

DOCUMENT NO.:



PORTABLE DISSOLVE GAS ANALYZER- SPECIFICATION

A Document of the Kenya Power & Lighting Co. Ltd
June 2018



TITLE:
**PORTABLE DISSOLVE GAS
ANALYSER - SPECIFICATION**

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0.1 CIRCULATION LIST

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COPY NO.	COPY HOLDER
1	Manager, Standards
2	

REVISION OF KPLC STANDARDS

In order to keep abreast of progress in the industry, KPLC standards shall be regularly reviewed. Suggestions for improvements to approved standards, addressed to the Manager, Standards department, are welcome.

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0.2 AMENDMENT RECORD

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Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2018-06-08	New issue	Nancy Wairimu	Dr. Eng. Peter Kimemia

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FOREWORD

This specification has been prepared by the Standards Department in collaboration with Technical Services Department both of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for Portable Dissolve gas analyzer.

The portable Dissolve gas analyzer is intended for use by the Technical Services Department for measuring resistance.

This specification was prepared to establish and promote uniform requirements for portable Dissolve gas analyzer to be used at Kenya Power and Lighting Company Ltd.

There are no other specifications in this series.

This specification stipulates the minimum requirements for portable Dissolve gas analyzer acceptable for use in the company and it shall be the responsibility of the suppliers and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC, good workmanship and good engineering practice in the manufacture of the Portable Dissolve gas analyzer for KPLC.

Users of Kenya Power specifications are responsible for their correct interpretation and application.

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1. SCOPE

- 1.1. This specification is for portable Dissolve gas analyzer for use by company's Technical Services Department.
- 1.2. The specification covers requirements, design, inspection and tests and schedule of Guaranteed Technical Particulars of portable Dissolve gas analyzer.

2. NORMATIVE REFERENCES

The following standards contain provision which, through reference in this text, constitute provisions of this specification. For dated editions the cited edition will apply; for undated editions the latest edition of the referenced document shall apply.

- IEC 61557: Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c - Equipment for testing, measuring or monitoring of protective measures - Part 1: General requirements;
- IEC 60815: Selection and dimensioning of high voltage insulators intended for use in polluted conditions -Part 1: Definitions, information and general principles
- OIML D 11: General Requirements for Measuring Instruments - Environmental Conditions
- IEC 61000: Electromagnetic Compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test; – Part 6-2: Generic standards – Immunity for Industrial environment.
- IEC 60529: Degrees of protection provided by enclosures (IP code)
- ISO 9001: Quality Management systems – Requirements
- ISO/IEC 17025: General Requirements for the competence of testing and calibration laboratories

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3. DEFINITIONS AND ABBREVIATIONS

For the purpose of this specification the definitions and abbreviations given in the reference standards shall apply together with the following abbreviations.

3.1. ABBREVIATIONS

KPLC- Kenya Power and Lighting Company Limited

ISO – International Organization for Standardization.

LED –Light Emitting Diode

Kg –Kilogram

KV - Kilovolt

IP – Ingress Protection

LV – Low Voltage

EMC – Electromagnetic Compatibility

EU – European Union

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

4.1.1 The Portable Dissolve gas analyzer shall be suitable for use outdoors in tropical areas and harsh climatic conditions including areas exposed to:

a) Altitudes of up to 2200m above sea level;

b) Humidity of up to 95%;

c) Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C

d) Pollution: Design pollution level to be taken as “Heavy” (Pollution level III) for inland and “Very Heavy” (Pollution level IV) for coastal applications in accordance with IEC 60815.

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4.2. DESIGN AND CONSTRUCTION

- 4.2.1. The portable Dissolve gas analyser shall be designed, manufactured and tested according to IEC 61557.
- 4.2.2. The portable Dissolve gas analyser shall be capable of taking different measurements, including:
- a) Transformer oil,
 - b) Transformer Gas
- 4.2.3. It shall be portable, weight, compact and rugged.
- 4.2.4. suitable for site testing
- 4.2.5. It shall have the technical particulars as shown in table 1 below:

Table 11: Technical particulars of Portable Dissolve gas analyzer

Parameters	
Measurement technology	Dual-channel gas chromatograph Micro-machined injectors and TCD detectors Shake Test® sampling and gas extraction1
Gases measured	H2 (hydrogen) CH4 (methane) C2H6 (ethane) C2H4 (ethylene) C2H2 (acetylene) CO (carbon monoxide) CO2 (carbon dioxide) O2 (oxygen) N2 (nitrogen)
Gas-in-oil measurement range	H2: 5 - 60,000 ppm Other fault gases: 1 - 60,000 ppm O2: 4000 - 100,000 ppm N2: 10,000 - 100,000 ppm
Gas-in-oil repeatability	H2: greater of ± 2 ppm or ± 2% CO2: greater of ± 10 ppm or ± 2% Other fault gases: greater of ± 2 ppm or ± 2% O2: ± 2% N2: ± 2%
Gas-in-oil accuracy	H2: greater of ± 5 ppm or ± 6% CO2: greater of ± 10 ppm or ± 6% Other fault gases: greater of ± 2 ppm or ± 6% O2: ± 6% N2: ± 6%
Gas-in-oil specifications encompass instrument-to-instrument, syringe-to-syringe and gas	

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extraction method uncertainties.	
Resolution	All gases: 1 ppm
Measurement time	2 minutes
Calibration	NIST traceability
Sampling	100 ml Shake Test® syringe for oil samples 10 ml glass syringe for gas samples from relay, tank or PTFE membrane Room temperature injection
Sample integrity	Used as directed, individual syringes ensure no gas loss and no cross contamination Automatic line purging with internal sampling pump
Gas filtering	Disposable oil traps (5µm) Replaceable particle trap (10µm)
Communication & Data	
Connectivity	Direct or networked TCP/IP Ethernet
Interface Software	(Win 98, 2000, NT, XP, Vista) Provides instrument control, data acquisition, data management, DGA diagnostic tools, and customizable PDF reports
Operation	
Power supply	Inline power adaptor with IEC 60320/C14 receptacle Input: 100 – 240 VAC, 50/60 Hz, 100 W, 1Ø Output: 24VDC, 6.2A 8 ft power cord with IEC 60320/C13 to NEMA 5-15P
Gas requirements	99.999% He, 80 psi
Operating temperature range (standard)	0 to 50°C
Storage temperature range	0 to 75°C
Humidity range	5 - 95% RH non-condensing
Altitude	Up to 4,500 m (15,000 ft)
Cooling	Forced air convection
Maintenance	Annual visual inspection
Expected Operating Life	> 10 years

Construction	
Width	250 mm
Height	155 mm
Depth	420 mm

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Weight	10 kg
Enclosure	Cast aluminum frame, aluminum covers, powder coat paint, carrying handle
Ruggedness	Drop tested to 1 m

Standard instrument and kits	
Analyzer	portable DGA MicroGC PPMreport 3 interface software
Calibration Kit	2 gas tight glass syringes (10 cc) NIST traceable CALGAS cylinder (500 cc) Micro-flow regulator with dial gauge CO2 trap
Oil Sampling Kit	Shake Test® syringe (100 cc) Bag of oil traps (25/bag) CO2 trap
Squirt Method Kit	Squirt stopper Squirt tube
O2/N2 Kit - Field	Shake Test® syringe (100 cc) Extraction gas cylinder (500 cc) Micro-flow regulator with dial gauge
O2/N2 Kit - Laboratory	Bench top micro-flow regulator assembly with line and fittings
Field Kit	Ruggedized field carrying case Portable controller Syringe carrying case with 4 Shake Test® syringes Helium field module with regulator High pressure filling line 3 bags of oil traps (25/bag)
Lab Kit	Two-stage helium pressure regulator with CGA 580 connection and gas supply line Syringe carrying case with 4 Shake Test® syringes 3 bags of oil traps (25/bag) Syringe shaker

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Consumables and Accessories
NIST traceable CALGAS cylinder (500 cc), suitable for 200 calibrations
Extraction gas cylinder (500 cc), for O2/N2 Kit - Field
Bag of oil traps (25/bag)
Shake Test® syringe (100 cc)
Gas tight syringe (10 cc)
CO2 trap
3-way valve/stopcock (20/bag)
Inline power adaptor with IEC 60320/C14 receptacle

Others	
Syringe Shaker	Easy-to-use automatic shaker Ideal for laboratory applications Holds up to 3 Shake Test® syringes simultaneously
Helium Field Module with Regulator	Provides 30 hours autonomous operation Includes high pressure filling line
Ruggedized Field Carrying Case	Sturdy plastic case with retractable handle and rollers Stores all necessary accessories including portable controller to measure 9 gases Provides convenient field workstation Weights 26 kg when fully equipped
Portable Controller	Preloaded with Windows, PPMreport, support documentation, instrument-specific method file Fits inside the Field Carrying Case Shockproof
12VDC/120VAC Vehicle Inverter	Connects to 12V vehicle source Pure sine, 300W
Shake Test® Syringe Carrying Case	Holds securely up to 6 syringes
TOA Diagnostic Software	Transformer Oil Analyst software (in standalone and web based versions)
On-site Training	1-day on-site training , (maximum of three people)
Warranty	from 3 to 5 years

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5. TESTS REQUIREMENTS

The Portable Dissolve gas analyser shall be inspected and tested in accordance with the requirements of relevant standards and provision of this specification.

6. MARKING AND PACKING

6.1. MARKING

The following information shall be marked legibly and in a permanent manner on the Portable Dissolve gas analyzer:

- a) The manufacturer's name or trade mark;
- b) The type reference number / model number;
- c) Units of the measured quantity;
- d) Ranges of measurement;
- e) Type of battery and polarity of connection in the battery compartment
- f) Standard of manufacture;
- g) The serial number;
- h) The instructions for handling and use (in the English Language).
- i) The words "PROPERTY OF KENYA POWER AND LIGHTING COMPANY."

6.2. PACKING

- 6.2.1. The Portable Dissolve gas analyser shall be packed in a carrying case so as to protect it from damage and entry of moisture during transportation, handling and storage.
- 6.2.2. The carrying case shall shock proof and impact resistant and shall be able to withstand a fall of one meter without damage to the Portable Dissolve gas analyser.

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APPENDICIES

A: TESTS AND INSPECTION (Normative)

- A.1 It shall be the responsibility of the supplier to test or to have all the relevant tests performed.
- A.2 Copies of Type Test Certificates and Type Test Reports issued by a third party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation. A copy of the accreditation certificate for the testing laboratory shall also be submitted with the tender (all in English Language). Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Authority.
- A.3 Test certificates and calibration certificates for the Portable Dissolve gas analyser to be supplied shall be submitted to KPLC for approval before shipment/delivery of the equipment.
- A.4 On receipt of the portable dissolve gas analyzer Kenya Power will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to Kenya Power, any Dissolve gas analyser which upon examination, test or use fail to meet any or all of the requirements in the specification.

B: QUALITY MANAGEMENT SYSTEM (Normative)

- B.1 The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the Portable Dissolve gas analyser physical properties, tests and documentation, will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001: 2015.
- B.2 The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001:2015 certificate shall be submitted with the tender for evaluation.
- B.3 The bidder shall indicate the delivery time of the equipment, manufacturer's monthly & annual production capacity and experience in the production of the Portable Dissolve gas analyser being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the Portable Dissolve gas analyser sold in the last five years as well as reference letters from at least four of the customers shall be submitted with the tender for evaluation.

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C: DOCUMENTATION AND DEMONSTRATION (Normative)

C.1 The bidder shall submit its tender complete with technical documents for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:

- a) Fully filled clause by clause guaranteed technical particulars (GTP) signed by the manufacturer;
- b) Copies of the Manufacturer's catalogues, brochures, drawings giving all relevant dimensions, Wiring diagram / Schematic Diagram and technical data;
- c) Sales records for the last five years and at least four customer reference letters;
- d) Details of manufacturing capacity and the manufacturer's experience;
- e) Copies of required type test reports by a third party testing laboratory accredited to ISO/IEC 17025;
- f) Copy of accreditation certificate to ISO/IEC 17025 for the third party testing laboratory;
- g) Manufacturers letter of authorization, ISO 9001 certificate, and other technical documents required in the tender.
- h) Manufacturer's warranty and guarantee; subject to 12 months from date of delivery to KPLC stores
- i) Operational manual.
- j) Service manual.

C.2 The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:

- a) Fully filled clause by clause guaranteed technical particulars (GTP) stamped and signed by the manufacturer;
- b) Design Drawings with details of the Portable Dissolve gas analyzer to be manufactured for KPLC.
- c) Product manuals, operation manuals and brochures,
- d) Quality assurance plan (QAP) that will be used to ensure that the design, material; workmanship, tests, service capability, maintenance and documentation will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001.
- e) Marking details and method to be used in marking the Portable Dissolve gas analyzer;

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- f) All documentation necessary for safety of the equipment.
- g) Packaging details (including packaging materials).

- C.3. The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the Portable Dissolve gas analyzer to KPLC stores.
- C.4. The successful bidder shall demonstrate to KPLC Staff (in Nairobi) the use of the Portable Dissolve gas analyzer.

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D: GUARANTEED TECHNICAL PARTICULARS (Normative)

To be filled and signed by the Manufacturer and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for previous five years, four customer reference letters, details of suppliers' capacity and experience; and copies of complete type test certificates and test reports for tender evaluation, all in English Language)

Tender No.

Bidder's name and Address.....

Clause number	Requirement	Bidder's offer
	Manufacturer's Name and address	Specify
	Country of Manufacture	Specify
	Name and model Number	Specify
1.	Scope	State
2.	Normative References	State
3.	Definitions and Abbreviations	
3.1.	Abbreviations	State
4.	Requirements	
4.1	Service Conditions	State
4.2		
4.2.1		State
4.2.2		State
4.2.3		State
		State
4.2.4		State
4.2.5	Technical particulars	State
		State
		State
		State
		State
		List

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5	Test Requirements	Specify
6	Marking and Packing	
6.1	Marking	Specify
6.2	Packing	Specify
A	Test and inspection	
A.1	Responsibility of carrying out tests	State
A.2	Copies of Type Test Reports submitted with tender	Provide
A3	Test certificates and calibration certificates to be submitted by supplier to KPLC for approval before supply/delivery	Provide
A.4	Inspection at the stores and replacement of rejected items	State compliance
B	Quality Management System	
B.1	Quality Assurance Plan	Provide
B.2	Copy of ISO 9001:2015 Certificate	Provide
B.3	Delivery time of the equipment	Provide
	Manufacturer's experience	Provide
	Manufacturing Capacity (units per month)	Provide
	List of previous customers	Provide
	Customer reference letters	Provide
C	Documentation and demonstration	
C.1	Documents submitted with tender	Provide
C.2	Documents to be submitted by supplier to KPLC for approval before manufacture	Provide
C.3	Documents to be submitted during delivery at the store	Provide
C.4	Demonstration	State
	Statement of compliance to specification (indicate deviations if any & supporting documents)	State compliance

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Manufacturer's Name, Signature, Stamp and Date

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