

ANNEXURE TO INDENT : 240694241
DESCRIPTION OF EQPT. : **ONLINE DISSOLVED GAS (MULTI GAS) & MOISTURE ANALYZER**
WORK ORDER NO. : 68038-A-512-01, 68039-A-512-01, 68040-A-512-01.
CUSTOMER : M/s MSETCL

ONLINE DISSOLVED GAS (MULTI GAS) & MOISTURE ANALYZER**1. TECHNICAL SPECIFICATION:**

For Technical specification please refer Annexure-A

2. OTHER DETAILS

- Scheme and electrical connection:** Complete schematic showing the connections of power supply to the unit, terminal marking and wiring termination of alarm contacts shall be furnished along with offer. Further, type and size of terminals used in unit shall also be furnished to select suitable cable lugs.
- Mounting details** – Outline and fixing detail drawings for unit to be furnished along with offer, to enable us to provide suitable mounting arrangement. Conduit thread size for cable entry should also be furnished along with offer.
- The bidder** should submit the following along with the technical offer:
 - Compliance checklist as per enclosed Annexure-B duly filled up and signed.
 - 2 sets of descriptive leaflet clearly mentioning the model name of the equipment being offered, catalogue and technical literature of the model.
 - List of the total items in the scope of supply.

3. INSTALLATION AND COMMISSIONING

Installation & commissioning of the system along with all the items necessary for complete installation and commissioning of the item shall also be in the scope of supply of bidder, at each of the project site. The bidder shall install, commission the equipment in all the transformer, provide training for operation and maintenance to our ultimate customer at site on intimation of BHEL, and obtain certificate from the customer for the same. Bidder shall quote the charges for the same, if any, in the offer separately.

The equipment shall be commissioned at site directly by Equipment manufacturer's representative only.

4. INSPECTION & DISPATCH

4.1 Three sets of inspection, routine, acceptance and calibration test reports, operation and maintenance manual, descriptive catalogue/ leaflets shall be sent along with dispatch document. One set shall be supplied along with the equipment.

4.2 The supplier shall furnish a list of all fittings and components in the dispatch details giving description and quantity of each item (Quantity of each item shall be mentioned). All items shall be properly packed in wooden boxes to avoid scratches/damage in transit.

4.3 All the items of each equipment to be kept in set of box only (one Box for main equipment + 1 Box for commissioning/accessories items)

REV	DATE	ALT Ckd & Appd	REV	DATE	ALT Ckd & Appd	REV	NAME	SIGN	DATE
						PREP	S. DUTTA	<i>Suth</i>	04/7/19.
						CKD.	A. DAVE	<i>AD</i>	5.7.19

6

PI-240694241

ANNEXURE-A

xxvii) On-Line Multi Gas (9 Gases) DGA for Transformer Oil.

1. The Monitor shall be a microprocessor based Intelligent Electronic Device (IED), designed to continuously detect and measure Acetylene (C_2H_2), Methane (CH_4), Ethane (C_2H_6), Hydrogen(H_2), Ethylene (C_2H_4), Carbon Dioxide (CO_2), Carbon monoxide (CO) and moisture(H_2O) and the two atmospheric gases i.e. Oxygen(O_2) & Nitrogen(N_2) in Transformer Oil, even at very low concentrations. It should be easy to install and it should be possible to retrofit it on an energized transformer, without shutting down the transformer.
2. The monitor shall be designed for permanent outdoor use in high voltage sub-station environments, for environment temperatures of -10^0 C to 55^0 C or wider range and oil temperatures of -10^0 C to 120^0 C.
3. The monitor shall comply to the following standards:
 - a. IEC 61326-1 EMI/EMC Standards
 - b. IEC 60255-21-1/ IS 9000 Basic Environmental Testing Procedures covering Shock, bump and vibration tests.
 - c. IEC 364-4-41 Protection against electric shock
 - d. IEC 61010 Safety requirements for electrical equipment for

5

Measurement & control use.

e. IEC 60529, IP 55 Weather Proof Standards.

4. The Test kit shall meet the technical requirements listed below:

- a) The monitor shall be equipped with an inbuilt oil circulation system to ensure that the oil being sampled is the true representative sample of the oil from the transformer tank/ in continuous touch with the sensor of the equipment for online continuous monitoring of the oil from the transformer tank.
- b) The equipment should have stabilized extraction and measuring system. The equipment shall be capable of extracting the seven Fault gases and the two Atmospheric gases and measuring them individually and reporting the concentrations from transformer oil.
- c) Moisture Measurement must be through a direct oil immersed Relative Saturation (RS) sensor.
- d) The monitor shall be equipped with an inbuilt oil circulation system with oil flow monitoring and alarm for stoppage of flow. Inlet and return oil lines must be of Stainless Steel.
- e) The monitor must have facility for collecting an oil sample for external oil tests, such as an external quick connect port plus sampling accessories.
- f) As the equipment is to be connected to transformer by the circulating oil lines, its performance should not be affected by vibrations, noise, transformers hum etc.
- g) The Equipment shall connect to the transformer's main body in two locations. One connection is for supply of oil from the transformer, Second connection is for the return of the oil to the transformer.
- h) The equipment outfitted with the ability to communicate via modem/Ethernet or RS232 & RS485 ports and Analog 4-20mA isolated outputs. The result shall be communicated to the local computers and as well as transmitted to remote location computers.
- i) The equipment shall be able to measure gas concentration and when downloaded should immediately compare it with user selected alarm and caution level for immediate display. The sampling rate shall be selectable as for example 4 or 6 or 12 hrs etc.
- j) The equipment shall have inbuilt memory to store the results, for a minimum of 2 years
- k) The equipment should have Front panel display and controls. LCD display to provide upto date information at sight level.

- l) The levels of dissolved gases shall be displayed in PPM. Also, it shall be possible to set different alarms levels for dangerous levels immediately.

5. The technical features of the equipment shall be as under.

i) **Operating Conditions:**

Instrument should work on 230V single-phase, 50Hz supply/ 220 V DC power supply. All the necessary power cables /adapters shall be provided by the supplier. Instrument should have CE certification.

ii) **Detection of Gases: -**

The gases extracted shall be detected using Photo Acoustic Spectroscopy (PAS) method or Gas Chromatograph (GC) method with Thermal Conductivity Detector (TCD) / Flame Ionization Detector (FID) / any other detector. All the fault gases i.e. H₂, CH₄, C₂H₄, C₂H₆, C₂H₂, CO, CO₂ & two atmospheric gases i.e. O₂ and N₂ concentrations shall be individually measured and displayed.

iii) **Performance Parameters: -**

The equipment shall comply to the following Performance parameters.

Gasses	Minimum Detection Limit in ppm	Working Range	Accuracy	Repeatability	Resolution
Hydrogen (H ₂)	5	Up to 5,000ppm	±2ppm or ±5% whichever is better	±2% or ±3ppm whichever is better	0.5
Hydrocarbons (CH ₄ , C ₂ H ₄ , C ₂ H ₆ ,)	3	Up to 5,000ppm			0.2
Acetylen (C ₂ H ₂)	1	Up to 3,000ppm			
Carbon Monoxide (CO)	10	Up to 10,000ppm	±15%	±10%	5
Carbon Dioxide (CO ₂)	25	Up to 30,000ppm	±15%	±10%	5
Moisture (H ₂ O)	0	100% RS	±5%	-	-
Oxygen (O ₂)	500	Up to 25,000ppm	±15%	±10%	200
Nitrogen (N ₂)	10,000	Up to 1,00,000ppm	±15%	±10%	1000

Oil temperature Range	: -10°C to + 120°C
External Temperature Range	: -10°C to + 55°C
Humidity Range	: 10 to 100 %
Pressure withstand.	: The monitor must withstand pressure from Full Vacuum to 40 psi.
Degree of protection of the enclosure:	IP 55
Enclosure material	: Stainless Steel
Operating Voltage	: 230V AC $\pm$ 10%; 50 $\pm$ 5% Hz or 220V DC
Communications	: RS-232 ports and Analog 4 – 20 mA isolated outputs /RS-485, USB, PSTN/GSM Modem, Ethernet shall be Fiber Optic over Ethernet with IEC 61850 protocol support for substation Automation.
Alarm	: Sophisticated Programmable alarm system

6. Calibration:

The instrument has linear response with gases changes then the auto calibration is not necessary. If instrument must have Auto calibrations function on site at regular time interval. The Monitor must be calibrated with a Reference Calibration Gas Standard that has a NIST Traceability Certificate.

7. Software:

The software should provide diagnostic report for individual pieces of equipment or for a full system, using the equipment tree. A laptop PC of Compaq/HP/IBM/DELL/Lenovo make with latest specifications (i.e. Minimum i-5 processor, 4 GB RAM, 320 GB Hard Disk & at-least 14" screen) shall be included in the scope of supply as an accessory to the offered equipment shall be supplied for data Archival, Analysis and reporting. Equipment should be supplied with the user friendly PC software which provides fault indication and fault diagnostics including the following:

Fault indication:

- IEEE, IEC or user configurable levels of dissolved gases
- Rate of change trending

Fault Diagnosis:

- Key gases
- Ratios (Rogers, IEC. Etc)
- Duval's Triangle

2

Free hardware and software upgrade shall be supplied till expiry of guarantee period.

8. Accessories :

The equipment shall be supplied with all necessary accessories required for carrying out on-line DGA of transformer oil complete in all respect as per the technical specification. Bidder to furnish the list of accessories being supplied with the equipments. Free consumables shall be supplied by the bidder till expiry of guarantee period. The following shall be also form a part of supply.

i) Operation Manual : one set for every unit-

1. DGA Software Manual
2. PC Software manual
3. Compact disc giving operation procedures of Main. Manual & Trouble Shooting instructions.

9. DEMONSTRATION:-

The acceptance of the kit shall be subjected to the successful demonstration by supplier to the satisfaction of MSETCL at prescribed site at the time of commissioning.

BIDDER HAS TO COMPLY TECHNICAL SPECIFICATION COMPLETELY. IF THERE IS ANY DEVIATION THAT SHOULD BE CLEARLY BROUGHT OUT.

1

Annexure - B
Compliance Check List

	Compliance to Requirement	Yes/ No	Deviation, if any
1.	COMPLETE COMPLIANCE TO ANNEXURE-A		
2.	OTHER DETAILS		
3.	INSTALLATION AND COMMISSIONING		
4.	INSPECTION & DISPATCH		
3.	DEVATION (IF ANY)		

Seal & Signature of Bidder