Annexure-I

ASSAM GAS COMPANY LIMITED (A Govt. Of Assam Undertaking) P.O. DULIAJAN, DIST :DIBRUGARH,ASSAM 786 602 TEL: +91-374-2800556



NOTICE INVITING TENDER

M/s ASSAM GAS COMPANY LIMITED invites e-tenders through M/s VCS QUALITY SERVICES PVT, LTD. on e-procurement system of Govt. of Assam from eligible bidders for AGCL's N-G-N Gas Pipeline project in Assam for "PROCUREMENT OF FIRE AND GAS SYSTEMS" (Tender No. AGCL/BD/PMC-GHT/F&G/2020/158) Please visit www.assamtenders.gov.in for details.

Also visit <u>www.assamgas.org</u> and <u>www.vcsquality.com</u> for corrigendum etc.

MANAGING DIRECTOR Assam Gas Company Limited Head C&P VCS Quality Services Pvt. Ltd., Noida- UP

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Assam Tender Details						Details	5					
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Basic Details												
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Start Date			Date		
Clarification Start Date	е	17-Nov-2022 09:00 AM	Clarifica	tion End Date	03-Dec-2022 06:00 PM
Bid Submission Start	Date	25-Nov-2022 10:00 AM	Bid Subr	nission End Date	06-Dec-2022 02:30 PM

Tender Do	ocume	ents				
NIT Document	S.No	Document Name		Description		Document Size (in KB)
	1	Tendernotice_1.pdf		Commercial Co	ver	1847.45
	2	Tendernotice_2.pdf		Technical Cover	·	16093.24
Work Item Documents	S.No	Document Type	Documer	nt Name	Description	Document Size (in KB)
	1	BOQ	BOQ 4315	j2.xls	BOQ Document	291.00

Bid Openers List						
S.No	Bid Opener Login Id	Bid Opener Name	Certificate Name			
1.	utpal_2320@rediffmail.com	Utpal Borgohain	UTPAL KUMAR BORGOHAIN			
2.	baruah_dipankar@rediffmail.com	DIPANKAR BARUAH	DIPANKAR BARUAH			
3.	janardanchetia89@gmail.com	JANARDAN CHETIA	JANARDAN CHETIA			

Tender Properties					
Auto Tendering Process allowed	No	Show Technical bid status	Yes		
Show Finance bid status	Yes	Show Bids Details	Yes		
BoQ Comparative Chart model	Normal	BoQ Compartive chart decimal places	2		
BoQ Comparative Chart Rank Type	L	Form Based BoQ	No		

Tender Inviting Authority					
Name	GM OGMB				
Address	Assam Gas Company Limited Duliajan - 786602, Dibrugarh, Assam Phone 9435038804				
Tender Creator De	etails				
Created By	Utpal Borgohain				
Designation	Sr. Officer HR and A				
Created Date	16-Nov-2022 11:46 AM				



NAMBOR – GOLAGHAT– NUMALIGARH AREA GAS PIPELINE PROJECT

BID DOCUMENT FOR PROCUREMENT OF FIRE AND GAS SYSTEMS

OPEN DOMESTIC COMPETITIVE BIDDING

Bid Document No.: AGCL/BD/PMC-GHT/F&G/2020/158

DTD. 16/11/2022

PMC DOC No.: 1009-VCS-AGCL-TENDER-001

Rev No.:D1

Volume I of II: Commercial

Prepared and Issued by



PREPARED AND ISSUED BY VCS QUALITY SERVICES PVT. LTD. Noida, India





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SECTION - I

INVITATION FOR BIDS (IFB)





1.0 INTRODUCTION

1.1 Assam Gas Company Ltd. (AGCL) (hereinafter called as Owner/AGCL), is an ISO 9001 : 2008 certified, 60 years old Natural Gas transmission and distribution company , wholly owned by the Govt. of Assam with its registered office at Duliajan, Dist : Dibrugarh, Assam 786 602. The company transports Natural Gas through its integrated pipeline infrastructure to several market segments i.e. Power, Fertilizer, petrochemicals, Industrial, Commercial and Domestic consumers primarily located in upper Assam. The present infrastructure of the company has a transportation capacity of about 6.0 MMSCM of gas per day.

At present, AGCL is collecting and transporting Natural Gas from the gas fields of ONGCL in Khoraghat region of Golaghat District bordering Nagaland through its 8"X 12 km and 4" NB x 47 km Khoraghat -Uriumghat – Golaghat gas pipeline and distributing the same to the consumers of Golaghat/Jorhat districts of Assam through its network of established pipeline infrastructure. Presently, the company has been allotted additional allocation of Natural Gas from the above mentioned region that needs to be gainfully utilized in and around Golaghat and other districts of upper Assam.

1.2 AGCL has appointed "VCS Quality Services Pvt. Ltd." as a consultant for carrying out the detail engineering and project management works for laying of the pipeline along with associated facilities from Nambor-Khoraghat-Numaligarh for catering the requirement of natural gas.

2.0 BRIEF DESCRIPTION OF PROJECT

The brief project details of the pipeline are as follows:

- Laying of 12" X 17 km piggable pipeline and associated terminal facilities connecting ONGCL gas field off-take point at Nambor GGS to Khoraghat GGS to Uriumghat.
- Laying of 8" x 47 km piggable pipeline and associated terminal facilities connecting Uriumghat to Golaghat town.
- Laying of 8" x 29 km piggable pipeline and associated terminal facilities connecting Golaghat town to Numaligarh along with tap off points to cater gas supply to around 50 nos. of tea factories.
- Laying of 6" X 6 km pipeline from Thoramukh to Hamiramukh.
- Laying of PE Spur lines for tap off to the customers.

3.0 BRIEF SCOPE OF SUPPLY

The scope of work includes supply of below mentioned materials and installation services for satisfying the functional / operational requirements confirming to the specifications provided in the tender documents.





3.1 **DETAILS OF FIRE & GAS SYSTEM:**

Sr. NO.	DESCRIPTION	QUANTITY (UoM)				
PART A- FIRE AND GAS SYSTEM						
1	 F&G system for Nambor – Golaghat – Numaligarh Gas pipeline project shall be supplied as per scope of work, specification, Control system schematic, I/O List and cable schedule attached with this requisition. F&G System supplied shall be complete in all regard and shall consists of the following: 1. Hardware – F&G system shall consist of Dual 32-bit CPU, Minimum 32 Mbyte SDRAM (Extendable), Power supply modules, Input / Output modules, Modbus / Ethernet base interface and shall support minimum 100 Mbps redundant Ethernet communication, serial communication speed, and supporting multiple communication protocol, SIL 3 rated located at Golaghat subcontrol room; F&G cabinet (8 nos.) shall be standalone floor mounted, dimensions 800x800x2200 mm (WxDxH) and IP-54 rated as per IEC 60529; Exterior portion of all panels and closed cabinets shall have a color of RAL 7032 (Siemens grey), MOC shall be CRCA steel, Front opening at Nambor, Khoraghat, Uriumghat, Golaghat, Numalighar, Thoramukh, Hamiramukh and SV stations (01 Nos.); F&G system at each location shall interface with proposed new RTU at terminals through secure and redundant communication link; Software with license etc., complete with system configuration and programming; Testing – FAT / SAT, Installation, commissioning and training; 	1 (Lot)				
2	Point Type Gas Detectors – IR Type – for detection of Natural Gas in Process Area	29				
3	Open Path Gas Detectors – UV/IR Type in Process Area	13				
4	Beacon – Amber Colour – for visual indication of flammable gas leak alarm in process areas	8				
5	Outdoor Hooter– Dual Tone Type for installation in Process	8				
6	Manual Call Point for installation in Process Area	8				





8 9 10 11 PART-B: F	6T x 1.5 Sq. mm, Fire resistant, Individual Screened and Over all Screened 1P x 1.5 Sq. mm, Fire resistant, Over all Screened 6P x 1.5 Sq. mm, Fire resistant, Over all Screened Junction Box FIRE ALARM CONTROL PANEL	1400 700 700 20
9 10 11 10 10 10 10 10 10 10 10 10 10 10	1P x 1.5 Sq. mm, Fire resistant, Over all Screened 6P x 1.5 Sq. mm, Fire resistant, Over all Screened Junction Box FIRE ALARM CONTROL PANEL	700 700 20
10 (11 · PART-B: F	6P x 1.5 Sq. mm, Fire resistant, Over all Screened Junction Box FIRE ALARM CONTROL PANEL	700 20
11 · PART-B: F	Junction Box FIRE ALARM CONTROL PANEL	20
PART-B: F	FIRE ALARM CONTROL PANEL	
PART-B: F	FIRE ALARM CONTROL PANEL	
1	 Fire Alarm Control Panel (FACP): Design, detailed, engineering, supply, configuration, testing, installation, erection and commissioning of 2 loop, Addressable, Intelligent Fire Detection and Alarm Panel for automatic fire detection & communication of alarms for various types of detectors installed like multi sensor, loop isolators, manual call points, hooters, beacon etc. installed in respective control room with supporting multiple communication protocol. 2 Loop Addressable FACP shall be installed in suitable location inside control building at Nambor, Khoraghat, Uriumghat, Golaghat, Numalighar, Thoramukh, Hamiramukh and SV stations(1 Nos.);- 08 Nos. FACP 4 Loop Addressable FACP shall be installed in suitable location inside control building at Golaghat Sub-Control Room;- 01 Nos. FACP Supply, laying of cable inside Control room (Porta cabin)between detectors, MCP, hooter and FACP including glanding, termination, ferruling, dressing etc. at both ends. Supply & installation of cable trays (if necessary), supply of erection materials, cable ferrules, cable lugs, cable tie etc. for successful commissioning of FACP. FACP shall interface with F&G system at terminals through secure and redundant communication link or hardwired; Supply of erection & commissioning spares; Testing – FAT / SAT, Installation, commissioning and training. 	1 (Lot)
f2	Addressable multi sensor (Smoke + Heat) – for installation in terminal control room (Portacabin)	44
3	Beacon – Amber Colour – for visual indication of fire alarm inside the control building or Portacabin;	01
4	Indoor Hooter– Dual Tone Type for installation inside the control building or Portacabin;	10
5	Manual Call Point for installation inside the control building or Portacabin;	11





1.	Comprehensive Annual Maintenance Contract (CAMC) for F&G System and FACP - for period of 4 years, applicable after successful completion of warranty phase.	1 Lot
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NOTES:

1. The above quantities are indicative and for evaluation purpose only. Purchaser reserve the right to increase or decrease the quantity at the time of award.

4.0 PROPOSED STORAGE LOCATION & DELIVERY PERIOD

4.1 **DELIVERY LOCATION**

AGCL store at Uriumghat.

4.2 **DELIVERY PERIOD**

For Supply- 3 (Three) months from the date of LOI.

For Installation- 3 (Three) months from the date of intimation from client/ PMC subject to readiness of the site.

5.0 BID VALIDITY

Bid should be valid for 180 days from the date of schedule submission.

6.0 BIDDING PROCEDURE

- 6.1 Bidding will be conducted through **Open Domestic Competitive Bidding** basis. Single stage two bid system is adopted for this tender. Bid document shall be submitted through E-Tender Process only.
- 6.2 Bids must be submitted strictly in accordance with Clause No. 22 of ITB.
- 6.3 Bid must be submitted only on <u>http://assam.gov.in/tenders</u> . Physical submission of bid shall not be accepted.
- 6.4 The bid will be submitted in two parts as below:

6.4.1 PART- I (UN-PRICED BID)

Un-priced bid must be completed with all technical details along with all other required documents including price schedule WITH PRICE BLANKED OUT etc. as per clause no. 22.1 of ITB.

<u>Tender processing fee and EMD to be submitted online</u>. Following documents need to be uploaded along with Un-Priced bid on e-Portal.

- i) Tender Fee
- ii) EMD/Bid Security
- iii) Power of Attorney

6.4.2 PART-II (PRICED BID)

Priced bid shall contain only the prices without any conditions as per clause no. 22.2 of ITB.





7.0 DETAILS OF BID DOCUMENTS

SI. No.	Description	Details		
7.1	Tender Document Number	AGCL/BD/PMC-GHT/F&G/2020/158 Dated 15/11/2022		
7.2	Type of Tender	E-Tender		
7.3	Tender Document on Sale	16/11/2022 to 06/12/2022		
7.4	Tender document fee	INR 6,000/- (Exclusive of GST)		
7.5	Pre bid meeting date and venue	On 23/11/2022 at 1100 Hrs. IST Online through Google Meet. Google Meet Link for Pre-Bid Meeting: https://meet.google.com/yvg-ardp-ojh		
7.6	Bid Submission date and time	06/12/2022 till 1430 Hrs. IST		
7.7	Un-Priced bid opening date and Time	06/12/2022 at 1500 Hrs. IST		
7.8	Place of Un-Priced bid opening	GM (O&GMB) Assam Gas Company Limited P.O. Duliajan, Dist. Dibrugarh, Assam-786602		
7.9	Price bid opening date and time	Date and time shall be intimated later		

DOWNLOADING OF TENDER DOCUMENT

The entire tender document has been web-hosted on AGCL, Assam Govt. e-procurement website i.e. <u>www.assamgas.org</u> and <u>http://www.assamtenders.gov.in</u> respectively. However, Bidder shall be allowed to upload its bid only in <u>http://www.assamtenders.gov.in</u> website.

Any revision, clarification, addendum, corrigendum, time extension, etc. to this Tender Document will be hosted on the websites mentioned above.

8.0 BIDDER EVALUATION CRITERIA (BEC)

8.1 **TECHNICAL:**





- 8.1.1 The bidder shall be a regular manufacturer of Fire & Gas System.
- 8.1.2 The Bidder should have successfully engineered, manufactured, supplied and installed the offered systems and the same should be in service for at least minimum 5 years period from bid due date.
- 8.1.3 The bidder should have supplied, installed and commissioned Fire & Gas Systems to industries like Oil and Gas Pipeline facility/ Refinery/ Petrochemicals/ Oil and Gas Processing Plants/ Fertilizer/ Nuclear Plants/ Power Plants for a single order not less than Rs. 100 Lakhs during previous 7 years period from bid due date.

8.1.4 Bids Submitted by the Owner / Authorized Supplier / Trading House / Sole Selling Agent / Distributor of a Manufacturer.

- 8.1.4.1 Bids are invited from the Fire & Gas System manufacturer. In case an organization (the owner), who owns a separate manufacturing company, can also submit the bid. Likewise, an authorized supplier / trading house / sole selling agent / distributor of a manufacturer can also submit the bid.
- 8.1.4.2 Bids submitted by owner / authorized Supplier / Trading house / Sole Selling Agent / Distributor of a manufacturer shall also be considered provided the manufacturer meets the Technical Criteria stipulated under clause no. 8.1 above, subject to the following:
 - i) Bidder is owner / authorized Supplier / Trading house / Sole Selling Agent / Distributor of a Manufacturer.
 - ii) The manufacturer as a policy does not quote directly.
 - iii) Compliance of Technical Specifications and Guarantee / Warrantee requirements by Manufacturer, in case order is placed on the bidder.
 - iv) One manufacturer can quote only through one marketing Organization and a marketing Organization shall offer product of only one manufacturer.

8.2 **FINANCIAL:**

8.2.1 Annual turnover:

The minimum annual turnover of the bidder as per their audited financial statement in any one of the three financial years i.e. FY 2021-22, 2020-21 & 2019-20 shall be **INR 312.16 Lakhs.**

8.2.2 **Net Worth:**

Net worth of the bidder should be positive as per immediate preceding financial year's audited annual financial results i.e. FY: 2021-22.

8.2.3 Working Capital:

The minimum working capital of the bidder as per audited financial statement of immediate preceding year i.e. FY: 2021-22 shall be **INR 31.22 Lakhs.**

Note: If the bidder's working capital is inadequate, the bidder should submit a letter from bidder's bank (as per Format F-15 attached with section III of the tender) having net worth not less than Rs. 100 Crores Confirming the availability of the line of credit for at least for the working capital requirement as stated above.





8.3 **DOCUMENTS REQUIRED:**

Bidder shall meet the qualification criteria as stated above. Bidder shall furnish following documents along with the bid to justify meeting the stipulated qualification criteria:

Duly certified / attested (by Chartered Engineer and notary pu	SI. No.	Criteria	Required document(s)			
1 Documents required in support to Clause 8.1 in case the bidder is an authorized dealer, then duly signed stamped copies of the authorization certificates from manufacturer must be submitted with the Technical Bid.	1	Documents required in support to Clause 8.1	 Duly certified / attested (by Chartered Engineer and notary public with legible stamp) copy of Purchase Orders along with its proof of execution i.e. execution certificate / proof of payment / inspection release note, dispatch n clearance note issued by purchaser etc. showing reference no. of order towards meeting above criteria. Duly certified / attested (by Chartered Engineer and notary public with legible stamp) copy of typical sectional drawings / General Arrangement Drawing of the above-mentioned items. In case the bidder is an authorized dealer, then duly signed and stamped copies of the authorization certificates from the manufacturer must be submitted with the Technical Bid. 			

Note: Bidders to note that all the BEC (Technical) related documents shall be under one file named BEC Technical. The same file shall be uploaded on the e-tendering portal.

8.4 Authentication of document submitted in support of Bid Evaluation Criteria (BEC):

- 8.4.1 For authentication of document submitted in support of Financial Criteria of Bid Evaluation criteria (BEC), the bidder shall submit "Details of financial capability of bidder" in prescribed format duly signed and stamped by a Chartered Accountant.
- 8.4.2 Further, copy of audited annual financial statements submitted in bid shall be duly certified/ attested by notary public with legible stamp.
- 8.4.3 All documents in support of Technical Criteria of Bid Evaluation Criteria (BEC) to be furnished by the bidders shall necessarily be duly certified/ attested by Chartered Engineer and notary public with legible stamp.

9.0 TENDER PROCESSING FEE & BID SECURITY

9.1 TENDER PROCESSING FEE

9.1.1 Non- refundable tender processing fee of **INR 6,000/-** (**Indian Rupees Six Thousand only**) related to e-procurement shall be paid as per Options 1 or 2 below:

Option 1: Internet banking through State Bank of India (SBI) or any other Banks listed at State Bank Multi Option Payment System (SBMOPS) on <u>http://assamtenders.gov.in</u>

Option 2: In case of non-availability of net banking facility, bidders may submit tender processing fee using NEFT/ RTGS option from any bank against system generated prefilled challan.





9.1.2 VOID.

9.1.3 Bidders which are registered as Micro / Small Companies / Industries under MSME act 2006 or registered as N.S.I.C shall be exempted from submission of Tender Processing Fee. Such bidders must furnish valid document i.e. valid on the date of bid submission date along with bid to avail the exemption.

9.2 BID SECURITY / EMD

- 9.2.1 Bid must be accompanied by a bid security amount of INR 6,24,320/- (Indian Rupees Six Lakhs Twenty Four Thousand Three Hundred and Twenty only).
- 9.2.2 EMD/ Bid Security may be paid as per Options 1 or 2 below:

Option 1: Internet banking through State Bank of India (SBI) or any other Banks listed at State Bank Multi Option Payment System (SBMOPS) on <u>http://assamtenders.gov.in</u>

Option 2: In case of non-availability of net banking facility, bidders may submit tender processing fee using NEFT/ RTGS option from any bank against system generated prefilled challan.

- 9.2.3 VOID
- 9.2.4 VOID
- 9.2.5 Bidders which are registered as Micro / Small Companies / Industries under MSME act 2006 or registered as N.S.I.C shall be exempted from submission of EMD. Such bidders must furnish valid document i.e. valid on the date of bid submission date along with bid to avail the exemption.
- 9.2.6 Bidders to follow Instructions for submission/ Partial Exemption/ Complete Exemption of EMD/ Bid Security as attached at Annexure I to IFB.

10.0 PRE-BID MEETING

- 10.1 The bidder(s) or his representative who intend to bid are invited to attend a pre bid meeting which will take place on date specified in the tender document. Bidder(s) queries if any, must reach Owner/ Consultant office at least 2 days prior to pre bid meeting date.
- 10.2 Non-attendance of the pre-bid meeting will not be a cause for disqualification of the bidder.

11.0 GENERAL

- 11.1 AGCL reserves the right to place the order for part quantity or delete and item from bidder's scope of work.
- 11.2 The bids received after bid due time/ date shall be rejected.
- 11.3 Bids through Fax/ E-MAIL are not acceptable.
- 11.4 AGCL reserves the right to reject any or all the bids received at its discretion without assigning any reason whatsoever.
- 11.5 Contact Details of Assam State Procurement Cell Help Desk Telephone: 1800 2121 18866
- 11.6 Contact details are given below:





OWNER:

GM (O&GMB), Assam Gas Company Limited, P.O. Duliajan, Dist. Dibrugarh, Assam-786602 Mobile No. : +91-94350 38804, Email ID: <u>manujbaruah@agclgas.co</u>m

CONSULTANT

Head (Contracts & Procurement) M/s VCS Quality Services Pvt. Ltd. Unit no. 1116 - 1121, Tower 4, Assotech Business Cresterra, Plot No. 22, Sector-135, Expressway Noida - 201301 Phone No.: +91-8447121518/ 9205366772 E-mail: rachna.shukla@vcsprojects.com/ ashwani.chandra@vcsprojects.com/ manohar.joshi@vcsprojects.com/





SECTION – II INSTRUCTIONS TO BIDDERS (ITB)





1.0 INTRODUCTION

- 1.1 The Owner/ Purchaser invites sealed bids for the supply of goods as mentioned in the tender documents.
- 1.2 The biding document specifies the contractor scope of work, terms and conditions.
- 1.3 All terms, conditions and specifications of the bidding document shall be construed as applicable in general, unless specifically indicated to the contrary.
- 1.4 Bidders shall quote in the manner as specified in the bidding document. Owner reserves the right to evaluate and accept bids at their sole discretion.

2.0 ELIGIBLE GOODS AND SERVICES AND ORIGIN OF GOODS

- 2.1 All goods and related services to be supplied under the contract shall have their origin only in source countries, which are not prohibited to trade with by any law or rules made there under having the force of law of the Union of India or any state Government of India.
- 2.2 For purposes of this clause, "Origin" means the place where the goods are mined, grown, or produced, or the place from which the related services are supplied. Goods are produced when, through manufacturing, processing, or substantial and major assembly of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.
- 2.3 The origin of goods and services may or may not be from the home country of the Bidder.

3.0 ELIGIBILITY OF BIDDERS

- 3.1 Bidders shall as part of their bid, submit a written Power of Attorney authorizing the signatory of the bid to bind the bidder.
- 3.2 Bidders should not be associated, or have been associated in the past, directly or indirectly, with a firm or any of its affiliates which have been engaged by the Owner to provide consultancy services for the preparation of the design, specifications, and other documents to be used for carrying out the Works under this Invitation for Bids.
- 3.3 The Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices issued by the Owner/ Consultant in accordance with ITB.
- 3.4 The bidder should not be on holiday or black listed by Purchaser or any Government Department/ Public Sector/ Joint Venture CGD company of PSU. If the documents were issued inadvertently/ downloaded from website, offers submitted by such bidders shall not be considered for opening/ evaluation/award.

4.0 ONE BID PER BIDDER

4.1 Each bidder shall submit only one bid. A bidder who submits or participates in more than one bid will be disqualified. If bid of companies which is managed & controlled by same group of individual (common owners/ proprietor, common partner/ common directors), the participation in a particular tender by more than one such bidder will not be allowed and bids will be disqualified.





- 4.2 Also, if this fact is known at a later stage during bid evaluation or even after finalization of contract, the award will be made null and void and appropriate action including forfeiting of security deposit in any form and putting the firms on holiday list will be taken.
- 4.3 Alternative bids are not acceptable.

5.0 COST OF BIDDING

The Bidder shall bear all costs associated with the preparation and submission of its bid, and the Purchaser/Consultant will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

6.0 NON-TRANSFERABILITY OF THE BID DOCUMENTS

Bid document is non-transferable. Bid received from the bidders in whose name bid document fee has been submitted shall only be considered. Bidder must submit the bid document fee in their name. Bid document fee shall be submitted by the bidder as defined in tender document.

A. THE BID DOCUMENTS

7.0 CONTENT OF BID DOCUMENTS

7.1 The Bid Documents are those stated below and should be read in conjunction with any corrigendum issued in accordance with clause "AMENDMENT OF BID DOCUMENTS " of Instruction to bidders (ITB).

Volume I: Commercial Volume consisting of:

- Section I : Invitation for Bids (IFB)
- Section II : Instructions to Bidders (ITB)
- Section III : General Conditions of Contracts (GCC)
- Section IV : Special Conditions of Contracts (SCC)
- Section V : Forms and Formats
- Section VI : Schedule of Rates (SOR)
- Section –VII : Forms to be used after award of Contract.

Volume II: Technical Volume

7.2 The Bidder is expected to examine all instructions, forms, terms, and specifications in the bid documents. Failure to furnish all information required by the bid documents or to submit a bid not substantially responsive to the bid documents in every respect will be at the Bidder's risk and may result in the rejection of its bid.

8.0 CLARIFICATION ON BID DOCUMENTS

8.1 A prospective Bidder requiring any clarification of the bid documents may notify the Purchaser and / or the Consultant as the case may be, in writing or by email address indicated in the tender. The Owner / Consultant will respond in writing to any request for clarification of the bid





documents which it receives after issue of the bid documents but prior to at least two (02) working days before the pre-bid meeting date. Written copies of the Owner's/ Consultant's response will be sent to bidder from whom query is received. All such clarifications issued shall deem to form a part of the Bid documents.

8.2 Any query/ clarification from the bidder shall be considered before 7 days from bid submission date.

9.0 AMENDMENT OF BID DOCUMENTS

- 9.1 At any time prior to the deadline for submission of bids, the Purchaser / Consultant, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, may modify the bid documents by amendment.
- 9.2 Any addendum /corrigendum/ clarifications to bidders query thus issued shall be part of the bidding documents pursuant to ITB Clause "CONTENT OF BID DOCUMENTS" and shall be hosted on the website(s) www.assamgas.org and http://www.assamtenders.gov.in before bid due date. All the prospective bidders who have attended the Pre-Bid meeting/ submitted bid document fee, shall be informed by email/ post about the addendum/ corrigendum/ clarifications to bidders query for their reference. Bidders desirous to submit its bid have to take into consideration of all the addendum(s)/ corrigendum (s)/ clarifications to bidders query hosted on the above websites before submitting the bid.
- 9.3 In order to allow prospective bidders reasonable time to take care of the addendum/ corrigendum into account in preparing their bids, the Purchaser/ Consultant, at its discretion, may extend the deadline for the submission of bids.
- 9.4 Bidders are advised to visit AGCL's websites time to time to get updated information/ documents.

PREPARATION OF BIDS

10.0 LANGUAGE OF BID

- 10.1 The bid prepared and submitted by the Bidder, as well as, all correspondence and documents relating to the bid exchanged by the Bidder and the Purchaser / Consultant, shall be in English.
- 10.2 In the event of submission of any document/ certificate by the bidder in a language other than English, the English translation of the same duly authenticated by Chamber of Commerce of bidder's country shall be submitted by the bidder along with the bid.

11.0 DOCUMENTS CONSTITUTING THE BID

- 11.1 The bid prepared by the Bidder shall comprise the following components:
- 11.2 Un-priced Techno-commercial bid along with the Bid Forms completed in accordance with the tender documents;
- 11.3 Price Bid having Price Schedule/SOR filled up in accordance with tender documents.
- 11.4 Documentary evidence established in accordance with ITB that the goods and ancillary services to be supplied by the Bidder are eligible goods and services and conform to the bid documents; and





11.5 Bid security/EMD submission will be online.

12.0 BID FORM

- 12.1 The Bidder shall complete all the Bid Forms attached in Section-V "FORM & FORMAT" of bid document and submit the same as a part of "Techno-Commercial Un-priced bid "as per clause "PREPARATION OF BIDS" of ITB.
- 12.2 In two-part bidding as specified in IFB, Bidder shall submit bid in two parts, the first part will contain all bid forms with related documents, SOR without prices and bid security but not the price schedule, the second part will contain only price schedule.

13.0 BID PRICES

Bidder has to indicate price in the "Schedule of Rates" (SOR) as under:-

- i. Ex-works price quoted by the bidder (including packing, forwarding, third party inspection charges and GST on components and raw materials but excluding Inland Transportation to Delivery Location)
- ii. Inland transportation up to Delivery location and other costs (transit insurance, unloading etc.) Incidental to delivery of goods.
- iii. GST on the finished goods including inland transportation (i.e. on sl. no. i and ii above).
- iv. Year wise Comprehensive Annual Maintenance Charges (CAMC) for 04 years after expiry of warranty period.
- v. GST on CAMC charges (i.e. on sl. no. iv above).

14.0 PRICE BASIS

Prices quoted by the bidder shall be considered as firm and fixed during the entire execution of the contract and not subject to variation on any account (except statutory in taxes & duties for Indian bidders).

15.0 CURRENCIES OF BID

Bidders shall submit bid in INR only.

16.0 DOCUMENTS ESTABLISHING BIDDER'S ELIGIBILITY AND QUALIFICATION

- 16.1 Pursuant to IFB, the Bidder shall furnish, as part of its bid, documents establishing the Bidder's eligibility to bid and its qualifications to perform the contract if its bid is accepted.
- 16.2 The documentary evidence of the Bidder's qualifications to perform the contract if its bid is accepted shall establish to the Purchaser's satisfaction:
 - that the Bidder has the financial, technical, and production capability necessary to perform the contract;
 - that the Bidder meets the qualification criteria stipulated in the Tender.

17.0 DOCUMENTS ESTABLISHING GOOD'S ELIGIBILITY AND CONFORMITY TO BID DOCUMENTS





- 17.1 The documentary evidence of the eligibility of the goods and services shall consist of a statement in the Price Schedule of the country of origin of the goods and services offered and a certificate of origin (for goods other than that of Indian origin) issued at the time of shipment shall confirm the same.
- 17.2 Wherever appropriate the documentary evidence of conformity of the goods and services to the bid documents may be in the form of literature, drawings, and data, and shall consist of:
 - a detailed description of the essential technical and performance characteristics of the goods;
 - an item-by-item commentary on the Purchaser/ Consultant's Technical Specifications demonstrating substantial responsiveness of the goods and services to those of the specifications, or a statement of deviations and exceptions to the provisions of the Technical Specifications.
- 17.3 For purposes of the commentary to be furnished pursuant to ITB above, the Bidder shall note that standards for workmanship, material, and equipment, as well as references to brand names or catalogue numbers designated in the Technical Specifications, are intended to be descriptive only and not restrictive.

18.0 BID SECURITY/ EMD

- 18.1 Pursuant to the provisions of IFB and ITB, the Bidder shall furnish, as part of its bid, a bid security in the amount specified in the Tender.
- 18.2 The bid security is required to protect the Purchaser against the risk of Bidder's conduct, which would warrant the security's forfeiture.
- 18.3 The bid security shall be submitted as per clause 9.2 of IFB of Commercial Vol. I of II.
- 18.4 Any bid not secured in accordance with ITB Clauses may be treated as non-responsive and rejected.
- 18.5 Unsuccessful bidders' bid security shall be refunded as promptly as possible, but not later than thirty (30) days after the expiration of the period of sixty (60) days beyond the validity of the bid and any extension if required by the Purchaser.
- 18.6 The successful Bidder's bid security will be discharged upon such Bidder accepting the award, and furnishing the Contract Performance Guarantee.
- 18.7 The bid security may be forfeited:

a. If a Bidder:

- Withdraws its bid during the period of bid validity specified by the Bidder on the Bid Form including extensions if any granted, or
- Does not accept the correction of errors; or
- b. In the case of a successful Bidder, if such Bidder fails
- to accept the award
- to furnish Contract Performance Bank Guarantee in accordance with tender.





18.8 Bidders which are registered as Micro / Small Companies / Industries under MSME act 2006 or registered as N.S.I.C in relevant area shall be exempted from submission of Tender Processing Fee and EMD. Such bidders must furnish valid document along with bid to avail the exemption.

19.0 PERIOD OF VALIDITY OF BIDS

- 19.1 Bids shall remain valid for the period specified in the IFB after the date of bid submission as prescribed by the Purchaser. Purchaser may reject the bid having shorter validity period as non-responsive.
- 19.2 In exceptional circumstances, the Purchaser may request the Bidder for an extension of the period of validity. The request and the responses thereto shall be made in writing. The bid security provided under ITB shall also be suitably extended. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request for extension of its bid validity will not be required nor permitted to modify its bid.

20.0 FORMAT AND SIGNING OF BID

- 20.1 The Bidder shall prepare one original of the document comprising the bid as per ITB clause "SEALING AND MARKING OF BIDS" marked "ORIGINAL". In addition, the bidder shall submit one copy of the original bid marked "COPY". In the event of any discrepancy between the original & the copy, the one marked as original shall govern.
- 20.2 The original and the copy of the bid shall be typed or written in indelible ink. Each page of bid offer shall be stamped and signed by the Bidder or a person or persons duly authorized by competent authority in order to bind the bidder to the contract.
- 20.3 Any interlineations, erasures, or corrections shall be valid only if the person or persons signing the bid initial them. Overwriting will not be treated as correction and may lead to rejection of bid. A correction shall be considered if a part of text or figures or dates needing corrections are deleted and a separate text or figure or date, as the case may be, is written separately having proper link to the place of correction.

21.0 DEVIATIONS

- 21.1 Purchaser/ Consultant will appreciate submission of offer based on the terms and conditions in the enclosed GCC, SCC, ITB, Scope of Work, Technical Specification etc. to avoid delay seeking clarifications on technical/ commercial aspect of the offer.
- 21.2 **Deviations if any have to be listed only in the Form 7** of the bid submitted by the bidder. Deviations listed anywhere else will not be considered and in case of award of the job to the bidder, the job has to be completed in accordance with the tender terms and conditions without any commercial implications to the Purchaser.
- 21.3 Notwithstanding to the above, bids with the deviation(s) to the bid conditions shall be summarily rejected without any post bid reference to the bidder. However, Purchaser reserves the right to take the final decision in this regard, without assigning any reason.





B. PREPARATION AND SUBMISSION OF BIDS

22.0 PREPARATION OF BIDS

22.1 **Techno-commercial/Un-priced** comprising following documents should be uploaded in the eprocurement portal as mentioned in IFB.

Covering Letter with

- Bidder's General Information Form F-1
- Details of Bid security/EMD
- Power of Attorney as per Form F-3
- Financial Details as per Form F-4A & Form F-4B
- Certificate from Bank if bidder's working Capital is inadequate as per Form F-5
- Check List for agreed terms and conditions as per Form F-6
- No deviation confirmation / Deviation Form as per Form F-7
- Confirmation that bidder is not banned by any Indian Government organization/ Government Undertaking from quoting as per Form F-8
- Letter of authority in favour of any one or two of Bidder's executives having authority to attend the un-priced and price bid opening as per Form F-9.
- Information regarding any current litigation in which the bidder is involved in Form F-10.
- Certificates as per Form- 11 and 12
- Declaration as per Form-13
- Declaration as per Form-14
- Documents for meeting BEC as per IFB clause no. 8 including Form F-15 duly filled with required details.
- Proforma for Performance Bank Guarantee Unconditional) as per Form F-16.
- Un-priced Schedule of Rates (SOR) / In Price column should be mentioned as "Quoted".
- Copy of GST & PAN Registration Certificates
- Other documents as per Technical Volume of bid document
- **Note:** All pages of the bid offer to be signed and stamped by an authorised representative (as described in bid document) of the bidder.
- 22.2 **Part-II: The price bid** shall contain Schedule of Rates dully filled in the prescribed format available on the e-portal.





23.0 SEALING AND MARKING OF BIDS – (NOT APPLICABLE)

- 23.1 Tender document may be downloaded from E-procurement portal prior to the deadline for submission of bids. The bids shall be submitted online. Users are requested to map their system as per the System settings available on the link "System Requirement and Registration Manual" on the E-Procurement portal.
- 23.2 After downloading / getting the tender document/schedules, the Bidder should go through them carefully and then submit the documents as required, otherwise bid will be rejected. It is construed that the bidder has read all the terms and conditions before submitting their offer. Bidders are advised that prior to bid submission they should read the Bid Submission manual available on E-Procurement portal.
- 23.3 Bidders may insert their e-Token/ Smart Card in their computer and Logon to E- procurement portal, using the User-Id and Password chosen during registration. Then they may enter the password of the e-Token/Smart Card to access the DSC.
- 23.4 Prior to bid submission, bidder should get ready with the documents to be uploaded as part of the bid as indicated in the tender document/ schedule. Generally, they can be in Excel/PDF/ZIP formats. No other format is accepted. If there is more than one PDF document, then they can be clubbed together in a ZIP file for uploading. Maximum Single file size permitted for uploading is 20 MB. One can upload multiple of such files in case information to be uploaded in single file exceeds 20MB.
- 23.5 The bid both "Un-priced bid & Price Bid" (i.e., Part-I and Part-II) should be submitted online in the prescribed format. No other mode of submission is accepted.
- 23.6 Bid shall be digitally signed by the Authorized Signatory of the bidder and submitted "on-line". No hard copies of the documents (except those specifically asked in the tender document) are required to be submitted.
- 23.7 The bidders will have to accept unconditionally the online user portal agreement which contains the Terms and Conditions of NIT including General and Special Terms & Conditions and other conditions, if any, along with online undertaking in support of the authenticity regarding the facts, figures, information and documents furnished by the Bidder online in order to become an eligible bidder.
- 23.8 The bidder has to digitally sign and upload the required bid documents one by one as indicated. Bidders to note that the very act of using DSC for downloading the bids and uploading their offers shall be deemed to be a confirmation that they have read all sections and pages of the tender/bid document including terms and conditions without any exception and have understood the entire document and are clear about tender requirements.
- 23.9 The bidders are requested to submit the bids through online e-tendering system before the deadline for submission of bids (as per Server System Clock displayed on the portal). AGCL will not be held responsible for any sort of delay or the difficulties faced during online submission of bids by the bidders.
- 23.10 The bidder may seek clarification online only within the specified period. The identity of bidder will not be disclosed by the system. AGCL/VCS will clarify the relevant queries of bidders as far as possible. The clarifications given will be visible to all the bidders intending to participate in





that tender. The clarifications may be asked from the day of "Pre Bid Clarification Start Date and Time" till "Pre Bid Clarification End Date and Time".

24.0 DEADLINE FOR SUBMISSION OF BIDS

- 24.1 Bids must be received by the Purchaser/ Consultant at the address specified under ITB, not later than the time and date specified in the tender documents.
- 24.2 The Purchaser/Consultant may, at its discretion, extend this deadline for the submission of bids by amending the bid documents in accordance with ITB, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

25.0 LATE BIDS

25.1 Any bid received by the Purchaser/Consultant after the deadline for submission of bids prescribed by the Purchaser/Consultant will be rejected and returned unopened to the Bidder.

26.0 MODIFICATION AND WITHDRAWAL OF BIDS

- 26.1 The Bidder may modify or withdraw its bid after the bid's submission (but before the deadline for submission of bids), provided that written notice of the modification, including substitution or withdrawal of the bids, is received by the Purchaser/Consultant prior to the deadline prescribed for submission of bids.
- 26.2 The Bidder's modification or withdrawal notice shall be prepared, sealed, marked, and dispatched in accordance with the provisions of ITB. A withdrawal notice may also be sent by electronic mail, but followed by a signed confirmation copy, postmarked not later than the deadline for submission of bids.
- 26.3 No bid shall be modified after the deadline for submission of bids.
- 26.4 No bid shall be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Bid Form. Withdrawal of a bid during this interval may result in the Bidder's forfeiture of its bid security.

E. OPENING AND EVALUATION OF BIDS

27.0 OPENING OF BIDS BY THE PURCHASER/ CONSULTANT

- 27.1 The Purchaser/Consultant will open all bids in the presence of Bidders' representatives who choose to attend, at the time, on the date (as specified in IFB), and at the place specified in the Tender. The Bidders' representatives, who are present, shall sign a register evidencing their attendance, if so required by the Purchaser / Consultant.
- 27.2 The Bidders' names, bid modifications or withdrawals, and the presence or absence of requisite bid security and such other details as the Purchaser, at its discretion, may consider appropriate, will be announced at the opening. No bid shall be rejected at bid opening, except for late bids, which shall be later returned unopened to the concerned Bidder.
- 27.3 Bids (and modifications) that are not opened and read out at bid opening shall not be considered further for evaluation, irrespective of the circumstances. Bidder's specific attention is





drawn to this stipulation to enable the representative of the Bidder at the bid opening time to bring out to the attention for the Purchaser / Consultant any documents pertaining to its bid is not being acknowledged and relevant portions read out.

27.4 The Purchaser/Consultant will prepare a bid opening statement to be signed by all representatives present during bid opening.

28.0 CLARIFICATION OF BIDS

28.1 During evaluation of the bids, the Purchaser / Consultant may, at its discretion, ask the Bidder for a clarification of its bid. The request for clarification (shall be sent to e-mail ID provided in Form F-1) and the response shall be in writing, and no change in the prices or substance of the bid shall be sought, offered, or permitted.

29.0 PRELIMINARY EXAMINATION

- 29.1 The Purchaser/Consultant will examine the bids to determine whether they are complete, whether required sureties have been furnished, whether the documents have been properly signed and whether the bids are generally in order.
- 29.2 The Purchaser/Consultant may waive any minor informality, non-conformity, or irregularity in a bid which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any Bidder.
- 29.3 Prior to the detailed evaluation, pursuant to ITB, the Purchaser/Consultant will determine the substantial responsiveness of each bid to the bidding documents. For purposes of these Clauses, a substantially responsive bid is one, which conforms to all the terms and conditions of the Bid Documents without deviations.
- 29.4 If a bid is not substantially responsive, it will be rejected by the Purchaser/Consultant and shall not subsequently be made responsive by correction of the nonconformity by the Bidder.

30.0 REJECTION CRITERIA

- 30.1 Minor unconformities may be neglected and/or bidders may be required to rectify such minor unconformities.
- 30.2 Any deviation/unconformity on following conditions will result in summarily rejection of the bid:
 - Bid security.
 - Value of bid security less than that specified.
 - Bid security not complying with the requirements of ITB.
 - Contract Performance Bank Guarantee as per tender.
 - Period of validity of bid shorter than specified.
 - Price change on account of technical/ commercial clarification and/ or validity extension.
 - Resolution of Dispute/ Arbitration clause.
 - Payment terms.
 - Delivery schedule





- Price Reduction Schedule.
- Price not quoted as per SOR
- Warranty / Guarantee
- Force Majeure
- Applicable Law
- Scope of Work
- Any other condition specifically mentioned in the tender documents elsewhere that noncompliance of the clause lead to rejection of the bid

31.0 OPENING OF PRICE BID

- 31.1 In case of two-part bidding, the Bidders whose bids are found substantially responsive shall be invited to attend the opening of price bid. Such bidders may be required to attend the price bid opening at a short notice. The place, date and time of price bid opening will be informed to all such Bidders. The Bidder's representatives who are present shall sign a register evidencing their attendance.
- 31.2 The bid prices and discounts, if any stated in the price schedules will be announced during price bid opening.

32.0 EVALUATION AND COMPARISON OF BIDS

32.1 The Purchaser/ Consultant will evaluate and compare the bids which have been determined to be substantially responsive.

32.2 Evaluation

The Owner will evaluate and compare the bids previously determined to be substantially responsive. In evaluating bids, the Owner will determine for each bid the evaluated bid Price by adjusting the bid Price as follows:

- Arithmetical errors will be rectified on the following basis:
- If there is discrepancy between the unit rate and the total cost that is obtained by multiplying the unit rate and quantity, the unit rate shall prevail and the total cost will be corrected.
- If there is a discrepancy between the total bid amount and the sum of total costs, the sum of the total costs shall prevail and the total bid amount will be corrected.
- Deviations from terms and conditions of the bid document stipulated by the bidder if found acceptable, shall be evaluated and loaded to the quoted price.

32.3 Other Conditions Related To Bid Evaluation

- Canvassing in any form will make the bid liable for rejection.
- Unsolicited clarifications to the offer and/or change in prices during its validity period would render the bid liable for outright rejection.
- Bidders are advised to ensure that their bids are complete in all respects and conform to our terms, conditions and Bid Evaluation criteria of bid. Bids not complying with Owner's requirement may be rejected without seeking any clarifications.





- Bidders will not be allowed to revise their price/bid for any subsequent clarification, compliance to bid conditions after submission of bid.
- Bid should be complete covering the individual item wise total scope of work indicated in the Bid documents.
- Price bid will be evaluated as per applicable GST and other taxes & duties as on date of Priced bid opening.

32.4 **Comparison of Prices**

- 32.4.1 The Purchaser/ Consultant will evaluate and compare the bids which have been determined to be substantially responsive.
- 32.4.2 Prices shall be evaluated on **Overall Basis including CAMC charges of 04 years after** warranty period as per technical tender to arrive at the lowest evaluated cost to Purchaser.
- 32.4.3 Bidder must quote for all items of SOR, failing which bid shall be rejected.
- 32.4.4 The evaluated price of bidders shall include the following:
 - i.) Ex-works price quoted by the bidder (including packing, forwarding, third party inspection charges and GST on components and raw materials but excluding Inland Transportation to Delivery Location).
 - ii.) Inland transportation up to Delivery location and other costs (transit insurance, unloading etc.) incidental to delivery of goods.
 - iii.) GST on the finished goods including inland transportation (i.e. on sl. no. i and ii above).
 - iv.) CAMC charges of 04 years after warranty period.

33.0 CONTACTING THE PURCHASER/ CONSULTANT

- 33.1 From the time of bid opening to the time of contract award, if any Bidder wishes to contact the Purchaser/ Consultant on any matter related to the bid, it should do so in writing.
- 33.2 Any effort by a Bidder to influence the Purchaser/ Consultant in its decisions on bid evaluation, bid comparison, or contract award may result in the rejection of the Bidder's bid.

F. AWARD OF CONTRACT

34.0 POST-QUALIFICATION

- 34.1 In the absence of pre-qualification, the Purchaser/ Consultant will determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated responsive bid is qualified to perform the contract satisfactorily, in accordance with the criteria listed in ITB.
- 34.2 The determination will take into account the Bidder's financial, technical, and production capabilities. It will be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, as well as such other information as the Purchaser/Consultant deems necessary and appropriate.
- 34.3 An affirmative determination will be a prerequisite for award of the contract to the Bidder. A negative determination will result in rejection of the Bidder's bid.





35.0 AWARD CRITERIA

35.1 The Purchaser will award the contract to the successful Bidder whose bid has been determined to be substantially responsive and has been determined to be the lowest evaluated bid, provided further that the Bidder is determined to be qualified to perform the contract satisfactorily.

36.0 SPLIT OF AWARD

36.1 Not Applicable

37.0 PURCHASER'S RIGHT TO VARY QUANTITIES AT TIME OF AWARD

37.1 The Purchaser reserves the right at the time of contract award to increase or decrease the quantity of goods and services originally specified in the Schedule of Requirements without any change in unit price or other terms and conditions.

38.0 PURCHASER'S RIGHT TO ACCEPT OR REJECT ANY OR ALL BIDS

38.1 The Purchaser reserves the right to accept or reject any bid in full or part, to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to the affected Bidder or Bidders. Purchaser also reserves the right not to accept lowest rates quoted by the bidder.

39.0 NOTIFICATION OF AWARD

- 39.1 Prior to the expiration of the period of bid validity, the Purchaser will notify the successful Bidder in writing by Letter of Intent (LOI) or registered letter or by cable, to be confirmed in writing by registered letter, that its bid has been accepted.
- 39.2 The date of Letter of Intent (LOI) for notification of award will constitute effective date.
- 39.3 The bidder shall promptly, but not later than Seven (7) days of notification of award shall furnish its acceptance of award.
- 39.4 Upon the successful Bidder's furnishing of the performance Bank Guarantee pursuant to ITB Clause.
- 39.5 The Purchaser will discharge the bid security of unsuccessful Bidders as early as possible.
- 39.6 Letter of Intent (LOI) read in conjunction with bid documents shall be binding Contract.

40.0 CORRUPT OR FRAUDULENT PRACTICES

- 40.1 It is required that all concerned in the entire procurement process to observe the highest standard of ethics during the said process. In pursuance of this policy, the Purchaser/Consultant:
 - (a) defines for the purposes of this provision, the terms set forth below as follows:
 - "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution; and
 - "fraudulent practice" means a misrepresentation of facts in order to influence a





procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition;

- (b) will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;
- (c) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a Bank-financed contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a Bank financed contract.
- 40.2 Furthermore, Bidders shall be aware of the provision stated in General Conditions of Contract (GCC).

41.0 WHISTLE BLOWER POLICY

- 41.1 AGCL has implemented whistle-blower policy as part of the vigil mechanism to comply with the regulatory requirements laid down by the companies act 2013 and clause 49 of the SEBI's listing agreement. With the implementation of vigil mechanism, the company provides a platform to its vendors and suppliers to come forward and raise their genuine concerns without any fear of retaliation and victimisation.
- 41.2 The policy is designed to deal with concerns raised in relation to the specific issues which are not in the interest of the company. The company has appointed an independent third party service provider to manage the operations of whistle-blower hotline.

42.0 EVALUATION OF PERFORMANCE

42.1 Performance of the contract awarded if any shall be evaluated on half yearly basis or early on need basis as per approved AGCL.

43.0 CONTRACTOR SAFETY MANUAL

43.1 The contractor / vendor needs to ensure all the safety conditions as mentioned in the Contractor Safety manual.



CONTRACT (GCC)



SECTION – III GENERAL CONDITIONS OF CONTRACT (GCC)



CONTRACT (GCC)



General Conditions of Contract-GOODS

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GENERAL CONDITIONS OF



CONTRACT (GCC)

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1. **DEFINITIONS**

In this document, General Conditions of Contract (GCC Goods), the following terms shall have the following respective meanings:

- 1.0 BIDDER : Designates the individual or legal entity which has made a proposal, a tender or a bid with the aim of concluding a Contract with the PURCHASER.
- 1.1 CONSULTANT shall mean M/s VCS Quality Service Pvt. Ltd. having its registered office at 505, 5th Floor, 360 Degree Business Park, Maharana Pratap Chowk, L. B. S. Marg, Mulund West, Mumbai, Maharashtra, 400380. The term consultant includes successors, assigns of M/s. M/s VCS Quality Service Pvt. Ltd.
- 1.2 CONTRACT shall mean Purchase Order/Contract and all attached exhibits and documents referred to therein and all terms and conditions thereof together with any subsequent modifications thereto.
- 1.3 CONTRACT PRICE shall mean the price payable to the Seller under the Contract for the full and proper performance of his contractual obligations.
- 1.4 COMPLETION DATE shall mean the date on which the goods are successfully commissioned by the Seller and handed over to the PURCHASER.
- 1.5 COMMERCIAL OPERATION shall mean the condition of the operation in which the complete equipment covered under the Contract is officially declared by the PURCHASER to be available for continuous operation at different loads up to and including rated capacity.
- 1.6 DELIVERY terms shall be interpreted as per INCO TERMS 2000 in case of Contract with a foreign Bidder and as the date of LR/GR in the case of a contract with an Indian Bidder.
- 1.7 DRAWINGS shall mean and include Engineering drawings, sketches showing plans, sections and elevations in relation to the Contract together with modifications and/or revisions thereto.
- 1.8 ENGINEER or Engineer-in-Charge of the Project SITE shall mean the person designated from time to time by PURCHASER/CONSULTANT at SITE and shall include those who are expressly authorized by him to act for and on his behalf for operation of this CONTRACT.
- 1.9 FINAL ACCEPTANCE shall mean the PURCHASER's written acceptance of the Works performed under the Contract after successful completion of performance and guarantee test.
- 1.10 GOODS shall mean articles, materials, equipment, design and drawings, data and other property to be supplied by Seller to complete the contract.
- 1.11 INSPECTOR shall mean any person or outside Agency nominated by PURCHASER/CONSULTANT through CONSULTANT to inspect equipment, stage wise as well as final, before dispatch, at SELLER's works and on receipt at SITE as per terms of the CONTRACT.
- 1.12 INITIAL OPERATION shall mean the first integral operation of the complete equipment covered under the Contract with sub-systems and supporting equipment in service or available for service.
- 1.13 PURCHASER shall mean Assam Gas Company Ltd. having its registered office at Duliajan, Dist: Dibrugarh, Assam 786 602. The term PURCHASER includes successors, assigns of AGCL.




- 1.14 PERFORMANCE AND GUARANTEE TESTS shall mean all operational checks and tests required to determine and demonstrate capacity, efficiency and operating characteristics as specified in the Contract documents.
- 1.15 SELLER shall mean the person, firm or company with whom PURCHASE ORDER/CONTRACT is placed/ entered into by PURCHASER for supply of equipment, materials and services. The term Seller includes its successors and assigns.
- 1.16 SERVICE shall mean erection, installation, and testing, commissioning, provision of technical assistance, training and other such obligations of the Seller covered under the Contract.
- 1.17 SITE designates the land and/or any other premises on, under, in or across which the Goods and/or Services have to be supplied, erected, assembled, adjusted, arranged and/or commissioned.
- 1.18 SPECIFICATIONS shall mean and include schedules, details, description, statement of technical data, performance characteristics, standards (Indian as well as International) as applicable and specified in the Contract.
- 1.19 SUB-CONTRACT shall mean order placed by the Seller, for any portion of the contracted work, after necessary consent and approval of PURCHASER.
- 1.20 SUB-CONTRACTOR shall mean the person named in the CONTRACT for any part of the work or any person to whom any part of the CONTRACT has been sub-let by the SELLER with the consent in writing of the CONSULTANT/PURCHASER and will include the legal representatives, successors, and permitted assigns of such person.
- 1.21 START-UP shall mean the time period required to bring the equipments covered under the Contract from an inactive condition, when construction is essentially complete to the state of readiness for trial operation. The start-up period shall include preliminary inspection and check out of equipment and supporting subsystems, initial operation of the complete equipment's covered under the Contract to obtain necessary pre-trial operation data, perform calibration and corrective action, shutdown inspection and adjustment prior to the trial operation period.
- 1.22 TESTS shall mean such process or processes to be carried out by the Seller as are prescribed in the Contract or considered necessary by PURCHASER or his representative in order to ascertain quality, workmanship, performance and efficiency of equipment or part thereof.
- 1.23 TESTS ON COMPLETION shall mean such tests as prescribed in the by the Seller before the Works are taken over by the PURCHASER.
- 1.24 FOB means Free on Board, the FOB term requires the seller to clear the goods for export.
- 1.25 FOT means Free on Trucks, and refers to goods being carried by truck.
- 1.26 CIF means Cost, Insurance and Freight. Seller must pay the costs and freight includes insurance to bring the goods to the port of destination.
- 1.27 CFR means Cost and freight. The seller pays for the carriage of the goods up to the named port of destination.





2. SELLER TO INFORM

The Seller shall be deemed to have carefully examined all contract documents to his entire satisfaction. Any lack of information shall not in any way relieve the Seller of his responsibility to fulfil his obligation under the Contract.

3. Application

These General Conditions of Contract (GCC-Goods) shall apply to the extent that they are not superseded by provisions of other parts of the Contract.

4. Country of Origin

For purposes of this Clause "origin" means the place where the Goods were mined, grown or produced, or from which the services are supplied. Goods are produced when, through manufacturing, processing or substantial and major assembling of components, a commercially recognized new product results that is substantially different in basic characteristics or in purpose or utility from its components.

5. Scope of Contract

- 5.1 Scope of the CONTRACT shall be as defined in the PURCHASE ORDER/CONTRACT specifications, drawings and Annexure thereto.
- 5.2 Completeness of the EQUIPMENT shall be the responsibility of the SELLER. Any equipment, fittings and accessories which mentioned in the specifications or drawings, but which are usual or necessary for the satisfactory functioning of the equipment (successful operation and functioning of the EQUIPMENT being SELLER's responsibility) shall be provided by SELLER without any extra cost.
- 5.3 The SELLER shall follow the best modern practices in the manufacture of high grade EQUIPMENT notwithstanding any omission in the specifications. The true intent and meaning of these documents is that SELLER shall in all respects, design, engineer, manufacture and supply the equipment in a thorough workmanlike manner and supply the same in prescribed time to the entire satisfaction of PURCHASER.
- 5.4 The SELLER shall furnish twelve (12) copies in English language of Technical documents, final drawings, preservation instructions, operation and maintenance manuals, test certificates, spare parts catalogues for all equipment's to the PURCHASER.
- 5.5 The documents once submitted by the SELLER shall be firm and final and not subject to subsequent changes. The SELLER shall be responsible for any loss to the PURCHASER/CONSULTANT consequent to furnishing of incorrect data/drawings.
- 5.7 All equipment to be supplied and work to be carried out under the CONTRACT shall conform to and comply with the provisions of relevant regulations/Acts(State Government or Central Government) as may be applicable to the type of equipment/work carried out and necessary certificates shall be furnished.
- 5.8 The Seller shall provide cross sectional drawings, wherever applicable, to identify the spare part numbers and their location. The size of bearings, their make and number shall be furnished.





- 5.9 Specifications, design and drawings issued to the SELLER alongwith RFQ and CONTRACT are not sold or given but loaned. These remain property of PURCHASER/ CONSULTANT or its assigns and are subject to recall by PURCHASER/CONSULTANT. The SELLER and his employees shall not make use of the drawings, specifications and technical information for any purpose at any time except for manufacture against the CONTRACT and shall not disclose the same to any person, firm or corporate body, without written permission of PURCHASER/CONSULTANT. All such details shall be kept confidential.
- 5.10 SELLER shall pack, protect, mark and arrange for despatch of EQUIPMENT as per instructions given in the CONTRACT.

6. STANDARDS

The GOODS supplied under the CONTRACT shall conform to the standards mentioned in the Technical Specifications, or such other standards which ensure equal or higher quality, and when no applicable standard is mentioned, to the authoritative standard appropriate to the GOODS' country of origin and such standards shall be the latest issued by the concerned institution.

7. INSTRUCTIONS, DIRECTION & CORRESPONDENCE

- 7.1 The materials described in the CONTRACT are to be supplied according to the standards, data sheets, tables, specifications and drawings attached thereto and/or enclosed with the CONTRACT, itself and according to all conditions, both general and specific enclosed with the contract, unless any or all of them have been modified or cancelled in writing as a whole or in part.
- 7.2 All instructions and orders to SELLER shall, excepting what is herein provided, be given by PURCHASER/CONSULTANT.
- 7.3 All the work shall be carried out under the direction of and to the satisfaction of PURCHASER/CONSULTANT.
- 7.4 All communications including technical/ commercial clarifications and/or comments shall be addressed to CONSULTANT in quintuplicate with a copy to PURCHASER and shall always bear reference to the CONTRACT.
- 7.5 Invoices for payment against CONTRACT shall be addressed to PURCHASER.
- 7.6 The CONTRACT number shall be shown on all invoices, communications, packing lists, containers and bills of lading, etc.

8. CONTRACT OBLIGATIONS

If after award of the contract, the Seller does not acknowledge the receipt of award or fails to furnish the performance guarantee within the prescribed time limit, the PURCHASER reserves the right to cancel the contract and apply all remedies available to him under the terms and conditions of this contract.

Once a contract is confirmed and signed, the terms and conditions contained therein shall take precedence over the Seller's bid and all previous correspondence.

9. MODIFICATION IN CONTRACT

9.1 All modifications leading to changes in the CONTRACT with respect to technical and/or





commercial aspects including terms of delivery, shall be considered valid only when accepted in writing by PURCHASER/CONSULTANT by issuing amendment to the CONTRACT. Issuance of acceptance or otherwise in such cases shall not be any ground for extension of agreed delivery date and also shall not affect the performance of contract in any manner except to the extent mutually agreed through a modification of contract.

9.2 PURCHASER/CONSULTANT shall not be bound by any printed conditions or provisions in the SELLER's Bid Forms or acknowledgment of CONTRACT, invoices, packing list and other documents which purport to impose any conditions at variance with or supplemental to CONTRACT.

10. USE OF CONTRACT DOCUMENTS & INFORMATION

- 10.1 The Seller shall not, without the PURCHASER's/ CONSULTANT's prior written consent, disclose the CONTRACT or any provision thereof, or any specification, plan, drawing, pattern, sample or information furnished by or on behalf of the PURCHASER in connection therewith, to any person other than a person employed by the SELLER in the performance of the CONTRACT. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purpose of such performance.
- 10.2 The SELLER shall not, without the PURCHASER's prior written consent, make use of any document or information enumerated in Article 10.1. except for purpose of performing the CONTRACT.

11. PATENT RIGHTS, LIABILITY & COMPLIANCE OF REGULATIONS

- 11.1 SELLER hereby warrants that the use or sale of the materials delivered hereunder will not infringe claims of any patent covering such material and SELLER agrees to be responsible for and to defend at his sole expense all suits and proceedings against PURCHASER based on any such alleged patent infringement and to pay all costs, expenses and damages which PURCHASER and/or CONSULTANT may have.
- 11.2 The SELLER shall indemnify the PURCHASER against all third party claims of infringement of patent, trade mark or industrial design rights arising from use of the GOODS or any part thereof in the PURCHASER's country.

The SELLER shall indemnify the PURCHASER against all third party claims of infringement of patent, trade mark or industrial design rights arising from use of the GOODS or any part thereof pay or incur by reason of any such suit or proceedings.

- 11.3 SELLER shall also protect and fully indemnify the PURCHASER from any claims from SELLER'S workmen/employees or their heirs, dependants, representatives, etc. or from any other person/persons or bodies/companies etc. for any acts of commissions or omission while executing the CONTRACT.
- 11.4 SELLER shall be responsible for compliance with all requirements under the laws and shall protect and indemnify completely the PURCHASER from any claims/penalties arising out of any infringements.

12. PERFORMANCE GUARANTEE





- 12.1 Within 15 days after issue date of award of the CONTRACT, the SELLER shall furnish Performance Guarantee in the form of Bank Guarantee/irrevocable Letter of Credit to the PURCHASER, in the form provided in the Bidding Documents, for an amount equivalent to 10% of the total value of the CONTRACT.
- 12.2 The proceeds of Performance Guarantee shall be appropriated by the PURCHASER as compensation for any loss resulting from the SELLER's failure to complete his obligations under the CONTRACT without prejudice to any of the rights or remedies the PURCHASER may be entitled to as per terms and conditions of CONTRACT. The proceeds of this Performance Guarantee shall also govern the successful performance of Goods and Services during the entire period of Contractual Warrantee/Guarantee.
- 12.3 The performance guarantee shall be denominated in the currency of the CONTRACT.
- 12.4 The Performance Guarantee shall be valid for the duration of 90 days beyond the expiry of Warrantee/Guarantee period. The Bank Guarantee will be discharged by PURCHASER not later than 6 months from the date of expiration of the Seller's entire obligations, including any warrantee obligations, under the CONTRACT.

13. INSPECTION, TESTING & EXPEDITING

- 13.1 The PURCHASER or its representative shall have the right to inspect and/or to test the GOODS to confirm their conformity to the CONTRACT specifications. The special conditions of CONTRACT and/or the Technical Specifications shall specify what inspections and tests the PURCHASER requires and where they are to be conducted. The PURCHASER shall notify the SELLER in writing the identity of any representative(s) retained for these purposes.
- 13.2 The inspections and tests may be conducted on the premises of the SELLER or his subcontractor(s), at point of DELIVERY and/or at the GOODS' final destination, When conducted on the premises of the SELLER or his sub-contractor (s), all reasonable facilities and assistance including access to the drawings and production data shall be furnished to the inspectors at no charge to the PURCHASER.
- 13.3 Should any inspected or tested GOODS fail to conform to the specifications, the PURCHASER may reject them and the SELLER shall either replace the rejected GOODS or make all alterations necessary to meet Specifications' requirements, free of cost to the PURCHASER.
- 13.4 The PURCHASER's right to inspect, test and where necessary reject the GOODS after the GOODS' arrival in the PURCHASER's country shall in no way be limited or waived by reason of the GOODS having previously been inspected, tested and passed by the PURCHASER, or their representative prior to the GOODS shipment from the country of origin.
- 13.5 The INSPECTOR shall follow the progress of the manufacture of the GOODS under the CONTRACT to ensure that the requirements outlined in the CONTRACT are not being deviated with respect to schedule and quality.
- 13.6 SELLER shall allow the INSPECTOR to visit, during working hours, the workshops relevant for execution of the CONTRACT during the entire period of CONTRACT validity.
- 13.7 SELLER shall place at the disposal of the INSPECTOR, free of charge, all tools, instruments, and other apparatus necessary for the inspection and/or testing of the GOODS. The INSPECTOR is entitled to prohibit the use and dispatch of GOODS and/or materials which





have failed to comply with the characteristics required for the GOODS during tests and inspections.

- 13.8 SELLER shall advise in writing of any delay in the inspection program at the earliest, describing in detail the reasons for delay and the proposed corrective action.
- 13.9 ALL TESTS and trials in general, including those to be carried out for materials not manufactured by SELLER shall be witnessed by the INSPECTOR. Therefore, SELLER shall confirm to PURCHASER by fax or e-mail about the exact date of inspection with at least 30 days' notice. SELLER shall specify the GOODS and quantities ready for testing and indicate whether a preliminary or final test is to be carried out.
- 13.10 If on receipt of this notice, PURCHASER should waive the right to witness the test, timely information will be given accordingly.
- 13.11 Any and all expenses incurred in connection with tests, preparation of reports and analysis made by qualified laboratories, necessary technical documents, testing documents and drawings shall be at SELLER's cost. The technical documents shall include the reference and numbers of the standards used in the construction and, wherever deemed practical by the INSPECTOR, copy of such standards.
- 13.12 Nothing in Article-13 shall in any way release the SELLER from any warrantee or other obligations under this CONTRACT.
- 13.13 Arrangements for all inspections required by Indian Statutory Authorities and as specified in technical specifications shall be made by SELLER.
- 13.14 **INSPECTION & REJECTION OF MATERIALS BY CONSIGNEES** When materials are rejected by the consignee, the supplier shall be intimated with the details of such rejected materials, as well as the reasons for their rejection, also giving location where such materials are lying at the risk and cost of the contractor/supplier. The supplier will be called upon either to remove the materials or to give instructions as to their disposal within 14 days and in the case of dangerous, infected and perishable materials within 48 hours, failing which the consignee will either return the materials to the contractor freight to pay or otherwise dispose them off at the contractor's risk and cost. The PURCHASER shall also be entitled to recover handling and storage charges for the period, during which the rejected materials are not removed @ 5% of the value of materials for each month or part of a month till the rejected materials are finally disposed off.

14. TIME SCHEDULE & PROGRESS REPORTING

14.1 TIME SCHEDULE NETWORK/BAR CHART

- 14.1.1 Together with the Contract confirmation, SELLER shall submit to PURCHASER, his time schedule regarding the documentation, manufacture, testing, supply, erection and commissioning of the GOODS.
- 14.1.2 The time schedule will be in the form of a network or a bar chart clearly indicating all main or key events regarding documentation, supply of raw materials, manufacturing, testing, delivery, erection and commissioning.
- 14.1.3 The original issue and subsequent revisions of SELLER's time schedule shall be sent to PURCHASER.





14.1.4 The time schedule network/bar chart shall be updated at least every second month.

14.2 PROGRESS TREND CHART/MONTHLY REPORT

- 14.2.1 SELLER shall report monthly to PURCHASER, on the progress of the execution of CONTRACT and achievement of targets set out in time bar chart.
- 14.2.2 The progress will be expressed in percentages as shown in the progress trend chart attached to the Time Schedule specification.
- 14.2.3 The first issue of the Progress Trend Chart will be forwarded together with the time bar chart along with CONTRACT confirmation.
- 14.3.1 PURCHASER's/CONSULTANT's representatives shall have the right to inspect SELLER's premises with a view to evaluating the actual progress of work on the basis of SELLER's time schedule documentation.
- 14.3.2 Irrespective of such inspection, SELLER shall advise CONSULTANT, with copy to PURCHASER. at the earliest possible date of anv anticipated delay in the progress14.4Notwithstanding the above, in case progress on the execution of contract at various stages is not as per phased time schedule and is not satisfactory in the opinion of the PURCHASER/CONSULTANT which shall be conclusive or SELLER shall neglect to execute the CONTRACT with due diligence and expedition or shall contravene the provisions of CONTRACT, PURCHASER/CONSULTANT may give notice of the same in writing to the the SELLER calling upon him to make good the failure, neglect or contravention complained of. Should SELLER fail to comply with such notice within the period considered reasonable by PURCHASER/CONSULTANT, the PURCHASER/ CONSULTANT shall have the option and be at liberty to take the CONTRACT wholly or in part out of the SELLER's hand and make alternative arrangements to obtain the requirements and completion of CONTRACT at the SELLER's risk and cost and recover from the SELLER, all extra cost incurred by the PURCHASER on this account. PURCHASER/ CONSULTANT In such event shall not be responsible for any loss that the SELLER may incur and SELLER shall not be PURCHASER/CONSULTANT shall, in addition, have the right to entitled to any gain. encash Performance Guarantee in full or part

15 DELIVERY & DOCUMENTS

- 15.1 Delivery of the GOODS shall be made by the SELLER in accordance with terms specified in the CONTRACT, and the goods shall remain at the risk of the SELLER until delivery has been completed.
- 15.2 Delivery shall be deemed to have been made :
 - a) In the case of FOB, CFR & CIF Contracts, when the Goods have been put on board the ship, at the specified port of loading and a clean Bill of Lading is obtained. The date of Bill of Lading shall be considered as the delivery date.
 - b) In case of FOT despatch point contract (For Indian bidder), on evidence that the goods have been loaded on the carrier and a negotiable copy of the GOODS receipt obtained. The date of LR/GR shall be considered as the date of delivery.
 - c) In case of FOT site (for Indian bidders) on receipt of goods by PURCHASER/Consultant at





the designated site(s).

- 15.3 The delivery terms are binding and essential and consequently, no delay is allowed without the written approval of PURCHASER/CONSULTANT. Any request concerning delay will be void unless accepted by PURCHASER/CONSULTANT through a modification to the CONTRACT.
- 15.4 Delivery time shall include time for submission of drawings for approval, incorporation of comments, if any, and final approval of drawings by PURCHASER/ CONSULTANT.
- 15.5 In the event of delay in delivery, Price Reduction Schedule as stipulated in Article 26 shall apply.
- 15.6 The documentation, in English Language, shall be delivered in due time, in proper form and in the required number of copies as specified in the contract.
- 15.7 The additional copies of final drawings and instructions will be included in the package of goods, properly enveloped and protected.
- 15.8 The SELLER should comply with the Packing, Marking and Shipping Documentation Specifications enclosed.

16. TRANSIT RISK INSURANCE

- 16.1 All goods supplied under the contract shall be fully insured in a freely convertible currency against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery.
- 16.2 Where delivery is on FOB or CFR basis, marine insurance shall be the responsibility of the Purchaser. Insurance Requirements: Indigenous Bidders: Transit risk insurance from F.O.T. despatch point onwards shall be arranged and borne by AGCL. Foreign Bidders: Marine insurance as well as transit insurance in Purchaser's country shall be arranged and borne by AGCL

The SELLER shall ensure that in effecting despatch of materials, the primary responsibility of the carriers for safe movement is always retained so that the PURCHASER's interests are fully safeguarded and are in no way jeopardised. The Seller shall furnish the cost of materials, for each equipment.

16.3 **PURCHASER'S INSURANCE AGENT:**

[The name and address-as mentioned under SCC]

17. TRANSPORTATION

- 17.1 Where the SELLER is required under the CONTRACT to deliver the GOODS FOB, transport of the GOODS until delivery, that is, up to and including the point of putting the GOODS on board the export conveyance at the specified port of loading, shall be arranged and paid for, by the SELLER and the cost thereof shall be included in the Contract price.
- 17.2 Where the SELLER is required under the CONTRACT to deliver the GOODS CFR or CIF, transport of the Goods to the port of discharge or such other point in the country of destination as shall be specified in the CONTRACT shall be arranged and paid for by the SELLER and the cost thereof shall be included in the Contract price.

18. INCIDENTAL SERVICES





- 18.1 The Seller may be required to provide any or all of the following services:
- 18.1.1 Performance or supervision of onsite assembly and/or start-up of the supplied Goods:
- 18.1.2 Furnishing tools required for assembly and/or maintenance of the supplied Goods:
- 18.1.3 Performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Seller of any warrantee/guarantee obligations under the Contract.
- 18.1.4 Training of the Purchaser's personnel at the Seller's plant and/or at Site, in assembly, startup operation, maintenance and/or repair of the supplied Goods at no extra cost. However, Purchaser will bear boarding, lodging & personal expenses of Trainees.
- 18.2 Prices charged by the Seller for the preceding incidental services, shall not exceed the prevailing rates charged to other parties by the Seller for similar services.
- 18.3 When required, Seller shall depute necessary personnel for supervision and/or erection of the Equipment at site for duration to be specified by Purchaser on mutually agreed terms. Seller's personnel shall be available at Site within three (03) days for emergency action and twenty- one days for medium and long-term assistance, from the date of notice given by Purchaser.

19. SPARE PARTS, MAINTENANCE TOOLS, LUBRICANTS

- 19.1 Seller may be required to provide any or all of the following materials and notification pertaining to spare parts manufactured or distributed by the Seller.
- 19.1.1 Such spare parts as the Purchaser may opt to purchase from the Seller, provided that his option shall not relieve the Seller of any warrantee obligations under the Contract, and
- 19.1.2 In the event of termination of production of the spare parts:
 - i) Advance notification to the Purchaser of the pending termination, in sufficient time to permit the Purchaser to procure needed requirements, and
 - ii) Following such termination, furnishing at no cost to the Purchaser, the blue prints, drawings and specifications of the spare parts, if any when requested.
- 19.2 Seller shall supply item wise list with value of each item of spare parts and maintenance tools requirements Purchaser to procure needed requirements, and along with full details of manufacturers/vendors for such spares/maintenance tools for:
- 19.2.1 The construction, execution and commissioning.
- 19.2.2 Two years operation and maintenance.
- 19.3 Spare parts shall be new and of excellent quality as per engineering standards/ codes, free of any defects (even concealed), deficiency in design, materials and workmanship and also shall be completely interchangeable with the corresponding parts.
- 19.4 Type and sizes of bearings shall be clearly indicated.
- 19.5 Spare parts shall be packed for long storage under tropical climatic conditions in suitable cases,





clearly marked as to intended purpose.

- 19.6 A list of special tools and gauges required for normal maintenance and special handling and lifting appliances, if any, for the Goods shall be submitted to Purchaser.
- 19.7 Bidders should note that if they do not comply with Clause 19.2 above, their quotation may be rejected.

19.8 Lubricants

- 19.8.1 Whenever lubricants are required, Seller shall indicate the quantity of lubricants required for the first filling, the frequency of changing, the quantity of lubricants required for the one year's continuous operation and the types of recommended lubricants indicating the commercial name (trade-mark), quality and grade.
- 19.8.2 If Seller is unable to recommend specific oil, basic recommended characteristics of the lubricants shall be given.
- 19.8.3 Seller shall indicate various equivalent lubricants available in India.

20. GUARANTEE

20.1 All Goods or Materials shall be supplied strictly in accordance with the specifications, drawings, data sheets, other attachments and conditions stated in the Contract. No deviation from such specifications or alterations or of these conditions shall be made without PURCHASER'S/ CONSULTANT'S agreement in writing which must be obtained before any work against the order is commenced. All materials supplied by the SELLER pursuant to the Contract (irrespective of whether engineering, design data or other information has been furnished, reviewed or approved by PURCHASER/CONSULTANT) are guaranteed to be of the best quality of their respective kinds (unless otherwise specifically authorised in writing by PURCHASER/CONSULTANT) and shall be free from faulty design, workmanship and materials, and to be of sufficient size and capacity and of proper materials so as to fulfil in all respects all operating conditions, if any, specified in the Contract If any trouble or defect, originating with the design, material, workmanship or operating characteristics of any materials, arises at any time prior to twelve(12) months from the date of the first commercial operation of the Plant for which the materials supplied under the Contract form a part thereof, or twenty four (24) months from the date of last shipment whichever period shall first expire, and the SELLER is notified thereof, SELLER shall, at his own expense and as promptly as possible, make such alterations, repairs and replacements as may necessary to permit the materials to function in accordance with the specifications and to fulfil the foregoing guarantees.

PURCHASER/CONSULTANT may, at his option, remove such defective materials, at SELLER'S expense in which event SELLER shall, without cost to PURCHASER/CONSULTANT and as promptly as possible, furnish and install proper materials. Repaired or replaced materials shall be similarly guaranteed by the SELLER for a period of no less than twelve (12) months from the date of replacement/repair.

In the event that the materials supplied do not meet the specifications and/or not in accordance with the drawings data sheets or the terms of the Contract and rectification is required at site, PURCHASER/ CONSULTANT shall notify the SELLER giving full details of differences. The SELLER shall attend the site within seven (7) days of receipt of such notice to meet and agree with representatives of PURCHASER/ CONSULTANT, the action required to correct the deficiency. Should the SELLER fail to attend meeting at Site within the time specified



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above, PURCHASER/ CONSULTANT shall immediately rectify the work/ materials and SELLER shall reimburse PURCHASER all costs and expenses incurred in connection with such trouble or defect.

- 20.2 PERFORMANCE GUARANTEE OF EQUIPMENT
- 20.2.1 SELLER shall guarantee that the performance of the EQUIPMENT supplied under the CONTRACT shall be strictly in conformity with the specifications and shall perform the duties specified under the CONTRACT.
- 20.2.2 If the SELLER fails to prove the guaranteed performance of the EQUIPMENT set forth in the specification, the SELLER shall investigate the causes and carry out necessary rectifications/modifications to achieve the guaranteed performance. In case the SELLER fails to do so within a reasonable period, the SELLER shall replace the EQUIPMENT and prove guaranteed performance of the new equipment without any extra cost to PURCHASER.
- 20.2.3 If the SELLER fails to prove the guarantee within a reasonable period, PURCHASER/CONSULTANT shall have the option to take over the EQUIPMENT and rectify, if possible, the EQUIPMENT to fulfil the guarantees and/or to make necessary additions to make up the deficiency at Seller's risk and cost. All expenditure incurred bv PURCHASER. the

21. TERMS OF PAYMENT

- 21.1 The method of payment to be made to the SELLER under this CONTRACT shall be specified in the Special Conditions of Contract.
- 21.2 The type(s) of payment to be made to the SELLER under this CONTRACT shall be specified in the Special Conditions of Contract.
- 21.3 The SELLER's request(s) for payment shall be made to the PURCHASER in writing accompanied by an invoice describing, as appropriate, the Goods delivered and services performed, and by shipping documents submitted, and upon fulfilment of other obligations stipulated in the Contract
- 21.4 Payment will be made in the currency or currencies in which the Contract Price has been stated in the SELLER's bid, as well as in other currencies in which the SELLER had indicated in his bid that he intends to incur expenditure in the performance of the Contract and wishes to be paid. If the requirements are stated as a percentage of the bid price along with exchange rates used in such calculations these exchange rates shall be maintained

GENERAL NOTES:

- i) For dispatches on FOT dispatch point (in India) basis, the payment shall be through PURCHASER's bank/ Net Banking i.e. NIFT, RTGS. Payment through Bank, wherever applicable, shall be released as per normal banking procedures.
- ii) Payment shall be released within 30 days after receipt of relevant documents complete in all respects.
- iii) Unless otherwise specifically stated in bid document, all payments shall be made in the currency quoted.





- iii) No interest charges for delay in payments, if any, shall be payable by PURCHASER.
- v) In case of Indian bidder, variation, if any, on account of customs duty on their built-inimport content, as per terms of bid document, shall be claimed separately by bidder after receipt of goods at site (s). However, any price benefits to the PURCHASER, on account of such variation as per terms specified in the bid document, shall be passed on to the PURCHASER along with invoicing itself

22. PRICES

Prices charged by the SELLER for Goods delivered and services performed under the CONTRACT shall not, with the exception of any price adjustments authorized by the Contract vary from the prices quoted by the SELLER in his bid.

23. SUBLETTING & ASSIGNMENT

The contractor shall not without previous consent in writing of the PURCHASER authority, sublet, transfer or assign the contract or any part thereof or interest therein or benefit or advantage thereof in any manner whatsoever. Provided, nevertheless, that any such consent shall not relieve the contractor from any obligation, duty or responsibility under the contract.

24. TIME AS ESSENCE OF CONTRACT

The time and date of delivery/completion of the GOODS/SERVICES as stipulated in the Contract shall be deemed to be the essence of the Contract.

25. DELAYS IN THE SELLER'S PERFORMANCE

- 25.1 If the specified delivery schedule is not adhered to or the progress of manufacture or supply of the items is not satisfactory or is not in accordance with the progress schedule the PURCHASER has the right to:
 - i) hire for period of delay from elsewhere goods which in PURCHASER's opinion will meet the same purpose as the goods which are delayed and SELLER shall be liable without limitation for the hire charges; or
 - ii) Cancel the CONTRACT in whole or in part without liability for cancellation charges. In that event, PURCHASER may procure from elsewhere goods which PURCHASER's opinion would meet the same purpose as the goods for which CONTRACT is cancelled and SELLER shall be liable without limitations for the difference between the cost of such substitution and the price set forth in the CONTRACT for the goods involved; or
 - iii) hire the substitute goods vide (I) above and if the ordered goods continue to remain undelivered thereafter, cancel the order in part or in full vide (ii) above.
- 25.2 Any inexcusable delay by the SELLER or his sub- contractor shall render the SELLER liable, without prejudice to any other terms of the Contract, to any or all of the following sanctions: forfeiture of Contract performance guarantee, imposition of price reduction for delay in delivery and termination of the contract for default.

26. PRICE REDUCTION SCHEDULE

FOR DELAYED DELIVERY





- 26.1 Subject to Article -29, if the SELLER fails to deliver any or all of the GOODS or performance the services within the time period (s) specified in the CONTRACT, the PURCHASER shall, without prejudice to his other remedies under the CONTRACT, deduct from the CONTRACT PRICE, a sum calculated on the basis of the CONTRACT PRICE, including subsequent modifications.
- 26.1.1 Deductions shall apply as per following formula: In case of delay in delivery of equipment/materials or delay in completion, total contract price shall be reduced by ½ % (half percent) of the total contract price per complete week of delay or part thereof subject to a maximum of 5% (five percent) of the total contract price.
- 26.2 In case of delay in delivery on the part of Seller, the invoice/document value shall be reduced proportionately for the delay and payment shall be released accordingly.
- is not reduced proportionately for the delay, the 26.3 event the invoice value In the PURCHASER may deduct the amount so payable by SELLER, from any amount falling due to the SELLER or by recovery against the Performance Guarantee. Both seller and PURCHASER agree that the above percentages of price reduction are genuine pre estimates of the loss/damage which the PURCHASER would have suffered on account of delay/breach on the part of the SELLER and the said amount will be payable on demand without there being any proof of the actual loss/or damage caused by such breach/delay. A decision of the PURCHASER in the matter of applicability of price reduction shall be final and binding.
- 26.4 In a supply contract, the portion of supply completed in all respect which can be used for commercial operation shall not be considered for applying PRS, if delivered within contractual delivery period. The remaining supplies which are completed beyond the contractual delivery shall attract price reduction schedule @1/2 % per week of delay or part thereof of the delayed delivery value maximum upto 5% of the total order value.
- 26.5 The PRS shall be applicable in the same way where individual release order against ARC shall be taken as independent order."
- 26.5 The value referred in PRS Clause is excluding taxes and duties.

27. REJECTIONS, REMOVAL OF REJECTED EQUIPMENT & REPLACEMENT

- 27.1 Preliminary inspection at SELLER's works by INSPECTOR shall not prejudice PURCHASER's/ CONSULTANT's claim for rejection of the EQUIPMENT on final inspection at SITE or claims under warranty provisions.
- 27.2 If the EQUIPMENTS are not of specification or fail to perform specified duties or are otherwise not satisfactory the PURCHASER/CONSULTANT shall be entitled to reject the EQUIPMENT/MATERIAL or part thereof and ask free replacement within reasonable time failing which obtain his requirements from elsewhere at SELLER's cost and risk.
- 27.3 Nothing in this clause shall be deemed to deprive the PURCHASER AND/OR AFFECT ANY rights under the Contract which it may otherwise have in respect of such defects or deficiencies or in any way relieve the SELLER of his obligations under the Contract.
- 27.4 EQUIPMENT rejected by the PURCHASER/ CONSULTANT shall be removed by the Seller at his cost within 14 days of notice after repaying the amounts received against the SUPPLY. The PURCHASER shall in no way be responsible for any deterioration or damage to





the EQUIPMENT under any circumstances whatsoever.

27.5 In case of rejection of EQUIPMENT, PURCHASER shall have the right to recover the amounts, if any, from any of CONTRACTOR'S invoices pending with.

28 TERMINATION OF CONTRACT

- 28.1 Termination for Default
- 28.1.1 The PURCHASER may, without prejudice to any other remedy for breach of CONTRACT, by written notice of default sent to the SELLER, terminate the CONTRACT in whole or in part
 - A) If the SELLER fails to deliver any or all of the GOODS within the time period(s) specified in the CONTRACT; or
 - B) If the SELLER fails to perform any other obligation(s) under the CONTRACT, and
 - C) If the SELLER, in either of the above circumstances, does not cure his failure within a period of 30 days (or such longer period as the PURCHASER may authorize in writing) after receipt of the default notice from the PURCHASER.
- 28.1.2 In the event the PURCHASER terminates the CONTRACT in whole or in part, pursuant to Article 28.1.1, the PURCHASER may procure, upon such terms and in such manner as it deems appropriate, goods similar to those undelivered and the SELLER shall be liable to the PURCHASER for any excess costs for such similar GOODS. However, the SELLER shall continue performance of the CONTRACT to the extent not terminated.
- 28.1.3 In case of termination of CONTRACT herein set forth (under clause 28) except under conditions of Force Majeure and termination after expiry of contract, the VENDOR shall be put under holiday [i.e. neither any enquiry will be issued to the party by AGCL Against any type of tender nor their offer will be considered by AGCL against any on-going tender (s) where contract between AGCL and that particular VENDOR (as a bidder) has not been finalized] for three years from the date of termination by AGCL to such VENDOR.
- 28.2 Termination for Insolvency
- 28.2.1 The PURCHASER, may at any time, terminate the CONTRACT by giving written notice to the SELLER, without compensation to the SELLER, if the SELLER becomes bankrupt or otherwise insolvent, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the PURCHASER.
- 28.3 Termination for Convenience
- 28.3.1 The PURCHASER may, by written notice sent to the SELLER, terminate the CONTRACT, in whole or part, at any time for his convenience. The notice of termination shall specify that termination is for the PURCHASER's convenience, the extent to which performance of work under the CONTRACT is terminated and the date upon which such termination becomes effective.
- 28.3.2 The GOODS that are complete and ready for shipment within 30 days after the SELLER's receipt of notice of termination shall be purchased by the PURCHASER at the CONTRACT terms and prices. For the remaining GOODS, the PURCHASER may opt:
 - a) to have any portion completed and delivered at the CONTRACT terms and prices, and /or





b) to cancel the remainder and pay to the SELLER an agreed amount for partially completed GOODS and for materials and parts previously procured by the SELLER.

29. FORCE MAJEURE

- 29.1 Shall mean and be limited to the following:
 - a) War/hostilities
 - b) Riot or Civil commotion
 - c) Earthquake, flood, tempest, lightening or other natural physical disaster.
 - d) Restrictions imposed by the Government or other statutory bodies which prevents or delays the execution of the Contract by the SELLER.

The SELLER shall advise PURCHASER/ CONSULTANT by a registered letter duly certified by the local Chamber of Commerce or statutory authorities, the beginning and end of the above causes of delay within two (2) days of the occurrence and cessation of such Force Majeure Conditions. In the event of delay lasting over one month, if arising out of causes of Force Majeure, PURCHASER/CONSULTANT reserves the right to cancel the Contract and the provisions governing termination stated under Article 28.0 shall apply.

For delays arising out of Force Majeure, the SELLER shall not claim extension in completion date for a period exceeding the period of delay attributable to the causes of Force Majeure and neither PURCHASER/CONSULTANT nor SELLER shall be liable to pay extra costs provided it is mutually established that Force Majeure Conditions did actually exist.

SELLER shall categorically specify the extent of Force Majeure Conditions prevalent in their works at the time of submitting their bid and whether the same have been taken into consideration or not in their quotations. In the event of any force majeure cause, the SELLER or the PURCHASER shall not be liable for delays in performing their obligations under this order and the delivery dates will be extended to the SELLER without being subject to price reduction for delayed deliveries, as stated elsewhere within seven (7) days of the occurrence and cessation of such Force Majeure Conditions. In the event of delay lasting over one month, if arising out of causes of Force Majeure, PURCHASER/CONSULTANT reserves the right to cancel the Contract and the provisions governing termination stated under Article 28.0 shall apply.

For delays arising out of Force Majeure, the SELLER shall not claim extension in completion date for a period exceeding the period of delay attributable to the causes of Force Majeure and neither PURCHASER/CONSULTANT nor SELLER shall be liable to pay extra costs provided it is mutually established that Force Majeure Conditions did actually exist.

SELLER shall categorically specify the extent of Force Majeure Conditions prevalent in their works at the time of submitting their bid and whether the same have been taken into consideration or not in their quotations. In the event of any force majeure cause, the SELLER or the PURCHASER shall not be liable for delays in performing their obligations under this order and the delivery dates will be extended to the SELLER without being subject to price reduction for delayed deliveries, as stated elsewhere

30. **RESOLUTION OF DISPUTES**

30.1 The PURCHASER and the SELLER shall make every effort to resolve amicably by direct informal negotiations any disagreement or dispute arising between them under or in connection with the contract.





30.2 If, after thirty days from the commencement of such informal negotiations, the PURCHASER and the SELLER have been unable to resolve amicably a Contract dispute, either party may require that the dispute be referred for resolution to the formal mechanism as specified hereunder.

30.3 Legal Construction

The Contract shall be, in all respects be construed and operated as an Indian Contract and in accordance with Indian Laws as in force for the time being and is subject to and referred to the Court of Law situated within Dibrugarh, Assam.

30.4 All disputes arising under this Guarantee shall be referred to a tribunal comprising three (3) arbitrators under the (Indian) Arbitration and Conciliation Act, 1996. Each Party to the arbitration shall appoint one (1) arbitrator and the two (2) arbitrators thus appointed shall choose the third arbitrator who will act as a presiding arbitrator of the tribunal (together forming the "Arbitral Tribunal"). The decision(s) of the Arbitral Tribunal, shall be final and binding on the Parties. The venue of arbitration shall be Dibrugarh, Assam. This Clause shall survive the termination or expiry of this Guarantee. The governing law of the arbitration shall be the substantive laws of India.

31. GOVERNING LANGUAGE

shall The Contract written be English language specified the in as by PURCHASER/CONSULTANT in the Instruction to Bidders. All literature, correspondence and other documents pertaining to the Contract which are exchanged by the parties shall be written in English language. Printed literature in other language shall only be considered, if it is accompanied by an English translation. For the purposes of interpretation, English translation shall govern and be binding on all parties.

32. NOTICES

- 32.1 Any notice given by one party to the other pursuant to the Contract shall be sent in writing or by Email, confirmed in writing.
- 32.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later

33 TAXES & DUTIES

- 33.1 A foreign Seller shall be entirely responsible for all taxes, stamp duties, licence fees, and other such levies imposed outside the PURCHASER's country
- 33.2 A domestic Seller shall be entirely responsible for all taxes, duties, licence fees etc. incurred until the delivery of the contracted goods to the PURCHASER. However applicable GST on finished products shall be reimbursed by PURCHASER.
- 33.3 Customs duty payable in India for imported goods ordered by PURCHASER on foreign Seller shall be borne and paid by PURCHASER
- 33.4 Any income tax payable in respect of supervisory services rendered by foreign Seller under the Contract shall be as per the Indian Income Tax Act and shall be borne by SELLER. It is upto the bidder/seller to ascertain the amount of these taxes and to include them in his bid price

34. BOOKS & RECORDS

SELLER shall maintain adequate books and records in connection with Contract and shall make



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them available for inspection and audit by PURCHASER/ CONSULTANT or their authorized agents or representatives during the terms of Contract until expiry of the performance guarantee. Fixed price (lumpsum or unit price) Contract will not be subject to audit as to cost except for cost reimbursable items, such as escalation and termination claims, transportation and comparable requirements.

35. PERMITS & CERTIFICATES

SELLER shall procure, at his expense, all necessary permits, certificates and licences required by virtue of all applicable laws, regulations, ordinances and other rules in effect at the place where any of the work is to be performed, and SELLER further agrees to hold PURCHASER and/or CONSULTANT harmless from liability or penalty which might be imposed by reason of any asserted or established violation of such laws, regulations, ordinances or other rules. PURCHASER will provide necessary permits for SELLER's personnel to undertake any work in India in connection with Contract.

36. GENERAL

- 36.1 In the event that terms and conditions stipulated in the General Conditions of Contract should deviate from terms and conditions stipulated in the Contract, the latter shall prevail.
- 36.2 Losses due to non-compliance of Instructions Losses or damages occurring to the PURCHASER owing to the SELLER's failure to adhere to any of the instructions given by the PURCHASER/CONSULTANT in connection with the contract execution shall be recoverable from the SELLER.
- 36.3 Recovery of sums due

All costs, damages or expenses which the PURCHASER/CONSULTANT may have paid, for which under the CONTRACT SELLER is liable, may be recovered by the PURCHASER(he is hereby irrevocably authorized to do so) from any money due to or becoming due to the SELLER under this Contract or other Contracts and/or may be recovered by action at law or otherwise. If the same due to the SELLER be not sufficient to recover the recoverable amount, the SELLER shall pay to the PURCHASER, on demand, the balance amount.

- 36.4 Payments, etc. not to affect rights of the PURCHASER No sum paid on account by the PURCHASER nor any extension of the date for completion granted by the PURCHASER/CONSULTANT shall affect or prejudice the rights of the PURCHASER against the SELLER or relieve the SELLER of his obligation for the due fulfilment of the CONTRACT.
- 36.4 Cut-off Dates

No claims or correspondence on this Contract shall be entertained by the PURCHASER/Consultant after 90 days after expiry of the performance guarantee (from the date of final extension, if any).

37. IMPORT LICENSE

No import license is required for the imports covered under this document.

38. FALL CLAUSE

38.1 The price charged for the materials supplied under the order by the supplier shall in no event exceed the lowest price at which the supplier or his agent/principal/dealer, as the case may be,





sells the materials of identical description to any Persons/Organizations including the Purchaser or any Department of the Central Govt. or any Department of a State Govt. Or any Statutory Undertaking of the Central or State Govt. as the case may be, during the currency of the order

38.2 If at any time during the said period, the supplier or his agent/principal/dealer, as the case may be, reduces the sale price, sells or offers to sell such materials to any persons/organizations including the Purchaser or any Department. Of Central Govt. or State Govt. as the case may be, at a price lower than the price chargeable under the order, he shall forthwith notify such reduction or sale or offer of sale to the Purchase Authority who has issued this order and the price payable under the order for the materials supplied after the date of coming into force of such reduction or sale or offer of sale shall stand correspondingly reduced.

The above stipulation will, however, not apply to:

- a) Exports by the Contractor/Supplier or
- b) Sale of goods as original equipment at prices lower than the prices charged for normal replacement
- c) Sale of goods such as drugs which have expiry dates.
- 38.3 The supplier shall furnish the following certificate to the concerned Paying Authority along with each bill for payment for supplies made against this order:-

"I/We certify that there has been no reduction in sale price of the items/goods/materials of description identical to those supplied to the AGCL under the order herein and such items/goods/materials have not been offered/ sold by me/us to any person/organizations including the Purchaser or any Department of Central Govt. or any Department of State Govt. or any Statutory Undertaking of the Central or State Govt. as the case may be upto the date of bill/during the currency of the order whichever is later, at a price lower than the price charged to the AGCL under the order".

Such a certificate shall be obtained, except for quantity of items/goods/materials categories under sub-clause (a), (b) & (c) of sub-Para 38.2 above, of which details shall be furnished by the supplier

39. PUBLICITY & ADVERTISING

39.1 Seller shall not without the written permission of PURCHASER/CONSULTANT make a reference to PURCHASER/CONSULTANT or any Company affiliated with PURCHASER/CONSULTANT or to the destination or the description of goods or services supplied under the contract in any publication, publicity or advertising media.

40. REPEAT ORDER

PURCHASER reserves the right, within 6 months of order to place repeat order up to 50% of the total order value without any change in unit price or other terms and conditions.

41. LIMITATION OF LIABILITY

Notwithstanding anything contrary contained herein, the aggregate total liability of Seller under the Agreement or otherwise shall be limited to 100% of Agreement / Order price. However, neither party shall be liable to the other party for any indirect and consequential damages, loss of profits or loss of production.





SECTION-IV SPECIAL CONDITIONS OF CONTRACT (SCC)





SPECIAL CONDITIONS OF THE CONTRACT (SCC)

The following Special Conditions of Contract shall supplement the General Conditions of Contract. Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions of the Contract. The corresponding clause number of the GCC is indicated in parentheses.

1.0 **DEFINITIONS**

GCC 1.1(m): The Purchaser is: **Assam Gas Company Limited** (AGCL) as (P.O. Duliajan, Dist. Dibrugarh, Assam-786602)

GCC 1.1(c): The Consultant is: VCS Quality Services Pvt ltd

FOT shall mean sum of Ex-works price including packing and forwarding, GST, Transit appl, transportation and unloading at AGCL designated site/ store.

2.0 INSPECTIONS AND TESTS

Inspection and tests prior to shipment of Goods and at final acceptance shall be as per Technical Specifications, Quality Control Table and approved Inspection & Test Procedure. However, without prejudice to the provisions of Technical specifications following shall hold good:

- 2.1 The Purchaser or its representative shall have the right to inspect and/ or to test the material to confirm their conformity to the specifications.
- 2.2 The inspections and tests may be conducted on the premises of the Seller or his subcontractor (s) at point of Delivery and/or at the final destination. When conducted on the premises of the Seller or his subcontractor(s), all reasonable facilities and assistance including access to the production data shall be furnished to the Purchaser's representatives at no charge to the Purchaser.
- 2.3 The Purchaser's right to inspect, test and where ever necessary reject the material after the material's arrival in the Purchaser's country shall in no way be limited to or waived by reason of the material having previously been inspected, tested and passed by the Purchaser or their representative prior to the material shipment from the country of origin.

3.0 PRICE REDUCTION SCHEDULE (PRS)

- 3.1 In case the Supplier / Contractor fails to deliver any or all the goods to perform the services within the contractual delivery period(s) specified in the agreement for the reasons not solely attributable to the Purchaser and / or subject to the provisions of Force Majeure (Clause of GCC of tender document), the Purchaser shall, without prejudice to its other remedies under the agreement, deduct a sum @ ½ % (Half Per Cent) of the value of the undelivered portion per week for delay in supply of material subject to a maximum ceiling of 5% of total order value. The amount to be deducted shall be worked out on the basis of scheduled quantity as defined in the delivery terms at Clause of IFB (DELIVERY TERMS AND DURATION OF THE CONTRACT).
- 3.2 In this supply contract, the portion of supply completed in all respect which can be used for commercial operation shall not be considered for applying PRS, if delivered within contractual delivery period. The remaining supplies which are completed beyond the contractual delivery





shall attract price reduction schedule $@\frac{1}{2}$ % per week of delay or part thereof of the delayed delivery value maximum upto 5% of the total order value.

3.3 All sums payable by way of compensation shall be considered as reasonable compensation without reference to the actual loss or damage which shall have been sustained.

4.0 PACKING

- 4.1 Vessels, unless provided with their own steel saddles for entire protection, shall be provided with suitable wooden/steel saddles with steel ties and tension rods. The minimum height of the saddle shall correspond to the maximum projected length of the connected attachments, plus an additional clearance of 45mm. Saddles spacing shall depend on the length of the equipment.
- 4.2 Large diameter equipment shall be provided with adequate number of supports to prevent ovalisation effect while being handled. These supports shall not be removed until the equipment's are placed in position at job site.
- 4.3 All connections/protrusions shall be suitably protected. Flanges shall be provided with bolts on metal covers (minimum 5 mm thk.) using at least four bolts. (Wiring on covers is not acceptable). For ocean shipment, flanged openings shall be additionally covered with heavy plastic bags taped to nozzle. All tell-tale holes shall be plugged with hard grease before dispatch. Tapped orifices shall have threaded plugs.

5.0 DELIVERY AND DOCUMENTS

Bidder to note that delivery shall be done at **AGCL store at Uriumghat** as per SOR.

Upon delivery of the Goods to the transporters/ carriers, the Supplier shall notify the Purchaser/ Consultant and fax/ mail the following documents to the Purchaser/ Consultant:

- (a) LR or GR
- (b) Packing List showing weight and dimension of each package
- (c) Manufacturer's factory inspection complying the technical specification as per tender
- (d) Inspection release note issued by Purchaser/ Consultant/ TPIA
- (e) Cargo Insurance
- (f) Dispatch clearance issued by Purchaser/ Consultant
- (g) Likely date of arrival.
- (h) Invoice

The above documents shall be received by the Purchaser before arrival of the Goods and, if not received, the Supplier will be responsible for any consequent expenses.

Final original documents for release of payment shall be submitted at AGCL Duliajan Office and transport copy shall be submitted at the time of delivery at AGCL designated store.

6.0 SHIPMENT

- 6.1 The Bidder shall make shipment only after obtaining despatch clearance from Purchaser. For getting despatch clearance, bidder has to submit inspection release note issued by Third Party Inspection agency/ Purchaser's authorized representative to the Purchaser.
- 6.2 The bidder shall provide details of adequate coverage of transit insurance along with despatch



SPECIAL CONDITIONS OF

CONTRACT (SCC)



documents.

7.0 PAYMENT TERMS

- **7.1** 60% against successful Factory Acceptance Testing (FAT), receipt and acceptance at site, submission of invoice in triplicate, indemnity bond of the contract value and following documents:
 - a. LR or GR (original)
 - b. Packing List.
 - c. Inspection release note by Purchaser/Consultant.
 - d. Dispatch instructions/clearance by purchaser/consultant.
 - e. Proof of customs clearance including payment of customs duty for imports permitted in the Contract.
 - f. Receipt and acceptance of all material designated store at site on submission of Goods Receipt Voucher (GRV) & Certificate for receipt of all Goods as per PO issued by Purchaser/Consultant/ Engineer – in - Charge (EIC) at site. (The material shall be checked as per the packing list of the vendor without opening of the boxes for physical verification (must be verified jointly by Purchaser/Consultant during FAT and recorded). Physical verification will be done during erection of the material along with the representatives of Purchaser/Consultant/ Engineer – in -Charge (EIC)).
 - g. Client Site Visit
- 7.2 20% value shall be paid pro-rata on completion of Erection at individual station and on submission Certification for completion of Erection, issued by Purchaser/ Engineer In -Charge / representative at site. If, erection is not started within 90 days after supply due to non-availability of site, payment against erection shall be released to the successful bidder against receipt of bank guarantee of the equivalent amount to initially remain valid for a period of 1 year after completion of 90 days; i.e; 15 months from the date of FOT site (actual) & shall be extended further, if required.
- **7.3** 10% value shall be paid on successful Site Acceptance Testing, Trial run, overall commissioning and on submission of Certification for completion of successful SAT, Trial, overall commissioning issued by Engineer in -Charge / representative at site. In case the commissioning cannot be completed within 90 days after "Overall Completion of Erection (As per Certification of EIC)" due to non-availability of site, payment against commissioning shall be released to the successful bidder against receipt of bank guarantee of the equivalent amount to initially remain valid for a period of 1 year after completion of 90 days; i.e; 15 months from the date of "Overall Completion of Erection (As per Certification of EIC)" & shall be extended further, if required.
- 7.4 10% of supply value on completion of all works including final acceptance, Handing over and submission of Certification for completion of all works including final acceptance, All documents as specified in tender document; Submission of "As built drawing/ documents" and handing over issued by Purchaser/Consultant/ / Engineer In -Charge (EIC) / representative at site. In case the final acceptance cannot be completed within 90 days after "Overall Commissioning (As per Certification of EIC)" due to non-availability of site, the payment against Final Acceptance shall be released to the successful bidder against receipt of bank guarantee of the equivalent amount to initially remain valid for a period of 1 year after completion of 90 days; i.e; 15 months from the date of "Overall Commissioning (As per Certification of EIC)" & shall be extended further, if required.





8.0 MODE OF PAYMENT

- 8.1 Payment shall be released within a period of thirty (30) days of receipt of invoices with all relevant / supporting documents, by AGCL through cheque/ RTGS.
- 8.2 The Bidder's request (s) for payment shall be made to the Purchaser in writing, accompanied by an invoice describing, as appropriate, the Goods delivered, and by documents submitted, and upon fulfilment of other obligations stipulated in the Agreement.
- 8.3 Any payment which in reasonable opinion of the Purchaser is not payable and/or not due and accordingly informed to the Bidder shall be considered as disputed payment and such payment or part thereof shall be released as per GCC on satisfactory resolution of dispute.
- 8.4 Any release of payment by the Purchaser to Bidder shall not relieve the latter from any of its obligations, whatsoever

9.0 WARRANTY PERIOD

9.1 Warranty period shall be 12 months after the Goods, or any portion thereof as the case may be, have been put into operation or 18 months from the date of delivery as per delivery terms (FOT Site) for the last supply of particular lot whichever is earlier.

10.0 CONTRACT PERFORMANCE BANK GUARANTEE

- 10.1 The successful bidder shall furnish to the purchaser the Contract Performance Bank Guarantee (CPBG) equivalent to 10% of the total order value (total order value will be cost of supply of material including charges for storage yard but excluding taxes and duties) within a period of twenty-one (21) Days from the date of issue of Purchase Order. The CPBG should initially be kept valid for 90 days beyond the guarantee / warranty period.
- 10.2 All bank guarantees will also have 30 days claim period beyond expiry date.
- 10.3 The proceeds of the Contract-Cum-Equipment Performance Bank Guarantee shall be payable to the Purchaser as compensation for any loss or damage resulting from the Supplier's failure to complete its obligations under the Agreement.
- 10.4 The Contract-Cum-Equipment Performance Bank Guarantee shall be denominated in the currency of the Contract/ Letter of award.
- 10.5 A bank guarantee issued by a nationalized bank or a scheduled Indian bank or by the branch of a reputable international bank located in India and registered with RBI.
- 10.6 The Contract Performance Guarantee will be discharged by the Owner and returned to the Supplier not later than thirty (30) days following the date of completion of all the Supplier's performance obligations under the Contract, including any warranty obligations.

11.0 AGCL BANKING DETAILS REQUIRED FOR CPBG

AGCL Banking Details Required For CPBG		
BANK NAME	STATE BANK OF INDIA	
ACCOUNT NAME	ASSAM GAS COMPANY LIMITED	





Account No.	10494832011
IFSC Code	SBIN0002053
MICR Code	786002302

12.0 ORDER OF PRECEDENCE

In case of an irreconcilable conflict between Indian or other applicable standards, General Conditions of Contract, Special Conditions of Contract, Specifications, Drawings or Schedule of Rates, the following shall prevail to the extent of such irreconcilable conflict in order of precedence:

- i. Contract Agreement
- ii. Detailed Letter of Acceptance along with Statement of Agreed Variations.
- iii. Fax / Letter of Intent / Fax of Acceptance.
- iv. Schedule of Rates as enclosures to Letter of Acceptance.
- v. Job / Particular Specifications.
- vi. Drawings
- vii. Technical / Material Specifications.
- viii. Special Conditions of Contract.
- ix. Instruction to Bidders
- x. General Conditions of Contract.
- xi. Indian Standards
- xii. Other applicable Standards





SECTION-V FORMS & FORMATS



FORMS & FORMATS



FORM F-1

BIDDER'S GENERAL INFORMATION

1.1	Bidder Name	
1.2	Name of Contact Person & Mobile No.	
1.3	Numbers of Years in Operation	
1.4	Address of Registered Office	
1.5	Operation Address (If different from above)	
1.6	Telephone Number	
1.7	Mobile Numbers, if any	
1.8	E-mail address	
1.9	Website	
1.10	Fax Number	
1.11	ISO Certifications, if any (If yes, please furnish details)	
1.12	Bid Currency	
1.13	Port of shipment	
1.14	Whether Supplier / Manufacture / Dealer / Trader / Service provider	
1.15	Type of Material Supplies	
1.16	Nature of firm Partnership firm/Prop firm / LLP/	
	Private limited /Public Ltd/Others	
1.17	If others please specify	
1.18	Details of Directors/ Proprietors / Partners	(Kindly attach separate sneets giving details for name of directors / proprietors and their stakes along with the supporting documents)
1.19	Bankers' Name	
1.20	Branch	
1.21	Branch Code	
1.22	Bank account numbers	
1.23	PAN No.	
1.24	TIN No.	
1.25	Whether MSE Registrant or not	
1.26	GSTN Registration no	





FORM F-2

DELETED



FORMS & FORMATS



FORM F-3

POWER OF ATTORNEY

(To be submitted on the letter-head of company)

Tender No.: _____

Tender Description:

Name of Bidder:_____

"The undersigned _______(Name of LEGAL PERSON*) is lawfully authorized to represent and act on behalf of the company M/s______(Name of bidder) whose registered address is ______and does hereby appoint Mr./Ms______ [name of authorized person/(s)] ______ (Designation) of M/s ______ (Name of bidder) whose signature appears below to be the true and lawful attorney/(s) and authorize him/her to sign the bid (both digitally and manually)and all subsequent communications, agreements, documents etc., in the name and on behalf of the company in connection with the tender no. ______ for ______ (Name of work).

The Signature of the authorized person/(s) herein constitutes unconditional obligations of M/s _____ (Name of bidder)

This Power of Attorney shall remain valid and in full force and effect before we withdrawal it in writing (by fax, or mail or post). All the documents signed (within the period of validity of the Power of Attorney) by the authorized person/(s) herein shall not be invalid because of such withdrawal.

SIGNATURE OF THE LEGAL PERSON

(Name of person with Company seal)

SIGNATURE OF THE AUTHORIZED PERSON/(S)

(Name of person)

E-mail id:

Digital token no. used for uploading the bid:

(*)In case of a Single Bidder, Power of Attorney issued by the Board of Directors/ CEO / MD / Company Secretary of the Bidder/ all partners in case of Partnership firm/Proprietor (for Proprietorship firm) in favour of the authorized employee(s) of the Bidder, in respect of the particular tender for signing the Bid and all subsequent communications, agreements, documents etc. pertaining to the tender and to act and take any and all decision on behalf of the Bidder, is to be submitted.





FORM F – 4 A

ANNUAL TURNOVER

Bidder must fill in this form

Annual Turnover data for the last 3 financial years:

Year		Amount (in INR)
Year 1:	2021-22	
Year 2:	2020-21	
Year 3:	2019-20	

- 1. The information supplied should be the Annual Turnover of the bidder
- 2. A brief note should be appended describing thereby details of turnover as per audited results.

SEAL AND SIGNATURE OF THE BIDDER





FORM F – 4 B

FINANCIAL STATUS

Bidder must fill this form

FINANCIAL DATA FOR LAST AUDITED FINANCIAL YEAR

Description	For the year of 2021-22
	Amount
	(in INR)
1. Current assets	
2. Current Liabilities	
3. Working Capital (Current	
Assets-Current liabilities)	
4. Net Worth	
Owners funds (Paid up share	
capital and Free Reserves &	
Surplus) (NW)	

- Attached are copies of the audited balance sheets, including all related notes and income statement for the last Audited Financial year, indicated above, complying with the following conditions;
- All such documents reflect the financial situation of the bidder
- Historic financial statements must be audited by a certified accountant.
- Historic financial statements must be complete, including all notes to the financial statements.
- Historic financial statements must correspond to accounting periods already completed and audited (no statement for partial periods shall be requested or accepted)

SEAL AND SIGNATURE OF BIDDER







FORM F – 5 FORMAT FOR CERTIFICATE FROM BANKIF BIDDER'S WORKING CAPITAL IS INADEQUATE

(To be provided on Bank's Letter Head)

To,

M/s. Assam Gas Company Limited P.O. Duliajan, Dist. Dibrugarh, Assam-786602

Dear Sir,

This is to certify that M/s (Name of the bidder with address) (hereinafter referred to as Customer) is an existing customer of our Bank.

The Customer has informed that they wish to bid for AGCL's RFQ/Tender no.______ dated _______for ______(Name of the supply/work/services/consultancy) and as per the terms of the said RFQ/Tender they have to furnish a certificate from their Bank confirming the availability of line of credit.

Accordingly, M/s______ (name of the Bank with address) confirms availability of line of credit to M/s ______ (name of the bidder) for at least an amount of Rs._____.

It is also confirmed that the net worth of the Bank is more than Rs. 100 Crores (or Equivalent USD) and the undersigned is authorized to issue this certificate.

Yours truly for (Name & address of Bank)

(Authorized signatory) Name of the signatory : Designation : Stamp





FORM F-6

CHECK LIST FOR AGREED TERMS AND CONDITIONS

S. NO.	DESCRIPTION	BIDDER'S CONFIRMATION	
1	Price Basis	Firm & Fixed	
2	Complete Scope of work as defined in the Bid documents	Accepted	
3	Confirmation of acceptance of bid document in Toto	Included	
4	Prices include all Taxes, duties, levies, fees, insurance, etc.	Included	
5	Contract Validity (As per Bid document)	Included	
6	Price Reduction Schedule as per Bid document	Accepted	
7	Terms of Payments (As per Bid document)	Accepted	
8	Performance Bank Guarantee to be submitted in fifteen (15) days	Accepted	
9	General /Special/ Technical terms & Conditions of Bid	Accepted	
10	Validity of bid & bid security	Accepted	
	Tender Processing Fees amount submitted		
	Details of Tender Processing Fee:	Ves	
11	Online Payment Receipt	163	
	Dtdfor		
	EMD of requisite amount submitted :		
40	Details of EMD:	Vos	
12	Online Payment Receipt		
	Dtdfor		
13	Price Quoted as per SOR.	Yes	
14	Deviation / exception Form 7	Yes	
15	Guarantee/ Warranty/ Defect Liability Period	Accepted	
16	GST @% as applicable	Included	
17	Split of Qty.	Not Applicable	
18	Place of Works/ Godown for dispatch		

Name of the Bidder

:

Signature



:

:



Name

Designation

Date

seal:





FORM F-7 DEVIATION FORM (On Bidder's letter head)

To, M/s. Assam Gas Company Limited P.O. Duliajan, Dist. Dibrugarh, Assam-786602

Notes

- 1) BIDDER may give here a consolidated list of deviations / clarifications / comments for all sections of the bid documents which for an appropriate offer are considered unavoidable by him.
- 2) Deviations / clarifications mentioned elsewhere in the offer shall not be binding on the AGCL and any such deviations if indicated elsewhere other than this form will render the offer non-responsive and shall liable to be rejected.
- 3) BIDDER shall state the reason for the deviations in the remark column.
- 4) Only the deviations listed herein, in conjunction with the original Tender shall constitute the contract document for the award of the job of the BIDDER.

Sec No./ Cls. No.	Page No.	Requiremen ts as per tender	Deviation by Bidder	Clarification / Comments by Bidder	Remarks

The bidder confirms that all clauses of the tender document, which are not listed above are fully complied by the bidder.

(Signature of the bidder)





FORM F – 8

DECLARATION (on Bidder's letter head)

To, M/s. Assam Gas Company Limited P.O. Duliajan, Dist. Dibrugarh, Assam-786602

We confirm that we are not under any liquidation, court receivership or similar proceedings.

We also confirm that we have not been banned or delisted by any Indian Government organisation or its undertaking from quoting.

SEAL AND SIGNATURE OF BIDDER



FORMS & FORMATS



FORM F- 9 PROFORMA FOR LETTER OF AUTHORITY			
Ref. No.		Date:	
To, M/s. Assam Gas Comp P.O. Duliajan, Dist. Dib Assam-786602	any Limited rugarh,		
Sub: Bidding Docum	ent for		
We representative (s) to Document:	attend the Un-priced Bid o	hereby authorise following bening and Priced Bid opening against above Bidding	
1. Name & Desigr	ation	Signature	
2. Name & Desigr	ation	Signature	
We confirm that we sl	nall be bound by all and wh	atsoever our representative(s) shall commit.	
Yours faithfully,			
Signature			
Name & Designation			
For and on behalf of			
Note: This letter of a person competent an	uthority should be on the d having the power of attorr	letterhead of the bidder and should be signed by a ney to bind the bidder.	

SEAL OF THE COMPANY




FORM F-10

DETAILS OF LITIGATION (ON BIDDER'S LETTER HEAD)

Bidder shall furnish details of litigation cases of the bidder during the last 5 years if any, in this Form.





FORM F - 11	
(COVERING LETTER ON LETTER	HEAD)
To,	Date:
Subject: Certificate regarding	
Dear Sir,	
We(name of the Statutory Statutory Auditor/Chartered Accountant of M/s the bidder).	Auditor/Chartered Accountant) are the (name of
We hereby confirm that we have issued following certificate:	
1.	
2.	
3.	
Thanking You,	
Place:	(Signature)
Date:	Name of Authorised Signatory
	Membership No.
Encl.: As above	
Note:	
Submission of this form is Mandatory for all the bidders.	





FORM F-12

FORMAT FOR STATUTORY AUDITOR'S/ CHARTERED ACCOUNTANT

CERTIFICATE FOR FINANCIAL CAPABILITY OF THE BIDDER

(For supply of Goods/Works/Services)

We have verified the Annual Accounts and other relevant records of M/s..... (Name of the bidder) and certify the following

A. ANNUAL TURNOVER OF LAST 3 YEARS:

Year	Amount
Year 1: 2021-22	
Year 2: 2020-21	
Tear 3: 2019-20	

B. FINANCIAL DATA FOR LAST AUDITED FINANCIAL YEAR:

Description	Year: 2021-22
	Amount (Currency)
1. Currency Assets	
2. Current liabilities	
3. Working capital (Current assets-current liabilities)	
4. Net worth (Paid up share capital and free reserves & surplus)	

Name of Audit Firm:

Chartered Accountant

Date:

[Signature of Authorized signatory]

Name:

Designation:

Seal:

Membership no.





Instructions:

- 1. The financial year would be the same as one normally followed by the bidder for its Annual Report.
- 2. The bidder shall provide the audited annual financial statements as required for this Tender Document. Failure to do so would result in the personnel being considered as non-responsive.
- 3. For the purpose of this Tender document (i) Annual Turnover shall be "Sale value/Operating Income" (ii) Working capital shall be "Current Assets less Current Liabilities" and (iii) Net Worth shall be "Paid up share capital and Free reserves & Surplus"





FORM F-13

FORMAT FOR CERTIFICATE FROM STATUTORY AUDITOR FOR DETAILS OF SIMILAR GOODS/ WORK/ SERVICES SUPPLIED/ DONE DURING PAST 5 YEARS

Sr. no.	Description of the goods/ works/ services	LOA/ PO/ WO no. & date	Full proposal, address & phone nos. of client Name, designation & address of engineer/offic er-in- charge(for cases other than purchase)	Value of Contract/ Order (Specify Currency amount)	Date of Comm encem ent of work/s ervices or supply of goods	Schedule d completi on time(mo nths) delivery schedul e	Date of actual complet ion/ supply	Reasons for delay in execution , if any	Proje ct cost
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

Place:

[Sign. Of authorized signatory of bidder]

Date:

Name:

Designation:

Instructions:

- 1. Copies of letter of awards/order/work orders and completion certificate (in case of works/services) or IRN/Proof of delivery (in case of supplies, if applicable) to be enclosed.
- 2. The supply/work/services completed earlier than 5 years need not be indicated here.
- 3. The list of supply/ work/ services not of similar nature need not be indicated here. Failing to comply aforementioned instructions may lead to rejection of bid.
- 4. Bidders are expected to provide details in respect of each order in this Annex. The orders cited must comply with the bid evaluation criteria specified in Tender Document Details provided in this section is intended to serve as a backup for information provided in Offer/Quotation. Bidder should also refer to the instructions below.
- 5. A separate sheet should be filled for each LOA/work order/ purchase order.
- 6. Certificate from the bidder's statutory auditors must be furnished in the format below for LOA/Work Order/Purchase Order mentioned above (separately for each orders)
- 7. It may be noted that in the absence above certificates, the details would be considered inadequate and could lead to the bid being considered ineligible for further evaluation.





Certificate from the Statutory Auditor regarding Supply of Goods/Works/Services

Based on its books of accounts and other published information authenticated by it, {this is to certify that
LOA/PO/WO nodateddatedwas awarded to
(name of the bidder) by(name of the bidder) by
execute((name of the supply/work/service). The Supply/ works/services commenced on
(date) was/is likely to be completed on(date, if any). It is certified that
the total value of contract/order executed by
wasand executed value
was(specify currency & amount).
Name of Audit Firm:
[Signature of authorized

signatory] Chartered Accountant:

Date:

Name: Designation: Seal: Membership no.:





FORM F-14

DECLARATION ON TENDER DOCUMENT PURCHASED / DOWNLOADED (on Bidder's letter head)

Ref. No.

Date:

To, M/s. Assam Gas Company Limited P.O. Duliajan, Dist. Dibrugarh, Assam-786602

Sub: - Bid Document no AGCL/BD/PMC-GHT/F&G/2020/158 for Supply of Fire & Gas Systems (Volume I & II) Corrigendum(s) & Reply to bidder's queries etc.

Sir,

We hereby confirm that we have read each page of the subject tender document along with Corrigendum & Reply to bidder's queries thoroughly and understood the complete Scope of Work and other terms & conditions. We hereby also confirm that tender terms & conditions are acceptable to us and any deviation other than mentioned in deviation form is not to be taken into account.

Yours faithfully,

Signature Name & Designation For and on behalf of





FORM F-15

FORMAT FOR SUPPLY RECORDS OF GOODS FOR MEETING BEC

Sr. no.	Purchase Order no.	Purchaser Name	Ordered Quantity	Supplied Quantity	IRN no./ DCN/ Taxable Invoice	Sr. No. of
					no.	pages
(1)	(2)	(3)	(4)	(5)	(6)	(7)
						· · /

Bidder shall submit this form along with relevant document with proper numbering.





ASSAM GAS COMPANY LIMITED

(A GOVT. OF ASSAM UNDERTAKING) Tender No: AGCL/BD/PMC-GHT/F&G/2020/158 Dated: 15.11.2022

FORM F-16 (Proforma for Performance Guarantee - Unconditional)

[on stamp paper of appropriate value] [from a scheduled bank]

Date: Loan / Credit No: IFB No: [Name of Contract] To: [Name and address of Purchaser]

Subject : Bank Guarantee No. [insert]

WHEREAS, [insert] a company incorporated under [insert] having its registered office at [insert] and a company incorporated under [insert] having its registered office at [insert] and a company incorporated under [insert] having its registered office at [insert] (collectively hereinafter referred to as the "Supplier/ Contractor" which expression shall unless repugnant to the context or meaning thereof include its successors and permitted assigns) have entered into a Contract for______ for

[insert description of the Project]at [insert location State of Assam, India], dated [insert] (hereinafter such agreement,

as amended modified or supplemented, referred to as the "Contract") with AGCL a company duly incorporated and existing under the laws of India having its registered office at Duliajan (hereinafter referred to as the "Purchaser" which expression shall unless repugnant to the context or meaning thereof include its successors and assigns).

WHEREAS, it has been stipulated under Clause 6.4 of IFB of the General Conditions of Contract that the Supplier/ Contractor is obliged to furnish to AGCL an irrevocable, unconditional, first demand bank guarantee issued by specified financial institutions acceptable to AGCL, for a sum equal to 10% (ten percent) of the Order Value/Contract Value for the due performance by the Supplier/ Contractor of the Contract. AND WHEREAS, [insert] having its registered office at [insert] and a branch office at [insert name of city in India] India, hereinafter referred to as the "Bank" (which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors), being a schedule bank in India and acceptable to AGCL, has at the request of the Supplier/ Contractor agreed to issue this performance bank guarantee in favour of AGCL.

NOW THEREFORE THIS BANK GUARANTEE WITNESSETH AS FOLLOWS:

1) The Bank hereby undertakes the pecuniary responsibility of the Supplier/ Contractor to AGCL for the due performance of the Contract and for the payment of any money by the Supplier/ Contractor to AGCL and hereby issues in favour of AGCL this irrevocable and unconditional performance and payment bank guarantee (hereinafter referred to as the "Guarantee") on behalf of the Supplier/ Contractor in the amount of Indian Rupees / USD [insert] (insert an amount equal to Ten percent (10%) of the Order Value/Contract Value) (hereinafter referred to as the "Guarantee Amount".]

2) The Bank for the purpose hereof unconditionally and irrevocably undertakes to pay to AGCL without any demur, reservation, cavil, protest or recourse; immediately on receipt of first written demand from AGCL, any sum or sums (by way of one or more claims) not exceeding in the aggregate the amount of Indian Rupees /USD[insert] (insert an amount equal to Ten percent (10%) of the Order Value/Contract Value) without AGCL needing to prove or to show to the Bank grounds or reasons for such demand for the sum specified therein and notwithstanding any dispute or

difference between AGCL and the Supplier/ Contractor in respect of the performance of the Contract or moneys payable by Supplier/ Contractor to AGCL or any matter whatsoever related thereto.





3) The Bank acknowledges that any such demand by AGCL of the amounts payable by the Bank to AGCL shall be final, binding and conclusive evidence in respect of the amounts payable by the Supplier/ Contractor to AGCL.

4) The Bank hereby waives the necessity for AGCL from demanding the aforesaid amount or any part thereof from the Supplier/ Contractor and also waives any right that the Bank may have of first requiring AGCL to pursue its legal remedies against the Supplier/ Contractor, before presenting any written demand to the Bank for payment under this Guarantee.

5) The Bank further unconditionally agrees with AGCL that AGCL shall be at liberty, without the Bank's consent and without affecting in any manner the Bank's obligation under this Guarantee, from time to time, to:

(i) vary and/or modify any of the terms and conditions of the Contract,

(ii) extend and/or postpone the time for performance of the obligations of the Supplier/ Contractor under the Contract, or

(iii) forbear or enforce any of the rights exercisable by AGCL against the Supplier/ Contractor under the terms and conditions of the Contract

and the Bank shall not be relieved from its liability by reason of any such act or omission on the part of AGCL or any indulgence by AGCL to the Supplier/ Contractor or other thing whatsoever which under the law relating to sureties would, but for this provision, have the effect of relieving the Bank of its obligations under this Guarantee.

6) The Bank's obligations under this Guarantee shall not be reduced by reason of any partial performance of the Contract. The Bank's obligations shall not be reduced by any failure by Purchaser to timely pay or perform any of its obligations under the Contract.

7) Any payment made hereunder shall be made free and clear of and without deduction for, or on account of, any present or future taxes, levies, imposts, duties, charges, fees, commissions, deductions or withholdings of any nature whatsoever and by whomever imposed; and where any withholding on a payment is required by law, the Bank shall comply with such withholding obligations and shall pay such additional amount in respect of such payment such that Purchaser receives the full amount due hereunder as if no such withholding had occurred.

8) This Guarantee shall be a continuing bank guarantee and shall not be discharged by the change in constitution of any member of the Supplier/ Contractor and the Guarantee shall not be affected or discharged by the liquidation, winding up, bankruptcy, reorganization, dissolution or insolvency of any member of the Supplier/ Contractor or any other circumstances whatsoever.

9) This Guarantee shall be in addition to and not in substitution or in derogation of any other security held by AGCL to secure the performance of the obligations of the Supplier/ Contractor under the Contract.

10) The Bank agrees that AGCL at its option shall be entitled to enforce this Guarantee against the surety, as a principal debtor in the first instance without proceeding at the first instance against the Supplier/ Contractor.

11) Without prejudice to any continuing liability to perform obligations under this Guarantee which have arisen prior thereto, the Bank shall be released from any further obligations arising hereunder after [insert] (insert the date as per clause 16).

12) AGCL may assign this Guarantee to any person and in such case AGCL shall inform the Bank in writing. This Guarantee shall not be assigned or transferred by the Bank.

13) All disputes arising under this Guarantee shall be referred to a tribunal comprising three (3) arbitrators under the (Indian) Arbitration and Conciliation Act, 1996. Each Party to the arbitration shall appoint one (1) arbitrator and the two (2) arbitrators thus appointed shall choose the third arbitrator who will act as a presiding arbitrator of the tribunal (together forming the "Arbitral Tribunal"). The decision(s) of the Arbitral Tribunal, shall be final and





binding on the Parties. The venue of arbitration shall be Dibrugarh, Assam. This Clause 13 shall survive the termination or expiry of this Guarantee. The governing law of the arbitration shall be the substantive laws of India.

14) This Guarantee shall be construed and interpreted in accordance with and governed by the laws of India, and subject to Clause (13) above the courts at [Dibrugarh] shall have jurisdiction over all matters arising out of or relating to this Guarantee.

15) The Bank has the power to issue this Guarantee in favour of AGCL. The aggregate liability of the Bank under this Guarantee shall not under any circumstance exceed Indian Rupees/ USD [insert] (insert an amount equal to ten percent (10%) of the Order Value/Contract Value).

16) Notwithstanding anything contained herein, this Guarantee shall be valid up to ninety (90) days from the date of completion of guarantee/warrantee period or including any extensions thereof, written notice of which shall be provided to the Bank, whichever occurs later. Any claim under this Guarantee must be received by us before the expiry of the validity period of this Bank Guarantee. If no such claim has been received by us by the said date, the rights of

Owner under this guarantee will cease. However, if such a claim has been received by us by the said date. All the rights of AGCL under this guarantee shall be valid and shall not cease until we have satisfied that claim.

17) No action, event or condition which by any Applicable Law should operate to discharge the Bank from liability hereunder shall have any effect and the Bank hereby waives any right it may have to apply such law, so that in all respects its liability hereunder shall be irrevocable and, except as stated herein, unconditional in all respects.

18) Capitalized terms not otherwise defined herein shall have their respective meanings given such terms set forth in the Contract.

IN WITNESS WHEREOF the Bank, through its authorized officer, has set its hand and stamp on this [insert] day of [insert] 2006.

(Signature)

[insert name of signatory] [insert designation of signatory] (Duly Authorized representative) Vide power of attorney No. [insert] Dated [insert] Witness [insert] [insert]

Note: Validity of bank guarantee shall be, delivery period + 12 months' warrantee period + 90 days





SECTION – VI SCHEDULE OF RATES (SOR)



NAMBOR – GOLAGHAT– NUMALIGARH AREA GAS PIPELINE PROJECT

BID DOCUMENT FOR PROCUREMENT OF FIRE AND GAS SYSTEMS

OPEN DOMESTIC COMPETITIVE BIDDING

Bid Document No.: AGCL/BD/PMC-GHT/F&G/2020/158

DTD. 16/11/2022

PMC DOC No.: 1009-VCS-AGCL-TENDER-001

Rev - D1

Volume II of II: Technical

Prepared and Issued by



PREPARED AND ISSUED BY VCS QUALITY SERVICES PVT. LTD.

Noida, India



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01



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	Nambor – Golaghat - Numaligarh Area Gas Pipeline Project.
OWNER	Assam Gas Company Ltd. (AGCL)
CONTRACTOR	VCS Quality Services Private Limited 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

Assam Gas Company Ltd. (AGCL) (hereinafter called as Owner/AGCL), is an ISO9001: 2008 certified, 56 years old Natural Gas transmission and distribution company, wholly owned by the Govt. of Assam with its registered office at Duliajan, Dist.: Dibrugarh, Assam 786 602. The company transports Natural Gas through its integrated pipeline infrastructure to several market segments i.e. Power, Fertilizer, petrochemicals, Industrial, Commercial and Domestic consumers primarily located in upper Assam. The present infrastructure of the company has a transportation capacity of about 6.0 MMSCM of gas per day.

At present, AGCL is collecting and transporting Natural Gas from the gas fields of ONGCL in Khoraghat region of Golaghat District bordering Nagaland through its 8" x 12 km and 4" NB x 47 km Khoraghat - Uriumghat – Golaghat gas pipeline and distributing the same to the consumers of Golaghat / Jorhat districts of Assam through its network of established pipeline infrastructure. Presently, the company has been allotted additional Natural Gas from the above mentioned region that needs to be gainfully utilized in and around Golaghat and other districts of upper Assam.

AGCL has appointed "VCS Quality Services" as a consultant for carrying out the detail engineering and project management works for laying of the pipeline along with associated facilities from Nambor – Khoraghat - Numaligarh for catering the requirement of natural gas.

2.1 Purpose of the Document

The purpose of this document is to define the minimum technical requirements and Seller's scope of work / supply of GDS (Gas detector system), Gas detectors and devices to be purchased for this project.



Material	Rea	uisition	for	F&G	System
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2.2 **PROJECT DESCRIPTION**

The brief project details of the pipeline are as follows: -

- Laying of 12" X 17 km piggable pipeline and associated terminal facilities connecting ONGCL gas field off-take point at Nambor GGS to Khoraghat GGS to Uriumghat.
- Laying of 8" x 47 km piggable pipeline and associated terminal facilities connecting Uriumghat to Golaghat town.
- Laying of 8" x 29 km piggable pipeline and associated terminal facilities connecting Golaghat town to Numaligarh along with tap off points to cater gas supply to around 50 nos. of tea factories.
- Laying of 6" X 12 km pipeline from Thoramukh to Hamiramukh.
- Laying of PE Spur lines for tap off to the customers.

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:

- Datasheets;
- 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)



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S. No.	Description	Quantity
Part-A:	F&G System	
1	 F&G system for Nambor - Golaghat - Numaligarh Gas pipeline project shall be supplied as per scope of work, specification, Control system schematic, I/O List and cable schedule attached with this requisition. F&G System supplied shall be complete in all regard and shall consists of the following: 1. Hardware - F&G system shall consist of Dual 32-bit CPU, Minimum 32 Mbyte SDRAM (Extendable), Power supply modules, Input / Output modules, Modbus / Ethernet base interface and shall support minimum 100 Mbps redundant Ethernet communication, serial communication protocol, SIL 3 rated located at Golaghat sub-control room; F&G cabinet (8 nos.) shall be standalone floor mounted, dimensions 800x800x2200 mm (WxDxH) and IP-54 rated as per IEC 60529; Exterior portion of all panels and closed cabinets shall have a color of RAL 7032 (Siemens grey), MOC shall be CRCA steel, Front opening at Nambor, Khoraghat, Uriumghat, Golaghat, Numalighar, Thoramukh, Hamiramukh and SV stations (01 Nos.); F&G system at each location shall interface with proposed new RTU at terminals through secure and redundant communication link; Software with license etc., complete with system configuration and programming; Testing – FAT / SAT, Installation, commissioning and training; Supply of erection & commissioning spares; 	1 Lot
2	Point Type Gas Detectors – IR Type – for detection of Natural Gas in Process Area	29
3	Open Path Gas Detectors – UV/IR Type in Process Area	13
4	Beacon – Amber Colour – for visual indication of flammable gas leak alarm in process areas	8
5	Outdoor Hooter- Dual Tone Type for installation in Process	8
6	Manual Call Point for installation in Process Area	8
7	1T x 1.5 Sq. mm, Fire resistant, Over all Screened	1800



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8	6T x 1.5 Sq. mm, Fire resistant, Individual Screened and Over all Screened	1400
9	1P x 1.5 Sq. mm, Fire resistant, Over all Screened	700
10	6P x 1.5 Sq. mm, Fire resistant, Over all Screened	700
11	Junction Box	20
PART-B	: Fire Alarm Control Panel	
1.	 Fire Alarm Control Panel (FACP): Design, detailed, engineering, supply, configuration, testing, installation, erection and commissioning of 2 loop, Addressable, Intelligent Fire Detection and Alarm Panel for automatic fire detection & communication of alarms for various types of detectors installed like multi sensor, loop isolators, manual call points, hooters, beacon etc. installed in respective control room with supporting multiple communication protocol. 2 Loop Addressable FACP shall be installed in suitable location inside control building at Nambor, Khoraghat, Uriumghat, Golaghat, Numalighar, Thoramukh, Hamiramukh and SV stations(01 Nos.);- 08 Nos. FACP 4 Loop Addressable FACP shall be installed in suitable location inside control building at Golaghat Sub-Control Room;- 01 Nos. FACP Supply, laying of cable inside Control room (Portacabin) between detectors, MCP, hooter and FACP including glanding, termination, ferruling, dressing etc. at both ends. Supply & installation of cable trays (if necessary), supply of erection materials, cable ferrules, cable lugs, cable tie etc. for successful commissioning of FACP. FACP shall interface with F&G system at terminals through secure and redundant communication link or hardwired; Supply of erection & commissioning spares; Testing – FAT / SAT, Installation, commissioning and training. 	1 Lot
2.	Addressable multi sensor (Smoke + Heat) – for installation in terminal control room (Portacabin)	44
3.	Beacon – Amber Colour – for visual indication of fire alarm inside the control building or Portacabin;	1
4.	Indoor Hooter– Dual Tone Type for installation inside the control building or Portacabin;	10
	1	



Material Requisition for F&G System



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5.	Manual Call Point for installation inside the control building or Portacabin;	11
Part – C	: Comprehensive Annual Maintenance Contractor (CAMC)	
1.	Comprehensive Annual Maintenance Contract (CAMC) for F&G System and FACP - for period of 4 years, applicable after successful completion of warranty phase.	1 Lot

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 (FAT and SAT);
- Painting;
- Packing & Forwarding;
- Supply of Spares as specified;
- Documentation;
- CAMC for period of 4 years
- Vendor to facilitate one number of International visits of 2 Nos. client personnel and 1 Nos. PMC/Consultant personnel for FAT or Training sessions or to visit Manufacturer parent company of the SCADA/RTU system for a week. Bidder to quote considering the above.

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.

4.1 Notes to Vendor

4.1.1 F&G System

F&G System and its accessories shall be sized as per requirements; F&G system shall be provided at all stations installed along the length of pipeline.

Vendor shall submit F&G System design documents and drawings for approval. Vendor to proceed further only upon approval of Vendor submitted documents.

Vendor shall submit FAT / SAT procedures of F&G System for review and approval. Vendor to proceed further only upon approval of Vendor submitted documents.

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



Material Requisition for F&G System



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 F&G system and its accessories shall be at M/s AGCL's Golaghat Sub-Control Room 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 / IO list 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.

Works prior to Purchaser's inspector reserves the right to perform stage wise inspection and witness tests, as indicated in Specification for F&G S at Manufacturer's 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.

Fire Alarm Control Panel (FACP) 4.1.2

F&G System and its accessories shall be sized as per requirements; F&G system shall be provided at all stations installed along the length of pipeline.

Vendor shall submit F&G System design documents and drawings for approval. Vendor to proceed further only upon approval of Vendor submitted documents.

Vendor shall submit FAT / SAT procedures of F&G System for review and 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.



Material Requisition for F&G System

01



Delivery of F&G system and its accessories shall be at M/s AGCL's Golaghat terminal 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 / IO list 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.

Works prior to Purchaser's inspector reserves the right to perform stage wise inspection and witness tests, as indicated in Specification for F&G S at Manufacturer's 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.

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 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 to the term of 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

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COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT (CAMC):

F&G system vendor shall quote as required for CAMC service for 4 years for complete services and spares for the offered system. CAMC service is applicable after successful completion of warranty phase. The prices offered shall be on comprehensive basis for all the F&G equipment/ software version support for the duration as specified in job specs. As part of CAMC Service, quarterly visits (4 visits per year) and as many as



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required breakdown visits for maintenance shall be made by F&G system vendor for preventive maintenance as a minimum.

If the bidder fails to provide the required services for any day, the bidder shall compensate the owner @ Rs 3000/- per hour for the default period. For calculation, default period will be recorded jointly by the bidder and owner on daily basis. However, compensation will be on monthly cumulative basis rounded to nearest hour.

In any case, the maximum penalty imposed in a month for non-performance of the equipment would be limited to 50% of the amount of O&M charges to be paid to the bidder per month.

7.0 VENDOR DOCUMENTS

This section describes the Vendor Data Requirements applicable to a Vendor's scope. The Vendor data requirements shall be as mentioned in F&G system 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 list and relevant "As Built" drawings.

7.1 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.

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



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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.

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



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9.0 LIST OF ATTACHMENTS

- 1. Standard Specification;
- 2. Standard Cabinet drawings;
- 3. Instrument Index;
- 4. IO List;
- 5. System Architecture;
- 6. Checklist Technical

10.0 BID DOCUMENTS

The Following documents are to be provided along with the bid:

- 1. SOR form duly filled and signed by the bidder
- 2. Bill of Material (BOM)
- 3. List of Mandatory spares
- 4. List erection & commissioning spares
- 5. System architecture diagram
- Catalogues and minimum technical specifications, datasheets of offered F&G system like hardware, Processor/ CPU, switches, IO cards, communication modules, Panel GA drawings, OPGD, PGD, ionization smoke detector, optical smoke detector, Multisensor detector, heat sensing cable, heat detectors, MCP, response indicators, beacon, hooters, etc.,
- 7. Power consumption calculations,
- 8. ITP of F&G System



PROJECT NUMBER: 1009				ASSAM GA	S COMPA	NY LTD			
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	Documer	nt No		1009	00	IN	SOV	V	5004
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01	02-06.2022			Issued fo	or Bids		AK	SV	KNC
00	27-02.2020			Issued fo	or Bids		KS	VB	KNC
C1	30-12-2019			Issued for	Review		KS	VB	KNC
REV	DATE			DESCRIF	TION		PREP	СНКД	APPR



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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	Nambor – Golaghat - Numaligarh Area Gas Pipeline Project.
OWNER	Assam Gas Company Ltd. (AGCL)
CONTRACTOR	VCS Quality Services Pvt Ltd 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

Assam Gas Company Ltd. (AGCL) (hereinafter called as Owner/AGCL), is an ISO 9001: 2008 certified, 56 years old Natural Gas transmission and distribution company, wholly owned by the Govt. of Assam with its registered office at Duliajan, Dist.: Dibrugarh, Assam 786 602. The company transports Natural Gas through its integrated pipeline infrastructure to several market segments i.e. Power, Fertilizer, petrochemicals, Industrial, Commercial and Domestic consumers primarily located in upper Assam. The present infrastructure of the company has a transportation capacity of about 6.0 MMSCM of gas per day.

At present, AGCL is collecting and transporting Natural Gas from the gas fields of ONGCL in Khoraghat region of Golaghat District bordering Nagaland through its 8" x 12 km and 4" NB x 47 km Khoraghat - Uriumghat - Golaghat gas pipeline and distributing the same to the consumers of Golaghat / Jorhat districts of Assam through its network of established pipeline infrastructure. Presently, the company has been allotted additional Natural Gas from the above mentioned region that needs to be gainfully utilized in and around Golaghat and other districts of upper Assam.

AGCL has appointed "VCS Quality Services" as a consultant for carrying out the detail engineering and project management works for laying of the pipeline along with associated facilities from Nambor – Khoraghat - Numaligarh for catering the requirement of natural gas.

2.1 Purpose of the Document

The purpose of this document is to define the minimum technical requirements and Seller's scope of work / supply of SCADA/ RTU to be purchased for this project.

2.2 **Project Description**

The brief project details of the pipeline are as follows: -

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- Laying of 12" X 17 km piggable pipeline and associated terminal facilities connecting ONGCL gas field off-take point at Nambor GGS to Khoraghat GGS to Uriumghat.
- Laying of 8" x 47 km piggable pipeline and associated terminal facilities connecting Uriumghat to Golaghat town.
- Laying of 8" x 29 km piggable pipeline and associated terminal facilities connecting Golaghat town to Numaligarh along with tap off points to cater gas supply to around 50 nos. of tea factories.
- Laying of 6" X 12 km pipeline from Thoramukh to Halmiramukh.
- Laying of PE Spur lines for tap off to the customers.

2.3 Abbreviation

FAT	Factory Acceptance Test
F&G	Fire and Gas
IO	Input and Output
ITP	Inspection & Test Plan
LAN	Local Area Network
OFC	Optical Fiber Cable
PLDS	Pipeline Leal Detection System
RTU	Remote Terminal Unit
SAT	Site Acceptance Test
SCADA	Supervisory Control & Data Acquisition
UPS	Uninterrupted Power Supply
QA	Quality Assurance
QC	Quality Control

2.4 Codes & Standards

Vendor shall refer the latest revision of Codes and Standards and



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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:

- Scope of Work & Supply
- System Architecture & IO List
- Standard Specifications;
- Other Documents & Drawings;
- International & National Codes & 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).

S. No.	Description	Quantity				
Part-A: F&G System						
1	Io.Descriptiont-A: F&G SystemF&G system for Nambor - Golaghat - Numaligarh Gas pipeline project shall be supplied as per scope of work, specification, Control system schematic, I/O List and cable schedule attached with this requisition. F&G System supplied shall be complete in all regard and shall consists of the following: 1. Hardware –•F&G system shall consist of Dual 32-bit CPU, Minimum 32 Mbyte SDRAM (Extendable), Power supply modules, Input / Output modules, Modbus / Ethernet base interface and shall support minimum 100 Mbps redundant Ethernet communication, serial communication speed, and supporting multiple communication protocol, SIL 3 rated located at					





		Scope of Work for F&G System	1009-00-IN-SOW-5	5004	01		
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	 Fire Alarm Control Panel (FACP): Design, detailed, engineering, supply, configuration, testing, installation, erection and commissioning of 2 loop, Addressable, Intelligent Fire Detection and Alarm Panel for automatic fire detection & communication of alarms for various types of detectors installed like multi sensor, loop isolators, manual 			1	Lot		
PAR	RT-B	: Fire Alarm Control Panel					
1	2	Cable Glands and erection hardware		1	Lot		
1	1	Junction Box		2	20		
1	0	6P x 1.5 Sq. mm, Fire resistant, Over all Scree	ned	7	00		
9	9	1P x 1.5 Sq. mm, Fire resistant, Over all Scree	ned	7	00		
8	3	6T x 1.5 Sq. mm, Fire resistant, Individual Screened and Over all Screened			00		
7	7	1T x 1.5 Sq. mm, Fire resistant, Over all Screened					
6	5	Manual Call Point for installation in Process Area					
5	5	Outdoor Hooter– Dual Tone Type for installation in Process					
4	4	Beacon – Amber Colour – for visual indication of flammable gas leak alarm in process areas					
3	3	Open Path Gas Detectors – UV/IR Type in Process Area					
2		Point Type Gas Detectors – IR Type – for dete Gas in Process Area	ection of Natural	2	!9		
		5. Supply of erection & commissioning spares;					
		 (Siemens grey), MOC shall be CRO opening at Nambor, Khoraghat, Urium Numalighar, Thoramukh, Hamiramukh (1 Nos.); 2. F&G system at each location shall interfact new RTU at terminals through secure communication link; 3. Software with license etc., complete configuration and programming; 4. Testing – FAT / SAT, Installation, com training; 	CA steel, Front nghat, Golaghat, and SV stations e with proposed and redundant with system nmissioning and				
		 F&G cabinet (9 nos.) shall be standalon dimensions 800x800x2200 mm (WxE rated as per IEC 60529; Exterior port and closed cabinets shall have a col- 	e floor mounted, DxH) and IP-54 ion of all panels or of RAL 7032				

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	call points, hooters, beacon etc. installed in respective			
	control room with supporting multiple communication			
	ριοιοςοι. - 2 Loon Addressable FΔCP shall be installed in suitable			
	location inside control building at Nambor, Khoraghat,			
	Uriumghat, Golaghat, Numalighar, Thoramukh,			
	Hamiramukh and SV stations(1 Nos.); - 08 Nos. FACP			
	-4 Loop Addressable FACP shall be installed in suitable			
	location inside control building at Golaghat Sub-Control			
	ROOM;- UI NOS. FACP Supply laving of cable inside Control room (Portacabin)			
	between detectors. MCP, hooter and FACP including			
	glanding, termination, ferruling, dressing etc. at both ends.			
	Supply & installation of cable trays (if necessary), supply of			
	erection materials, cable ferrules, cable lugs, cable tie etc.			
	for successful commissioning of FACP.			
	2. FACP shall interface with F&G system at terminals through			
	secure and redundant communication link or hardwired;			
	Supply of erection & commissioning spares;			
	4. Testing – FAT / SAT, Installation, commissioning and			
	training.			
2.	Addressable multi sensor (Smoke + Heat) - for installation in	44		
	terminal control room (Portacabin)			
_	Beacon – Amber Colour – for visual indication of fire alarm	1		
3.	inside the control building or Portacabin;			
4.	Indoor Hooter- Dual Tone Type for installation inside the	10		
	control building or Portacabin;			
	Manual Call Point for installation inside the control building or	11		
5.	Portacabin:	11		
	,			
Part – C: Comprehensive Annual Maintenance Contractor (CAMC)				
	Comprehensive Annual Maintenance Contract (CAMC) for F&G	1 Lot		
1.	System and FACP - for period of 4 years, applicable after	I LUC		

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;



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Scope of Work for F&G System

successful completion of warranty phase.

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- Documentation;
- CAMC for period of 4 years;
- Vendor to facilitate one number of International visits of 2 Nos. client personnel and 1 Nos. PMC/Consultant personnel for FAT or Training sessions or to visit Manufacturer parent company of the SCADA/RTU system for a week. Bidder to quote considering the above.

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.

5.0 SELECTION & DESIGN CRITERIA

F&G system and detectors / devices design aspects shall be as mentioned in Datasheets, Standard Specification for Fire and Gas System.

5.1 F&G System

F&G System shall be provided for Nambor – Khoraghat – Numaligarh pipeline project in order to monitor gas detectors in pipeline facilities at Nambor, Khoraghat, Uriumghat, Golaghat, Numaligarh, Thoramukh, Hamiramukh and 01 number SV stations.

F&G system shall be of high reliability and integrity, featuring redundancy of critical hardware components which shall facilitate safe process operation. I/O redundancy of 25% is to be maintained.

F&G system design shall be SIL-3 certified with system availability of minimum 99.99% and MTTR of maximum 4 hours.

F&G system shall initiate audio and visual alarms upon detection of gas by individual gas detector. Upon confirmed detection of gas, shutdown logic shall be initiated.

In terminal control room FACP signals shall be reflected in the main control room i.e., visual and

F&G cabinet shall be SIL 3 rated, IP 54. System and marshalling cabinets shall be provided with front access with double leaf hinged lift off door. Cable entry shall be designed for bottom entry through removable gland plates.

F&G System will be inspected as required by the Project specifications referenced by this requisition and other codes, standards, and specifications referenced by the Project Specifications. Material testing shall be in accordance with EN 10204 Section 3.2.

Compliance by Seller with the provisions of this package does not relieve Seller of the responsibility of furnishing material of proper design, suited to meet safety and operating guarantees of integrated system.



Scope of Work for F&G System



All documents shall be provided in the English language.

5.2 F&G Detectors and Devices

Point gas detectors and Open path gas detectors shall be provided pipeline terminal and SV station area.

Fire & Gas detectors and devices shall be as specified in Data sheets and Specification for F&G System.

Detector accuracy shall be as indicated in respective datasheets. The accuracy includes linearity, hysteresis, repeatability and other external effects on the calibrated span.

Electrical / Electronic system located in hazardous area shall be certified for Zone 1, Gas Group IIA/B, and T3 as standard. For I.S design, they shall be certified Ex 'i' in accordance with IEC 60079-11 and for flameproof design it shall be certified Ex 'd' in accordance with IEC 60079-1 / IS 2148. Ingress protection shall be IP 67 or better in accordance with IEC 60529 / IS 2147.

ATEX or CCOE / PESO approval is required for all electrical / electronic items located in hazardous area.

F&G detectors and devices will be inspected as required by the Project specifications referenced by this requisition and other codes, standards, and specifications referenced by the Project Specifications. Material testing shall be in accordance with EN 10204 Section 3.1.

Compliance by Seller with the provisions of this package does not relieve Seller of the responsibility of furnishing material of proper design, suited to meet safety and operating guarantees of integrated system.

All documents shall be provided in the English language.

6.0 SCOPE OF WORK

Vendors scope of work includes following activities:

- Design & Engineering, Manufacturing as per project requirement;
- Project Management & Control Activities;
- Supply of material defined in Section 4.0;
- Quality Assurance & Quality Control;
- Packing and Shipment to site;
- Inspection and Testing as per vendor proposed ITP and approved by Owner;
- Engineering Documentation.

7.0 DETAILED SCOPE OF WORK & SUPPLY

Vendor scope of work and supply, Installation, Pre-Commissioning and Commissioning of F&G System shall include the following as a minimum, however, it shall be the

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complete responsibility of the F&G vendor to supply any hardware, software & material and provide all required services to achieve the intended functionality of the system to meet the overall objective of the Project.

F&G System Vendor shall refer the System Architecture, Input and Output List, Project Specifications, General Specifications and other drawings/documents referred in this scope of work/supply system for Technical requirements of the system.

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

7.1 F&G System

Vendor scope of work and supply shall include the following as a minimum:

- Design & Engineering, Manufacturing & Procurement, Fabrication & Assembly, Project Management & Control Activities, Protection, Marking and export packing, Field Assembling, Erection & Installation, Start-up, Field Training, Quality Assurance & Control Activities, Performance Guarantee and Warranty, FAT, SAT and Commissioning & Successful operation / Handover to Company;
- Supply and Installation of F&G package along with necessary Hardware at Subcontrol room, Golaghat station;
- Supply and Installation of 8 Nos F&G cabinets at respective terminals Nambor, Khoraghat, Uriumghat, Golaghat, Numalighar, Thoramukh, Hamiramukh and SV stations(1 nos.);
- Supply and installation of software with license etc., complete with system configuration and programming;
- Development of new Graphics and displays (Alarms, Diagnostic, Trends etc.) in the new SCADA system with co-ordination of SCADA vendor;
- Supply and Installation of all required Cables, Junction boxes, Network cables (CAT6 & Ethernet), Communication cables, Ethernet Patch Chords and FO patch chords for connectivity to the other vendor package equipment's;
- F&G shall be integrated with SCADA through safe and redundant communication link;
- Test & Inspection (Internal Test, FAT, SAT). All required test & inspection in accordance with code & specification and approved FAT Procedure by Owner;
- Loop Testing for all the new signals configured in it;
- Start-up, Commissioning & Successful operation / Handover to Company;
- Field Training, Performance Guarantee and Warranty

7.2 Fire Alarm Control Panel (FACP)

Vendor scope of work and supply shall include the following as a minimum:

• Design & Engineering, Manufacturing & Procurement, Fabrication & Assembly, Project Management & Control Activities, Protection, Marking and export packing,


Field Assembling, Erection & Installation, Start-up, Field Training, Quality Assurance & Control Activities, Performance Guarantee and Warranty, FAT, SAT and Commissioning & Successful operation / Handover to Company;

- Supply and Installation of 2- Loop Fire Alarm Control Panel and Addressable Multi Sensor (Smoke + Heat) package along with necessary Hardware at respective terminal and SV stations control room (Porta cabin).
- Supply and installation of software with license etc., complete with system configuration and programming;
- Supply and Installation of all required Cables, Junction boxes, Network cables (CAT6 & Ethernet), Communication cables, Ethernet Patch Chords and FO patch chords for connectivity to the other vendor package equipment's;
- FACP shall be integrated with F&G through safe and redundant communication link;
- Test & Inspection (Internal Test, FAT, SAT). All required test & inspection in accordance with code & specification and approved FAT Procedure by Owner;
- Loop Testing for all the new signals configured in it;
- Start-up, Commissioning & Successful operation / Handover to Company;
- Field Training, Performance Guarantee and Warranty

7.3 Drawings and Documents

Vendor documentation shall include the following as a minimum, however, it shall be the complete responsibility of the Vendor to provide any drawings and documents as asked by Company during engineering.

- F&G System and FACP system documents and drawings like, IO List, Internal IO wiring and termination diagram, internal power wiring diagram;
- Detailed F&G system and FACP System Architecture;
- Functional Design Specification for F&G system and FCP System;
- F&G system and FACP Configuration Manual;
- Trouble Shooting Manual;
- Detailed Bill of Material with Make and Model Number;
- Detailed Specifications / Data Sheet/vendor Catalog of all items of F&G system and FACP System
- GA and IA of F&G SYSTEM and FACP System Cabinets, Power distribution cabinet & marshaling cabinets, relay cabinets etc.;
- F&G system and FACP System cabinet power wiring diagram;
- F&G system and FACP Assignment / Allocation Table;
- F&G system and FACP Tag Data base, including Trip and Alarm Set points;
- Sub-Vendor List;



Scope of Work for F&G System



- F&G system and FCAP Wiring and Termination Drawings;
- F&G system and FACP Logic Diagram;
- F&G system and FACP Panel Earthing Drawing;
- Heat Dissipation Calculation;
- Power Consumption Calculation;
- Operational and Maintenance Manuals;
- FAT and SAT Procedures;
- Inspection and Test Plan / QAP;
- As-Built Documents

7.4 Language and units

All drawings, documents, information, correspondence, test reports, operating and maintenance instructions and like items shall be in the English language and SI Units. In the case of pamphlets and trade brochures, English translations neatly marked on the documents shall be deemed to have complied with this clause.

7.5 **Drawings and information**

Vendor shall supply and maintain a schedule of the drawings and information which he expects to prepare or provide for use during the Contract. The list shall be kept up to date during the contract period and shall not be amended or deviated from without prior approval of the Company.

7.6 **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.

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.



Scope of Work for F&G System

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7.7 Statutory approvals

It shall be the responsibility of the Automation Vendor to obtain all the necessary certificates on the job carried out by him from the Electrical Inspector or any other statutory authority

7.8 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.

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.



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NAMBOR-GOLAGHAT-NUMALIGARH AREA GAS PIPELINE PROJECT



DEVICES TOTAL SHEETS 13 DOCUMENT No. 1009 00 IN DS 5004 ASSAM GAS COMPANY LTD ASSAM GAS COMPANY LTD NAMBOR-GOLAGHAT-NUMALIGARH AREA GAS PIPELINE PROJECT INSTRUMENT DATASHEETS - FIRE AND GAS DEVICES 02.06.2022 ISSUED FOR BIDS AK SV KNC Q7.02.2020 ISSUED FOR BIDS KS VB KNC C13 0.2.2019 ISSUED FOR BIDS KS VB KNC Q7.02.2020 ISSUED FOR BIDS KS VB KNC Q7.02.2020 ISSUED FOR REVIEW KS VB KNC	IN	STRUMENT	DATASHEETS -	FIRE AND	GAS	CLIENT JO	B No.	VCS-1009				
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1	INDEX SHEET							/.⊦	_		
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SI. NO.	Point Type Cas	Description			Si	heet Numbe	r				
2	Open Path Gas	Detector				Sheet 4 of 13	_				
3	Beacon				5	Sheet 5 of 13		_			
4	Horn				9	Sheet 6 of 13					
5	Manual Call Poi	nt			5	Sheet 7 of 13					
6	Addressable Mu	ılti Sensor			5	Sheet 8 of 13					
7	Single Pair Cab	le(IS)			9	Sheet 9 of 13					
8	Pair Cable (NIS	5)			S	heet 10 of 13	3				
9	Triad Cable				S	heet 11 of 13	3				
10	Multi Triad Cab	le			S	heet 12 of 13	3				
11	Fire Junction Bo	X			S	heet 13 of 1.	3				
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	POINT GAS DETECTOR Rev.												
	S No.												
	1	Tag Number	ĸ	**									
	2	Quantity	Ĩ	29 Nos.									
	3	Ambient Temperat	ure(0C)	16-40									
Ł	4	Relative Humidity	(RH) 5	5 - 90%									
R/	5	Operating Tempera	ature (⁰ C)	20-40									
N.	6	Service	1	Natural Gas									
B	7	% of Governing Co	omponent in Gas	Natural Gas									
	8	Monitoring system	F	F&G System									
	9	Area Classification		Zone-1, IIA/IIE	3,Т3								
	10	Certification	4	ATEX or IECx v	vith PESO								
	11												
	12	Sensor Type	1	IR Absorption s	sensor								
	13	Output	2	4∼20 mA , HAI	रा								
	14	Power Supply		24 VDC									
	15	Range	(0 - 100% LEL									
	16	Alarm Levels		HH- 40% FL a	and H- 20% Fl								
	17	Integral Indicator		Required									
Ř	18	Enclosure Protectio	 onF	Ex 'd'. IP 67									
2	10	Enclosure Material		SS316									
ы	20	Response time		150 < 3 Secon	ds								
ET	20			+ 2%									
	21	Electrical Connectiv		420 X 1 5									
	22	Power Consumptio		*									
	23	SIL Cortification		211.2									
	24	Drinciplo		Infra Rod									
	25	Linoprity											
	26	Linearity		< 5% FSD									
	27	ID Jamp course	r	Danlagaabla									
	28		F		diation Duat facu	:							
	29	Immunity	line and Durate ation	Required									
S	30	Dust and Splash G	uard Protection	kequirea									
L X	31	Dimensions		* 									
臣	32	Weight		*									
Ö	33		· · · · · · · · · · · · · · · · · · ·	1 No. (configur	ed to Natural Gas	sensing)							
	34	Mounting Accessor	ies	Swivel Mountin	ig bracket to suit a	2" Pole							
	35	Make / Model No.		*									
	36												
Notes	s: lo be												
	the det	specily. **	vided with dust quard and splas	bauard									
	ine uet	SS316) stamped wi	ith instrument tag number and	service in 10m	m characters sha	ll be attac	hed via SS	wire (1					
3 mr	n).												
4 Ca	libration	and hazardous are	ea certificates shall be provided	by the Vendor									
5 Ve	ndor to	consider sunshade	(MOC: FRP) and mounting acce	essories in the	offer								
6 Ve	ndor to	include commissior	ning spares and 2 years operation	ng spares in th	ne offer.								
								I					
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2		CLIENT:	ASSAM GAS COMPANY LTD	01	02.06.2022	AK	SV	KNC					
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	OPEN PATH GAS DETECTOR Rev.									
	S No.									
	1	Tag Number	**	ĸ						
	2	Quantity	13	3 Nos.						
	3	Ambient Temperat	ure (⁰ C) 16	5 - 40						
L L	4	Relative Humidity ((RH) 5	- 90%						
RA	5	Service	Na	atural Gas						
N.	6	% of Governing Co	mponent in Gas Na	atural Gas						
B	7	Monitoring system	F8	kG System						
	8	Area Classification	Zc	one-1, IIA/	IIB,T3					
	9	Certification	A	TEX or IEC>	with PESO					
	10	Operating Tempera	ature (⁰ C) 20)-40						
	11	<u> </u>								
	12	Sensor Type	IR	Absorptio	n Type					
~	13	Output	41	~20 mA, H	ART					
	14	Power Supply	24	1 VDC*						
Ē	15	Range	0	- 100% LE	L (0 - 5 LEL.Meters	5)				
EC EC	16	Response time	TS	50 < 3 Seco	onds	,				
8	17	Accuracy	±	3% of FS						
R S	18	, Distance B/w Trans	smitter & Receiver 30) Mtrs*						
Ë	19	Transmitter / Rece	iver Cable Entry M	20 X 1.5						
Į	20	Enclosure Material	S	5316						
ISI	21	Enclosure Protectio	in Ex	('d', IP 67						
AN	22	Power Consumption	n *							
H H	23	SIL Certification	SI	L 3						
	24			-						
	25	Rain Guard Protect	ion Re	equired						
IERS	26	Mounting Accessor	ies M	ounting Bra	ackets with Swivel	mountii	ng acces	sories		
Ē	27	Site Alignment Kit	Re	equired						
	28	-		· ·						
Notes	: To b	e decide**								
1 Vei	ndor to	specify. *								
2 Tag wir	gplate e (1 m	(SS316) stamped w m).	ith instrument tag number and servi	ce in 10mr	n characters shall l	be attac	ched via	SS		
3 Cal	libratio	n and hazardous ar	ea certificates shall be provided by t	he Vendor.	66 o 11					
4 Vei	ndor to		(MOC: FRP) and mounting accessor	ares in the	offer					
5 1 1 6			ing spares and 2 years operating sp						L	
								·		
				•						
5		CLIENT:	ASSAM GAS COMPANY LTD	01	02.06.2022	AK	SV	KNO	<u> </u>	
6				00	27.02.2020	KS VC	VB			
4	20	PROJECT:	NUMALIGARH AREA GAS PIPELINE		DATE				<u>~</u>	
E'-E -0.	5424	03	PROJECT	KEV.		PRPD				

BEACON Rev.											
	S No.										
	1	Tag Number		**							
	2	Quantity		9 Nos.							
Ļ	3	Ambient Temperati	ure	16 - 40 C)eg.	.C					
RA	4	Relative Humidity ((RH)	5 - 90%							
Z	5	Service		Natural G	Gas						
5	6	Monitoring system		F&G Syst	em						
	7	Area Classification		Zone-1, I	IIA/	IIB,T3					
	8	Certification		ATEX or 1	IEC	x with PESO					
	9										
	10	Туре		Xenon Di	sch	arge Lamp					
	11	Color		Amber							
	12	Flash Frequency		1 Flash /	Sec	cond					
	13	Luminous Intensity	,	*							
z	14	, Power Supply		24 VDC							
O V V	15	Enclosure Material		SS316							
3EA	16	Enclosure Protectio	n	Ex 'd', IP	67						
	17	Cable Entry		M20 X 1.	5						
	18	Power Consumption	า	*	-						
	10	SII Certification	·	SIL 3							
	20										
20 21 Mounting Accessories Flush Mounting											
II S	21	Make & Model No		*	arre						
^d ^z	22										
Notes	• To b	e decided**		l							
	dor to	cnocify *									
1 vei		specify.									
2 Tag	plate ((SS316) stamped w	ith instrument tag number and se	ervice in 1	0mi	m characters sl	hall be a	ttached v	ia SS		
WIF	e (1 m	m).									
3 Haz	zardou	s area certificates s	hall be provided by the Vendor.								
4 Ver	ndor to	consider mounting	accessories in the offer								
5 Ver	ndor to	include commission	ning spares and 2 years operating	g spares in	the	e offer.					
55		CI TENT.		01		02.06.2022	AK	SV	KNC		
				00		27.02.2020	KS	VB	KNC		
6	200	DDOJECT.	INAMBOR-GOLAGHAT-			30.12.2019	KS	VB	KNC		
EVE AUR		PROJECT	PROJECT	REV	<i>'</i> .	DATE	PRPD	СНКД	APPD		
			-	•		Documer	nt No.: 1	009-00-	IN-DS-5004		

			HORN					Rev.	
	S No.								
	1	Tag Number		**					
	2	Quantity		19 Nos.					
Ļ	3	Ambient Temperat	ure	16 - 40 [Deg.C				
ERA	4	Relative Humidity ((RH)	5 - 90%					
ENE	5	Service		Outdoor	- Natural Gas	Common Area	3		
G	6	Monitoring system		F&G Sys	tem				
	7	Area Classification		Zone-1,	IIA/IIB,T3				
	8	Certification		ATEX or	IECx with PES	0			
	9								
	10	Туре		Dual Tor	е				
	11	Sound Level		90 dB @	3 meter				
	12	Volume Adjustmen	it	Required					
	13	Power Supply		24 VDC					
RN	14	Enclosure Material		SS316					
РН	15	Enclosure Protectio	วท	Ex 'd', IF	67				
	16	Cable Entry		M20 X 1.	5				
	17	Power Consumption	n	*					
	18	SIL Certification		SIL 3					
	19								
Z	20	Mounting Accessor	ies	Flush Mo	unting				
S	21	Make & Model No.		*					
QO	22								
Notes	5:	•							
1 Ve	ndor to	specify. *							
2 Ta	gplate ((SS316) stamped w	ith instrument tag number and se	ervice in 1)mm characte	rs shall be att	ached via		
2 SS	wire (1 mm).							
3 Ha	zardou	s area certificates s	hall be provided by the Vendor.						
4 Ve	ndor to	consider mounting	accessories in the offer						
5 Ve	ndor to	include commission	ning spares and 2 years operating	spares in	the offer.				
_									
				01	02.06.20	22 AK	SV	KNC	
	2	CLIENT:	ASSAM GAS COMPANY LTD	00	27.02.20	20 KS	VB	KNC	
4	See.		NAMBOR-GOLAGHAT-	C1	30.12.20	19 KS	VB	KNC	
E-REAL	L-JO DARS	PROJECT:	INUMALIGARH AREA GAS PIPELI		. DATE	PRPD	СНКД	APPD	
<u> </u>		1		I	Docume	nt No.: 1009	-00-IN-C	S-5004	

			MANUAL ALARM C	ALL POINT					Rev.		
	S No.										
	1	Tag Number		**							
	2	Quantity		20 Nos.							
Ļ	3	Ambient Temperati	Jre	16 - 40 Deg	.C						
ER/	4	Relative Humidity (5 - 90%							
N E N	5	Service		Outdoor - N	atural Gas Comm	non Areas					
G	6	Monitoring system		F&G System	<u> </u>						
	7	Area Classification		Zone-1, IIA,	/IIB,T3			_			
	8	Certification		ATEX or IEC	x with PESO						
	9										
	10	Туре		B <u>reak Glass</u>	with Nickel Plate	d <u>Brass Han</u>	n <u>mer & SS</u>	S Chain			
	11	Contact Rating		2A, 24 VDC							
5	12	Alarm Position		Contact Brea	ak to Alarm (Ope	n circuit to A	Alarm)				
ΊL	13	Wiring System		2 Wire							
ETA	14	Open Circuit Fault		EOL resistor	required						
ō	15	Output		Voltage free	Contact to Fire a	alarm Syster	n				
MF	16	Operating Voltage		24 VDC Loo	р						
Ľ	17	Enclosure Material		LM6 (shade	536 of IS-5) [FI	RE RED]					
	18	Enclosure Protectio	n	Ex 'd', IP 67	,						
	19	Cable Entry		M20 X 1.5							
	20										
N	21	Mounting Accessori	les	To suit 2" po	ole						
ĨĽ S	22	Make & Model No.		*					_		
Ō	23										
Notes	: To b	e decided**									
1 Ver	ndor to	specify. *									
	plate (יי	(SS316) stamped w	ith instrument tag number and se	rvice in 10m	m characters sha	ll be attache	ed via SS	wire (1			
3 Ha:	zardou	s area certificates sl	hall be provided by the Vendor.								
4 Ver	ndor to	consider mounting	accessories in the offer								
5 Ver	ndor to	include commission	ning spares and 2 years operating	spares in the	e offer.						
				oh				I			
	1	CLIENT:	ASSAM GAS COMPANY LTD	01	02.06.2022	AK	SV	KNC	2		
G				00	27.02.2020	KS	VB	KNC	<u> </u>		
	2	PROJECT:	NUMALIGARH AREA GAS PIPELI		30.12.2019	KS	VB		-		
B-B(35	45 A. 10		PROJECT	REV.	DATE	PRPD			D		

	MULTI SENSOR (SMOKE + HEAT) Rev.										
	S No.										
	1	Tag Numbers		**							
	2	Quantity		44 Nos.							
	3	Ambient Temperat	ure	16 - 40 De	eg.C						
EAL	4	Relative Humidity	(RH)	5 - 90%							
Ë	5	Operating Tempera	ature	-40 - 50 [Deg.C						
Ĩ,	6	Service		Heat & Sm	oke Detection						
	7	Monitoring system		Fire Alarm	Panel						
	8	Area Classification		Zone-1, II	A/IIB,T3						
	9	Certification		UL 268 cer	rtified						
	10			1							
	11	Sensor Type		Light Emit	ting Diode						
	12	Open Circuit fault		EOL resist	or required						
	13	Output		Voltage fre	e Contact to Fire	alarm Sv	stem				
	14	Ouiescient Current		*		,					
	15	Operating Voltage		24 VDC (*)						
	16	Power Consumptio	n (Normal / Alarm)	*	/						
	10			2 Wire Svs	stem or 4 Wire sv	stem (as a	accepted	by			
	17	Wiring system		FACP)				~ /			
Ř	18	Enclosure Protectio	on	Ex 'd', IP 6	57						
E E	19	Enclosure Material		Polycarbor	nate or Equivalent						
E E	20	Bug Screen		Required	·						
	21	InBuilt LED		Green/ Re	d with Blinking Fr	equency					
	22 Cycle Time 3 or 4 Seconds (Or better)										
23 Dimensions *											
	23	Weight		*							
	25	Principle		Ionization + Photoelectric							
	26	Terminal Size & Ca	able entry Size	*							
	20	Make & Model		*							
	27	Mounting Accessor	ies	Required	Indoor Surface Flu	ish Moun	tina				
	20	Hounding Accessor		Required,			ung				
Note	<u> </u>	e decided**									
	5 .100										
I VE		specify.									
2 AI	the det	tectors shall be prov	vided with dust guard and splas	hguard.			to ob o d vi				
3 wi	gplate (re (1 m	(SS 316) stamped v m)	with instrument tag number and	service in 10	umm characters s	nall be at	tached vi	a 55			
4 Ca	libratio	n and hazardous ar	ea certificates shall be provided	by the Vend	or.						
5 Ve	ndor to	consider mounting	accessories in the offer	by the venu							
		include commission	ning approx and 2 years approxi	na enoree in	the offer						
6 VE			ning spares and 2 years operation	ng spares m	the offer.						
				01	02 06 2022	Δ٧	<u>د\/</u>	KNC			
214	-	CLIENT:	ASSAM GAS COMPANY LTD	00	27.02.2022	KS	VB	KNC			
			NAMBOR-GOLAGHAT-	C1	30 12 2019	KS	VR	KNC			
200		PROJECT:	NUMALIGARH AREA GAS		55.12.2015						
etech			PIPELINE PROJECT	REV.	DATE	PRPD	CHKD	APPD			
					Docum	ent No.:	1009-00	<i>ו</i> -1N-DS-5004			

INSTRUMENT - SINGLE PAIR CABLE Rev.										
	1	Cable Identific	ation	PVC/OSCR-AL/INF	DSCR-AL/F	FR/PVC/SWA/P	VC			
	2	Number of Pai	rs	1P (IS)						
٩L	3	Cable Length		Refer SOR						
R.	4	Number of Tw	ists per Meter	10 minimum						
z	5	Application		Instrumentation 8	<u>k Control (</u>	Cables				
5	6	Voltage Grade		500 V						
	7	Code Confirmi	ty	BS 5308: part 2: 8130/84	1986 type	2 & IS 1554 p	art1 arı	moured	cables, IS-	
R	8	Туре		7 Stranded, each	strand of	0.53 mm dia				1
5	9	Conductor Size	e	1.5 Sq.mm						T
5 F	10	Material		Plain Annealed El	ectrolytic (Copper Conduct	tor,BS:	6360, C	lass 2	T
ъ	11	Core Identifica	ation	Black and White (as per BS	-5308, part-2,	1986)			T
Z	12									T
ŏ	13									
-	14	Material		PVC Type TI1 (as	per BS: 6	746), as referr	ed in BS	5: 5308		T
ζ_	15	Niminal Thickr	ness of Insulation	As per table 1 OF	BS: 5308					T
S S	16	Color of Condu	uctor Insulation	As per BS: 5308	Table 11)					T
	17									T
1	18									
	19	Material		Extruded Flame R per BS: 6746.	etardant L	_ow Smoke (FR	LS) TM	1 PVC to) IS-5831, as	
۳. ۳	20	Nominal Thick	ness (in mm)	As per table 10 &	CL. 13.3 /	of BS 5308: Pa	rt 2: 19	86		1
ξŌ	21	Lead Jacket Th	nickness	N/A					-	1
5	22	Color		Red						1
	23									1
	24	Material		Aluminium backe	d by Mylar	· / Polyster tape	e			1
ļ	25	Nominal Thick	ness (in mm)	0.05 mm minimu	m					1
50	26	Binder Tape M	aterial	Non-Hygroscopic	Таре					1
5 🗄	27	Overlap		Min. 25% on eith	er side					1
Ξ₽	28	Coverage		100%						1
ΞŪ	29	Drain Wire		Multi-strand bare	tinned an	nealed Copper	conduct	tor		1
5	30	Drain Wire Cro	oss section	0.5 mm ² minimu	n					1
	31									1
۵	32	Material		Aluminium backe	d by Mylar	/ Polyster tabe	e		-	1
	33	Nominal Thick	ness (in mm)	0.05 mm minimu		<u> </u>				1
Ŧ	34	Binder Tape M	aterial	0.05 mm minimum Non-Hygroscopic Tape						
S	35	Overlap		Min. 25% on eith	er side					1
Ξ.	36	Coverage		100%						1
Σ.	37	Drain Wire		Multi-strand bare	tinned an	nealed Copper	conduct	tor		1
ē	38	Drain Wire Cro	oss section	0.5 mm ² minimu	n					1
6	39									1
~ -	40	Material		Extruded FRLS TN	11 PVC to	IS-5831, as pe	er BS: 6	746		1
μĤ	41	Color		Blue						1
5 <u>0</u>	42	Nominal Thick	ness (in mm)	As per table 10 &	CL. 13.3 /	of BS 5308: Pa	rt 2: 19	86		1
S S	43									1
2	44	Armour Matori	al	Calvanicod stool y	viro ac po	rd 13 2 2 of [36 2308	v.Dart2.	1096	1
ž	47		21	BS: 5308 (Table	10)	G. 13.2.2 UI E	.5 5500	uitz.	1,00	┣—
ž	45	Armour Wire S	bize	55. 5500, (Table	10)					–
AR.	46									+
4	47									+
	48	Overall Outer	Diameter (with Tolerance)	*						+
	49	under Armour	Diarnater	^*						+
	50	over Armour I		*						+
	51	weight (in Kg	/ KIII)	*						+
ŝ	52	Min. Bending I	Raulus			-linet				+
R	53	KIP Cord	and ad Dallace T	Non-metallic unde	er inner ja	скет				+
E	54	Max. Recomm	ended Pulley Tension	<u> </u>		N D 2002				+
ò	55	Oxygen Index	a day	30 % minimum a	s per AST					+
	50	Convertiel M	Huex	250 °C minimum	as per AS	1111112803				+
	5/	Sequential Ma	rking on Outer Sheath	Length marking e	very mete	лг				+
	58	Drum Length		T						+
	59	iolerance		± 5%						+
a.h	60 . To 1	مطممتط دعيوه								+
otes	: 10 D									+
1	vendo	or to specify.*	fightion for Instrument C. 11	dee Ne MDC CDC Forto	fan	in fa una a t !				+
2	Kefer	standard speci	incation for instrument Cable	uuc. NO. VPC-SPC-5310	ior more i	mormation .				+
ځ	Cable	Cable ray number shall be same as instrument tag number.								
	CLIENT: ASSAM GAS COMPANY LTD									
		-			00	I Z / .UZ.ZUZU	ND	VD	I KING	
		<u> </u>	NAMBOR-COLACHAT NUMA	LICADH ADEA CAS	C1	06.01.2020	VS	VB	KNC	
		PROJECT:	NAMBOR-GOLAGHAT-NUMA	LIGARH AREA GAS	C1	06.01.2020	KS	VB	KNC	

INSTRUMENT - PAIR CABLE Rev.										
	1	Cable Identific	ation	PVC/OSCR-AL/IN	DSCR-AL/	FR/PVC/SWA/F	PVC		-	
	2	Number of Pai	rs	6P (NIS)						
AL.	3	Cable Length		Refer SOR						
2	4	Number of Tw	ists per Meter	10 minimum						
z	5	Application		F&G cable						
B	6	Voltage Grade		500 V						
	7	Code Confirmi	ty	BS 5308: part 2: 8130/84	1986 type	2 & IS 1554 p	oart1 ar	moured	cables, IS-	
R	8	Туре		7 Stranded, each	strand of	0.53 mm dia				-
2	9	Conductor Size	9	1.5 Sq.mm						-
ច្ន	10	Material		Plain Annealed Ele	ectrolytic (Copper Conduc	tor,BS:	6360, 0	Class 2	-
ъ	11	Core Identifica	ation	Black and White (as per BS	-5308, part-2,	1986)	· · · ·		-
z	12									-
ö	13									
-	14	Material		PVC Type TI1 (as	per BS: 6	746), as referr	ed in B	5: 5308		-
1	15	Niminal Thickr	ess of Insulation	As per table 1 OF	BS: 5308					1
Z	16	Color of Condu	uctor Insulation	As per BS: 5308 (Table 11)					-
50	17									-
	18									
~	19	Material		Extruded Fire Res	istant (FR), TM1 PVC to	1S-5831	., as per	BS: 6746	
μ	20	Nominal Thick	ness (in mm)	As per table 10 &	CL. 13.3	of BS 5308: Pa	rt 2: 19	86	-	1
ξŌ	21	Lead Jacket Th	nickness	N/A						1
- A	22	Color		Red						1
	23								-	1
	24	Material		Aluminium backer	d by Mvlar	/ Polyster tap	e			1
	25	Nominal Thick	ness (in mm)	0.05 mm minimu	m	,,	-			+
5	26	Binder Tane M	aterial	Non-Hydroscopic	Tane					-
5 1	27	Overlan		Min. 25% on eith	er side					-
	28	Coverage		100%						-
55	29	Drain Wire		Multi-strand bare	tinned an	nealed Conner	conduc	tor		-
5	30	Drain Wire Cro	oss section	0.5 mm ² minimu	n	inculcu copper	conduc	.01		+
	31	Drain wire ere		0.5 1111 11111						
~	32	Matorial		Aluminium backer	t by Mylar	r / Polyster tap	0			-
Ξ.	32	Nominal Thick	noss (in mm)		n by Piylai	/ Toryster tap	e			-
H	24	Rindor Tana M	ominal Thickness (in mm) 0.05 mm minimum 0.05 mm minimum							
R	24	Diriuer Tape M	ateria	Min 25% on oith	rape ar cido					+
-	26	Coverage		100%	el siue					-
N.	27	Coverage Drain Wiro		Multi strand bara	tinned an	napled Conner	conduc	tor		-
Ľ.	20	Drain Wire Cro	ac castion			nealed Copper	conduc	.01		
2	20	Dialit Wile Cit	SS Section	0.5 mm- mmmu	11					
<u> </u>	40	Matorial		Extruded EDLC TA		IC E021	PCIC	746		
ΗĒ	40	Color		Blue	II FVC LU	13-3031, as pe	EI D3. 0	740		-
Ξð	41	Nominal Thick	noss (in mm)	Ac per table 10 %	CI 12.2	of DC E200, Da	+ 2, 10	06		-
5Ă	42	Nominal Thick	ness (in mm)	As per table 10 &	CL. 13.3 (01 DS 5308: Pa	IFL 2: 19	80		_
	45									_
۳,	44	Armour Materi	al	Galvanised steel v	vire as per	r cl. 13.2.2 of E	BS 5308	Part2:	1986	L
ę	45	Armour Wire S	Size	BS: 5308, (Table	10)					
2	46									
4	47									
	48	Overall Outer	Diameter (with Tolerance)	*						
	49	Under Armour	Diamater	*						T
	50	Over Armour [Diamater	*						Т
	51	Weight (in Kg	/ Km)	*						1
	52	Min. Bending F	Radius	*						1
ß	53	Rip Cord		Non-metallic unde	er inner ja	cket				1
뽀	54	Max. Recomm	ended Pulley Tension	*	<u> </u>					1
E	55	Oxygen Index		30 % minimum a	s per ASTI	M D 2863				1
0	56	Temperature I	ndex	250 °C minimum	as per AS	TM D 2863				1
	57	Sequential Ma	rking on Outer Sheath	Length marking e	very mete	er				1
	58	Drum Lenath		*						
	59	Tolerance		± 5%						1
	60								-	1
otes	: To be	e decided **								1
1	Vendo	or to specify.*								1
-	Refer	standard speci	fication for Instrument Cable	doc. No. VPC-SPC-5310	for more i	information				1
2	Cable	able Tag number shall be same as instrument tag number.								
2	Sabie									
3										
3				CLIENT: ASSAM GAS COMPANY LTD						
3	3	CLIENT:	ASSAM GAS COMPANY LTD		00	27.02.2020	KS	VB	KNC	
3	2	CLIENT:	ASSAM GAS COMPANY LTD	IGARH AREA GAS	00 C1	27.02.2020	KS KS	VB VB	KNC KNC	
3	3	CLIENT: PROJECT:	ASSAM GAS COMPANY LTD NAMBOR-GOLAGHAT-NUMAL PIPELINE PROJECT	IGARH AREA GAS	00 C1 RFV:	27.02.2020 06.01.2020 DATF	KS KS PRPD	VB VB CHKD	KNC KNC	

		INSTRUME	NT - SINGLE TRIAD C	ABLE				Rev
	1	Cable Identification	PVC/OSCR-AL/INDSC	R-AL/FR/P	VC/SWA/PVC			
	2	Number of Pairs	1T					
F	3	Cable Length	Refer SOR					
2	4	Number of Twists per Meter	10 minimum					
z	5	Application	F&G Cables					
6	6	Voltage Grade	500 V					
_	7	Code Confirmity	BS 5308: part 2: 198	36 type 2 &	IS 1554 part	armoured	d cables, IS	5-8130
	8	Code Identification	Black and White (as	per BS-530	8, part-2, 198	16)		
F	9	Туре	7 Stranded, each stra	and of 0.53	mm dia			
١ <u>٩</u>	10	Conductor Size	1.5 Sq.mm					
₽ 6	11	Material	Plain Annealed Electr	olytic Copp	er Conductor,	BS: 6360,	Class 2,	
ō	12							
0	13							
< _	14	Material	PVC Type TI1 (as per	BS: 6746)	, as referred i	n BS: 5308	3	
55	15	Niminal Thickness of Insulation	As per table 1 OF BS	: 5308				
ΣË	16	Color of Conductor Insulation	As per BS: 5308 (Tat	ole 11)				
I	17							-
~ -	18	Material	Extruded Fire Resista	nt (FR), TM	11 PVC to IS-5	831, as pe	er BS: 6746	5
Ш÷	19	Nominal Thickness (in mm)	As per table 10 & CL.	13.3 of BS	5 5308: Part 2	: 1986		
N D	20	Lead Jacket Thickness	N/A					
= 2	21	Color	Red					
<u> </u>	22	Matavial	Alizzation in a star 1.1	Mula / 2	li sakan ke se e			
Ι.	23	Material	Aluminium backed by	/ Mylar / Po	nyster tape			
٦Ľ	24	Rinder Tape Material						
125	25		Min 25% on oither a	ido				
58	20	Coverage	Mill. 25% Off either s	lue				
E D	27	Drain Wire	Multi-strand baro tin	and anneal	od Coppor con	ductor		
Z	20	Drain Wire Cross section	0.5 mm ² minimum	leu anneaid	eu copper con	uuctoi		
	30	Drain wire cross section	0.5 1111- 1111111111					
_	31	Material	Aluminium backed by	Mylar / Po	lyster tane			
12	32	Nominal Thickness (in mm)	0.05 mm minimum	riyidi / i c	hyster tape			
Ę	33	Binder Tape Material	Non-Hygroscopic Tar	e				
ŝ	34	Overlap	Min. 25% on either s	ide				
1	35	Coverage	100%					
₽	36	Drain Wire	Multi-strand bare tin	ned anneal	ed copper con	ductor		
E S	37	Drain Wire Cross section	0.5 mm ² minimum					
ō	38							
~ -	39	Material	Extruded Fire Resista	nt (FR), TM	11 PVC to IS-5	831, as pe	er BS: 6746	5
μËΨ	40	Color	Orange					
Σ¥	41	Nominal Thickness (in mm)	As per table 10 & CL.	13.3 of BS	5 5308: Part 2	: 1986		
0 7	42							
0	43	Armour Material	Galvanised steel wire	as per cl.	13.2.2 of BS 5	308:Part2	: 1986	
žu	44	Armour Wire Size	BS: 5308, (Table 10)	·				
A -	45							
	46	Overall Outer Diameter (with Tolerance)	*					
	47	Under Armour Diamater	*					
	48	Over Armour Diamater	*					
1	49	Weight (in Kg / Km)	*					
	50	Min. Bending Radius	*					
RS	51	Rip Cord	Non-metallic under in	nner jacket				
Η	52	Max. Recommended Pulley Tension	*					
6	53	Oxygen Index	30 % minimum as pe	er ASTM D	2863			
–	54	Temperature Index	250 °C minimum as	per ASTM D	2863			
1	55	Sequential Marking on Outer Sheath	Length marking ever	y meter				
1	56	Drum Length	*					
1	57	Tolerance	± 5%					
<u> </u>	58							
Notes	:: To b	e decided **						
1	Vende	or to specify.*	A NA MAC CRC FRIG C					
2	Keter	stanuard specification for Instrument Cable do	C. NO. VPC-SPC-5310 for	r more info	rmation .			
3	Cable	Tag number shall be same as instrument tag i	number.					
4	Saret	y Cables shall be FIFE RESISTANT Type.						
<u> </u>								
<u> </u>								
<u> </u>								
<u> </u>								
		10		01	02 06 2022	۵ĸ	SV/	KNC
1		CLIENT: ASSAM GAS COMPANY LTD		00	27.02.2022	KS	VR	KNC
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			INSTRU	MENT - MULTI - TRIA	AD CABLE				P	Rev.
	1	Cable Identifica	ition	PVC/OSCR-AL/FR/PV0	C/SWA/PVC					
	2	Number of Pairs	5	6T	., ,					
-	3	Cable Length		Refer SOR						
R	4	Number of Twis	sts per Meter	10 minimum						
۳	5	Application		F&G Cables						
E	6	Voltage Grade		500 V						
Ŭ	7	Code Confirmity	d.	BS 5308: part 2: 198	6 type 2 & IS 155	4 nart1 armou	red cables	IS-8130/8	4	
	8	Code Identificat	tion	Black and White (as n	or BS-5308 nart	-2 1086)	irea cabies,	15 0150/0	-	
-	0	Type		7 Strandod, oach stra	nd of 0 52 mm di	2, 1900)				
Ê	10	Conductor Sizo		1 5 Ca mm		a				
<u>ے</u> د	10	Material		1.3 Sq.mm	lutia Connor Con	ductor BC+ 620				
₽ "	11	Material		Fiain Annealed Liectio	livit copper com	uuctor, 55. 050	50, Class 2,			
8	12									
	13				DO (746)		200			
₹_	14	Material		PVC Type III (as per	BS: 6746), as rei	rerrea in BS: 5	308			
36	15			As per table 1 OF BS:	5308					
SN E	16	Color of Conduc	ctor Insulation	As per BS: 5308 (Tab	le 11)					
Ħ	1/									
	18	Material		Extruded Fire Resistar	nt (FR), TM1 PVC	to IS-5831, as	s per BS: 67	746,		
E	19	Nominal Thickn	ess (in mm)	As per table 10 & CL.	13.3 of BS 5308:	Part 2: 1986				
ΞÒ	20	Lead Jacket Thi	ckness	N/A						
ΞĂ	21	Color		Red						
L	22									
1	23	Material		Aluminium backed by	Mylar / Polyster I	tape				
L ا	24	Nominal Thickn	ess (in mm)	0.05 mm minimum						
Ър	25	Binder Tape Ma	terial	Non-Hygroscopic Tape	e					
LC 교	26	Overlap		Min. 25% on either si	de					
12 H	27	Coverage		100%						
15 10	28	Drain Wire		Multi-strand bare tinn	ed annealed Cop	per conductor			_	ſ
Ξ.	29	Drain Wire Cros	ss section	0.5 mm ² minimum						
	30									
0	31	Material		Aluminium backed by	Mylar / Polyster 1	tape				
3	32	Nominal Thickn	ess (in mm)	0.05 mm minimum						
Ē	33	Binder Tape Ma	terial	Non-Hygroscopic Tape	9					
S	34	Overlap		Min. 25% on either si	de					
1	35	Coverage		100%						
₹	36	Drain Wire		Multi-strand bare tinn	ed annealed copr	per conductor				
Ē	37	Drain Wire Cros	ss section	0.5 mm ² minimum						
6	38									
	39	Material		Extruded Fire Resista	nt (FR) TM1 PVC	to IS-5831 as	s per BS: 67	746		
1 H U	40	Color		Orange			, p			
5 ġ	41	Nominal Thickn	ess (in mm)	As per table 10 & CL.	13.3 of BS 5308:	Part 2: 1986				
0 5	42									
~	43	Armour Materia	1	Galvanised steel wire	as per cl 13 2 2	of BS 5308-Pa	rt2: 1086			
DO	44	Armour Huteriu		BS: 5308 (Table 10)	us per en 15.2.2	01 00 0000.10	112. 1900			
NN	44	Armour wire Siz	ze	201 0000) (10010 10)						
٩	45	Oursell Outset D	······	*						
	40	Overall Outer D		*						
	47	Under Armour L	Diamater							
1	48	over Armour Di	lamater							
1	49	weight (in Kg /	Km)							L
Ś	50	Min. Bending Ra	adius	*						L
H	51	KIP Cord		Non-metallic under in	ner jacket					L
Ē	52	Max. Recomme	naea Pulley Tension	*	10711 5 2222					L
5	53	Oxygen Index		30 % minimum as pe	r ASTM D 2863					
1	54	Temperature In	idex	250 °C minimum as p	er ASTM D 2863					
1	55	Sequential Mark	king on Outer Sheath	Length marking every	meter					
1	56	Drum Length		*						
1	57	Tolerance		± 5%						
	58									
Notes	: To b	e decided **								
1	Vendo	or to specify.*								
2	Refer	standard specifi	cation for Instrument Cable doc.	No. VPC-SPC-5310 for n	nore information .					
3	Cable	e Tag number sha	all be same as instrument tag nur	nber.						
4	Safet	y Cables shall be	e Fire Resistant type.							
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	1	lag N	Number				**						
	2	Quan	tity				Refer SOR	<u></u>					
	3	Appli	cation				For Termination	Cables					
	4	Suita	ble for				Multipair cable*	*					
	5	Area	Classification				Zone 1 Group II	A /IIB as	per IEC, T3				
AL	6	Enclo	sure Rating			EEx'd' (Explosio	n Proof)						
ER	7	Ingress Protection					WP to IP-65 as	per IEC-6	0529 / IS-214	47			
N	8	Material of Construction					Corrosion resist	ant , Cast	Aluminum Ll	M6 /25	or FRP		
B	9	Overa	all Dimension				*						
	10	Cove	r				Bolted						
	11	Painti	ing / Finish				Blue						
	12	Ratin	g				Upto 500 VAC						
	13		-										
	14												
	15				Left Side		5 Nos., 3/4" NP	TF					
	16				Right Side		3 Nos., 1/2" NP	TF					
	17	Νοο	f Entry		Ton Side		-	••					
ш	18				Bottom Side		-						
BL	10				Other		_						
A	13				ould		Evid' Double C	mproceie	n Typo Proco	with 7	inc/ Nicks		_
щ	20				Туре		nlated	mpi essi0	in type, biass	vvitil Z	IIIC/ INICKE	a	
191	21	Cable	e Gland		Size		3/4 NDTM & 1/2	" NPTM					
NI:	21				05/20		3/ - 11/ 11/ 2 1/ 2	111 111					
	22				νυ Τνης		Evid' Brace with	a Zine/ Ni	ckal plated				
	23	Dives			size		2/4 NDTM 0 1/2	I ZITIC/ INI	ckei piateu				
	24	riugs	•		054		2/4 NPTM 4 M						
	25						JH NEIM- I NO	., 1/2 NP	11"1- 3 INOS.				
	26				Leit Side		-						
	27						-						
	28	No. o	of Entry		Top Side		-						
Е	29				Bottom Side		1 No., 1.5" NPT	F and 1 N	o., 1" NPTF				
AB	30				Other		-						
Ú Ú	31				Туре		Ex'd', Double Co	Double Compression Type, Brass with Zinc/ Nickel					
E		Cable Gland		Gland									
10	32				Size		1.5" NPIM & 1"	NPIM					
~	33				Qty		**						
	34				Туре		Ex'd', Brass with	n Zinc/ Ni	ckel plated				
	35	Plugs	;		Size		1.5" NPTM & 1"	NPTM					
	36				Qty		1.5" NPTM- 1 No. & 1" NPTM- 1 No.						
	37	Type					Spring Loaded,	anti-loose	ening, vibratio	on proo	f, screwle	SS	
S		.,					clamp type						
AL	38	Quan	tity				41 Nos.						
IN	39	No. o	of Rows				1 no. *						
RM	40	Numb	bering System				lerminal strip and terminals shall be suitably numbered						
ΠE	41	Size	Size				2.5 mm ²						
-	42	Make					1 ^m						
	43												
	44	Earth	Earthing Busbar (Internal)				Required						
ES	45	Earth	ing Screw (External)			Required						
RI	46	Rail(s	s) for Terminals				Required						
SO	47	PVC S	Shroud along with C	able Gland			Required						
ES	48	Name	eplate Fixture				Required						
8	49	Gask	et				Required						
•	50	Moun	iting				Suitable for mou	unting on	wall, column	and ste	eel structu	ure	
	51												
S	52	Manu	Ifacturer				*						
ER	53	Mode					*						
Ŧ	54	Certif	fication				DGMS & PESO c	ertified					
0	55												
Note	es: To	o be decided **											
1	Vendo	dor to specify.*											
2	Refer	stand	ard specification for	Junction B	ox doc. No. V	/PC-SF	PC-5311 for more	e informat	tion .				
3	Materi	rial certificates shall be provided by the Vendor.											
Δ	Vendo	dor to provide General Arrangement Drawing of JB supplied, indicating dimension, layout etc. and hazardous area ifficates.											
4	certific												
			<u></u>	466411				01	02.06.2022	AK	SV	KNC	
1			CLIENT:	ASSAM G	AS COMPANY	LID		00	27.02.2020	KS	VB	KNC	
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VCS Quality Services Pvt. Ltd.

STANDARD SPECIFICATION FOR INSTRUMENTATION CABLES

VCS-SS-IN-5801_02

02	11.05.2022	AK	AS	SV	KNC
01	18.01.2020	RB	VB	KNC	AD
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Rev. No	Date	Prepared By	Checked By	Approved By	Authorized By

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	REVISION RECORD								
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01	18 01 2020					Format change and document			
01 18.01.2020		Rakesh Bhardwaj	Vinod Babu	Kedarnath Chakraborty	Anupam Das	numbering is revised.			
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02	11.05.2022	Amita Kumari	Anmol Saxena	Sarita Verma	Kedarnath Chakraborty	Integration			



ABBREVIATION

ASTM	American Society of Testing and Materials
AWG	American Wire Gauge
BS	British Standards
DC	Direct Current
DIN	Deutsches Institute for numbering
EPR	Ethylene Propylene Rubber
F&G	Fire and Gas
IEC	International Electro-technical Commission
IS	Indian Standards
PVC	Polyvinyl Chloride



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10	DOCUMENTATION	12



1 SCOPE

This Standard Specification, together with the Data Sheets attached herewith, establishes the minimum technical and functional requirements for design, engineering, materials, fabrication, painting, inspection and testing, documentation, marking, packing and shipping of Cables along with its spares and accessories.

2 **DEFINITIONS**

For the purpose of this document, the words and expressions listed below shall have the meanings assigned to them as follows:

Owner/ Purchaser/ Company	Owner of the particular Project (Project Specific).
Consultant	The party which comes out all or part of the engineering, procurement, construction, pre- commissioning and assistance for commissioning, monitors and controls the overall project management.
Bidder/ Manufacturer / Supplier / Vendor	The party(s) which manufactures and / or supplies material, equipment, technical documents / drawings and services to perform the duties specified by Contractor.
Works/ Shop	The place where the ITEM / UNIT is fabricated and tested and transported to Purchaser.
Datasheet	Technical data provided by the Purchaser / Owner / Company.
Standard Specification	Specifications Developed as Standard by the Company.
Job Specification	Specifications Developed pertaining to particular project / Job in regard.
Material Requisition	Requisition as raised to Supplier for Quotation of the item
Purchase Requisition	Requisition as raised to Supplier for Procurement of the item
Purchase Order	Legal Order supplied to Supplier for procurement of the Engineered Item
Site	The work place where the equipment is installed and commissioned.



3 REFERENCE DOCUMENTS

3.1 Codes & Standards

The related standards referred to herein and mentioned below shall be of the latest editions prior to the date of the Purchaser's enquiry.

IEC-332-3 Part 3	Tests on bunched wires and cables
IEC 584-3 Part	Extension and compensating cables – Tolerances identification system
IEC-60332 Part 3	Tests on electric and optical fibre cables under fire conditions - Test for vertical flame spread of vertically mounted bunched wires or cables
IEC-60331	Fire-Resisting Characteristics of Electric Cables
ASTM D 2863	Test method for measuring the minimum oxygen concentration to support candle like combustion of plastics (Oxygen index)
BS-5308 Part 1	Specification for Polyethylene insulated cables
BS-5308 Part 2	Specification for PVC insulated cables
DIN-50049	Document on Material Testing
IS-1554 Part 1	PVC insulated (heavy duty) electric cables-working voltage up to and including 110 V
IS-2633	Method for testing uniformity of coating on zinc coated articles
IS-3975	Mild steel wires, formed wires and tapes for armouring cables
IS-5831	PVC insulation and sheath of electric cables
IS-8784	Thermocouple compensating cables

3.2 Order of Precedence

In the event of conflict between Specifications, Data sheets, related standards, codes etc., the order of precedence shall be as follows:

- a. Data sheets
- b. Job Specifications
- c. Standard Specifications
- d. Codes and Standards

Vendor shall refer the matter to the Purchaser for clarification and only after obtaining the approval in writing, the same should proceed with the manufacture of the items in question.



4 MATERIALS

Materials selected shall be in accordance with the Data Sheets and Company's Standard Specifications. Type and material of extension Cable shall be as per IS-5831 and IEC 584-3 where applicable.

Cable cores shall be of annealed electrolytic tinned copper conductor with PVC jackets conform to IS-5831. Insulation shall be Mica-glass / EPR or silicon rubber for F&G. signal/control Cables. Armouring shall be of galvanized steel wire / strip armour conforming to IS-1554. Screening / shielding shall be of black Aluminium backed Mylar / Polyester foil.

5 DESIGN

The following design requirement covers the general requirements of Instrument Cables and accessories etc., but for the exact requirements and applications, the relevant, specific job Specifications and design basis shall be referred and complied.

5.1 Signal and Control Cables

5.1.1 Type – I (Single Pair / Triad Shielded Cable)

Each core shall be 1.5 mm2, made of 7 stranded annealed electrolytic copper conductor. Each strand shall be 0.53 mm dia.

Primary insulation shall be 85°C polyvinyl chloride (PVC) as per IS-5831 Type-C. Thickness shall be 0.5 mm minimum.

A pair or triad shall have twisted cores and number of twists shall be not less than 10 per meter. Colour of core insulation shall be black-blue in pair and black-blue-brown in a triad.

Individual pair and triad shall be shielded. Shield shall be Aluminium backed by Mylar / polyester tape with the metallic side down helically applied with either side 25 % overlap or 100% coverage. Minimum shield thickness shall be 0.05 mm. Drain wire shall be 0.5 mm2 multistrand bare tinned annealed copper conductor. The drain wire shall be in continuous contact with Aluminium side of the shield.

Inner and outer jacket shall be made of extruded flame retardant 90°C PVC to IS 5831 - Type ST2. Oxygen index of PVC shall be over 30 %. Temperature Index shall be over 250°C. The thickness of the jacket shall be as per IS-1554 Part-1.

Inner jacket colour shall be black. Outer jacket colour shall be black, except for cables to be used in intrinsically safe systems it shall be light blue. A rip cord shall be provided for inner jacket.

Armour over inner jacket shall be of galvanized steel wire / flat as per IS-1554 Part-1.

Tolerance in overall diameter of cable shall be within ± 2 mm over offered value.

5.1.2 Type – II (Multipair / Multitriad Cable with Individual Pair Shield and Overall Shield)

- a. Generally the Cable shall be same as single pair shielded Cable except conductor sizes shall be 0.5 mm2 made of 7 strands of annealed electrolytic copper conductor. Each strand shall be of 0.3 mm dia.
- b. Overall shield shall be of Aluminium backed up by Mylar / polyester tape helically applied with the metallic side down with either side 25% overlap or 100% coverage. Minimum shield thickness shall be 0.075 mm. Drain wire shall be similar to individual pair drain wire and shall be of the overall shield.
- c. Overall twist of all pair / triads shall be as per Vendor's standard.



- d. A pair of communication wire shall be provided for multipair / multitriad cables. Each wire shall be 0.5 mm2 of plain annealed single or multistrand copper conductor with 0.4 mm thick 85°C PVC insulation. Insulation shall be green and red colour coded.
- e. Pair identification shall be with numbers at interval of not more than 250 mm as per vendor's standards.
- 5.1.3 Type III (Multipair / Multitraid Cable with Only Overall Shield)
 - a. These Cables shall be same as type-II cables except that the individual pair / triad shall not have shielding.
- 5.1.4 Type IV (Multipair / Multitriad Cable with Individual Pair Shield and Overall Shield)
 - a. The Cable shall be same as Type II except conductor size shall be 1.5 mm2 made of 7 stranded annealed electrolytic copper conductor. Each strand shall be of 0.53 mm dia.
- 5.1.5 Type V (Multipair / Multitriad Cable with Overall Shield only)
 - a. The Cable shall be same as type IV except that the individual pair / triad shall not have the shielding.
- 5.2 Fire and Gas Cables shall be fire resistant and shall meet all the Specifications mentioned above and:
 - a. Insulation shall be Mica-Glass / EPR or silicon rubber.
 - b. The inner sheath shall be applied with a low smoke fire resisting compound.
 - c. Suitable filler material (if necessary) shall be filled.
 - d. Outer sheath shall be made up of low smoke, heat and oil resistant and flame retardant material.
 - e. Circuit integrity of the Cable shall be maintained for a minimum period of 3 hours as per IEC-60331.
 - f. The outer jacket colour shall be orange.

5.3 Thermocouple Extension Cables

Type and material of extension cable shall be as per IS-5831 and IEC-584-3 where applicable.

- 5.3.1 Type I (Single Pair Shielded Cable)
 - a. Each core shall be made of 16 AWG solid conductors.
 - b. Primary insulation shall be 85°C polyvinyl chloride (PVC) as per IS 5831 Type C. Thickness shall be 0.5 mm minimum. Colour coding shall be as per IS-8784 Table-5.
 - c. The cores of the pair shall be twisted and number of twists shall be not less than 10 per meter. The pair shall be shielded. Shield shall be Aluminium backed by Mylar / polyester tape bonded together helically applied with the metallic side down with either side 25% overlap and 100% coverage. Minimum shield thickness shall be 0.05 mm. Drain wire shall be 0.5 mm2 multistrand bare tinned annealed copper conductor. The drain wire shall be continuous contact with Aluminium side of the shield.
 - d. Inner and outer jacket shall be made of extruded flame retardant 90°C PVC to IS 5831- Type ST2. Oxygen index of PVC shall be over 30 %. Temperature index shall



be over 250°C. The thickness of the jacket shall be as per IS-1554 part-1. Inner jacket and outer jacket colour shall be as per IS-8784. A rip cord shall be provided for inner jacket.

- e. Armour over inner jacket shall be of galvanized steel wire/flat as per IS-1554 Part-I.
- f. Tolerance in overall diameter of cable shall be within ± 2 mm over offered value.
- 5.3.2 Type II (Multipair Cable with Individual Shield and Overall Shield)
 - a. The Cable shall be same as single pair shielded cable except for following;
 - i. Each core shall be 20 AWG solid conductor.
 - ii. In addition to individual pair shield overall shield shall be provided. Overall shield shall be of Aluminium backed up by Mylar / polyester tape helically applied with metallic side down either side 25% overlap or 100% coverage. Minimum shield thickness shall be 0.075 mm. Drain wire shall be similar to individual pair drain wire and shall be in continuous contact with the aluminium side of the overall shield.
 - iii. Overall twist of all pair shall be as per Vendor's standard.
 - iv. A pair of communication wire shall be provided for multipair cables. Each wire shall be 0.5 mm2 of plain annealed single or multistrand copper conductor with 0.4 mm thick 85°C PVC insulation. Insulation shall be green and red colour coded.
 - v. Pair identification shall be with numbers at interval of not more than 250 mm as per Vendor's standard.
- 5.3.3 Type III (Multipair Cable with Individual Pair Shield and Overall Shield)

a. The Cable shall be same as type II except conductor size shall be 16 AWG.

5.4 Electrical Characterstics

- 5.4.1 Cable parameters L/R ratio, capacitance shall conform to intrinsic safety requirements for IS cables. Limitations for cable parameter shall be as follows:
 - a. Maximum DC resistance of the conductor of the completed cable shall not exceed 12.3 Ω /km at 20°C for cables with 1.5 mm2 conductors and 39.7 Ω /km at 20°C for cables with 0.5 mm2 conductors.
 - b. Mutual capacitance between any core and screen shall not exceed 250 pF/m at 1 KHz. Capacitance between any cores or screen shall not exceed 400 pF/m at 1 KHz.
 - c. L/R ratio of adjacent core shall not exceed 40 $\mu H/\Omega$ for cables with 1.5 mm2 conductors and 25 $\mu H/\Omega$ for cables with 0.5 mm2 conductors.
 - d. Electrostatic noise rejection ratio shall be minimum 76 dBA.
 - e. Drain wire resistance including screen shall not exceed 30 Ω /km.
 - f. Core inductance shall not exceed 4 mH/Km.
 - g. Values shall be derived under the fault condition in the cable which produces the worst case parameters for intrinsic safe cables.
 - All Cables shall have insulation voltage rating of 600 / 1100 V.



5.5 Name Plate

All Instrument Cable shall be marked as per Manufacturer's standard and shall have a permanently attached stainless steel plate with the following, as a minimum detail:

- a. Tag number as per Data Sheet;
- b. Manufacturer's name;
- c. Details of the Cable;
- d. Length of the Cable in meters contained in the drum;
- e. Gross weight;
- f. Direction of rotation of drum for unwinding by means of an arrow;
- g. Purchase Order number.

6 FABRICATION AND PAINTING

Vendor shall obtain approval in writing from the Purchaser before start of fabrication of Cables. Vendor shall submit the required Specification, drawings & documents for approval. Also Vendor shall refer the relevant codes and standards for manufacturing herein.

7 INSPECTION AND TESTING

Vendor shall perform all inspection and testing as per Job Specification requirements, and as per relevant codes, prior to shipment. The inspection and testing for Instrument Cables shall be carried out as per approved Inspection and Test Plan. Vendor shall submit the Inspection and Testing for Approval. Vendor shall submit the test certificates to the Company for the tests conducted during the manufacturing process like hydro test, material test, hazardous area certification test, and any other before Factory Acceptance Testing (FAT).

7.1 Factory Acceptance Testing (FAT)

Prior to FAT, Vendor shall submit to the Company a detailed FAT procedure, for review and approval, listing all the Instrument Cables, complete with the project approved tags, and highlighting the inspection and testing requirements of all such devices. FAT shall be carried out as per approved Inspection and Test Plan. FAT shall be carried out prior to shipment of the Instrument Cables.

FAT procedures shall be submitted at least 4 weeks prior to FAT testing taking place. FAT shall be carried out at the manufacturing facilities. The tests shall be witnessed by the Company or their approved representative. FAT procedure will be signed off by the Vendor and Company or their approved representative at the successful completion and conclusion of testing.

The FAT shall be consisting of the following as a minimum:

- 7.1.1 Standard Type Test certificate shall be furnished for Cables similar to those being offered,
 - a. Cable shall be flame retardant to IEC-60332 part-III category A.
 - b. Cables required for F&G applications shall be as per IEC-60331.



- 7.1.2 Standard Routing Test (to be carried out by the manufacturer during various stages of manufacturing, test certificates shall be furnished)
 - a. Insulation resistance, voltage test and spark test as per 8S-5308 part-II and sheath test as per IS-5831;
 - b. Armor test as per IS-3975;
 - c. Cable capacitance, L/R ratio and inductance test;
 - d. Conductor resistance test in Ohms/km;
 - e. Thermo emf tests for thermocouple extension cables.
- 7.1.3 Standard Acceptance Test shall be carried out in the presence of Purchaser or his authorized representatives,
 - a. Continuity test;
 - b. Voltage test as per 8S-5308 part-II;
 - c. L/R ratio and capacitance values test;
 - d. Oxygen index test as per ASTM D 2863 latest edition;
 - e. Conductor resistance and drain wire resistance;
 - f. Dimensional check for overall diameter and under armor lover armor diameter;
 - g. Fire resistant test / certificate review (when specified);
 - h. Tests for uniformity of galvanization of armor as per IS-2633;
 - i. Check for drum length and overall length tolerances.

7.2 Site Acceptance Testing (SAT)

A SAT shall be carried out on completion of the installation of the Cables at site which shall be witnessed by the company / owner's representative. SAT shall be performed as per the approved test procedure. A comprehensive test procedure in compliance with the company specification shall be developed and issued to company / owner for review and approval.

The Site Acceptance Test (SAT), in general, shall demonstrate that the Cables functions correctly and properly in accordance with the specified requirements. SAT mainly consists of the following inspections:

- a. Continuity test
- b. Conductor resistance and drain wire resistance
- c. Drum length and overall length tolerances
- d. Any other test, if required.

8 MARKING, PACKING AND SHIPMENT

Following FAT completion, Vendor ensure that all Cables, associated materials and accessories are designed properly, marked and packed, and secured for transit to site without damage.

Vendor shall provide and submit his standard "Marking, Packing and Shipping Procedures" for review by Company / Owner.

Vendor shall specify any conditions, normal or special, to be verified in intermediate storage and during transport.



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

Cables shall be dispatched in wooden drums, securely battened with take-off end fully protected against damage

The ends of the Cable shall be sealed with suitable PVC / Rubber caps to prevent ingress of moisture.

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

9 SPARES AND ACCESSORIES

The following spare philosophy shall be followed in case it is not covered in Job Specification.

The Vendor shall include recommended Spare Parts List for start-up, precommissioning and two years operation as per the following;

- a. Itemized recommended spare parts list for start-up and pre-commissioning.
- b. Itemized recommended spare parts list for two years operation.

Vendor shall recommend accessories and special tools required for operation and maintenance of Instrument Cables for Company review.

All the spare parts furnished by Vendor shall be wrapped and packaged to preserve an original as-new condition under normal conditions of storage. The same parts shall be properly tagged with stainless steel tags and coded so that later identification as to their intended equipment usage shall be clear.

All items supplied shall be packaged separately and clearly marked as "Spare Parts" and shipped with the equipment.

10 DOCUMENTATION

The following documentation shall be fulfilled by the Vendor, if it is not covered in Job Specification.

10.1 Documentation Required with Technical Bid

During bidding stage Vendor shall submit in his offer the following documents as a minimum:

- a. Standard Specification, Data Sheets;
- b. Bill of Materials including Vendor list, details of third party items;
- c. Catalogues and Manuals;
- d. Quality Assurance Plan;
- e. Any other documents.

10.2 Documentation Required for Approval

Upon placement of Purchase Order, Vendor shall submit as a minimum the following drawings, documents and specifications for the Company's approval:

- a. Specifications, Data Sheets;
- b. Bill of materials including Vendor list, details for third party items;



- c. Catalogues, Manuals and relevant drawings and documents;
- d. Dimensional drawings;
- e. Material test certificates;
- f. Procedures for FAT;
- g. Quality Assurance Plan;
- h. List for spare parts for start-up and for 2 years of operation.

10.3 Guarantee & Warranty

Vendor shall guarantee that the complete scope of supply shall be safely and reliably meet all of the requirements of this Company Specification.

Vendor shall provide warranty support for a period of 12 months from the date of supply or 18 months from the date of manufacturing. Warranty shall apply to defective material workmanship and facility design .The cost of correction / replacement of any warranty items shall be borne by the Vendor, as per the purchase conditions of the Material / Purchase Requisition.

The Job specifications / Data sheets shall be referred for any specific warranty / guarantee.



VCS Quality Services Pvt. Ltd.

STANDARD SPECIFICATION FOR JUNCTION BOXES AND CABLE GLANDS

VCS-SS-IN-5802_02

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ABBREVIATION

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
FAT	Factory Acceptance Test
IEC	International Electro-technical Commission
IP	Ingress Protection
IS	Indian Standards
ISO	International Organization for Standardization
NACE	National Association of Corrosion Engineers
SAT	Site Acceptance Test



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1 SCOPE

This Standard Specification, together with the Data Sheets attached herewith, establishes the minimum technical and functional requirements for design, engineering, materials, fabrication, painting, inspection and testing, documentation, marking, packing and shipping of Junction Boxes and Cable Glands along with its accessories which include the following types:

- a. Electrical junction boxes
- b. Pneumatic junction boxes
- c. Cable glands.

2 **DEFINITIONS**

For the purpose of this document, the words and expressions listed below shall have the meanings assigned to them as follows:

Owner/ Purchaser/ Company	Owner of the particular Project (Project Specific).
Consultant	The party which comes out all or part of the engineering, procurement, construction, pre- commissioning and assistance for commissioning, monitors and controls the overall project management.
Bidder/ Manufacturer / Supplier / Vendor	The party(s) which manufactures and / or supplies material, equipment, technical documents / drawings and services to perform the duties specified by Contractor.
Works/ Shop	The place where the ITEM / UNIT is fabricated and tested and transported to Purchaser.
Datasheet	Technical data provided by the Purchaser / Owner / Company.
Standard Specification	Specifications Developed as Standard by the Company.
Job Specification	Specifications Developed pertaining to particular project / Job in regard.
Material Requisition	Requisition as raised to Supplier for Quotation of the item
Purchase Requisition	Requisition as raised to Supplier for Procurement of the item
Purchase Order	Legal Order supplied to Supplier for procurement of the Engineered Item
Site	The work place where the equipment is installed and commissioned.



3 REFERENCE DOCUMENTS

3.1 Codes & Standards

The related standards referred to herein and mentioned below shall be of the latest editions prior to the date of the Purchaser's enquiry.

ASME B1.20.1	Pipe Threads
DIN 50049	Document on Material Testing
IS 5	Colours for ready mixed paints and enamels.
IS 2147	Degree of Protection provided for Enclosures
IS 2148	Flame proof Enclosure of Electrical Apparatus.
IEC 529	Degree of Protection by providing Enclosures
IEC 79	Electrical Apparatus for Explosive Gas Atmosphere
EN 837	Pressure Gauges Part-t: Bourdon Type Pressure Gauges, Dimensions, Metrology, Requirements and Testing

3.2 Order of Precedence

In the event of conflict between Specifications, Data sheets, related standards, codes etc., the order of precedence shall be as follows:

- a. Data sheets
- b. Job Specifications
- c. Standard Specifications
- d. Codes and Standards

Vendor shall refer the matter to the Purchaser for clarification and only after obtaining the approval in writing, the same should proceed with the manufacture of the items in question.

4 MATERIALS

Materials selected of the Junction Boxes and Cable Glands shall be in accordance with the Data Sheets and Standard Specifications. For corrosion service the material selected shall be in compliance with the requirements of NACE MR-0175 / IS0-15156 latest editions.

5 DESIGN

5.1 Junction Boxes

Junction Boxes shall be either of the following type as specified in Data Sheets.

- a. Weather proof Junction Boxes.
- b. Weather proof and flameproof Junction Boxes.



The enclosure shall be as per IS-2147 and IP-65 for weather proof Junction Boxes and for flameproof it shall be as per IS-2148 suitable for the area classification specified.

Number of entries and locations shall be as per Data Sheets and all the cable entries shall be bottom entries.

Junction Boxes shall be provided with telephone sockets and plugs for connection of hand powered telephone set.

5.1.1 Electrical Junction Boxes

Material shall be die-cast aluminium of minimum 5 mm thick (LM-6 alloy)

Flame proof Junction Boxes shall have detachable cover which is fixed to the box by means of cadmium plated triangular head /hexagonal head screws.

Weatherproof Junction Boxes shall have doors which shall be hinged type and these shall be fixed by plated countersunk screws.

Flameproof Junction Boxes shall have a warning engraved/integrally cast on the cover as given below;

"Isolate power supply elsewhere before opening."

Terminals shall be spring loaded, vibration proof, clip- on type, mounted on nickel plated steel rails complete with end cover and clamps for each row.

All terminals shall be suitable for accepting minimum 2.5 sq. mm copper conductor, in general. However, for power supply distribution boxes, terminal detail shall be as per job specification/data sheets.

The Junction Box shall be sized for termination of all cores and screens including spares without the need for more than 1 core per terminal. In addition a minimum of 10 % spare terminals shall be provided, unless specified otherwise in Data Sheet.

The Junction Boxes shall have sufficient space to ensure ease of termination. Sizing shall be done with due consideration for accessibility and maintenance in accordance with the following guidelines;

- a. 50 to 60 mm between terminals and sides of box parallel to terminal strip for upto 50 terminals and additional 25 mm for each additional 25 terminals.
- b. 100 to 120 mm between terminals for up to 50 terminals and additional 25 mm for each additional 25 terminals.
- c. Bottom/top of terminal shall not be less than 100mm from bottom/top of the Junction Box.

Terminals shall be marked as per various types indicated in Data Sheets.

Shall be provided with external earthing lugs.

5.1.2 Pneumatic Junction Boxes

Pneumatic Junction Boxes shall be made of 3 mm thick hot rolled steel. They shall have necessary neoprene gasket between door and body. Door shall be flush with the box and shall be hinged type and provided with wing nuts.

Single tube entries shall be suitable for 6 mm 0.0 copper tube with bulk head fittings. Multi tube bundle entry shall be suitable for the data furnished in Data Sheets.

5.2 **Cable Glands, Plugs and Reducers / Adaptors**

Cable Glands shall be supplied by Vendor whenever specified.

Cable Glands shall be double compression type for use with armoured cables.


The Cable Glands shall be of nickel plated brass material unless specified otherwise in Data Sheet.

The Cable Glands shall be weather proof. Whenever specified they shall also be flameproof and certificate from statutory body shall be furnished.

Cable Glands shall be supplied to suit the Cable dimensions indicated along with tolerance indicated in Data Sheets. Various components like rubber ring, metallic ring, metallic cone and the outer/inner nuts etc. shall be capable of adjusting to the above tolerances of Cable dimensions.

Each Cable Gland shall be supplied as a kit complete with locknut, shroud, and earth tag and sealing washer with proper identification of Gland size. Shrouds provided for additional protection to the Cable Gland termination. Earth tag shall be of nickel plated brass material.

Reducers/Adaptors shall be supplied as per details indicated in Data Sheets. They shall be nickel plated brass. These shall be weather proof in general. These shall also be flame proof wherever specified and certificate from statutory body for flame proofness shall be furnished.

Stopper plugs to seal spare cable entries in the Instrument Junction Boxes shall be provided wherever specified in Data Sheet. They shall be of nickel plated brass for metallic Junction Boxes and glass fibre reinforced polyamide for non-metallic junction boxes.

Plugs shall be certified flameproof when used with Flameproof Junction Boxes.

All Cable Glands and accessories such as reducers, adaptors, stopper plugs shall be stamped with type and size of Cable Glands, type and size of entry thread and the relevant approval details.

5.3 Name Plate

All Junction Boxes shall be marked as per Manufacturer's standard and shall have a permanently attached stainless steel plate with the following, as a minimum detail:

- a. Tag number as per Purchaser's Data Sheets.
- b. Type of enclosure such as terminal capacity, size, IP rating, serial no etc.
- c. Name of Manufacturer.
- d. Type of explosion protection (as applicable)
- e. Name of certifying agency and certificate number

The Tag no shall be generally white character on red background for fire & gas, white character on blue background for intrinsically safe circuits and black character on white background for all other applications.

6 FABRICATION AND PAINTING

Vendor shall obtain approval in writing from the Purchaser before start of fabrication of Junction Boxes and Cable Glands .Vendor shall submit the required Specification, drawings & documents for approval. Also Vendor shall refer the relevant codes and standards for manufacturing herein. Painting of Junction Box shall be in accordance with Standard Painting Specifications.

Surface shall be prepared for painting. It shall be smooth and devoid of rust and scale

Two coats of lead - free base primer and two final coats of lead free epoxy based paint shall be applied both for interior and exterior surfaces.



The colour shall be as specified in Data Sheets.

7 INSPECTION AND TESTING

Vendor shall perform all inspection and testing as per Job Specification requirements, and as per relevant codes, prior to shipment. The inspection and testing for Junction Box and Cable Glands shall be carried out as per approved Inspection and Test Plan. Vendor shall submit the Inspection and Testing for Approval. Vendor shall submit the test certificates to the Company for the tests conducted during the manufacturing process like Certificate from statutory body for suitability to install in specified area classification, dimensional test report, material test, calibration test and any other before Factory Acceptance Testing (FAT).

7.1 Factory Acceptance Testing (FAT)

Prior to FAT, Vendor shall submit to the Company a detailed FAT procedure, for review and approval, listing all the Junction Box and Cable Glands complete with the project approved tags, and highlighting the inspection and testing requirements of all such devices. FAT shall be carried out as per approved Inspection and Test Plan. FAT shall be carried out prior to shipment of the Junction Box and Cable Glands.

FAT procedures shall be submitted at least 4 weeks prior to FAT testing taking place. FAT shall be carried out at the manufacturing facilities. The tests shall be witnessed by the Company or their approved representative. FAT procedure will be signed off by the Vendor and Company or their approved representative at the successful completion and conclusion of testing.

The FAT shall be consisting of the following as a minimum:

- a. Visual inspection
- b. Calibration
- c. Functional test

A certificate to detail the results and records obtained during the FAT shall be made available for ratification by the Vendor on the date of test.

7.2 Site Acceptance Testing (SAT)

A SAT shall be carried out on completion of the installation of the equipment at site which shall be witnessed by the company / owner's representative. SAT shall be performed on the Junction Box and Cable Glands as per the approved test procedure. A comprehensive test procedure in compliance with the company specification shall be developed and issued to company / owner for review and approval.

The Site Acceptance Test (SAT), in general, shall demonstrate that the Junction Box and Cable Glands functions correctly and properly in accordance with the specified requirements.

8 MARKING, PACKING AND SHIPMENT

Following FAT completion, Vendor responsible for the Junction Box and Cable Glands shall ensure that all equipment and associated materials and accessories are designed properly, marked and packed, and secured for transit to site without damage.

Vendor shall provide and submit his standard "Marking, Packing and Shipping Procedures" for review by Company / Owner.

Vendor shall specify any conditions, normal or special, to be verified in intermediate storage and during transport.



Equipment shall be suitably packed including any dismantling, transit fastening and bracing necessary to prevent distortion or damage during transit.

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

Each packing shall have its weight clearly marked on it and shall be identified with the contents, purchase order no and item number.

All entries shall be installed with plastic plugs to prevent unwanted material and insects entering the instrument junction boxes.

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

9 SPARES AND ACCESSORIES

The following spare philosophy shall be followed in case it is not covered in Job Specification.

The Vendor shall include recommended Spare Parts List for start-up, precommissioning and two years operation as per the following;

- a. Itemized recommended spare parts list for start-up and pre-commissioning.
- b. Itemized recommended spare parts list for two years operation.

Vendor shall recommend accessories and special tools required for operation and maintenance of Junction Box and Cable Glands, for Company review.

All the spare parts furnished by Vendor shall be wrapped and packaged to preserve an original as-new condition under normal conditions of storage. The same parts shall be properly tagged with stainless steel tags and coded so that later identification as to their intended equipment usage shall be clear.

All items supplied shall be packaged separately and clearly marked as "Spare Parts" and shipped with the equipment.

10 DOCUMENTATION

The following documentation shall be fulfilled by the Vendor, if it is not covered in Job Specification.

10.1 Documentation Required with Technical Bid

During bidding stage Vendor shall submit in his offer the following documents as a minimum:

- a. Standard Specification, Data Sheets;
- b. Bill of Materials including Vendor list, details of third party items;
- c. Catalogues and Manuals;
- d. Quality Assurance Plan;

10.2 Documentation Required for Approval

Upon placement of Purchase Order, Vendor shall submit as a minimum the following drawings, documents and specifications for the Company's approval:

a. Specifications, Data Sheets;



- b. Bill of materials including Vendor list, details for third party items;
- c. Catalogues, Manuals and relevant drawings and documents;
- d. Dimensional drawings;
- e. Calibration certificates;
- f. Material test certificates;
- g. Procedures for FAT;
- h. Quality Assurance Plan;

10.3 Guarantee & Warranty

Vendor shall guarantee that the complete scope of supply shall be safely and reliably meet all of the requirements of this Company Specification.

Vendor shall provide warranty support for a period of 12 months from the date of supply or 18 months from the date of manufacturing. Warranty shall apply to defective material workmanship and facility design .The cost of correction / replacement of any warranty items shall be borne by the Vendor, as per the purchase conditions of the Material / Purchase Requisition.

The Job specifications / Data sheets shall be referred for any specific warranty / guarantee.



VCS Quality Services Pvt. Ltd.

STANDARD SPECIFICATION FOR FIRE & GAS DETECTORS

VCS-SS-IN-5901_02

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ABBREVIATION

BS	British Standard
CENELEC	European Committee for Electrotechnical Standardization
FG	Flammable Gas
F&G	Fire & Gas
FAP	Fire Alarm Panel
GGDS	Gas Gathering and Distribution Station
HSSD	High Sensitivity Smoke Detector
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
IR	Infra-Red
LASER	Light Amplification by Stimulated Emission of Radiation
LED	Light Emitting Diode
LEL	Lower Explosive Limit
MAC	Manual Alarm Call-point
NACE	National Association of Corrosion Engineers
NFPA	National Fire Protection Association
PLC	Programmable Logic Controller
PO	Purchase Order
PPM	Parts Per Million
SCADA	Supervisory Control And Data Acquisition
SPIR	Spare Parts lists and Inter-changeability Record
SSL	Solid State Logic control system
UV	Ultraviolet
100N	one out of N (any number) logic voting principle



200N	Two out of N (any number) logic voting principle
2003	Two out of Three logic voting principle
EPIC	Engineering, Procurement, Installation and Commissioning
UL	Underwriters Laboratories Inc., USA
FM	Factory Mutual, USA
LPCB	Loss Prevention Certifying Board, UK
VdS	Verband der Sachversicherer e.v, Germany
SSL	Scientific Services Laboratory, Australia
TUV	Technischer Uberwachungs Verein
NPT	Nominal / National Pipe Thread



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1.0 SCOPE

This Standard Specification, together with the Data Sheets attached herewith, establishes the minimum technical and functional requirements for design, engineering, materials, Name plate marking, inspection and testing, documentation, packing and shipping of Fire & Gas Detectors.

2.0 **DEFINITIONS**

For the purpose of this document, the words and expressions listed below shall have the meanings assigned to them as follows:

Owner/ Purchaser/ Company	Owner of the particular Project (Project Specific).			
Consultant	The party which comes out all or part of the engineering, procurement, construction, pre- commissioning and assistance for commissioning, monitors and controls the overall project management.			
Bidder/ Manufacturer / Supplier / Vendor	The party(s) which manufactures and / or supplies material, equipment, technical documents / drawings and services to perform the duties specified by Contractor.			
Works/ Shop	The place where the ITEM / UNIT is fabricated and tested and transported to Purchaser.			
Datasheet	Technical data provided by the Purchaser / Owner / Company.			
Standard Specification	Specifications Developed as Standard by the Company.			
Job Specification	Specifications Developed pertaining to particular project / Job in regard.			
Material Requisition	Requisition as raised to Supplier for Quotation of the item			
Purchase Requisition	Requisition as raised to Supplier for Procurement of the item			
Purchase Order	Legal Order supplied to Supplier for procurement of the Engineered Item			
Site	The work place where the equipment is installed and commissioned.			



3.0 REFERENCE DOCUMENTS

3.1 Codes & Standards

The related standards referred to herein and mentioned below shall be of the latest editions prior to the date of the Purchaser's enquiry.

British Standards

- a. BS 6266, Code of Practice for Fire Protection for Electronic Data Processing Installations.
- b. BS EN50014-39, Electrical Apparatus for Potentially Explosive Atmospheres.
- c. BS 7430, Code of Practice for Earthing.
- d. BS 6755, Testing of Valves Part 2 Fire Type Testing Requirements.
- e. BFPSA, British Fire Protection Systems Association: Code of Practice for Category 1 Aspirating Detection Systems.

Instrumentation Systems and Automation Society (ISA)

a. ANSI/ISA-12.15, Installation, Operation and Maintenance of Hydrogen Sulphide Detection Instruments Part '1 &2

European Standards (EN)

- a. EN 50054, Electrical apparatus for the detection and measurement of flammable gases.
- b. EN 50018, Constructions and Testing Of Electrical Apparatus with Flameproof Enclosures.
- c. EN 10204, Metallic Products Type of Inspection Documents.
- d. BS EN 60529, Degrees of Protection provided by Enclosures.

International Electrotechnical Commission (IEC)

- a. IEC 68-2-34, Vibration Testing for Electrical Apparatus.
- b. IEC 61508, Functional safety of electrical/electronic/programmable electronic safety related systems
- c. IEC 60801, EMC for Industrial Process Measurement and Control Equipment
- d. IEC 61131, Programming Industrial Control Systems

International Organization for Standardization (ISO)

a. ISO-9001, Quality Assurance System - Edition 1994.



National Fire Protection Association (NFPA)

a. NFPA 72, National Fire Alarm Code

Institute of Petroleum (IP)

a. IP 15, Model code of Safe Practice Part-15 (Hazardous Area Classification)

3.2 Order of Precedence

In the event of conflict between Specifications, Data Sheets, related standards, codes etc., and the order of precedence shall be as follows:

- a. Data sheets
- b. Job Specifications
- c. Standard Specifications
- d. Codes and Standards

Vendor shall refer the matter to the Purchaser for clarification and only after obtaining the approval in writing, the same should proceed with the manufacture of the items in question.

4.0 MATERIAL

The material used for the Fire & Gas Detectors shall be SS 316 as minimum unless and otherwise specified in the Specifications / Datasheets.

All field-mounted devices shall be certified for use in hazardous area Zone 1, Gas Group IIC, Temperature Class T6, Ingress Protection IP 65 or better and shall be suitable for dusty, saline, sand laden and H_2S Environment. All Detectors shall be microprocessor based.

Field mounted-detectors, manual alarm call points, beacons and sounders shall be suitable for the ambient conditions as mentioned as per Job Specifications.

Selection of makes and types of field detectors shall be based on Client Preferred Vendor List. Vendor shall indicate in his bid compliance with this requirement.

Detectors shall be installed in the plant areas and at the control buildings as indicated on the drawings referenced as part of this Specification.

No order shall be placed with any sub-Vendor until Client has given approval in writing, even when the Vendor is on Client's Preferred Vendor List.

5.0 DESIGN

The Fire & Gas Detectors and devices are responsible for the protection of facility, equipment and workmen in the Station or the pipeline. The Fire & Gas Detectors shall be intelligent type Detectors which shall alarm or trip depending on the level of



severity. The Job Specifications / Data Sheets shall be referred for the exact requirements of the Fire & Gas Detectors.

5.1 Fire Detection

Fire Detectors shall be designed to detect one or more of three characteristics of fire, smoke, heat or radiation (flame). The prime function of a Fire Detector shall be to detect a fire in its early stage by one of its characteristic phenomena like combustion gases in fire infrared radiation from flame, rise of temperature due to fire and convert the same into an electrical signal for initiating the local and remote alarms.

- a. The electronic circuit shall be of solid state and of failsafe design and virtually hermetically sealed to have resistance to humidity and corrosion and to prevent its operation from being impaired by dust and dirt.
- b. The circuit shall be protected against usual electrical transients, electromagnetic and electrostatic interference (EMI & RFI) normally present at the functioning station.
- c. Reverse polarity or fault in the field wiring shall not damage the Detector.
- d. No moving parts subject to wear & tear shall be provided.
- e. The response sensitivity shall also be field adjustable and not only from fire panel over a wide range to suit site conditions. It shall be possible to test the sensitivity of a detector in the field. The sensitivity / threshold value of detectors which are cross zoned must be compatible.
- f. The visual (alarm) response of a Detector (by a LED) shall be clearly visible from the outside by a steady / flashing light of sufficient brightness.
- g. The base plate of the Detector shall be suitable for mounting on a four way standard outlet box and a single junction box for terminating directly the field cable run in conduit. The field terminals shall be suitable for field wires of core size upto 1.5 mm2.
- h. The Fire Detectors shall be plug in type. Suitable locking device shall be supplied along with each Detector. It shall be inserted into or removed from the standard base by simple push twist mechanism to facilitate easy exchange for cleaning and maintenance.
- i. All types of Detectors offered shall have inbuilt electronic circuit for addressing capability for individual address on the fire alarm panel. In case of manual call points where the addressing capability is not an integral part, a separate addressable interface unit shall be provided.
- j. All types of Detectors shall be suitable for connection in any particular loop / circuit with any other type of Detector. In case of non-addressable type of Detector or group of such Detectors shall also be suitable for connection in the same loop / circuit by providing suitable addressable interface units.



k. The Detector shall confirm to relevant Standards such as IS, BS, NFPA, etc. Test certificates shall be supplied along with the tender.

The Fire Detection shall comprise of a variety of Fire Detection devices and sensors, including:-

- a. Optical Flame Detectors.
- b. Smoke detectors.
- c. Thermal detectors.
- d. Fusible plug loops.
- e. Manual Alarm calls points.
- 5.1.1 Optical Flame Detectors
 - a. Optical Flame detectors shall be Infrared / Ultra violet (IR/UV) type and shall make use of such sensor, filters and / or design to reject phenomena such as electric arcs, heaters, artificial light sources, lightening and shall be completely" Solar Blind".
 - b. The detectors shall be able to detect all types of Flaming Fires.
 - c. UV detectors may be used where they are not exposed to external UV rays, such as in compressors and power generating enclosures.
 - d. Detectors shall be powered from 24 V DC, with a 4-20 mA signal loop to cover the calibrated range. Detector faults shall be signalled by a 4 mA signal. Sufficient margin shall be allowed between fault, normal and alarm levels to minimize spurious alarms.
 - e. Optical Flame Detectors shall have automatic, self-diagnostic circuitry that continuously monitors the optical surfaces, sensor sensitivity and electronic circuitry, and shall give fault status. Any Detector malfunction shall be alarmed on the Fire and Gas detection system panel and DCS.

5.1.2 Smoke Detectors

- a. Smoke Detectors shall be installed indoors in all rooms, including concealed floor and ceiling voids.
- b. The Smoke Detectors shall incorporate an integral LED indicator for confirmation that the unit is active.
- c. Detectors that are not visible, such as ceiling void or under floor, shall be provides with remote LED's located in the room being monitored.
- d. Two independent Smoke Detector loops shall be installed in each area where executive action is required on detection of fire.



- e. Ionization Smoke Detectors shall be used in general-purpose areas to provide early response to smouldering or flaming fires in their incipient stages. A Detector base shall be provided for connecting the individual Detectors to the Fire and Gas (F&G) control system.
 - i. This Detector shall be capable of detecting a fire both in its incipient or smouldering stages as well as invisible flames. To meet this requirement the Detector shall respond to visible combustion products in the form of smoke as well as in - visible particles, aerosols and pyrolysis products from a clear burning fire.
 - ii. The sensitivity / response threshold value, the design and construction of the detector shall be in accordance with IS 11360, BS 5445 Part 7 (European Standard EN54 7) or ANSI UL. 268 as applicable. Test certificates for the same shall be submitted by the Vendor. The Detectors shall be marked with their normal sensitivity, sensitivity range listed spacing, radiation level of radioactive component etc. as per relevant standards.
 - iii. Ionisation type Detectors quickly respond to smaller smoke particles which are normally produced by rapidly developing fire. Ionisation type Detectors are ideal for fire involving flammable liquid, and easily ignited free burning material such as wood, paper and cellulose materials. In ionisation type Detector, the change of current flowing through an ionisation chamber due to smoke particles entering the chamber is used to sense the fire.
- iv. This type of Detector comprises two ionisation chambers electrically connected in series each containing a radioactive source (emitter) generally Am 241 (Americium 241) with activity level not exceeding 1 5 μ Ci or Ra226 (Radium 226) with activity level 0 -1 μ Ci. One of the chambers is semi sealed and termed as 'reference chamber and the other is termed as 'smoke chamber. The air in the chamber is ionised. In the presence of voltage applied between electrodes in the chamber, the ionisation results in small current flow. Since the chambers are of identical design under normal condition, the applied voltage is distributed equally between the chambers. Smoke particles are comparatively larger than air. Movement of molecules icon is restricted when the products of combustion enter the smoke chamber, due to presence of smoke particles. Because of this, current flow in the smoke chamber reduces. However, the current in sealed chamber remains unchanged. This imbalance of current due to smoke in is used to trigger the associated electronic circuits to initiate the alarm.
- v. Smoke Detectors shall remain in alarm state until reset by the fire and gas control system.
- vi. Photoelectric smoke detectors shall be used in electric equipment and control room areas. A Detector base shall be provided for connecting the individual Detectors to the F & G control system.
- vii. This Detector working on the light scattering principle shall be capable of detecting visible smoke from smouldering fires long before the fire breaks out into visible flame. It shall respond quickly to smoke that is optically dense. It



shall detect the scattering / change in intensity of light by smoke particles in the light beam. The light source of SDO shall automatically adjust to compensate for possible effects of dirt and dust accumulation in the sensor. The smoke density in the chamber shall be measured by a symmetrical optical system. The Detector principle shall employ a multiple light pulse coincidence circuit, preventing false alarms.

- viii. The normal sensitivity / response threshold value, the design & construction of this smoke detector shall be in accordance with IS - 11360, BS - 5445, Part - 7 (European Standard, EN - 54 - 7) or ANSI. UL. 268 as applicable. Test certificate for the same shall be furnished along with the Tender. Smoke Detectors shall be marked with their normal sensitivity, tolerance limits and listed spacing as per relevant standards.
- ix. The optical type Detector is basically a photo electric Detector working on the principle of light obscuration & scattering. A beam of light from infrared LED travels across a light tight chamber to a collector on the other side of the chamber. A photo cell senses no light as long as the air inside the chamber is clean. When the Smoke enters the chamber the light from the beam is reflected or scattered in all directions. Some of this scattered light reaches the photo cell which triggers to initiate fire alarm.

5.1.3 Thermal Detectors

- a. Thermal Detectors shall be used in all indoor spaces including all rooms and equipment enclosures, including concealed floor and ceilings voids.
- b. Rate of rise Thermal Detectors shall be used where an early warning of smouldering fires is required, such as storerooms and equipment rooms where air flow or high humidity may inhibit the response of Smoke Detectors.
- c. Fixed temperature or rate compensated type Heat Detectors shall be used within areas unsuitable for Smoke Detection where a rapidly achieved high temperature can be expected, such as machinery rooms or equipment enclosures. These shall be set at approximately 12°C above maximum ambient temperature within the area.
- d. Thermal Detectors shall remain in alarm state until reset by the fire and gas control system.
- e. All visible Detectors shall incorporate an LED indicator as an integral part of the detector head or its mounting base. Concealed Thermal Detectors shall be provided with an LED "repeater" that is located in a visible location. Normally, unmanned equipment rooms or offices shall have indicators in the corridor. The Detector circuitry shall cause the LED to remain illuminated while the Detector is the alarm condition.
- f. The sensitivity, setting, response grade, listed spacing, the design and construction of the Detector shall be in accordance with IS.2175, BS 5445 PART 5 or



(European standard EN - 54 -5 or 8) or ANSI - UL - 521 as applicable. Test certificates shall be furnished along with the Tender.

5.1.4 Linear Heat Sensing Cable

- a. Linear Heat Sensor Cables shall be of temperature sensitive insulated wire type.
- b. This Linear Heat Sensor shall be in the form of continuous Cables consisting of copper conductors / cores and shall be of analogue type.
- c. Each core of analogue Linear Heat Sensor Cable shall be insulated with a color coded, negative temperature coefficient material. The cores shall be protected by an outer sheath of high temperature, flame retardant PVC insulation. Additional mechanical protection shall be provided over the cable in the form of bronze or tinned copper metallic braid. The outer sheath, as well as the metallic braid shall not affect the performance of the heat sensor.
- d. The Linear Heat Sensor Cable for each zone / area shall be connected to an electronic interface unit, which shall sense the temperature variations by continuously monitoring the resistance of the negative temperature coefficient core insulation. The electronic interface unit shall be located suitably in the area being protected.
- e. The analogue linear Heat Sensor Cable of every zone shall be continuously monitored for open and short circuit. A breakage, disconnection or a short between cores shall initiate a FAULT alarm on the fire alarm panel.
- f. All necessary accessories and jointing kits for both end of line terminations and in line jointing shall be supplied.
- g. Subsequent to an alarm / actuation due to a fire, the sensor cable shall automatically reset. In case a length of the sensor cable in the middle of a run gets damaged, it shall be possible to splice in a new cable for the length which has been damaged, without affecting the performance of the sensor in any manner.
- h. The design of the analog, linear heat sensor cable and corresponding electronic sensing circuits shall be such as to allow a maximum length of atleast 1000 metres to be connected as a single cable for monitoring one-zone. However, in case different grades of analog linear heat sensor cables are available, considering the constraints of the maximum length required and the maximum ambient, the most sensitive grade shall be used. The system shall be designed to have an optimum sensitivity.
- i. The linear heat sensor cable and the electronic interface unit shall be compatible with the microprocessor based addressable fire alarm panel, incorporating all the features required for the system.
- j. Details of the setting procedure for the analogue linear heat sensor cable along with the necessary monograms shall be supplied by the Tenderer along with the



Tender. Details of the response time of the linear sensor cable for different temperatures shall also be furnished.

- k. For a given length of sensor cables it shall be possible to set the alarm temperature over a wide range by means of a setting switch or other means provided on the electronic interface unit. Provision shall also be made for setting the alarm temperature from the fire alarm panel.
- The sensitivity, response time, type, the design and construction of the sensor cables shall be in accordance with relevant standards. All relevant details shall be marked on the electronic interface unit. Test certificate shall be furnished along with the Tender.
- m. All relevant catalogues, technical literature installation procedures etc. shall be furnished along with the Tender.
- 5.1.5 Manual Alarm Call Point
 - a. Manual alarm stations shall be provided for following functions:
 - i. Fire alarm.
 - ii.
 - iii. Platform Abandonment.
 - a. Manual alarm stations for fire alarm shall be located throughout all areas of the platform, especially at exits and in the main equipment rooms. These stations shall be located at easily accessible, well lighted, conspicuous areas and located no more than 30 meters apart.
 - b. Manual alarm stations- platform abandonment shall be located adjacent to each survival craft.
 - c. All manual alarm stations shall require a double action to activate the alarm. They shall be the break-glass, pushbutton type.
 - d. Each unit shall be surface mounted at a height of 1.4 meters and shall be provided with a striker connected to the station by a chain.
 - e. Each unit shall be wired to the F&G control system in the Control Room.
 - f. The manual alarm stations- Fire alarm shall be red in color & manual alarm stations- Platform abandonment shall be black in color.

5.1.6 Flashing Alarm Beacons

- a. The Flashing Alarm Beacons shall be direct ignition, Xenon type. Flashing Alarm Beacons shall be powered from 24 V DC, -ve earthed supply or depending on project Specifications / manufacturing standards.
- b. The Flashing Alarm Beacons shall have flashing speed of 60 flashes per minute.



c. Separate Flashing Alarm Beacons shall be provided for visual indication of confirmed HC-H2 gas release & H2S gas release.

5.1.7 Sounders

- d. Field Sounder shall be electronic type, and shall be powered from a 24 V DC, -ve earthed supply.
- e. Field Sounder shall be provided for audible alarm for confirmed HC-H2 / H2S gas release.
- f. Field Sounder shall be located near personnel rest room on Main deck of the platform.
- 5.1.8 High Sensitivity Smoke Detection System (HSSD)

The High Sensitivity Smoke Detection System shall be capable of detecting & analysing air-borne particles generated during the pre-combustion stage of an incipient fire, sampled through the protected zones via a network of air sampling pipes. The design of the smoke sampling zones shall be based on the principle of one smoke zone per room. The system shall comprise of a 200% balanced, air sampling network together with a detector & control unit with display & battery back-up power unit facilities, including display & historical logging.

5.1.9 Building Smoke Detection System

Where applicable a Building Smoke Detection System shall be provided for other building facilities not covered by HSSD System. The Building Smoke Detection System shall compose of a Fire Alarm Panel (FAP) and all of its accessories. The Building Smoke Detection System shall be of State of the Art, fully programmable, intelligent and addressable system. Details of the FAP and its accessories are as described below.

5.2 Gas Detection

The Gas Detection shall consist of Gas sensing devices or Detectors as required for protection of leakage of Gas.

5.2.1 H2S Detectors

Sensor Type	Electrochemical/Metal Oxide Semiconductor
Output Signal	Analog 4-20 mA
Range	TO BE PROVIDED
Accuracy	+/-2 ppm or better
Set point	TO BE PROVIDED
Housing	Manufacturer Std. (To suit Environmental Conditions)



Cable entry

Metric (M20)

Malfunction and true alarms shall latch until manually reset and normal conditions are restored.

The Detector shall be fast and reliable. Preference shall be given to speed of response over precision. The Vendor shall indicate the response time of the Detector for the detection levels.

In general, the Detector shall be mounted integral to the transmitter. However, remote mounting of the sensor from the transmitter is acceptable on inaccessible locations.

The transmitters shall have fault monitoring Detection capability. A malfunction alarm shall be raised on under or over-ranging.

The Vendor shall supply a full set of support equipment, including test gas for calibration purposes for a period of 6 months. The support equipment shall contain all elements required for to calibrate for all the Detectors for a period of 2 years including commissioning.

5.2.2 Flammable Gas Detectors

Sensor Type	Infrared (Point Type)
Output Signal	Analog 4-20 mA
Range	0- 100 % LEL
Accuracy	± 3% LEL up to 50% LEL; ± 5% LEL for> 51% LEL
Set point	20 % and 50 % LEL
Housing	Manufacturer Std. (To suit Environmental Conditions)
Cable entry	Metric (M20)

Malfunction and true alarms shall latch until manually reset following the restoration of normal conditions. It shall also be provided with continuous self-testing/indication of fault due to dirty optics. Once fault is detected, the transmitter shall send a pre-set current output.

The transmitters shall have fault monitoring detection capability. A malfunction alarm shall be raised on under or over-ranging. The accuracy of the transmitter shall be \pm 2% LEL at s 50% LEL and \pm 5% LEL at ~ 50% LEL reading.

Detection shall be fast and reliable. Preference shall be given to speed of response over precision. The Vendor shall indicate the response time the detector for the Detection levels of 20% LEL and 50% LEL.

The Detector shall preferably be integral to the transmitter and shall have over range protection in case of sudden exposure to high hydrocarbon gases.



Zero Drift shall be less than 2% of full scale over a period of 2 years.

The Vendor shall supply a full set of support equipment, including test gas for calibration purposes for a period of 6 months. The support equipment shall contain all elements required for to calibrate for all the Detectors for a period of 2 years including commissioning.

High-high flammable gas voting logic shall not latch the logic input.

5.3 Name Plate

- a. The Tag Nos. for Detector and Devices shall be as per various layout of Buildings / areas enclosed.
- b. All panels shall have Tag number and the same shall appear on the front and rear along with a descriptive name.
- c. Each item shall be provided with a name plate or label designating the service of the particular equipment.
- d. The shape and size of the plate and inscriptions shall be approved by Purchaser. Such name plates shall be anodized aluminium plates having engraved black lettering or the plate shall be of multi layered laminated plastic material with black lettering engraved on a white background.
- e. The name plates shall be screwed to the body of the equipment.

6.0 FABRICATION AND PAINTING

Vendor shall obtain approval in writing from the Purchaser before start of fabrication of Fire & Gas Detectors. Vendor shall submit the required Specification, calculations, drawings & documents for approval. Also Vendor shall refer the relevant codes and standards for manufacturing herein.

7.0 INSPECTION AND TESTING

Vendor shall perform all inspection and testing as per job Specification requirements, and as per relevant codes, prior to shipment. The inspection and testing for Fire & Gas Detectors shall be carried out as per approved Inspection and Test Plan. Vendor shall submit the Inspection and Testing Plan for Proprietary items / Special items for Approval. Vendor shall submit the test certificates to the Company for the tests conducted during the manufacturing process like hydrostatic test, hazardous area certification test, Radiography test, calibration test and any other before Factory Acceptance Testing (FAT).

7.1 Factory Acceptance Testing (FAT)

Prior to FAT, Vendor shall submit to the Company a detailed FAT procedure, for review and approval, listing all the Self Actuated Control Valve/ Regulators complete with the project approved tags, and highlighting the inspection and testing requirements of all such devices. FAT shall be carried out as per approved Inspection and Test Plan. FAT shall be carried out prior to shipment of the F&G Detectors.



FAT procedures shall be submitted at least 4 weeks prior to FAT testing taking place. FAT shall be carried out at the manufacturing facilities. The tests shall be witnessed by the Company or their approved representative. FAT procedure will be signed off by the Vendor and Company or their approved representative at the successful completion and conclusion of testing.

The FAT shall be consisting of the following as a minimum:

- a. Visual Inspection
- b. Calibration
- c. Functional Test

A certificate to detail the results and records obtained during the FAT shall be made available for ratification by the Vendor on the date of test.

7.2 Site Acceptance Testing (SAT)

A SAT shall be carried out on completion of the installation of the equipment at site which shall be witnessed by the Company / Owner's representative. SAT shall be performed on the Fire & Gas Detectors as per the approved test procedure. A comprehensive test procedure in compliance with the Standard Specification shall be developed and issued to Company / Owner for review and approval.

The Site Acceptance Test (SAT), in general, shall demonstrate that the F&G System with its Fire & Gas Detectors functions correctly and properly in accordance with the specified requirements.

8.0 MARKING, PACKING AND SHIPMENT

Following FAT completion, Vendor responsible for Fire & Gas Detectors shall ensure that all equipment and associated materials and accessories are designed properly, marked and packed, and secured for transit to site without damage.

Vendor shall provide and submit his standard 'Marking, Packing and Shipping Procedures' for review by Company / Owner.

Vendor shall specify any conditions, normal or special, to be verified in intermediate storage and during transport.

Equipment shall be suitably packed including any dismantling, transit fastening and bracing necessary to prevent distortion or damage during transit.

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

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 account of the Vendor.



8.1 Rejection

Vendor shall make his offer in detail, with respect to every item of the Purchaser's Specification. Any offer not conforming to this shall be summarily rejected.

9.0 SPARES AND ACCESSORIES

The following spare philosophy shall be followed in case it is not covered in Job Specification.

The Vendor shall include recommended spare parts list for start-up, precommissioning and two years operation as per the following:

a. Itemized recommended spare parts list for start-up and pre-commissioning.

b. Itemized recommended spare parts list for two years operation.

Vendor shall recommend accessories and special tools required for operation and maintenance of Fire & Gas Detectors for Company review.

All the spare parts furnished by Vendor shall be wrapped and packaged to preserve an original as-new condition under normal conditions of storage. The same parts shall be properly tagged with stainless steel tags and coded so that later identification as to their intended equipment usage shall be clear.

All items supplied shall be packaged separately and clearly marked as "Spare Parts" and shipped with the equipment.

10.0 DOCUMENTATION

The following documentation shall be fulfilled by the Vendor, if it is not covered in Job Specification.

10.1 Documentation Required with Technical Bid

During bidding stage Vendor shall submit in his offer the following documents as a minimum:

- a. Specification of Fire & Gas Detectors;
- b. Bill of Materials including Vendor list, details for third party items;
- c. Catalogues and manuals;
- d. Quality Assurance Plan;
- e. Any other documents (Project Specific).

10.2 Documentation Required for Approval

Upon placement of Purchase Order, Vendor shall submit as a minimum the following drawings, documents and Specifications for the Company's approval:

a. Standard Specifications, Data Sheets;



- b. Bill of Materials including Vendor list, details for third party items;
- c. Catalogues and manuals and relevant drawings and documents;
- d. Dimensional drawings;
- e. Material test certificates;
- f. Procedures for FAT;
- g. Quality Assurance Plan;
- h. Any other documents (Project Specific).

10.3 Guarantee / Warranty

Vendor shall guarantee that the complete scope of supply shall be safely and reliably meet all of the requirements of this Company Specification.

Vendor shall provide warranty support for a period of 12 months from the date of supply or 18 months from the date of manufacturing. Warranty shall apply to defective material workmanship and facility design. Warranty work shall be done at Owner's local facilities. The cost of correction / replacement of any warranty items shall be borne by the Vendor.

The Job Specifications/Data Sheets Shall be referred for any specific warranty / guarantee.



VCS Quality Services Pvt. Ltd.

STANDARD SPECIFICATION FOR FIRE DETECTION AND ALARM PANEL

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ABBREVIATION

BASEEFA	British Approval Service for Electrical Equipment in Flammable Atmospheres
BGU	Break Glass Unit
BIS	Bureau of Indian Standards
BS	British Standard
FACP	Fire Alarm Control Panel
CMRI	Central Mining Research Institute
CRCA	Cold Rolled Close Annealed
DC	Direct Current
DG	Diesel Generator
EEPROM	Electrically Erasable Programmable Read Only Memory
EN	European Standard
FA	Fire Alarm
FAT	Factory Acceptance Test
FM	Factory Mutuals
FO	Fibre Optic
FR	Fire Retardant
IP	Ingress Protection
IR	Infra Red
IS	Indian Standards
ITU	International Telecommunication Union
LED	Light Emitting Diode
LIFO	Last In First Out
МСР	Manual Call Point
MMI	Man Machine Interface



NC	Normally Close
NFPA	National Fire Protection Interface
NO	Normally Open
PCB	Printed Circuit Board
PLC	Programmable Logic Controller
PVC	Poly Vinyl Chloride
SAT	Site Acceptance Test
UL	Underwriters Laboratory
ZFAP	Zonal Fire Alarm Panel



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1 SCOPE

This Standard Specification establishes the minimum technical and functional requirements for design, engineering, materials, fabrication, painting, inspection and testing, documentation, marking, packing and shipping of an integrated Fire Alarm System.

2 **DEFINITIONS**

For the purpose of this document, the words and expressions listed below shall have the meanings assigned to them as follows:

Owner/ Purchaser/ Company	Owner of the particular Project (Project Specific).
Consultant	The party which comes out all or part of the engineering, procurement, construction, pre- commissioning and assistance for commissioning, monitors and controls the overall project management.
Bidder/ Manufacturer / Supplier / Vendor	The party(s) which manufactures and / or supplies material, equipment, technical documents / drawings and services to perform the duties specified by Contractor.
Works/ Shop	The place where the ITEM / UNIT is fabricated and tested and transported to Purchaser.
Datasheet	Technical data provided by the Purchaser / Owner / Company.
Standard Specification	Specifications Developed as Standard by the Company.
Job Specification	Specifications Developed pertaining to particular project / Job in regard.
Material Requisition	Requisition as raised to Supplier for Quotation of the item
Purchase Requisition	Requisition as raised to Supplier for Procurement of the item
Purchase Order	Legal Order supplied to Supplier for procurement of the Engineered Item
Site	The work place where the equipment is installed and commissioned.



3 REFERENCE DOCUMENTS

3.1 Codes & Standards

The related standards referred to herein and mentioned below shall be of the latest editions prior to the date of the Purchaser's enquiry.

IS-5	Colours for ready mixed paints and emulsions
IS-513	Specifications for cold rolled low carbon steel sheets and strips
IS-2148 IS-1646	Flameproof enclosure for electrical apparatus Code of practice for fire safety of buildings (general): electrical installation
IS-2189	Code of practice for selection; installation and maintenance of automatic fire detection and alarm
IS-3034	Code of practice for fire safety of industrial buildings: electrical generating and distributing standards
15-3700	devices (applicable parts).
IS-3826	Connectors for frequencies below 3KHz general requirements part-1 and tests.
IS-5469	Code of practice for the use of semi-conductor junction devices (applicable parts).
IS-5780	Specification for intrinsically safe electrical apparatus and circuite
IS-11360	Specification for smoke detectors for use in automatic electrical fire alarm system.
IS-12459	Code of practice for fire safety in cable runs.
IS-13346	General requirement for electrical for explosive gas Atmosphere.
IS-14154 (Part-2)	Electrical apparatus with protection of enclosure for use in the presence of combustible dust.
NFPA-72 VOL.4	National fire alarm code
LPC	Loss prevention council recommendations
BS-5839	specification for manual call points, part-2
BS-EN50081-1	EMC (electromagnetic compatibility test)
BS-EN50082-1	EMC (electromagnetic compatibility test)
CMRI	Central Mining Research Institute



3.2 Order of Precedence

In the event of conflict between Specifications, Data sheets, related standards, codes etc., the order of precedence shall be as follows:

- a. Data sheets
- b. Job Specifications
- c. Standard Specifications
- d. Codes and Standards

Vendor shall refer the matter to the Purchaser for clarification and only after obtaining the approval in writing, the same should proceed with the manufacture of the items in question.

4 DESIGN

The following design requirement covers the general requirements of fire alarm system and its accessories. But for the exact requirements and applications, the relevant, project specifications and design basis shall be referred and complied.

4.1 General

Fire alarm system under this specification is envisaged to provide fire monitoring in Plant / Process / Pipeline / Pig Launcher / Receiver area and non-plant buildings. The system shall be designed to detect incipient fires and generate audio / visual alarm in case of fire.

The system shall consist of automatic fire detectors and manual call point or break glass unit. Automatic fire detector shall work on the principle of sensing of smoke, heat or infrared rays. Depending on the type of scope, optical or ionization type detector shall be used. Detectors shall generally be provided in plant / non plat buildings. Manual call point shall be provided at exit doors of the buildings and at exit route of Process I Plant area. Number of detectors and break glass unit shall be decided as per guidelines given in applicable codes and standards.

The plant / building shall be divided in to fire monitoring zones. Detectors and MCP at these buildings and plants shall be connected to fire panels. These panels shall continuously monitor the state of these devices. On sensing fire condition, an audio/visual alarm shall be initiated identifying the zone where fire is detected. Panels shall continuously monitor the health of the cabling and in case of short circuit or open circuit fault alarm shall be actuated. Fire alarm panels shall also have powered outputs for switching on exit signs and hooters. Further, Panels shall provide required output for interfacing with Purchaser's system such as air conditioning system or pressurization system or fire protection system.

Alarms, if specified, shall be relayed to repeater panel provided in buildings like control rooms / administrative buildings to provide zone wise annunciation. In addition facility shall be provided to actuate siren / hooter.

4.2 Design Features

The system shall be modular and scalable facilitating further extension / modification. The design of common facility and hard ware shall be provided for required future extension of zones.



PCBs shall have watchdog features for self diagnostic. Each PCB shall have LED for annunciating card failure. Following self diagnostic features may be considered as minimum:

- a. open loop detection;
- b. Short circuit detection;
- c. Earth faults;
- d. Power supply failure e.g. low battery voltage main incoming supply fails;
- e. System faults (PCB failure).

Logic of operation shall be built on "Fail Safe" feature i.e. NC contact of field devices shall be considered as healthy condition and NO as fire condition. 1NO + 1 NC contact of output relays shall be wired to terminal block for interface with Purchase's other equipment.

It shall be possible to test lamps, hooters, flasher circuit, and functional tests etc. through common "Test" push button.

The circuit shall be so designed that silencing of the current alarm by ACCEPT push button shall not prevent annunciation of subsequent fire alarm received from any other location.

Signal to noise ratio shall be high to avoid spurious actuation due to noise induced in the field wiring because of proximity with power cables. Cables for field devices shall be multicore copper conductor, unscreened, armoured, copper conductor cable. If required noise filter shall be provided at fire alarm panel.

Detectors and MCPs in a loop shall be wired through 1.5 mm² multi cores copper conductors, PVC insulated, armoured cables. Limiting distance from fire alarm panel to last detector / MCP shall be Vendor specific. Generally it shall be 2 kms or more.

LEDs shall be provided for fire / fault visual annunciation on the panel front. LED shall also be provided for power supply healthy, battery backup ON, battery / charger status.

If zone is protected with clean agent / CO2 system, the detectors and MCPs of the zone shall be wired in cross-zones by providing minimum two loops in a zone. The last device in each loop shall be provided with end of line resistor of suitable value as per circuit design to facilitate cable open circuit and short circuit detection.

SYSTEM CONDITION	AUDIO	VISUAL
Normal	OFF	OFF
Fire	ON (Tone 1)	Flasher ON, Fire LED steady ON
Accept	OFF	Flasher steady, Fire LED steady ON
Reset	OFF	Flasher OFF, Fault LED off

Scheme for FIRE / FAULT annunciation shall be as per the following:



STANDARD SPECIFICATION FOR FIRE DETECTION AND ALARM PANEL

Fault	ON (Tone 2)	Flasher OFF, Fault LED steady ON
Accept	OFF	Flasher OFF, Fault LED steady ON
Reset	OFF	Flasher OFF, Fault LED OFF

Fire Alarm Panels including repeater panels and Central Fire alarm panel shall be certified I approved by applicable approving agency of country of origin as required.

4.3 Fire Alarm Control Panel

The FACP shall be located in fire station in plants or in building control room. Fire and fault annunciation for each zone or group of zones at ZFAP shall be repeated at FACP. Annunciation scheme at FACP shall be provided as per the above table.

FACP shall be in vertical panel construction or desk type construction having controls such as accept, test and reset push buttons, auto / manual control of sirens etc.

Unless otherwise specified, FACP shall have mimic to display geographical location of fire. Mimic shall form an integral part of the FACP and shall be located at the top of the panel. When separate mimic panel is specified, it shall either be provided for each zone on mimic panel for display of fire alarm. Mimic panel shall be powered by FACP. Mimic made out of plastic sticker shall not be acceptable.

4.4 Integration With Various Plant Systems

Fire alarm system shall have required hardware to have interface with following plant systems as specified:

- a. Public alarm announcement;
- b. Paging and plant intercom system;
- c. Plant data network;
- d. Fire suppression system.

For micro processor based system the system architecture and all the activities shall be same as specified above, and the system shall have following as a minimum:

- a. Dual redundant at processor level (communication processor and I/O card processor);
- b. Dual redundant communication port;
- c. Dual redundant data highway cable;
- d. Dual redundant microprocessor at CFAP;
- e. Dual redundant work station / MMI (Engineering Work Station + Operator's WorkStation);
- f. Dual redundant power supply card at all fire panels (but with single source of battery backup).



Systems shall have provided adequate EEPROM size to store minimum of 10 events fire / fault. The event shall be stored in LIFO structure. All events shall be time stamped.

Software access for either zone programming or access to plant /building graphic on monitor shall be password protected. For viewing status of various field devices e.g. fire and fault status password protection shall not be given.

4.5 Panel Construction

All fire alarm panels shall be free standing, floor mounting type unless specified otherwise and shall be fabricated out of minimum 2 mm thick CRCA sheets and doors shall be fabricated out of minimum 1.6 mm CRCA sheets. Panel shall be naturally ventilated in IP-42 enclosure protection as a minimum.

In equipment mounting, all apparatus display screen, instruments and indicating lamps mounted on the panel front shall be flush mounting type. External cabling shall not be terminated directly on the base connector of PCBs but shall be terminated on separate terminal block. Further connection to PCBs shall be as per manufacturing standard. Routine calibration, adjustment, programming and operation shall be acceptable from the front of the panel without opening the door. External cabling shall preferably be done from the rear.

Power supply system including battery bank shall be mounted inside the panel.

Doors shall be provided with pistol grip handle with lock. Lamps shall be provided inside the panel to provide adequate light for maintenance of equipments.

Cable entry shall be from bottom unless otherwise specified. Terminal strips shall be provided for incoming / outgoing cables.

In wiring and terminals, wiring within the panel shall be laid in slotted plastic raceways enclosed with cover. Control connection shall be done with 660 V grade PVC insulated wires having stranded copper conductors. 1.5 sq.mm size of wire shall normally be used for circuits with control fuse rating of 10A or less. Control wiring for electronic circuits shall be through ribbon cable or through copper wire minimum of 0.5 mm dia. Panels shall supplied completely pre-wired, such that only field termination shall be required at site before it is energized.

PCBs for identical function shall be interchangeable. PCBs shall be plug in type having pin / edge connectors. PCBs shall be suitable for use in tropical, humid and dusty environment. These shall be protected with anti fungus treatment.

The cables shall be terminated on the terminal blocks. Clamp type terminals shall be spring loaded, stacking type, mounted on rails. Terminals shall be sized to accept as a minimum 2.5 sq.mm cross section conductors. Not more than one conductor shall be provided in each panel for termination of spare cores of cables.

In earthing, a common earth bar of minimum 25 X 3 mm. copper or equivalent aluminium shall be provided through the length of the panel. All noncurrent carrying metallic parts of the panel-mounted equipment shall be earthed. Flexible jumpers shall connect all doors and movable parts to the earth bus, two number earth lugs shall be provided outside the panel.

In name plates / warning plates, all name plates for panel shall be engraved out of 3 ply (black - white- black) lamicoid sheets or anodized aluminium. Back engraved perspex sheet nameplates will also be acceptable. Engraving shall be done with square groove cutters. Hard paper or self-adhesive plastic tape nameplates shall not be acceptable.



Label shall be provided for each component on cards, connecting wires as well as for the terminals in the terminal strip inside the panel .wiring diagram shall be pasted inside the panel door as required for termination and maintenance.

Special warning plates shall be provided on all removable covers or doors giving access to energize metallic parts above 24 volts.

4.6 Cable And Cable Accessories

Vendor, as a part of integration and selection of fire alarm equipment, shall furnish detailed specification for loop /zone cables, data high way cables, cables for hooter/exit signs etc. giving details such as type of cables, number of pairs, size of cable, inductance and capacitance data number of fibers / connectors etc. the cables should be as per fire Vendor specification.

In data highway cables, unless specified otherwise Vendor shall supply copper cable / FO type data highway cable to suit system design and equipment specification. Copper cables, if supplied shall be of adequate size, twisted pair, PVC insulated, overall screened. PVC inner sheathed, armoured, FR type PVC outer sheathed as the minimum requirement. Fiber optic cables, if supplied shall be armoured, overall FR PVC outer sheathed and shall be as per ITU-T recommendation as a medium.

Vendor shall supply and install all hardware and cabling accessories as per data highway design including modems, repeaters etc. as part of the FA system. Modems / repeaters shall be powered by the supply provided for fire panel.

In cable glands / accessories, all cable glands / lugs / connectors as required for the equipment shall be included in Vendor's scope and shall be supplied along with the system , irrespective of whether installation is to be performed by Vendor or not.

All the cable glands for outdoor application shall be weatherproof, nickel-plated brass and double compression type, whereas those for indoor application shall be single compression type.

Cable glands for hazardous area equipment shall be flameproof, weather proof and nickel plated brass double compression type.

4.7 Automatic Fire Detector And Accessories

Any simulators required for checking, calibrating the automatic fire detectors shall be provided along with detectors / fire alarm system.

Heat detectors – fixed type shall use negative temperature coefficient thermisters for sensing and for reference. The detector shall be carefully calibrated to ignore any normal fluctuation in temperature but to respond quickly when the temperature and the rate of rise in temperature.

The rate of rise element shall be carefully calibrated to ignore any normal fluctuation in temperature, but to respond quickly when the temperature rise is 9 degree centigrade or more per minute.

The fixed temperature feature should be entirely independent of the rate of rise element. The operating temperature of fixed temperature element should be factory set at 57 degC \pm 5 degC.

The detector shall be self-restoring type ensuring repeated use and easy maintenance.

Ionization smoke detector shall be solid state type, working on ionization principle and shall preferably be of dual chamber and dual source type.

The detector shall be able to sense incipient fire by detecting the presence of visible and invisible products of combustion like wood, paper ammonia processing paper,


cloth, PVC, bakelite nylon foam, acrylic thermocol, photo film, nylon, polyester, painted sheets, Teflon, leather etc.

The sensitivity of the detector shall not vary with change in ambient temperature, humidity, pressure or permissible voltage variation, its performance shall not be affected by an air current of 5 m/sec. it shall have an inbuilt arrangement such that puffs of smoke or hot air pockets do not inadvertently trigger the alarm. The detector shall be protected against dust accumulation / ingress. It shall have insect resistant screen to prevent nuisance alarms.

Where air velocity is expected to be higher, smoke guard / baffle shall be used.

IR detector shall work on the principle of a single wavelength infrared flame detector using one of several different photocell types to detect the infrared emission in a single wavelength band that are produced by flame.

It shall react to the infrared rays of a flame. Flame detector shall be sensitive enough to detect smoky fires in which flame is hardly recognizable. The detector should not react to extremely glaring artificial light or direct sunlight .The detector shall be completely solid state type.

Where specified, combination of UV-IR detectors shall be used.

Manual Call Point (MCP) / Break Glass Unit (BGU) shall be fabricated out of 14 -gauge cold rolled sheet steel. Alternatively the break glass unit may be made of die cast aluminium alloy such as LM-6. It shall have IP-65 enclosure and weather proof construction suitable for outdoor installation. The break glass unit shall have a minimum dimension of 100 mm X 100 mm X 80 mm.

The box shall be fabricated in such a way, that it can be mounted lush to the wall or on the surface without any modification. Two nos. 19 mm knockouts shall be provided at the bottom of the box to facilitate cable / conduit entry. The glass shall cover atleast 30 sq. cm area and shall have a thickness not exceeding 2 mm.

The box shall have a push button element kept in pressed condition by a glass sheet fitted in the front of the box.

The enclosure shall be painted with the fire red colour (shade 536 of IS-5) epoxy paint and an inscription "break glass in case of fire", shall be painted in white letter or riveted on the enclosure by a steel nameplate. A suitable nickel-plated brass hammer, duly chained to the box with stainless steel chain shall be provided with each box for breaking the glass. Each box shall have a distinct identification number boldly painted on it. Hazardous area break glass unit shall meet the requirement of field devices and hazardous area clause.

Hooters unit shall consist of solid-state circuitry on a printed circuit board, a loud speaker and a flashing lamp housed in a weather proof dust tight, wall mounted type enclosure. The hooter shall at least have 102db (A) output measured at 1 meter distance. The unit shall be powered from the fire alarm panel and operate on DG power. In the event of fire, the hooter shall raise pulsating audio alarm and lamp shall start flashing.

Acknowledgement switches shall be provided at exit doors of building to mute the hooters after evacuation.

Flashing lights (Beacons) unit shall consist of solid-state circuitry on a printed circuit board and a red-capped incandescent lamp and audio unit housed in a dust tight, wall ceiling mounting type enclosure. It shall derive power from the fire panel and shall operate on DC supply.

It shall be installed in the enclosed areas where clean agent / CO2 are to be released. In the event of a signal for clean agent / CO2 release is given, the lamp shall start



blinking with a warning sound enabling operating personnel to evacuate the area. The audio unit (hooter) shall have 102db (a) output measured at 1 meter distance.

Clean agent / C02 release and inhibit switches unit is required to be provided at the exit of the protected buildings / rooms. This shall consist of pull type release and inhibit switches clean / agent C02. This unit shall be fabricated out of 2mm thick cold rolled sheet steel suitable for wall mounting. Switches shall be pulled to release or inhibit the clean agent / C02.

Release switches shall have inscription: "PULL TO RELEASE CLEAN AGENT / CO2"

Inhibit switches shall have inscription: "PULL TO INHIBIT CLEAN AGENT / CO2"

Exit Sign shall be fabricated out of 1.6 mm thick clod rolled sheet steel. This shall be suitable for wall mounting or suspension from ceiling. Exit signs suspended from the ceiling shall have text / direction printed on both the sides of exit sign.

Fire exit shall be displayed by means of 5 mm dia LEDs or backlit text. It shall be powered from the fire alarm panel. Exit sign shall operate on DC power supply.

The exit sign shall be either in red letters on white background or white letters on green back ground.

If specified self luminous exit sign shall be provided.

Zener barrier preferably flameproof (Ex'd') equipment that does not require the use of Zener barrier When necessary, intrinsically safe (Ex 'i') detectors and MCPs. Zener barriers shall be provided. These shall be located in unclassified / non-hazardous area.

Normally not more than 10 detectors shall be connected to one Zener barrier. However, Vendor shall indicate maximum number of detectors / MCPs that can be connected to one Zener barrier without compromising on working of loop / zone. Vendor shall also indicate the maximum loop lengthy from Zener barrier considering 1.5 mm^2 - copper conductors, screened cable.

Fault isolator shall be designed to provide short circuit protection to an addressable detector loop. It shall be possible to wire the fault isolator at any point in the detector loop.

On occurrence of a fault (short circuit), the isolator shall cut power to all devices installed between the two isolators minimizing the outage of all the detectors in a loop.

The fault isolator shall have the capability to continuously check the faulted side of the loop to determine if the fault still exists, on rectification of the fault, the isolator shall automatically reset itself.

Fault isolator module shall be housed in an enclosure having IP-65 degree of protection as a minimum, if located in hazardous area; it shall also be tested and approved for use in area classification defined.

Field devices shall be suitable for installation in hazardous area as per specified area classification.

Field devices such as detectors, MCPs, fault isolator, beacons, hooters etc. for use in hazardous area, if specified in the data sheet shall have flame proof enclosure conforming to IS-2148. All equipment for hazardous area installation shall be complete with flame proof, weather proof cable glands.

Equipment, which cannot have flameproof construction, shall be intrinsically safe in design and shall be used with Zener barriers located in safe area.

Equipment that are tested / certified by a recognized test laboratory for the country of origin shall only be offered. The Vendor shall posses valid test certificate issued by a



recognized independent test house such as CMRI / BASEEFA / UL / FM or equivalent for the offered equipment.

All equipment (ingenious or imported) shall have valid statutory approval as applicable for the specified hazardous location from any applicable statutory authority. All indigenous flameproof equipment shall also have valid BIS license and corresponding marking as required by statutory authority.

A separate name plate shall also be provided on each equipment to indicate details of testing agency, test certificate number with date, statutory approval number with date, approval agency, SIS license number with date, applicable gas group, temperature class etc. the name plate shall be riveted / fixed with screw and hot pasted. Incase above information are embossed on the enclosure, the same need to be repeated.

5 FABRICATION AND PAINTING

Vendor shall perform all inspection and testing as per job specification requirements, and as per relevant codes, prior to shipment. The inspection and testing for fire alarm system shall be carried out as per approved Inspection and Test Plan. Vendor shall submit the Inspection and Test Plan for proprietary items / special items for approval. Vendor shall submit the test certificates to the Company for the tests conducted during the manufacturing process like material test, hazardous area certification test, calibration test and any other before Factory Acceptance Testing (FAT).

6 FACTORY ACCEPTANCE TESTING (FAT)

Prior to FAT, Vendor shall submit to the Company a detailed FAT procedure, for review and approval, listing all the FA system complete with the project approved tags, and highlighting the inspection and testing requirements of all such devices and panels. FAT shall be carried out as per approved Inspection and Test Plan. FAT shall be carried out prior to shipment of fire alarm systems.

FAT procedures shall be submitted at least 4 weeks prior to FAT testing taking place. FAT shall be carried out at the manufacturing facilities. The tests shall be witnessed by the Company or their approved representative. FAT procedure will be signed off by the Vendor and Company or their approved representative at the successful completion and conclusion of testing.

The FAT shall be consisting of the following as a minimum:

- a. Visual Inspection;
- b. Simulation of operational field conditions;
- c. Test for functional adequacy;
- d. Calibration test;
- e. Dimensional checks which shall be carried out as per the approved drawings;
- f. Any other relevant test.

A certificate to detail the results and records obtained during the FAT shall be made available for ratification by the Vendor on the date of test.

6.1 Site Acceptance Testing (SAT)

A SAT shall be carried out on completion of the installation of the equipment at site which shall be witnessed by the Company / Owner's representative. SAT shall be performed on the Fire Alarm System as per the approved test procedure. A



comprehensive test procedure in compliance with the Company Specification shall be developed and issued to Company / Owner for review and approval.

The SAT, in general, shall demonstrate that the fire alarm system functions correctly and properly in accordance with the specified requirements.

7 MARKING, PACKING AND SHIPMENT

Following FAT completion, Vendor responsible for fire alarm system shall ensure that all equipment and associated materials and accessories are designed properly, marked and packed, and secured for transit to site without damage.

Vendor shall provide and submit his standard 'Marking, Packing and Shipping Procedures' for review by Company / Owner.

Vendor shall specify any conditions, normal or special, to be verified in intermediate storage and during transport.

Equipment shall be suitably packed including any dismantling, transit fastening and bracing necessary to prevent distortion or damage during transit.

All equipment shall be divided into several sections for protection and ease of handling during transportation. The panels shall be wrapped in polythene sheets before being placed in crates to prevent damage to finish. Crates shall have skid bottom for handling. Special notation such as "Fragile", "This side up", "centre of gravity", "weight" etc. shall be clearly marked on the package together with Tag Nos. Purchase order Nos. etc.

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 account of the Vendor.

7.1 Rejection

Vendor shall make his offer in detail, with respect to every item of the Purchaser's Specification. Any offer not conforming to this shall be summarily rejected.

8 SPARES AND ACCESSORIES

The following spare philosophy shall be followed in case it is not covered in Job Specification.

The Vendor shall include fire detectors simulators (if any), recommended Spare Parts

List for start-up, pre-commissioning and two years operation as per the following;

a. Itemized recommended spare parts list for start-up and precommissioning.

b. Itemized recommended spare parts list for two years operation.

Vendor shall recommend accessories and special tools required for operation and maintenance of fire alarm system, for Company review.

All the spare parts furnished by Vendor shall be wrapped and packaged to preserve an original as-new condition under normal conditions of storage. The same parts shall be properly tagged with stainless steel tags and coded so that later identification as to their intended equipment usage shall be clear.

All items supplied shall be packaged separately and clearly marked as "Spare Parts" and shipped with the equipment.



9 DOCUMENTATION

The following documentation shall be fulfilled by the Vendor.

9.1 Documentation Required With Technical BID

During bidding stage Vendor shall submit in his offer the following documents as a minimum:

- a. Specification, Data Sheets;
- b. Bill of Materials including Vendor list, details for third party items;
- c. Catalogues and manuals;
- d. Quality Assurance plan;

9.2 Documentation Required For Approval

Upon placement of Purchase Order, Vendor shall submit as a minimum the following drawings, documents and Specifications for the Company's approval:

- a. Specifications, Data Sheets;
- b. Bill of Materials including Vendor list, details for third party items;
- c. Catalogues, Manuals and relevant drawings and documents;
- d. Calibration Certificates;
- e. Material Test Certificates;
- f. Procedures for FAT;
- g. Procedures for SAT;
- h. Quality Assurance plan;

9.3 Guarantee / Warranty

Vendor shall guarantee that the complete scope of supply shall be safely and reliably meet all of the requirements of this Job Specification.

Generally Vendor shall provide warranty support for a period of 12 months from the date of supply or 18 months from the date of manufacturing. Warranty shall apply to defective material workmanship and facility design. Warranty work shall be done at Owner's Local facilities. The cost of correction / replacement of any warranty items shall be borne by the Vendor.



VCS Quality Services Pvt. Ltd.

STANDARD SPECIFICATION FOR FIRE AND GAS DETECTION SYSTEM

VCS-SS-IN-5905_02

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ABBREVIATION

NFPA	National Fire Protection Association
SCADA	Supervisory Control and Data Acquisition
IEC	International Electrotechnical Commission
EPIC	Engineering, Procurement, Installation and Commissioning
100N	One out of N (any number) logic voting principle
200N	Two out of N (any number) logic voting principle-
2003	Two out of three logic voting principle
PLC	Programmable Logic Controller
МСВ	Miniature Circuit Breaker
MAC	Manual Alarm Call Point
RTU	Remote Terminal Unit
SIL	Safety Integrity Level
LED	Light Emitting Diode
PVC	Poly Venial Chloride
F&G	Fire & Gas
EN	European Standard
BS	British Standard
IP	Ingress Protection



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1.0 SCOPE

This standard specification establishes the minimum technical and functional requirements for design, engineering, materials, fabrication, painting, inspection and testing, documentation, marking, packing and shipping of fire & gas detection system.

2.0 **DEFINITIONS**

For the purpose of this document, the words and expressions listed below shall have the meanings assigned to them as follows:

Owner/ Purchaser/ Company	Owner of the particular Project (Project Specific).
Consultant	The party which comes out all or part of the engineering, procurement, construction, pre- commissioning and assistance for commissioning, monitors and controls the overall project management.
Bidder/ Manufacturer / Supplier / Vendor	The party(s) which manufactures and / or supplies material, equipment, technical documents / drawings and services to perform the duties specified by Contractor.
Works/ Shop	The place where the ITEM / UNIT is fabricated and tested and transported to Purchaser.
Datasheet	Technical data provided by the Purchaser / Owner / Company.
Standard Specification	Specifications Developed as Standard by the Company.
Job Specification	Specifications Developed pertaining to particular project / Job in regard.
Material Requisition	Requisition as raised to Supplier for Quotation of the item
Purchase Requisition	Requisition as raised to Supplier for Procurement of the item
Purchase Order	Legal Order supplied to Supplier for procurement of the Engineered Item
Site	The work place where the equipment is installed and commissioned.



3.0 REFERENCE DOCUMENTS

3.1 Codes & Standards

The related standards referred to herein and mentioned below shall be of the latest editions prior to the date of the Purchaser's enquiry.

IEC-61508	Functional safety of electrical/electronic / programmable electronic safety related system.
IEC-61131	Programming Industrial Control System
BS 6266	Code of practice for Fire Protection for Electronic data Processing Installations
BS EN50014-39	Electrical Apparatus for Potentially Explosive Atmospheres
BS 7430	Code of practice for Earthing
EN 50018	Constructions and Testing of Electrical Apparatus with Flameproof Enclosures
EN 10204	Metallic products type of inspection Documents
BS EN 60529	Degrees of protection provided by Enclosures
NFPA 70	National Electric Codes
NFPA 72	National Fire Alarm Code

3.2 Order of Precedence

In the event of conflict between specifications, data sheets, related standards, codes etc., and the order of precedence shall be as follows:

- a. Data sheets;
- b. Job Specifications;
- c. Standard Specifications;
- d. Codes and Standards.

Vendor shall refer the matter to the Purchaser for clarification and only after obtaining the approval in writing, the same should proceed with the manufacture of the items in question.

4.0 FIRE AND GAS DETECTION SYSTEM

4.1 General

This Specification generally covers overall F & G system general requirements and minimum technical requirements.



The fire & gas detection systems shall be used to automatically detect fire, presence of toxic gas (H2S) and flammable gas.

The F&G systems shall be PLC-based, redundant and SIL-3 certified unless otherwise specified. For exact SIL requirement and its certification refer Project I&C design basis. The system shall employ separate processors with redundant I/O and bus structure, chassis and software, with all systems running in parallel.

Detector signals shall be separated into isolated paths via input module(s), and sent via separate paths to each processor, where 2003 voting is performed on the data.

Each processor shall execute its individual application program simultaneously and independently; verifying data, executing logic instructions, control calculations, clock and voter / synchronization signals and performing comprehensive system diagnostics and discrepancy monitoring. Outputs shall be sent to output modules where they are again voted (2003) to ensure logic and output integrity.

The system shall be self-monitoring to detect faults that may affect the operation of the system. The system shall be physically arranged so that a single failure in it is unlikely to cause critical impairment of the system's safety function.

The F&G panels shall drive the switched and fused outputs to visual and audible alarm devices in the field. The system alarms shall be generated upon a single detector, not only on voted signals.

The system shall also be used to monitor the Manual Alarm Call points (MAC) located in the plant areas as well as in the buildings

The systems shall be remotely monitored by the SCADA system via serial links. In addition to this, selected alarm signals as identified in the F&G I/O schedule shall be hardwired to the SCADA.PLC.

The fire and gas detection panels shall meet the following functional requirements, as a minimum:

- a. Continuous monitoring of all detectors for alarms and circuit integrity conditions;
- b. For H2S and flammable gas, a continuous readout of concentration shall be provided;
- c. Generate outputs for sounders and beacons;
- d. Generate potential free alarm outputs for connection to the SCADA PLC as specified;
- e. Generate potential free trip signal outputs to diesel generator, power incomer/feeder, as specified in the Job Specifications;
- f. Provide a serial link interface for communication with the SCADA system as specified;
- g. Provide a serial link interface for monitoring of FACP where applicable;
- h. Provide a graphical presentation of the station with LED indicating the location of gas or fire detection or AC activation or modification of existing if applicable;
- i. Provide lamp test facilities;



- j. Provide logic functionality to achieve the above;
- k. Alarm initiation shall be based on voted circuits where specified.

4.2 Input/ Output Requirements

4.2.1 General

The system shall be designed with a minimum of 30% installed spare capacity in I/O's. In addition spare card slots shall be provided.

Intrinsically safe barriers and signal isolators where required shall be installed within the F&G cabinet.

4.2.2 Digital Inputs

Digital input shall be fully redundant' (triplicated), fault-tolerant and testable. The SIL 3 level triplication shall be based on the project requirements.

Input cards shall be capable of accepting potential free contacts.

4.2.3 Analog Inputs

The 4-20 mA analogue input cards shall be fully redundant (triplicated), testable and able to connect 4-20 mA: current sinking or sourcing, 24 VDC. The SIL 3 level triplication shall be based on the project requirements.

Analogue inputs shall have incorporated open, short, and out-of-range circuit detection

4.2.4 Digital Outputs

The F&G system shall provide fault-tolerant potential free contact outputs for connection to the SCADA PLC. The output circuits shall be quad-voted and fully tested. Line monitoring shall be user configurable to detect-short and open circuit failures at the field side of the circuit.

The F&G system shall be able to provide low power outputs, e.g. lamps, if required, with a power consumption of approximately 3 Watt.

The F&G system shall also be able to provide dedicated 24 VDC high power outputs for sounders and flashing beacons. The outputs shall be fail-safe, testable and "short circuit" proof. Short-circuiting of one output shall not affect other outputs.

4.3 Interface Requirements

4.3.1 Hardwired

The F&G System shall be provided with the following potential free contacts, as a minimum:

a. 100N Manual Call Alarm;



- b. 100N H2S detection alarm per fire zone;
- c. 200N H2S detection alarm per fire zone;
- d. 100N Flammable gas detection alarm per fire zone;
- e. 200N Flammable gas detection alarm per fire zone;
- f. 100N Flame detection alarm per fire zone;
- g. 200N Flame detection alarm per fire zone;
- h. 100N Heat detection alarm per fire zone;
- i. 200N Heat detection alarm per fire zone.

The contacts shall open on alarm or fault condition

4.3.2 Serial Link

The F&G system shall have a minimum of two serial links to communicate with other systems.

The serial ports shall comply with Modbus RTU / Ethernet communication protocol.

All indication and alarm signals within the F&G system shall be transmitted via serial link to the SCADA PLC for remote monitoring.

4.4 Minimum Requirements for F&G Cabinets

A standard panel from a reputable Manufacturer shall be used.

- a. Vendor shall assume that the panel "'will be positioned against. a wall- unless otherwise specified All access required shall be possible from the front of .the cabinet. There should be easy access to terminations;
- b. The panel shall be designed to house the following instrument / accessories Monitors/ controllers for Fire detectors, Alarm annunciator , relays / logic cards for shutdown / protection system, Pushbuttons /switches as required (including lamp. test pushbuttons), any other items which are not listed above but essential to make the system operational and to meet requirements specified in Job Specification;
- c. Cabinet doors shall be of the window type so that alarms and status indications can be viewed without the need to open doors;
- d. The cabinet shall have a minimum of IP-42 degree of Ingress protection, as per BS EN 60529, and shall be fitted with a tamperproof locking system;
- e. The cable entry shall be from the bottom of the cabinet;
- f. All required cooling, venting and air filtering facilities shall be included;
- g. Suitable Cable clamps and rails shall be provided for all incoming cables for adequate cable connection stress relief;
- h. All unused card locations shall be fitted with cover plates;
- i. Galvanic isolators for intrinsically safe circuits;
- j. A separate insulated IS earth bar;
- k. The Vendor shall apply a universal method as per referred Codes & Standards, of allocating inputs, outputs and other components to the cabinet, to provide an easy maintainable system;



- I. The cabinet shall have lifting eyes to facilitate handling during transportation and installation;
- m.Cabinets shall have 30% spare space;
- n. Each cabinet shall be provided with a nameplate;
- o. The nameplate made from Traffolyte engraved with black letters on white background;
- p. Final tagging details shall be advised at order placement.

4.5 Wiring Details

- a. The EPIC supplied field cabling shall terminate directly on the terminal strips in the pre-wired F&G cabinet.
- b. All metallic equipment within the cabinets shall be connected to a single safety earthpoint. The cabinet shall be provided with a M8 earthing bolt for connection to the plant safety earthing system.
- c. Terminals carrying voltages higher than 24 volts shall be physically separated and protected against accidental contact by removable cover plates and be labelled accordingly.
- d. The Vendor shall supply all wire required for panel internal wiring. Interconnecting wires shall be standard copper conductor, with 600 volt rated fire retardant PVC insulation.
- e. Stranded copper wire shall be installed, wire ends at terminal points shall be provided with suitable type wire crimp pins/lugs and markers.
- f. All internal wiring, except cross-wiring of hardwired logic, shall be laid in PVC close slotted ducting with covering lid.' The wire ducting shall have a minimum of 35% spare capacity.
- g. Terminal arrangements shall be such that all single cores (including spares) of the multicore cables can be connected in the same sequential order as the pattern and layout of the cores in the cable.
- h. Separate Junction Boxes for IS and Non-IS signals shall be provided. Cable entries shall be located at the bottom and side only via removable gland plates. Suitable flameproof cable glands shall be used and spare cable entries shall be provided with plugs, labels shall be provided stating Junction Boxes contain IS circuits.

4.6 Marking

Terminals and (main) wiring shall be clearly identified in strict accordance with the system documentation. Earthing for IS, screens, AC and DC systems shall be segregated and identified.

The cabinet and all major system components, modules, boards, terminals,' blocks, cables, card files and individual card locations shall be clearly labelled and identified with a tag number. Individual wires shall be tagged with the terminal number. Nameplates shall be in the English language. In addition all equipment shall be identified-with the Vendor type and serial number to facilitate future reference.

The wiring shall be colour coded in accordance with the following standards



24 V DC Power supply	Positive	Red
	Negative	Black
24 V DC Digital signals	Positive	Light gray (with "+" sleeve marker)
	Negative	
24 V DC Analog signals	Positive	Purple (with "+" sleeve marker) Negative
	Negative	Purple (with "_' sleeve marker)
Intrinsic Safe signals	Positive	Blue (with "+" sleeve marker)
	Negative	Blue (with "_" sleeve marker)

Panel wiring shall be sized in accordance with the following:

24 V DC Power output	Tinned ,stranded, 2.5 mm2" minimum
	and copper conductors 600V grade
24 V DC Digital signals	Tinned ,stranded, 1.0 mm2 minimum and
	copper conductors 600V grade
24 V DC Analog signals	Tinned ,stranded, 0.75 mm2 minimum
	and copper conductors 600V grade
Signal Earth	Yellow with black stripe
I.S Signal Earth	Yellow

Notice giving details of the wiring colour scheme shall be fixed to the inside of the cabinet, using a plastic-laminated sheet. A document holder shall be installed on the inside of the cabinet door

All power and signal wiring shall be clearly marked with reference codes and/or tag numbers.

All signal wires terminated to incoming or outgoing cabinet terminals shall be marked with the terminal number.

4.7 **Power Supply Requirements**

4.7.1 Power Supply Facilities

Two (2) secure 24 V DC power supply feeders will be available from the Plant UPS system.

DC Voltage	24 V DC (±5%)
Ripple at full load	100 mV PIP

The system shall be fed by the two main supplies with blocking diodes to allow uninterrupted supply in case one of the main feeders fails. A main feeder failure alarm shall be generated.



The internal distributions of the 24 V DC supply shall be as per indicated standard. The F&G system shall supply the required power for 24 VDC digital output signals to sounders and beacons as well as to analogue input signals.

The power supply to the logic input and. output circuits shall be floating (non-earthed).

The main power supply to the cabinet -shall be protected and isolated by means of a thermal circuit breaker (MCB type C). Separate Mini Circuit Breakers (MCB type B) shall be provided for each power supply unit. Vendor shall guarantee proper selectivity.

4.7.2 Power Distribution Features

Within the F&G cabinet the power supply system shall have the following minimum features:

- a. The provision of all the necessary power, voltage, frequency etc. That individual components and modules require, .with full redundancy.
- b. Proper power distribution to all systems, with necessary isolation and fusing.
- c. Isolation of individual racks within the cabinet.
- d. Isolation of I/O cards within a "logic entity". Fuse blowout indication shall be provided, while it shall be possible to easily replace fuses.

4.7.3 Power Consumption

The Vendor shall submit a calculation of the estimated power consumption and heat dissipation of the F&G cabinet, two weeks after order placement.

5.0 FABRICATION

Vendor shall obtain approval in writing from the Purchaser before start of fabrication of Fire & Gas detection panel. Vendor shall submit the required specification, drawings & documents for approval. Also, Vendor shall refer the relevant codes and standards for manufacturing mentioned herein. Painting of Fire & Gas detection panel shall be in accordance with Company painting specifications.

6.0 **INSPECTION AND TESTING**

Vendor shall perform all inspection and testing as per project specification requirements, and as per relevant codes, prior to shipment. The inspection and testing for F&G system devices & panels shall be carried out as per approved Inspection and Test Plan.

Vendor shall submit the Inspection and Test Plan for proprietary items / special items for approval. Vendor shall submit the test certificates to the Company for the tests conducted during the manufacturing process such as material test, hazardous area certification test, calibration test and any other before Factory Acceptance Testing (FAT).



6.1 Factory Acceptance Testing

Prior to FAT, Vendor shall submit to the Company a detailed FAT procedure, 'for review and approval, listing all the F&G system complete with the project approved tags, and highlighting the inspection and testing requirements of all such devices' & panels.

FAT shall be carried out as per approved Inspection and Test Plan. FAT shall' be carried out prior to shipment of the F&G system devices & panels.

FAT procedures shall be submitted at least 4 weeks prior to FAT testing taking' place.

FAT shall be carried out at the manufacturing facilities. The tests shall be witnessed by the Company or their approved representative. FAT procedure will be signed off by the Vendor and Company or their approved representative at the successful completion and conclusion of testing.

The FAT 'shall be consisting of the following as a- minimum:

- a. Visual Inspection;
- b. Dimensional checks which shall be carried out as per the approved drawings;
- c. Material checks in accordance with the appropriate instrumental standards & codes;
- d. Simulation of the serial link interface to prove that the Modbus / Ethernet protocol is properly functioning;
- e. Functional Test;
- f. Calibration Test;
- g. Paint checks;
- h. Any other relevant test.

A certificate to detail the results and records obtained during the FAT shall be 'made available for ratification by the Vendor on the date of test.

6.2 Site Acceptance Testing (SAT)

A SAT shall be carried out on completion of the installation of the equipment at site which shall be witnessed by the Company / Owner's representative. SAT shall be performed on the F&G system devices as per the approved test procedure. A comprehensive test procedure in compliance with the Company Specification shall be developed and issued to Company / Owner for review and approval.

The Site Acceptance Test (SAT), in general, shall demonstrate that the F&G system functions correctly and properly in accordance with the specified requirements.

7.0 MARKING, PACKING AND SHIPMENT

Following FAT completion, Vendor responsible for F&G system shall ensure that all equipment and associated materials and accessories are designed properly, marked and packed, and secured for transit to site without damage.



Vendor shall provide and submit his standard 'Marking, Packing and Shipping Procedures' for review by Company / Owner.

Vendor shall specify any conditions, normal or special, to be verified in intermediate storage and during transport.

Equipment shall be suitably packed including any dismantling, transit fastening and bracing necessary to prevent distortion or damage during transit.

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 account of the Vendor.

8.0 SPARES AND ACCESSORIES

The Vendor shall include recommended spare parts list for start-up, pre commissioning and two years operation as per the following:

a. Itemized recommended spare parts list for start-up and pre commissioning;

b. Itemized recommended spare parts list for two years operation;

Vendor shall recommend accessories and special tools required for operation and maintenance of F&G System, for Company review.

All the spare parts furnished by Vendor shall be wrapped and packaged to preserve an original as-new condition under normal conditions of storage. The same parts shall be properly tagged with stainless steel tags and coded so that later identification as to their intended equipment usage shall be clear.

All items supplied shall be packaged separately and clearly marked as "Spare Parts" and shipped with the equipment.

9.0 DOCUMENTATION

The following documentation shall be fulfilled by the Vendor, if it is not covered in Job Specification.

9.1 **Documentation Required With Technical BID**

During bidding stage Vendor shall submit in his offer the following documents as a minimum:

- a. Specification, Data Sheets;
- b. Bill of Materials including Vendor list, details for third party items;
- c. Catalogues and manuals;
- d. Quality assurance plan ;



9.2 Documentation Required For Approval

Upon placement of Purchase Order, Vendor shall submit as a minimum the following drawings, documents and Specifications for the Company's approval:

- a. Specifications, Data Sheets;
- b. Bill of Materials including Vendor list, details for third-party items;
- c. Catalogues, manuals and relevant drawings and documents;
- d. Dimensional drawings;
- e. Calibration certificates;
- f. Material Test certificates;
- g. Procedures for FAT;
- h. Quality Assurance.

9.3 Guarantee / Warranty

Vendor shall guarantee that the complete scope of supply shall be safely and reliably meet all of the requirements of this Company Specification.

Generally Vendor shall provide warranty support for a period of 12 months from the 'date of supply or 18 months from the date of manufacturing. Warranty shall apply to defective' material workmanship and facility design. Warranty work shall be done at Owner's local facilities. The cost of correction / replacement of any warranty items shall be borne by the Vendor.

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	-	FAN ASSEMBLY						
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	_	OUT FILTER						
	-	COMFORT HANDLE						
		LIFTING EYEBOLT						
D	D	SECURITY LOCK						
ABB	REVIATION:							
J	в –	JUNCTION BOX						
J	S –	JUNCTION BOX STAI	NDARD					
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STANDARD NO. VCS PROJECT CONSULTANTS JUNCTION BOX AND CABINET STANDARD DRAWING VPC-SD-IN-032 PVT. LTD. SHEET NO. 3 OF 8 GENERAL ARRANGEMENT JUNCTION BOX (CORE CABLE) 400 400 _60 U (TERMINATE BONDING JUMPERS AT SAFETY EARTH BUS) 6 1 -(### ┙┝╘┎╝ ŝ 200 00 232425 + 2928272621 181920 (7)24258 (4) 6 BOTTOM VIEW (CABLE GLAND PLATE DETAILS) TOP VIEW SIDE VIEW 420 400 345 8 6 0 ò 1. -12 (19) 225 22 22 40 QUANTITY 3 ITEM DESCRIPTION 1 JUNCTION BOX 400X400X200 GRP/ SS316 1 1 2 AS REQ'D 2 MOUNTING PLATE 0 С 15 14 16 13 3 TERMINAL AS REQ'D AS REQ'D DOOR LOCKING SYSTEM 4 5 WALL BRACKET AS REO'D 26272829 0 NAMEPLATE LAMINATED PLASTIC PLASTIC WHITE/ BLACK/ WHITE 60X22 AS REQ'D 6 mm GN/YL EARTH FRONT VIEW 7 DRAIN PLUG AS REQ'D AS REQ'D 8 MOUNTING RAIL TERMINALS AS REQ'D 9 AS REQ'D 10 EARTH PLATE END BRACKET AS REQ'D 11 AS REQ'D TERMINAL END PLATE 12 13 TERMINALS AS REQ'D 2 AS REO'D 14 EARTH BAR TAG PLATE DETAIL ATTACH TO JUNCTION BOX WITH STAINLESS STEEL HARDWARE EARTH BAR SUPPORT AS REQ'D 15 16 EARTH WIRE 25mm GREEN AS REO'D AS REQ'D 17 CABLE GLAND, BRASS 18 ARMOR CONTINUITY KIT AS REO'D AS REQ'D CONTINUITY COPPER CORD 19 20 CABLE GLAND ZONE 2 STEEL WIRE ARMORED AS REQ'D AS REQ'D CABLE GLAND EARTH TAG BRASS 21 TABLE - 1 22 LOCKNUT, BRASS AS REQ'D APPROX. BOX SIZE GLANDS (BOTTOM & SIDE) BLANKING PLUG AS REQ'D 23 M32 10PR 19C 5TR M20 1PR 2C 1TR M50 20PR 37C 24 0-RING AS REQ'D M25 5PR 7C M63 20TF M40 10TR JUNCTION BOX TYPE (H x W x D) TERMINALS AS REQ'D LOCK NUT 25 CABLE LUG, TUBULAR COMPRESSION AS REQ'D 26 19 CORE 300x300x200 25 1 12 _ MACHINE SCREW, BRASS, SLOTTED PAD HEAD AS REO'D 27 27 CORE 400x420x200 15

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NUT, BRASS

LOCK WASHER

CABLE GLAND EARTH TAG BRASS

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INSTRUMENT EARTHING STANDARD DRAWING

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1 OF 4

NOTES, ABBREVIATION AND LEGEND

GENERAL NOTES:

- 1. SCREENS AT THE INSTRUMENT END TO BE CUT BACK AND INSULATED FROM EARTH.
- 2. SCREEN SHALL BE INSULATED FROM EACH OTHER AND EARTHED AT SCREEN BAR IN JUNCTION BOX.
- 3. CABLE GLAND TO BE FITTED WITH EARTH RING. ARMOUR TO BE EARTHED VIA CABLE GLAND EARTH RING.
- 4. EARTHING WITHIN CABINETS WILL BE INSTRUMENTATION VENDOR SCOPE. ANY EARTHING OUTSIDE CABINET TO BUS BARS/ MSE/ MIE/ PAS MRE/ PEG WILL BE IN ELECTRICAL SCOPE.
- 5. WHERE EARTHING ELECTRODE/ RING IS PROVIDED (Eg. FOR NON-CONDUCTING OR LINED PIPES), RECOMMENDATIONS OF INSTRUMENT MANUFACTURER SHALL BE FOLLOWED.
- 6. ALL METAL EQUIPMENT AND ENCLOSURES WITHIN THE PANEL OR SERIES OF PANELS (I.E INSTRUMENT CASES HINGED DOORS, CABINETS, ETC.) SHALL BE BONDED WITH BONDING JUMPER AND CONNECTED TO A SAFETY EARTH BUS WITH A MINIMUM COPPER WIRE SIZE OF 2.5 SQ. MM. TWO COPPER CONDUCTORS, OF 20 SQ. MM MINIMUM SHALL BE CONNECTED FROM THE SAFETY EARTH BUS TO A SINGLE TIE POINT ON THE SAFETY EARTH GRID IN A CLOSED LOOP CONFIGURATION. SAFETY EARTH CONNECTIONS MUST BE MADE SUCH THAT WHEN A CASE- EARTHED INSTRUMENT IS REMOVED, THE INTEGRITY OF THE REST OF THE SAFETY EARTH SYSTEM IS MAINTAINED.
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- 8. THE DC SHIELD BUS-BAR WITH IN EACH PANEL SHALL BE ELECTRICALLY ISOLATED AND SPACED AT LEAST 25mm FROM THE BODY OF THE PANEL.
- 9. THE CROSS-SECTIONAL AREA OF THE EARTH WIRE SHALL BE SIZED IN ACCORDANCE WITH BS 7430.
- 10. CONNECTION TO EARTHING RODS/ GRID SHALL MADE USING CLAMPS/BOLTS OR BY USING APPROVED EARTHING CONNECTIONS.
- 11. THE RESISTANCE FROM THE INSTRUMENT EARTH BUS WITHIN THE PANEL TO PAS MRE/ PEG SHALL BE LESS THAN 1 OHM.
- 12. THE TWO EARTHING CONNECTION BETWEEN PAS MRE AND PLANT GRID, SHALL BE LOCATED IN EARTHING WELLS FOR REMOVAL DURING TESTING.
- 13. ALL EARTH WIRES CONNECTING BUS BARS WITHIN PANELS TO MIE/ MSE BARS WITHIN THE BUILDING, CONNECTING THE PAS MRE TO THE PEG OR CONNECTING THE MSE TO PEG HAVE TO BE INSULATED TO ENSURE SINGLE POINT EARTH.
- 14. IT IS HIGHLY RECOMMENDED TO HAVE MINIMUM ONE MIE & ONE MSE BUS-BAR PER BUILDING. HOWEVER IF CONDITIONS DICTATE HAVING MORE THAN ONE, THEN THESE MULTI MASTER BARS SHALL BE LOOPED TOGETHER WITH REDUNDANT EARTH WIRES AND SHALL CONNECTED TO PAS MRE OR PEG FROM THE OPPOSITE ENDS OF THE BUILDING.
- 15. THE TOTAL LENGTH OF EARTHING CABLE BETWEEN CABINETS AND MRE SHALL NOT EXCEED 150 METERS (AS PER BS 7430 CODE OF PRACTICE FOR EARTHING).
- 16. THE PAS MRE RODS SHALL NOT BE TOUCHING THE OVERALL PLANT EARTHING GRID EXCEPT AT THE GRID SINGLE POINT CONNECTION. THE DISTANCE BETWEEN THE RODS AND PLANT GRID SHOULD BE 3 METERS.
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- 19. CABLE TRAY CONNECTION TO BE EARTHED AT EVERY 25 METERS INTERVAL DIRECTLY TO MAIN GRID OR THROUGH STRUCTURE.
- 20. REFER ELECTRICAL EARTHING DETAIL STANDARD DRAWING VPC-SD-EL-103/104/105/118/120 FOR MORE DETAILS.

CCR : CENTRAL CONTROL ROOM INSTRUMENT GROUND (GREEN) JB : JUNCTION BOX INSTRUMENT GROUND (GREEN) LER : LOCAL EQUIPMENT ROOM SAFETY CONNECTION BY ELECTRICAL LOP : LOCAL CONTROL PANEL SAFETY GROUND (GREEN/ YELLOW TRAC ME : MASTER INSTRUMENT EARTH SAFETY GROUND (GREEN/ YELLOW TRAC MSE : MASTER REFERENCE EARTH SAFETY GROUND (GREEN/ YELLOW TRAC PEG : PLANT EARTH GRD SAFETY GROUND (GREEN/ YELLOW TRAC	ABBREVIATION:	LEGEND:
PAS : PROCESS AUTOMATION STSTEM	CCR : CENTRAL CONTROL ROOM JB : JUNCTION BOX LER : LOCAL EQUIPMENT ROOM LCP : LOCAL CONTROL PANEL MIE : MASTER INSTRUMENT EARTH MSE : MASTER SAFETY EARTH MRE : MASTER REFERENCE EARTH PEG : PLANT EARTH GRID PAS : PROCESS AUTOMATION SYSTEM	INSTRUMENT GROUND (GREEN) SAFETY CONNECTION BY ELECTRICAL SAFETY GROUND (GREEN/ YELLOW TRACER)

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INSTRUMENT EARTHING STANDARD DRAWING

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ABBREVIATION				LEGEND				
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	-	COMFORT HANDLE						
		LIFTING EYEBOLT						
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NUT, BRASS

LOCK WASHER

CABLE GLAND EARTH TAG BRASS

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- 20. REFER ELECTRICAL EARTHING DETAIL STANDARD DRAWING VPC-SD-EL-103/104/105/118/120 FOR MORE DETAILS.

CCR : CENTRAL CONTROL ROOM JB : JUNCTION BOX LER : LOCAL EQUIPMENT ROOM LCP : LOCAL CONTROL PANEL	
ME : MASTER INSTRUMENT EARTH MSE : MASTER SAFETY EARTH MRE : MASTER REFERENCE EARTH PEG : PLANT EARTH GRID PAS : PROCESS AUTOMATION SYSTEM	EEN) Electrical Yellow tracer;

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C1	07.01.2020	Issued for Client Re	eview	KS	VB	KNC
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I/O LIST (F&G SYSTEM) - NAMBOR GGS

														Rt	=v.	Sheet
														C)1	2 of 10
Sr.	Tag Number	10	Туре	Service	Location	Instrument Type	Line / Equipment Number	P & ID	IS / NIS	Signal Level	System Type	Junction Box No	Calibration	Instrument	Units	Remarks
No.		AI AO	DI DO										Range	Range		
F&G De	vices															
Process	Area															
1	1009-NA-OPGD-1001	1		Natural Gas	Filter seperator + Pig Launcher + Metering skid	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
2	1009-NA-OPGD-1002	1		Natural Gas	Filter seperator + Pig Launcher + Metering skid	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
3	1009-NA-PGD-1001	1		Natural Gas	Knock-out Drum KOD-1011	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
4	1009-NA-PGD-1002	1		Natural Gas	Knock-out Drum KOD-1011	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 100	*	% LEL	
5	1009-NA-PGD-1003	1		Natural Gas	Motor operated Valve MOV-1003	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
6	1009-NA-PGD-1004	1		Natural Gas	Electro-hydraulic Valve EHOV-1002	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
7	1009-NA-PGD-1005	1		Natural Gas	Closed drain tank	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
8	1009-NA-MCP-1001		1	Natural Gas	Nambor GGS	Manual Call Point	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
9	1009-NA-BA-1001		1	Natural Gas	Nambor GGS	Beacon	N/A	N/A	NIS	24 VDC	GDS	HOLD	-	*	-	
10	1009-NA-HA-1001		1	Natural Gas	Nambor GGS	Hooter	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
Termina	l Control Building (Portaca	bin)														
1	1009-NA-MCP-1002		1	Natural Gas	Portacabin	Manual Call Point	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
2	1009-NA-HA-1002		1	Natural Gas	Portacabin	Hooter	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
3	1009-NA-FGD-1001	1		Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
4	1009-NA-FGD-1002	1		Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	-	
5	1009-NA-FGD-1003	1		Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
6	1009-NA-FGD-1004	1		Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
		•														





I/O LIST (F&G SYSTEM) - KHORAGHAT GGS

															RE	:V.	Sheet
					-										0	1	3 of 10
Sr.	Tag Number		IO Type	•	Forwise	Location	Instrument Type	Line / Equipment Number	B & ID		Signal Laval	Suctom Tuno	Junction Box No.	Calibration	Instrument	Unite	Bomarka
No.	Tag Number	AI	AO DI	I DO	Service	Location	instrument rype	Line / Equipment Number	PQID	13 / N13	Signal Level	System Type	Junction Box No	Range	Range	onics	Relliarks
F&G De	evices																
Process	Area																
1	1009-KH-OPGD-1001	1			Natural Gas	Filter seperator + Pig Launcher + Pig Reciever + Metering Skid	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
2	1009-KH-OPGD-1002	1			Natural Gas	Filter seperator + Pig Launcher + Pig Reciever + Metering Skid	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
3	1009-KH-OPGD-1003	1			Natural Gas	Filter seperator(FS-1001) + Metering Skid(FM-1001)	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
4	1009-KH-OPGD-1004	1			Natural Gas	Filter seperator(FS-1001) + Metering Skid(FM-1001)	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
5	1009-KH-PGD-1001	1			Natural Gas	Motor Oprated Valve MOV-1005	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 100	*	% LEL	
6	1009-KH-PGD-1002	1			Natural Gas	Motor Oprated Valve MOV-1015	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 100	*	% LEL	
7	1009-KH-PGD-1003	1			Natural Gas	Electro-hydraulic Valve EHOV-1004	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
8	1009-KH-PGD-1004	1			Natural Gas	Electro-hydraulic Valve EHOV-1016	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
9	1009-KH-PGD-1005	1			Natural Gas	Odourising Package ODT-1001	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
10	1009-KH-PGD-1006	1			Natural Gas	Closed Drain tank CDT-1001	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
11	1009-KH-MCP-1001			1	Natural Gas	Khoraghat GGS	Manual Call Point	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
12	1009-KH-BA-1001		1		Natural Gas	Khoraghat GGS	Beacon	N/A	N/A	NIS	24 VDC	GDS	HOLD	-	*	-	
13	1009-KH-HA-1001		1		Natural Gas	Khoraghat GGS	Hooter	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
Termina	l Control Building (Portaca	abin)															
1	1009-KH-MCP-1002			1	Natural Gas	Portacabin	Manual Call Point	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
2	1009-KH-HA-1002		1		Natural Gas	Portacabin	Hooter	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
3	1009-KH-FGD-1001	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
4	1009-KH-FGD-1002	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	-	
5	1009-KH-FGD-1003	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
6	1009-KH-FGD-1004	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	





I/O LIST (F&G SYSTEM) - URIUMGHAT STATION

																RE	EV.	Sheet
																0	1	4 of 10
Sr.	Tag Number		10	Туре	-	Service	Location	Instrument Type	Line / Equipment Number	P&ID	IS / NIS	Signal Level	System Type	Junction Box No	Calibration	Instrument	Units	Remarks
NO.	-	A	I AO	DI	DO							_			Range	капде		
F&G De	vices																	
Process	Area			1		n	1		1 1			I		n				
1	1009-UR-OPGD-1001	1				Natural Gas	Pig Launcher (PL-1002)+ Pig Reciever (PR-1001)	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
2	1009-UR-OPGD-1002	1				Natural Gas	Pig Launcher (PL-1002)+ Pig Reciever (PR-1001)	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
3	1009-UR-PGD-1001	1				Natural Gas	EHOV-1020	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
4	1009-UR-PGD-1002	1				Natural Gas	MOV-1019	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 100	*	% LEL	
5	1009-UR-PGD-1003	1				Natural Gas	MOV-1017	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
6	1009-UR-PGD-1004	1				Natural Gas	EHOV-1018	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
7	1009-UR-PGD-1005	1				Natural Gas	Closed Drain tank (CDT-1001)	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
8	1009-UR-MCP-1001				1	Natural Gas	Uriumghat Station	Manual Call Point	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
9	1009-UR-BA-1001			1		Natural Gas	Uriumghat Station	Beacon	N/A	N/A	NIS	24 VDC	GDS	HOLD	-	*	-	
10	1009-UR-HA-1001			1		Natural Gas	Uriumghat Station	Hooter	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
Termina	l Control Building (Portaca	abin)																
1	1009-UR-MCP-1002				1	Natural Gas	Portacabin	Manual Call Point	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
2	1009-UR-HA-1002			1		Natural Gas	Portacabin	Hooter	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
3	1009-UR-FGD-1001	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
4	1009-UR-FGD-1002	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	-	
5	1009-UR-FGD-1003	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
6	1009-UR-FGD-1004	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	



I/O LIST (F&G SYSTEM) - GOLAGHAT STATION



Sheet

REV.

															c)1	5,6 of 10
Sr. No.	Tag Number	AI	IO T AO	Type DI DO	Service	Location	Instrument Type	Line / Equipment Number	P & ID	IS / NIS	Signal Level	System Type	Junction Box No	Calibration Range	Instrument Range	Units	Remarks
F&G D	evices																
Process	s Area		1 1											1	1		
1	1009-GG-OPGD-1001	1			Natural Gas	Pig Launcher + Pig Reciever	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
2	1009-GG-OPGD-1002	1			Natural Gas	Pig Launcher + Pig Reciever	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
3	1009-GG-OPGD-1003	1			Natural Gas	metering skid + Shutdown valves(XSDV-1032) + Flow control valve(FCV-1001)	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
4	1009-GG-OPGD-1004	1			Natural Gas	metering skid + Shutdown valves(XSDV-1032) + Flow control valve(FCV-1001)	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
5	1009-GG-PGD-1001	1			Natural Gas	Motor operated Valve MOV-1026	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 100	*	% LEL	
6	1009-GG-PGD-1002	1			Natural Gas	Electro-hydraulic Valve EHOV-1027	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
7	1009-GG-PGD-1003	1			Natural Gas	Motor operated Valve MOV-1024	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
8	1009-GG-PGD-1004	1			Natural Gas	Electro-hydraulic Valve EHOV-1025	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
9	1009-GG-PGD-1005	1			Natural Gas	Instrument Gas Reciever (V-1001)	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
10	1009-GG-MCP-1001			1	Natural Gas	Golaghat Station	Manual Call Point	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
11	1009-GG-BA-1001			1	Natural Gas	Golaghat Station	Beacon	N/A	N/A	NIS	24 VDC	GDS	HOLD	-	*	-	
12	1009-GG-HA-1001			1	Natural Gas	Golaghat Station	Hooter	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
Termin	I al Control Building (Portaci	abin)	1 1														
1	1009-GG-MCP-1002			1	Natural Gas	Portacabin	Manual Call Point	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
2	1009-GG-HA-1002			1	Natural Gas	Portacabin	Hooter	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
3	1009-GG-FGD-1001	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
4	1009-GG-FGD-1002	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	-	
5	1009-GG-FGD-1003	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
6	1009-GG-FGD-1004	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
AGCL C	Control Room Building (AGC	CL Offic	e Area)			- I		L 1		- 1	1			1	1		
1	1009-GG-MCP-1003			1	Natural Gas	AGCL Control Room Building	Manual Call Point	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
2	1009-GG-MCP-1004			1	Natural Gas	AGCL Control Room Building	Manual Call Point	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
3	1009-GG-MCP-1005			1	Natural Gas	AGCL Control Room Building	Manual Call Point	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
4	1009-GG-HA-1003			1	Natural Gas	AGCL Control Room Building	Hooter	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
5	1009-GG-HA-1004			1	Natural Gas	AGCL Control Room Building	Hooter	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
6	1009-GG-BA-1002			1	Natural Gas	AGCL Control Room Building	Beacon	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
7	1009-GG-FGD-1005	1			Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
8	1009-GG-FGD-1006	1			Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
9	1009-GG-FGD-1007	1			Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
10	1009-GG-FGD-1008	1			Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	-	
11	1009-GG-FGD-1009	1			Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
12	1009-GG-FGD-1010	1			Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	

13	1009-GG-FGD-1011	1	Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	
14	1009-GG-FGD-1012	1	Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	
15	1009-GG-FGD-1013	1	Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	
16	1009-GG-FGD-1014	1	Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	
17	1009-GG-FGD-1015	1	Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	
18	1009-GG-FGD-1016	1	Natural Gas	AGCL Control Room Building	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	





I/O LIST (F&G SYSTEM) - NUMALIGARGH STATION

															RE	v.	Sheet
															0	1	7 of 10
Sr.	Tag Number		ІО Тур	e	Service	Location	Instrument Type	Line / Equipment Number	P & ID	IS / NIS	Signal Level	System Type	Junction Box No	Calibration	Instrument	Units	Remarks
No.		AI	AO D	I DO								-,,		Range	Range		
F&G De	evices																
Process	Area	1	<u> </u>		1					1		1	1	1			
1	1009-NU-OPGD-1001	1			Natural Gas	Pig Reciever	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
2	1009-NU-OPGD-1002	1			Natural Gas	Pig Reciever	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 10	*	LEL Meter	
3	1009-NU-PGD-1001	1			Natural Gas	Electro-hydraulic Valve	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 100	*	% LEL	
4	1009-NU-PGD-1002	1			Natural Gas	Motor operated Valve	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
5	1009-NU-MCP-1001			1	Natural Gas	Numaligarh GGS	Manual Call Point	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
6	1009-NU-BA-1001		:	L	Natural Gas	Numaligarh GGS	Beacon	N/A	N/A	NIS	24 VDC	GDS	HOLD	-	*	-	
7	1009-NU-HA-1001		:	L	Natural Gas	Numaligarh GGS	Hooter	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
Termina	al Control Building (Portaca	abin)															
1	1009-NU-MCP-1002			1	Natural Gas	Portacabin	Manual Call Point	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
2	1009-NU-HA-1002		:	L	Natural Gas	Portacabin	Hooter	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
3	1009-NU-FGD-1001	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
4	1009-NU-FGD-1002	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	-	
5	1009-NU-FGD-1003	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
6	1009-NU-FGD-1004	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	





I/O LIST (F&G SYSTEM) - THORAMUKH STATION

																RI	EV.	Sheet
																c)1	8 of 10
Sr.	Tag Number		ІО Тур	e		Service	Location	Instrument Type	Line / Equipment Number	P & ID	IS / NIS	Signal Level	System Type	Junction Box No	Calibration	Instrument	Units	Remarks
NO.		AI	AO E	DI	00							_			Range	Range		
F&G De	evices																	
Process	Area	1	r															
1	1009-TH-OPGD-1001	1				Natural Gas	Pig Launcher PL-1001	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
2	1009-TH-OPGD-1002	1				Natural Gas	Pig Launcher PL-1001	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 10	*	LEL Meter	
3	1009-TH-PGD-1001	1				Natural Gas	EHOV-1050	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 100	*	% LEL	
4	1009-TH-PGD-1002	1				Natural Gas	MOV-1051	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
5	1009-TH-MCP-1001				1	Natural Gas	Thoramukh Station	Manual Call Point	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
6	1009-TH-BA-1001			1		Natural Gas	Thoramukh Station	Beacon	N/A	N/A	NIS	24 VDC	GDS	HOLD	-	*	-	
7	1009-TH-HA-1001			1		Natural Gas	Thoramukh Station	Hooter	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
Termina	al Control Building (Portaca	abin)																
1	1009-TH-MCP-1002				1	Natural Gas	Portacabin	Manual Call Point	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
2	1009-TH-HA-1002			1		Natural Gas	Portacabin	Hooter	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
3	1009-TH-FGD-1001	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
4	1009-TH-FGD-1002	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP	-	-	-	-	
5	1009-TH-FGD-1003	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
6	1009-TH-FGD-1004	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	





I/O LIST (F&G SYSTEM) - HAMIRAMUKH STATION

															RE	v.	Sheet
															0	1	9 of 10
Sr.	Tag Number		10 T	уре	Service	Location	Instrument Type	Line / Equipment Number	P & ID	IS / NIS	Signal Level	System Type	Junction Box No	Calibration	Instrument	Units	Remarks
No.		AI	AO	DI DO										Range	Range		
F&G De	vices																
Process	Area				r	T	a.		1	r							
1	1009-HA-OPGD-1001	1			Natural Gas	Pig Reviever PR-1001	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
2	1009-HA-OPGD-1002	1			Natural Gas	Pig Reviever PR-1001	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 10	*	LEL Meter	
3	1009-HA-PGD-1001	1			Natural Gas	MOV-1054	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 100	*	% LEL	
4	1009-HA-PGD-1002	1			Natural Gas	EHOV-1055	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
5	1009-HA-MCP-1001			1	Natural Gas	Hamiramukh Station	Manual Call Point	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
6	1009-HA-BA-1001			1	Natural Gas	Hamiramukh Station	Beacon	N/A	N/A	NIS	24 VDC	GDS	HOLD	-	*	-	
7	1009-HA-HA-1001			1	Natural Gas	Hamiramukh Station	Hooter	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
Terminal	Control Building (Portacab	in)															
1	1009-HA-MCP-1002			1	Natural Gas	Portacabin	Manual Call Point	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
2	1009-HA-HA-1002			1	Natural Gas	Portacabin	Hooter	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
3	1009-HA-FGD-1001	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
4	1009-HA-FGD-1002	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
5	1009-HA-FGD-1003	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
6	1009-HA-FGD-1004	1			Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	





I/O LIST (F&G SYSTEM) - SV-1 station(Golaghat to Numaligargh)

																RI	EV.	Sheet
																c	01	10 of 10
Sr. No.	Tag Number	AI	IO T AO	Type DI	DO	Service	Location	Instrument Type	Line / Equipment Number	P & ID	IS / NIS	Signal Level	System Type	Junction Box No	Calibration Range	Instrument Range	Units	Remarks
F&G De	vices													l				
Process	Area																	
1	1009-S3-OPGD-1001	1				Natural Gas	Sectionalizing Valve SV1-1028	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 10	*	LEL Meter	
2	1009-S3-OPGD-1002	1				Natural Gas	Sectionalizing Valve SV1-1028	Open Path Gas Detector	N/A	N/A	IS	4-20 mA	GDS	HOLD	0 - 10	*	LEL Meter	
3	1009-S3-PGD-1001	1				Natural Gas	Sectionalizing Valve SV1-1028	Point Type Detector	N/A	N/A	IS	4-20 mA	GDS		0 - 100	*	% LEL	
4	1009-S3-MCP-1001				1	Natural Gas	SV-1 station	Manual Call Point	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
5	1009-S3-BA-1001			1		Natural Gas	SV-1 station	Beacon	N/A	N/A	NIS	24 VDC	GDS	HOLD	-	*	-	
6	1009-S3-HA-1001			1		Natural Gas	SV-1 station	Hooter	N/A	N/A	NIS	24 VDC	GDS		-	*	-	
Termina	l Control Building (Portac	abin)																
1	1009-S3-MCP-1002				1	Natural Gas	Portacabin	Manual Call Point	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
2	1009-S3-HA-1002			1		Natural Gas	Portacabin	Hooter	N/A	N/A	NIS	24 VDC	FACP		-	*	-	
3	1009-S3-FGD-1001	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
4	1009-S3-FGD-1002	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
5	1009-S3-FGD-1003	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	
6	1009-S3-FGD-1004	1				Natural Gas	Portacabin	Addressable Multi Sensor (Smoke+ Heat)	NA	NA	NIS	4-20 mA	FACP		-	-	-	

	PROJE	CT NUMBEF	ASSAM COMPANY LTD		
F&G CA	BLE SCHED	ULE		Client Job Number	1009
	Total Sheets	10			
Document no.	LST	5001			

ASSAM GAS COMPANY LTD.

NAMBOR-GOLAGHAT-NUMALIGARH AREA GAS PIPELINE PROJECT

01	02.06.2022	Issued for Bids	AK	SV	KNC
00	27.02.2020	Issued for Bids	KS	VB	KNC
C1	30.12.2019	Issued for Client Review	KS	VB	KNC
REV	DATE	DESCRIPTION	PREP	СНКД	APPR

																	CLI	ENT : ASSAM G	AS COMPA	NY LTD.				Job No.: 1009	,
																PROJECT : NAMB	OR-GOL	AGHAT-NUMAL	IGARH ARE	A GAS PIPELINE PI	ROJECT			Doc.No.: 1009	J-00-IN-SCH-
	SHEE SHE D.A.P.	ASSA	Mas Compar	NY LTD													DOC. T	ITLE : INSTRUM	IENT CABLI	SCHEDULE				REV.	01
																					GDS				
Sr.No	Cable Tag No.		Cable Detail	5	Instrument/Description	1/0	Gland		Local			Т	erminal [Details			Mulati Pa	ir Cable		Marshalling Cabinet	Group TB	Input Termin	al I/O Card	Bom	
		Pair / Triad No	Type x Size	Length (mts)				From	To (Junction Box)	+	-	SCR	OSCR	IS / NIS	Pair No.	Cable No.	Length (mts)	Type x Size	Gland	Tag No.	No.	+ -	Model No.	Kein	
Gas I	Detection System		•												•								•	•	
NAM	BOR																								
1	1009-NA-OPGD-1001	1,2,3	1 T X 1.5 sq.mm	20	Open Path Gas Detector - Receiver	AI	M15	Field		1	2	3	-	-	1										
2	1009-NA-OPGT-1001	1,2,3	1 T X 1.5 sq.mm	20	Open Path Gas Detector - Transmitter	AI	M15	Field		4	5	6	-	-	2										
3	1009-NA-OPGD-1002	1,2,3	1 T X 1.5 sq.mm	20	Open Path Gas Detector - Receiver	AI	M15	Field		7	8	9	-	-	3	1000-NA-CDS-1001A	60	6T V 1 5 Sa mm	M25	HOLD	HOLD	HOLD	HOLD		
4	1009-NA-OPGT-1002	1,2,3	1 T X 1.5 sq.mm	20	Open Path Gas Detector - Transmitter	AI	M15	Field		10	11	12	-	-	4	1009-NA-GD3-1001A	00	01 X 1.5 Sq.mm	1125	HOLD	HOLD	HOLD	HOLD		
5	Spare	-	-	-	-	-	-	-		13	14	15	-	-	5										
6	Spare	-	-	-	-	-	-	-	1009-NA-GDS-1001	16	17	18	19	-	6										
7	1009-NA-PGD-1001	1,2,3	1 T X 1.5 sq.mm	20	Point Gas Detector	AI	M15	Field		1	2	3	-	-	1	_									
8	1009-NA-PGD-1002	1,2,3	1 T X 1.5 sq.mm	20	Point Gas Detector	AI	M15	Field		4	5	6	-	-	2	_									
9	1009-NA-PGD-1003	1,2,3	1 T X 1.5 sq.mm	20	Point Gas Detector	AI	M15	Field		7	8	9	-	-	3	1009-NA-GDS-1001B	60	6T X 1.5 Sa.mm	M25	HOLD	HOLD	HOLD	HOLD		
10	1009-NA-PGD-1004	1,2,3	1 T X 1.5 sq.mm	20	Point Gas Detector	AI	M15	Field		10	11	12	-	-	4										
11	1009-NA-PGD-1005	1,2,3	1 T X 1.5 sq.mm	20	Point Gas Detector	AI	M15	Field	_	13	14	15	-	-	5										
12	Spare	-	-	-	-	-	-	-		16	17	18	19	-	6										
13	1009-NA-MCP-1001	1	1P X 1.5 Sq.mm	20	Manual Call Point	DI	M15	Field		1	2	3	-	-	1										
14	1009-NA-BA-1001	2	1P X 1.5 Sq.mm	20	Beacon	DO	M15	Field	_	4	5	6	-	-	2										
15	1009-NA-HA-1001	3	1P X 1.5 Sq.mm	20	Hooter	DO	M15	Field	1009-NA-GDS-1002	7	8	9	-	-	3	1009-NA-GDS-1002	60	6P X 1.5 Sa.mm	M25	HOLD	HOLD	HOLD	HOLD		
16	Spare	4	-	-	-	-	-	-	_	10	11	12	-	-	4										
17	Spare	5	-	-	-	-	-	-		13	14	15	-	-	5	_									
18	Spare	6	-	-	-	-	-	-		16	17	18	19	-	6										
Notes	s : * Vendor to specify																								
1. Sin	ngle pair cable number	shall be sa	me as Instrument	tag no.																					
2. Mu	liti pair cable number s	nall be sam	e as junction box	tag no.																					
3. Ca	S Overall Shield TO T	nuve & Co	nuractor Shall Ver	ny the Lengt	in as per site conditions																				
4. 05	5- Overall Shield, IS- II	iuividual S	neia																						

Priority in the second secon		
Intruse problem in the problem intervent of the problem inter		
<th colsay="" in="" stand="" stand<="" th="" the="" with=""><th></th></th>	<th></th>	
New base with the series of the ser	06	
Image: stateState<	Input Ter	
DescriptionDescript	+	
1 009-KH-OPCD-100 1,2, 1,3, 1,3, 2,0 Open Path Gas Detector - Trainmiter AI MI Field 2 009-KH-OPCT-100 1,2,3 1,3,1,5 20 Open Path Gas Detector - Trainmiter AI MIS Field 4 109-KH-OPCT-100 1,2,3 1,7,1,5 20 Open Path Gas Detector - Trainmiter AI MIS Field 5 Spare - <td></td>		
1 109-KH-ORG2-100 1.3 s.g.mm 20 OpenPerbet tosated AI MI Pried 2 109-KH-ORG2-100 1.2.3 1TX 1.5 0 OpenPerbet tosated AI MI Field 3 109-KH-ORG2-1002 1.2.3 1TX 1.5 0 OpenPerbet tosated AI MI Field 4 109-KH-ORG2-1002 1.2.3 1TX 1.5 0 OpenPerbet tosated AI MI Field 5 OpenPerbet tosated AI MI Field Field Field I </td <td></td>		
1 09 - KH-OPGT-1001 1.2,3 1 sq, mm 20 OPPT Part Gas Detector AI MIS Field 3 109 - KH-OPGD-1002 1.2,3 1 T X.1.5 20 Open Part Gas Detector AI MIS Field 4 109 - KH-OPGD-1002 1.2,3 1 T X.1.5 20 Open Part Gas Detector AI MIS Field 5 Spare 1.2,3 1 T X.1.5 20 Open Part Gas Detector AI MIS Field 7 109 - KH-OPGD-1002 1.2,3 1 T X.1.5 20 Open Part Gas Detector AI MIS Field 109 - KH-OPGD-1002 1.2,3 1 T X.1.5 20 Open Part Gas Detector AI MIS Field 109 - KH-OPGD-1002 1.2,3 1 T X.1.5 20 Point Gas Detector AI MIS Field 10 109 - KH-OPGD-100 1.2,3 1 T X.1.5 20 Point Gas Detector AI MIS Field 10 109 - KH-OPGD-100 1.2,3 1 T X.1.5 20 Point Gas Detector AI MIS Field 10 109		
3 109-KH-OPC-102 1,2,3 1,1,1,5 20 Open Path Gas Detector- Transmitter AI MIS Field 4 1099-KH-OPC-102 1,2,3 1,1,1,1,5 20 Open Path Gas Detector- Transmitter AI MIS Field 1		
4 1009-KH-OPGT-1002 1,2,3 1 T A.1.5 s.n.m 20 Open Part assurations AI MI MIS Field 5 Spare	HOLD	
5 Spare		
6 Spare <td></td>		
7 1009-KH-OPGD-1003 1,2,3 $1 \times 1.5 \\ sq,mm$ 20 Point Gas Detector AI M15 Field 8 1009-KH-OPGD-1003 1,2,3 $1 \times 1.5 \\ sq,mm$ 20 Point Gas Detector AI M15 Field 9 1009-KH-OPGD-1004 1,2,3 $1 \times 1.5 \\ sq,mm$ 20 Point Gas Detector AI M15 Field 10 1009-KH-OPGD-1004 1,2,3 $1 \times 1.5 \\ sq,mm$ 20 Point Gas Detector AI M15 Field 11 009-KH-OPGD-1004 1,2,3 $1 \times 1.5 \\ sq,mm$ 20 Point Gas Detector AI M15 Field 11 009-KH-OPGT-1004 1,2,3 $1 \times 1.5 \\ sq,mm$ 20 Point Gas Detector AI M15 Field 11 Spare - <t< td=""><td></td></t<>		
8 1009-KH-OPGT-1003 1,2,3 1 T X 1.5 sq.mm 20 Point Gas Detector AI M15 Field 9 1009-KH-OPGT-1004 1,2,3 1 T X 1.5 sq.mm 20 Point Gas Detector AI M15 Field 10 1009-KH-OPGT-1004 1,2,3 1 T X 1.5 sq.mm 20 Point Gas Detector AI M15 Field 11 1009-KH-OPGT-1004 1,2,3 1 T X 1.5 sq.mm 20 Point Gas Detector AI M15 Field 11 Spare A. T X 1.5 sq.mm A. T X 1.5 sq.mm A. T X 1.5 sq.mm A. M15 Field 11 Spare A. T X 1.5 sq.mm A. T X 1.5 sq.mm A. T X 1.5 sq.mm M15 M15 M16 11 Spare A. A. T X 1.5 sq.mm A. T X 1.5 sq.mm A. T X 1.5 sq.mm M15 M16 M16 12 A. A. A. A. A. T X 1.5 sq.mm M15 <		
10 109-KH-OPGT-1004 1,2,3 1T X 1.5 sq,mm 20 Point Gas Detector AI M15 Field 11 Spare - - - - 4		
11 Spare - - - - - 13 14 15 - - 5	HOLD	
12 Spare 16 17 18 19 - 6		
13 109-KH-PGD-1001 1,2,3 1T X 1.5 20 Point Gas Detector AI M15 Field 1 2 3 - - 1 1 0 - 1 0 - - 1 0 - 1 1 1 1		
14 109-KH-PGD-1002 1.2.3 1 T X 1.5 20 Point Gas Detector AI M15 Field 4 5 6 - - 2		
15 1009-kH-PGD-1003 1 2 3 1 T X 1.5 20 Point Gas Detector AI M15 Field		
13 100-KH-GD-1003 1,2,3 sq.mm 20 Point Gas betector A1 Prior 14 100-KH-GD-1003 1,2,3 sq.mm 20 Point Gas betector A1 Prior	HOLD	
1b Spare - - - - - - 10 Spare - - - - 4		
17 Spare 13 14 15 5		
18 Spare - - - - - - - - - 16 17 18 19 - 6 - - - - - - - 100% - 100% - 6 -		
19 1009-KH-PGD-1004 1,2,3 1 × 1.5 sq.mm 20 Point Gas Detector AI M15 Field 1 2 3 - - 1		
20 1009-KH-PGD-1005 1,2,3 1 T X 1.5 sq.mm 20 Point Gas Detector AI M15 Field 4 5 6 - - 2		
21 Spare - - - - 7 8 9 - - 3 1009-KH-GDS-1002B 60 6T X 1.5 So.mm M25 H0LD H0LD	HOLE	
22 Spare - - - - - 10 11 12 - - 4	11025	
23 Spare 13 14 15 5		
24 Spare - - - - - 16 17 18 19 - 6		
25 1009-KH-MCP-1001 1 1PX1.5 Sq.mm 20 Manual Call Point DI M15 Field 1 2 3 1		
26 1009-KH-BA-1001 2 1P X 1.5 Sq.mm 20 Beacon DO M15 Field 4 5 6 - - 2		
27 1009-KH-HA-1001 3 1P X 1.5 Sq.mm 20 Hooter D0 M15 Field 7 8 9 3	ног	
28 Spare 4 - - - - - 10 11 12 - - 4	HOLD	
29 Spare 5 - - - - 13 14 15 - - 5		
30 Spare 6 - - - - 16 17 18 19 - 6		
Notes : * Vendor to specify 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.		
4. OS- Overall Shield, IS- Individual Shield		

S COMPAN	Y LTD.	OJECT				Job No.: 1009 Doc.No.: 1009-	00-IN-SCH-
	SCHEDULE					5001 REV.	01
		GDS					
	Marshalling Cabinet	Group TB	Input Terr	minal	I/O Card		
Gland	Tag No.	No.	+	-	Model No.	Rema	irks
			1 1				
M25	HOLD	HOLD	HOLD		HOLD		
M25	HOLD	HOLD	HOLD		HOLD		
1125	HOLD	HOLD	HOLD		HOLD		
MOE	HOLD	HOLD	HOLD				
M25	HOLD	HOLD	HOLD		HOLD		
M25	HOLD	HOLD	HOLD		HOLD		
M25	HOLD	HOLD	HOLD		HOLD		
				_			

PROJECT : NAMBOR-GOLAGHAT-NUMALIGARH AREA GAS ASSAM DOC. TITLE : INSTRUMENT CABLE SCHI SHERE SHE DUALTY Cable Details Local **Terminal Details** Mulati Pair Cable Sr.No Cable Tag No. Instrument/Description 1/0 Gland Marsh Pair / Triad No To (Junction Box) Length (mts) Length (mts) SCR OSCR IS / NIS Pair No. Type x Size From + Cable No. Type x Size Gland -Gas Detection System Process Area 1 T X 1.5 Open Path Gas Detector -Receiver 1,2,3 20 AI 1 1009-UR-OPGD-1001 M15 Field 1 2 3 -1 sq.mm 1 T X 1.5 Open Path Gas Detector -4 2 1,2,3 M15 5 6 1009-UR-OPGT-1001 20 AI Field -2 -Transmitter sq.mm 1 T X 1.5 Open Path Gas Detector -3 7 1009-UR-OPGD-1002 1,2,3 20 AI M15 Field 8 9 3 sq.mm Receiver 6T X 1.5 Sq.mm 1009-UR-GDS-1001A 60 M25 1 T X 1.5 Open Path Gas Detector -4 1009-UR-OPGT-1002 10 11 20 AI 12 1,2,3 M15 4 Field -sq.mm Transmitter 5 13 14 15 -5 -Spare ------6 16 17 18 19 Spare -------6 1009-UR-GDS-1001 1 T X 1.5 1009-UR-PGD-1001 1,2,3 20 AI M15 Point Gas Detector Field 3 7 2 1 1 sq.mm 1 T X 1.5 8 1009-UR-PGD-1002 1,2,3 20 Point Gas Detector AI M15 Field 4 5 6 -2 sq.mm 1 T X 1.5 7 9 1009-UR-PGD-1003 1,2,3 20 AI M15 8 9 Point Gas Detector Field 3 sq.mm 1009-UR-GDS-1001B 60 6T X 1.5 Sq.mm M25 1 T X 1.5 10 1009-UR-PGD-1004 1,2,3 20 Point Gas Detector AI M15 Field 10 11 12 4 sa.mm 1 T X 1.5 sq.mm 13 14 15 11 1009-UR-PGD-1005 1,2,3 20 Point Gas Detector AI M15 Field --5 12 16 17 18 19 6 Spare -------1P X 1.5 13 1009-UR-MCP-1001 20 DI M15 1 2 3 1 Manual Call Point 1 Field -Sq.mm 1P X 1.5 14 1009-UR-BA-1001 2 20 DO M15 Field 4 5 6 -2 Beacon -Sa.mm 1P X 1.5 15 1009-UR-HA-1001 3 20 Hooter DO M15 Field 7 8 9 -3 Sq.mm 1009-UR-GDS-1002 60 6P X 1.5 Sq.mm 1009-UR-GDS-1002 M25 16 10 11 12 4 4 Spare -------17 13 5 14 15 5 Spare -------18 Spare 6 --16 17 18 19 -6 --Notes : * Vendor to specify 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. Cables Lengths are Tentative & Contractor Shall verify the Length as per Site Conditions OS- Overall Shield, IS- Individual Shield

CLI	ENT : ASSAM G	AS COMPAN	IY LTD.					Job No.: 1009	
GOL	AGHAT-NUMAL	IGARH ARE	A GAS PIPELINE PI	ROJECT				Doc.No.: 1009- 5001	00-IN-SCH-
с. ті	TLE : INSTRUM	IENT CABLE	SCHEDULE					REV.	01
				GDS					
ti Pai	r Cable								
			Marshalling Cabinet	Group TB	Input Te	erminal	I/O Card	Rema	rks
ngth nts)	Type x Size	Gland	Tag No.	NO.	+	-	Model No.		
			1		1				
50	6T X 1.5 Sq.mm	M25	HOLD	HOLD	HOL	D	HOLD		
50	6T X 1.5 Sq.mm	M25	HOLD	HOLD	HOL	D	HOLD		
50	6P X 1.5 Sq.mm	M25	HOLD	HOLD	HOL	D	HOLD		
			•		•			•	
				-					-

SSAM COMPANY LTD DOC. TITLE : INSTRUMENT CABLE SCHI SHERE SHE OLALTY Cable Details Local **Terminal Details** Mulati Pair Cable Cable Tag No. Instrument/Description I/O Gland Sr.No Marsl Pair / Triad No To (Junction Box) Length (mts) Length (mts) SCR OSCR IS / NIS Pair No. Type x Size From + Cable No. Type x Size Gland -Gas Detection System Process Area 1 T X 1.5 Open Path Gas Detector -Receiver 1 1009-GG-OPGD-1001 1,2,3 20 AI M15 Field 1 2 3 -1 sq.mm 1 T X 1.5 Open Path Gas Detector 4 2 6 1009-GG-OPGT-1001 1.2.3 20 AI M15 Field 5 -2 Transmitter sq.mm 1 T X 1.5 Open Path Gas Detector -3 7 1009-GG-OPGD-1002 1,2,3 20 AI M15 8 9 3 Field sq.mm Receiver 1009-GG-GDS-1001A 60 6T X 1.5 Sq.mm M25 1 T X 1.5 Open Path Gas Detector -10 4 1009-GG-OPGT-1002 20 1,2,3 AI 11 12 4 M15 Field -sq.mm Transmitter 5 13 14 15 5 --Spare -----6 16 17 18 Spare -----19 -6 -1009-GG-GDS-1001 1 T X 1.5 1,2,3 20 M15 1009-GG-OPGD-1003 AI 7 Point Gas Detector Field 2 3 1 1 sq.mm 1 T X 1.5 8 1009-GG-OPGT-1003 1,2,3 20 Point Gas Detector AI M15 Field 4 5 6 -2 _ sq.mm 1 T X 1.5 7 9 1009-GG-OPGD-1004 1,2,3 20 AI M15 8 9 Point Gas Detector Field 3 sq.mm 1009-GG-GDS-1001A 60 6T X 1.5 Sq.mm M25 1 T X 1.5 10 1009-GG-OPGT-1004 1,2,3 20 Point Gas Detector AI M15 Field 10 11 12 4 sa.mm 15 11 Spare -------13 14 --5 12 16 17 18 19 Spare -------6 1 T X 1.5 13 1009-GG-PGD-1001 1,2,3 20 Point Gas Detector AI M15 Field 3 1 sq.mm 1 T X 1.5 14 1009-GG-PGD-1002 1.2.3 20 AI M15 4 6 2 Point Gas Detector Field 5 --1 T X 1.5 15 7 1009-GG-PGD-1003 1,2,3 20 Point Gas Detector AI M15 Field 8 9 3 sq.mm 1009-GG-GDS-1002 1009-GG-GDS-1002 6T X 1.5 Sq.mm M25 60 1 T X 1.5 10 16 1,2,3 11 12 1009-GG-PGD-1004 20 AI M15 Field -4 Point Gas Detector sq.mm 17 13 14 15 5 --Spare ------18 Spare --16 17 18 19 -6 ----1P X 1.5 19 1009-GG-MCP-1001 1 20 Manual Call Point DI M15 Field 1 2 3 1 -Sq.mm 1P X 1.5 Sq.mm 20 1009-GG-BA-1001 2 20 DO M15 4 5 6 2 Beacon Field --1P X 1.5 21 DO 1009-GG-HA-1001 7 9 3 20 Hooter M15 Field 8 -3 -Sa.mm 1009-GG-GDS-1003 6P X 1.5 Sq.mm 1009-GG-GDS-1003 60 M25 22 Spare 4 -10 11 12 -4 -23 13 5 --14 15 5 Spare -16 17 24 Spare 6 -----18 19 -6 Notes : * Vendor to specify . Single pair cable number shall be same as Instrument tag no. . Multi pair cable number shall be same as junction box tag no. 3. Cables Lengths are Tentative & Contractor Shall verify the Length as per Site Conditions 4. OS- Overall Shield, IS- Individual Shield

	CLI	ENT : ASSAM G	AS COMPAN	IY LTD.				Job No.: 1009	
PROJECT : NAMB	OR-GOL/	AGHAT-NUMAL	IGARH ARE	A GAS PIPELINE PI	ROJECT			Doc.No.: 1009- 5001	-00-IN-SCH-
	DOC. TI	TLE : INSTRUM	IENT CABLE	SCHEDULE				REV.	01
					GDS				
	Mulati Pai	r Cable		Marshalling Cabinet	Group TB	Input Terminal	I/O Card	Rema	rks
Cable No.	Length (mts)	Type x Size	Gland	Tag No.	No.	+ -	Model No.		-
1009-GG-GDS-1001A	60	6T X 1.5 Sq.mm	M25	HOLD	HOLD	HOLD	HOLD		
1009-GG-GDS-1001A	60	6T X 1.5 Sq.mm	M25	HOLD	HOLD	HOLD	HOLD		
1009-GG-GDS-1002	60	6T X 1.5 Sq.mm	M25	HOLD	HOLD	HOLD	HOLD		
1009-GG-GDS-1003	60	6P X 1.5 Sq.mm	M25	HOLD	HOLD	HOLD	HOLD		
								•	

DOC. TITLE : INSTRUMENT CABLE SCHI SHERE SHE DUALTY Cable Details Local **Terminal Details** Mulati Pair Cable Sr.No Cable Tag No. Instrument/Description I/O Gland Marsh Pair / Triad No To (Junction Box) Length (mts) Length (mts) SCR OSCR IS / NIS Pair No. Gland Type x Size From + Cable No. Type x Size -Gas Detection System Process Area 1 T X 1.5 Open Path Gas Detector -Receiver 1 1009-NU-OPGD-1001 1,2,3 20 AI M15 Field 1 2 3 -1 sq.mm 1 T X 1.5 Open Path Gas Detector -4 2 1009-NU-OPGT-1001 1,2,3 M15 5 6 2 20 AI Field --Transmitter sq.mm 1 T X 1.5 Open Path Gas Detector -3 7 1009-NU-OPGD-1002 1,2,3 20 AI M15 Field 8 9 3 sq.mm Receiver 6T X 1.5 Sq.mm 1009-NU-GDS-1001A 60 M25 1 T X 1.5 Open Path Gas Detector -4 1009-NU-OPGT-1002 10 11 1,2,3 20 AI 12 M15 4 Field -sq.mm Transmitter 13 5 14 15 -5 --Spare -----6 16 17 18 19 6 Spare -------1009-NU-GDS-1001 1 T X 1.5 1009-NU-PGD-1001 1,2,3 20 AI M15 Point Gas Detector Field 3 7 2 1 1 sq.mm 1 T X 1.5 8 1009-NU-PGD-1002 1,2,3 20 Point Gas Detector AI M15 Field 4 5 6 -2 sq.mm 9 7 8 9 3 Spare --------1009-NU-GDS-1001B 6T X 1.5 Sq.mm 60 M25 10 Spare -10 11 12 4 -------13 14 15 11 Spare ---------5 12 16 17 18 19 6 Spare -------1P X 1.5 13 1009-NU-MCP-1001 20 DI M15 1 2 3 Manual Call Point 1 1 Field -Sq.mm 1P X 1.5 14 1009-NU-BA-1001 2 20 DO M15 Field 4 5 6 -2 Beacon -Sa.mm 1P X 1.5 15 1009-NU-HA-1001 3 20 Hooter DO M15 Field 7 8 9 -3 Sq.mm 1009-NU-GDS-1002 1009-NU-GDS-1002 60 6P X 1.5 Sq.mm M25 16 10 11 12 4 4 Spare -------17 5 13 14 15 5 Spare -------16 18 Spare 6 --17 18 19 -6 --Notes : * Vendor to specify 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. Cables Lengths are Tentative & Contractor Shall verify the Length as per Site Conditions OS- Overall Shield, IS- Individual Shield

ODJECT : NAMBOR-GOLAGHAT-NUMALIGARH AREA GAS PIPELINE PROJECT DOC.NO.: 1009-00-IN-SCH 500 DOC. TITLE : INSTRUMENT CABLE SCHEDULE REV. 01 Mulati Pair Cable Imput Terminal NO. REV. 01 COC. TITLE : INSTRUMENT CABLE SCHEDULE Imput Terminal NO. REV. 01 Mulati Pair Cable Imput Terminal Imput Terminal </th <th></th> <th>CLI</th> <th>ENT : ASSAM G</th> <th>AS COMPAN</th> <th>IY LTD.</th> <th></th> <th></th> <th></th> <th>Job No.: 1009</th> <th></th>		CLI	ENT : ASSAM G	AS COMPAN	IY LTD.				Job No.: 1009	
REV. REV. REV. REV. 01	PROJECT : NAMB	OR-GOL/	AGHAT-NUMAL	IGARH ARE	A GAS PIPELINE PI	ROJECT			Doc.No.: 1009- 5001	00-IN-SCH-
$\begin{array}{c c c c c c c } & & & & & & & & & & & & & & & & & & &$		DOC. TI	TLE : INSTRUM	IENT CABLE	SCHEDULE				REV.	01
IDENTIFY TO TABLE									1	
Induct pair Cable Image: Pair Cable Type x Size Gland Parshalling Cable No. Input Termina <		Mulati Dai	* Cable			GDS				
Cable No. Length (mts) Type x Size Gland Tag No. No. + - Model No. 1009-NU-GDS-1001A 60 6T X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD HOLD 1009-NU-GDS-1001A 60 6T X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD HOLD 1009-NU-GDS-1001B 60 6T X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD HOLD 1009-NU-GDS-1001B 60 6T X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD 1009-NU-GDS-1001B 60 6F X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD		Mulati Pal			Marshalling Cabinet	Group TB	Input Termina	I/O Card	Rema	rks
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1009-NU-GDS-1001B 60 6T X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD HOLD HOLD 1009-NU-GDS-1002 60 6P X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD HOLD HOLD	1009-NU-GDS-1001A	60	6T X 1.5 Sq.mm	M25	HOLD	HOLD	HOLD	HOLD		
1009-NU-GDS-1002 60 6P X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD	1009-NU-GDS-1001B	60	6T X 1.5 Sq.mm	M25	HOLD	HOLD	HOLD	HOLD		
	1009-NU-GDS-1002	60	6P X 1.5 Sq.mm	M25	HOLD	HOLD	HOLD	HOLD		
			•				•	•	-	

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PROJECT : NAMBOR-GOLAGHAT-NUMALIGARH AREA GAS PIPELINE PROJECT Doc.No.: 1009-00 501 DOC. TITLE : INSTRUMENT CABLE SCHEDULE REV. GDS Mulati Pair Cable Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. Input Terminal Model No. <	01
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$\begin{tabular}{ c c c c } & & & & & & & & & & & & & & & & & & &$	
Multit Pair Cable Marshalling Cabinet Tag No. Group TB No. Input Terminal H I/O Card Model No. Remarks Cable No. Length (mts) Type x Size Gland $$	
Cable No. Length (mts) Type x Size Gland I ag No. Hol + - Model No. 1009-TH-GDS-1001A 60 6T X 1.5 Sq.mm M25 HOLD HOL	
1009-TH-GDS-1001A 60 6T X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD	
1009-TH-GDS-1001A 60 6T X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD	
1009-TH-GDS-1001A 60 6T X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD	
1009-TH-GDS-1001B 60 6T X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD	
1009-TH-GDS-1002 60 6P X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD	

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DOC. GOLAGHAT-NUMALIGARH AREA GAS PIPELINE PROJECT Doc.No:: 1009-00-IN-5001 DOC. TITLE : INSTRUMENT CABLE SCHEDULE REV. 00: No:: 1009-00-IN-5001 MUIATI PAIR CABLE SCHEDULE REV. 00: No:: 1009-00-IN-5001 MUIATI PAIR CABLE SCHEDULE REV. 00: No: GDS COS Cable No. Length (mts) Type x Size Gland Investigned and the second and the se	-SCH-
DOC. TITLE : INSTRUMENT CABLE SCHEDULE REV. 0 Mulati Pair Cable Mulati Pair Cable Mulati Pair Cable Mulati Pair Cable Goog TB Input Terminal Length (mts) Type x Size Gland Togo of the state	1
Image: Size of Cable No. Image: Size of C	
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Multi Pair Cable Marshalling Cablent Tag No. Input Terminal <	
Cable No. Length (mts) Type x Size Gland I ag No. No. + - Model No. 1009-HA-GDS-1001A 60 6T X 1.5 Sq.mm M25 HOLD HOL	
1009-HA-GDS-1001A 60 6T X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD UNDER HOLD HOLD HOLD HOLD HOLD HOLD HOLD HOLD	
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1009-HA-GDS-1001B 60 6T X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD	
1009-HA-GDS-1002 60 6P X 1.5 Sq.mm M25 HOLD HOLD HOLD HOLD HOLD	

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	CLI	ENT : ASSAM G	AS COMPAN	IY LTD.				Job No.: 1009	
PROJECT : NAMB	OR-GOL	AGHAT-NUMAL	IGARH ARE	A GAS PIPELINE PI	ROJECT			Doc.No.: 1009- 5001	00-IN-SCH-
	DOC. TI	TLE : INSTRUM	IENT CABLE	SCHEDULE				REV.	01
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		6 .11			GDS				
	Mulati Pai	r Cable		Marshalling Cabinet	Group TB	Input Termina	I/O Card	Rema	rks
Cable No.	Length (mts)	Type x Size	Gland	Tag No.	No.	+ -	Model No.		-
						1			
	n								
1009-S3-GDS-1001A	60	6T X 1.5 Sq.mm	M25	HOLD	HOLD	HOLD	HOLD		
1009-S3-GDS-1001B	60	6T X 1.5 Sq.mm	M25	HOLD	HOLD	HOLD	HOLD		
1009-S3-GDS-1002	60	6P X 1.5 Sq.mm	M25	HOLD	HOLD	HOLD	HOLD		
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	FQU	G CAUSE AND EFFE			TO	TAL SHE	ETS	22
	DOCUME	ENT No.	1009	00	IN	CAE	I	5001
	NAMBOR-(ASSAM GOLAGHAT-NUI	GAS CO	OMPAN	NY LTE). PIPELII	NE PRO	JECT
01	02.06.2022	ISS	UED FOR B	SID		AK	SV	KNC
C1	07.01.2019	ISSUE	D FOR RE	/IEW		KS	VB	KNC
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A	CLIENT : ASSAM GAS COMPANY LTD.		JOB N	0. 1	1009					
GAS COMPANY LTD	PROJECT : NAMBOR –GOLAGHAT– NUMALIGARH AREA GAS PIPELINE PROJECT	Doc. No.: 1	009-0	0-II	N-CA	E-50	01			
CHERT CARL	F & G CAUSE AND EFFECT MATRIX FOR NAMBOR GGS	Sheet. 2 c	of 24	C1	6 01	≀ev.				
	INDEX SHEET	•				<u> </u>				
il. No	I. No Description									
1 General Notes			3	3 to	3					
		4	4 to	5						
2 F & G Cause an	2 F & G Cause and Effect Matrix for Nambor GGS									
2F & G Cause an3F & G Cause an	d Effect Matrix for Nambor GGS d Effect Matrix for Khoraghat GGS		6	5 to	8					
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	CLIENT : ASSAM GAS COMPANY LTD.	JOB	NO. 1009
GAS COMPANY LTD	PROJECT : NAMBOR -GOLAGHAT- NUMALIGARH AREA GAS PIPELINE PROJECT	Doc. No.: 1009-(00-IN-CAE-5001
			Rev.
CHURCH CARGORITY	F & G CAUSE AND EFFECT MATRIX	Sheet. 3 of 24	

A.General Notes

- 1. All Alarm Signals shall be repeated to RTU through serial communication from F&G PLC.
- 2. Disconnection of of any fire & gas detector shall not disable zone alarm.
- 3.Short circuit & open circuit setpont shall be defined by F&G system Vendor.
- 4. Maintenance Override(MOS) will operate as follows:
- Activation of master permissive soft switch in graphic screen.
- Activation of individual detector maintainence soft switch for respective detector bypass / inhibit, which shall be password authorized.
- Maintenance Override / Inhibit will degrade the voting philosophy as follows:

NORMAL VOTING	1001	1002	2002	200N*
DEGRADED VOTING	**	1001	1001	1oo(N*-1)

* N Greater than 2

** Hold Last Value or Alarm

- 5. Device Fault shall inititiate the voting degradation philosophy as per above mentioned table.
- 6. F & G system Graphic screens shall be implemented in SCADA system at Sub control Room, Golaghat and Maian Control Room at Duliajan
- 7. Activation of particular detector / MCP shall result in flashing of that detector symbol in Graphics.
- Zone Acknowledge Soft Switch when pressed shall steady the flashing. Zone Reset will be accepted only when the detector is back to normal.
- 9. Zone Acknowledge and Reset Buttons shall be placed on each of the zone layout graphics.

B. Reference Documents

a. F&G Layout,. Drawing No: 1.1009-NA-IN-DR-5001 (Nambor GGS)

- 2.1009-KH-IN-DR-5001 (Khoraghat GGS)
- 3.1009-UR-IN-DR-5001 (Uriumghat station)
- 4.1009-GG-IN-DR-5001 (Golaghat station)
- 5.1009-NU-IN-DR-5001 (Numaligarh station)
- 6.1009-TH-IN-DR-5001 (Thoramukh station)
- 7.1009-HA-IN-DR-5001 (Hamiramukh station)
- 8.1009-S1-IN-DR-5001 (SV-1 station, Uriumgaht to Golaghat station)
- 9.1009-S3-IN-DR-5001 (SV station, Golaghat to Numaligarh station)

C. Notes and Abbrivations

200N: 2 Out Of N F&G : Fire & Gas LEL: Lower Explosive Limit RTU: Remote Terminal Unit

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						ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor - Golaghat - Pipelien Job No F&G Cause and Eff Document No 100	Numaligarh Area Gas e Project o1009 fect for Nambor GGS 09-00-IN-CAE-5001		EFFECT		DESCRIPTION	MCP ALARM TO F&G	MCP ALARM TO FACP	GAS ALARM TO F&G - SINGLE HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE-HIGH	GAS ALARM TO SCADA - SINGLE-HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH		MCP ALARM TO SCADA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN
CA	USE				DEVICE TAG NO		ı					1	1	1	1		1		1009-KH-BA-1001	1009-КН-НА-1001	1009-КН-НА-1002
					SYSTEM			F٤	&G						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
								•	1	•		•		•	•						
	1009-NA-PGD-1001																				
	1009-NA-PGD-1002																				
	VOTING	1002	20% LEL	Knock out drum				x				x							x		
IR POINT TIPE GAS DETECTOR	VOTING	1002	40% LEL	(KOD-1001)					x				x						x		
	VOTING	2002	20% LEL	-						x				x					x		
	VOTING	2002	40% LEL								x				x				x	x	
	1009-NA-PGD-1005																				
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Closed Drain Tank (CDT-1001)				x		x		x		x					x		
	VOTING	1001	40% LEL						x		x		x		x				x	x	
	1009-NA-PGD-1004																				
IR POINT TYPE GAS DETECTOR	VOTING	1002	20% LEL	Actuated Valve (EHOV- 1002)				x				x							x		
	VOTING	1002	40% LEL						x				х						x	x	
	1009-NA-PGD-1003																				
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (MOV- 1003)				x		x		x		x					x		
	VOTING	1001	40% LEL	-					x		x		x		x				x	x	
	1009-NA-OPGD-1001																				
	1009-NA-OPGD-1002																				
	VOTING	1002	3 LEL METER	- Pig Launcher + Metering +				x				x							x		
OPEN PATH GAS DETECTOR	VOTING	1002	5 LEL METER	Fileter Seperator (FS-1001)					x				x						x	x	
	VOTING	2002	3 LEL METER	1						x				x					x		
	VOTING	2002	5 LEL METER	1							x				x				x	x	
MANUAL ALARM CALL POINT	1009-NA-MCP-1001					x											x			x	
PORTA CABIN DETECTROS																					

							ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor - Golaghat - Pipelien Job No F&G Cause and Eff Document No 100	Numaligarh Area Gas e Project 91009 fect for Nambor GGS 99-00-IN-CAE-5001		EFFECT		DESCRIPTION		MCP ALARM TO F&G	MCP ALARM TO FACP	GAS ALARM TO F&G - SINGLE -HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE-HIGH	GAS ALARM TO SCADA - SINGLE-HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH		MCP ALARM TO SCADA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN
CAI	JSE					DEVICE TAG NO					,	,	1	ı	ı	ı	ı	ı	'	1009-KH-BA-1001	1009-КН-НА-1001	1009-КН-НА-1002
						SYSTEM			F8	kG						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ADRESSABLE MULTI SENSOR																						
(SMOKE + HEAT)	1009-NA-FGD-1001			PORTA CABIN															×			×
(SMOKE + HEAT)	1009-NA-FGD-1002			PORTA CABIN															x			X
(SMOKE + HEAT)	1009-NA-FGD-1003			PORTA CABIN															x			X
(SMOKE + HEAT)	1009-NA-FGD-1004			PORTA CABIN															x			X
MANUAL ALARM CALL POINT	1009-NA-MCP-1001						x											x			x	
DETECTOR INHIBIT/MAINTAI				1	1	I	1	1	1		1	1										
	1009-NA-PGD-1001	-	-	-							I	I			I	I						
	1009-NA-PGD-1002	-	-	-							I	I			I	I						
IR POINT TYPE GAS DETECTOR	1009-NA-PGD-1003	-	-	-							I	I			I	I						
	1009-NA-PGD-1004	-	-	-							I	I			I	I						
	1009-NA-PGD-1005	-	-	-							I	I			I	I						
	1009-NA-OPGD-1001	-	-	-							I	I			I	I						
of ENTATIL GAS DATECTOR	1009-NA-OPGD-1002	-	-	-							I	I			I	I						
	1009-NA-FGD-1001	-	-	-															I			
ADRESSABLE MULTI SENSOR	1009-NA-FGD-1002	-	-	-															I			
(SMOKE + HEAT)	1009-NA-FGD-1003	-	-	-															I			
	1009-NA-FGD-1004	-	-	-															I			
	1009-NA-MCP-1001	-	-	-			I											I				
MANUAL ALARM CALL POINT	1009-NA-MCP-1002	-	-	-			I											I				
Notes:				•	•																	·
1. Terminal control building Senso	ors (Smoke+Heat),MCP, Beacon ar	nd Hooter signals shall	be integated with	F&G system through FC	AP (Fire	e Alarm (Control Pabe	I)														

Nambor-Golaghat-Numaligarh Area Gas Pipeline Project				-	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	
Job No F&G Cause and Effer Document No 100	o 1009 ct for Khoraghat GGS 09-00-IN-CAE-5001		EFFECT		DESCRIPTION	MCP ALARM TO F&G	FIRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	GAS ALARM TO F&G - SINGLE -HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE-HIGH	GAS ALARM TO SCADA - SINGLE-HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH	ı	MCP ALARM TO SCDA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN
CA	USE				DEVICE TAC NO	-										1			1009-KH-BA-1001	1009-KH-HA-1001	1009-KH-HA-1002
					METSYS			I	F&G						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION		1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
	1	1									T		T								
	1009-KH-PGD-1001																				
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Odorisation Package				x		×	~	X	~	×	~				X		
		1001	40% LEL						×		×		X		×				×		
		1001	20% El	Actuated Valve (MOV-						v		×		×					×		-
R POINT TYPE GAS DETECTOR	VOTING	1001	40% LEL	1015) at Pig Launcer				^	×	^	×	^	×	^	×				x	×	
	1009-KH-PGD-1003	1001							A		~		~		^				~		
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (EHOV-				x		x		x		x					x		
	VOTING	1001	40% LEL	1016) at Pig Launcer					x		x		x		x				x	x	
	1009-KH-PGD-1004																				
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (MOV-				x		x		x		x					x		
	VOTING	1001	40% LEL						x		x		x		x				x	x	
	1009-KH-PGD-1005																				
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (EHOV- 1004) at Pig Receiver				x		x		x		x					x		
	VOTING	1001	40% LEL						x		x		x		x				x	x	
	1009-KH-PGD-1006																			. <u>.</u>	
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Closed Drain Tank (CDT-1001)				x		x		x		x					x		
	R POINT TYPE GAS DETECTOR VOTING	1001	40% LEL						x		x		x		x				x	x	
	1009-KH-OPGD-1001																				
	1009-KH-OPGD-1002																				
	VOTING	1002	3 LEL METER	Pig Launcher (PL-1002) + Pig Receiver (PR -1001)				x				x							x		
OPEN PATH GAS DETECTOR	VOTING	1002	5 LEL METER	Knock Out Drum					x				x						x	x	
	VOTING	2002	3 LEL METER	(KUD-1001)						x				x					x		
	VOTING	2002	5 LEL METER								x				x				x	x	

Nambor-Golaghat-Numaligarh Area Gas Pipeline Project						ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	
Job No Job No F&G Cause and Effe Document No 10	oject o 1009 oct for Khoraghat GGS 09-00-IN-CAE-5001		EFFECT		DESCRIPTION		MCP ALARM TO F&G	FIRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	GAS ALARM TO F&G - SINGLE -HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE-HIGH	GAS ALARM TO SCADA - SINGLE-HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH	ı	MCP ALARM TO SCDA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN
CA	USE					DEVICE TAG NO			,	,	1	ı	,	ı	ı	,	1			1009-KH-BA-1001	1009-KH-HA-1001	1009-KH-HA-1002
						SYSTEM			F8	kG						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
	1009-KH-OPGD-1003																					
	1009-KH-OPGD-1004			-																		
	VOTING	1002	3 LEL METER	Metering Skid (FM-					x				x							x		
OPEN PATH GAS DETECTOR	OPEN PATH GAS DETECTOR	1002	5 LEL METER	Filter Separator(FS- 1001)						x				x						x	x	
	VOTING	2002	3 LEL METER	-							x				x					x		
	VOTING	2002	5 LEL METER									x				x				x	x	
MANUAL ALARM CALL POINT	1009-KH-MCP-1001						x											x			x	
Terminal Control Building (PO	RTA CABIN DETECTROS)			1	11			I				I		I	I							1
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-KH-FGD-1001			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-KH-FGD-1002			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-KH-FGD-1003			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-KH-FGD-1004			PORTA CABIN				x											x			x
MANUAL ALARM CALL POINT	1009-KH-MCP-1002			PORTA CABIN			x											x				x
DETECTOR INHIBIT/MAINTAI	NANCE OVERRIDE			1	11			I				I		I	I							1
	1009-KH-PGD-1001	-	-	-							I	I			I	I						
	1009-KH-PGD-1002	-	-	-							I	I			I	I						
	1009-KH-PGD-1003	-	-	-							I	I			I	I						
	1009-KH-PGD-1004	-	-	-							I	I			I	I						
	1009-KH-PGD-1005	-	-	-							I	I			I	I						
	1009-KH-PGD-1006	-	-	-							I	I			I	I						<u> </u>
	1009-KH-OPGD-1001	-	-	-							I	I			I	I						<u> </u>
OPEN PATH GAS DATECTOR	1009-KH-OPGD-1002	-	-	-							I	I			I	I						<u> </u>
	1009-KH-OPGD-1003	-	-	-							I	I			I	I						

Nambor-Golaghat-Num Pr	Nambor-Golaghat-Numaligarh Area Gas Pipeline Project				-		ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Job No F&G Cause and Effe Document No 10	o 1009 ect for Khoraghat GGS 09-00-IN-CAE-5001		EFFECT		DESCRIPTION		ИСР ALARM TO F&G	TRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	3AS ALARM TO F&G - SINGLE -HIGH	3AS ALARM TO F&G - SINGLE - HIGH HIGH	3AS ALARM TO F&G - CONFIRMED - HIGH	3AS ALARM TO F&G - CONFIRMED - HIGH HIGH	SAS ALARM TO SCADA - SINGLE-HIGH	3AS ALARM TO SCADA - SINGLE-HIGH HIGH	3AS ALARM TO SCADA - CONFIRMED-HIGH	3AS ALARM TO SCADA - CONFIRMED - HIGH HIGH	1	MCP ALARM TO SCDA	TRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	JISUAL ALARM ON LAMMABLE GAS DETECTION - AMBER	JUTDOOR HOOTER - PROCESS AREA	DUTDOOR HOOTER - PORTACABIN
CA	CAUSE					DEVICE TAG NO	1		1	1	'	'	'	1	'		,			1009-KH-BA-1001 F	1009-KH-HA-1001	1009-КН-НА-1002
									F8	kG	•			•	•	SCADA	•	•	•			
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	VOTING LOGIC SET POINT ZONE / LOCATION				1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
							1	1														
	1009-KH-OPGD-1004	-	-	-							I	I			I	I						
	1009-KH-FGD-1001	-	-	-				I											I			
	1009-KH-FGD-1002	-	-	-				I											I			
(SMOKE + HEAT)	1009-KH-FGD-1003	-	-	-				I											I			
	1009-KH-FGD-1004	-	-	-				I											I			
	1009-KH-MCP-1001	-	-	-			I											I				
MANUAL ALARM CALL POINT	1009-KH-MCP-1002	-	-	-			I											I				
Notes:		1	<u> </u>	1	1		I	L	1	1		l		l	I			l	L	1		1
1. Terminal control building Sens	ors (Smoke+Heat),MCP, Beacon an	d Hooter signals shall	be integated with F	F&G system through FCA	P (Fire A	Alarm Co	ontrol Pabel)														

Nambor-Golaghat-Numaligarh Area Gas Pipeline Project						ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	
F&G Cause and Effect Document No 100	ject 1009 for Uriumghat Station)9-00-IN-CAE-5001		EFFECT		DESCRIPTION		MCP ALARM TO F&G	FIRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	GAS ALARM TO F&G - SINGLE - HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE-HIGH	GAS ALARM TO SCADA - SINGLE-HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH	-	MCP ALARM TO SCDA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN
CAU	USE					DEVICE TAG NO			ı	1	1	ı	1	1			I	ı	ı	1009-UR-BA-1001	1009-UR-HA-1001	1009-UR-HA-1002
						SYSTEM			F8	kG						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
		- -		1	T								-									
	1009-UR-PGD-1002			-																		
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (MOV- 1019) at Pig Launcer					x		x		x		x					x		
	VOTING	1001	40% LEL							x		x		x		x				x	x	
	1009-KH-PGD-1001																					
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (EHOV- 1020) at Pig Launcer					x		x		x		x					x		
	VOTING	1001	40% LEL							x		x		x		x				x	x	
	1009-KH-PGD-1003																					
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (MOV- 1017) at Pig Receiver					х		х		х		х					x		
	VOTING	1001	40% LEL							x		x		x		x				x	x	
	1009-KH-PGD-1004																					
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (EHOV- 1018) at Pig Receiver					x		x		x		x					x		
	VOTING	1001	40% LEL							x		x		x		x				x	x	
	1009-KH-PGD-1005																					
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Closed Drain Tank (CDT-1001)	-				x		x		x		x					x		
	VOTING	1001	40% LEL							x		x		x		x				x	x	
	1009-UR-OPGD-1001																					
	1009-UR-OPGD-1002			-																		
	VOTING	1002	3 LEL METER	Pig Launcher (PL-1002)	-				x				x							x		
OPEN PATH GAS DETECTOR	VOTING	1002	5 LEL METER	+ Pig Receiver (PR -1001)						x				x						x	x	+
	VOTING	2002	3 LEL METER								x				x					x		+
	VOTING	2002	5 LEL METER	-								x				x				x	x	1
MANUAL ALARM CALL POINT	1009-UR-MCP-1001						x											x			x	
					1			1			1											
									-	-								-				
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						ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	
Nambor-Golaghat-Numa Pro	iligarh Area Gas Pipeline ject				z			ч щ	- щ										BLE	SS		
Joh No	- 1000		5		DIL		НЕАТ	SINGL	SINGL		НD	I.			- H5			HEA	MMAI ER	ROCE		
JOD NO	- 1009		Ŭ		RIF	U	+ ყე	0 '	ט י	ύπ	G - H HIG	ADA	ADA H	ADA	ADA H HI(DA	KE + ADA	FLAI AMB	14 - X	-~~	
F&G Cause and Effect	for Uriumghat Station		ш		ESC	0 F&	SMOK 0 F&	0 F&	0 F&	o F& HIG	o F& HIG	0 SC	0 SC HIG	o sc High	o sc Hig	I.	o sc	SMO 0 SC	4 ON - NO	OTE	OTEF	
Document No 100)9-00-IN-CAE-5001					RMT	RM(S R) To	RM T	RM T HE	RM T	RM T	T M T HIGH	RM T HIGH	RM T	RM T		RM T	RM (R) To	ILARI ECTI	к но	R HO BIN	
						ALA	ECTC	H H	H HIG	IFIRM	IFIRM	GLE-I	GLE-I	IFIRM	IFIRM		ALA	E ALA	JAL A	D00 A	D00 TAC/	
						MCP	FIRE DET	GAS HIG	GAS HIG	GAS CON	GAS CON	GAS	GAS SIN	GAS CON	GAS CON		MCF	FIRE DET	VISI	OUT ARE	OUT POR	
					N														1001	1001	1002	
					TAG					1		I							-BA-	-HA-	-HA-	
					VICE														9-UR	9-UR	9-UR	
CAI	USE				DE														100	100	100	
					Σ																	
					SYST			F8	G						SCADA							
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION		1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30	
					<u> </u>	<u> </u>																
Terminal Control Building (PO	RTA CABIN DETECTROS)																			<u> </u>	<u> </u>	
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-UR-FGD-1001			PORTA CABIN			x											x			x	
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-UR-FGD-1002			PORTA CABIN			x											x			x	
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-UR-FGD-1003			PORTA CABIN			x											x			x	
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-UR-FGD-1004			PORTA CABIN			x											x			x	
MANUAL ALARM CALL POINT	1009-UR-MCP-1002			PORTA CABIN		x											x				×	
DETECTOR INHIBIT/MAINTAI	NANCE OVERRIDE																					
	1009-UR-PGD-1001	-	-	-						I	I			I	I							
	1009-UR-PGD-1002	-	-	-						I	I			I	I							
IR POINT TYPE GAS DETECTOR	1009-UR-PGD-1003	-	-	-						I	I			I	I							
	1009-UR-PGD-1004	-	-	-						I	I			I	I							
	1009-UR-PGD-1005	-	-	-						I	I			I	I							
OPEN PATH GAS DATECTOR	1009-UR-OPGD-1001	-	-	-						I	I			I	I							
	1009-UR-OPGD-1002	-	-	-						I	I			I	I							
	1009-UR-FGD-1001	-	-	-			I											I				
ADRESSABLE MULTI SENSOR	1009-UR-FGD-1002	-	-	-			I											I				
(SMOKE + HEAT)	1009-UR-FGD-1003	-	-	-			I											I				
	1009-UR-FGD-1004	-	-	-			I											I				
MANUAL ALARM CALL POINT	1009-UR-MCP-1001	-	-	-		I											I			ļ		
	1009-UR-MCP-1002	-	-	-		I											I					
Notes:	+			ł	, , , , , , , , , , , , , , , , , , , 	•	•	•	<u> </u>				•	Į				<u> </u>		ı	•	
1. Terminal control building Senso	ors (Smoke+Heat),MCP, Beacon ar	nd Hooter signals shal	I be integated with	F&G system through FC	AP (Fire Alarm	Control Pab	el)															

T		1			-			1			1	1			1	1						·		
							ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor-Golaghat-Numa Pro Job No F&G Cause and Effec Document No 100	aligarh Area Gas Pipeline oject o 1009 ct for Golghat Station 09-00-IN-CAE-5001		EFFECT		DESCRIPTION		1CP ALARM TO F&G	:IRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	5AS ALARM TO F&G - SINGLE - HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	5AS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE- IIGH	GAS ALARM TO SCADA - SINGLE- IIGH HIGH	5AS ALARM TO SCADA - CONFIRMED-HIGH	5AS ALARM TO SCADA - CONFIRMED - HIGH HIGH		1CP ALARM TO SCDA	-IRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	/ISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	JUTDOOR HOOTER - PROCESS AREA	JUTDOOR HOOTER - PORTACABIN	JUTDOOR HOOTER - Control Suilding(AGCL Office)	JUTDOOR HOOTER - Control Building(AGCL Office)
CA	USE					DEVICE TAG NO	-		1		1	1					ı	-	'	1009-GG-BA-1001	1009-GG-HA-1001	1009-GG-HA-1002	1009-GG-HA-1003	1009-GG-HA-1004
						SYSTEM			F8	\$G						SCADA								
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30		
		·		•													•							
	1009-GG-PGD-1001																							
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (MOV- 1026) at Pig Launcer					x		x		x		x					x				
	VOTING	1001	40% LEL							x		x		x		x				x	x			
	1009-GG-PGD-1002																							
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (EHOV- 1027) at Pig Launcer					x		x		x		x					x				
	VOTING	1001	40% LEL							x		x		x		x				x	x			
	1009-GG-PGD-1003																							
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (MOV- 1024) at Pig Receiver					x		x		x		x					x				
	VOTING	1001	40% LEL							x		x		x		x				x	x			
	1009-GG-PGD-1004																							
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (EHOV- 1025) at Pig Receiver					x		x		x		x					x				
	VOTING	1001	40% LEL							x		x		x		x				x	x			
	1009-GG-PGD-1005																							
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Instrument Gas Receiver (V-1001)					x		x		x		x					x				
	VOTING	1001	40% LEL							x		x		x		x				x	x			
	1009-GG-OPGD-1001																							
	1009-GG-OPGD-1002																							
	VOTING	1002	3 LEL METER	Pig Launcher (PL-1002) +					x				×							x				
OPEN PATH GAS DETECTOR	VOTING	1002	5 LEL METER	Pig Receiver (PR -1001)						x				x						x	x			
	VOTING	2002	3 LEL METER								x				x					x				
	VOTING	2002	5 LEL METER	1								x				x				x	x			
	1009-GG-OPGD-1003																							
	1009-GG-OPGD-1004]																				

							ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor-Golaghat-Numa Pro Job No F&G Cause and Effec Document No 100	aligarh Area Gas Pipeline nject n 1009 ct for Golghat Station 09-00-IN-CAE-5001		EFFECT		DESCRIPTION		MCP ALARM TO F&G	FIRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	GAS ALARM TO F&G - SINGLE - HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE- HIGH	GAS ALARM TO SCADA - SINGLE- HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH	·	MCP ALARM TO SCDA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN	OUTDOOR HOOTER - Control Building(AGCL Office)	OUTDOOR HOOTER - Control Building(AGCL Office)
CA	USE					DEVICE TAG NO			1	1	1						1	1		1009-GG-BA-1001	1009-GG-HA-1001	1009-GG-HA-1002	1009-GG-HA-1003	1009-GG-HA-1004
						SYSTEM			F8	kG						SCADA								
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30		
	VOTING	1002	3 LEL METER	Metering Skid					x				x							x				
OPEN PATH GAS DETECTOR	VOTING	1002	5 LEL METER	(FM-1001) + Flow control Valve (FCV-10010						x				x						x	x	 		
	VOTING	2002	3 LEL METER								x				x					x		 		
	VOTING	2002	5 LEL METER	-								x				x				x	x			
MANUAL ALARM CALL POINT	1009-GG-MCP-1001						x											x			x			
Terminal Control Building (PO	RTA CABIN DETECTROS)		I	1	1 1			I	1	1	1	1	1	1			1	1		1	I			
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1001			PORTA CABIN				x											x			x		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1002			PORTA CABIN				x											x			x		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1003			PORTA CABIN				x											x			x		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1004			PORTA CABIN				x											x			x		
MANUAL ALARM CALL POINT	1009-GG-MCP-1002			PORTA CABIN			x											x				x		
Control Building (AGCL Office))																							
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1005			PORTA CABIN				x											x			x		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1006			PORTA CABIN				x											x			x		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1007			PORTA CABIN				x											x			x		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1008			PORTA CABIN				x											х			x		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1009			PORTA CABIN				x											x			x		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1010			PORTA CABIN				x											x			x		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1011			PORTA CABIN				x											x			×		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1012			PORTA CABIN				x											x			x		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1013			PORTA CABIN				x											x			x		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1014			PORTA CABIN				x											x			x		

							ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor-Golaghat-Numa Pro Job No F&G Cause and Effec Document No 100	aligarh Area Gas Pipeline oject o 1009 ct for Golghat Station 09-00-IN-CAE-5001		EFFECT		DESCRIPTION		LTO F&G	1(SMOKE + HEAT TO F&G	I TO F&G - SINGLE -	I TO F&G - SINGLE -	I TO F&G - CONFIRMED -	I TO F&G - CONFIRMED -	I TO SCADA - SINGLE-	I TO SCADA - SINGLE-	I TO SCADA - D-HIGH	I TO SCADA - D - HIGH HIGH	1	TO SCDA	1 (SMOKE + HEAT TO SCADA	RM ON FLAMMABLE GAS 1 - AMBER	HOOTER - PROCESS	HOOTER - PORTACABIN	HOOTER - Control CL Office)	HOOTER - Control ICL Office)
							1CP ALARM	IRE ALARN	as alarn IIGH	as alarn Iigh high	as alarn IIGH	as alar ⁿ IIGH HIGH	as alarn IIGH	as alarn Iigh high	ALARM	SAS ALARM		1CP ALARM	IRE ALARN	ISUAL AL	UTDOOR I	UTDOOR I	UTDOOR I	UTDOOR I
CA	USE					DEVICE TAG NO	<u> </u>		<u>'</u>		<u> </u>	<u> </u>	<u>'</u>	<u> </u>				- <u>></u>	<u> </u>	V 1009-GG-BA-1001	009-GG-HA-1001 0	1009-GG-HA-1002 O	1009-GG-HA-1003 B	009-GG-HA-1004
						SYSTEM			F	&G						SCADA								
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30		
								1			1			1		1	1							
(SMOKE + HEAT)	1009-GG-FGD-1015			PORTA CABIN				x											x			×		
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-GG-FGD-1016			PORTA CABIN				x											x			×		
MANUAL ALARM CALL POINT	1009-GG-MCP-1003			PORTA CABIN			x											x				x		
MANUAL ALARM CALL POINT	1009-GG-MCP-1004			PORTA CABIN			x											x				x		
MANUAL ALARM CALL POINT	1009-GG-MCP-1005			PORTA CABIN			x											x				x		
DETECTOR INHIBIT/MAINTAI	INANCE OVERRIDE																							
	1009-GG-PGD-1001	-	-	-							I	I			I	I								
	1009-GG-PGD-1002	-	-	-							I	I			I	I								
IR POINT TYPE GAS DETECTOR	1009-GG-PGD-1003	-	-	-							I	I			I	I								
	1009-GG-PGD-1004	-	-	-							I	I			I	I								
	1009-GG-PGD-1005	-	-	-							I	I			I	I								
	1009-GG-OPGD-1001	-	-	-							I	I			I	I								
	1009-GG-OPGD-1002	-	-	-							I	I			I	I								
OPEN PATTI GAS DATECTOR	1009-GG-OPGD-1003	-	-	-							I	I			I	I								
	1009-GG-OPGD-1004	-	-	-							I	I			I	I								
	1009-GG-FGD-1005	-	-	-				I											I					
	1009-GG-FGD-1006	-	-	-				I											I					
	1009-GG-FGD-1007	-	-	-				I											I					
	1009-GG-FGD-1008	-	-	-				I											I					
	1009-GG-FGD-1009							I											I					
ADRESSABLE MULTI SENSOR	1009-GG-FGD-1010							I											I					
(SMOKE + HEAT)	1009-GG-FGD-1011							I											I					
	1009-GG-FGD-1012							I											I					

							ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor-Golaghat-Numa Pro Job No F&G Cause and Effec Document No 100	aligarh Area Gas Pipeline oject o 1009 ct for Golghat Station 09-00-IN-CAE-5001		EFFECT				MCP ALARM TO F&G	FIRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	GAS ALARM TO F&G - SINGLE - HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE- HIGH	GAS ALARM TO SCADA - SINGLE- HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH		MCP ALARM TO SCDA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN	OUTDOOR HOOTER - Control Building(AGCL Office)	OUTDOOR HOOTER - Control Building(AGCL Office)
CA	USE					DEVICE TAG NO	·		-	ı	ı	1	ı		ı	ı	ı	ı	ı	1009-GG-BA-1001	1009-GG-HA-1001	1009-GG-HA-1002	1009-GG-HA-1003	1009-GG-HA-1004
						SYSTEM			F8	kG						SCADA								
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30		
	1			1	· · ·																			
	1009-GG-FGD-1013	-	-	-				I											I					
	1009-GG-FGD-1014	-	-	-				I											I					_
	1009-GG-FGD-1015	-	-	-				I											I					
	1009-GG-FGD-1016	-	-	-				I											I					
	1009-GG-MCP-1001	-	-	-			I											I						
	1009-GG-MCP-1002						I											I						
MANUAL ALARM CALL POINT	1009-GG-MCP-1003						I											I						
	1009-GG-MCP-1004						I											I						
	1009-GG-MCP-1005	-	-	-			I											I						
Notes:		•			<u> </u>	I															. 1			
1. Terminal control building Sens	sors (Smoke+Heat),MCP, Beacon	and Hooter signals sh	all be integated w	ith F&G system through	FCAP (F	ire Alar	m Control	Pabel)																

					1											1			1	1		
							ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor-Golaghat-Numa Pro	aligarh Area Gas Pipeline oject				z						ED -	ED -	ய்	ய்						GAS		SIN
Job No	o 1009		C		TIO			EAT	IGLE	- JOLE -	NFIRM	NFIRM	SINGL	SINGL		_			EAT	1ABLE	CESS	TACA
F&G Cause and Effect	for Numaligarh Station				CRIF		(1)	出 出 出 ()	SIN - 5	SIN - 5	0	- CO	ADA - S	ADA - S	- ADA	ADA - H HIGF		AC	KE + H ADA	FLAMN ER	- PRC	- POR
					DES		LO F&G	SMOK TO F&G	TO F&G	FO F&G	LO F&G	TO F&G	TO SC/	TO SC/	TO SC/ HIGH	TO SC/ - HIGF		ro sci	(SMOK	AMBE	DOTER	DOTER
Document No 10	09-00-IN-CAE-5001						ARM	LARM(TOR) 1	ARM	LARM 1 HIGH	ARM	_ARM _ HIGH	ARM	_ARM _ HIGH	_ARM _ RMED-	_ARM _ RMED		ARM	LARM TOR) 1	L ALAR TION -	JOR HO	OR HC
							MCP AI	FIRE A DETEC	GAS AI HIGH	GAS AI HIGH F	GAS AI HIGH	GAS AI HIGH F	GAS AI HIGH	GAS AI HIGH F	GAS AI CONFII	GAS AI CONFII		MCP AI	FIRE A DETEC	VISUAI	OUTDC AREA	OUTDC
						NO												_		001	1001	1001
						e tag	ı.		ı			ī	ı	I.		ı		ı	1	U-BA-1	U-HA-	U-HA-
СА	USE					EVIC														IN-600	N-600	IN-600
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						SYSTEN			F	k G						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
	1										1											
	1009-NU-PGD-1001																					<u> </u>
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (EHOV- 1030) at Pig Launcer					x		×		x		x					x		
	VOTING	1001	40% LEL							x		x		x		x				x	x	
	1009-NU-PGD-1002			_																		
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (MOV- 1029) at Pig Receiver					x		x		x		x					x		
	VOTING	1001	40% LEL							x		x		x		x				x	x	
	1009-NU-OPGD-1001																					
	1009-NU-OPGD-1002																					
	VOTING	1002	3 LEL METER	Pig Receiver					x				x							x		
OFEN FAITI GAS DETECTOR	VOTING	1002	5 LEL METER	(PR -1001)						x				x						x	x	
	VOTING	2002	3 LEL METER								x				x					x		
	VOTING	2002	5 LEL METER									x				x				x	x	
MANUAL ALARM CALL POINT	1009-NU-MCP-1001						x											x			x	
Terminal Control Building (PO	RTA CABIN DETECTROS)		·																			
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-NU-FGD-1001			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-NU-FGD-1002			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-NU-FGD-1003			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-NU-FGD-1004			PORTA CABIN				x											x			x
MANUAL ALARM CALL POINT	1009-NU-MCP-1005			PORTA CABIN			x											x				x
DETECTOR INHIBIT/MAINTAI																						
	1009-NU-PGD-1001	-	-	-							I	I			I	I						
IN THE FILE FILE TAC INETERTAD	·	•	•	•		· I		•	•	•	•	•	•	•	•	•	•	•	•	•	•	*

							ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor-Golaghat-Numa Pro Job No F&G Cause and Effect Document No 100	iligarh Area Gas Pipeline ject 1009 for Numaligarh Station 09-00-IN-CAE-5001		EFFECT		DESCRIPTION		MCP ALARM TO F&G	FIRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	GAS ALARM TO F&G - SINGLE - HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE- HIGH	GAS ALARM TO SCADA - SINGLE- HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH		MCP ALARM TO SCDA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN
CA	USE					DEVICE TAG NO	·		1	ı	ı				ı	·		1	I	1009-NU-BA-1001	1009-NU-HA-1001	1009-NU-HA-1001
						SYSTEM			F8	kG						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
IN FOINT TIFE ORS DETECTOR		1			· · ·																	
	1009-NU-PGD-1002	-	-	-							I	I			I	I						
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ODEN DATH CAC DATECTOD	1009-NU-OPGD-1001	-	-	-							I	I			I	I					' '	
OPEN PATH GAS DATECTOR	1009-NU-OPGD-1001 1009-NU-OPGD-1002	-	-	-							I	I			I I	I						
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OPEN PATH GAS DATECTOR	1009-NU-OPGD-1001 1009-NU-OPGD-1002 1009-NU-FGD-1001 1009-NU-FGD-1002	- - - -	- - - -	-				I			I	I			I	I			I			
OPEN PATH GAS DATECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-NU-OPGD-1001 1009-NU-OPGD-1002 1009-NU-FGD-1001 1009-NU-FGD-1002 1009-NU-FGD-1003	- - - -	- - - - -	- - - -				I I I			I	I			I	I			I			
OPEN PATH GAS DATECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-NU-OPGD-1001 1009-NU-OPGD-1002 1009-NU-FGD-1001 1009-NU-FGD-1002 1009-NU-FGD-1003 1009-NU-FGD-1004	- - - - -	- - - - -	- - - - -				I I I I			I	I I			I	I I			I I I I			
OPEN PATH GAS DATECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-NU-OPGD-1001 1009-NU-OPGD-1002 1009-NU-FGD-1001 1009-NU-FGD-1002 1009-NU-FGD-1003 1009-NU-FGD-1004 1009-NU-MCP-1001	- - - - - -	- - - - - -	- - - - - -				I I I I			I	I I			I	I 		I	I I I I			
OPEN PATH GAS DATECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT) MANUAL ALARM CALL POINT	1009-NU-OPGD-1001 1009-NU-OPGD-1002 1009-NU-FGD-1001 1009-NU-FGD-1002 1009-NU-FGD-1003 1009-NU-FGD-1004 1009-NU-MCP-1001 1009-NU-MCP-1002	- - - - - - - - - -	- - - - - - -	- - - - - - - - -				I I I I			I	I I			I I 	I I 		I	I I I I			
OPEN PATH GAS DATECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT) MANUAL ALARM CALL POINT Notes:	1009-NU-OPGD-1001 1009-NU-OPGD-1002 1009-NU-FGD-1001 1009-NU-FGD-1002 1009-NU-FGD-1003 1009-NU-FGD-1004 1009-NU-MCP-1001 1009-NU-MCP-1002	- - - - - - - -	- - - - - - -	- - - - - - - -			I	I I I I			I	I 			I	I 		I	I I I			
OPEN PATH GAS DATECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT) MANUAL ALARM CALL POINT Notes: 1. Terminal control building Senso	1009-NU-OPGD-1001 1009-NU-OPGD-1002 1009-NU-FGD-1001 1009-NU-FGD-1002 1009-NU-FGD-1003 1009-NU-FGD-1004 1009-NU-MCP-1001 1009-NU-MCP-1002 prs (Smoke+Heat),MCP, Beacon a	- - - - - - - - - - - - - - - - -	- - - - - - - - -		AP (Fire	Alarm (I I Control Pab	I I I I el)			I				I I 	I 		I	I I I			

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Nambor-Golaghat-Numa Pro	aligarh Area Gas Pipeline vject				z				I		1ED -	1ED -	ц	ц						GAS		BIN
Job No	1009		C		TIO			EAT	NGLE	NGLE	NFIRN	NFIRN	SING	SING		_			EAT	1ABLE	CESS	TACA
F&G Cause and Effect	for Thoramukh Station				CRIF		(1)	田 田 田 田 四 の	G - SI	G - SI	- 5 9	- 5 9	ADA -	ADA -	- ADA -	ADA - HIGH		AC	KE + H ADA	FLAMN ER	- PRC	- POR
					DES		LO F&G	SMOK TO F&G	TO F&	TO F&	TO F&	TO F&	TO SC	TO SC	TO SC HIGH	TO SC - HIGF		IO SCI	(SMOK	AMBE	DOTER	DOTER
Document No 10	09-00-IN-CAE-5001						ARM	LARM(TOR) 1	LARM	LARM HIGH	LARM	LARM HIGH	LARM	LARM HIGH	LARM RMED-	LARM RMED		ARM	LARM TOR) 1	L ALAR TION -	JOR HO	OR HC
							MCP AI	FIRE A DETEC	GAS A HIGH	GAS A HIGH I	GAS A HIGH	GAS A HIGH I	GAS A HIGH	GAS A HIGH I	GAS A	GAS A		MCP AI	FIRE A DETEC	VISUA	OUTDC AREA	OUTDO
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CA	USE					EVIC														1T-600	1T- 600	1T-900
						-														H		
						SYSTEN			F8	kG						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
		1																				
	1009-TH-PGD-1001																					
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	1050) at Pig Launcer					x		x		x		x					x		
	VOTING	1001	40% LEL							x		x		x		x				x	x	
	1009-TH-PGD-1002			_																		<u> </u>
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (MOV- 1051) at Pig Receiver					x		x		x		x					x		
	VOTING	1001	40% LEL							x		x		x		x				x	x	
	1009-TH-OPGD-1001			_																		
	1009-TH-OPGD-1002																					
OPEN PATH GAS DETECTOR	VOTING	1002	3 LEL METER	Pig Receiver					x				x							x		
of ENTATILICAS DETECTOR	VOTING	1002	5 LEL METER	(PR -1001)						x				x						x	x	
	VOTING	2002	3 LEL METER								x				x					x		
	VOTING	2002	5 LEL METER									x				x				x	x	
MANUAL ALARM CALL POINT	1009-TH-MCP-1001						x											x			x	
Terminal Control Building (PO	RTA CABIN DETECTROS)																					
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-TH-FGD-1001			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-TH-FGD-1002			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-TH-FGD-1003			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-TH-FGD-1004			PORTA CABIN				x											x			x
MANUAL ALARM CALL POINT	1009-THMCP-1005			PORTA CABIN			x											x				x
DETECTOR INHIBIT/MAINTAI	NANCE OVERRIDE																					
	1009-TH-PGD-1001	-	-	-							I	I			I	I						
IN THE FILL FACTOR	•	•		•		· I		•	•	•	•	•	•	•	•		•	•	•	•	•	*

						ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor-Golaghat-Num Pro Job No F&G Cause and Effect Document No 10	aligarh Area Gas Pipeline oject o 1009 for Thoramukh Station 09-00-IN-CAE-5001		EFFECT		DESCRIPTION	MCP ALARM TO F&G	FIRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	GAS ALARM TO F&G - SINGLE - HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE- HIGH	GAS ALARM TO SCADA - SINGLE- HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH		MCP ALARM TO SCDA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN
CA	USE				DEVICE TAG NO			I	I	I	I	I	-	1	1		1	ı	1009-TH-BA-1001	1009-TH-HA-1001	1009-ТН-НА-1001
					SYSTEM			F8	kG						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION		1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
		1			rr	1															
- IK FOINT THE ORS DETECTOR	1009-TH-PGD-1002	-	-	-						I	I			I	I						
- IK FOINT THE OAS DETECTOR	1009-TH-PGD-1002 1009-TH-OPGD-1001	-	-	-						I	I			I	I						
OPEN PATH GAS DATECTOR	1009-TH-PGD-1002 1009-TH-OPGD-1001 1009-TH-OPGD-1002	-	-							I I I	I I I			I I I	I I I						
OPEN PATH GAS DATECTOR	1009-TH-PGD-1002 1009-TH-OPGD-1001 1009-TH-OPGD-1002 1009-TH-FGD-1001		- - - -	- - - -			I			I I I	I I I			I I I	I I I			I			
OPEN PATH GAS DATECTOR	1009-TH-PGD-1002 1009-TH-OPGD-1001 1009-TH-OPGD-1002 1009-TH-FGD-1001 1009-TH-FGD-1002		- - - -	- - - -			I			I I I	I I I			I I I	I I I			I			
OPEN PATH GAS DETECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-TH-PGD-1002 1009-TH-OPGD-1001 1009-TH-OPGD-1002 1009-TH-FGD-1001 1009-TH-FGD-1002 1009-TH-FGD-1003		- - - - -	- - - - -			I			I I I	I I I			I I I	I I I			I			
OPEN PATH GAS DETECTOR OPEN PATH GAS DATECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-TH-PGD-1002 1009-TH-OPGD-1001 1009-TH-OPGD-1002 1009-TH-FGD-1001 1009-TH-FGD-1002 1009-TH-FGD-1003 1009-TH-FGD-1004		- - - - - -	- - - - - - - -			I I I I			I I I	I			I	I I I			I I I I			
OPEN PATH GAS DETECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-TH-PGD-1002 1009-TH-OPGD-1001 1009-TH-OPGD-1002 1009-TH-FGD-1001 1009-TH-FGD-1002 1009-TH-FGD-1003 1009-TH-FGD-1004 1009-TH-MCP-1001	- - - - - - - -	- - - - - - - -	- - - - - - - - - - - -		I	I I I I I			I	I			I	I I I I		I	I I I I			
OPEN PATH GAS DETECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT) MANUAL ALARM CALL POINT	1009-TH-PGD-1002 1009-TH-OPGD-1001 1009-TH-OPGD-1002 1009-TH-FGD-1001 1009-TH-FGD-1002 1009-TH-FGD-1003 1009-TH-FGD-1004 1009-TH-FGD-1001 1009-TH-FGD-1002	- - - - - - - - - - -	- - - - - - - - - - - -	- - - - - - - - - - - - -		I	I I I I			I	I			I	I		I	I I I I			
OPEN PATH GAS DETECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT) MANUAL ALARM CALL POINT Notes:	1009-TH-PGD-1002 1009-TH-OPGD-1001 1009-TH-OPGD-1002 1009-TH-FGD-1001 1009-TH-FGD-1002 1009-TH-FGD-1003 1009-TH-FGD-1004 1009-TH-FGD-1001 1009-TH-FGD-1002	- - - - - - - - - - - -	- - - - - - - - - -	- - - - - - - - - - - - - - - - -		I	I I I I			I I I I	I			I	I I I I		I	I I I I			
OPEN PATH GAS DETECTOR ADRESSABLE MULTI SENSOR (SMOKE + HEAT) MANUAL ALARM CALL POINT Notes: 1. Terminal control building Sens	1009-TH-PGD-1002 1009-TH-OPGD-1001 1009-TH-OPGD-1002 1009-TH-FGD-1001 1009-TH-FGD-1002 1009-TH-FGD-1003 1009-TH-FGD-1004 1009-TH-MCP-1001 1009-TH-MCP-1002		- - - - - - - - - - - -		AP (Fire Alarm	I I Control Pak	I I I I el)			I	I			I	I		I	I I I I			

							ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor-Golaghat-Numa Pro Job No F&G Cause and Effect f Document No 100	aligarh Area Gas Pipeline ject for Hamiramukh Station 09-00-IN-CAE-5001		EFFECT		DESCRIPTION	-	MCP ALARM TO F&G	FIRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	GAS ALARM TO F&G - SINGLE - HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE- HIGH	GAS ALARM TO SCADA - SINGLE- HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH	1	MCP ALARM TO SCDA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN
CA	USE					DEVICE TAG NO			,	,	,	,	,	,	1	ı	1	1	1	1009-HA-BA-1001	1009-HA-HA-1001	1009-HA-HA-1001
						SYSTEM			F8	kG						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
																						-
	1009-HA-PGD-1001		2007 1 51	Actuated Valve (EHOV-																		+
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	1055) at Pig Launcer					X	×	X	×	X	×	X	~				x		
	1009-HA-PGD-1002	1001	40% LEL							^		^		^		^				^		
IR POINT TYPE GAS DETECTOR	VOTING	1001	20% LEL	Actuated Valve (MOV-					x		x		x		x					x		
	VOTING	1001	40% LEL	1054) at Pig Receiver						x		x		x		x				x	x	
	1009-HA-OPGD-1001																					
	1009-HA-OPGD-1002			-																		
	VOTING	1002	3 LEL METER	Pia Receiver					x				x							x		
OPEN PATH GAS DETECTOR	VOTING	1002	5 LEL METER	(PR -1001)						x				x						x	x	
	VOTING	2002	3 LEL METER	-							x				x					x		
	VOTING	2002	5 LEL METER									x				x				x	x	
MANUAL ALARM CALL POINT	1009-HA-MCP-1001						x											x			x	
Terminal Control Building (PO	RTA CABIN DETECTROS)	1										1				1						-
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-HA-FGD-1001			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-HA-FGD-1002			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-HA-FGD-1003			PORTA CABIN				x											x			x
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-HA-FGD-1004			PORTA CABIN				x											x			x
MANUAL ALARM CALL POINT	1009-HAMCP-1005			PORTA CABIN			x											x				x
DETECTOR INHIBIT/MAINTAI		·		·	<u>. </u>	·								·					·	·	·	<u> </u>
	1009-HA-PGD-1001	-	-	-							I	I			I	I						

							ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor-Golaghat-Numa Pro Job No F&G Cause and Effect f Document No 10	aligarh Area Gas Pipeline oject o 1009 for Hamiramukh Station 09-00-IN-CAE-5001		EFFECT		DESCRIPTION		MCP ALARM TO F&G	FIRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	GAS ALARM TO F&G - SINGLE - HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE- HIGH	GAS ALARM TO SCADA - SINGLE- HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH	1	MCP ALARM TO SCDA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN
CA	USE					DEVICE TAG NO	ı		1		T		T	T	ı	I	T		ı	1009-HA-BA-1001	1009-НА-НА-1001	1009-НА-НА-1001
						SYSTEM			Fŧ	\$G						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
IN FOINT TIPE GAS DETECTOR		Т			1		1	1			1											
	1009-HA-PGD-1002	-	-	-							I	I			I	I						
	1009-HA-OPGD-1001	-	-	-							I	I			I	I						
OPEN PATH GAS DATECTOR	1009-HA-OPGD-1002	-	-	-							I	I			I	I						
	1009-HA-FGD-1001	-	-	-				I											I			
	1009-HA-FGD-1002	-	-	-				I											I			
(SMOKE + HEAT)	1009-HA-FGD-1003	-	-	-				I											I			
	1009-HA-FGD-1004	-	-	-				I											I			
	1009-HA-MCP-1001	-	-	-			I											I				
MANUAL ALARM CALL POINT	1009-HA-MCP-1002	-	-	-			I											I				
Notes:	1	1	l		1 1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	I
1. Terminal control building Sense	ors (Smoke+Heat),MCP, Beacon a	nd Hooter signals shal	ll be integated with	1 F&G system through FC	CAP (Fire	Alarm	Control Pat	oel)														

						LARM	LARM	ILARM	ILARM	LARM	ILARM	LARM	LARM	LARM	LARM	LARM	LARM	ILARM	LARM	ILARM	ILARM
Nambor-Golaghat-Num Pro Job No F&G Cause and Ef Document No 10	aligarh Area Gas Pipeline oject o 1009 fect for SV1-Station 09-00-IN-CAE-5001		EFFECT		DESCRIPTION	MCP ALARM TO F&G	FIRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	GAS ALARM TO F&G - SINGLE -	GAS ALARM TO F&G - SINGLE -	GAS ALARM TO F&G - CONFIRMED -	GAS ALARM TO F&G - CONFIRMED -	GAS ALARM TO SCADA - SINGLE-	GAS ALARM TO SCADA - SINGLE- HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH		MCP ALARM TO SCDA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS	OUTDOOR HOOTER - PROCESS	OUTDOOR HOOTER - PORTACABIN
CA	USE				DEVICE TAG NO	1			1	ı	,	1	1	ı	ı		,	1	1009-S1-BA-1001	1009-S1-HA-1001	1009-S1-HA-1001
					SYSTEM			F٤	kG						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION		1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
	1000 C1 DCD 1001																				
	VOTING	1001	20% El	Actuated Valve (EHOV-				×		v		v		v					v		
IKTOINT THE GAS DETECTOR	VOTING	1001	20% LEL	1055) at Pig Launcer				^	×	^	×	^	×	^	×				×	×	
	1009-S1-OPGD-1001	1001							~		~		~		~				~	~	
	1009-S1-OPGD-1002			-																	
	VOTING	1002	3 LEL METER					x				x							x		
OPEN PATH GAS DETECTOR	VOTING	1002	5 LEL METER	Pig Receiver (PR -1001)					x				x						x	x	
	VOTING	2002	3 LEL METER							x				x					x		
	VOTING	2002	5 LEL METER								x				x				x	x	
MANUAL ALARM CALL POINT	1009-S1-MCP-1001					x											x			x	
Terminal Control Building (PC	PRTA CABIN DETECTROS)																				
ADRESSABLE MULTI SENSOR (SMOKE + HEAT)	1009-S1-FGD-1001			PORTA CABIN			x											x			x
ADRESSABLE MULTI SENSOR	1009-S1-FGD-1002			PORTA CABIN			x											x			x
ADRESSABLE MULTI SENSOR	1009-S1-FGD-1003			PORTA CABIN			x											x			x
ADRESSABLE MULTI SENSOR	1009-S1-FGD-1004			PORTA CABIN			x											x			x
MANUAL ALARM CALL POINT	1009-S1-MCP-1005			PORTA CABIN		x											x				x
DETECTOR INHIBIT/MAINTA	INANCE OVERRIDE	1	<u> </u>	1			I	1	1	1	1	I	I	1	1	I	I	I	l		
IR POINT TYPE GAS DETECTOR	1009-S1-PGD-1001	-	-	-						I	I			I	I						
	1009-S1-OPGD-1001	-	-	-						I	I			I	I						
OPEN PATH GAS DATECTOR	1009-S1-OPGD-1002	-	-	-						I	I			I	I						
	1009-S1-FGD-1001	-	-	-			I											I			

							ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM	ALARM
Nambor-Golaghat-Numa Pro Job No F&G Cause and Eff Document No 100	aligarh Area Gas Pipeline oject o 1009 Fect for SV1-Station D9-00-IN-CAE-5001		EFFECT		DESCRIPTION		MCP ALARM TO F&G	FIRE ALARM(SMOKE + HEAT DETECTOR) TO F&G	GAS ALARM TO F&G - SINGLE - HIGH	GAS ALARM TO F&G - SINGLE - HIGH HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH	GAS ALARM TO F&G - CONFIRMED - HIGH HIGH	GAS ALARM TO SCADA - SINGLE- HIGH	GAS ALARM TO SCADA - SINGLE- HIGH HIGH	GAS ALARM TO SCADA - CONFIRMED-HIGH	GAS ALARM TO SCADA - CONFIRMED - HIGH HIGH		MCP ALARM TO SCDA	FIRE ALARM (SMOKE + HEAT DETECTOR) TO SCADA	VISUAL ALARM ON FLAMMABLE GAS DETECTION - AMBER	OUTDOOR HOOTER - PROCESS AREA	OUTDOOR HOOTER - PORTACABIN
CA	USE					DEVICE TAG NO	ı		r	r	I	I	I	ſ	I	ı		ſ	I	1009-S1-BA-1001	1009-S1-HA-1001	1009-S1-HA-1001
						SYSTEM			F8	G						SCADA						
DEVICE TYPE	DEVICE TAG NO.	VOTING LOGIC	SET POINT	ZONE / LOCATION			1	2	5	6	7	8	15	16	17	18	23	24	25	27	29	30
ADRESSABLE MULTI SENSOR	1009-S1-FGD-1002	-	-	-				I											I			
(SMOKE + HEAT)	1009-S1-FGD-1003	-	-	-				I											I			
	1009-S1-FGD-1004	-	-	-				I											I			
	1009-S1-MCP-1001	-	-	-			I											I				
MANUAL ALARM CALL POINT	1009-S1-MCP-1002	-	-	-			I											I				
Notes:								•							L						L	4
1. Terminal control building Sense	ors (Smoke+Heat),MCP, Beacon ar	nd Hooter signals shal	l be integated with	h F&G system through FC	AP (Fire	e Alarm	Control Pat	pel)														



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	S.NO.		TITI	E				NO		
	1	PIPEL	INE ROUTE	MAP	100	9-00-	-PP-RM	-2001		K
	2	P&ID	- NAMBAR)	100)9–NA-	-PC-PI)-1001	TO 1005	
	3	P&ID	- KHORAG	HAT	100)9-KH-	-PC-PI	D-1001	TO 1006	
	4	P&ID	- URIUMG	HAT	100)9–UR-	-PC-PI	D-1001	TO 1004	
	5	P&ID	- SV-1		100)9–S1-	-PC-PI	0-1001		
	6	P&ID	- SV-2		100)9–S2-	-PC-PI	0-1001		Π
	7	P&ID	– GOLAGH	AT	100)9–GG-	-PC-PI	0-1001	TO 1003	
	8	P&ID	– SV–3		100)9–S3-	-PC-PI)-1001		
	9	P&ID	- NUMALIO	GARH	100)9–NU-	-PC-PI	D-1001		
	10	PIPFI	NE SCHEM	ATIC DIAGE	RAM 100)9-00-	-PP-SM	D-200 ⁻		
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	1. SC	ADA AR	CHITECTURE	REPRESEN	TED IN TI	his dr <i>i</i>	AWING IS	HIGH L	evel 🔨	
	RE		ENT AND SH	IALL BE DE	VELOPED	DURIN	g detail	DESIGN		
	2. SE	RVER B	ASED SCADA	SYSTEM S	SHALL BE	PROVIL	DED AND	EXISTIN	G SERVER	
			AN MASIER	CONTROL	ROOM SH	ALL BE	USED A	S BACKI	JP SERVER!	
	3. NE	IWORK	SWITCHES S	HALL BE F	EDUNDAN					I
	4. FU	LL DUP	ONTROL DO	NICATION II	HROUGH	MORIFE			TO AGEL	
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	10. AL	L STATIC	ON RIU'S S	HALL BE P	ROVIDED	DNP 3.	0 PROIC	COL.		
	11. RI	U SHALI	L CAPABLE	IO COMMU	NICATION	SACADA	(THROU	GH OPTIC	CAL FIBER	
	AT	GOLAG	hat station	AND MCS	AT DULIA	AJAN OV	VER MPL	S (PRIM/	ARY-OFC),	U
	GS	M (SEC	ondary) si	MULTANEOU	SLY.	~~~~	~~~~~	~~~~~		
	12. SIL	3 PL(C FOR F&G	SYSTEMS S	SHALL BE	PROVI	DED IN S	SUB-CON	ITROL	8
	RO	om at	GOLAGHAT.	F&G PANEL	. ALONG	WITH N	ECESSAR	Y ACCES	SORIES	
	SH	ALL BE	PROVIDED	IN EACH TE	RMINALS	AND F	&g dete	CTORS S	Shall be	
	HA	RD WIRI	ED TO F&G	MARSHALIN	g cabine	ETS.				X I
	(13. EX	ISTING S	SCADA SERV	ER ALDU	LIAJAN M	IASTER		. ROOM	SHALL NOT	X I
	E BE	EXIEN	DABLE TO G	olaghai S	UB CONT	ROL RC	INT OUT			F
		NDUR E	NSURE THA	I SCADA SI	RVER AI		MAI SUE	TPOLLING	OF NEW	
NC		ALL INL	SYSTEM THE	E SIGNAL	INTEREAC	ING RE	IWFEN S	UR CONT	FROL ROOM	
		GOLAG	HAT AND MA	STER CON	ROL ROC)M AT I) III IAJAN	SHALL	RF	
	BIC	DIRECTIC	NAL.					OT IT LEE		
	15. LE/	ak dete	ECTION SYST	EM WITH A	PPS WOR	KSTATIC	N WITH	leak de	TECTION	
	AN	D LOCA	LIZATION SC	FTWARE SH	IALL BE I	INSTALL	ed at s	JB-CON	TROL	
	RC	OM, GC	LAGHAT.							8
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	NC	)TE ">	<" : ONE 3	SV STAT	ION S	TAND	S DEL	ETED		
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	RLU	_	PF	UUESS C(		NEIWO				_
	RED		SA	FETY INST	RUMENTI	ED SYS	STEM			`
	MAG	ENTA	PF	ROCESS C	ONTROL	- HAR	DWIRED			
ISITION SYSTEM										
	01 18	.02.2020	RE-ISS	SUED FOR B	ID	КК	VB	KNC		Π
	00 02	.12.19	ISSU	ED FOR BID	)	кк	VB	KNC		
RNET PROTOCOL	C1 14	.05.19	ISSUED FC	R CLIENT R	EVIEW	КК	VB	KP	OWNER	
	REV. D	DATE	DE	SCRIPTION		BY	CHKD.	APPD.	APPVL.	В
	OWNER	AM (A)								
	A35	GASVCO	MPANY LTD	ROSAIV	GAS					
	PMC		VCS C	UALITY		V		OJECT		1
			SERVICE	S PVT. L	гD.  С			S PV1	. LTD.	$\mid \mid$
	ENERGISM	~~~*******1			 	 ^ עעווא			/ : ^	
	PROJE	СТ	INANIBAI				лысар JECT		.~	
										$\left  \right $
				CONTRO	L SYST	EM A	RCHIT	ECTUR	Ε.	A
	SIZE		SCALE	JOB NO	DRAW		/BER:	SHEET	REV.	11
	A1		N.T.S.	1009	1009-0	00-IN-DF	R-5001	1 OF 1	01	
4		3			2				 L	1



			REFERENCE I	DRAWINGS			
s.	NO.	DRAWING	TITLE	DRA	WING N	IUMBER	ર
	1	P& ID		1009-NA-	-PC-PID-100	01,02,03,04	4 & 1005
	2	PLOT PLAN		1009-NA-	-CS-PPL-60	)01	
N	OTES	1					
1	. ALL	DIMENSIONS ARE IN	MILLIMETER AND LEV	ELS ARE IN METER	RS UNLESS	OTHERWI	SE
2	2. REF	TED. Erence level +100	0.00 MTR. CORRESPON	IDS TO FINISHED (	grade leve	EL (F.G.L)	
2	3. LOC UPT	ATION AND ELEVATION	NS OF GAS DETECTOR	S ARE TENTATIVE.	THE SAME	SHALL B	E
4	1. BEA	CON FOR GAS DETEC	CTION SHALL BE INSTA	ALLED ON A SINGL	e stanchic	ON NEAR	
Ę	PRC 5. SIN	OCESS AREA. GLE HORN FOR GAS	DETECTION SHALL BE	INSTALLED ON A	SINGLE STA	ANCHION	NEAR
6	PRC 6. ALL	DCESS AREA. GAS DETECTORS EL	IFLD SHALL BE CONNI	ECTED TO JUNCTI	ION BOX. IN	NTEGRATIC	)n of
_	GAS	DETECTORS WITH	GAS DETECTION SYSTE	M SHALL BE IN C	ONTRACTOR	SCOPE.	
/	PEF	R SITE CONDITIONS.	TOR TO JE AND TERM	MINAL CONTROL RU	JUM SHALL	BE RUU	IED AS
_							
]	LEG	END:-					
	LEG.	END:-	DESCRIPTION	1		QUANT	ITY
	LEG SYMBOL EL:+000	END:- 		l		QUANT	ITY
	EL:+000	END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT	I OR		QUANT	ITY
	LEG SYMBOL EL:+000 XX-XX-	END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT EN PATH GAS DETECT	I OR OR / TRANSMITTER	R	QUANT	ITY
	LEG SYMBOL EL:+000 XX-XX-	END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT EN PATH GAS DETECT NUAL ALARM CALL POINT	or / Transmitter	R	QUANT 05 02 01	ITY 
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT EN PATH GAS DETECT NUAL ALARM CALL POINT ACON — AMBER	i 'or or / transmitter	R	QUANT 05 02 01 01	ITY
	LEG SYMBOL EL:+000 XX-XX- XX- MCI	END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT EN PATH GAS DETECT NUAL ALARM CALL POINT ACON — AMBER OTER E. DETECTION JUNCTIO	OR OR / TRANSMITTER	R	QUANT 05 02 01 01 01	ITY
	LEG SYMBOL EL:+000 XX-XX- XX-XX- MCI	END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT EN PATH GAS DETECT NUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO	I OR OR / TRANSMITTER	R	QUANT 05 02 01 01 01 01	ITY 5
	LEG SYMBOL EL:+000 XX-XX- MCI MCI	END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT IEN PATH GAS DETECT NUAL ALARM CALL POINT ACON — AMBER OTER E DETECTION JUNCTIO	OR OR / TRANSMITTER	R	QUANT 05 02 01 01 01 01	ITY
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT EN PATH GAS DETECT NUAL ALARM CALL POINT ACON — AMBER OTER E DETECTION JUNCTIO	OR OR / TRANSMITTER N BOX	R	QUANT 05 02 01 01 01 01	ITY 5
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT EN PATH GAS DETECT NUAL ALARM CALL POINT ACON — AMBER OTER E DETECTION JUNCTIO	I OR OR / TRANSMITTER	R	QUANT 05 02 01 01 01 01	ITY 5
		END:-	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT IEN PATH GAS DETECT NUAL ALARM CALL POINT ACON — AMBER OTER E DETECTION JUNCTIO	OR OR / TRANSMITTER	R	QUANT 05 02 01 01 01 01	ITY 6
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT EN PATH GAS DETECT NUAL ALARM CALL POINT ACON — AMBER OTER E DETECTION JUNCTIO	OR OR / TRANSMITTER N BOX	R	QUANT 05 02 01 01 01 01	ITY
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT EN PATH GAS DETECT NUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO	OR OR / TRANSMITTER	R	QUANT 05 02 01 01 01	ITY
		END:-	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT IEN PATH GAS DETECT NUAL ALARM CALL POINT ACON — AMBER OTER E DETECTION JUNCTIO	OR OR / TRANSMITTER	R	QUANT 05 02 01 01 01 01	ITY
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT EN PATH GAS DETECT NUAL ALARM CALL POINT ACON — AMBER OTER E DETECTION JUNCTIO	OR OR / TRANSMITTER	R	QUANT 05 02 01 01 01 01	ITY
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT IEN PATH GAS DETECT NUAL ALARM CALL POINT ACON — AMBER OTER E DETECTION JUNCTIO	OR OR / TRANSMITTER	R	QUANT 05 02 01 01 01 01 01 01	
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT IEN PATH GAS DETECT NUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO	OR OR / TRANSMITTER N BOX	R	QUANT 01 01 01 01 01 01 01 01 01 01 01 01 01	ITY
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT IEN PATH GAS DETECT NUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO	OR OR / TRANSMITTER	R	QUANT 01 01 01 01 01 01 01 01 01 01 01 01 01	ITY
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT IEN PATH GAS DETECT NUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO	I OR OR / TRANSMITTER N BOX	KK	QUANT 05 02 01 01 01 01 01 01 01 01 01 01 01 01 01	ITY
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT IEN PATH GAS DETECT NUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO ISSUED FOR E DESCRIPTIC	OR OR / TRANSMITTER N BOX	R R R R R R R R R R R R R R R R R R R	QUANT 05 02 01 01 01 01 01 01	ITY
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT VAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO ISSUED FOR E DESCRIPTIC	OR OR / TRANSMITTER N BOX		QUANT 05 02 01 01 01 01 01 01 01 01 01 01 01 01 01	ITY
- - - - - - - - - - - - - - - - - - -		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT EN PATH GAS DETECT NUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO ISSUED FOR E DESCRIPTIC	OR OR / TRANSMITTER N BOX		QUANT 05 02 01 01 01 01 01	ITY
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT IEN PATH GAS DETECT NUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO ISSUED FOR E DESCRIPTIC SSAM GAS C JALITY	I OR OR / TRANSMITTER N BOX SID ON OMPANY I VCS		QUANT 05 02 01 01 01 01 01 01 01 01 01	ITΥ 
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT VAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO ISSUED FOR E DESCRIPTIO SSAM GAS C JALITY PVT. LTD.			QUANT 05 02 01 01 01 01 01 01 01 01 01 01 01 01 01	ITY
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT VUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO ISSUED FOR E DESCRIPTIC SSAM GAS C JALITY PVT. LTD.	OR OR / TRANSMITTER N BOX		QUANT 05 02 01 01 01 01 01 01 01 01 01 01 01 01 01	IТY
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT NUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO ISSUED FOR E DESCRIPTIC SSAM GAS C JALITY PVT. LTD.	OR OR OR / TRANSMITTER N BOX N BOX BID SID SID SID SID SID SID SID SID SID S		QUANT 01 01 01 01 01 01 01 01 01 01 01 01 01	ITΥ 
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT VUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO ISSUED FOR E DESCRIPTIO SSAM GAS C JALITY PVT. LTD. CR – GOLAGHA REA GAS PIPEI			QUANT 05 02 01 01 01 01 01 01 01 01 01 01 01 01 01	ITΥ 
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT VUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO ISSUED FOR E DESCRIPTIO SSAM GAS C JALITY PVT. LTD. OR - GOLAGHA REA GAS PIPEI	OR OR OR / TRANSMITTER N BOX N BOX OMPANY I OMPANY I COMPANY I CONSULTA (ENG: AT - NUMAL LINE PROJE FERCONNEC ATION		QUANT 05 02 01 01 01 01 01 01 01 01 01 01 01 01 01	ITΥ 
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT VAL ALARM CALL POINT ACON - AMBER OTER E DETECTION JUNCTIO ISSUED FOR E DESCRIPTIO SSAM GAS C JALITY PVT. LTD. OR - GOLAGHA REA GAS PIPEI FOR NEW INT NAMBOR ST I TOTAL NO. OI	OR OR OR / TRANSMITTER N BOX N BOX N BOX SID SID OMPANY I COMPANY I		QUANT 01 02 02 01 01 01 01 01 01 01 01 01 01 01 01 01	ITΥ
		END:- 	DESCRIPTION EVATION STRUMENT TAG NO. INT TYPE GAS DETECT NUAL ALARM CALL POINT ACON – AMBER OTER E DETECTION JUNCTIO SSAM GAS C JALITY PVT. LTD. SSAM GAS PIPEI FOR NEW INT NAMBOR ST AMBOR ST I TOTAL NO. OI DR.	OR OR OR / TRANSMITTER N BOX N BOX N BOX SCONSULT CONS		QUANT 01 02 01 01 01 01 01 01 01 01 01 01 01 01 01	ITΥ ITY ITY ITY ITY ITY ITY ITY ITY



				REFERENC	E DRAWINGS			
:	S.NO	DF	RAWING '	TITLE	DF	RAWING	NUMBE	R
	1	P& ID	)		1009-KH-PC-F	PID-1001,02,0	03,04,05,06	5 & 07
-	2	PLOT	PLAN		1009-KH-CS-F	PPL-6001		
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	NOTE	S I DIMENS	IONS ARE IN	MILLIMETER AND	IEVELS ARE IN ME	TERS LINIES	SS OTHERI	NISE
	2. F	STATED.	IFVFI + 10	0.00 MTR. CORRE	SPONDS TO FINISH	FD GRADE I	evei (e.c	
	3. L	OCATION A	ND ELEVATIO	NS OF GAS DETEC	TORS ARE TENTATIN	E. THE SAN	ME SHALL	BE
	4. E	BEACON FOR	R GAS DETE	CTION SHALL BE I	NSTALLED ON A SIN	IGLE STANC	hion neaf	7
	5. 5	SINGLE HOR	REA. RN FOR GAS	DETECTION SHALL	BE INSTALLED ON	A SINGLE S	STANCHION	I NEAR
	6. A	ALL GAS DE	REA. Etectors f	IELD SHALL BE CO	ONNECTED TO JUN	ICTION BOX,	INTEGRAT	ION OF
	( 7. (	GAS DETECT CABLE FROM	ORS WITH G	AS DETECTION SYS	STEM SHALL BE IN TERMINAL CONTROL	CONTRACTO ROOM SHA	R SCOPE. LL BE RO	uted as
	F	PER SITE C	ONDITIONS.					
	LEG	END:-						
	SYMBO			DESCRIPT	ION		QUAN	TITY
;	EL:+0 XXXX-X	00.00 (	XX INIS	FRUMENT TAG NO				
			POIN	IT TYPE GAS DETECT			0	6
	R		1.011		UK			
	R		OPE	N PATH GAS DETECT	OR / TRANSMITTER		04	4
			OPE MAN BFA	N PATH GAS DETECT UAL ALARM CALL PC CON – AMBER	OR / TRANSMITTER		0,	4
			MAN BEAG HOO	N PATH GAS DETECT UAL ALARM CALL PC CON – AMBER TER	INT		0· 0 0	4 1 1 1
			MAN BEAG HOO FIRE	N PATH GAS DETECT UAL ALARM CALL PC CON – AMBER TER DETECTION JUNCTIC	N BOX		0. 0 0 0 0	4 1 1 1 1
			OPE MAN BEAG HOO FIRE	N PATH GAS DETECT UAL ALARM CALL PC CON – AMBER TER DETECTION JUNCTIC	OR / TRANSMITTER		0. 0 0 0 0	4 1 1 1
			OPE MAN BEAI HOO FIRE	N PATH GAS DETECT UAL ALARM CALL PC CON — AMBER TER DETECTION JUNCTIC	OR / TRANSMITTER		0. 0 0 0 0	4 1 1 1 1
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			OPE MAN BEAG HOO FIRE	N PATH GAS DETECT UAL ALARM CALL PC CON – AMBER TER DETECTION JUNCTIC	OR / TRANSMITTER		0. 0 0 0 0	4 1 1 1 1 1
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		) P ( ) ( ) ( ) ) ) ) ) ) ) ) ) ) ) ) )	OPE MAN BEAG HOO FIRE	N PATH GAS DETECT		KK	<ul> <li></li></ul>	4 1 1 1 1 1
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				N PATH GAS DETECT		KK PREP. LTD. S PROJE SANTS SINEER	<ul> <li></li></ul>	4 1 1 1 1 1 1 1 1 1 1 1 1 1
		De.o1.20 DATE T: SEI		N PATH GAS DETECT UAL ALARM CALL PC CON - AMBER TER DETECTION JUNCTIC ISSUED FOF DESCRIPT SSAM GAS ALITY PVT. LTD. R - KHORAC		KK PREP. LTD. 5 PROJE TANTS GINEER	<ul> <li></li></ul>	4 1 1 1 1 1 KNC APPD
		De.o1.20 DATE T: SEI		N PATH GAS DETECT		KK PREP. LTD. S PROJE SANTS GINEER ALIGAR	<ul> <li></li></ul>	4 1 1 1 1 1 1 1 1 1 1 1 1 1
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		) ) ) ) ) ) ) ) ) ) ) ) ) )		N PATH GAS DETECT UAL ALARM CALL PC CON - AMBER TER DETECTION JUNCTIC ISSUED FOF DESCRIPT SSAM GAS ALITY PVT. LTD. R - KHORAC GAS PIPEL FOR NEW IN KHORAGHA		KK PREP. LTD. S PROJE TANTS GINEER ALIGAR T	Image: Control of the sector of the secto	4 1 1 1 1 1 1 1 1 1 1 1 1 1
				N PATH GAS DETECT UAL ALARM CALL PC CON - AMBER TER DETECTION JUNCTIC ISSUED FOF DESCRIPT SAM GAS ALITY PVT. LTD. R - KHORAC GAS PIPEL FOR NEW II KHORAGHA I TOTAL NO.		KK PREP. LTD. S PROJE SINEER ALIGAR T CTION	I	4 1 1 1 1 1 1 1 1 1 1 1 1 1
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S.NO.DRAW1P& ID2PLOT PLAN2PLOT PLAN3Intersection2REFERENCE LEVEL3LOCATION AND ELUPDATED AS PER4BEACON FOR GASPROCESS AREA.5SINGLE HORN FOPROCESS AREA.6ALL GAS DETECTORS7CABLE FROM GASPER SITE CONDIT	ING TITLE ARE IN MILLIMETER AND L - + 100.00 MTR. CORRES EVATIONS OF GAS DETECT SITE CONDITION. DETECTION SHALL BE INS R GAS DETECTION SHALL BE INS R GAS DETECTION SHALL BE CON WITH GAS DETECTION SYST DETECTOR TO JB AND TE IONS.	DRAWI         1009-NA-PC-F         1009-UR-CS-F         1009-UR-CS-F         EVELS ARE IN METERS U         SPONDS TO FINISHED GR/         ORS ARE TENTATIVE. THE         STALLED ON A SINGLE S         BE INSTALLED ON A SINGLE S         NNECTED TO JUNCTION         TEM SHALL BE IN CONTR         ERMINAL CONTROL ROOM	ING NUMBEI PID-1001,02,03, PPL-6001 UNLESS OTHERW ADE LEVEL (F.G E SAME SHALL TANCHION NEAR GLE STANCHION BOX, INTEGRATI ACTOR SCOPE.	R & 04 
1       P& ID         2       PLOT PLAN         2       PLOT PLAN         1.       ALL DIMENSIONS STATED.         2.       REFERENCE LEVEL         3.       LOCATION AND EL UPDATED AS PER         4.       BEACON FOR GAS PROCESS AREA.         5.       SINGLE HORN FO PROCESS AREA.         6.       ALL GAS DETECTORS         7.       CABLE FROM GAS PER SITE CONDIT	ARE IN MILLIMETER AND L + 100.00 MTR. CORRES EVATIONS OF GAS DETECT SITE CONDITION. DETECTION SHALL BE INS R GAS DETECTION SHALL BE DRS FIELD SHALL BE CON WITH GAS DETECTION SYST DETECTOR TO JB AND TE IONS.	EVELS ARE IN METERS U PONDS TO FINISHED GRA ORS ARE TENTATIVE. THE STALLED ON A SINGLE S BE INSTALLED ON A SING NNECTED TO JUNCTION TEM SHALL BE IN CONTR ERMINAL CONTROL ROOM	PPL-6001 PPL-6001 UNLESS OTHERW ADE LEVEL (F.G E SAME SHALL TANCHION NEAR GLE STANCHION BOX, INTEGRATI	WISE ;.L). BE ? NEAR
<ul> <li>NOTES</li> <li>1. ALL DIMENSIONS STATED.</li> <li>2. REFERENCE LEVEN</li> <li>3. LOCATION AND EL UPDATED AS PER</li> <li>4. BEACON FOR GAS PROCESS AREA.</li> <li>5. SINGLE HORN FO PROCESS AREA.</li> <li>6. ALL GAS DETECTOR GAS DETECTORS</li> <li>7. CABLE FROM GAS PER SITE CONDIT</li> </ul>	ARE IN MILLIMETER AND L + 100.00 MTR. CORRES EVATIONS OF GAS DETECT SITE CONDITION. DETECTION SHALL BE INS R GAS DETECTION SHALL BE DRS FIELD SHALL BE CON WITH GAS DETECTION SYST DETECTOR TO JB AND TE IONS.	EVELS ARE IN METERS U PONDS TO FINISHED GR/ ORS ARE TENTATIVE. THE STALLED ON A SINGLE S BE INSTALLED ON A SING NNECTED TO JUNCTION TEM SHALL BE IN CONTR ERMINAL CONTROL ROOM	UNLESS OTHERW ADE LEVEL (F.G E SAME SHALL TANCHION NEAR GLE STANCHION BOX, INTEGRATI	VISE ;.L). BE ? NEAR
<ul> <li>NOTES</li> <li>1. ALL DIMENSIONS STATED.</li> <li>2. REFERENCE LEVEL</li> <li>3. LOCATION AND EL UPDATED AS PER</li> <li>4. BEACON FOR GAS PROCESS AREA.</li> <li>5. SINGLE HORN FO PROCESS AREA.</li> <li>6. ALL GAS DETECTORS</li> <li>7. CABLE FROM GAS PER SITE CONDIT</li> </ul>	ARE IN MILLIMETER AND L + 100.00 MTR. CORRES EVATIONS OF GAS DETECT SITE CONDITION. G DETECTION SHALL BE INS R GAS DETECTION SHALL BE DRS FIELD SHALL BE CON WITH GAS DETECTION SYST G DETECTOR TO JB AND TE IONS.	EVELS ARE IN METERS U PONDS TO FINISHED GRA ORS ARE TENTATIVE. THE STALLED ON A SINGLE S BE INSTALLED ON A SING NNECTED TO JUNCTION TEM SHALL BE IN CONTR ERMINAL CONTROL ROOM	UNLESS OTHERW ADE LEVEL (F.G E SAME SHALL TANCHION NEAR GLE STANCHION BOX, INTEGRATI	NISE S.L). BE NEAR
<ul> <li>NOTES</li> <li>1. ALL DIMENSIONS STATED.</li> <li>2. REFERENCE LEVEL</li> <li>3. LOCATION AND EL UPDATED AS PER</li> <li>4. BEACON FOR GAS PROCESS AREA.</li> <li>5. SINGLE HORN FO PROCESS AREA.</li> <li>6. ALL GAS DETECTORS</li> <li>7. CABLE FROM GAS PER SITE CONDIT</li> </ul>	ARE IN MILLIMETER AND L + 100.00 MTR. CORRES EVATIONS OF GAS DETECT SITE CONDITION. 3 DETECTION SHALL BE INS R GAS DETECTION SHALL BE DRS FIELD SHALL BE CON WITH GAS DETECTION SYST 5 DETECTOR TO JB AND TE IONS.	EVELS ARE IN METERS U PONDS TO FINISHED GRA ORS ARE TENTATIVE. THE STALLED ON A SINGLE S BE INSTALLED ON A SING NNECTED TO JUNCTION TEM SHALL BE IN CONTR ERMINAL CONTROL ROOM	UNLESS OTHERV ADE LEVEL (F.G E SAME SHALL TANCHION NEAR GLE STANCHION BOX, INTEGRATI	NISE S.L). BE NEAR
<ol> <li>ALL DIMENSIONS STATED.</li> <li>REFERENCE LEVE</li> <li>LOCATION AND EL UPDATED AS PER</li> <li>BEACON FOR GAS PROCESS AREA.</li> <li>SINGLE HORN FO PROCESS AREA.</li> <li>ALL GAS DETECTOR</li> <li>CABLE FROM GAS PER SITE CONDIT</li> </ol>	ARE IN MILLIMETER AND L + 100.00 MTR. CORRES EVATIONS OF GAS DETECT SITE CONDITION. DETECTION SHALL BE INS R GAS DETECTION SHALL BE DRS FIELD SHALL BE CON WITH GAS DETECTION SYST DETECTOR TO JB AND TE IONS.	EVELS ARE IN METERS U PONDS TO FINISHED GRA ORS ARE TENTATIVE. THE STALLED ON A SINGLE S BE INSTALLED ON A SING NNECTED TO JUNCTION TEM SHALL BE IN CONTR ERMINAL CONTROL ROOM	UNLESS OTHERV ADE LEVEL (F.G SAME SHALL TANCHION NEAR GLE STANCHION BOX, INTEGRATI	NISE S.L). BE NEAR
<ol> <li>STATED.</li> <li>REFERENCE LEVE</li> <li>LOCATION AND EL UPDATED AS PER</li> <li>BEACON FOR GAS PROCESS AREA.</li> <li>SINGLE HORN FO PROCESS AREA.</li> <li>ALL GAS DETECTORS</li> <li>CABLE FROM GAS PER SITE CONDIT</li> </ol>	- + 100.00 MTR. CORRES EVATIONS OF GAS DETECT SITE CONDITION. DETECTION SHALL BE INS R GAS DETECTION SHALL F DRS FIELD SHALL BE CON WITH GAS DETECTION SYST DETECTOR TO JB AND TE IONS.	SPONDS TO FINISHED GRA ORS ARE TENTATIVE. THE STALLED ON A SINGLE S BE INSTALLED ON A SING NNECTED TO JUNCTION TEM SHALL BE IN CONTR ERMINAL CONTROL ROOM	ADE LEVEL (F.G E SAME SHALL TANCHION NEAR GLE STANCHION BOX, INTEGRATI	NEAR
<ol> <li>LOCATION AND EL UPDATED AS PER</li> <li>BEACON FOR GAS PROCESS AREA.</li> <li>SINGLE HORN FO PROCESS AREA.</li> <li>ALL GAS DETECTO GAS DETECTORS</li> <li>CABLE FROM GAS PER SITE CONDIT</li> </ol>	EVATIONS OF GAS DETECT SITE CONDITION. DETECTION SHALL BE INS R GAS DETECTION SHALL F ORS FIELD SHALL BE CON WITH GAS DETECTION SYST DETECTOR TO JB AND TE IONS.	ORS ARE TENTATIVE. THE STALLED ON A SINGLE S BE INSTALLED ON A SING NNECTED TO JUNCTION TEM SHALL BE IN CONTR ERMINAL CONTROL ROOM	E SAME SHALL TANCHION NEAR GLE STANCHION BOX, INTEGRATI	BE NEAR
<ol> <li>BEACON FOR GAS PROCESS AREA.</li> <li>SINGLE HORN FO PROCESS AREA.</li> <li>ALL GAS DETECTO GAS DETECTORS</li> <li>CABLE FROM GAS PER SITE CONDIT</li> </ol>	DETECTION SHALL BE INS R GAS DETECTION SHALL I DRS FIELD SHALL BE COM WITH GAS DETECTION SYST DETECTOR TO JB AND TE IONS.	STALLED ON A SINGLE S BE INSTALLED ON A SING NNECTED TO JUNCTION TEM SHALL BE IN CONTR ERMINAL CONTROL ROOM	TANCHION NEAR GLE STANCHION BOX, INTEGRATI	NEAR
<ol> <li>5. SINGLE HORN FO PROCESS AREA.</li> <li>6. ALL GAS DETECTORS</li> <li>7. CABLE FROM GAS PER SITE CONDIT</li> </ol>	R GAS DETECTION SHALL I DRS FIELD SHALL BE CON WITH GAS DETECTION SYST DETECTOR TO JB AND TE IONS.	BE INSTALLED ON A SING NNECTED TO JUNCTION "EM SHALL BE IN CONTR ERMINAL CONTROL ROOM	GLE STANCHION BOX, INTEGRATI 'ACTOR SCOPE.	NEAR
PROCESS AREA. 6. ALL GAS DETECTO GAS DETECTORS 7. CABLE FROM GAS PER SITE CONDIT	DRS FIELD SHALL BE COM WITH GAS DETECTION SYST DETECTOR TO JB AND TE IONS.	NNECTED TO JUNCTION "EM SHALL BE IN CONTR ERMINAL CONTROL ROOM	BOX, INTEGRATI ACTOR SCOPE.	
GAS DETECTORS 7. CABLE FROM GAS PER SITE CONDIT	WITH GAS DETECTION SYST DETECTOR TO JB AND TE IONS.	EM SHALL BE IN CONTR ERMINAL CONTROL ROOM	ACTOR SCOPE.	IUN OF
PER SITE CONDIT	IONS.		SHALL BE ROL	UTED AS
LEGEND:-				
SYMBOL	DESCRIPTION		QUANT	ITY
XXXX-XX-XXXX-XXXX	INSTRUMENT TAG NO.			
	POINT TYPE GAS DETEC	CTOR	05	ō
	OPEN PATH GAS DETECTO	DR / TRANSMITTER	02	2
	MANUAL ALARM CALL POIN	NI	01	1
	HOOTER		01	1
	FIRE DETECTION JUNCTION	BOX	01	1
00 06.01.20	ISSUED FOR	RID K		KNC
CLIENT:	DESCRIPTI		LF. LHKD.	APPD
ASSAM	ASSAM GAS (	COMPANY LTI	D.	
VC	5 QUALITY	VCS PR CONSIII TAN	OJECT	.TD.
	CES PVT. LTD.	(ENGINE	ERING)	
PROJECT:				
	MBOR - KHORAG	HAT - NUMALIG NE PROJECT	iarh	
	JAJ FIFELI	INE FRUJEUI		
				•
F&G LAY	JUI FUK NEW IN	ITERCONNECTIO		
F&G LAY		ITERCONNECTION	UN POINT	
F & G LAY	D TOTAL NO. C	TERCONNECTION STATION OF SHTS:	1 101 POINT	
SCALE: JOB N	D TOTAL NO. C	TERCONNECTION STATION OF SHTS: RAWING NUMBER	1	REV.



	REFERENCE DI	RAWINGS	
S.NO.	DRAWING TITLE	DRAWING NUMBER	
1	P& ID	1009-GG-PC-PID-1001	K
2	PLOT PLAN	1009-GG-CS-PPL-6001	
NOTES			
1. ALL DIN	MENSIONS ARE IN MILLIMETER AND LEVEL	S ARE IN METERS UNLESS OTHERWISE	
2. REFERE	NCE LEVEL + 100.00 MTR. CORRESPONI	DS TO FINISHED GRADE LEVEL (F.G.L).	
3. LOCATIC UPDATE	N AND ELEVATIONS OF GAS DETECTORS D AS PER SITE CONDITION.	ARE TENTATIVE. THE SAME SHALL BE	
4. BEACON	I FOR GAS DETECTION SHALL BE INSTALL	ED ON A SINGLE STANCHION NEAR	
5. SINGLE	HORN FOR GAS DETECTION SHALL BE I	NSTALLED ON A SINGLE STANCHION NEAR	2
PROCES 6. ALL GA	;S AREA. S DETECTORS FIELD SHALL BE CONNEC	TED TO JUNCTION BOX, INTEGRATION O	F
GAS DE 7. CABLE	TECTORS WITH GAS DETECTION SYSTEM S FROM GAS DETECTOR TO JB AND TERMIN	SHALL BE IN CONTRACTOR SCOPE. IAL CONTROL ROOM SHALL BE ROUTED /	AS
PER SI	FE CONDITIONS.		
			I
-1001			
LEGEN	D:-		
SYMBOL	DESCRIPTION	QUANTITY	F
EL:+000.00	ELEVATION		
XXXX-XX-XX>	X-XXX INSTRUMENT TAG NO.		
	OPEN PATH GAS DETECTOR	TRANSMITTER 04	
MCP	MANUAL ALARM CALL POINT	01	
ÆB	BEACON – AMBER	01	
		01 X 01	— E
			I
			I
			I
00 06.0	1.20 ISSUED FOR BI	D KK VB KN	
00 06.0 REV. DAT	1.20 ISSUED FOR BI TE DESCRIPTION	D KK VB KN PREP. CHKD. AP	I I NC PD.
00 06.0 REV. DAT CLIENT:	1.20 ISSUED FOR BI E DESCRIPTION	MPANY LTD.	I I NC PD.
OO O6.0 REV. DAT CLIENT: ASSAM GAS COMPANY LTD	1.20 ISSUED FOR BI TE DESCRIPTION ASSAM GAS CC	D KK VB KN PREP. CHKD. AP	I NC PD.
00 06.0 REV. DAT CLIENT: ASSAM	1.20 ISSUED FOR BI TE DESCRIPTION ASSAM GAS CC VCS QUALITY	D KK VB KN D KK VB KN D PREP. CHKD. AP OMPANY LTD.	I I PD.
000 06.0 REV. DAT CLIENT: ASSAME CLIENT: PMC: EXECUTION COULTY	1.20 ISSUED FOR BI DESCRIPTION ASSAM GAS CC VCS QUALITY SERVICES PVT. LTD.	MPANY LTD. VCS PROJECT CONSULTANTS PVT. LTD. (ENGINEERING)	I I NC PD.
	1.20 ISSUED FOR BI TE DESCRIPTION ASSAM GAS CC VCS QUALITY SERVICES PVT. LTD.	MPANY LTD. VCS PROJECT CONSULTANTS PVT. LTD (ENGINEERING)	
	1.20 ISSUED FOR BI TE DESCRIPTION ASSAM GAS CO VCS QUALITY SERVICES PVT. LTD. NAMBOR - KHORAGHA	MPANY LTD. VCS PROJECT CONSULTANTS PVT. LTD (ENGINEERING)	I NC PD.
	1.20 ISSUED FOR BI TE DESCRIPTION ASSAM GAS CO VCS QUALITY SERVICES PVT. LTD. NAMBOR - KHORAGHA GAS PIPELINE	MPANY LTD. VCS PROJECT CONSULTANTS PVT. LTD (ENGINEERING) XT - NUMALIGARH PROJECT	I I NC PD. E
	1.20 ISSUED FOR BI TE DESCRIPTION ASSAM GAS CC VCS QUALITY SERVICES PVT. LTD. NAMBOR - KHORAGHA GAS PIPELINE F & G LAYOUT AT NEW I	MPANY LTD. VCS PROJECT CONSULTANTS PVT. LTD (ENGINEERING) XT - NUMALIGARH PROJECT	I NC PPD.
	1.20 ISSUED FOR BI TE DESCRIPTION ASSAM GAS CO VCS QUALITY SERVICES PVT. LTD. NAMBOR - KHORAGHA GAS PIPELINE F & G LAYOUT AT NEW I POINT GOLAGHAT (1)	MPANY LTD. VCS PROJECT CONSULTANTS PVT. LTD (ENGINEERING) XT - NUMALIGARH PROJECT NTERCONNECTION RUPKHELIYA)	PD.
OO OG.O REV. DAT CLIENT: ASSAND CLIENT: ASSAND PMC: ENERGISHIE GUALITY PROJECT: TITLE: SCALE:	1.20 ISSUED FOR BI TE DESCRIPTION ASSAM GAS CC VCS QUALITY SERVICES PVT. LTD. NAMBOR - KHORAGHA GAS PIPELINE F & G LAYOUT AT NEW I POINT GOLAGHAT (1) 1:150 TOTAL NO. OF	MPANY LTD. VCS PROJECT CONSULTANTS PVT. LTD (ENGINEERING) VCS PROJECT CONSULTANTS PVT. LTD (ENGINEERING)	PD.
00 06.0 REV. DAT CLIENT: ASSAND PMC: PMC: PROJECT: PROJECT: SCALE: SIZE	1.20       ISSUED FOR BI         IZE       DESCRIPTION         ASSAM GAS CC       VCS QUALITY         SERVICES PVT. LTD.       NAMBOR - KHORAGHA         GAS PIPELINE       F & G LAYOUT AT NEW I         POINT GOLAGHAT (1)       1:150         JOB NO.       DRAY	MPANY LTD. VCS PROJECT CONSULTANTS PVT. LTD (ENGINEERING) VCS PROJECT CONSULTANTS PVT. LTD (ENGINEERING) AT - NUMALIGARH PROJECT NTERCONNECTION RUPKHELIYA) SHTS: 1 WING NUMBER 1	
	1.20       ISSUED FOR BI         120       ISSUED FOR BI         IE       DESCRIPTION         ASSAM GAS CC         VCS QUALITY         SERVICES PVT. LTD.         NAMBOR - KHORAGHA         GAS PIPELINE         F & G LAYOUT AT NEW I         POINT GOLAGHAT (1)         1:150       TOTAL NO. OF         JOB NO.       DRA         1009       1009-	MPANY LTD. VCS PROJECT CONSULTANTS PVT. LTD (ENGINEERING) VCS PROJECT CONSULTANTS PVT. LTD (ENGINEERING) AT - NUMALIGARH PROJECT NTERCONNECTION RUPKHELIYA) SHTS: 1 WING NUMBER 1 RE GG-IN-DR-5002 00	



			REFER				
	<b>S.NO</b> 1 2	P& ID	AWING TITLE		DRAWING 1009-NU-PC-PID-10	<b>NUMBER</b> 001 5001	2
-	NOT	ES					
	1.	ALL DIMENSION	NS ARE IN MILLIMETER	AND LEVELS ARE	IN METERS UNLES	SS OTHERW	ISE
	2. 3.	REFERENCE LE	EVEL + 100.00 MTR. ( ELEVATIONS OF GAS	CORRESPONDS TO DETECTORS ARE T	FINISHED GRADE L ENTATIVE. THE SAM	LEVEL (F.G. 1E SHALL E	L). BE
	4.	UPDATED AS F BEACON FOR	PER SITE CONDITION. GAS DETECTION SHALL	BE INSTALLED ON	I A SINGLE STANCH	HION NEAR	
	5.	PROCESS ARE SINGLE HORN	A. FOR GAS DETECTION S	Shall be install	ED ON A SINGLE S	STANCHION	NEAR
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	00 06 REV. D CLIENT:	J	ISSUED FOR DESCRIPTIO		KK PREP. C	VB CHKD.	KNC APPD.
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			ISSUED FOR DESCRIPTIO ASSAM GAS C OUALITY	BID DN	KK PREP. C TD.	VB CHKD.	KNC
		0.01.20 0ATE	ISSUED FOR DESCRIPTIO ASSAM GAS C QUALITY ES PVT. LTD.	BID DN	KK PREP. C TD. ROJEC NTS P	VB CHKD.	KNC APPD.
			ISSUED FOR DESCRIPTIO ASSAM GAS C QUALITY ES PVT. LTD.	BID DN	KK PREP. C TD. ROJEC NTS P NEERII	VB CHKD. CT VT. L NG)	KNC APPD.
			ISSUED FOR DESCRIPTIO ASSAM GAS C QUALITY ES PVT. LTD. BOR - KHORAGH	BID DN	KK PREP. C TD. ROJEC NTS P NEERII	VB CHKD.	KNC APPD.
			ISSUED FOR DESCRIPTIO ASSAM GAS C QUALITY ES PVT. LTD. BOR - KHORAGH GAS PIPELIN	BID DN	KK PREP. C TD. TD. ROJEC NTS P NEERII	VB CHKD.	KNC APPD.
		.01.20 ATE SERVIC SERVIC	ISSUED FOR DESCRIPTIO ASSAM GAS C QUALITY ES PVT. LTD. BOR - KHORAGH GAS PIPELIN	BID DN	KK PREP. C TD. ROJEC NTS P NEERII	VB CHKD.	KNC APPD.
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		SOLAYOU FROM GC 1:150	ISSUED FOR DESCRIPTIO ASSAM GAS C QUALITY ES PVT. LTD. BOR - KHORAGH GAS PIPELIN T FOR SV-1 STA DLAGHAT TO NU	BID DN COMPANY L COMPANY L COMPANY L CONSULTA (ENGII AT - NUMAL E PROJECT ATION (FOR P MALIGARN S F SHTS:	KK PREP. C TD. TD. IGARH	VB CHKD. CT PVT. L NG) RETCI	KNC APPD.
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		1	P& ID		1009-S1-PC-PID-	-1001	К
		2	ριοτ. ριαν		1009-HA-CS-PPL	6001	
		NOTE	S				
		1. A	LL DIMENSIONS ARE IN MILI	LIMETER AND LEVELS ARE IN METER	S UNLESS OTHERWISE STA	TED.	
		2. K 3. L(	DCATION AND ELEVATIONS C	F GAS DETECTORS ARE TENTATIVE.	GRADE LEVEL (F.G.L). THE SAME SHALL BE UPDA	ATED AS PER SITE	
		C	ONDITION.				J
		4. B	EACON FOR GAS DETECTION	I SHALL BE INSTALLED ON A SINGLE	STANCHION NEAR PROCES	SS AREA.	
		5. S 6. A	INGLE HURN FOR GAS DETE LL GAS DETECTORS FIELD	SHALL BE CONNECTED TO JUNCTION	DN BOX. INTEGRATION OF 1	GAS DETECTORS WITH	
		G	AS DETECTION SYSTEM SHA	LL BE IN CONTRACTOR SCOPE.			
		7. C	ABLE FROM GAS DETECTO	OR TO JB AND TERMINAL CONTRO	DL ROOM SHALL BE ROU	JTED AS PER SITE	
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		REV.		DESCRIPTION	PREP.	CHKD. APPD.	
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		PMC-	SUI DEPENNES			CT	
			vcs qu		VCS PROJE(	UI   DVT   TD	
		ENERGENE	SERVICES	PVT. LTD.	ENGINEERT	NG)	В
		PROJE	CT:		(		
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				GAS PIPELINE PR	OJECT		
		<b>TITI E</b>					
		F	& G LAYOUT I	FOR SV-1 STATION	I (FOR P/L ST	RETCH	
			FROM URI	UMGHAT TO GOLAG	GHAT STATIO	N)	
			. 1.150	TOTAL 110 2	<b>-</b>	1	
		SCALE	: 1:150	TOTAL NO. OF SHTS	5:	1	А
		SCALE	: 1:150 JOB NO.	TOTAL NO. OF SHTS	S: G NUMBER	1 REV.	A
		SCALE SIZE A1	:: 1:150 JOB NO. 1009	TOTAL NO. OF SHTS DRAWIN 1009-S1-I	5: G NUMBER :N-DR-5002	1REV00	Α
2	4	SCALE SIZE A1	E: 1:150 JOB NO. 1009	TOTAL NO. OF SHTS DRAWIN 1009-S1-I	S: G NUMBER N-DR-5002	1 REV. 00	A

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00	12.12.2019	ISSUF	D FOR I	BID	KS	VB	KNC
C1	10.05.2019	ISSUED FOR	CLIEN	r review	DG	VB	KP
REV	DATE	DESC	RIPTIC	DN	PREPD	СНКД	APPRD



# NAMBOR – GOLAGHAT – NUMALIGARH AREA GAS PIPELINE PROJECT

INSTR	UCTIONS FO	R FILLING UP	:				CODES	FOR EXTE	INT OF	INSPECTI	ON, TESTS, TES	ST CERTIFIC	CATES & DOCL	JMENTS :	
1. QAP shall be submitted for each equipment separately with breakup							CODE DESCRIPTION			CODE DE	CODE DESCRIPTION CODE DES			CRIPTION CODE DESCRIPTION	
<ul> <li>or assembly / sub-assembly &amp; part/component of for group of equipment having same specification.</li> <li>2. Use numerical codes as indicated for extent of inspection &amp; tests and submission of test certificates &amp; documents. Additional codes &amp; description for extent of inspection &amp; test may be added as applicable for the plant and equipment's.</li> <li>3. Separate identification number with quantity for equipment shall be indicated wherever equipment having same specifications belonging to different facilities are grouped together.</li> <li>4. Weight in kilogram must be indicated under column 5 for each item. Estimated weights may be indicated wherever actual weights are not available.</li> <li>ABBREVIATION USED:</li> <li>CONTR: Contractor</li> <li>MFR: Manufacturer</li> <li>TPI: Third Party Inspection Agency</li> <li>*: Vendor / Bidder to provide</li> <li>P: Performer, R: Review; W: Witness</li> </ul> EN 10204, Type 3.2 certificates shall be provided for bought out items. Those shall be inspected by TPI appointed by Vendor					1. Visu. 2. Dime 3. fitme 4. Phys (Sampl 5. Cher test(Sa 6. Ultra 7. Mag test(MF 8. Radi 9. Dye 10. Mei value a) Befo b) After 11. Hig test/Dio Test	2. Differiorition       If         3. fitment & alignment       If         4. Physical Test       1         (Sample)       rd         5. Chemical       o         test(Sample)       1         6. Ultrasonic test       1         7. Magnetic particle       T         test(MPT)       1         8. Radiography test       14         9. Dye Penetrant test       11         10. Measurement of IR       to         value       1         a) Before HV test       2         11. High voltage       b         test/Dielectric       c         7       2			12. Routine test as per relevant23. Sho 24. OpeIS other standardfunction 13. Type test as per relevant IS/25. Ove 26. Flan 27. Cleaother standard27. Clea creepag14. Impulse Testcreepag 28. Acce 29 Honi16. Heat run risk test/temper30 Hydr leak tes 31 Pneu leak tes17. Enclosure protection test32 Impa19. Noise & Vibration 20. Test certificate of bought out components 21. Tank pressure test 22. Paint shed vibration32 Impa		me rating onal & est eed test proof Test ce and stance ance test Test est/ Shell tic Seat	D1. Approved GA Drawing. D2. Approved singl line/ schematic diagram D3. Test certificate D4. Approved Bill of materials D5. Un-priced P.O. copy D6. Calibration certificates of all measuring instrum And gauges.	<ul> <li>)1. Approved GA</li> <li>)rawing.</li> <li>)2. Approved single ine/ schematic liagram</li> <li>)3. Test certificates</li> <li>)4. Approved Bill of naterials</li> <li>)5. Un-priced P.O.</li> <li>copy</li> <li>)6. Calibration</li> <li>certificates of all neasuring instrument</li> <li>And gauges.</li> </ul>		
		Equipmer	nt Dei	ails							Inspectio	on & Test			
							In-Pr	ocess Sta	ge		Final Inspection	ı		Acceptance	
S No.	Item	Identificatio Item n Qty Number	Identificatio Weigh Date n Qty t of Number Kg Inspec tion	Exp Date MFR of Name & nspec Address tion	MFR	CONTR & TPI	AG CL	MFR	CONTR & TPI	AGCL	Test certificate a Document t be submitte to AGCL	Criteria & standards/ o IS/BS/ASM d E/ Norms and documents	Rem ark / Sam pling Plan		
1.	Gauges	Refer P&ID	*	*	*	AGCL 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	1,2,3,4,5,18,2 24,D3, D6	20, D3,D6, Tech.spec	100%



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2	PTD	Pofor P&ID	*	*	*	AGCL	1,2,3,4	_	_	1,2,3,18,	1,2,3,18,20 -R	1,2,3,18,	1.2.3.4.5.	D3,D6,	100%
2.	RID	Refer Faib			-	Approved	,5 – P		_	20 – P	,24 - W	20,24 -R	18,20,24,D3,D6	Tech. spec	100 %
з	Transmitters	Refer P&ID	*	*	*	AGCL	1,2,3,4	_	_	1,2,3,18,	1,2,3,18,20 -R	1,2,3,18,	1,2,3,4,5,	D3, D6,	100%
5.	Transmitters	Refer Fulb				Approved	,5 – P			20 – P	,24 - W	20,24 -R	18,20,24,D3,D6	Tech. spec	100 /0
4	Thermowells	Refer P&ID	*	*	*	AGCL	1,2,3,4	_	-	1,2,3,18,	1,2,3,18,20 -R	1,2,3,18,	1,2,3,4,5,	D3, D6,	100%
	mermowens	Refer Fulb				Approved	,5 – P			20 – P	,24 - W	20,24 -R	18,20,24,D3,D6	Tech.spec	100 /0
							1.2.3.4			1.2.3.5.8	1.2.3.5.8.20.1	1,2,3,5,8			
5.	Thermal	Refer P&ID	*	*	*	AGCL	5.8.30.	30 - W	-	.20.18.2	8.24.30.	,20,18,	1,2,3,5,8,18,20,	D3, D6,	100%
5.	Safety Valve					Approved	32 – P	32 – R		4 31 - P	31 32 -R	24,30,31	D3,D4,D6	Tech.spec	100 /0
							52 1			1,51 1	51,52 1	,32 -R			
							1234			12358	12358201	1,2,3,5,8			
6	Pressure	Refer P&ID	*	*	*	AGCL	5 8 30	30 - W	_	20 18 2	8 24 30	,20,18,	1,2,3,5,8,18,22	D3, D6,	100%
0.	Safety Valve	Kelel I GID				Approved	37 - P	32 – R		/ 31 – P	31 32 -P	24,30,31	4,30,31,32D1, D3,D4,D6	Tech.spec	100 /0
							52 1			7,51 1	51,52 K	,32 -R	-, , -		
							1234			12358	1 2 3 5 8 20 1	1,2,3,5,8			
7	FSDV	Refer P&ID	*	*	*	AGCL	5 8 30	30 - W	_	20 18 2	8 24 30	,20,18,	1,2,3,5,8,18,20,	D3, D6,	100%
/.	230 1	Kelel I dib				Approved	37 – P	32 – R		4 31 - P	31 32 -R	24,30,31	24, 30,31,32D1, D3,D4,D6	Tech.spec	100 /0
							52 1			1,51 1	51,52 1	,32 -R			
										12345	1234518	12345	1 2 3 4 5 18 20		
8	EHOV	Refer P&ID	*	*	*	AGCL	1,2,3,4	30,31 -	_	18 20 3	20 30 31-R	18 20 24	24 30 31 D1 D3	D3,D6,	100
01	Actuator					Approved	,5,18-P	W		1-P	20,00,01 IX	30 31-R	D4 D6	Tech. Spec	%
											2.,,,,	,50,51 K	10 1100		
9	Point Gas	Refer P&ID	*	*	*	AGCL	1,2,3,4	_	-	1,2,3,18,	1,2,3,18,20 -	1,2,3,18,	1,2,3,4,5,18,20,	D3, D6,	100%
51	Detectors					Approved	, 5 – P			20 – P	R, 24 - W	20, 24 R	24,D3, D6	Tech.spec	100 /0
	Open Path														
10	Gas	Refer P&ID	*	*	*	AGCL	1,2,3,4	_	_	1,2,3,18,	1,2,3,18,20 -R	1,2,3,18,	1,2,3,4,5,18,20,	D3, D6,	100%
10.	Detectors					Approved	,5 – P			20 – P	,24 - W	20,24 -R	24,D3, D6	Tech.spec	



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11.	Beacon	Refer P&ID	*	*	*	AGCL 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%
12.	Horn	Refer P&ID	*	*	*	AGCL 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%
13.	Manual Call Point	Refer P&ID	*	*	*	AGCL 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%
14.	FAT Procedure	-	-	-	-	AGCL Approved	-	-	-	Р	R	R	FAT Procedure	Test record	100%
15.	SAT Procedure	-	-	-	-	AGCL Approved	-	-	-	Ρ	R	R	SAT Procedure	Test record	100%
16.	Factory Acceptance Test	As per approved P&ID, GAD, datasheets, FAT	*	*	*	AGCL Approved				1,2,3,12, 24,Loop check, Power on,Cal.ve rification	1,2,3,12,24 Loop check, Power on,Cal.verifica tion	1,2,3,12, 24 Loop check, Power on,Cal.ve rification	FAT Test Report	Approved FAT procedure and other relavant doc.	100%
17.	Site Acceptance Test	As per approved P&ID, GAD, datasheets, SAT procedure, FAT Report	*	*	*	AGCL Approved				1,2,3,12, 24 Loop check, Power on,Cal.ve rification	1,2,3 ,12, 24,Loop check, Power on,Cal.verifica tion	1,2,3 ,12,24 Loop check, Power on,Cal.ve rification	SAT Test Report	Approved FAT procedure and other relavant doc.	100%



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	Ca	LIST OF APPROVED PARTIES FOR BOUGHT OUT ITEMS										
					TOTAL SH	EETS	47					
0		NO	VCS	V	Ĺ	0	01					
		LIST O	F APPROVEI BOUGHT OL		SFOR							
2	25.06.2018	KE-ISSU	VENDOR LIST	PPROVED	MD	MC	AD					
1	09.05.2018	RE-ISSUI	ED AS STANDARD A VENDOR LIST	PPROVED	СМ	MC	AD					
0	23.05.2017	ISSUED	O AS STANDARD API VENDOR LIST	PROVED	AS	SM	AD					
REV	DATE		DESCRIPTION		PREP	СНК	APPR					



### **INDEX**

Α.	MAINLINE & MECHANICAL	3
B.	(CIVIL & STRUCTURE)	18
C.	(ELECTRICAL)	25
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E.	(SHOP & FIELD PAINTING)	45



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## LIST OF SUPPLIERS OF MAJOR BOUGHT-OUT ITEMS

### 1. (MECHANICAL & FIRE FIGHTING EQUIPMENT)

### A. MAINLINE & MECHANICAL

#### i) Pipe Carbon Steel To Indian Standards

- 1. A.S.T. Pipes Pvt. Ltd. (AST Group)
- 2. Advance Steel Tube Ltd.
- 3. Apl Apollo Tubes Ltd. (Er. Bihar Tubes Ltd.
- 4. Asian Mills Pvt. Ltd.
- 5. Asrani Tubes Limited
- 6. Dadu Pipes (P) Ltd.
- 7. Essar Steel Limited(Er Hazira Pipes Mill)
- 8. Gaurang Products Pvt Ltd. (Ast Group)
- 9. Goodluck Steel Tubes Ltd.
- 10. Hi-Tech Pipes Limited
- 11. Indus Tube Limited
- 12. Jindal Industries Ltd
- 13. Jindal Pipes Ltd.
- 14. Jindal Saw Ltd (Kosi Works)
- 15. Jotindra Steel & Tube Ltd
- 16. Lalit Pipes And Pipes Ltd.
- 17. Maharashtra Seamless Ltd.
- 18. Man Industries (India) Ltd. Pithampur
- 19. Man Industries (India) Ltd. Anjar
- 20. Mukat Tanks & Vessels Ltd.
- 21. Nezone Tubes Limited
- 22. North Eastern Tubes Limited
- 23. Pratibha Industries Limited
- 24. Pratibha Pipes & Structural Ltd.
- 25. Psl Ltd (Chennai)
- 26. Psl Ltd (V1, V2 & Nc)
- 27. Rama Steel Tubes Ltd.



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- 28. Ratnamani Metals And Tubes Ltd.
- 29. Ravindra Tubes Limited
- 30. Samshi Pipe Industries Limited
- 31. Surya Roshni Ltd.
- 32. Swastik Pipes Ltd.
- 33. Utkarsh Tubes & Pipes Ltd. (Formly Bmw)
- 34. Welspun Corp. Limited (Dahej)
- 35. Zenith Birla (India) Limited

### ii) Pipe & Tubulars To A.P.I. Standards

- 1. Arcelormittal Tubular Products Roman Sa, Romania
- 2. Bhel (Trichy), India
- 3. Dalmine Spa (Enquiry To Tenaris), Uae
- 4. Eewkorea Co. Ltd (Germany), Korea
- 5. Eew Korea Co. Ltd. (Korea), Korea
- 6. Eisenbau Kramer Gmbh, Germany
- 7. Hyundai Rb Co. Ltd. South Korea
- 8. Ilva Lamiere E Tubi Srl (Enq To Ilva Spa, Italy
- 9. Inox Tech. Spa, Italy
- 10. Ismt Ltd. Ahmedngr, India
- 11. Ismt Ltd. Baramati, India
- 12. Jindal Pipes Ltd., India
- 13. Jindal Saw Ltd. (Kosi Works), India
- 14. Jindal Saw Ltd. (Nashik Works), India
- 15. Lalit Pipes And Pipes Ltd. India
- 16. Maharashtra Seamless Ltd., India
- 17. Man Industries (I) Ltd. (Pithampur), India
- 18. Mukat Tanks & Vessels Ltd., India
- 19. Pratibha Industries Limited, India
- 20. Ratnamani Metals And Tubes Ltd., India
- 21. Siderca S.A.I.C (Enquiry Totenaris), Uae
- 22. Sumitomo Metal Ind. Ltd., India
- 23. Surya Roshni Ltd., India
- 24. Swastik Pipes Ltd, India
- 25. Tata Steel Uk Limited (Formerly C702)
- 26. Tubos De Acero De Mexico Sa (Enq. Tenaris), Uae





- 27. Tubos Reunidos Sa Spain
- 28. Umran Steel Pipe Inc (Turkey), Turkey
- 29. Valcovny Trub Chomutov, Czech Republic
- 30. Vallourec And Mannesmann Tubes, France
- 31. Welspun Corp Limited (Dahej), India

### iii) Pipe/Tube CS (Seamless) To ASTM Stds

- 1. Arcelormittal Tubular Products Roman Sa, Romania
- 2. Bhel (Trichy), India
- 3. Changshu Seamless Steel Tube Co. Ltd., China
- 4. Dalmine Spa (Enquiry To Tenaris, Uae
- 5. Heavy Metals & Tubes Limited (Mehsana), India
- 6. Ismt Ltd. Ahmedngr, India
- 7. Ismt Ltd. Baramati India
- 8. Jfe Steel Corporation, Uae
- 9. Jindal Sdaw Ltd (Nashik Works) India
- 10. Klt Automotive And Tubular Products Ltd., India
- 11. Mahalaxmi Seamless Limited, India
- 12. Maharashtra Seamless Ltd, India
- 13. Products Tubulares S.A.U, Spain
- 14. Ratnadeep Metal Tubes Ltd., India
- 15. Staineest Tubes Pvt Ltd., India
- 16. Sumitomo Metal Ind. Ltd., India
- 17. Tubos Reunidos Sa Spain
- 18. Valcovny Trub Chomutov, Czech Republic
- 19. Vallourec Andmannesmann Tubes France
- 20. Yangzhou Chengde Steel Pipe Co. Ltd Dubai (UAE)

#### iv) Pipe Carbon Steel (Welded) To ASTM Stds

- 1. Eew Korea Co. Ltd. (Germany), Korea
- 2. Eew Korea Co. Ltd. (Korea), Korea
- 3. Eisenbau Kramer Gmbh, Germany
- 4. Hyundai Rb Co. Ltd., South Korea
- 5. Inox Tech. Spa, Italy
- 6. Jindal Saw Ltd (Kosi Works), India
- 7. Lalit Pipes And Pipes Ltd., India



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- 8. Man Industeries (I) Ltd.(Pithampur), India
- 9. Man Industries (India) Ltd. Anjar, India
- 10. Mukat Tanks & Vessels Ltd., India
- 11. Ratnamani Metals And Tubes Ltd., India
- 12. Sumitomo Metal India Ltd., India
- 13. Tata Steel Uk Limited

# v) <u>Valve</u>

## a) Globe Valves

- 1) M/S BDK (New Delhi)
- 2) M/S Datre Corpn (Calcutta)
- 3) M/S KSB Pumps (New Delhi)
- 4) M/S L&T (New Delhi)
- 5) M/S Neco Schuber & Salzer Ltd. (New Delhi)
- 6) M/S Niton Valve (Mumbai)
- 7) M/S Ornate Valves (Mumbai)
- 8) M/S Panchavati Valves (Mumbai)
- 9) AV Valves Ltd.
- 10) BHEL (Trichy), India
- 11) Econo Valves Pvt Ltd, India
- 12) Fouress Engg (I) Ltd (Aurangabad)
- 13) Guru Industrial Valves Pvt Ltd
- 14) Leader Valves Ltd, India
- 15) NSSL Ltd. (Neco Schubert & SalzerItd)
- 16) Oswal Industries Ltd, India
- 17) Petrochemical Engineering Enterprises, India
- 18) Sakhi Engineers Pvt Ltd
- 19) Shalimar Valves Pvt Ltd
- 20) Steel Strong Valves India Pvt Ltd, India
- 21) Petro Valves Pvt. Limited, Ahmedabad

# b) Check Valves

- 1. M/s Advance Valves Pvt. Ltd., Noida
- 2. M/s Aksons & Mechanical Enterprises, Mumbai
- 3. M/s Larsen & Toubro Limited (M/s Audco India Limited, Chennai)





- 4. M/s AV valves Ltd., Agra
- 5. M/s BDK engineering India Ltd., Hubli
- 6. M/s BHEL,OFE&OE Group, New Delhi
- 7. M/s Datre Coroportion Limited, Calcutta
- 8. M/s Leader Valves Ltd., Jalandhar
- 9. M/s Neco schubert & Salzer Ltd., New Delhi
- 10. M/s Niton Valves Industries (P) Ltd., Mumbai
- 11. M/s Precision Engg.Co., Mumbai
- 12. Econo Valves Pvt Ltd, India
- 13. Fouress Engg (I) Ltd (Aurangabad)
- 14. KSB Pumps Ltd (Coimbattore), India
- 15. NSSL Ltd. (Neco Schubert & SalzerLtd)
- 16. Oswal Industries Ltd, India
- 17. Panchvati Valves & Flanges Pvt Ltd, India
- 18. Petrochemical Engineering Enterprises, India
- 19. Sakhi Engineers Pvt Ltd
- 20. Shalimar Valves Pvt Ltd
- 21. Steel Strong Valves India Pvt Ltd, India
- c) Plug Valves
- 1. M/s Breda Energia Sesto Industria Spa, Italy
- 2. M/s Fisher Sanmar Ltd., Chennai
- 3. M/s Larsen & Toubro Ltd., New Delhi
- 4. M/s Nordstrom Valves, USA
- 5. M/s Serck Audco Valves, UK
- 6. M/s Sumitomo Corporation India Pvt. Ltd., New Delhi
- 7. M/s Z Corporation, Korea
- 8. M/s Hawa Valves (India) Pvt. Ltd., Mumbai
- 9. M/s Steel Strong Valves India Pvt. Ltd., Navi Mumbai
- 10. M/s Econo Valves
- 11. M/s Flow-Serve PTE (Mfr. SERCK), India

# d) Ball Valves

- 1. M/s Hawa Valves (India) Pvt. Ltd, Navi Mumbai
- 2. M/s Larsen & Toubro, Delhi
- 3. M/s Microfinish Valves Pvt. Ltd., Noida





- 4. M/s Oswal Industries Ltd., Gandhi nagar
- 5. M/s Virgo Engineers Ltd., Delhi
- 6. M/s Boteli Valve Group Co. Ltd., China
- 7. M/s Cameron (Malaysia) SDN BHD, Malaysia
- 8. M/s Dafram S.P.A., Italy
- 9. M/s Fangyuan Valve Group Co. Ltd., China
- 10.M/s Franz Schuck GmbH, Germany
- 11.O.M.S. Saleri (Italy)
- 12.Pibi Viesse S.P.A (Italy)
- 13.Nuovo Pignone (Italy)
- 14.Perar S.P.A (Italy)
- 15.Pietro Fiorentini (Italy)
- 16.Cooper Cameron Valv Italy SRL-FRM, Itly
- 17.Petrol Valves SRL
- 18.Tormene Gas Technology S.P.A (VALVITALIA)

#### vi) Flow Tee

- 1) M/s Coprosider SPA, Italy
- 2) M/s GEA Energy System India Limited, Chennai
- 3) M/s Multitex Filteration
- 4) M/s Pipeline Engineering, UK
- 5) M/s Scomark Engg. Limited (U.K.)
- 6) M/s Skeltonhall Limited, Engaland(U.K.)
- 7) M/s Technospecial SPA, Italy
- 8) M/s Tectubi SPA, Italy
- 9) M/s RMA Germany
- 10) M/s Pipefit Engineers Pvt. Ltd.
- 11) M/s PSN Energy Systems (up to 24"NB, 600#)

#### vii) Split Tee

1) M/s T D Williamson India Private Limited, India





- 2) M/s Furmanite International Ltd., USA
- 3) M/s Huwelco Inc., South Houston
- 4) M/s Plant-Tech Power Technical Services Pvt. Ltd., India
- 5) M/s VKVC, India
- 6) Teemans, UK

## viii) <u>Flanges</u>

- 1. M/s Aditya Forge Ltd., Vadodara
- 2. M/s Amforge Industries Ltd., Mumbai
- 3. M/s CD Engineering Co., Ghaziabad
- 4. M/s Echjay Forgings Pvt. Ltd. (Bombay), Mumbai
- 5. M/s Echjay Industries Ltd., Rajkot
- 6. M/s Forge & Forge Pvt. Ltd., Rajkot
- 7. M/s Golden Iron & Steel Works, New Delhi
- 8. M/s JK Forgings, New Delhi
- 9. M/s Metal Forgings Pvt. Ltd., Mumbai
- 10. M/s Perfect Marketings Pvt. Ltd., New Delhi
- 11. M/s Sky Forge, Faridabad
- 12. M/s S&G, Faridabad
- 13. Chaudhry Hammer Works Ltd, India
- 14. JAV Forgings (P) Ltd, India
- 15. Kunj Forgings Pvt Ltd, India
- 16. MS Fittings
- 17. R.N. Gupta & Co. Ltd, India
- 18. R.P. Engineering Pvt Ltd, India
- 19. Sanghvi Forgings & Engineering Ltd
- 20. Shri Ganesh Forgings Ltd., India
- 21. Uma Shankar Khandelwal & Co., India
- 22. Sawan Engineers, Baroda
- 23. Stewarts & Lloyds of India Ltd., Kolkata
- 24. Engineering Services Enterprises
- 25. Pipefit Engineers Pvt. Ltd.

# ix) <u>Fittings</u>

1.

### M/s Commercial Supplying Agency, Mumbai

		Document No.	Rev	
	LIST OF APPROVED PARTIES FOR BOUGHT OUT ITEMS	VCS-VL-001 2		
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- 2. M/s Dee Development Engineers Ltd.
- 3. M/s Eby Industries, Mumbai
- 4. M/s Flash Forge Pvt. Ltd., Vishakhapatnam
- 5. M/s Gujarat Infra Pipes Pvt. Ltd., Vadodara
- 6. M/s M.S. Fittings Mfg. Co. Pvt. Ltd., Kolkata
- 7. M/s Stewarts & Lloyds of India Ltd., Kolkata
- 8. M/s Teekay Tubes Pvt. Ltd., Mumbai
- 9. M/s Pipe Fit,Baroda
- 10. M/s Sky Forge, Faridabad
- 11. M/s S&G, Faridabad
- 12. M/s Sawan Engineers, Baroda
- 13. Eby Fasteners, India
- 14. Leader Valves Ltd, India
- 15. R.N. Gupta & Co. Ltd, India
- 16. Exten Engg Pvt Ltd
- 17. Sivananda Pipe & Fittings Ltd
- 18. Sawan Engg Vadodara
- 19. P.K. Tubes –rajastan
- 20. CSA fittings
- 21. Dee Development Engineers Limited (Palwal)
- 22. Fittech Industries Pvt Ltd (Thane)
- 23. Gujrat Infrapipes Pvt Ltd ,Vadodara
- 24. K.S Pipe Fittings (P) Ltd, Palwal
- 25. Teekay Tubes Pvt Ltd (New Mumbai)
- 26. Petro Chem Industries, Vadodara
- 27. Topaz Piping Industires ,Vadodara
- 28. Tube Bend ,Calcutta
- 29. Tube Turn India Pvt Ltd , Navi Mumbai
- 30. Sidharth & Gautam Engineers

# i) <u>Gaskets</u>

- 1. IGP Engineers (P) Ltd., Madras
- 2. Madras Industrial Products, Madras
- 3. Dikson & Company, Bombay
- 4. Banco Products (P) Ltd., Vadodara
- 5. Goodrich Gaskets Pvt Ltd



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- 6. Starflex Sealing India Pvt Ltd, India
- 7. Teekay Meta Flex Pvt Ltd
- 8. UNIKLINGER Ltd
- 9. HEM Engg. Corp.
- 10. Unique Industrial Packing Pvt. Ltd.

#### ii) Fasteners

- 1. Nireka Engg. Co. (P) Ltd., Calcutta
- 2. Precision Taps & Dies, Bombay
- 3. AEP Company, Vithal Udyoug Nagar
- 4. Fix Fit Fasteners, Calcutta
- 5. Precision Engg. Industries, Baroda
- 6. Echjay Forgings Pvt. Ltd., Bombay
- 7. Capital Industries, Bombay
- 8. Boltmaster India Pvt Ltd, India
- 9. Deepak Fasteners Limited, India
- 10. Fasteners & Allied Products Pvt Ltd, India
- 11. Hardwin Fasteners Pvt Ltd, India
- 12. J.J. Industries. India
- 13. Multi Fasteners Pvt Ltd. India
- 14. Nexo Industries, India
- 15. Pacific Forging & Fasteners Pvt Ltd, India
- 16. Pioneer Nuts & Bolts Pvt Ltd. India
- 17. Precision Auto Engineers, India
- 18. President Engineering Works, India
- 19. Sandeep Engineering Works, India
- 20. Syndicate Engineering Industries, India

#### iii) Welding Electrodes

- 1. For Mainline Lincon make
- 2. For Terminal For root pass Lincon Make
- For other passes Lincon, D&H or equivalent make

#### iv) **Fire Fighting Equipments**

## a) Fire Extinguishers





- 1. Avon Services (Production & Agencies) Pvt. Ltd., Bombay
- 2. Kooverji Devshi & Co., Bombay
- 3. Zenith Fire Services, Bombay
- 4. Safex Fire Services, Bombay
- 5. Reliable (Fire Protection) India Ltd., Bombay
- 6. Brij Basi Hi
- 7. tech Udyog
- 8. Bharat Engg Works, India
- 9. Gunnebo India Ltd
- 10. Nitin Fire Protection Industries Ltd, India
- 11. Supremex Equipments, India
- 12. Vimal Fire Controls Pvt Ltd., India

## b) Fire Hydrants, Monitors, Deluge Valve, Nozzles

- 1. Zenith
- 2. Minimax
- 3. Newage
- 4. HD Fire
- 5. Vijay Fire
- 6. Asco Strumech Pvt Ltd, India
- 7. Brij Basi Hi
- 8. tech Udyog
- 9. Gunnebo India Ltd
- 10. Nitin Fire Protection Pvt Ltd
- 11. Shah Bhogilal Jethamal & Brothers
- 12. Venus Pumps & Engineering Works

## c) RRL Hose

- 1. Jayshree
- 2. Newage

## d) Hoses

- 1. Ashit Sales Corporation, Bombay
- 2. Royal India Corporation, Bombay
- 3. Gayatri Industrial Corporation
- 4. Simplex Rubber Products Ltd., Ahmedabad



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- 5. Zaverchand Marketing Pvt. Ltd., Baroda
- 6. Presidency Rubber Mill, Calcutta
- 7. The Cosmopolite, Calcutta
- 8. Simplex Rubber Products, Thane

# e) Hose Delivery

- 1. Chhatarya Rubber & Chemical Industries,
- 2. Nitin Fire Protection Industries Ltd, India

# f) Fire Hose Accessories

- 1. Asco Strumech Pvt Ltd
- 2. Brij Basi Hi-tech Udyog
- 3. Gunnebo India Ltd
- 4. Shah Bhogilal Jethamal & Brothers
- 5. Vimal Fire Controls Pvt Ltd., India

# g) Heat Shrinkable Sleeves

- 1. Covalence Raychem (Berry Plastics Corporation)
- 2. Canussa CPS

# h) Cold Applied Tapes

- 1. Denso GmBH
- 2. Polyken (Berry Plastics Corporation)

# i) PUR Coating

1. Powercrete (Berry Plastics Corporation)

# j) Casing End Closure

- 1. Raci, Italy
- 2. Raychem RPG Limited

# k) Casing Insulators

- 1. Raci, Italy
- 2. Raychem RPG Limited

# I) Rockshield



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1. Raychem RPG Limited

## m) Warning Tape /Mesh

- 1. Sparco Multiplast Pvt. Ltd., Ahmedabad
- 2. M/s Raychem RPG Limited
- 3. Singhal Industries Private Limited

## n) High Build Epoxy Coating

- 1. Berry Plastics Powercrete
- 2. Specialty Polymer Canada
- 3. Denso Protal, Canada

## o) Casing Insulators

- 1. Raci, Italy
- 2. Raychem RPG Limited
- 3. Veekay Vikram

## v) DRY GAS FILTER & FILTER SEPERATOR

- 1. Grand Prix Fab (Pvt.) Ltd.(New Delhi)
- 2. Perry Equipment, USA
- 3. Faudi Filter, Germany
- 4. Forain S.r.l., Italy
- 5. ABB, Faridabad
- 6. Burgess Manning, USA
- 7. Multitex Filtration Engineers India
- 8. Triveni Plenty Engg. Ltd. (New Delhi)
- 9. Siirtec International Contractor S.P.A (Italy)
- 10. Flashpoint, Pune india
- 11. Filteration Engineers (I) Pvt Ltd, India
- 12. Gujarat Otofilt, India
- 13. Tormene Gas Technology



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- 14. Ultrafilter (India) Pvt Ltd, India
- 15. Ravi Techno Systems Pvt Ltd, India
- 16. Siirtec Nigi S.P.A
- 17. Filtan Filter Anlagenbau Gmbh
- 18. Fairley Arlon BV
- 19. PECO Facet
- 20. EPE Epenstenner GMBH
- 21. Filtrex srl
- 22. Petromar Engineered Soln
- 23. Plenty Filter
- 24. Eurofiltec
- 25. PTI Technologies Inc

## vi) QUICK OPENING END CLOSURE (QOEC)

- 1. Forain S.R.L.
- 2. GD Engineering
- 3. Pipeline Engineering, UK
- 4. Siirtec Nigi S.P.A
- 5. TD Williamson
- 6. Peerless
- 7. Grinelli
- 8. Huber Yale
- 9. Tube Turn (U.S.A.)
- 10. Pipeline Technologies, France
- 11. M/s Grand Prix Engineering Pvt. Ltd.
- 12. M/s VKVC LLP
- 13. M/s Multitex Filtration Engineers Ltd
- ii) FILTER ELEMENT
  - 1. Peco Facet
  - 2. Velcon



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- Pall Filterite 3.
- 4. **Burgress Manning**

#### viii) **NDT Agency**

- 1. NDT Services, Ahmedabad
- 2. GEECY Industrial Services Pvt. Ltd., Mumbai
- 3. Corrosion Control Services, Mumbai
- 4. Perfect Metal Testing & Inspection Agency, Calcutta
- 5. Inter Ocean Shipping Co., New Delhi
- 6. RTD, Mumbai
- 7. Sievert, Mumbai
- 8. X-Tech, Vizag

#### ix) Long Radius Bends

- 1. M/s BHEL, Trichy, Tamilnadu
- 2. M/s Jindal SAW Limited, (Koshi Works), U.P.
- 3. M/s PSL Limited, Gandhidham, Gujarat
- 4. M/s Welspun, Gujarat
- 5. M/s Fabricon, Belgium
- 6. M/s Sawan
- 7. M/s Gujarat Infra
- 8. M/s P K Tubes
- 9. M/s DEE Development
- 10. Pipefit Engineers Pvt. Ltd.

#### X) PIG LAUNCHERS/ RECEIVERS/ PIG SIGNALERS

- 1. Bassi Luigi Fittings B.V., Holland
- 2. BRAUN STAHL PIPE TEC, GERMANY
- 3. FORAIN, ITALY
- 4. Fluidel SRL, ITALY





- 5. RMA Maschinen- und, GERMANY
- 6. Siiritec Nigi, Itlay
- 7. SCHUCK ARMATUREN, GERMANY
- 8. T.D. Williamson Inc., USA
- 9. Tectubi SPA, Italy
- 10. Taylor Forge Engineering System INC, USA
- 11. Tormene Americana S.A. (Argentina)
- 12. Tormene Gas Technology S.p.A., Italy
- 13. PIPELINE ENGINEERING, UNITED KINGDOM
- 14. Krohne, Oil & Gas BV, Drive Houston,
- 15. Multitex Filtration Engrs. Ltd, New Delhi
- 16. BGR ENERGY SYSTEMS LIMITED New Delhi
- 17. Glapwell Contracting Services Ltd. UK
- 18. FULGOSI GIOVANNI S.n.c di Corrado & C , ITALY
- 19. VEEKAY VIKRAM & CO, GUJRAT
- 20. GBM S.R.L, ITALY
- 21. Multitex F iltration Engineers Ltd., India
- 22. Cardew Ltd., Alexeander
- 23. Forain S.R.L.
- 24.GD Engineering, India
- 25. Pipeline Engineering, UK
- 26. Siirtec Nigi SPA



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## LIST OF MATERIALS OF APPROVED BRAND AND/ OR MANUFACTURE

## B. (CIVIL & STRUCTURE)

Unless otherwise specifically mentioned in the Schedule of Items, Contractor has to use materials as listed below, of only these brand names/Company's names, which are mentioned in the approved list for civil, water supply and sanitary items thereon.

#### <u>CIVIL</u>

Sr. No.	Items/ Name of Products	Make/ Brands/ Manufactures
1.	Reinforcement Steel	TATA,SAIL,RINL,IISCO,RATHI
2.	Cement	Ambuja,ACC,JK,Grasim,Ultratech,Birla,L&T,Ceme nt
3.	Structural Steel	TATA,SAIL,RINL,IISCO,ESSAR, ISPAT
4.	Pre- engineered building (PEB) firms	Kirby Building system India Itd ,Interach Building Product limited, Tata blue scope steel ,Lloyd Insulation India Itd, Everest Industries. Ltd. Modern Prefab System Pvt Ltd,Aster Building Solution Pvt.Ltd, Octamec Engineering Ltd,Jindal Mectec Pvt Ltd,Fedders Lioyd Corporation Ltd.
5.	Structural Steel Tubes ISI Marked	TATA, JINDAL , SURYA , SWASTIK





	(a) Zincalume colour coated	(a)Tata Blue scope, Dongbu Steel ,Union Steel, JSW STEEL Ltd.
6.	sheet(COIL) (b) Profile of Sheet(as per tender specification)	Kirby Building system India Itd ,Interach Building Product limited, Tata blue scope steel ,Lloyd Insulation India Itd, Everest Industries. Ltd. Modern Prefab System Pvt Ltd,Aster Building Solution
7	Dolycorhonoto Shoot	Pvt.Ltd, Octamec Engineering Ltd, Jindal Mectec
1.	Mineral wool for	Rock wool (india) Ltd. Minwool Rock Fibres Ltd
8.	thermal insulation of ceilings ( Under deck insulation )	Lloyd Insulation,
9.	Rolling shutters(ISI marked)	Swastic, Hercules, Shubdwar, M/s Bharat Rolling Shutters Industries Agra, Bengal Rolling Shutter Rama Rolling Shutter Works, Gandhi Entrance Automations Private
10.	Wind driven air Ventilators	Apurva Enterprises (Mumbai), SVS Wind Driven Turbo Ventilator(Ahmadnagar),Real Green Engineers Pvt.Ltd. Bangalore;Sun Green Ventilation system
		Mumbai, Multi colour, Anchit Ispat Pvt Ltd. (Faridabad),
11.	Synthetic Enamel Paint (1st quality only)	ICI Paint (Dulux), Asian Paint (Apcolite), Berger Paints (Luxol). Goodlass Nerolac Paints (Nerolac), Jenson & Nicholson Paints Ltd (Borolac), Shalimar,
12.	G.I SHEET	ESSAR,JSW,,SAIL
13.	Sheeting Screw	Corroshield, Buildex,
14.	Chemical for Antitermite treatment	DE- NOCIL Bombay, Pest Control of India, Trishul
15.	Factory made Panelled Door shutter	M/s Goel Brothers Raipur New Industrial Area Raipur (CG) M/s Hindustan Housing factory Ltd- New Delhi M/s Delhi Construction Eqpt Sadar Bazar Delhi M/s Joinery manufacturing Co Calcutta M/s Goyal Industries Faridabad M/s Surbhi Metal (India) Ltd Jodhpur
16.	Flush doors IS-2191, 2202	M/s Mysore Wood Products M/s Laxmi Doors, Faizabad Road, Chinhat, Lucknow M/s Merino flush doors M/s Poineer Timber Products, Chandigarh, M/S Goyal Industries Faridabad





	Ely proof doors (Modo	M/S Lovmi Doors Egizabad Bood Chiphat
47	Fly proof doors (Made	W/S Laxini Doors, Faizadau Roau, Chininal,
17.	OUT OF SOIID DIOCK	Lucknow, Northern doors Kanpur
	marine grade)	_
	Natural Fibre Thermo	Durosam
	Composite	
18.	door/window shutter &	
	frames, roofing sheets	
	etc	
4.0	PVC Panel Door (	Rajshri Plastiwood Limited, Sintex, Hindopan,
19.	Solid Core )	Marino
	Pressed steel door	M/s
	frames/ cupboard and	SAIL
20.	window frames	M/s
	(manufacturers)	ΤΔΤΔ
21	Dressed steel dear	Malavel eefe werke Mevepuri, N/Delbi
21.	fremes ( support and	M/s Loyal Sale works Mayapull, N/Dellill
	marines/ cupboard and	M/s Multiwyn industriar Corph Calculta
	window frames	
	(fabricators)	M/s Chnabra Steel Udyog, 260 Sadar Bazar,
		Meerut
		Cantt
		M/s Delite safe works, Rani Jhansi Road,
		N/Delhi M/s Ishwar Industries, 175/A Bombay
		Bazar, Meerut Cantt
		M/s Chandni Industries, J-142, Patel Nagar 1st,
		Ghaziabad.
22.	Steel Windows,	M/S Multiwyn Industrial Corpn
	Ventilators(as per IS-	Calcutta M/S Metal Window Corp
	1038 of 1983) &	N/ Delhi Govind Enterprises, Delhi
	frames pressed steel	M/S Chhabra Steel Udyog 260, Sadar Bazar,
	door/window	Meerut
		Cantt, Agent steel MFG Pvt Ltd, Ahmedabad,
		Godrej, M/S Chandni Industries, J-142, Patel
23.	AI Section for AI Door/	Hindalco, Indal, Ajit India, Jindal
	Window/ Partitions	
24.	AluminumI Door/	M/s Ahlcon
	Window/ Glazing	M/s Alumilite Pvt
	Fabricated and	Ltd, M/s Ajit
	Anodized	India Pvt Ltd,
		M/s Ramniklal S Raste Agra, Argent Industries.
		M/s Aluminium Tech Industries, I-2249 DSIDC
		Narela, Delhi,
25	Aluminium door and	M/s Elite Enterprises C/6 Shalimar Hardware
	windows Fittings	133. Jarg Mahal, Dhobitalao Mumbai 400002
		M/s Mohan Metal Industries 178/2-A Bhole Nath
		Nagar Shahadara Delhi 110032
		Menro Argent New Delhi Classic New
		Delhi lindal
		Argont Now Dolbi
		Coldon Inductrice Dut
	Automotia Class Dest	LIU. EVIE
20.	Automatic Glass Door	
	1	





27.	Aluminium Grill	Alu Grill, Arihant Aluminium Corporation, Decogrille
28.	Door Closer	Everite, Golden, Gandhi
29.	Floor Spring	Prabhat,Everite
30.	Builders Hardware	M/s Golden Industries Pvt. Ltd., Everite, Solo, Hardwyn
31.	Plywood for general purpose (IS-303)	National Plywood Inds Pvt Ltd, S Fancy lane, 8th floor Calcutta-700001,
32.	Pre laminated Particle board	Kitply, Bhutan board, Ecoboard, Novapan, Archid ply, Merinova, Merino
33.	Laminated Sheets	Formica, Merino Lam, Greenlam, National
34.	Modular Partitions	Godrej, Blowplast
35.	False Ceiling (Mineral Fibre Board)	Armstrong, , Daiken, Luxalon, Llyods, Gypboard,Trac,Aerolite
36.	False Ceiling (POP/ Gypsum Board)	Gypboard, Anchor ceiling tiles, LA
37.	Aluminium False Ceiling	Lloyds,Armstrong,Luxlon,Trac
38.	Flooring Tiles ( Mosaic / Terrazzo / PCC ) (1st quality only)	M/S Mehtab Tiles, NITCO, Royal Tiles, Gem Tiles, Hindustan Tiles, M/S National Tiles & Industries, Ultra Tiles
39.	Glazed Ceramic Tiles, Non-Skid (Floor/Wall), (1st quality only)	Kajaria, Somany, NITCO. Murudeshwar Ceramic Ltd (Navin Diamond tile), Johnson (Marbonite), Marbito, Somany, Orient, Asian
40.	Vitrified/ Designer Vitrified Tiles (1st quality only)	Asian, Marbonite (Johnson), Kerrogres (Kajaria), NITCO, Orient
41.	PVC Tiles/Flooring (IS 3461) (1st quality only)	Marblex Tiles, Krishna Tiles, Polyfin, Armstrong, Wonder floor.
42.	False Flooring	Godrej or equivalent
43.	Glass Mosaic Tiles (1st quality only)	Paladio, Coral, Accura, Bisazza, Italia, Mridul.
44.	Designer Paver Tiles/ Interlocking tiles ISI marked/ Grass-jointed Tiles (1st quality only)	Pavit, Ultra, Hindustan, Eurocon, Vyara, National Tiles, Gem, Unistone, Konkrete, Unitile
45.	Glass reinforced Paver block	Unistone or equivalent
46.	Wall care Putty for Base preparation (1st quality only)	Birla Wall care putty, Berger, Jenson & Nicholson, JK White
47.	White Cement (1st quality only)	Birla, JK
48.	Cement based Paints (1st quality only)	Super Snowcem, Duracem, Super Acrocem.





49.	Dry Distemper / Oil	Goodlass Nerolac Paint, Shalimar Paint,
	(1st quality only)	
50	Acrylic Washable	Asian Berger ICI Dulux Jenson &
50.	Distemper	Nicholson Nerolac Shalimar Garware
	(1st quality only)	& Goodlass
51	Plastic Emulsion Paint	Asian Berger ICI Nerolac Jenson &
51.	(1st quality only)	Nicholson, Shalimar, Garware & Goodlass
52.	Exterior Acrylic	ICI (Weathercoat), Excel (Nerolac), Apex
	Emulsion	(Asian), Berger, Jenson & Nicholson,
	(1st quality only)	Shalimar, Garware & Goodlass
53.	Polymer based Paint	STP,CICO
54.	Textured Paint / Wall	Unitile, Heritage, Spectrum, Iokos, Acropaints,
	Tile	Asian
	(1st quality only)	
55.	Flexible board for	STP or equivalent
	Expansion joint	
56.	Grout	Shrinkomp,Fosroc,Fairmate
57.	Integral water proofing	STP, Pidilite, Fosroc, CICO, Sika.
	compound	
58.	Concrete Admixture	Pidilite, Fosroc, CICO, Sika.
59.	Water proofing for	Acrocrete & Acrocote, CICO, Fosroc, STP
	cementitions surface IS-2645	
60.	Bituminous Product	M/s Faridabad Spinning & Woolen Mills Pvt
		Ltd, 837, SP Mukherjee Marg Delhi,
		M/s STP Ltd (Formerly Shalimar Tar Products)
		M/s Bitufelt Pvt Ltd 123/377 Fazalm Ganj
		Kanpur
		208012, Texas, Texas India Ltd,
61.	Hardeners	Ironite, Ferrok, Hardonate
62.	Construction	Choksey, CICO, Forsroc, Sika
	Chemicals	
63.	Non Metalic Surface	CICO, Fosroc, STP, Sika
	Hardners	
64.	Corrugated, Semi	M/s Everest Bldg Products Ltd Jata Sankar
	Corrugated & AC	Bosa Marg
	Sheets (IS-459-	Muland (west) Bombay 400080,
	1970,IS-2098)	M/s Ramco AC Sheets "SWASTIK",
		M/s Eternit Everest Ltd, UP Asbestos Ltd
65.	GI Sheet ISI Marked	Multicolor, TATA, Bluescope, JSW,
		Colour Plus, Interarch, Lloyds, Jindal,
66.	Sheet Glass /Structural	Hindustan Pilkington Glass Works, Saint Gobain,
67	Delveerbenete Dens	Delbi Malexon Ma Calling
07.	Folycorbonate Panel	India Pvt I td
	Stainless Steel	lindal
68.	Cladding	
	Sladding	





69.	Punch Tape Concertina Coil	Global Technocrat, S.G.Engineers Delhi
70.	Punch Tape In Plastic Spool	Global Technocrat, S.G.Engineers Delhi
71.	Stainless Steel Railing	Jindal
72.	FRP/ HDPE Garbage Bins	Sintex, Swift, Nutech, Sheetal
73.	Thermoplastic Road Marking Paint	Shalimark (STP)
74.	Bollard	STP
75.	Cateye	TATA, STP
76.	Readymade Speed Breaker	STP
77.	Fountain	Ripples, Green Evolutions, Agritech Services, Premier
78.	Multi-Vent	Multicolor
79.	Sanitary ware	Neycer Kermag (standard), Hindustan Sanitary Ware (Ist quality), Parryware (superfine), Cera (Ist quality), Classica (Ist /
80.	WC seat cover ISI Marked	Parryware, Neycer Kermag (standard), Hindustan Sanitary Ware (Ist quality), Cera (Ist quality), Classica (Ist / standard)
81.	PVC Flushing Cistern IS: 774-1984 (ISI Certified)	Parryware, Hindustan Sanitary Wares, Cera.
82.	Faucets & Taps, Stop Valves & Pillar Taps, Surgical basin mixer, Shower rose etc.	Gem, Parko, Parryware, HSW, Jaquar,Orient
83.	Kitchen Stainless Steel Sink	Diamond, Nirali, Neel Kanth, Jayna
84.	Looking Mirror	Saint Gobain, Modi Float, Triveni Float Glass, Crown, Atul,Ashai
85.	Ready made Bathroom Cabinets	Commander Gratings (I) Pvt Ltd, Gratolite Cabinet, A- 4 Sector Viii Noida-202701, Alpina, Cera.
86.	Float Valve	Leader, Bombay Metal & Alloy Co, Bombay
87.	SGSW Pipes (IS-651) ISI Marked	Perfect Agra, Devraj Ind Gaziabad, Buran, RK, Prince,
88.	CI (Centrifugally Cast) Pipes for sewage disposal ISI marked	NICCO, SRIF, A-1 Singhal Casting Co Agra, Jindal Saw, Kesoram, NECO
89.	PVC rain water/sewage pipes (IS-4985)	Reliance, Finolex, Supreme, Kisan, Prince,Hindustan Plastic & machine corporation,Polypack industries (P) Ltd.





90.	HDPE Water storage tanks (Rotational Moulded)	Sintex, Swift, Nutech, Sheetal
91.	Cast Iron Pipes and Fittings	Hindustan Engineering Products Company Calcutta, SL.C., Standard approved manufacturers of any other brand of fittings
92.	RCC Pipes	Indian Hume Pipe Company, Delhi / Allahabad / Chandigarh / Lucknow; Hindustan Pressure Pipes, Kolhapur; Dhere Concrete Products, Pune or any other approved manufacturer conforming B.I.S.
93.	Brass Fittings	Leader Engineering Works, Jalandhar; L & K Mathura; Luster Sanitary, Jalandhar; Annapurna Metal Works, Calcutta; Neta Metal Works, Jalandhar; Honey Industrial
94.	C.P. Fittings	Ego Metal Works, Ballabhgarh; Jaquar Industries, Delhi; Soma Plumbing Fixtures Limited, Calcutta; Gem Sanitary Appliances Pvt. Ltd.,Delhi; Essco Sanitations, Delhi; Bilmet,
95.	Stone Ware (Salt-Glazed) Pipes	Hind Ceramics Limited, Orissa; Ceramic Industries Limited, Sambalpur; Shrikamakshi Agencies, Madras; Binary Udyog Pvt. Limited, Howrah; Tirumati Moulds Limited, Nagpur; Kiran Potteries, Hyderabad; Perfect Sanitary
96.	Asbestos Cement Pipes and Fittings	Ganga Asbestos Limited, U.P.; Hyderabad Asbestos Cement Products Limited; J.K. Super Pipe Industries, Nanded; Konark Cement and Asbestos Limited, Orissa; Maharashtra Asbestos Limited, Bombay; Poddar Industrial Corporation, Patna;
97.	HDPE pipes and fittings	ORI-PLAST,HASTI

# **STRUCTURE**

SI. No.	Items/Name of Products	Makes/Brands/Manufactures
1	Structural Steel	SAIL / TATA / RINL / IISCO / ESSAR / ISPAT
2	Structural Steel Tubes ISI Marked	TATA / JINDAL / SURYA / SWASTIK
3	Synthetic Enamel Paint Ist Quality only	ICI Paint (Deluxe), Asian Paint (Apcolite), Shalimar Paint (Superlac), Goodlass,Nerolac Paint(Nerolac), Berger Paints





Any materials not fully specified in these specification and which may be offered for use in the works shall be subject to approval of Engineer, without which it shall not be used anywhere in the construction works.

## LIST OF SUPPLIERS OF MAJOR BOUGHT-OUT ITEMS

- C. (ELECTRICAL)
- i) <u>Air Conditioner</u>
  - 1. O General
  - 2. Daikin
  - 3. Hitachi

## ii) Batteries (Lead Acid)

- 1. Amco Batteries Ltd.
- 2. Exide Industries Ltd.
- 3. HBLNIFE Power System Ltd.
- 4. Amara Raja Batteries Ltd.

## iii) Batteries (Nickel Cadmium)

- 1. Amco Batteries Ltd.
- 2. HBLNIFE Power Systems Ltd.

## iv) Batteries Charger/DC-DC Converter

- 1. Amara Raja Power System(P)Ltd.
- 2. BCH.
- 3. Chhabi Electricals Pvt. Ltd.
- 4. Caldyne Automatics Limited



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- 5. Dubas
- 6. HBL Nife Power Systems Ltd.
- 7. Universal Industries Products
- 8. Universal Instrument Mfg Co Pvt Ltd

## v) <u>Cable – Fire Alarm & Communication Cables</u>

- 1. Cords Cable Industries Ltd.
- 2. CMI
- 3. Delton cables Ltd.
- 4. ELKAY Telelinks
- 5. KEI Industries Ltd.
- 6. Reliance Engineers Ltd.

## vi) <u>Cable – HT(XLPE)</u>

- 1. Universal Cable Ltd.
- 2. KEI Industries Ltd.
- 3. Industrial Cables
- 4. NICCO Corporation Ltd.
- 5. Uniflex
- 6. Polycab.
- 7. Torrent cables Ltd.

## vii) <u>Cable – LT Power and Control</u>

- 1. Cords Cable Industries Ltd.
- 2. Universal Cable Ltd.
- 3. KEI Industries Ltd.
- 4. Havells.
- 5. Delton
- 6. Elkay Telelinks
- 7. Evershine Electricals
- 8. Ecko
- 9. Ravin
- 10. Rallison.
- 11. Suyog
- 12. Netco
- 13. Uniflex
- 14. Paramount
- 15. Gloster



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- 16. Associated cables Pvt Ltd.
- 17. CMI
- 18. Gemscab
- 19. Industrial cables
- 20. NICCO
- 21. Polycab
- 22. Torrent

## viii) <u>Cable – Gland</u>

- 1. .Baliga
- 2. .Comet
- 3. Flexpro
- 4. Flameproof
- 5. FCG
- 6. Electro Werke
- 7. Dowels
- 8. CCI

## ix) <u>Cable – Lugs</u>

- 1. Dowels
- 2. Jainson
- 3. Ismal

## x) <u>Cable – Tray</u>

- 1. Ercon Composites
- 2. Yamuna Power & Infrastructure Ltd.

## xi) <u>Cable Termination and Jointing Kit</u>

- 1. CCI
- 2. Raychem
- 3. M-Seal

## xii) <u>Ceiling/Exhaust/Pedestal Fans & Circulators</u>

1. Bajaj Electricals Ltd.



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- 2. Crompton Greaves Ltd.
- 3. Khaitan Electricals Ltd.
- 4. Havell's

## xiii) <u>Contractors – AC Power</u>

- 1. Andrew Yule
- 2. ABB
- 3. BHEL
- 4. C&S
- 5. Havell's
- 6. L&T
- 7. Schneider
- 8. Siemens Ltd.
- 9. Telemechanique

## xiv) <u>Control Transformer</u>

- 1. AE
- 2. Indushree
- 3. Intra Vidyut
- 4. Kalpa Electrikals
- 5. Transpower Industries Ltd.
- 6. Siemens

## xv) <u>DG Set</u>

- 1. Sterling and Wilson.
- 2. GD ankalesaria.
- 3. Deev Genset.
- 4. Jackson Limited.
- 5. Sudhir Gensets.
- 6. Power Engineering (India) Pvt Ltd.
- 7. Prasha Technologies Limited.
- 8. Kumar Generator house.
- 9. Ashok Leyland Ltd.
- 10. Powerica Limited.
- 11. Supernova Engineers Limited.



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- 12. Bhaskar Power Products (P) Ltd.
- 13. Caterpillar India (P) Ltd.
- 14. Cummins India Ltd.
- 15. Escorts Ltd.
- 16. Greaves Cotton Ltd.
- 17. Kirloskar Itd.
- 18. Mahindra & Mahindra Ltd.
- 19. Honda.
- 20.Perkins.
- 21.Eicher.
- 22.Tata Motors.
- 23.Ashok Leyland.

## xvi) <u>Earthing Materials</u>

- 1. Rukmani Electrical & Components Pvt Ltd.
- 2. Indiana Grating Pvt Ltd.
- 3. Jef Techno Solutions Pvt Ltd

Flame proof LDB's/ JB,s/Control Station/ switches

- 7. FCG
- 8. Sudhir
- 9. Prompt Engineering Works
- 10. Flame Proof equipments pvt. Ltd.
- 11. Baliga Lighting Equipments Pvt. Ltd.
- 12. Flexpro Electricals Pvt. Ltd.

## xvii) High Mast

- 1. Bajaj Electricals Limited
- 2. Crompton Greaves Limited.
- 3. Philips India Limited
- 4. Surya Roshani

## xviii) High Voltage PCC/ MCC panels

- 1. BHEL
- 2. Control and Switchgear
- 3. Siemens
- 4. Tricolite Electrical Industries



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- 5. Schneider
- 6. CGL
- 7. L&T

## xix) Indicating Lamps

- 1. Alstom Ltd.
- 2. BCH
- 3. L&T Ltd.
- 4. Siemens Ltd.
- 5. Vaishno Electricals

## xx) Indicating Meters

- 1. ABB
- 2. AMCO
- 3. AE
- 4. Alstom Ltd. (EE)
- 5. Conzerv/Schneider
- 6. Elecon Measurement Pvt. Ltd.
- 7. HPL Electric & Power Pvt. Ltd.
- 8. MECO Instruments Ltd.
- 9. Minilec
- 10. Rishabh Instruments Pvt. Ltd.
- 11. Trinity energy system
- 12. kaycee
- 13. Salzer

## xxi) Lighting Fixtures

- 1. GE Lighting Pvt. Ltd.
- 2. Bajaj Electricals Ltd.
- 3. Crompton Greaves Ltd.
- 4. Philips India Ltd.

## xxii) Lighting Fixtures – Flameproof

- 1. Bajaj Electricals Ltd.
- 2. Baliga Lighting Equipment Pvt. Ltd.



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- 3. Crompton Greaves Ltd.
- 4. CEAG Flameproof Controlgear Pvt. Ltd.
- 5. Flexpro Electricals Pvt. Ltd.
- 6. Philips India Ltd.
- 7. Sudhir Switchgears Pvt. Ltd.
- 8. FCG.

#### xxiii) Miniature Circuit Breakers (MCBs) and Lighting DB

- 1. ABB
- 2. Hagger
- 3. Havell's India Ltd.
- 4. Indo Asian Fusegear Ltd.
- 5. Legrand
- 6. MDS Switchgear Ltd.
- 7. Schneider
- 8. Siemens Ltd.
- 9. HPL

#### Moulded Case Circuit Breaker (MCCBs) xxiv)

- 1. ABB
- 2. Andrew yule
- 3. Larsen & Toubro
- 4. Schneider
- 5. Siemens
- 6. Control and Switchgear

#### xxv) Protection Relays – Thermal

- 1. BCH
- 2. L&T Ltd.
- 3. Siemens Ltd.
- 4. Telemenchanique & Controls (India) Ltd.

#### Low Voltage Power Control Center (PCC)/ MCC/ PDB/ MLDB/ LDB xxvi)

- 1. ABB
- 2. BCH
- 3. C & S
- 4. Elecmech Switchgear & Instrumentation





- 5. KMG ATOZ
- 6. L&T
- 7. Pyrotech Electronics Pvt. Ltd.
- 8. Risha control Engineers Pvt. Ltd.
- 9. Siemens
- 10. Tricolite Electrical Industries
- 11. Unilec Engineers Itd.
- 12. Vidyut Control India Pvt. Ltd.
- 13. Control and Schematic
- 14. Zenith Engineering

## xxvii) Push Buttons

- 1. BCH
- 2. Alstom Ltd.
- 3. L&T
- 4. Siemens Ltd.
- 5. Telemenchanique & Controls (India) Ltd.
- 6. Vaishno Electricals

## xxviii) <u>Switches-Control</u>

- 1. BCH
- 2. Easum Reyrolle Relays & Devices Ltd.
- 3. Alstom
- 4. Kaycee Industries Ltd.
- 5. L&T
- 6. Siemens Ltd.

## xxix) Switches – 5/15A Piano/ Plate, Switch Socket

- 1. Anchor Electronics & Electricals Pvt. Ltd.
- 2. Kingal Electricals Pvt. Ltd.
- 3. North-West Switchgear Ltd.

## xxx) Switch Socket Outlets (Industrial)

- 1. Alstom Ltd.
- 2. Best & Cromption Engineering Ltd.



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- 3. BCH
- 4. Crompton Greaves Ltd.
- 5. Essen Engineering Company Pvt. Ltd.

## xxxi) Solar Modules

- 1. Tata BP Solar (I) Ltd.
- 2. REIL, Jaipur.
- 3. CEIL, Sahibabad.
- 4. HBL Power

## xxxii) Solar Street Lighting

- 1. Tata BP Solar (I) Ltd.
- 2. REIL, Jaipur.
- 3. CEIL, Sahibabad.
- 4. HBL.

#### xxxiii) <u>Terminals Blocks</u>

- 1. Connectwell
- 2. Controls & Switchgear Co. Ltd.
- 3. Elmex Controls Pvt. Ltd.
- 4. Essen Engineering Co. Pvt. Ltd.

## xxxiv) <u>Tranformers</u>

- 1. ABB
- 2. Andrew Yule
- 3. Areva
- 4. BHEL
- 5. Bharat Bijlee
- 6. Crompton Greaves
- 7. EMCO Ltd.
- 8. Intra Vidyut
- 9. Indushree
- 10. Indcoil
- 11. Kirloskar
- 12. Skippers Electricals
- 13. Transformers & Rectifiers (I) Ltd.
- 14. Voltamp



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## xxxv) UPS System and Inverter

- 1. DB Power
- 2. Aplab
- 3. Keltron
- 4. Hi-Rel
- 5. Dubas
- 6. Toshiba Corporation
- 7. Fuzi Electric Co Ltd

## xxxvi) <u>GI-Octogonal Pole</u>

- 1. Bajaj
- 2. Transrail
- 3. Wipro

## xxxvii) List Of Recommended Manufacturers for Heater

- 1. Escorts Limited, Faridabad, Haryana
- 2. Spherehot / Kanti Lal Chuni Lal & Sons Appliances Pvt Ltd.Surat
- 3. Kerone, Bhayander(E), Thane 401105
- 4. Excel Heaters, Andheri (West), Mumbai 400 053, India
- 5. Nirmal Industrial Controls Pvt. Ltd. , Mulund(W), Mumbai 400 080

NOTE:- Item/Vendor, which are not listed above, shall be subject to prior approval from Client/Consultant.



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## LIST OF MATERIALS OF APPROVED BRAND AND/ OR MANUFACTURE

#### D. (INSTRUMENTATION)

## I. <u>OFC</u>

Manufacture/Procurement, Testing and supply of suitable OFC Joint closures including all necessary accessories of any of the following make:

- 1. Raychem
- 2. 3M
- 3. Siemens
- 4. Any other make from the approved vendor list of client with supporting paper

## II. <u>METERING SKID</u>

- 1. M/s Chemtrols Industries Ltd., Mumbai
- 2. M/s Daniel Measurement Solutions Pvt Ltd, Vadodara.
- 3. M/s Elster-Instromet India Pvt Ltd, Vadodara
- 4. M/s INEL Gas Controls Pvt Ltd, Vadodara.
- 5. M/s Nirmal Industrial Controls Pvt. Ltd., Mumbai
- 6. M/s Oswal Industries Limited, Ahmedabad
- 7. M/s Autometer energytech ltd, NOIDA
- 8. M/s Rockwin Flowmeter india Pvt Ltd, Ghaziabad.
- 9. M/s Intromet international Ny Rajkmakeriaan 9, B-2910, Essen , Belgium Emailsales@instromet.be
- 10. M/s Pietro Fiorentini Spa, 20124, Milino, Itally, sales@fiorentini.com





- 11. M/s FMC Measurement Solutions , 6 Braidway , thetford, Norfolk, IP24 1 JA, England. Email- phil.lamming@fmcti.com
- 12. M/s Petrogas Gas system BV, Doesburgweg, 7 , 203 PL Gouda, PO Box 20, 2800, AA Gouda Netherland. Email- info@petrogas.nl
- 13.Tormene Gas technology SpA, via campolongo, 97, 35020 Due carrare (Padova) Itally email – tormene@tormene.it
- 14. M/s ODS BV, Donk 6, 2291 Berendrecht, Netherland, email info@odsbv.nl
- 15. M/s RMG Regel + Messtechnik Gmbh Osterholzstr, 45, D-34123 Kassel, Germany email- rmg@rmg.de , Gerhard.1embke@rmg.de

## III. PRESSURE GAUGES

- 1. AN Instruments Pvt Ltd
- 2. Badotherm Process Instruments B.V.
- 3. Baumer Bourdon Haenni S.A.S
- 4. British Rototherm Co Ltd
- 5. Budenberg Gauge Co Ltd
- 6. Dresser Inc
- 7. Forbes Marshall (Hyd) Pvt Ltd
- 8. General Instrument Consortium
- 9. H. Guru Instruments (South India) Pvt Ltd
- 10. Manometer (India) Pvt Ltd
- 11. Nagano Keiki Seisakusho Ltd
- 12. Hirlekar Precision, India
- 13. Waaree Instruments Ltd
- 14. Walchandnagar Industries Ltd (Tiwac Divn)
- 15. Wika Alexander Wiegand & Co GmbH
- 16. Wika Instruments India Pvt Ltd
- 17. Ashcroft India Pvt Ltd.



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#### **TEMPERATURE GAUGES**

- 1. AN Instruments Pvt Ltd.
- 2. Badotherm Process Instruments B.V.
- 3. Bourdon Haenni S.A.
- 4. Dresser Inc.
- 5. General Instruments Consortium
- 6. H. Guru Instruments (South India) Pvt Ltd
- 7. Nagano Keiki Seisakusho Ltd
- 8. Solartron ISA
- 9. Walchandnagar Industries Ltd (Tiwac Divn)
- 10.Wika Alexander Wiegand & Co GmbH
- 11.Wika Instruments India Pvt Ltd
- 12.Pyro Electric, Goa
- 13.Ashcroft India Pvt Ltd.

#### V. <u>TEMPERATURE ELEMENTS, THERMO-WELLS</u>

- 1. ABB Automation Ltd
- 2. Altop Industries Ltd
- 3. Bourdon Haenni S.A.
- 4. Detriv Instrumentation & Electronics Ltd
- 5. General Instruments Consortium
- 6. Japan Thermowell Co Ltd
- 7. Tecnomatic S.P.A
- 8. Tempsen Instrument India Ltd
- 9. Thermo Electric Co. Inc.
- 10. Thermo-Couple Products Co
- 11. Thermo-Electra B.V.
- 12. Wika Alexander Wiegand & Co GmbH
- 13. Altop Industries Ltd., Baroda
- 14. Nagman Sensors (Pvt.) Ltd.



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15. Pyro Electric, Goa

#### VI. <u>TURBINE METERS</u>

- 1. Daniel (USA)
- 2. RMG (Germany)
- 3. Instromet International (Belgium)
- 4. Sensus Metering System Inc
- 5. Rockwin Flowmeter (India)
- 6. Vemmtec Messtechnik Gmbh, (Germany)
- 7. ITRON GmbH (Germany)

#### VII. POSITIVE DISPLACEMENT FLOW METERS

- 1. Actaris
- 2. RMG (Germany)
- 3. Instromet International (Belgium)
- 4. Romet
- 5. Dresser
- 6. Itron GmbH (Germany)

## VIII. ORIFICES (METER RUN, FLOW CONDITIONER, ORIFICE PLATE AND ASSEMBLY)

- 1. Emerson
- 2. FMC, USA
- 3. Pietro Fiorentini S.P.A (Italy)
- 4. Canalta Controls, Canada

## IX. ULTRASONIC FLOW METERS

- 1. Daniel (USA)
- 2. RMG (Germany)
- 3. Instromet International (Belgium)
- 4. Sick Maihak, Germany
- 5. FMC, Germany



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## X. LEVEL GAUGES/ LEVEL INSTRUMENTS

- 1. Bliss Anand
- 2. Chemtrols
- 3. V-Automat
- 4. Levcon
- 5. Nivo Controls
- 6. Sbeletro Mechanicals
- 7. TRAC

## XI. FIELD INSTRUMENTS (P, DP, F, L, T)

- 1. ABB Ltd
- 2. Honeywell
- 3. Fuji Electric Instruments Co Ltd
- 4. Yokogawa
- 5. Invensys India Pvt.Ltd

#### XII. FLOW COMPUTERS

- 1. Emerson
- 2. Instromet International (Belgium)
- 3. FMC Measurement Solutions (UK)
- 4. RMG (Germany)
- 5. OMNI Flow Computers Inc.
- 6. Thermo Fisher, USA

#### XIII. PRESSURE REGULATOR AND SLAM SHUT VALVE

- 1. Pietro Fiorentini S.P.A. (Italy)
- 2. Emerson
- 3. RMG-Regel Messtechnik (Germany
- 4. Mokveld Valves BV (Netherlands)
- 5. Schlumberger (USA)



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- 6. Gorter Controls B V (Netherlands)
- 7. Instromet International NV
- 8. Nirmal Industrial Controls Pvt Ltd. (up to 6" size only)
- 9. ESME Valves Ltd
- 10.Kaye & Macdonald Inc.
- 11.Nuovo Pignone S.P.A (Italy) (GE Oil Co.)
- 12. Richards Industries (Formerly Treloar)
- 13.Samson AG Mess-und Regeltechnik
- 14. Tormene Gas Technology
- 15.Dresser Inc, USA (upto 8" size, 300# class only)

#### XIV. PRESSURE SAFETY VALVES

- 1. Keystone Valves (India) Pvt. Ltd.
- 2. Larson & Toubro Ltd.
- 3. Lesser GmbH & Co KG
- 4. Mekaster Engg Ltd..
- 5. Tyco Sanmar Ltd. (New Delhi)
- 6. Anderson Greenwood Crosby
- 7. BHEL (Trichy)
- 8. Curtiss Wright Flow Control Corporation
- 9. Dresser Inc.
- 10.Fukui Seisakusho Co. Ltd
- 11.Nakakita Seisakusho Co Ltd
- 12.Nuovo Pignone S.P.A (Italy) (GE Oil co)
- 13.Parcol S.P.A
- 14.Safety Systems UK Ltd
- 15.Tai Milano S.P.A
- 16.Weir Valves & Controls France
- 17.Bliss Anand Pvt Ltd.

## XV. <u>FLOW CONTROL VALVES</u>



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- 1. Fouress Engg. (New Delhi)
- 2. Fisher Xomox (New Delhi)
- 3. MIL Control Ltd. (Noida)
- 4. KOSO India Pvt Itd
- 5. Samson Control (Thane)
- 6. Dresser Valves India Pvt Ltd.
- 7. Fisher Controls
- 8. Valvitalia Italy
- 9. CCI Valve technology
- 10.Flowserve Pvt Ltd.
- 11.Metso Singapore Pvt Ltd.
- 12. Instrumentation Ltd Palghat
- 13. Dresser Inc. USA

## XVI. <u>CONTROL PANEL & ACCESSORIES</u>

- 1. Keltron Controls Ltd., Kerala
- 2. Elechmec Corporation Ltd., Mumbai
- 3. Industrial Controls & Appliances Pvt. Ltd.,
- 4. Alstom System Ltd., Noida
- 5. Emerson Process Management (I) Pvt. Ltd.
- 6. ABB Instruments Ltd., New Delhi
- 7. Larsen & Toubro Ltd.
- 8. Control & Automation, New Delhi
- 9. GE Fanuc Systems Pvt. Ltd., New Delhi
- 10. Rockwell Automation (I) Ltd., Ghaziabad
- 11. Honeywell Automation Ltd.
- 12. Rittal
- 13. Pyrotech Elcronics Pvt Ltd.
- 14. Positronics Pvt Ltd.
- 15. Electronics Corporation of India Ltd.



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#### XVII. JUNCTION BOXES AND CABLES GLANDS

- 1. Ex-Protecta
- 2. Flameproof Control Gears
- 3. Baliga
- 4. Flexpro Electricals

#### XVIII. CONTROL AND SIGNAL CABLES

- 1. Associated Cables
- 2. Brook
- 3. Associated Flexibles & Wires (Pvt) Ltd
- 4. Universal Cables Ltd, India
- 5. Delton Cables Ltd, India
- 6. KEI Industries Ltd INDIA
- 7. CMI Limited
- 8. Cords Cable Industries Ltd, India
- 9. Elkay Telelinks (P) Ltd., India
- 10. Udey Pyrocables Pvt Ltd, India
- 11. Goyolene Fibres (I) Pvt Ltd, India
- 12. Netco Cable Industries Pvt Ltd, India
- 13. Nicco Corporation Ltd, India
- 14. Paramount Communications Ltd, India
- 15. Polycab Wires Pvt Ltd, India
- 16. Radiant Cables Pvt Ltd, India
- 17. Reliance Engineers Ltd., India
- 18. Suyog Electricals Ltd, India
- 19. Thermo Cables Ltd

## XIX. INDICATORS & CONTROLLERS

1. Yokogawa



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- 2. Eurotherm Chessel
- 3. Honeywell
- 4. Emerson

XX. BARRIERS

- 1. MTL
- 2. STHAL
- 3. P&F
- 4. Phoenix

#### XXI. GAS CHROMATOGRAPH

- 1. ABB
- 2. Emerson
- 3. Instromet International, NV
- 4. RMG Regal+Messtechnik GmbH
- 5. Yokogawa

## XXII. I/P CONVERTERS

- 1. ABB
- 2. Emerson
- 3. IMI Watson Smith Ltd.
- 4. Moore Controls Ltd
- 5. Shreyas Instruments Pvt Ltd, India
- 6. Thermo Brandt Instruments

## XXIII. SS FITTINGS , INSTRUMENT VALVES & MANIFOLDS

- 1. Aura Inc.
- 2. Hoke
- 3. Excelsior Engg Works, India
- 4. Parker
- 5. Swagelok Co.



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- 6. Swastic Engineering Works, India
- 7. Comfit & Valves Pvt.Ltd
- 8. Arya Crafts & Engg.Pvt. Ltd

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## SS TUBES

- 1. Sandvik
- 2. Hoke
- 3. Parker
- 4. Swagelok Co.
- 5. Heavy metal & tubes LTD
- 6. Nuclear Fuel Complex .India
- 7. Ratnamani Metal & Tube Ltd
- 8. Jindal Saw

## XXV. GAS DETECTION SYSTEM

- 1. Crowcon Detection Instruments Ltd
- 2. Detection Instruments (I) Pvt Ltd
- 3. Detector Electronics Corporation
- 4. Drager Safety AG & Co. KGAA
- 5. General Monitors Ireland Ltd
- 6. Mine Safety Appliances Company
- 7. MSA Mines Safety Appliances(India) Ltd
- 8. Industrial Scientific Oldham France S.A.
- 9. Riken Keiki Co Ltd
- 10. Simrad Optronics Icare
- 11. Honeywell Analytics
- 12. Net Safety Monitoring Inc.
- 13. Simtronics SAS



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## LIST OF RECOMMENDED MANUFACTURERS

## E. (SHOP & FIELD PAINTING)

#### I. Indian Vendors

- 1. Asian Paints(I) Ltd.
- 2. Berger Paints Ltd.
- 3. Goodlass Nerlolac Paints Ltd.
- 4. Jenson And Nicholson Paint Ltd & chokuGu Jenson & Nicholson Ltd.
- 5. Shalimar Paints Ltd.
- 6. Sigma Coating, Mumabai
- 7. CDC Carboline Ltd.
- 8. Premier Products Ltd.
- 9. Coromandel Paints & Chemicals Ltd.
- 10. Anupam Enterprises
- 11. Grand Polycoats
- 12. Bombay Paints Ltd.
- 13. Vanaprabha Esters & Glycer, Mumbai
- 14. Sunil Paints and Varnishes Pvt. Ltd.
- 15. Courtaulds Coating & Sealants India (Pvt.) Ltd.
- 16. Mark-chem Incorporated, Mumbai (for phosphating chemicals only)




### LIST OF APPROVED PARTIES FOR BOUGHT OUT ITEMS

17. VCM Polyurethane Paint (for polyurethane Paint only)

### II. <u>Foreign Vendors For Overseas Products</u>

- 1. Sigma Coating, Singapore
- 2. Ameron, USA
- 3. Kansai Paint, Japan
- 4. Hempel Paint, USA
- 5. Valspar Corporation, USA
- 6. Courtaulds Coating, UK.

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Notes:

- Bidder can select equipment of two different makes, selected from this VENDOR LIST and mention the same in the checklist for technical evaluation attached with the tender. The offered bid must include filled datasheet indicating make, model, size, rating of offered instrument/ equipment duly supported by sizing calculation of offered equipment (wherever applicable).
- 2. Vendors who have already supplied above equipment in other terminals of GAIL (I) Ltd, shall also be considered qualified for this tender provided the supplied equipment are commissioned and running successfully and they have not been put on holiday in list of Client/VCS/ Other PSU
- 3. Equipment / Instruments of any make which is offered by one bidder and acceptable to GAIL (I) Ltd shall be accepted for other bidder also. After placement of order, on request of the successful bidder list of other qualified makes for a particular item (for which successful bidder wants to change the vendor) shall be provided.
- 4. Bidder shall take prior approval of the make / model no of the offered item and it shall be from the list given above. However additional vendors will be considered in exceptional cases, provided they have supplied for similar application to reputed gas transmission/distribution companies, in quantities at least half the numbers being supplied for this tender, and working satisfactorily for minimum 6 months. Documentary evidence substantiating above shall be submitted for taking approval.
- 5 For procuring bought out items from vendors other than those listed above, the same may be acceptable subject to the following:
  - a) The vendor/ supplier of bought out item(s) is a manufacturer/ supplier of said item(s) for intended services and the sizes being offered is in their regular manufacturing supply range.
  - b) Should have supplied at least one single random length (i.e. 5.5 meters to 6.5 meters) for item assorted pipes / tubes and for other items, which are to be supplied in quantity on number-basis (other than assorted pipes / tubes) minimum

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### LIST OF APPROVED PARTIES FOR BOUGHT OUT ITEMS

01 (One) number of same or higher in terms of size and rating as required for intended services. The bidder should enclose documentary evidences i.e. PO copies, Inspection Certificate etc. for the above, along with their bids.

- 6 For any other item(s) for which the vendor list is not provided, bidders can supply those item(s) from vendors/ suppliers who have earlier supplied same item(s) for the intended services in earlier projects and the item(s) offered is in their regular manufacturing/ supply range. The bidder is not required to enclose documentary evidences (PO copies, Inspection Certificate etc.) along with their offer, however in case of successful bidder, these documents shall required to be submitted by them within 30 days from date of Placement of Order for approval to CLIENT / VCS.
- 7 The details of vendors indicated in this list are based on the information available with VCS, Contractor shall verify capabilities of each vendor for producing the required quantity with. PMC does not guarantee any responsibility on the performance of the vendor. It is the contractor's responsibility to verify the correct status of vendor and quality control of each parties and also to expedite the material in time.



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# **CHECKLIST - TECHNICAL**

### CHECKLIST – TECHNICAL

Bidder confirms following, as a minimum, has been enclosed in the offer.

S.NO.	Requirements	Compiled by Bidder(Tick)
1	Reference List of previous supply of Procured item	
2	Filled – up Data Sheets, duly signed and stamped by bidder enclosed.	
3	List of recommended commissioning spares and accessories for Procured item.	
4	List of recommended spares and accessories for two year normal operation for procured item.	
5	Compliance statement duly filled and stamped enclosed.	
6	GA & assembly drawings, cross section drawings including part list & material list enclosed.	
7	Other technical details & vendor's product catalogues enclosed.	

0	25.05.2017	ISSUED AS STANDARD	AS	GS	AD
REV	DATE	DESCRIPTION	PREP	СНК	APPR



## **COMPLIANCE STATEMENT**

## **COMPLIANCE STATEMENT**

S.No	Requirement	Bidder's Confirmation
1	Bidder confirms that all materials proposed by the bidder are same/ superior to those specified in specification/ data sheets enclosed.	
2	Bidder confirms that the offer is in total compliance with the Technical requirements of the Material Requisition. Bidder confirms that deviation expressed or implied anywhere else in the offer shall not be considered valid.	
3	Bidder confirms that all spares and accessories required for two years of normal operation have been quoted separately.	
4	Bidder confirms that prices for start-up/commissioning spares and accessories have been included in the quoted items.	
5	Bidder confirms that in the event of securing order for the requisitioned item(s), good for manufacturing drawings of ordered item(s) shall have complete details with dimensions, part list and material list including back-up calculations in the first submission, failing which the vendor shall be solely responsible for any likely delay in delivery of item(s).	

#### **Bidder's Signature with Stamp**

0	25.05.2017	ISSUED AS STANDARD	AS	GS	AD
REV	DATE	DESCRIPTION	PREP	снк	APPR



## **DEVIATION SHEET**

		DEVIATION/ EXCEPTION/ CLARIFICATION SHEET							
Sr. No.	Contractor's Inquiry Reference	Contractor's Requirement	Proposed Deviation by Supplier, with Technical Justification	Cost Impact, if any	Contractor's Conclusions				

#### NOTES

- 1- Bidder confirms that apart of from the deviations/exceptions/clarifications listed above, the bid is in full
- 2- Bidder shall submit this sheet duly filled up and signed by him along with his bid. In case there is no deviation, then also supplier shall submit this sheet along with his bid indicating NIL deviation.

(Contractor's Name and Signature with Seal)

0	25.05.2017	ISSUED AS STANDARDS	AS	GS	AD
REV	DATE	DESCRIPTION	PREP	СНК	APPR



# **DRAWINGS & DOCUMENTS**

### INFORMATION/ DOCUMENTS / DRAWINGS TO BE SUBMITTED BY SUCCESSFUL BIDDER

Successful Bidder shall submit four copies unless noted otherwise, each of the following:

- 1. Inspection & test reports for all mandatory tests as per the applicable code as well as test reports for any supplementary tests, in nicely bound volumes.
- 2. Filled in Quality Assurance Plan (QAP) for Purchaser's/ Consultant's approval. These QAPs shall be submitted in two copies within 15 days from LOI/ FOI.
- 3. Detailed completion schedule activity wise (Bar Chart), within one week of placement of order.
- Note : All drawings, instructions, catalogues, etc., shall be in English language and all dimensions shall be metric units.

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# **INSTRUCTION TO BIDDER**

## **INSTRUCTION TO BIDDERS**

- 1. Bidder to note that no correspondence shall be entered into or entertained after the bid submission.
- 2. Bidder shall furnish quotation only in case he can supply material strictly as per this Material Requisition and specification/data sheet forming part of Material Requisition.
- 3. 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 & technical / performance data required to be submitted with the offer, the offer shall be liable for rejection.
- 4. Bidder must submit all documents as listed in checklist with his offer.
- 5. Supplier must note that stage wise inspection for complete fabrication, testing including the raw material inspected to be carried out.
- 6. Vendors for bought out items to be restricted to the approved vendor list attached with bid document. Approval of additional vendor if required, for all critical bought out items shall be obtained by the supplier from the purchaser before placement of order. Credentials/PTR of the additional vendor proposed to be submitted by supplier for review and approval of Purchaser/ Purchaser's representative

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# LIST OF SPARES

## LIST OF SPARES

S.No.	Pa	rt No.	Description		C	Quantity(N	Minimum)
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
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		REFERENCE LIST							VCS-SD-RL-001		
	Service									amp	
EFERENCE LIST	Size and Rating / thk									nature with st	
	Email									Bidder's Sigi	
	Client , Address and Contact No.										
	Year of Supply										
	Project										
	SI No.										
							· · · · · ·				
0	25.05.2017		ISSUED AS STANDARDS					A	S	GS	AD
REV	DATE		DESC	RIPTIC	ON			PR	REP	снк	APPR