221052-SGPL-HSH-1602	15,16			Valve Open Command from Local Control Panel	DI				HOLD	HOLD	-	-	NIS	8																																						
39	C221052-SGPL-HSL-1602	17,18			Valve Open Command from Local Control Panel	DI				HOLD	HOLD	-	-	NIS	9																																						
40		19,20								HOLD	HOLD	-	-	NIS	10																																						
16	-	21,22			-	-				-	-	-	-	-	-																																						
42	-	23,24			-	-				-	-	-	-	-	-																																						
43	-	23,24			-	-				-	-	-	-	-	-																																						
17	C221052-SGPL-GOOV-1603																																																				
31	C221052-SGPL-HSH-1603	1,2	-	-	Valve Open Command	DO	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-																											
32	C221052-SGPL-HSL-1603	3,4			Valve Close Command	DO																					HOLD	HOLD	-	-	-	-	-	-	-	2																	
33	C221052-SGPL-ZSH-1603	5,6			Valve Open Feed back	DI																															HOLD	HOLD	-	-	-	-	-	-	3								
34	C221052-SGPL-ZSL-1603	7,8			Valve Close Feed back	DI																																								HOLD	HOLD	-	-	-	-	-	4
35	C221052-SGPL-DPSH-1603	9,10			DP High Across the valve	DO																																															

Notes : * Vendor to specify
TBD - To be decide
1. Single pair cable number shall be same as instrument tag no.
2. Multi pair cable number shall be same as junction box tag no.
3. Single pair and multi pair calbel lenghts are tentative, actual lengths shall be verified in the site by contractor.
4. Hold points shall be upadted after reciving of vendor document


<div> Energising Quality</div> <div> IGGL</div>					INDRADHANUSH GAS GRID LIMITED																			Job No.: C221052			
					NORTH EAST GAS GRID LIMITED PHASE-III OF IGGL																			Doc.No.: C221052-SGPL-IN-SCH-5001			
					SILIGURI-GANGTOK PIPELINE SECTION(SGPL)																						
					GAS DETECTOR CABLE SCHEDULE SV 04, UNIT 15 SGPL STATION																			REV.	D1		
Sr.No	Cable Tag No.	Cable Details			Instrument/Description	I/O	Gland	Local		Terminal Details				Multi Pair Cable						RTU							
		Pair / Core No	Type x Size	Length (mts)				From	To (Junction Box)	+	-	SCR	OSCR	IS / NIS	Pair No.	Cable No.	Length (mts)	Type x Size	Gland	Marshalling Cabinet Tag No.	Group TB No.	+	-	I/O Card No.	Remarks		
Field Instruments																											
1	C221052-SGPL-PGD-1101	1,2,3	1 T X 1.5 sq.mm,IS	40	Point Gas Detector	AI	M15	Field	C221052-SGPL-AFJB-1101	1	2	3	-	IS	1	C221052-SGPL-AFJB-1101	125	6T X 1.5 (IS & OS) Sq.mm	M25	GDS PANEL	HOLD			HOLD			
2	C221052-SGPL-PGD-1102	1,2,3	1 T X 1.5 sq.mm,IS	40	Point Gas Detector	AI	M15	Field		4	5	6	-	IS	2												
3	Spare	-	-	-	-	-	-	-		-	-	-	IS	3													
4	Spare	-	-	-	-	-	-	-		-	-	-	IS	4													
5	Spare	-	-	-	-	-	-	-		-	-	-	IS	5													
6	Spare	-	-	-	-	-	-	-		-	-	-	IS	6													
7	C221052-SGPL-MCP-1101	1,2	2C X 1.5 sq.mm,OS	20	Manual Call Point	DI	M15	Field	C221052-SGPL-DFJB-1101	19	20	-	-	NIS	1	C221052-SGPL-DFJB-1101	125	8C X 1.5 (OS) Sq.mm	M25	GDS PANEL	HOLD			HOLD			
8	C221052-SGPL-BA-1101	1,2	2C X 1.5 sq.mm,OS	20	Beacon	DO	M15	Field		22	23	-	-	NIS	2												
9	C221052-SGPL-HA-1101	1,2	2C X 1.5 sq.mm,OS	20	Hooter	DO	M15	Field		25	26	-	-	NIS	3												
10	Spare	-	-							-	-	-	-	-	4												
Notes : * Vendor to specify																											
(1) Above IO list is Typical for One SV Station(Unit 11) . This list is similar for following SV stations. P&ID to follow for tag numbers and other P&ID details.																											
(c) Unit 14 at SV 04 (d) Unit 15 at SV 05 (e) Unit 17 at SV 06																											
1. Hold points shall be upadted after reciving of vendor document																											
2. Single pair and multi pair calbel lenghts are tentative, actual lengths shall be verified in the site by contractor.																											
3. Multi pair cable number shall be same as junction box tag no.																											
4. Single pair cable number shall be same as instrument tag no.																											

 ENERGISING QUALITY		PROJECT NUMBER : C221052			
ITP FOR INSTRUMENT ITEMS				Total Sheets	5
Document No.	C221052	00	IN	ITP	5003
<div>Indradhanush Gas Grid Limited</div> <div>NORTH EAST GAS GRID PHASE-III OF IGGL PART D1 & D2</div>					
D1	13.12.2022	Issued For Bid		VK	DGM KNC
A1	08.12.2022	Issued For Internal Review		VK	DGM KNC
REV	DATE	DESCRIPTION		PREPD	CHKD APPR



NORTH EAST GAS GRID PHASE-III OF IGGL PART D1 & D2


INSTRUCTIONS FOR FILLING UP: 1. QAP shall be submitted for each equipment separately with breakup of assembly / sub-assembly & part/component or for group of equipment having same specification. 2. Use numerical codes as indicated for extent of inspection & tests and submission of test certificates & documents. Additional codes & description for extent of inspection & test may be added as applicable for the plant and equipment's. 3. Separate identification number with quantity for equipment shall be indicated wherever equipment having same specifications belonging to different facilities are grouped together. 4. Weight in kilogram must be indicated under column 5 for each item. Estimated weights may be indicated wherever actual weights are not available.	CODES FOR EXTENT OF INSPECTION, TESTS, TEST CERTIFICATES & DOCUMENTS :			
	CODE DESCRIPTION	CODE DESCRIPTION	CODE DESCRIPTION	CODE DESCRIPTION
	1. Visual 2. Dimensional 3. fitment & alignment 4. Physical Test (Sample) 5. Chemical test(Sample) 6. Ultrasonic test 7. Magnetic particle test(MPT) 8. Radiography test 9. Dye Penetrant test 10. Measurement of IR value a) Before HV test b) After HV test 11. High voltage test/Dielectric Test	12. Routine test as per relevant IS other standard 13. Type test as per relevant IS/ other standard 14. Impulse Test 15. Partial Discharge Test 16. Heat run risk test/temper 17. Enclosure protection test 18. Calibration 19. Noise & Vibration 20. Test certificate of bought out components 21. Tank pressure test 22. Paint shed vibration	23. Short time rating 24. Operational & functional test 25. Over speed test 26. Flame proof Test 27. Clearance and creepage distance 28. Acceptance test 29 Honing Test 30 Hydro test/ Shell leak test 31 Pneumatic Seat leak test 32 Impact test	D1. Approved GA Drawing. D2. Approved single line/ schematic diagram D3. Test certificates D4. Approved Bill of materials D5. Un-priced P.O. copy D6. Calibration certificates of all measuring instrument And gauges.

 ENERGISING QUALITY	ITP FOR INSTRUMENT ITEMS	Document No.	Rev
		C221052-00-IN-ITP-5003	D1
		Page 2 of 5	



NORTH EAST GAS GRID PHASE-III OF IGGL PART D1 & D2

<p>ABBREVIATION USED: CONTR: Contractor MFR: Manufacturer TPI: Third Party Inspection Agency *: Vendor / Bidder to provide P: Performer, R: Review; W: Witness</p> <p>EN 10204, Type 3.2 certificates shall be provided for bought out items. Those shall be inspected by TPI appointed by Vendor</p>															
Equipment Details						Inspection & Test									
S No.	Item	Identification Number	Qty	Weight Kg	Exp Date of Inspection	MFR Name & Address	In-Process Stage			Final Inspection			Test certificate & Document to be submitted to IGGL	Acceptance Criteria standards/ IS/BS/ASME/ Norms and documents	Remark / Sampling Plan
							MFR	CONTR & TPI	IGGL	MFR	CONTR & TPI	IGGL			
1.	Gauges	Refer P&ID	*	*	*	IGGL Approved	1,2,3,4,5 - P	-	-	1,2,3,18,20 - P	1,2,3,18,20 -R,24 - W	1,2,3,18,20,24 -R	1,2,3,4,5,18,20,24,D3,D6	D3,D6, Tech.spec	100%
2.	RTD	Refer P&ID	*	*	*	IGGL	1,2,	-	-	1,2,3,18,20 - P	1,2,3,18,20 -R	1,2,3,18,20,24	1,2,3,4,5,18,20,24,D3,	D3,D6,	100%

 ENERGISING QUALITY	ITP FOR INSTRUMENT ITEMS	Document No.	Rev
		C221052-00-IN-ITP-5003	D1
		Page 3 of 5	



NORTH EAST GAS GRID PHASE-III OF IGGL PART D1 & D2


						Approved	3,4, 5 – P				,24 - W	4 –R	D6	Tech. spec	
3.	Transmitters	Refer P&ID	*	*	*	IGGL Approved	1,2, 3,4, 5 – P	-	-	1,2,3,18,20 – P	1,2,3,18,20 -R ,24 - W	1,2,3,18,20,2 4 –R	1,2,3,4,5, 18,20,24,D3, D6	D3, D6, Tech. spec	100%
4.	Thermowells	Refer P&ID	*	*	*	IGGL Approved	1,2, 3,4, 5 – P	-	-	1,2,3,18,20 – P	1,2,3,18,20 -R ,24 - W	1,2,3,18,20,2 4 –R	1,2,3,4,5, 18,20,24,D3, D6	D3, D6, Tech.spec	100%
5.	GOOV	Refer P&ID	*	*	*	IGGL Approved	1,2, 3,4 5,8, 30,3 2 – P	-	-	1,2,3,5,8,20,18, 24,31 – P	1,2,3,5,8,20,18,2 4,30, 31,32 -R	1,2,3,5,8,20, 18, 24,30,31,32 - R	1,2,3,5,8,18, 20, 24, 30,31,32D1, D3,D4,D6	D3, D6, Tech.spec	100%
6.	Pressure Safety Valve	Refer P&ID	*	*	*	IGGL Approved	1,2, 3,4, 5 – P	-	-	1,2,3,18,20 – P	1,2,3,18,20 -R, 24 - W	1,2,3,18, 20, 24 R	1,2,3,4,5,18, 20,24,D3, D6	D3, D6, Tech.spec	100%
7.	FAT Procedure	-	-	-	-	IGGL Approved	-	-	-	P	R	R	FAT Procedure	Test record	100%
8.	SAT Procedure	-	-	-	-	IGGL Approved	-	-	-	P	R	R	SAT Procedure	Test record	100%

	ITP FOR INSTRUMENT ITEMS	Document No.	Rev
		C221052-00-IN-ITP-5003	D1
		Page 4 of 5	



NORTH EAST GAS GRID PHASE-III OF IGGL PART D1 & D2

9.	Factory Acceptance Test	As per approved P&ID, GAD, datasheets, FAT	*	*	*	IGGL Approved				1,2,3,12,24,Loop check, Power on,Cal.verification	1,2,3,12,24 Loop check, Power on,Cal.verification	1,2,3,12,24 Loop check, Power on,Cal.verification	FAT Test Report	Approved FAT procedure and other relavant doc.	100%
10.	Site Acceptance Test	As per approved P&ID, GAD, datasheets, SAT procedure, FAT Report	*	*	*	IGGL Approved				1,2,3,12,24 Loop check, Power on,Cal.verification	1,2,3 ,12, 24,Loop check, Power on,Cal.verification	1,2,3 ,12,24 Loop check, Power on,Cal.verification	SAT Test Report	Approved SAT procedure and other relavant doc.	100%

 ENERGISING QUALITY	ITP FOR INSTRUMENT ITEMS	Document No.	Rev
		C221052-00-IN-ITP-5003	D1
		Page 5 of 5	



ENERGISING QUALITY
VCS Quality Services Pvt. Ltd.

PROJECT NUMBER: C221052



**Material Requisition for OFC, HDPE Duct
and Accessories**

Client Job
Number

C221052

Total Sheets

15

Document No

C221052

00

IN

MR

5001

Indradhanush Gas Grid Limited

North-East Gas Grid Phase-III Of IGGL Part D1 & Part D2

D1	13-12-2022	Issued for Bid	VK	DGM	KNC
A1	07-12-2022	Issued for Internal Review	VK	DGM	KNC
REV	DATE	DESCRIPTION	PREP	CHKD	APPR

CONTENTS

1.0	DEFINITION.....	3
2.0	INTRODUCTION	3
3.0	DOCUMENT PRECEDENCE	3
4.0	SCOPE OF SUPPLY	4
5.0	WARRANTY	12
6.0	VENDOR DOCUMENTS.....	13
7.0	PACKAGE AND STORAGE	14
8.0	LIST OF ATTACHMENTS	15

1.0 DEFINITION

Where used in this document, the following terms shall have the meanings indicated below, unless clearly indicated by the context to this order

PROJECT	North-East Gas Grid Phase-III of IGGL.
OWNER	Indradhanush Gas Grid Limited
CONTRACTOR	VCS Quality Services Private Limited (VCSQSPL) the party to act for and on behalf of OWNER for the Detailed Engineering Services
VENDOR/ MANUFACTURER	Party, which manufactures and supplies equipment and services to the OWNER or to CONTRACTOR

2.0 INTRODUCTION

The Hydrocarbon vision 2030 for North East India (vision document), released by MoP&NG proposes detailed plan for Natural gas infrastructure development in North-East. The states covered in the vision document include Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

-M/s Indradhanush Gas Grid Limited (IGGL), a Joint Venture of IOCL, ONGC, GAIL, OIL and NRL, is in the process of implementing the North East Gas Grid (NEGG) with a vision to connect all the eight (08) northeastern state capitals and major consumption centers in the region. The NEGG will be connected to National gas grid at Guwahati through Barauni-Guwahati pipeline (already under execution by M/s GAIL).

M/s IGGL intends to lay pipeline along with terminal works which consist of 12" NB x 186 Km (approx.) in section-11 mainline. Main line taken from Siliguri DT to Gangtok RT.

2.1 PROJECT DESCRIPTION

PROJECT TITLE: -SILIGURI-GANGTOK PIPELINE SECTION (SECTION-11)		
REF. SCHEMATIC DRAWING NO: -C221052-SGPL-PP-SCM-2001		
PART NO	SPREAD NO.	SCOPE OF WORK
PART-D1 (Length 44.2 km)	SPREAD-2B (Length 44.2 km)	Pipeline laying from Ch. 59+800 Km to Ch. 104+000 Km including associated works for One (01) SV stations.

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 3 of 15	

PART-D2 (Length 46.3 km)	SPREAD-2C (Length 46.3 km)	Pipeline laying from Ch. 104+000 km to Ch. 150+300 Km. Intermediate Pigging Station (IP station) Lava, West Bengal at Ch. 128+000 Km including associated works for Two (02) SV stations & One (01) IP Station.
---------------------------------------	----------------------------------	--

Note: Chainage shown above are tentative and for reference purpose only, there may be change in Chainage shown as per site condition during execution.

This document covers details of Scope of Supply for Laying of OFC & HDPE-Duct, Documents to be submitted by the Vendor etc.

3.0 DOCUMENT PRECEDENCE

It shall be the responsibility of the Manufacturer / Vendor to inform the Purchaser of any errors, ambiguities, inconsistencies, discrepancies or conflict of information that may be found to exist in any document, specification or drawing submitted by the Purchaser.

In case of conflict, the order of precedence shall be as follows:

- MR;
- Data Sheets;
- Specifications;
- Basic Documents;
- Codes and Standards.

As a general rule in the event of any discrepancy between technical matter and local laws / regulations (and documents above listed) the most stringent shall be applied.

Manufacturer / Vendor shall notify Purchaser of any apparent conflicts between MR, specifications, related datasheets, any code and standards and any other specifications noted herein. (Resolution and/ or interpretation precedence shall be obtained from Purchaser in writing before proceeding with the design/ manufacturer or completion of services.)

4.0 SCOPE OF SUPPLY

Vendor shall be completely responsible to supply below mentioned materials and services for satisfying the functional / operational requirements stated in this Requisition and its Attachments. (Herein after referred as Requisition).

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 4 of 15	

Siliguri-Gangtok Section-Part D1

S. No.	Description	Quantity
1.0	Telecommunication Work related to OFC Network has to be carried out by the Bidder as defined in Scope of Work of Job specification, other specifications, drawings, other provisions of Contract and instructions of Engineer-in-Charge including but not limited to followings works. For all supply, the scope covers design, manufacturing, factory testing, inspection, packaging, forwarding, transportation, insurance, handling and storage at site etc. .	
A.0	SUPPLY OF OFC ACCESSORIES (as per VCS Standard Specification VCS-SS-5910).	
1.0	Supply of 24 fibre composite SM Optical fibre cable (6 Fibre G-655 & 18 Fibre G-652D) of 4000 Meter \pm 2.5 % cable drums (Qty as per pipeline length with spare) as per the VCS OFC SS No. VCS-SS-5910 Any additional necessary requirements due to shorter length as per TS /Scope of work is in vendor scope.	50 kms.
2.0	Supply of 24 fibre composite SM Optical fibre cable (6 Fibre G-655 & 18 Fibre G-652D) of 2000 Meter \pm 2.5 % cable drums (Qty as per pipeline length with spare) as per the VCS OFC SS No. VCS-SS-5910 Any additional necessary requirements due to shorter length as per TS /Scope of work is in vendor scope.	6 kms.
3.0	Supply of Jointing Closures (suitable for 24 Fibre OFC) including all accessories of approved make only.(Planned Qty : 11 Nos , Spare Qty: 04 Nos)	15 Nos.
4.0	Supply of Special Tools & Tackles	1 Set
B.0	Supply of Permanently Lubricated Telecom HDPE Duct & Accessories as per VCS STANDARD SPECIFICATION No. VCS-SS-5910	
1.0	Supply of 40 mm, permanently lubricated HDPE Telecom DUCT (1000 meter drum), Factory Acceptance Testing as per specification. (Qty with spares) Supply of spare HDPE accessories Plastic Couplers (PC), End Plugs (EP), Cable Sealing Plugs (CSP), End Caps (EC) etc suitable for supplied Duct (Qty as PC-60 nos, EP-40 nos,CSP-40 nos, EC-40 nos).	50 Kms.

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 5 of 15	

C.0	SITE WORK (as per scope of work)	
1.0	Submission of optical fiber cable & HDPE alignment sheets as per the requirements of specification based on the existing pipe line survey (No separate survey reqd.), estimation of OFC & HDPE duct including all accessories in accordance with the alignment sheet and specifications. Laying work can not be started without approval of these documents from Client / Consultant / EIC.	1 Lot
2.0	Erection of HDPE Duct as per specification	
2.0a	Installation of 40mm OD, permanently lubricated HDPE ducts, in same pipeline trench, direct buried or cased crossing through CS conduit (2 duct in cased crossing) in all type of soil & terrain, all work as define in mainline work, for terminal area or non pipeline area - excavation, padding, backfilling, Laying of common warning mat/ mesh (as supplied for main line), cleaning and sealing of ducts, for river crossing additional blowing pit at both end of the river bank, jointing of HDPE conduit, supply and installation of all erection accessories as required, Testing of laid permanently lubricated HDPE ducts, rectification if required, cleaning and sealing of ducts at the end after testing, preparation of report, joint location marking in CAS, GPS location marking of each coupler, final acceptance / Handing over of the same to client, Drawings and documentation all complete as per specifications provided in the bid document. (Scope also includes Supply of HDPE accessories required including Plastic Couplers (PC), End Plugs (EP), Cable Sealing Plugs (CSP), End Caps (EC) etc suitable & sufficient for supplied Duct, complete in all respect as per specification and as per direction of EIC). (This duct is for blowing of 24 F for total length of pipeline as per spec. and drawing)	50000 per Meter of Trench Length
2.0b	Supply of OFC Blowing pits / Jointing pit (RCC pit as per the attached dwg & at every 1 KM distance for BP and every 4 KM for JP, at 1 meter away from the main pipeline), including sand etc all complete as per spec for all planned BP/JP, drawing provided in the bid document. Any unpanned BP/JP will not be paid.	50 Nos.
3.0	Blowing / Laying of Optical Fiber Cable	
3.0a	All activities pertaining to Blowing / Laying of optical fiber cable in same pipeline trench inside 40 mm HDPE telecom duct (after testing of OFC drum at site), through CS	50000 Per Meter of

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 6 of 15	

	conduits at crossing, testing of OFC before Blowing/laying, cable sealing etc. using all materials required complete as per specifications and drawing provided in the bid document & as per direction of EIC. (spare loop of 10 Meter at Blowing Pit, 20 Meter at Jointing Pit & 15 Meter at each station on wire-mesh (if applicable) shall be provided- No payments for laying shall be made for these spare loops).The optical fibre cable shall be as per VCS Standard Specification-VCS-SS-5910	Trench Length
4.0	Supply & installation of 300 dia OFC cable markers at all pipeline warning markers locations on same pipeline markers / KM marker / directional marker post as per specifications & drawing provided in the bid document and direction of consultant.	50 Nos.
5.0	Splicing, Jointing of optical fiber cable , final Jointing / splicing, Testing of OFC after jointing all completed as per specifications & drawing provided in the bid document and as per instruction of EIC.	15 Nos.
6.0	Supply and installation of Joint Marker at all jointing locations as per VCS's drawing all complete as per spec., drawing provided in the bid document and the direction of consultant.	15 Nos.
7.0	Supply, Installation & Commissioning of Electronic Marker System as per specification , test certificate and documents etc. consisting of :	
a	Electronic Markers (To be buried underground along with OFC Joints at all jointing location)	15 Set
b	Electronic Marker Locator and accessories (Including probe and locator electronics)	1 Set
8.0	Supply of set of FTC (in & out) (approved Make) with zero dB connectors & wiremesh (structural size 1.5 Mtr x 1 mtr and mesh size 15 cm x 15 cm) and other accessories for termination of OFC - 24 fibre in the equipment room (at all control room locations). At all locations such as SV, IP; contractor has to provide FTC for 48 F with Zero dB connector for both direction OFC termination as per channeling plan.	1 Set
9.0	Locations where CONTROL ROOM IS AVAILABLE - Installation of FTC for OFC termination (in and out)(approved Make) with zero dB connectors, installation of wiremesh (structural size 1.5 Mtr x 1 mtr and mesh size 15 cm x 15 cm) and other accessories for termination of OFC in FTC including all the items required for installation of FTC.	1 Set
10.0	Locations where CONTROL ROOM IS NOT AVAILABLE - Supply of IP 65 rated weather proof JB, post for JB with canopy etc., including all the items required for erection of FTC. Installation of FTC in field in weather proof JB, post for JB with canopy etc including all the items required for installation of FTC, and all work as required for complete termination of OFC on FTC .At All such locations additional 150 meter cables has to be stored in blowing pit near to FTC post. The blowing pit cost shall be included in the price.	0 Set

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 7 of 15	

11.0	<p>Termination and Testing</p> <p>Termination of OFC on FTC with Zero Db connector and all work as required for complete termination of OFC on FTC (including splicing) , Slicing with street fibre, Test of each fibre for the smooth operation system on wavelengths, OTDR Test of the laid OFC, station wise and end to end Power Testing of laid OFC, Identification of the fault, Rectification, preparation of reports, reconciliation of OFC etc., all testing reports in the format provided in the tender, CD of all fibre OTDR traces, work complete in all respect with all necessary accessories for all location, final acceptance / Handing over of the same to Client/ other contractor and as per the direction of Engineers in charge, as per specification & contract agreement.</p>	1 Lumpsum
------	--	-----------

Siliguri-Gangtok Section-Part D2

S. No.	Description	Quantity
1.0	Telecommunication Work related to OFC Network has to be carried out by the Bidder as defined in Scope of Work of Job specification, other specifications, drawings, other provisions of Contract and instructions of Engineer-in-Charge including but not limited to followings works. For all supply, the scope covers design, manufacturing, factory testing, inspection, packaging, forwarding, transportation, insurance, handling and storage at site etc. .	
A.0	SUPPLY OF OFC ACCESSORIES (as per VCS Standard Specification VCS-SS-5910).	
1.0	Supply of 24 fibre composite SM Optical fibre cable (6 Fibre G-655 & 18 Fibre G-652D) of 4000 Meter \pm 2.5 % cable drums (Qty as per pipeline length with spare) as per the VCS OFC SS No. VCS-SS-5910 Any additional necessary requirements due to shorter length as per TS /Scope of work is in vendor scope.	50 kms.
2.0	Supply of 24 fibre composite SM Optical fibre cable (6 Fibre G-655 & 18 Fibre G-652D) of 2000 Meter \pm 2.5 % cable drums (Qty as per pipeline length with spare) as per the VCS OFC SS No. VCS-SS-5910 Any additional necessary requirements due to shorter length as per TS /Scope of work is in vendor scope.	6 kms.
3.0	Supply of Jointing Closures (suitable for 24 Fibre OFC) including all accessories of approved make only.(Planned	20 Nos.

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 8 of 15	

	Qty : 15 Nos , Spare Qty: 05 Nos)	
4.0	Supply of Special Tools & Tackles	1 Set
B.0	Supply of Permanently Lubricated Telecom HDPE Duct & Accessories as per VCS STANDARD SPECIFICATION No. VCS-SS-5910	
1.0	Supply of 40 mm, permanently lubricated HDPE Telecom DUCT (1000 meter drum), Factory Acceptance Testing as per specification. (Qty with spares) Supply of spare HDPE accessories Plastic Couplers (PC), End Plugs (EP), Cable Sealing Plugs (CSP), End Caps (EC) etc suitable for supplied Duct (Qty as PC-60 nos, EP-40 nos,CSP-40 nos, EC-40 nos).	50 Kms.
C.0	SITE WORK (as per scope of work)	
1.0	Submission of optical fiber cable & HDPE alignment sheets as per the requirements of specification based on the existing pipe line survey (No separate survey reqd.), estimation of OFC & HDPE duct including all accessories in accordance with the alignment sheet and specifications. Laying work can not be started without approval of these documents from Client / Consultant / EIC.	1 Lumpsum
2.0a	Installation of 40mm OD, permanently lubricated HDPE ducts, in same pipeline trench, direct buried or cased crossing through CS conduit (2 duct in cased crossing) in all type of soil & terrain, all work as define in mainline work, for terminal area or non pipeline area - excavation, padding, backfilling, Laying of common warning mat/ mesh (as supplied for main line), cleaning and sealing of ducts, for river crossing additional blowing pit at both end of the river bank, jointing of HDPE conduit, supply and installation of all erection accessories as required, Testing of laid permanently lubricated HDPE ducts, rectification if required, cleaning and sealing of ducts at the end after testing, preparation of report, joint location marking in CAS, GPS location marking of each coupler, final acceptance / Handing over of the same to client, Drawings and documentation all complete as per specifications provided in the bid document. (Scope also includes Supply of HDPE accessories required including Plastic Couplers (PC), End Plugs (EP), Cable Sealing Plugs (CSP), End Caps (EC) etc suitable & sufficient for supplied Duct, complete in all respect as per specification and as per direction of EIC).	50000 per Meter of Trench Length

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 9 of 15	

	(This duct is for blowing of 24 F for total length of pipeline as per spec. and drawing)	
2.0b	Supply of OFC Blowing pits / Jointing pit (RCC pit as per the attached dwg & at every 1 KM distance for BP and every 4 KM for JP, at 1 meter away from the main pipeline), including sand etc all complete as per spec for all planned BP/JP, drawing provided in the bid document. Any unpanned BP/JP will not be paid.	50 Nos.
3.0	Blowing / Laying of Optical Fiber Cable	
3.0a	All activities pertaining to Blowing / Laying of optical fiber cable in same pipeline trench inside 40 mm HDPE telecom duct (after testing of OFC drum at site), through CS conduits at crossing, testing of OFC before Blowing/laying, cable sealing etc. using all materials required complete as per specifications and drawing provided in the bid document & as per direction of EIC. (spare loop of 10 Meter at Blowing Pit, 20 Meter at Jointing Pit & 15 Meter at each station on wire-mesh (if applicable) shall be provided- No payments for laying shall be made for these spare loops).The optical fibre cable shall be as per VCS Standard Specification-VCS-SS-5910.	50000 Per Meter of Trench Length
4.0	Supply & installation of 300 dia OFC cable markers at all pipeline warning markers locations on same pipeline markers / KM marker / directional marker post as per specifications & drawing provided in the bid document and direction of consultant.	50 Nos.
5.0	Splicing, Jointing of optical fiber cable , final Jointing / splicing, Testing of OFC after jointing all completed as per specifications & drawing provided in the bid document and as per instruction of EIC.	20 Nos.
6.0	Supply and installation of Joint Marker at all jointing locations as per VCS's drawing all complete as per spec., drawing provided in the bid document and the direction of consultant.	20 Nos.
7.0	Supply, Installation & Commissioning of Electronic Marker System as per specification , test certificate and documents etc. consisting of :	
a	Electronic Markers (To be buried underground along with OFC Joints at all jointing location)	20 Nos.
b	Electronic Marker Locator and accessories (Including probe and locator electronics)	1 Set
8.0	Supply of set of FTC (in & out) (approved Make) with zero dB connectors & wiremesh (structural size 1.5 Mtr x 1 mtr and mesh size 15 cm x 15 cm) and other accessories for termination of OFC - 24 fibre in the equipment room (at all control room locations). At all locations such as SV, IP; contractor has to provide FTC for 48 F with Zero dB connector for both direction OFC termination as per channeling plan.	3 Set

9.0	Locations where CONTROL ROOM IS AVAILABLE - Installation of FTC for OFC termination (in and out)(approved Make) with zero dB connectors, installation of wiremesh (structural size 1.5 Mtr x 1 mtr and mesh size 15 cm x 15 cm) and other accessories for termination of OFC in FTC including all the items required for installation of FTC.	3 Set
10.0	Locations where CONTROL ROOM IS NOT AVAILABLE - Supply of IP 65 rated weather proof JB, post for JB with canopy etc., including all the items required for erection of FTC. Installation of FTC in field in weather proof JB, post for JB with canopy etc including all the items required for installation of FTC, and all work as required for complete termination of OFC on FTC .At All such locations additional 150 meter cables has to be stored in blowing pit near to FTC post. The blowing pit cost shall be included in the price.	0 Set
11.0	Termination and Testing Termination of OFC on FTC with Zero Db connector and all work as required for complete termination of OFC on FTC (including splicing) , Slicing with street fibre, Test of each fibre for the smooth operation system on wavelengths, OTDR Test of the laid OFC, station wise and end to end Power Testing of laid OFC, Identification of the fault, Rectification, preparation of reports, reconciliation of OFC etc., all testing reports in the format provided in the tender, CD of all fibre OTDR traces, work complete in all respect with all necessary accessories for all location, final acceptance / Handing over of the same to Client/ other contractor and as per the direction of Engineers in charge, as per specification & contract agreement.	1 Lumpsum

Vendor shall have complete responsibility for all the items supplied by him including his sub Vendors if any. The Vendor's scope of work includes, but not limited to:

- Design & Engineering;
- Manufacturing;
- Acceptance Test and Inspection;
- Painting;
- Packing & Forwarding;
- Supply of Spares as specified;
- Documentation;

It is Vendor's responsibility to verify the selection of type of cable, material of construction of each component as per the data mentioned in individual specifications / data sheets. Vendor shall stand guarantee for all items supplied by them, including his brought-out items.

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 11 of 15	

4.1 Notes to Vendor

Optical fiber cable (OFC) and its accessories shall be sized as per requirements as mentioned in datasheet and suitable for installation in buried duct installed along natural gas pipeline.

Vendor shall submit OFC datasheets and drawings for approval. Vendor to proceed further only upon approval of Vendor submitted documents.

Vendor shall quote separately spares for 2-year normal operation. List of spares quoted shall be furnished as per attached formats.

Vendor to include the startup and commissioning spares in the quoted price. However, list of spares (start up and commissioning) to be made available without prices as per attached formats. In case no startup/commissioning spares are recommended by the Vendor but the same are required at the time of startup/commissioning, Vendor shall supply such spares free of cost.

Delivery of OFC and its accessories shall be at M/s IGGL's Dispatch Station at Siliguri and Dimapur and shall be in the Vendor's scope.

Vendor shall furnish quotation only in case he can supply material strictly as per this MR and specification / data sheets forming part of MR.

The submission of prices by the Vendor shall be construed to mean that he has confirmed compliance with all technical specifications of the corresponding item(s).

If the offer contains any technical deviations or clarifications or stipulates any technical specifications (even if in line with MR requirements) and does not include complete scope and technical / performance data required to be submitted with the offer, the offer shall be liable for rejection.

Vendor must submit all documents / drawings / calculations as specified in relevant specification along with his offer and after award of order.

Purchaser's inspector reserves the right to perform stage wise inspection and witness tests, as indicated in Specification for OFC at Manufacturer's works prior to shipment. Manufacturer shall give reasonable notice of time and shall provide without charge reasonable access and facilities require for inspection to the Purchaser's inspector. Inspection and tests performed / witnessed by Purchaser's inspector shall in no way relieve the Manufacturer's obligation to perform the required inspection and test.

Vendor shall deliver the OFC, HDPE Duct & Accessories at Golaghat & and the delivery schedule shall be 3 months FOT site basis

5.0 WARRANTY

The Vendor will warrant the equipment to be free of defects in material and workmanship and that it is adequately engineered to fulfill the design and operating conditions specified herein. The Vendor shall replace and install without cost to EPC

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 12 of 15	

Contractor any materials, supplies or equipment that fails under design conditions due to defects in design, material, or workmanship. If a defect is observed and/or such failure occurs within one (1) year from the date such equipment is put into operation, the Vendor shall replace and install without cost to EPC Contractor any materials, supplies or equipment involved.

Vendor shall provide another twelve (12) months warranty period for any repair or replacement in whole or in part made during the warranty period beginning on the day of satisfactory restoration of services. If the repair or replacement during the warranty period concerns an essential component, the new warranty shall extend to the whole equipment.

6.0 VENDOR DOCUMENTS

This section describes the Vendor Data Requirements applicable to a Vendor's scope. The Vendor data requirements shall be as mentioned in OFC specification.

Vendor shall submit, as a condition of Purchase Order or Contract, all data requirements specified on the Vendor Data Requirements. Electronic copies of all drawings will be provided on CD in DWG format for all drawing issues.

Each document submitted for review must be clear, legible, complete and properly identified. Failure to provide adequate documents may result in them being returned without review at Vendor's expense. In that event, Vendor will be considered not to have formerly submitted the documents so returned.

Vendor shall submit accurate, properly checked documents approved by the responsible Engineer(s). The documents shall be in English language. Dimensions, weights, and measures for drawings, etc. to be in SI units

Vendor shall submit Manufacturers Record Books with all certification, test and inspection information of a manufactured item.

Additionally, Vendor shall provide Vendor Data Books consisting of all pertinent Manufacturer's technical data and information relating to all the various elements of the units supplied by the Vendor. The data and information shall pertain to the facilities as a whole, to each major system, to each subsystem and every component. The Data Books shall commence with copy of the Purchase Order (pricing information may be blanked out) followed by the manufacturer's equipment brochures, data sheets, certificates, parts lists and relevant "As Built" drawings.

6.1 Vendor Drawing Review

Drawings returned to Vendor for correction after markup by Company and / or Company designated representative shall be resubmitted by Vendor until "Proceed with Fabrication Issue Final Drawings". All revisions to documents must be clouded and identified with the revision number contained within a triangle placed beside the cloud.

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 13 of 15	

Vendor shall not proceed with changes having a commercial impact unless authorized by Change Order.

If, for any reason, Vendor believes that he is not able to comply with Purchaser and / or Purchaser's designated representative marked-up comments on documents returned after review, Vendor shall notify, in writing, Purchaser within five (5) working days of receipt, giving his reasons and requesting a resolution. It is not acceptable to ignore marked-up comments.

Vendor must submit updated documents and drawings one (1) weeks after return of approved documents.

Drawings and data approval do not relieve Vendor of his responsibility to meet Purchase Order or contract conditions relating to specifications, material design or construction, and delivery requirements, nor relieve Vendor of responsibility for compliance with laws, codes and regulations.

7.0 PACKAGE AND STORAGE

Preparation for shipment shall be in accordance with the Vendor's standards and as noted herein. Vendor shall be solely responsible for the adequacy of the preparation for shipment provisions with respect to materials and application, and to provide equipment at the destination in ex-works condition when handled by commercial carriers.

Adequate protection shall be provided to prevent mechanical damage and atmospheric corrosion in transit and at the jobsite.

Preparation for shipment and packing will be subject to inspection and rejection by Company's / Contractor's inspectors. All costs occasioned by such rejection shall be to the account of the Vendor.

Equipment shall be packed, securely anchored, and skid mounted when required. Bracing, supports, and rigging connections shall be provided to prevent damage during transit, lifting, or unloading.

Separate, loose, and spare parts shall be completely boxed. Pieces of equipment and spare parts shall be identified by item number and service and marked with Contractor's order number, tag number, and weight, both inside and outside of each individual package or container. A bill of material shall be enclosed in each package or container of parts.

One complete set of the installation, operation, and maintenance instructions shall be packed in the boxes or crates with equipment. This is in addition to the number called for in the Purchase Order.

Equipment and materials shall be protected to withstand ocean transit and extended period of storage at the jobsite for a minimum period of 18 months. Equipment shall

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 14 of 15	

be protected to safeguard against all adverse environments, such as: humidity, moisture, rain, dust, dirt, sand, mud, salt air, salt spray, and sea water.

8.0 LIST OF ATTACHMENTS

1. Specification for OFC and HDPE Duct, Document no. VPC-SPC-5501;
2. Datasheet – OFC and HDPE Duct, Document no. 1009-00-IN-DS-5003;
3. Inspection and Test Plan for OFC, HDPE Duct and Accessories, Document No. 1009-00-IN-ITP-5003;
4. Checklist – Technical.

 ENERGISING QUALITY	Material Requisition for OFC, HDPE Duct and Accessories	Document No.	Rev
		C221052-00-IN-MR-5003	D1
		Page 15 of 15	



PROJECT NUMBER : C221052



DATA SHEET OF OFC & ACCESSORIES

Total Sheets

2

Document no.

C221052

00

IN


DS

5001

INDRADHANUSH GAS GRID LIMITED

NORTH-EAST GAS GRID PHASE-III OF IGGL

D1	11.10.2022	ISSUED FOR BID	VK	DGM	KNC
B1	07.10.2022	ISSUED FOR IDC	VK	DGM	KNC
A1	06.10.2022	ISSUED FOR INTERNAL REVIEW	VK	DGM	KNC
REV	DATE	DESCRIPTION	PREP	CHKD	APPR

DATASHEET FOR OPTICAL FIBER CABLE										Rev.	
GENERAL	1	Cable No.			**						
	2	Application			-						
	3	Quantity			426 Kms						
	4										
CONSTRUCTION	5	Standard			IEC 60793-1-1, 60794-3						
	6	Fiber Type			Single Mode						
	7	Fiber Count			24 core (6 fiber as per ITU-T-G-655 & 18 fiber as per ITU-T-G-652D)						
	8	Color Code			EIA/TI598B						
	9	No of Buffer and Fiber per Loose Tube			6 buffer tubes and 4 fibers / loose tube*						
	10	Cable Drum Length			4 KM *						
	11	Fibre Core Diameter			8.6 to 9.5 µm (±10%)						
	12	Cable Core			Filled with flooding jelly						
	13	Cladding Diameter			125 µm ± 2 µm						
	14	Primary Coating Material (over Fiber)			Ultra Violet cured Acrylic or Silicone						
	15	Primary Coating Diameter			250 µm ± 15 µm						
	16	Secondary Coating Material (over Primary Coating)			Optional *						
	17	Secondary Coating Diameter (if any)			250 µm to 900 µm						
	18	Index Profile			Step or Graded						
	19	Inner Sheath			HDPE						
	20	Inner Sheath Thickness			1.5 mm Minimum						
	21	Outer Sheath			HDPE						
	22	UV Shielding on Outer Sheath			Required						
	23	Thickness of UV resistant Protective Primary Coating			Cured acrylate 0.062 mm						
	24	Outer Sheath Thickness			3 mm (minimum)						
	25	Operational Wave Length			1310 nm to 1550 nm						
	26	Cable Tensile Strength			Better than 2000 N						
		27	Bending radius at Min. Installation Temperature			Minimum Bending Radius: Under Maximum Tension: 20 X Cable OD Without Tension: 10 x Cable OD					
		28	Bedding			Polyvinyl Chloride, Black Colour					
		29	Armour			Corrugated Steel Tape Armour					
		30	Fiber Identification			Colour Coded Fibers and Tubes					
		31	Cable Marking			Durable Marking Embossed Every One (1) Meter					
		32	Drum Identification Labels			Required					
		33	OTDR Measurements Test			Required					
		34	End to end attenuation Test			Required					
		35									
		36									
	OPTICAL PROPERTIES	37	Temperature Rating			-60 to +85 °C					
		38	Relative Humidity Suitability			95%, Non Condensing					
		39	Individual Splice Loss			≤ 0.1 dB					
		40	Cutoff Wavelength			λc=1150 -1320 nm, λcc≤=1280 nm					
41		Diff. in attenuation Coefficient when measured at both end			≤0.05 dB/Km (VTA)						
42		Voltage withstand			10 KV DC						
43		Numerical Aperture			at least 0.13						
44		Expected Fiber Life Span			30 years (min.)						
45		Crush Resistance			440 N/cm						
		46	Transmission Attenuation			For Bore fibers: At 1310 nm = 0.35 dB/km or less At 1550 nm = 0.22 dB/km or less For cabled fibers: At 1310 nm = 0.36 dB/km or less At 1550 nm = 0.21 dB/km or less					
		47	Central Strength Member Material			FRP / GRP					
		48	Central Strength Member Diameter			*					
		49	Cladding Non-Circularity			< 0.7 %					
		50	Polarization Mode Dispersion at 1310 & 1550 nm			as per ITU-T G.652 Standard					
		51	Weight in kg / 1000 Meters			*					
		52	Overall Diameter of Cable and Tolerance			*					
		53	Rip Cord			Yes (1 nos.)					
MISC.		54	Electrical Area Class			Zone 1 Group IIA /IIB as per IEC, T3					
		55	Make	Model No.		*	*				
		56									
	57										
Notes: **To be decided											
1	Vendor to specify. *										
2	Refer Standard Specification for OFC and Conduit,for detail information.										
		CLIENT:	INDRADHANUSH GAS GRID LIMITED			D1	11.10.2022	VK	DGM	KNC	
						B1	07.10.2022	VK	DGM	KNC	
		PROJECT:	NORTH EAST GAS GRID PHASE-III OF IGGL			A1	06.10.2022	VK	DGM	KNC	
						REV.	DATE	PRPD	CHKD	APPR	
Document No.: C221052-00-IN-DS-5001											



ENERGISING QUALITY

PROJECT NUMBER : C221052



DATA SHEET OF PLB-HDPE DUCT & ACCESSORIES

Total Sheets

2

Document no.

C221052

00

IN


DS



5002

INDRADHANUSH GAS GRID LIMITED

NORTH-EAST GAS GRID PHASE-III OF IGGL

D1	11.10.2022	ISSUED FOR BID	VK	DGM	KNC
B1	07.10.2022	ISSUED FOR IDC	VK	DGM	KNC
A1	06.10.2022	ISSUED FOR INTERNAL REVIEW	VK	DGM	KNC
REV	DATE	DESCRIPTION	PREP	CHKD	APPR

DATASHEET FOR HDPE DUCT										Rev.	
GENERAL	1	Duct Identificaiton No.			**						
	2	Application			Duct to include Pipeline OFC						
	3	Quantity			426 Kms						
	4										
	5										
CONSTRUCTION	6	Description			HDPE duct suitable for direct burial application						
	7	Standard			TEC GR No GR/CDS-008/03 March'11						
	8	Duct Drum Length (Mts)			1000 Mts						
	9	Outer Diameter (mm)			40 mm ± 0.4mm						
	10	Wall Thickness(mm)			3.5mm ± 0.2mm						
	11	Pressure Rating (kg/cm2)			10 kg/cm2						
	12	Lubrication			Solid permanent lubricant across drum length						
	13	HDPE Density (kg/m3 at 27 degC)			940 to 958 kg/m3 at 27° C						
	14	HDPE Melt Flow Index			0.2 to 1.1 grams per 10 min. at 190 °C						
	15	Color			Orange - uniform across drum length						
	16	Identification			Black, Length mark at every meter						
	17	Preinstalled Tape			Factory installed Bull-line Pull tape or 4 mm PP rope						
	18	Tensile strength			Min. 20 N/mm2 (Testing as per IS-14151 (Part-I))						
	19	Elongation			Min. 350% (Testing as per IS-14151 (Part-I))						
	20	Internal Coefficient of friction			≤ 0.08						
	21	Environmental stress crack resistance			No failure as per ASTM D 1693						
	22	Impact strength (striker weight 10kg)			No crack or split as per IS:12235						
	23	Crush resistance 50kg Load			Deflection with load<10% & Deflection after recovery <2%						
	24	Oxidation induction tect (> 30 mins)			Satisfactory						
	25	Bending radius			Min 1.25 mtr						
	26	Thickness of inner lubricant layer			≥0.35 mm						
	27	Heat Reversion			Max 3%						
	28	Ovality			1.0 mm as per IS:4984						
	29	Hydraulic Test , Duration: 165 hrs st Induced stress: 3.5 Mpa Acceptance test duration: 48 hrs at 80 Deg C			No failure or leakage as per IS: 4984						
	ACCESSORIES	30	Maximum pulling force			300 Kg					
		31	Plastic Coupler			Push-fit type having Push-Lock mechanism					
		32	Air Pressure Testing of Coupler			15 Kg/cm2 min period of 2 hours without any leakage					
		33	End plugs, Cable Sealing Plug & End Cap			Required					
		34	End Cap material			Hard rubber/plastics fitted to HDPE Ducts					
37											
38											
TESTS	39	Duct Integrity Test			Required						
	40	Pressue Test			Required						
	41	Crush and Deformity Test			Required						
	42	End Plug Test			Required						
	45										
	46										
MISC.	47	Make	Model No.	**		**					
	48										
	49										
	50										
Notes: ** TBD											
1	Vendor to specify. *										
2	Refer MR & Scope of Work.										
3	Refer Standard Specification for OFC and Conduit, for detail information.										
4	HDPE duct specification shall confirm to IS 7328, IS 4984 and ASTM D-1963 standards.										
		CLIENT:	INDRADHANUSH GAS GRID LIMITED			D1	11.10.2022	VK	DGM	KNC	
		PROJECT:	NORTH EAST GAS GRID PHASE-III OF IGGL			B1	07.10.2022	VK	DGM	KNC	
						A1	06.10.2022	VK	DGM	KNC	
						REV.	DATE	PRPD	CHKD	APPR	
Document No.: C221052-00-IN-DS-500											

 ENERGISING QUALITY		PROJECT NUMBER : C221052				 IGGL	
ITP FOR OFC, HDPE DUCT & ACCESSORIES					Total Sheets		12
Document No.	C221052	00	IN	ITP	5001		
<div style="text-align: center;"> <p>Indradhanush Gas Grid Limited</p> <p>North East Gas Grid Phase-III of IGGL</p> <p>Part-D1 & D2</p> <p>ITP For OFC ,HDPE Duct & Accessories</p> </div>							
D1	13.12.2022	Issued for Bid		VK	DGM	KNC	
A1	08.12.2022	Issued for internal review		VK	DGM	KNC	
REV	DATE	DESCRIPTION		PREPD	CHKD	APPR	



CONTENTS

1. QAP FOR OPTICAL FIBER CABLE.....	3
2. QAP FOR HDPE DUCTS.....	8
3. QAP FOR JOINT ENCLOSURES.....	10

1. QAP FOR OPTICAL FIBER CABLE

QAP FOR OFC										
S.No	Activity Description	TEST	Test Frequency	Ref. std & Cl.no.	Procedure NO.	Acceptance Criteria	Document / Report	MFR.	TPI agency	Control Authority
FOR FIBRES										
1	Core (Mode Field) Diameter @1310nm, @1550nm	Geometry Test	100%	ITU-T-G652	Vendor to specify	As per PTS	Vendor to specify	P	W	R
2	Cut of Wavelength on 2meter sample of fiber (in cable)	Spectral Test	100%	ITU-T-G652	Vendor to specify	As per PTS	Vendor to specify	P	W	R
3	Attenuation Co-efficient @1310@1550@1625	Attenuation Co-Efficient Test	100%	ITU-T-G652	Vendor to specify	As per PTS	Vendor to specify	P	W	R
4	Chromatic Dispersion a) 1285-1330 nm b) 1270-1340 nm c) 1550 nm d) 1625nm e) Zero Dispersion wavelength f) Zero Dispersion Slope	Chromatic Dispersion	100%	ITU-T-G652	Vendor to specify	As per PTS	Vendor to specify	P	W	R

QAP FOR OFC										
S.No	Activity Description	TEST	Test Frequency	Ref. std & Cl.no.	Procedure NO.	Acceptance Criteria	Document / Report	MFR.	TPI agency	Control Authority
5	Geometrical Parameters a) Primary Coating Diameter b) Cladding Diameter c) Clad non-Circularity d) Mode e) Field Concentricity error	Geometrical Test	100%	ITU-T-G652	Vendor to specify	As per PTS	Vendor to specify	P	W	R
6	Fiber PMD Maximum Individual fiber	PMD Test	100%	ITU-T-G652	Vendor to specify	As per PTS	Vendor to specify	P	W	R
7	Fiber Proof Test	Fiber Proof Test	100%	ITU-T-G652	Vendor to specify	As per PTS	Vendor to specify	P	W	R
8	Fiber Curl	Fiber Curl Test	100%	ITU-T-G652	Vendor to specify	As per PTS	Vendor to specify	P	W	R
9	Attenuation Vs. Wavelength @1285-1330nm @1525-1575nm	Spectral Attenuation Test	100%	ITU-T-G652	Vendor to specify	As per PTS	Vendor to specify	P	W	R
10	Attenuation with bending @100 turns on a) mandrel of 60 mm diameter b)1 turn of mandrel of 32mm diameter	Attenuation Test	100%	ITU-T-G652	Vendor to specify	As per PTS	Vendor to specify	P	W	R
QAP FOR FINISHED CABLE										

QAP FOR OFC										
S.No	Activity Description	TEST	Test Frequency	Ref. std & Cl.no.	Procedure NO.	Acceptance Criteria	Document / Report	MFR.	TPI agency	Control Authority
1	Visual Inspection a) Cable layup and fiber identification b) Identification and Length marking on outer jacket c) Color contrast of the marking with the outer sheath of the Cables d) Overall diameter of the cable	Visual Tests	5%	GR 409-CORE	Vendor to specify	As per PTS	Vendor to specify	P	W	R
2	Tests for Moisture barrier a) Thickness of layers b)Extent of overlapping c)Electrical Continuity of metallic layer d)Water swellable tape on power e) Water immersion	Moisture barrier tests	a)5% b)5% c)100% d)100% e)5%	GR-20-CORE; IEC-60793-1-53	Vendor to specify	As per PTS	Vendor to specify	P	W	R
3	Tensile performance (Tensile load of 9.81 W Newton or 2700 N whichever is higher, where W= weight of 1Km Cable in Kg)	Tensile Test	5%	IEC-794-1-E1	Vendor to specify	As per PTS	Vendor to specify	P	W	R
4	Crush (200 Kg of load to be slowly placed and held for 60 sec)	Crush Test	5%	IEC-794-1-E3	Vendor to specify	As per PTS	Vendor to specify	P	W	R

QAP FOR OFC										
S.No	Activity Description	TEST	Test Frequency	Ref. std & Cl.no.	Procedure NO.	Acceptance Criteria	Document / Report	MFR.	TPI agency	Control Authority
5	Impact (Mass of 5 Kg to fall freely from 500mm height on the cable sample 10 times repeatedly with a gap between 1 impact to another approx. at 60 sec)	Impact Test	5%	IEC-794-1-E4	Vendor to specify	As per PTS	Vendor to specify	P	W	R
6	Torsion (Weight of 7.5 Kg attached to the stationery chuck and shall be subjected to 10 cycles)	Torsion Test	5%	IEC-794-1-E7	Vendor to specify	As per TPS	Vendor to specify	P	W	R
7	Bend (To be performed preferably with procedure (of IEC) with a mandrel diameter of 20 D, where D is the diameter of the cable and testing shall be done with 4 turns of cable wrapped and then unwrapped for 10 complete cycles)	Bend Test	5%	IEC-794-1-E11	Vendor to specify	As per TPS	Vendor to specify	P	W	R
8	Snatch (With a load of 10 N)	Snatch Test	5%	IEC-794-1-E9	Vendor to specify	As per TPS	Vendor to specify	P	W	R
9	Kink (Radius:10 x cable Diameter)	Kink Test	5%	IEC-794-1-E10	Vendor to specify	As per TPS	Vendor to specify	P	W	R

QAP FOR OFC										
S.No	Activity Description	TEST	Test Frequency	Ref. std & Cl.no.	Procedure NO.	Acceptance Criteria	Document / Report	MFR.	TPI agency	Control Authority
10	Temperature Cycling	Tested on 200m Cable length with temperature cycles as follows: - a) At Room Temp : 1 hr. b) At 0 Deg. :12 hrs. c) At 65 Deg. : 12 hrs. d)From 65 Deg to room temperature :1 hr.	5%	IEC-794-1-F1	Vendor to specify	As per TPS	Vendor to specify	P	W	R
11	Water Penetration	Water Penetration Test	5%	IEC-794-1-F5	Vendor to specify	As per TPS	Vendor to specify	P	W	R
12	Water Immersion	Water Immersion test	5%	IEC-60793-53	Vendor to specify	As per PTS	Vendor to specify	P	W	R

2. QAP FOR HDPE DUCTS

QAP FOR HDPE DUCTS										
S.No	Activity Description	TEST	Test Frequency	Ref. std & Cl.no.	Procedure NO.	Acceptance Criteria	Document / Report	MFR.	TPI agency	Control Authority
1	Visual Inspection of Overall Dimension, ID and OD	Visual Inspection	100%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R
2	Strength of HDPE duct	Impact Test	100%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R
3	Crush resistance of the Duct	Crush resistance test	100%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R
4	Coiling, bending of HDPE duct	Coil test	10%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R

QAP FOR HDPE DUCTS										
S.No	Activity Description	TEST	Test Frequency	Ref. std & Cl.no.	Procedure NO.	Acceptance Criteria	Document / Report	MFR.	TPI agency	Control Authority
5	Withstand capacity of HDPE duct	Pressure test	10%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R
6	End plug check for HDPE installation	END plug test	10%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R

3. QAP FOR JOINT ENCLOSURES

QAP FOR JOINT ENCLOSURES										
S.No	Activity Description	TEST	Test Frequency	Ref. std & Cl.no.	Procedure NO.	Acceptance Criteria	Document / Report	MFR.	TPI agency	Control Authority
1	Dimensions	Visual Inspection	100%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R
2	Ingress analysis	Water Ingress Test	10%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R
3	Strength of material	Impact Test	10%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R
4	Drop and topple	Drop and topple Test	10%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R

QAP FOR JOINT ENCLOSURES										
S.No	Activity Description	TEST	Test Frequency	Ref. std & Cl.no.	Procedure NO.	Acceptance Criteria	Document / Report	MFR.	TPI agency	Control Authority
5	Elongation analysis	Pulling test	10%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R
6	Sustaining heavy weights	Static load test	10%	As per Technical Specification	Vendor to specify	As per Technical Specification	Vendor to specify	P	W	R

LEGEND: R: Review,W:Witness,P: Perform,TPIA:Third Party Inspection Agency

Notes:

1. The above mentioned testing and acceptance criteria are minimum requirements, however, supplier shall ensure that the product also comply with the additional requirements as per the technical specifications and data sheets.
2. The supplier shall submit their own detailed QAP prepared on the basis of the above approval of owner/owner's representative and TPIA.
3. TPIA shall have right to inspect minimum10% of all manufacturing activities on each day or as specified above.
4. TPIA along with owner/owner's representative shall review /approve all the documents related to QAP /Quality manuals Drawings etc. submitted by supplier.
5. TPIA shall also review the test certificates submitted by the manufacturer.
6. Supplier shall in coordination with sub vendor shall issue detailed production and inspection schedule indicating the dates and the locations to facilitate owner/owner's representative to organize inspection.
7. Supplier shall submit their own detailed QAP duly signed and stamped.

 Energising Quality	ITP For OFC, HDPE Duct & Accessories	Document No.	Rev
		C221052-00-IN-ITP-5001	C1
		Page 12 of 12	

VOLUME I ANNEXURE VI
(Fire Protection Works)



Energising Quality

PROJECT NUMBER: C221052



**FIRE FIGHTING SYSTEM
SCOPE OF WORK**

TOTAL SHEETS

41

DOCUMENT NO.

C221052

00

FFS

SOW

4002

INDRADHANUSH GAS GRID LIMITED

NORTH EAST GAS GRID PHASE-III OF IGGL

C1	14.11.2022	ISSUED FOR REVIEW	VV	RD	AA
REV	DATE	DESCRIPTION	PREP	CHKD	APPR

ABBREVIATION

CEA	Central Electricity Authority
SEA	State Electricity Authority
BS	British Standards
IGGL	Indra Dhanush Gas Grid Limited (IGGL),
PNGRB	Petroleum and Natural Gas Regulatory Board
OISD	Oil Industry Safety Directorate
FFS	Fire Fighting System
XLPE	Cross-Linked Polyethylene.
PVC	Poly Vinyl Chloride
NEC	National Electrical Code
UPS	Uninterruptible power systems
CMS	Clean monitoring System
MOV	Motor Operated Valve
PEE	Peak Exposure Encountered
TWA	Time Weighed Average (Exposures)
MCB	Miniature Circuit Breaker
MCCB	Molded Case Circuit Breaker
MPCB	Motor Protection Circuit Breaker
CT/PT	Current Transformer/Potential Transformer
AFFF	Aqueous Film Forming Foam
MCP	Manual call Points
O/ILDB	Outdoor/Indoor Lighting Distribution Board
FRLS	Flame Retardant Low Smoke

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 2 of 42	

TABLE OF CONTENTS

1.0	DEFINITION.....	4
2.0	INTRODUCTION	4
3.0	PROJECT BRIEF	5
4.0	PIPELINE SIZE, LENGTH AND DESIGN CONDITIONS.....	5
5.0	INTENT OF SPECIFICATION.....	7
6.0	WORKS TENDERED	8
7.0	METEOROLOGICAL DATA OF SITE	9
8.0	SCOPE OF WORK AND SERVICES.....	9
9.0	BRIEF FUNCTIONAL DESCRIPTION.....	12
10.0	DESIGN CRITERIA	25
11.0	STATUTORY REGULATIONS, LICENCES & PERMITS	28
12.0	HANDING OVER THE WORK ON COMPLETION.....	28
13.0	SCHEDULE OF RATES / BILL OF MATERIALS	28
14.0	SCOPE OF SUPPLY	31
15.0	DOCUMENTS, SPECIFICATION, STANDARDS AND DRAWINGS.....	32
16.0	RESOURCES FACILITIES	33
17.0	CONSTRUCTION.....	33
18.0	ORDER OF WORKS/PERMISSIONS/RIGHT OF ENTRY/CARE OF EXISTINGSERVICES 34	
19.0	INSPECTION OF SUPPLY ITEMS.....	35
20.0	ESCALATION	35
21.0	DOCUMENTS TO BE SUBMITTED/ PRODUCED ALONGWITH R.A. BILLS	35
22.0	INSPECTION AND QUALITY ASSURANCE	36

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 3 of 42	

1.0 DEFINITION

Where used in this document, the following terms shall have the meanings indicated below, unless clearly indicated by the context to this order:

PROJECT	PMC Services for North East Gas Grid Phase-III OF IGGL.
OWNER	Indradhanush Gas Grid Limited
CONSULTANT	VCS Quality Services Private Limited (VCSQSPL) the party to act for and on behalf of the OWNER for the Engineering Services
VENDOR / MANUFACTURER	Party, which manufactures and supplies equipment and services to the OWNER or to CONTRACTOR.

2.0 INTRODUCTION

The Hydrocarbon vision 2030 for North East India (vision document), released by MoP&NG proposes detailed plan for Natural gas infrastructure development in North-East. The states covered in the vision document include Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

M/s Indradhanush Gas Grid Limited (IGGL), a Joint Venture of IOCL, ONGC, GAIL, OIL and NRL, is in the process of implementing the North East Gas Grid (NEGG) with a vision to connect all the eight (08) northeastern state capitals and major consumption centers in the region. The NEGG will be connected to National gas grid at Guwahati through Barauni-Guwahati pipeline (already under execution by M/s GAIL).

M/s IGGL intends to lay pipeline along with terminal works for section-10 & 11 which consist of 12" NB x 199.007 Km (approx.) in section-10 and 12" NB x 186 Km (approx.) in section-11 mainline. Main line taken from Siliguri DT to Gangtok RT in Section-11. Similarly in section-10 12" Main line taken from T point Jorhat to Dimapur DT to Sekmai gas Bottling plant RT Via IP station at Tadubi (Manipur).

The brief scope of work includes supply of materials (other than free issue), pipeline laying work including but not limited to Construction Management, HSE & Quality Management, Survey, ROU management, clearing of ROU, grading, stringing, bending, welding (Manual), trenching, joint coating, lowering, crossings, crossings by HDD (wherever specified), Tie-ins, NDT and destructive testing, backfilling, laying of pipeline along-with OFC & HDPE ducts, TCP works, site restoration, hydro-testing, dewatering, swabbing, drying, nitrogen purging (as applicable), pre-commissioning, commissioning and Gas-in of pipeline including construction / installation of related facilities like scraper launching / receiving facilities and all piping works at dispatch / receiving terminals, I.P. Stations and piping works at Sectionalizing valve stations, Tap-off station & Injection points, etc. including associated Mechanical, Cathodic protection, Corrosion monitoring works,

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 4 of 42	

Electrical works, Telecom works, Firefighting works, Instrumentation, Civil works (including boundary wall and building works), Architectural and Structural works at all stations, and Pipeline Information Management system. The scope of work has been divided into the following parts:

PROJECT TITLE: -SILIGURI-GANGTOK PIPELINE SECTION (SECTION-11)		
REF. SCHEMATIC DRAWING NO: -C221052-SGPL-PP-SCM-2001		
PART NO	SPREAD NO.	SCOPE OF WORK
PART-D1 (Length 44.2 km)	SPREAD-2B (Length 44.2 km)	Pipeline laying from Ch. 59+800 Km to Ch. 104+000 Km including associated works (Mechanical, Piping & Including Terminal works as per scope matrix) & One (01) SV stations.
PART-D2 (Length 46.3 km)	SPREAD-2C (Length 46.3 km)	Pipeline laying from Ch. 104+000 km to Ch. 150+300 Km. Intermediate Pigging Station (IP station) Lava, West Bengal at Ch. 128+000 Km including associated works (Mechanical, Piping & Terminal works) at Two (02) SV stations.

Note: Chainage shown above are tentative and for reference purpose only, there may be change in Chainage shown as per site condition during execution.

3.0 PROJECT BRIEF

Summary of various stations envisaged in the proposed North East Gas Grid Phase-III of IGGL are as under:

A) SILIGURI – GANGTOK PIPELINE (SGPL)

Sr. No	Type of Station	Nos.	Location
1	Dispatch Terminal (DT / SGPL)	0	-----
2	Intermediate Pigging Station (IP/SGPL/01)	1	Tentatively at Lava
3	Receipt Terminal (RT/SGPL) with/ without Tap off	0	-----
4	Sectionalizing Valves with/without Tap off	3	Along the Siliguri-Gangtok route

4.0 PIPELINE SIZE, LENGTH AND DESIGN CONDITIONS

A) SILIGURI GANGTOK PIPELINE

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 5 of 42	

Spread	Approx. Length	DT/RT	SV	IP
Spread 2B	44.2 KM	0	1	0
Spread 2C	46.3 KM	0	2	1

B) Multi Products Pipeline Details

- i) Design Pressure: 92kg/Cm2g
- ii) Design Temperature; -29° TO +65°C
- iii) Pipeline Size: - 12" (90.6km).
- iv) Pipeline Material: - API 5L Gr. X 70 PSL 2
- v) Pipeline Wall Thickness; -7.14mm / 8.38 mm
- vi) Pipeline Total Length (APPROX.): - 90.5 Km (Approx.)
- vii) Pipeline Corrosion Coating; - 3LPE (EXTERNAL

C) SITE CONDITIONS

Parameters	
Max / Min. Temperature	50/-5 °C
Design Temperature	50°C
Relative Humidity	95%
Altitude above Sea level	Up to 1000 Meters
Atmospheric pollution	Designed to withstand the site conditions, dust, vapour, Industrial Gases
Hazardous Area classification	Zone-2, Gas group IIA, IIB, for Temp. Class T3
Control Room/ Substation/ D.G. Room/Guard Room/ Battery room.	Safe area

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 6 of 42	

5.0 INTENT OF SPECIFICATION

5.1 The intent of the specification is to cover the design, engineering, supply, manufacture/ fabrication, procurement, packing, forwarding to site, unloading at site, receipt, storing, erection, testing, shop painting, commissioning and guaranteed performance of the following and as outlined in various chapters of the technical specification:

- A. Clean Agent System for Ceiling void, Room void & Floor void/cable trenches.
- B. Fire Detection & Alarm System
- C. Associated Piping, supports, MCPs, nozzles etc.
- D. Associated Civil & structural works, electrical & instrumentation works including supply of all materials.
- E. Supply of Fire & Safety equipments, portable fire extinguishers.

THE CONTROL ROOM SIZES FOR CLEAN AGENT SYSTEM ARE INDICATED IN SOR.

The contractor shall include all supports, inserts etc. required for the above system, instrumentation & electrics of the system and all necessary operating platforms and ladders, if required, for the safety and maintenance of the equipment and the system as a whole. Contractor shall consider Clean Agent Suppression System for Cable Trenches/ Floor void apart from the dimensions mentioned above without additional cost to the company.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 7 of 42	

- 5.2** The delivery of the items shall be made at site of M/s IGGL at various locations of the project as elaborated elsewhere in the specification.
- 5.3** Any additional item/ component that are not specifically mentioned in the specification but are required to make the system/ equipment complete in all respects for safe operation and guaranteed performance shall be under the scope of this specification.
- 5.4** The contractor shall furnish the names of the sub-suppliers, if any, along with the units / quantity intended to be procured from them. List of approved makes of materials is enclosed in the tender document. Only those vendors shall be acceptable for whom the names are specified against the items. For any other item not mentioned in the list, the successful party shall take prior approval before placement of order.
- 5.5** Technological Part
- Depending upon the nature of the units to be protected from fire, fire protection systems viz. clean agent based Fire suppression system; automatic fire detection- cum-alarm system, portable fire extinguishers & fire fighting accessories shall be provided.
- However, automatic fire detection-cum-alarm system & fire suppression system shall be provided in all the electrical rooms, Control / Scada rooms and Battery room as per Specification.
- 5.6** The system as a whole along with equipments, components, flow calculation software etc. shall be approved by UL / FM / ULC / LPCB/VDS.

6.0 WORKS TENDERED

The work tendered in this bid package consists of Design, supply of materials as required, installation, testing and commissioning of Fire Protection system including all Associated Mechanical, Civil, Structural, Electrical, Instrumentation etc.

The work being tendered is covered as indicated below:

Sl. No	Description	Scope of Work
1	Fire Alarm System, Clean Agent System, Portable Extinguishers, Fire Protection Equipment, First Aid & safety Equipment.	<ul style="list-style-type: none"> Design, Supply, installation & commissioning of fire detection & Alarm system. Design, Supply, installation & commissioning of High Pressure Inert gas based clean agent system.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 8 of 42	

		<ul style="list-style-type: none"> Design, Supply, installation & commissioning of Linear Heat Sensing Cable for Cable trench. Civil & structural, Electrical & Instrumentation works including supply of all materials. Supply and installation of fire fighting equipments viz. portable extinguishers, hand appliances etc. Supply of First Aid & Safety Equipments.
--	--	---

7.0 METEOROLOGICAL DATA OF SITE

The fire protection systems shall be designed taking into account the meteorological data prevailing at the project site.

8.0 SCOPE OF WORK AND SERVICES

8.1 General & Technical Qualification Criteria

The scope of work of the Tenderer shall include supply, erection, testing and commissioning of clean agent Flooding system and fire alarm system in the control room, associated civil, electrical and instrumentation facilities at various stations of the Project.

The tenderer shall furnish the list of commissioning and two (2) years maintenance and operational spares in the offer. Complete details of all spare parts, their relation to the equipment and their itemized prices shall be furnished in the tender. Prices shall be mentioned in the price envelope and item wise list of spares without price shall be furnished in the unpriced bid.

The bidder must include in the quoted price for the following mandatory spares to be supplied with the Clean Agent system at each location. :

S.N o.	Item	Quantity
1	Automatic and Manual release system	One of each type/size used in the systems supplied
2	Cylinder Valve with safety pressure relief device	One of each type / size used in the systems supplied.
3	Clean Agent Nozzles	10% of total nozzles used in each size / type with minimum drill holes.
4	Clean Agent Release Push Buttons	10% of total used of each type etc. (Min, 2 nos)
5	Pressure Gauges	20 % (Subject to Minimum of 1) of each type, range, MOC, and rating, whichever

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 9 of 42	

		is higher.
6	Solenoid Valves	20% or Minimum 2 numbers of each type used.
7	Panel Mounted Instruments	10% of Panel Mounted items like pushbuttons, lamps, switches
8	Transmitters	10% or Minimum of 1, whichever is higher of each type, range

The Price for the same shall be included in the Lump sum price of Clean agent system & Fire Alarm system in SOR.


In addition to above mandatory spares, BIDDER must recommend list of spares required for 2 years trouble free operation, with unit rates and quantity, along with the offer.

8.2 The scope of work and services to be rendered by the Tenderer for installation of fire fighting system shall include but shall not be limited to the following activities:

- i) Design, engineering, manufacture/fabrication, assembly, shop testing and shop painting, sequential packing, delivery FOR site, unloading, unpacking, storage at site, site handling, preparation of erection drawings, erection as per approved drawings, site testing, painting, commissioning and fulfillment of guarantee of fire protection systems, sub-systems and integrated systems as described above and also covered under this tendering specification.
- ii) Miscellaneous materials and services, if not otherwise specifically asked for, shall include the following:
 - Constructing site office, covered store, open storage at designated place including supply of construction material and removal of the same on completion of work.
 - Site cleaning, removal and disposal of debris, maintaining clean condition in and around the working place and as instructed by authorized representative of VCS / Owner.
 - Distribution of electric power supply for erection work through licensed electrical contractor / licensed electrician. Construction power shall be made available by Owner at one place only.
 - All piping integral to or between any equipment furnished under this specification, except as otherwise specified.
 - All necessary isolation valves fitting at the tapping points and branch pipes.
 - Coupling guards for all exposed shafts and couplings.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 10 of 42	

-
- Base plates, thrust blocks, duck-foot bends, matching flanges, supporting materials and shims.
 - All necessary instruments, power and control wiring integral to any equipment furnished under this specification. This shall include terminal blocks and integral wiring to these terminal blocks for equipment requiring external connection.
 - All erection accessories, consumables and miscellaneous materials, though not specifically indicated in this specification, but actually required for completing the job in all respects.
 - Erection, testing and commissioning of materials and system as a whole.
 - Initial fill of gas in the cylinder and other fire extinguishing media.
 - All necessary fixtures, supports.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 11 of 42	

8.3 Formats for Work Permit System:

8.3.1 Work permit system in line with OISD: 105 as per IGGL'S HSE management system shall be followed.

8.3.2 Permits shall be issued in SAP system and shall be issued to EIC as per IGGL'S procedure.

8.4 Technical Qualification Criteria for Equipment which are pre-requisite to qualify technically in the bid are as follows

8.4.1 All the high pressure cylinders to be used for the clean agent system shall have peso approval in the name of IGGL as per IS: 7285-2 and also shall have approval from UL/FM/LPCB/VDS as part of complete system in addition to approval from PESO.

8.4.2 Support letter from OEM from whom the bidder intends to take authorization for the system, authorizing the bidder for clean agent system, for control room for design/ engineering/ execution, commissioning & after sales service for specialized systems such as clean agent suppression system, fire detection & alarm system compatible to the specifications shall be submitted along with the bid.

8.4.3 System / Equipment / Component offered shall be strictly in line with technical specifications defined in the tender document. No deviation to technical specification shall be permitted. Bidders must note that offer of bidders not matching the technical specification of their Item / System / Component with the tender specifications shall be rejected

9.0 BRIEF FUNCTIONAL DESCRIPTION


9.1 Automatic Addressable Fire Detection-Cum-Alarm System:

9.1.1 Manual push button type fire alarm system

Automatic fire detection-cum-alarm system shall be provided for service building. In addition to detection system, manual push button fire alarm system (manual call points) shall be provided for all the premises / bays within the scope of the Tenderer. These areas shall be protected from Fire using State-of-the-art Automatic Smoke/ Heat Detection/ Alarm & Fire Control mechanism using Code of Practices approved by agencies such as Bureau of Indian Standards (BIS), British Standards Institute (BSI) or National Fire Protection Association (NFPA). Relevant certificate of approval shall be enclosed. The alarms need to be monitored on a 24 x 7 basis & logged for providing reports.

The Fire system shall deploy High Sensitivity Smoke/ Heat Detectors to allow swift detection of heat and/or smoke.

The fire alarm should be designed to cut power to air-conditioning system. Second alarm should cut all the power supply to the control room excluding

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 12 of 42	

supply to critical equipments and the fire suppression system should be triggered off after a pre-set time interval.

The fire detection & alarm system shall comprise of the following items/ equipment:

- Automatic Fire Detectors and Accessories comprising of:
 - Heat Detectors
 - Ionization Type Smoke Detectors
 - Photo Electric / Optical Type Smoke Detector
- Manual Break Glass Boxes / Manual Call Points (MCP)
- Response Indicators
- Exit Signs
- Hooters
- Flashing Lights
- Clean Agent Release And Inhibit Switches
- Any other item(s) required for the completeness of the system

Signal and control shall also be provided on main fire alarm control panel from gas based fire extinguishing system.

9.1.2 Detection system for cable Trenches, below false flooring:

In cable trenches and below false floors, detection of fire shall be by a highly accurate & sensitive mechanism which can detect direct & indirect fire exposures.

LHS shall be used for detecting heat from a fire over its entire length. The sensor cable shall consist of a twisted pair of copper coated steel conductors covered by a temperature sensitive insulation. The LHS shall be UL/FM/LPCB/VDS approved and shall be designed for open area as well as proximity detection. LHS shall be compatible with any fire control panel that is capable of accepting contact closure type initiating devices.

Linear Heat Detection System shall be used for effective activation of a warning or alarm signal indicating a condition of excessive heat or fire. In this system, each discrete addressable LHS cable zone shall report an individual alarm to the addressable fire control panel. The detector should be capable of detecting fire even under harsh conditions. The response behavior of the detector shall be precisely adjustable to suit the environment & small temperature variations caused due to environmental fluctuations and shall not result in false alarms. The detector unit shall send fault signal when the LHS is damaged (Cut or damaged).

The detector specification shall be as follows:

- Rated Activation Temperature Tolerance : $\pm 5\%$

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 13 of 42	

- External Diameter Typical : 0.15" nominal (3.8mm nominal)
- Conductor Diameter : 0.035" nominal (0.89mm nominal)
- Outer sheath Thickness : 0.020" nominal (0.5mm nominal)
- Temperature Rating : 68 deg C
- Min. Installation operating temperature : 5`C
- Application : Indoor/Outdoor
- Outer Jacket Material : PVC
- Conductor Material : Tinned copper clad steel
- Tensile Strength : 245K PSI/Conductor
- Bend Radius (Minimum) : 2.5 inches (63.5 mm)
- Weight nominal per length : 0.016 lbs/ft (24 grams/m)
- Conductor Resistance at 20 °C (max) : 0.058 ohms/ft 2 conductor

The parameters as mentioned against each requirement are indicative and bidder has to submit the data sheet of LHS for approval of VCS during detailed engineering.

9.1.3 The system shall operate on 230V AC input and 24V DC SMF lead acid batteries for standby supply with battery backup of 48 hours in normal condition & 1 hour in case of fire condition.

9.2 Clean Agent Fire Suppression System (Inert Gas High PressureSystem)

Fire in strategically important places like computer rooms, control rooms, switch gear rooms, data storage rooms, server rooms, data storage archives, libraries, laboratories etc. is a serious hazard to highly precious and irretrievable items and properties. Occurrence of fire besides leading to personnel injuries and property damage also leadsto loss of productivity and precious time. The primary cause of fire may be due to short circuit / overheating of certain components somewhere in the areas. Since most of the areas are unmanned and completely closed, fire inside is not visible and accessible from outside till it becomes too big, dangerous and unmanageable.

Fire suppression with water-based systems such as hydrant or sprinkler system can damage the assets permanently. Therefore for these costly & critical areas, the Fire Protection System envisaged calls for early detection of fire and quenching the same by flooding the area with gas based fire suppression system besides giving out an audiovisual alarm. The design shall be strictly as per NFPA standard NFPA 2001.

The suppression system shall provide for high-speed release of Gas based on the concept of total Flooding protection for enclosed areas with **High Pressure clean agent gas (Inert Gas)**. A Uniform extinguishing concentration shall be as applicable and approved by NFPA 2001 of the gas for 70 deg F. The system discharge time shallbe in accordance with NFPA standard 2001.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 14 of 42	

The Fire Suppression System shall include a detection and control system provision for both pre-alarm and automatic agent release.

The detection and control system that shall be used to trigger the Fire suppression shall employ cross zoning of Multi-criteria smoke detectors and other detectors. A single detector in one zone activated, shall cause an alarm signal to be generated. Another detector in the second zone activated, shall generate a pre-discharge signal and start the pre-discharge condition.

The discharge nozzles shall be located in the protected volume in compliance to the limitation with regard to the spacing, floor and ceiling covering etc. The nozzle locations shall be such that the uniform design concentration will be established in all parts of the protected volumes. The final number of the discharge nozzles shall be according to the OEM's patented and certified software, which shall also be certified by such as UL / FM/LPCB/VDS.

The Gas shall be stored in seamless storage containers complying with the SMPV Rules set out by Chief Controller of Explosives, Nagpur, India. The Bidder shall be required to produce a NOC for the Chief Controller of Explosives, Nagpur for the storage containers against the cylinder identification numbers punched on them. Welded cylinders for agent storage will not be acceptable.

The Gas shall be discharged through the operation of an Electric (solenoid) operated device or pneumatically operated device, which releases the agent through the pneumatic operated pressure valve. Systems that employ explosive or pyrotechnic devices for the discharge shall not be permitted.

The Gas discharge shall be activated by an output directly from the Gas Release control panel, which will activate the solenoid valve.

9.3 Interlocking with A/C & Ventilation system

There will be interlocks to shut off the exhaust fans and simultaneous tripping of A/C and ventilation system. The fire signal from first detector will operate the audio-visual alarm whereas on confirmation of fire signal from the other detector the ventilation/air conditioning system shall be switched off automatically. Appropriate tripping relays and their contacts shall be provided by the tenderer for this purpose considering zone wise operation, partitions in cable gallery/ basement and number of fans/ system operating in the electrical rooms.

Potential free contacts (Relay modules) shall be made available for each zone for tripping of respective ventilation/air conditioning system. Location of above relay module shall be as finalized during detailed engineering stage. Tenderer to consider all accessories such as cabling/ wiring, contact multiplication etc required to achieve the system requirement. Contact of auxiliary relays shall be made available in relay

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 15 of 42	

auxiliary panel of the above mentioned places and shall be suitable to wire directly in MCC/starter panel control circuit. The relay modules shall be considered as part of fire alarm panel. Only cost of cabling on per meter basis shall be payable as per SOR item rate.

9.4 Portable Fire Extinguishers

9.4.1 In order to combat any occurrence of fire in any corner of the premises/area, adequate number of first aid portable and heavy-duty trolley mounted fire extinguishers shall be provided. Selection of the fire extinguishers shall be done depending upon the hazard, equipment to be protected, etc. Selection of fire extinguishers shall be done as per latest BIS2190 and as summarized in the table. However, all the computer/automation/plc/microprocessor rooms shall be provided with CO₂ type fire extinguishers (both portable and trolley mounted type). The fire extinguishers selected for each location will be based on the fire hazard class present in that area.

Class	Combustible Hazard	Extinguisher Type
A	Ordinary combustibles such as wood, cloth, paper, rubber, plastics etc.	Water, Dry Powder
B	Flammable liquids, oils, greases, oil based paints, lacquers and flammable gases	CO ₂ , Dry Powder
C	Electrical equipments where it is dangerous to use a conductive medium.	Dry Powder, CO ₂

All the extinguishers shall conform to relevant IS and also bear ISI marking on their body. All the extinguishers shall be supplied with mountings, accessories and initial fill. The extinguishers supplied shall be of reputed make having approval of the Purchaser. Relevant BIS and TAC approval certificate for all the extinguishers shall be furnished. In addition to the above certificates, a certificate from Chief Inspector of Explosives shall be furnished for carbon dioxide type fire extinguishers.

All the portable extinguishers shall be installed along the column/walls near entry/exit/suitable locations and at a height of approx. 1200 mm from the finished floor level and also in accordance with the requirements laid down in OISD: 189 & 214. The design, construction and testing of all types of fire extinguishers shall be specified in accordance with recognized standards as mentioned below.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 16 of 42	

Carbon-dioxide type (4.5 & 22.5 Kg. Cap.) : IS:15683-2006

Dry chemical powder (5.0 & 22.5 Kg Cap.) : IS:15683-2006

Mechanical foam type- AFFF (9.0 & 50.0 Ltr.) : IS:15683-2006

Water type (gas cartridge) : IS:15683-2006

All types of fire extinguishers shall, as far as possible, have a standard & simple method of operation. Portable fire extinguisher sizes will be selected as small as practical to be effective and for ease of operator deployment.

CO₂ extinguisher sizes will be determined to ensure that leakage or accidental discharge will not cause a hazardous CO₂ concentration.

Dry powder portable and wheeled fire extinguishers shall use potassium based agents and be compatible with AFFF.

Portable extinguishers located in exposed and naturally ventilated locations shall be stored in suitable weather proof cabinets as protection from the effects of wind and rain.

Trolley mounted dry powder extinguishers shall be provided in addition to portable extinguishers for protection to all areas where primary risk is from a liquid hydrocarbon fire.

9.4.2 General Requirements for Portable Fire Extinguishers

- a) All portable extinguishers shall be supplied along with mounting accessories, wall brackets and with initial fill of gas or powder in fully assembled condition.
- b) All extinguishers shall be treated with lead tin alloy for anti rust, anticorrosive treatment by electrolytic process.
- c) The extinguishers shall conform to the relevant Indian Standards and shall bear the IS certification mark on their body.
- d) Test certificates shall be furnished along with the equipment.
- e) All components shall be manufactured with materials of approved quality and of best workmanship.
- f) All extinguishers shall be welded construction.
- g) The cylinders of Carbon dioxide extinguishers shall be of cold drawn steel.
- h) All the components / parts of extinguishers viz. Unions, Caps, inner containers etc. shall be metallic and made of bronze or gunmetal.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 17 of 42	

- i) The Outdoor extinguishers shall be placed on a fixed or portable stand which can be firmly placed on the ground. The stand shall have hood above, to protect the extinguisher against Sun & Rain. The size of the stand and the hood shall be sufficient enough to keep 1 to 2 extinguishers at any point according to their size & capacity.

9.4.2.1 9 Kg DCP Fire Extinguisher


- a) The extinguisher shall conform to IS: 15683-2006.
- b) The welding process shall be per IS: 2825 and shall have the certification for every extinguisher.
- c) In addition to the IS marking, the following permanent markings by punching at the bottom ring shall be done:
 - Manufacturer's name
 - Year of manufacturing
 - Manufacturer's serial number

9.4.2.2 4.5 Kg CO₂ Fire Extinguisher

- a) The CO₂ extinguisher shall conform to the latest IS: 15683-2006 with amendments.
- b) The complete assembled / manufactured extinguisher shall be as per IS: 15683, and fitted with high pressure wire braided discharge hose of one meter length with horn, wall mounting bracket and carrying handle. The cylinder shall be fully charged with CO₂ Gas., The design, performance of extinguisher, anticorrosive treatment and the painting shall be as per IS.
- c) In addition to the IS marking, the following permanent markings by punching at the bottom ring shall be done:
 - Manufacturer's name
 - Year of manufacturing
 - Manufacturer's serial number

9.4.2.3 Fire (Sand) Bucket with Steel Stand

- a) Portable Supporting Stand: The stand shall be fabricated out of 50x50x5 angle and painted fire red as per painting spec, and the frame shall be designed to support 4 Nos. buckets filled with sand. The stand frame shall have a top hood, and sufficient enough to protect the buckets against Rain & Sun and paint finished.
- b) The fire (Sand) bucket shall be fabricated of MS galvanized sheet of 1.0 mm thick and the size shape & profile shall be as per IS 2546-1974

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 18 of 42	

RA2000 and shall have 10lts capacity. The leakage test shall be as per IS. The painting shall be fire red externally, white inside and black color for ears & handle etc.

9.5 Fire & Safety Equipment

9.5.1 SAFETY HELMET

The Safety helmet shall be suitable for personal protection against head injuries by falling objects and also for firefighting purposes. Helmet shall have suitable adjustable strap by which it can be secured firmly on the head. The helmet shall be made of HDPE material. Helmet shall be fitted with suitable cushion inside for comfortable wearing. The helmet shall conform to IS-2925-1984 RA2000, and shall bear IS mark on the body. As per purchasers requirement all the helmets shall be numbered on the front and rear sides. The white in color for the captain and bright yellow for rest of the crew members shall be considered.

9.5.2 STRETCHER WITH BLANKET:

Stretcher suitable for an adult of size approx 6 feet x 2 feet and made of wooden/MS poles/bars and adult size blanket and other features generally conforming to IS-4037-1967 RA-2001. The canvas shall conform to Variety No. 3 of IS : 1424 -1983 RA2000. The color would be as specified by the purchaser, The carriers shall conform to channels size 80 x 30 mm of IS : 811-1987. Spreader and Runner are manufactured from mild steel strips. The wooden poles shall be given a coat of protective varnish and spray painted to any shade as required by the purchaser. The testing and QA requirements are as per IS.

9.5.3 First Aid Box: *(Kit to be handled by medical / paramedical staff)*

HDPE/ Hard plastic carry case containing the First Aid accessories portable type, compartmentalized storage slots with locking arrangement and containing the required first aids as below:

The expiry of these items shall be at least 18/12 months from the date of supply.

1. First aid for cuts, buns, sprains (instant relief sprays) – 1 each.
2. Antiseptic lotion, liquids (Dettol / Savlon tincture iodine) - 1 bottle
3. Pain relieving medicines, anti vomiting medicines etc. -2 strips of 10 each.
4. 500 mg Paracetamol I.P - 100 tablets.
5. Anti snake serum bottle - 2 Nos.
6. Band-Aids - 20 pcs.
7. 25 gms of Soda Bi-Carb. I.P. - 1 pkt.
8. Wound dressing small (for fingers) - 12 pcs.
9. Wound dressing medium (for hands and feet) - 6 pcs.
10. Wound dressing large (for body) - 6 pcs.
11. Burn dressing large (for body) - 6 pcs.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 19 of 42	

12. Absorbent cotton wool 13 gms each - 6pcs.
13. Dressing instruments (scissors / blade etc.) - 1. set.
14. Eye pad with bandage in separate pkt. - 08 pcs.
15. Tourniquet cotton with belt & buckles. 1 No.
16. Polythene wash bottle 500 c.c. - I. No.
17. Book of instruction on first aid to injured- I. No.

9.5.4 RUBBER HAND GLOVES:

Hand gloves suitable for handling electrical jobs up to 1100 volts type -2 and conforming to IS-4770 -1991 RA-2001 shall be supplied.

The gloves shall be made from best quality natural rubber or synthetic rubber or from a mixture there of. The gloves shall have a smooth finish and the edges shall be finished with a roll or a reinforcing strip of rubber, unless specified otherwise. The size & thickness of the glove as specified in IS. The gloves shall be colour coded as Blue for Type 2 application of the rated potential. The gloves shall be marked indelibly at the back with the following information:

- a) Size and type of glove;
- b) Maximum working potential in volts, followed by the word 'working'
- c) Identification mark of manufacture and month and year of manufacture.

9.5.5 PORTABLE MULTI GAS DETECTOR / EXPLOSIMETER CUM OXYGEN METER

The Portable Multi Gas detector supplied shall confirm to the following Data sheet:


General	:	4 Multi-Gas detector with advanced microprocessor based operation
Power	:	Rechargeable Nicad / Lithium Polymer standard charge time : 3hours. Rechargeable choices 110/240v AC line 12 V DC Vehicle, 12/240 V charge cables shall be provided
Diffusion Mode	:	12-16 hours, Continuous Active Sampling Mode : 8-9 hoursexpected.
Operating Humidity	:	5 to 95% RH non-condensing
Operating Temperature	:	-20 ⁰ C to +58 ⁰ C
Full function self test	:	Automatic when the detector is turned ON.
Calibration	:	Methane
Battery	:	Continuous type.
PHYSICAL Features	:	Size - 4.2" X 2.4" X 1.4". Weight - Less than 160 gms. Including battery Enclosure Case - Rugged, high impact resistant, non corrosivecomposite material Handling: Unit shall be easily attached to the pocket or belt.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 20 of 42	

Ingress Protection	:	IP 66 / 67
Records & Displays	:	On Demand: a) TWA (Time Weighed Average) Exposures b) Peak Exposure Encountered (PEE)
Automatic Calibration	:	Fully Automatic Zero and span
Auto Zero	:	Initiate at any time in the field without gas
Password Security	:	Field selectable access protection to calibration and alarm setpoints.
Confidence Beep	:	Field selectable operational beep and flashing LED indicator(for every 10 seconds when enabled)
SENSORS	:	Combustible: Plug in catalytic (Toxic & Oxygen) type &Oxygen: Plug-in electrochemical cell
Calibration / and Diagnostics	:	Automatic to give valid calibration with respect to ambience air & gas levels
Enclosure	:	Ex e rating

Operating Specification	Measuring Range	Response Second	Detectable accuracy Resolution	Operating Temperature Range
Combustibles	0-100 %LEL	< _ 5	1% LEL	-40 to +90 °C
Oxygen	0-30 % by Vol.	< _ 2	0.1% by Vol	-20 to +50 °C
Carbon Monoxide	0.500 ppm 0-1000 expandable	< _ 7	1 ppm	-20 to +50 °C
Hydrogen Sulfide	0-100 ppm	< _ 5	1 ppm	-40 to +50 °C

Displays	:	Extra large gas specific alpha-numeric: LCD around 0.40 inch high.
Alarm Set Points	:	Displayed each time the unit is turned ON
Display Backlight	:	Push Button timed ON. Automatic ON in Alarm Condition.
Alarms	:	Low and High Gas Alarm Set points, Over-Range Multiple Gas Exposure, Sensor Removed, Calibration Air, Low Battery, Lowflow
Audible	:	90 db @ 1ft. Variable pulsed beeper.
Visuals	:	a) Two (2) flashing "Sun bright" LEDs b) Gas specific LCD flashes in alarm advising which hazard present. c) ICON Alarm readout advises alarm level present LOW, HIGH and /or Multiple Gas / Alarms d) Fan ICON indicator.
Alarm Levels	:	Two set points per sensor (User Adjustable) TOXICS - TWA (Low) and Instantaneous High

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 21 of 42	

		OXYGEN - Deficiency & Enrichment COMBUSTIBLES - Low & High
Sampling Pump	:	Integral Motorized sampling Turbine type pump.
Pump Flow Rate	:	300 to 350 ml/min with 10 foot hose and filters (dependent on pump)
Watertrap (Built-in)	:	Certified Intrinsically safe to comply with US & Canadian Standards.
Accessories	:	The following accessories shall be supplied along with the explosimeter: a) A manual aspirator pump with sampling hose / probe b) A motorized pump with sampling hose or probe. c) A Confined space entry kits in a hard sided carrying case. d) Automatic test & calibration and calibration station, that shall have: i. Bump test & calibration instruments in the field without requiring the use of a desk top PC or Laptop be fully portable and available in a variety of portable kit options. ii. Provide simultaneous management of up to 10 instruments docking models iii. Include battery and 110 / 240 V AC line power options. iv. Include software for downloading evaluating archiving and monitoring results.
Authorization	:	Indian vendors, representing their foreign manufacturer shall submit valid Authorization certificates from the original manufacturer to market their product in India.

9.5.6 Fire Proximity Suit:

The Fire Proximity Suit used for firefighting purposes envisaged in close proximity with the burning oil fire. The suit shall be supplied as per the following specification:

- a) Imported fire proximity suit having approval from any of these agencies:
 - U L of USA, U.S. Coast Guard Spec, U.S. Military, NFPA spec,
 - Standards / specifications and the copy of the same shall be submitted along with the offer.
- b) The fire suit shall be stitched with imported stainless steel thread and fabricated from imported impermeable aluminized glass fiber fabric, which shall neither burn nor melt during fire fighting operation and along with imported thermal insulation felt lining to sustain very high temperature.
- c) Fabric shall not react chemically with water, and shall not absorb oil, grease, petrol etc.
- d) The suit shall be flexible, with minimum discomfort fireman shall be

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 22 of 42	

able to climb a ladder or to carry running a pressurized hosepipe when he puts on the suit.

- e) The fire suit shall consist of detachable chest length drape buttoned head gear with built in industrial helmet and heat reflective dual layer visor, aluminized gloves.
- f) The suit shall include hood, coat, pants, boots, mitts/gloves. Metal zip fasteners shall be provided for easy donning and removal of the suit.
- g) The size of suit shall be of adjustable such that any adult fireman of height approximately 5'6" to 6'2" can use. The suit must have the provision for keeping the breathing apparatus at the back. The time required for donning the suit shall not be more than 1.5 minutes.
- h) High-aluminized boots shall be of standard size with adjustable strap, with proper insulation and leather lining with non-skid type sole.
- i) The suit shall protect & sustain against proximity ambient heat up to 260° C and the radiant heat up to 10000 C .
- j) The self life of the suit shall be around 10-12years.
- k) Authorized Indian vendors representing their foreign manufacturer shall have to submit valid authorization certificates from original manufacturer, at the time of submission of offer.

9.5.7 Electrical Siren

The Electrical Siren used for firefighting & general purposes shall be supplied complying to IS: 1941-1976-RA2002 (Part 1)

- a) Siren shall consist of 3 phase electric motor, siren head.
- b) Starter for on/off operations.
- c) Shall match to the Power rating 3 phase, not > 3.75kw, 50Hz, 415 volts.
- d) Acoustic power out put shall comply with IS.
- e) The Siren shall have a minimum range of 3.0 Kms.
- f) Shall be suitable for the power line specification available in the state.
- g) Siren shall be horizontal mounting type complete with base fittings.
- h) The electric motor shall be enclosed totally, with sealed greased ball bearing system and shall conform to IS: 325.
- i) The operation controls shall be available both at local point & central locations.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 23 of 42	

- j) The siren shall be clearly and permanently marked with the following information:
- i. Name of manufacturer or trademark if any,
 - ii. Type of siren as mentioned under
 - iii. Year of manufacture
 - iv. Speed of motor
 - v. Motor rating in kW.

9.5.8 Hand Operated Siren

The Hand Operated Siren used for firefighting & general purposes shall comply to IS:6026-1985-RA1995.

- a) The shape, components, material, design and construction shall comply with IS:6026-1985-RA1995.
- b) It shall have Siren body inbuilt disc and handle, guard & portable stand.
- c) The Siren shall have a minimum range of 1.6 Kms.
- d) Workmanship
- e) The performance test & QAP requirements are as per IS.
- f) The markings shall have the manufacturers name, trademark, date of manufacture, etc as per IS.


9.5.9 Red and Green Flag

Red and green bright colored flags suitable for the fire drill. Handle shall be made of hard aluminum tube of size not less than 20 mm dia. The edges shall smooth finish and have rubber caps. The flag shall have minimum dimensions of 0.6m x 0.4m. The cloth shall be of thick poly mixed cotton & color shall be bright and longlasting. The flag shall be firmly secured to the handle by the shorter side.

9.5.10 Trolley (General Purpose):

In order to carry the following fire & safety equipment to the place of emergency, a trolley shall be provided to carry the following items:

- i. Stretcher with Blanket
- ii. Fire Proximity Suit
- iii. Breathing Apparatus
- iv. Water Gel Blanket
- v. Resuscitator
- vi. First Aid Box
- vii. Explosimeter (Gas Detector)
- viii. Portable Public address (PA) System

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 24 of 42	

- ix. Special Purpose Nozzles.
- x. Spare Fire Hoses

The trolley shall be fabricated by using MS channels & angles. The body frame shall be minimum size of 6.0'x 3.0' (feet x feet) Supplier can also indicate different suitable size for the trolley. The compartments shall be fabricated type by using MS sheets and MS tubes or angles. The compartments shall be sufficient enough to carry all the above items at one go at any point of time. The inflated tyre & tube wheels assembly unit shall be fitted to the trolley to pull & push manually or by towing vehicle. For this purpose the handle and hook arrangement shall be made. The painting shall be as per painting spec. and shade shall be fire red color.

10.0 DESIGN CRITERIA

10.1 Codes and Standards:


10.1.1 All materials, equipments, piping, valves, fittings etc. dimensional standards, tolerance, prices of manufacture and testing procedure shall be in accordance with the latest revision of relevant Indian, British, American standards wherever applicable.

10.1.2 The material used and equipment supplied shall be new and the best of their kind and shall comply with the latest revisions of all relevant standards. The tenderer shall indicate in his tender the relevant standards to which the equipment, piping, fittings, etc. offered by him shall comply with. The latest revisions of applicable standards indicated in the technical specification shall be used for the design, manufacture, inspecting and testing of the items covered in this specification. The following codes and standards shall be considered for design: -

- OISD-113: Classification of areas for electrical installations at hydrocarbon processing and handling facilities.
- OISD-226
- OISD – 179 & OISD - 214
- National Fire Protection Association, USA (NFPA) codes
- Standard for installation of centrifugal pumps (NFPA-20)
- Standard for water spray systems (NFPA- 15)
- Standard for sprinkler systems (NFPA-13)
- API-25 10 A: Fire protection considerations for design and operation of LPG storage facilities.
- Auto start system with bypass arrangement for jockey pumps in case of pressuredrop in the fire hydrant line.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 25 of 42	

- Foam and Dry Chemical Power extinguishers of capacity as per SOR shall also be provided and located along with other fire fighting facilities.
- Standard for Horizontal Centrifugal Pumps for clear, cold, fresh water IS: 1520-1980
- Technical requirement for roto-dynamic special purpose pumps IS: 5120-1971
- Horizontal Centrifugal self priming pumps IS: 8418-1977
- Code of acceptance tests for centrifugal, mixed flow and axial flow pumps IS: 9137-1978, BS-5316-latest edition, ISO-2548-1973
- Technical specification for centrifugal pumps ISO: 9908-1993
- End suction centrifugal pumps ISO: 2858-1995
- Single faced sluice gates IS: 3042-1965
- Single faced cast iron thimble mounted sluice gates IS: 13349-1992
- Sluice valves for water works purpose (50-300mm size) IS: 780-1984
- Copper alloy gate, globe and check valves for general purpose. IS: 778-1984
- Specification for cast iron check valves BS 5153-1991
- Foot valves for water works purposes IS: 4038-1986
- Landing valves IS: 5290-1993
- Valve inspection & test IS: 6157-1981
- Specification for inspection and test of steel valves BS: 6755-1986
- Mild steel tubes, tubular and other wrought iron fittings IS: 1239, part-1-1990 & Part-2-1992
- Seamless or electrically welded steel pipes for water, gas and sewage IS: 3589-1991
- Steel pipe flanges for water, oil, steam etc. IS: 6392-1971
- Butt welded fittings ANSI B16.9
- Circular flanges for pipes, valves and fittings BS1560-latest editions
- Code for pressure piping ANSI B31.1
- Steel pipe flanges ANSI B 16.5
- Code of practice for laying of electrically welded steel pipes for water supply IS: 5822-1994

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 26 of 42	

- Excavation work-code of safety IS: 3764-1992
- Criteria for design of anchor blocks for penstock with expansion joints IS:5330- 1984
- Covered electrode for manual metal arc welding of carbon and carbon manganese steel IS:814-1991
- Approved tests for welding procedure IS: 7307 (Part-I)-1974
- Approved tests for welders working to approved welding procedures IS:7310(Part-I)-1974
- Specification for arc welding of carbon and carbon manganese steels BS:5135- 1984
- Code of practice for coating & wrapping IS:10221
- Code of practice for radiographic testing IS:2595-1978
- Recommended practice for radiographic inspection of fusion welded butt joints in steel pipes IS:4853-1982
- Recommended practice for radiographic inspection of fusion welded butt joints in steel pipes IS:1182-1983
- Safety code for industrial radiographic practice IS:2598-1966
- Ready mixed paint, stoving, red-oxide-zinc chrome priming IS:2074-1992
- Code of practice for painting of ferrous metals in building IS:1477-1971
- Colors for ready mixed paints and enamels IS:5-1994
- Steel for general structural purposes IS:2062-1992
- Fire safety of industrial building: electrical generating & distributing stations IS 3034:199

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 27 of 42	

11.0 STATUTORY REGULATIONS, LICENCES & PERMITS

- 11.1** The contractor shall adhere to all applicable statutory requirements including TAC, OISD, Inspectorate of Factories, Indian Electricity Rules and other statutes of Govt. of India and state government. The contractor shall himself ascertain all applicable requisite regulations.
- 11.2** The contractor shall be solely responsible for obtaining necessary clearances from various statutory bodies including those of Govt. of India / State Govt. and as applicable during the course of manufacture/ fabrication, testing, transportation and delivery of plant and equipment.
- 11.3** Contractor shall keep constant liaison with the local Fire Authority, Electrical Authority and all other Statutory Authorities whose approval and permissions/ sanctions before execution of the work are required to be obtained.
- 11.4** It shall be the Contractor's responsibility to obtain the approvals and permissions, sanctions, No Objection certificates from relevant Fire Authorities during construction by him to enable owner to take up the operation of plant. Contractor shall comply with all requirements of the appropriate authorities, submit documents, test reports and conduct such tests as may be required by the concerned authority to its full satisfaction.

12.0 HANDING OVER THE WORK ON COMPLETION

The contractor shall be responsible for handing over the work complete in all respects and in proper finished condition, on completion of the work. If there is any damage or disfiguration/ stains on the finished surfaces including on wall, floors, ceiling, columns, beams etc. due to contractors use, damage or any other reason during the period of construction, the same shall be rectified suitable by the contractor without any extra payment.


13.0 SCHEDULE OF RATES / BILL OF MATERIALS

The quantities of different material, pipes/ fittings, valves, flanges, erection, accessories etc. mentioned in the specification and SOR are approx. quantities and any change in requirements will be as per the finally approved drawings. Any item, instrument which is not specifically mentioned in the SOR, but required for the completeness of the system, will have to be supplied and erected by the contractor and the financial implication shall be built in the testing and commissioning item.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 28 of 42	

13.1 Procurement

- 13.1.1** CONTRACTOR shall procure and supply all the materials other than OWNER supplied materials, required for permanent installation of terminals in sequence and at appropriate time. All equipment, materials, components etc. shall be suitable for the intended service. Approved vendor list has been indicated in the bid package for various items. For items, which are not covered in the vendor list, CONTRACTOR shall obtain Owner's prior approval for the vendor. Equipment requiring specialized maintenance or operation shall be avoided as far as possible. Equipment offered shall be field proven.
- 13.1.2** CONTRACTOR shall procure all materials, components, equipment, consumable etc. required for successful completion of the pipeline system. CONTRACTOR shall also procure and supply spares required for pre-commissioning and commissioning/ start up as recommended for all items supplied by him as per specifications provided in the bid package. Where no specification is available in the contract, the same shall be prepared by the CONTRACTOR based on the piping material specification and shall be subject to Owner's approval.
- 13.1.3** Material take-off with complete description of size, rating, material, thickness and specifications.
- 13.1.4** Only single offer shall be provided by the bidder fully complying with the specifications/ drawings/ requirements for Owner's review and approval. CONTRACTOR shall provide for inspection of the items at vendor's works by the OWNER/ Owner's REPRESENTATIVE or by a reputed inspection agency and shall submit inspection reports for Owner's clearance.
- 13.1.5** Stores management for contractor supply items as well as free issue materials including receipt, warehousing, preserving the material in good condition, issue of material to construction site, reconciling/ handing over surplus material to OWNER for OWNER supplied items at Owner's store.
- 13.1.6** Carryout proper documentation of inspection and quality assurance programmes for all equipment and bulk materials duly approved by OWNER. CONTRACTOR shall maintain an accurate and traceable listing of procurement records for the location, quality and character of all permanent materials in the Project.
- 13.1.7** CONTRACTOR shall immediately report to the OWNER of all changes, which will affect material quality, and recommend any necessary corrective actions to be taken.
- 13.1.8** Submit periodic manufacturing progress reports highlighting hold ups and slippages, if any, to OWNER and take remedial measures.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 29 of 42	

- 13.1.9** Interact with authorities such as Sales Tax, Octroi, Excise, Customs etc. as necessary and arrange for transportation of the materials under his scope of supply to site.
- 13.1.10** All purchase requisitions including purchase orders shall be approved by OWNER/ Owner's REPRESENTATIVE.
- 13.1.11** Compliance with vendor's and supplier's instructions and recommendations for transportation, handling, installation & commissioning.

13.2 Construction

13.2.1 General

- 13.2.1.1** All construction works shall be carried out as per Approved drawings, procedures, specification and applicable codes and standards. Any changes at site shall also need prior approval from the OWNER and revision of drawings. Based on system to be proposed by bidder, the contractor shall submit detailed engineering execution drawings with all calculations for approval of PMC.
- 13.2.1.2** Providing schedules, progress reporting, organization chart at construction site, quality assurance plan and developing quality control procedures, as per requirements indicated elsewhere in the bid package.
- 13.2.1.3** Coordination and supervising the work of sub-contractors.
- 13.2.1.4** Transportation of appropriate materials and taking delivery of Company supply materials, store, worksite, intermediate storage points, maintaining and operating an adequate material control procedure at worksite.
- 13.2.1.5** Fabrication of all piping, structural components as per approved drawings.
- 13.2.1.6** All Civil / Structural Works, Electrical, Instrumentation Works, laying and commissioning works shall be performed in accordance with relevant specifications and requirements enclosed elsewhere in the bid package.
- 13.2.1.7** CONTRACTOR shall provide complete details of manpower, equipment etc. to be deployed. Mobilising and providing all equipments, manpower (skilled and unskilled), consumable and other resources etc. for each spread as required for the execution of the complete job defined herein and thereafter demobilising the same upon completion of work.
- 13.2.1.8** Provide, maintain and operate all temporary facilities required for the construction related works and remove after completion of work.
- 13.2.1.9** Hook up/ tie-in of piping system with terminal facilities.
- 13.2.1.10** All works related to testing, dewatering, swabbing, drying pre-commissioning and commissioning of the work tendered.
- 13.2.1.11** Idle time preservation of pipeline, if required.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 30 of 42	

13.2.1.12 All incidental and associated works and any other works not specifically listed therein but are required to be carried out to complete entire work related to pipelines and terminals.

13.2.1.13 Loading, unloading, handling, stacking, storing and shifting to workshop / worksite of all materials that may be used for the construction of ITEMS either supplied by OWNER at their designated stack yard/ dump site / store and / or by CONTRACTOR as the case may be.

13.2.2 Laying Works

13.2.2.1 Painting

- Painting (including supply of all materials) of all equipment, piping, structural steel elements for pipe supports, and all structural miscellaneous items as required and as directed by Company. Paint shall be suitable for highly corrosive environment as per specification. Painting shall include primer and finish coats as per specifications. Prior to painting surface shall be sand blasted as per instruction of Engineer-in-charge.

13.2.2.2 Other Works

- Obtaining all necessary approvals and work permits, as applicable, for performing the work.
- Carrying out all additional surveys, test and collection of data not furnished by company but required for construction of facilities.
- Any other work not specifically listed herein but required for completion of the system and making it ready for the operation.

14.0 SCOPE OF SUPPLY

14.1 Material to be supplied by Company as Free Issue

NIL

14.1.1 Openings of equipment, machinery etc. shall be kept blocked/ covered with blinds to prevent entry of foreign matter.

14.1.2 All valves, instruments, control valves, actuated valves, pressure gauges, thermometers etc. supplied along with equipment and machinery shall be stored separately, inside the covered godown on racks.

14.1.3 As far as possible materials shall be transported to the erection site, just prior to their actual erection and shall not be left laying around indefinitely. Instructions for the Engineer-in-charge shall be followed strictly in this regard.

14.2 Material to be supplied by Contractor

The procurement and supply, in sequence and at the appropriate time, of all materials and consumables required for completion of the work as defined in this Bid document except the materials shall be entirely the CONTRACTOR'S responsibility and item rates quoted for the execution of the CONTRACT shall be

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 31 of 42	

inclusive of supply of all these materials. The material to be supplied by the Contractor shall be as per specification and preferred make as indicated in Appendix-I or duly approved / recommended for use by IGGL/ VCS.

14.3 General

- 14.3.1** All safety tools/tackles, devices / apparatus / equipment etc. including ladders and scaffolding etc. complete as required.
- 14.3.2** Any other material not specifically listed herein, but required for the execution of the work.
- 14.3.3** List of materials required to be supplied and quantities indicated in SOR is tentative. These quantities can vary during execution to any extent and the same unit rate shall be applicable for payment. Quantities covered in SOR are for as erected quantities.

Bidder will procure additional materials as required to cover cutting, scraps, wastages and damages during erection, testing and commissioning. For these extra quantities no additional payment will be made.

15.0 DOCUMENTS, SPECIFICATION, STANDARDS AND DRAWINGS

- 15.1** Owner shall approve design & engineering drawings and construction drawings including general arrangement drawings for piping, electrical, mechanical & instrumentation systems and other related/ required systems, at appropriate times and as requisitioned by contractor in his time schedule based upon submission of those drawings by the contractor.
- 15.2** Contractor shall prepare Basic engineering Drawings, Detailed Drawings, isometric drawings & bill of materials and submit the same for Owner/Consultant's approval / record.
- 15.3** No construction small or big shall be carried out without proper construction drawings duly approved by Owner's Engineers site office or Owner's representative duly authorized to do so.
- 15.4** After Completion of construction & commissioning, Contractor shall incorporate all the correction in drawings, prepare and issue the drawings "as-built drawings" as listed below to Owner as final submission of drawings. P&ID, layout drawing, piping GAD, Isometric, all electrical & instrumentation drawing, all civil drawings. For final submission only 4 sets of documents plus the original transparencies shall be handed over by Contractor. Any construction done by Contractor without duly approved drawings shall be wholly at his risk and cost. Contractor shall also submit soft copy of consumption of materials in excel along with hard copy. Soft copy of all as-built drawings shall be also submitted in AutoCAD.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 32 of 42	

15.5 Drawing and Documents

15.5.1 The drawings accompanying the Bid document are indicative of scope of work and issued for tendering / bidding purpose only. These drawings indicate the general scheme as well as the layout to enable the contractor to make an offer in line with the requirements of the owner. Final construction shall be done as per Approved Drawings.

15.5.2 Basic/Detailed drawings shall be made by the contractor and shall be submitted for Approval.

16.0 RESOURCES FACILITIES

16.1 Recruitment of Personnel by Contractor

The Contractor shall not recruit personnel of any category from among those who are already employed by the other agencies working at the sites but shall make maximum use of local labor available.

16.2 Land for Residential Accommodation

Owner shall not provide any land for residential accommodation of contractors staff and labor.

17.0 CONSTRUCTION

OWNER reserves the right to inspect all phases of CONTRACTOR's operations to ensure conformity to the SPECIFICATIONS. Owner will have Engineers, Inspectors or other duly authorized representatives, made known to the CONTRACTOR present during progress of the WORK and such representatives shall have free access to the WORK at all times. The presence or absence of a OWNER's representative does not relieve the CONTRACTOR of the responsibility for quality control in all phases of the WORK. In the event that any of the WORK being done by the CONTRACTOR or any SUB-CONTRACTOR is found by OWNER's representatives to be unsatisfactory or not in accordance with the DRAWINGS, procedures and SPECIFICATIONS, the CONTRACTOR shall, upon verbal notice of such, revise the work in a manner to conform to the relevant DRAWINGS, procedures and SPECIFICATIONS.

17.1 Rules & Regulations

CONTRACTOR shall observe in addition to Codes specified in respective specification, all National and Local Laws, Ordinances, Rules and Regulations and requirements pertaining to the WORK and shall be responsible for extra costs arising from violations of the same.

17.2 Procedures

Various procedures and method statements to be adopted by CONTRACTOR during the construction as required in the respective specifications shall be submitted to OWNER in due time for APPROVAL. No such construction activity shall commence unless approved by OWNER in writing.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 33 of 42	

17.3 Field Inspection

CONTRACTOR shall have at all times during the performance of the WORK, a Competent Superintendent on the premises. Any instruction given to such superintendent shall be construed as having been given to the CONTRACTOR.

17.4 Erection and Installation

The CONTRACTOR shall carry out required supervision and inspection as per quality Assurance plan and furnish all assistance required by the OWNER in carrying out inspection work during this phase. The OWNER will have engineers, inspectors or other authorized representatives present who are to have free access to the WORK at all times. If an OWNER's representative notifies the CONTRACTOR's authorized representative not lower than a Foreman of any deficiency, or recommends action regarding compliance with the SPECIFICATIONS, the CONTRACTOR shall make every effort to carry out such instructions to complete the WORK conforming to the SPECIFICATIONS and approved DRAWINGS in the fullest degree consistent with best industry practice.

17.5 Construction Aids, Equipment, Tools & Tackles

CONTRACTOR shall be solely responsible for making available for executing the work, all requisite Construction Equipments, Special Aids, Cranes, Tools, Tackles and testing equipments and appliances. Such construction equipments etc. shall be subject to examination by owner and approval for the same being in first class operating condition. Any discrepancies pointed out by OWNER shall be immediately got rectified, repaired or the equipment replaced altogether, by CONTRACTOR. OWNER shall not in any way be responsible for providing any such equipment, machinery, tools and tackles.

The OWNER reserves the right to rearrange such deployment depending upon the progress and priority of work in various sections.

18.0 ORDER OF WORKS/PERMISSIONS/RIGHT OF ENTRY/CARE OF EXISTING SERVICES

18.1 The order in which the WORK shall be carried out shall be subject to the approval of the Engineer-in-charge and shall be so as to suit the detailed method of construction adopted by the CONTRACTOR, as well as the agreed joint programme. The WORK shall be carried out in a manner so as to enable the other contractors, if any, to work concurrently.

OWNER reserves right to fix up priorities which will be conveyed by Engineer-in-Charge and the CONTRACTOR shall plan and execute work accordingly.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 34 of 42	

18.2 Existing Service

- 18.2.1** Drains, pipes, cables, overhead wires and similar services encountered in course of the works shall be guarded from injury by the CONTRACTOR at his own cost, so that they may continue in full and uninterrupted use to the satisfaction of the Owners thereof, or otherwise occupy any part of the SITE in a manner likely to hinder the operation of such services.
- 18.2.2** Should any damage be done by the CONTRACTOR to any mains, pipes, cables or lines (whether above or below ground etc.), whether or not shown on the drawings the CONTRACTOR must make good or bear the cost of making good the same without delay to the satisfaction of the Engineer-in-Charge.

19.0 INSPECTION OF SUPPLY ITEMS

All inspections and tests shall be made as required by the specifications forming part of this contract. Contractor shall advise Owner/ Consultant in writing at least 10 days in advance of the date of final inspection/tests. Manufactures inspection or testing certificates for equipment and materials supplied, may be considered for acceptance at the discretion of Owner/ Consultant. All costs towards testing etc. shall be borne by the contractor within their quoted rates. All inspection of various items shall be carried out based on Quality Assurance Plan, which will be submitted by the Contractor and duly approved by Owner/ Consultant.

20.0 ESCALATION

The Unit Rates quoted shall be kept firm till completion of work and no price Escalation shall be paid.

21.0 DOCUMENTS TO BE SUBMITTED / PRODUCED ALONGWITH R.A. BILLS

- i) Computerized R.A. Bill/ Manual Bill, with IT No./ ST No./ Labor License No. printed thereon.
- ii) ESI/ EPF clearance certificates for the last month alongwith R.A. Bills.
- iii) Insurance Policy as per relevant clauses of Contract Agreement.
- iv) Attendance Register and Salary Records.
- v) Photocopy of the measurement book to be attached with R.A. Bills.
- vi) Any other document required for the purpose of processing the bills.
- vii) Registration Certificate with Sales tax authorities of state concerned.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 35 of 42	

22.0 INSPECTION AND QUALITY ASSURANCE

22.1 General

Inspection & testing of plant & equipment shall be carried out by Purchaser / Consultant at the works of successful Bidder (Contractor/Sub-contractor) during manufacturing and on final product to ensure conformity of the same with the acceptable criteria of technical specifications, approved drawings, authenticated manufacturing drawings and reference National / International standards.

22.2 Quality System Requirements

Contractor must follow defined quality program in all manufacturing and quality control activities of the product. Contractor must define and implement the tasks and controls that will provide needed assurance in case manufacturing of product is sub-contracted either partly or fully and/or for the procured components of the product. All bought-out equipment or component shall be procured from approved list of vendors issued by the project authority.

Purchaser/Consultant reserves the right to verify the quality program and entire product characteristics to assure the intended and specified quality of the product.

22.3 Quality Assurance Plan (QAP)

22.3.1 Contractor shall furnish Quality Assurance Plan (QAP) for respective equipment after completion of detailed engineering and finalization of billing schedule / equipment identification number for Purchaser / Consultant's approval at least two months prior to start of manufacturing.

22.3.2 Contractor shall indicate procurement source and furnish to Purchaser/Consultant during discussions on QAP, copies of P.O., Sub-P.O. T.S., approved GA drawings/data sheets & detailed manufacturing drawings, as backup reference materials for scrutiny & finalization of QAP.

22.3.3 Detailed QAP shall be prepared & furnished in formats in consultation with his Sub- contractors / Manufacturers to avoid any complication later.

22.3.4 Inspection and test requirements shall be decided with due consideration of factors like safety, duty cycle, operating conditions, equipment life, environmental conditions, place of installation and statutory regulations, as applicable, for a particular equipment. Any additional, special tests & routine tests if found necessary to establish the intended quality, shall be incorporated in the QAP.

22.3.5 QAP shall clearly indicate the following in the appropriate columns:

- a) Range of inspection & tests to be done by Manufacturers and cross checked by Contractor during manufacture of equipment from raw materials to finishing stage.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 36 of 42	

- b) Suggestive check/ hold points for Purchaser / Consultant Inspection and witnessing of tests during the manufacturing and final product inspection.
- c) Details of test certificates, internal inspection reports and calibration certificates to be furnished by Contractor / Manufacturers to Purchaser / Consultant.
- d) Inspection documents to be furnished by Contractor/ Manufacturers to Purchaser/Consultant for reference during inspection.

22.3.6 Sampling method for lot inspection of similar bulk items, if any, shall be indicated with linkage to applicable standard

22.3.7 While submitting the QAP, Contractor shall indicate the acceptance criteria regarding check parameters for all equipments. Acceptance criteria shall have reference of documents viz. P.O., Sub-P.O. T.S., approved drawings and manufacturing drawings.

22.4 Indicative Surveillance by Purchaser / Consultant.

22.4.1 Surveillance level by Purchaser/Consultant shall vary from equipment to equipments as per product characteristics.

However, indicative extents of inspection for a few classified items / products are furnished below for guidance of Contractors in developing QAP

22.5 Calibration of Measuring Equipment


22.5.1 All the measuring equipment used for inspection & testing shall be calibrated and appropriate accuracy class of measuring equipment shall be used.

22.5.2 Calibration Certificate of All Measuring Equipment


22.6 Test Certificates and Documents

22.6.1 For each of the items being manufactured, following test certificates and documents duly endorsed by the manufacturer / contractor shall be submitted to Inspection Agency.

- i) Raw materials identification & physical and chemical test certificates for all materials used in manufacture of the equipment (except IS 2062-1992 Gr.A & IS 210-1993, FG-150).
- ii) WPS, PQR & WPQ Documents as per applicable code.
- iii) Details of stage-wise inspection & rectification records for fabricated items, castings, forging and machined articles.
- iv) Control dimension chart with records of alignment, squareness etc.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 37 of 42	

- v) Manufacturer's material test certificates and performance / relevant test certificates for all bought - out items.
- vi) Details of heat-treatment and stress relieving charts as per specification.
- vii) Non-Destructive Test reports as per respective code.
- viii) Static/dynamic balancing certificate for rotating components/machines.
- ix) Hardness test certificate.
- x) Pressure Test Certificates.
- xi) Performance Test Certificates for all characteristics.
- xii) Geometric accuracy and repeatability test reports of machine tools.
- xiii) Routine / type / calibration / acceptance / special test certificates for electrical items.
- xiv) Diagnostic features of NC/CNC system and test certificates for electrical items.
- xv) Surface preparation and painting certificates.
- xvi) Certificates from competent authority for the items coming under statutory regulations.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 38 of 42	

22.6.2 Where physical and chemical test certificates of material are not available, the Contractor/Sub-contractor shall arrange to have specimens and test samples of the materials, tested in his own laboratory at his cost and submit the copies of test results to Inspection Agency for scrutiny and approval. Number of test samples against each heat/cast/lot or batch of materials shall be as per relevant Indian or International Standards.

22.6.3 Where facilities for testing do not exist in the Contractor/Sub-contractor's laboratories or in case of any dispute, samples and test pieces shall be drawn by the Contractor/Sub-contractor in presence of Inspection Agency and sealed sample shall be sent to any approved laboratory for necessary tests at Contractor/Sub-contractor's cost.

22.6.4 The Inspection Agency shall have the right to be present and witness all tests being carried out by the Contractor/Sub-contractor at their own laboratory or approved laboratories. Also, the Inspection Agency shall reserve the right to call for confirmatory test on samples, at his discretion.

22.7 Manufacturing and Inspection Schedule

22.7.1 All contractors shall submit the schedule for manufacturing and inspection indicating equipment/ components/ sub-assembly/ assembly, date of approval of drawings/data sheets, address of manufacturer with contact person and scheduled date of inspection. Such reports shall be submitted to Purchaser/Consultant's respective Inspecting Offices with a copy to Inspection Co-ordinating Office once in a month. These monthly reports shall state the planning for next three months. Submission of first report must commence one month prior to commencement of manufacturing activities of the product.

22.8 Internal Inspection by Contractor / Manufacturer

22.8.1 Inspection and tests shall be carried out by Contractor/ Manufacturer in accordance with approved drawings, T.S., P.O., and approved QAP. Contractor/ Manufacturer shall maintain record of each inspection and test carried out and signed documents shall be submitted to Purchaser/Consultant for verification.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 39 of 42	

- 22.8.2** Contractor shall carry out their internal inspection & obtain clearance from statutory bodies e.g. IBR, CCE, TAC, Weights & Measures, Safety, IE rules etc. Prior to offering any equipment for Purchaser/Consultant's inspection in accordance with approved QAP wherever required.
- 22.8.3** Contractor/manufacturer shall ensure use of appropriate calibrated measuring equipment during their internal inspection, as well as, make available the same during Consultant's/ Purchaser's inspection and tests.
- 22.8.4** Contractor / Manufacturers shall identify all the inspected equipment/ component/ raw materials & shall maintain the record of status of inspection viz. inspected & found acceptable, require rectification/ rework, rejected etc.
- 22.8.5** The Contractor shall establish and maintain procedures to ensure that non-conforming product are prevented from inadvertent use or installation. The description of non-conformity that has been accepted subsequently by Designer /Purchaser by concession and/or of repairs shall be recorded.
- Repaired and reworked product shall be offered for re-inspection to Consultant/Purchaser along with records of corrective action taken.
- 22.8.6** Contractor / Manufacturer shall not dispatch any equipment before inspection and issue of Inspection Certificate & dispatch clearance from Purchaser / Consultant.

22.9 Method of Undertaking Inspection & Testing by Purchaser/ Consultant:

22.9.1 Method of Issuing Inspection Call to Purchaser / Consultant:

- (i) Inspection call shall be given only on readiness of the equipment/ assembly/ sub-assembly and approval of all relevant drawings and QAP. In case, equipment/ assembly/ sub-assembly offered for inspection are found not ready, all the cost of visit of Purchaser / Consultant's engineer shall have to be borne by the Contractor. Also, if the equipment/assembly/sub-assembly after inspection found not acceptable, require rework and involve Consultant's re-inspection, all the cost of such re-inspections shall also be borne by the Contractor.
- (ii) Inspection call shall be floated enclosing all documents like test Certificates, Internal Inspection Reports, P.O., Sub-P.O., T.S., Approved QAP, approved GA drawings/ data sheets and manufacturing drawings with a copy of call letter. Inspection calls without above documents shall be ignored.
- (iii) The supplier shall offer substantial quantities for economical inspection consistent with the size of order.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 40 of 42	


22.10 Obligations of Contractor

- 22.10.1** The Contractor shall provide all facilities and ensure full and free access of the Inspection Engineer of Purchaser/Consultant to the Contractor's or their Sub-Contractor's premises at any time during contract period, to facilitate him to carry out inspection & testing during or after manufacture of the product.
- 22.10.2** The Contractor shall delegate a Representative / Co-ordinator to deal with Purchaser/Consultant on all inspection matters. Also, Contractor's Representative shall be present during all inspection at Sub-Contractor's works.
- 22.10.3** The Contractor shall comply with instructions of the Inspection Engineer fully and with promptitude.
- 22.10.4** The Contractor / Sub-Contractor shall provide all instruments, tools, necessary testing & other inspection facilities to Inspection Engineer free of cost for carrying out inspection.
- 22.10.5** The cost of testing welds by ultrasonic, radiographic and dye penetration tests etc. in the fabrication workshop shall be borne by the Contractor.
- 22.10.6** The Contractor shall ensure that the equipment/assembly/ component of the plant and equipment required to be inspected, are not dismantled or dispatched before inspection.
- 22.10.7** The Contractor shall not offer equipment for inspection in painted condition unless otherwise agreed to in writing by Purchaser/Consultant.
- 22.10.8** The Contractor shall ensure that the equipment and materials once rejected by the Inspection Engineer are not re-used in the manufacture of the plant and equipment. Where parts rejected by the Inspection Engineer have been rectified as per agreed procedures laid down in advance, such parts shall be segregated for separate inspection and approval, before being used in the work.
- 22.10.9** Performance test of any particular equipment which cannot be conducted / demonstrated either partially / wholly at the manufacturer's works, shall be conducted after erection at site in presence of Purchaser / Consultant. In such cases, prior approval of the Purchaser shall be obtained.

22.11 Stamping and Issue of Inspection documents

22.11.1 Inspection Memo

For stage inspection & for rejected items/items which do not conform to Technical Specification in one or more quality characteristics requiring rectification /rework, Inspection Memo shall be issued in standard form indicating therein the details of observation & remarks. All the non-conformities with respect to specification of the product shall be indicated in the Inspection Memo for further control by Manufacturer.*

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 41 of 42	


22.11.2 Inspection Certificate

On satisfactory completion of final inspection & testing, all accepted plant & equipment shall be stamped suitably and Inspection Certificate in standard form shall be issued by the Inspection Engineer for the accepted items.

22.12 General Clauses

22.12.1 Inspection & tests carried out by Purchaser / Consultant shall not absolve the responsibility of the Contractor/Manufacturer to provide acceptable product nor shall it preclude subsequent rejection.

Purchaser/ Consultant reserve the right to inspect any product at any stage of manufacturing without prior notice to Contractor/Manufacturer beyond pre-identified stages & hold points of approved QAP.

 Energising Quality	FIRE FIGHTING SYSTEM SCOPE OF WORK	Document No.	Rev
		C221052-00-FFS-SOW-4002	C1
		Page 42 of 42	

VOLUME-I ANNEXUREVII
(ELECTRICALWORKS)



Energising Quality

PROJECT NUMBER: C221052



ELECTRICAL DESIGN BASIS

TOTAL SHEETS

20

DOCUMENT NO.

C221052

00

EL

DB

4002

INDRADHANUSH GAS GRID LIMITED

NORTH EAST GAS GRID PHASE-III OF IGGL

C1	18.10.2022	ISSUED FOR REVIEW	VV	RD	AA
REV	DATE	DESCRIPTION	PREP	CHKD	APPR

ABBREVIATION

CEA	Central Electricity Authority
SEA	State Electricity Authority
BS	British Standards
IGGL	Indra Dhanush Gas Grid Limited (IGGL),
PNGRB	Petroleum and Natural Gas Regulatory Board
OISD	Oil Industry Safety Directorate
MEDB	Main Electrical Distribution Board
XLPE	Cross-Linked Polyethylene.
PVC	Poly Vinyl Chloride
NEC	National Electrical Code
UPS	Uninterruptible power systems
P/MCC	Power/Motor Control Centre
MOV	Motor Operated Valve
ACB	Air circuit breakers
MCB	Miniature Circuit Breaker
MCCB	Molded Case Circuit Breaker
MPCB	Motor Protection Circuit Breaker
CT/PT	Current Transformer/Potential Transformer
ELCB	Earth Leakage Circuit Breaker
PDB	Power Distribution Board
O/ILDB	Outdoor/Indoor Lighting Distribution Board
FRLS	Flame Retardant Low Smoke

 Energising Quality	ELECTRICAL DESIGN BASIS	Document No.	Rev
		C221052-00-EL-DB-4002	C1
		Page 2 of 17	

TABLE OF CONTENTS

1.0	DEFINITION.....	4
2.0	INTRODUCTION	4
3.0	PROJECT BRIEF	5
4.0	THE FOLLOWING ELECTRICAL EQUIPMENTS / SYSTEMS ARE ENVISAGED FOR:....	5
5.0	OPERATING REQUIRMENT.....	9
6.0	CRITICAL POWER (UPS/SOLAR) SUPPLY PARAMETERS:	9
7.0	LIGHTING SYSTEM	9
8.0	SITE CONDITIONS	11
9.0	AREA CLASIFFICATION AND EQUIPMENT SELECTION	11
10.0	ENCLOSURE PROTECTION OF EQUIPMENT	12
11.0	EARTHING AND LIGHTNING PROTECTION SYSTEM	12
12.0	CABLES	13
13.0	SOLAR SYSTEM.....	15
11.0	SPLIT A.C. SYSTEM	15
14.0	415V SWITCH BOARD.....	15
15.0	POWER SUPPLY DETAILS.....	15
16.0	STATUTORY APPROVAL	16
17.0	DRAWINGS AND DESIGN DOCUMENTS	16

 Energising Quality	ELECTRICAL DESIGN BASIS	Document No.	Rev
		C221052-00-EL-DB-4002	C1
		Page 3 of 17	

1.0 DEFINITION

Where used in this document, the following terms shall have the meanings indicated below, unless clearly indicated by the context to this order:

PROJECT	PMC Services for North East Gas Grid Phase-III OF IGGL.
OWNER	Indra Dhanush Gas Grid Limited
CONSULTANT	VCS Quality Services Private Limited (VCSQSPL) the party to act for and on behalf of the OWNER for the Engineering Services
VENDOR / MANUFACTURER	Party, which manufactures and supplies equipment and services to the OWNER or to CONTRACTOR.

2.0 INTRODUCTION

The Hydrocarbon vision 2030 for North East India (vision document), released by MoP&NG proposes detailed plan for Natural gas infrastructure development in North-East. The states covered in the vision document include Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

M/s Indradhanush Gas Grid Limited (IGGL), a Joint Venture of IOCL, ONGC, GAIL, OIL and NRL, is in the process of implementing the North East Gas Grid (NEGG) with a vision to connect all the eight (08) northeastern state capitals and major consumption centers in the region. The NEGG will be connected to National gas grid at Guwahati through Barauni-Guwahati pipeline (already under execution by M/s GAIL).

M/s IGGL intends to lay pipeline along with terminal works for section-10 & 11 which consist of 12" NB x 199.007 Km (approx.) in section-10 and 12" NB x 186 Km (approx.) in section-11 mainline. Main line taken from Siliguri DT to Gangtok RT in Section-11. Similarly in section-10 12" Main line taken from T point Jorhat to Dimapur DT to Sekmai gas Bottling plant RT Via IP station at Tadubi (Manipur).

The brief scope of work includes supply of materials (other than free issue), pipeline laying work including but not limited to Construction Management, HSE & Quality Management, Survey, ROU management, clearing of ROU, grading, stringing, bending, welding (Manual), trenching, joint coating, lowering, crossings, crossings by HDD (wherever specified), Tie-ins, NDT and destructive testing, backfilling, laying of pipeline along-with OFC & HDPE ducts, TCP works, site restoration, hydro-testing, dewatering, swabbing, drying, nitrogen purging (as applicable), pre-commissioning, commissioning and Gas-in of pipeline including construction / installation of related facilities like scraper launching / receiving facilities and all piping works at dispatch / receiving terminals, I.P. Stations and piping works at Sectionalizing valve stations, Tap-off station & Injection points, etc. including associated

 Energising Quality	ELECTRICAL DESIGN BASIS	Document No.	Rev
		C221052-00-EL-DB-4002	C1
		Page 4 of 17	

Mechanical, Cathodic protection, Corrosion monitoring works, Electrical works, Telecom works, Firefighting works, Instrumentation, Civil works (including boundary wall and building works), Architectural and Structural works at all stations, and Pipeline Information Management system. The scope of work has been divided into the following parts:

PROJECT TITLE: -SILIGURI-GANGTOK PIPELINE SECTION (SECTION-11)		
REF. SCHEMATIC DRAWING NO: -C221052-SGPL-PP-SCM-2001		
PART NO	SPREAD NO.	SCOPE OF WORK
PART-D1 (Length 44.2 km)	SPREAD-2B (Length 44.2 km)	Pipeline laying from Ch. 59+800 Km to Ch. 104+000 Km including associated works (Mechanical, Piping & Including Terminal works as per scope matrix) & One (01) SV stations.
PART-D2 (Length 46.3 km)	SPREAD-2C (Length 46.3 km)	Pipeline laying from Ch. 104+000 km to Ch. 150+300 Km. Intermediate Pigging Station (IP station) Lava, West Bengal at Ch. 128+000 Km including associated works (Mechanical, Piping & Terminal works) at Two (02) SV stations.

Note: Chainage shown above are tentative and for reference purpose only, there may be change in Chainage shown as per site condition during execution.

3.0 PROJECT BRIEF

Summary of various stations envisaged in the proposed North East Gas Grid Phase-III of IGGL are as under:

A) SILIGURI – GANGTOK PIPELINE (SGPL)

Sr. No	Type of Station	Nos .	Location
1	Dispatch Terminal (DT / SGPL)	0	-----
2	Intermediate Pigging Station (IP/SGPL/01)	1	Tentatively at Lava
3	Receipt Terminal (RT/SGPL) with/without Tap off	0	-----
4	Sectionalizing Valves Stations with/without Tap off	3	Along the Siliguri-Gangtok route

4.0 THE FOLLOWING ELECTRICAL EQUIPMENTS / SYSTEMS ARE ENVISAGED FOR:

 Energising Quality	ELECTRICAL DESIGN BASIS	Document No.	Rev
		C221052-00-EL-DB-4002	C1
		Page 5 of 17	

4.1.1 DISPATCH STATION & IP STATIONS:

- I) Pole mounted HT substation (11/0.433 KV, LA, DO fuse, Metering etc) for receiving Grid power from State Electricity Board.
- II) 63KVA, 11/0.433 kV ONAN distribution transformer with HT cable termination box on primary side & LT cable termination box on secondary side.
- III) 415V Switch Board/PDB for receiving normal power at Despatch & IP stations with Energy Saving device, phase selection logic, timer for AC etc.
- IV) Parallel Redundant UPS system (20/10 kVA) with static by - pass with Ni-Cd type battery bank (for 12 hours back up for Dispatch at compressor station and IP stations) for Instrumentation, SCADA and PCP loads at Despatch & IP terminals with ACDB for CPTRU, AMF panel, emergency lighting etc.
- V) On- Grid Solar Power system (ON Grid solar system with Net metering of 10/20 KWp rating) has been considered.
- VI) HT Power cables, HT Termination kit.
- VII) Split AC system with stabilizer with 12 hrs timer.
- VIII) LT Power and Control cables.
- IX) Indoor & Outdoor lighting (For Classified and Non-Classified area & Buildings).
- X) Emergency and Critical lighting.
- XI) Earthing and Lightning protection system
- XII) Local Control Stations (Classified and Non-Classified type)
- XIII) Lighting Distribution board (LDB).
- XIV) Automatic Voltage Regulator outdoor type.
- XV) Structural steel, cable tray, erection accessories etc as required.
- XVI) All panels like Solar Charger, UPS, Switch board, AMF panel, MFM meter of PDB shall be equipped for mod-bus communication for remote monitoring.

4.1.2 SV STATIONS:

- I) Pole mounted HT substation (11/0.433 KV, LA, DO fuse, Metering etc) for receiving Grid power from State Electricity Board.
- II) 25KVA, 11/0.433 kV ONAN distribution transformer with HT cable termination

 Energising Quality	ELECTRICAL DESIGN BASIS	Document No.	Rev
		C221052-00-EL-DB-4002	C1
		Page 6 of 17	

box on primary side & LT cable termination box on secondary side.

- III) 415V Switch Board/PDB for receiving normal power at SV stations with Energy Saving device, phase selection logic, timer for AC etc.
- IV) Hybrid Solar power system shall be considered with Ni-Cd type battery bank with 3 days autonomy (for 72 Hours back-up) for critical load (PCP, Instrumentation, SCADA and telecom and solar based stand alone Type Street lighting system for outdoor emergency lights at SV and tap-off.
- V) HT Power cables, HT Termination kit.
- VI) Split AC system, stabilizer with 12 hrs timer.
- VII) LT Power and Control cables.
- VIII) Indoor & Outdoor lighting (Classified and Non-Classified type).
- IX) DC- DC converter (85-135V DC to 24V DC & (+)48V-0V-(-)48V DC) required for supplying various critical load like critical lighting, Telecom, SCADA, Instrumentation etc.
- XVII) Emergency and Critical lighting.
- XVIII) Earthing and Lightning protection system
- XIX) Local Control Stations (Classified and Non-Classified type)
- XX) Lighting Distribution board (LDB).
- XXI) Automatic Voltage Regulator Outdoor type.
- XXII) Structural steel, cable tray, erection accessories etc as required.
- XVIII) All panels like Solar Charger, UPS, Switch board, AMF panel shall be equipped for mod-buscommunication for remote monitoring.

 Energising Quality	ELECTRICAL DESIGN BASIS	Document No.	Rev
		C221052-00-EL-DB-4002	C1
		Page 7 of 17	

2.0 CODES AND STANDARDS

Electrical equipment and system design, manufacture, testing, installation and commissioning will comply with all the latest applicable standards, regulations and codes as mentioned below:

BIS	-	Bureau of Indian Standards
CMIFR	-	Central Mining Institute & Fuel
DGMS	-	Research Director General Mines
OISD	-	Safety
IEEE	-	Oil Industrial Safety Directives
IER	-	Institute of Electrical & Electronics
ANSI	-	Engineer The Indian Electricity Rules
BEE	-	American National Standards Institute
IEC	-	Bureau of Energy Efficiency, India
		International Electro technical Commission

Note- M.B. Lal Committee recommendation to be followed in all electrical design & installations.

- 2.1** In case of imported equipment, standards of the country of origin shall be applicable if these standards are equivalent or stringent than the applicable Indian Standards.
- 2.2** The equipment shall also confirm to the provisions of Indian Electricity rules and other statutory regulations currently in force in the country.
- 2.3** In case of any contradiction between various referred standards/ specifications/ data sheet and statutory regulations the following order of priority shall govern.
 - Statutory regulations.
 - Data sheets.
 - Scope of Work/ Job specification.
 - Design Basis.
 - Standard Specification.

 Energising Quality	ELECTRICAL DESIGN BASIS	Document No.	Rev
		C221052-00-EL-DB-4002	C1
		Page 8 of 17	

- Codes and standards.

5.0 OPERATING REQUIREMENT

A.C. Power Supply

- a) Voltage - 415 V +10 %, -15%
- b) Frequency - 50 Hz +/- 5 %
- c) Phases and Wire - 3 Ph & N (4W)
1 Ph & N (2W)
- d) Fault level - 25kA for 1sec. for 3 Ph ckt
19 KA for 1 Sec. For 1 Ph ckt.
- e) Neutral Earthing - Solidly Earth

6.0 CRITICAL POWER (UPS/SOLAR) SUPPLY PARAMETERS:

Sr. No	Description/Terminal	DT/IP/RT Station	SV Station
1	INSTRUMENTATION	230 V AC UPS,	24 V DC
2	TELECOM SYSTEM	230 V AC UPS, (-)48 V DC will be generated from AC UPS by equipment vendor	(-) 48 V DC
3	SCADA	230 V AC UPS, 24V DC will be generated from AC UPS by equipment vendor	24V DC
4	CP SYSTEM	230 V AC UPS	48 V DC
5	FA & CO2 Flooding system	230 V AC UPS, 24 V DC will be generated from AC UPS by equipment vendor	24 V DC
6	Critical Lighting	230V AC by Inverter	230 V AC by Inverter
7	FEP/CCTV/EPABX	230 V AC UPS	24V DC

7.0 LIGHTING SYSTEM

7.1 Lux level in the plant area for calculation of lighting fixture is as follow:

Area	Required Lux Level (As per M.B. Lal Committee)	Lighting Technology
------	--	---------------------

 Energising Quality	ELECTRICAL DESIGN BASIS	Document No.	Rev
		C221052-00-EL-DB-4002	C1
		Page 9 of 17	

Primary Roads	10-20	LED street lights (Except Hazardous Area)
Secondary Roads	5-10	LED street lights (Except Hazardous Area)
Pump Houses (Product Pump Houses), T/W Pumps, Sheds	100-150	LED lights With flame proof fittings
Main Operation Platform & access stairs (within tank farm)	60-80	LED lights With flame proof fittings
Ordinary Platforms	20-50	LED Pole Mounted fittings
Parking Area	20-50	LED Pole Mounted fittings
Process Area	60-100	LED With flame proof fittings
Switchgear Bldg/ MCC Room/ DG Room/ Shed	150-200	9W, 12W, 18W, 36W LED Lights (Recessed/Surface fixtures)
Transformer Bay/ Switchyard	100-200	LED Pole Mounted fittings
Battery room	150-200	1x40W FTL/LED Flame Proof lighting fixture Recessed/ Surface mounting and flame Proof type Exhaust fan. (All switching outside the battery room)
Control Room bldg/ Laboratory	400-500	9W, 12W, 18W, 36W LED Lights (Recessed/Surface fixtures)
Charger/UPS room	150-200	9W, 12W, 18W, 36W LED Lights (Recessed/Surface fixtures)
Warehouse	100-150	9W, 12W, 18W, 36W LED Lights (Recessed/Surface fixtures)
Office room	300-400	9W, 12W, 18W, 36W LED Lights (Recessed/Surface fixtures)
Watch room/ Watchman Booth	100-150	9W, 12W, 18W, 36W LED Lights (Recessed/Surface fixtures)

 Energising Quality	ELECTRICAL DESIGN BASIS	Document No.	Rev
		C221052-00-EL-DB-4002	C1
		Page 10 of 17	

b) Gas Group : IIA and IIB

c) Temperature Classification: T3

All electrical equipment installed in hazardous area will be selected as per IS: 5571.

All electrical equipment for hazardous area will have CMIFR certification.

10.0 ENCLOSURE PROTECTION OF EQUIPMENT

10.1 Enclosure Protection:-

The electrical equipment installed outdoor shall have IP 65 enclosure Protection.

The equipment installed indoors will have the following enclosure protection :

UPS - IP 31

PDB – IP 42

The above enclosure protection will be in accordance with Indian/IEC standard.

10.2 Enclosure Protection in hazardous areas:-

The type of enclosure in the plant / process area shall be Flame proof (Ex-d)

11.0 EARTHING AND LIGHTNING PROTECTION SYSTEM

11.1 No. of earth pit will be provided as per IS: 3043.

11.2 All equipment earthing to be carried out as per IS: 3043, minimum size of GI/Copper earthconductor to be used will be as given below:

Equipment	Earthing Conductor size
Utility building PDB, MLDB, ropeSwitch Socket DB, UPSDB, Lighting DB etc.	50 x 6 mm GI/16 sq. mm GI
FLP – WP lights/control station	6 sq mm solid GI Wire
Product pipe line Mechanical equipment / Vessels, Tanks, Pipe/cable racks, structure, fencing	16 sq mm flexible copper wires 50 x 6 mm GI Flat
RTU, Telecom, UPS	25 x 3 mm copper Strip
Field Instruments	2.5 sq mm Cu Wire PVC
Jumper for flanges	25 x 3 mm Copper Strip

 Energising Quality	ELECTRICAL DESIGN BASIS	Document No.	Rev
		C221052-00-EL-DB-4002	C1
		Page 12 of 17	