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0.1 Circulation List

COPY NO.	COPY HOLDER
1	Research & Development Manager
2	Procurement Manager
3	Stores & Transport Manager
4	Technical Services Manager
5	Design & Construction Manager
6	Deputy Manager, Technical Audit

0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)

FOREWORD

This specification has been prepared by the Research and Development Department in collaboration with the Technical Services and Transmission Departments all of the Kenya Power & Lighting Company Ltd (KPLC) and it lays down requirements for 66kV Disconnector. The specification is intended for use by KPLC in purchasing the equipment.

The manufacturer shall submit information which demonstrates satisfactory service experience with products which fall within the scope of this specification.

1. SCOPE

This specification is for newly manufactured outdoor 66kV 800 Amps 50Hz Disconnector (Isolator) for use on overhead line disconnection and sectionalizing applications.

The specification also covers inspection and test of the Disconnector as well as schedule of Guaranteed Technical Particulars to be filled, signed by the manufacturer and submitted for tender evaluation.

The specification stipulates the minimum requirements for 66kV Disconnector (overhead lines type) acceptable for use in the company and it shall be the responsibility of the Manufacturer to ensure adequacy of the design, good workmanship and good engineering practice in the manufacture of the Disconnector for KPLC.

The specification does not purport to include all the necessary provisions of a contract.

2. REFERENCES

The following standards contain provisions which, through reference in this text constitute provisions of this specification. Unless otherwise stated, the latest editions (including amendments) apply.

ISO 1461: Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods.

IEC 62271-102: High Voltage Switchgear and Controlgear Part 102: Alternating Current Disconnectors and Earthing Switches.

IEC 60273: Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1000V.

3. TERMS AND DEFINITIONS

The terms and definitions given in the reference standards shall apply.

4. REQUIREMENTS

4.1 Service Conditions

The disconnector shall be suitable for continuous outdoor operation in tropical areas with the following conditions.

(a) Altitude: Up to 2200 metres above sea level.

(b) Temperature: average of +30°C with a minimum of -1°C and max +40 °C

(c) Humidity: up to 95%,

(d) Pollution: Design pollution level to be taken as "*Heavy*" (Pollution level III) according to IEC 815 (25mm/kV)

(e) Isokeraunic level: 180 thunderstorm days per year

(f) Wind pressure on project area of conductors & cylindrical objects: 383-430N/m²

(g) Max wind pressure on steel members on 1.5 times projected area: 820N/m²

4.2 General Requirements

4.2.1 The disconnector shall be designed and manufactured to IEC 62271-102 and the requirements of this specification. The breaking medium shall be air.

4.2.2 The disconnector shall be horizontal side opening, double side break with rotating centre post insulator type for use on a 66kV, 50 Hz, 3 - phase system.

4.2.3 The isolator shall be complete with supporting steelwork, base, phase coupling details, operating rod, unions and guides and operating mechanism. In addition, the isolator shall be complete with necessary steelwork including mounting stalk for mounting on wooden or concrete pole at a height of 12.0m above ground level.

4.2.4 The isolator shall be fitted with manual operation facility. The operating pipe shall be of 38mm outside diameter and thickness of at least 1.2mm.

4.2.5 The operating pipe shall have an insulation insert of at least 0.6m length and of adequate mechanical strength to withstand the switch operations.

4.2.6 All the three switches shall be arranged so that the phase units are mounted independently and then finally interconnected with coupling tubes so as to ensure simultaneous operation of all switches by drive rods and manual operating handle.

4.2.7 The operating mechanism shall be fixed at the base frame, in a weather proof, vermin proof and dust proof housing. The degree of protection shall be class IP 54 as per IEC. The operating mechanism shall be provided with a universal joint to allow for a reasonable degree of out-of alignment of the operating rod.

4.2.8 The design shall incorporate every reasonable precaution and provision for the safety of all those concerned in the operation and maintenance of the equipment keeping in view the regulatory requirements in Kenya.

4.2.9 All material used shall be of the best quality and of the class most suitable for working under the conditions specified and shall withstand the variations of temperatures and atmospheric conditions arising under working conditions without undue distortion or deterioration or the setting up of undue stresses in any part, and also without affecting the strength and suitability of the various parts for the work which they have to perform.

In choosing materials and their finishes, due regard shall be given to the humid tropical conditions under which the equipment will be called upon to work. The supplier shall submit details of his usual practice which have proven satisfactory and which he recommends for application to the parts of the work, which may be affected by tropical conditions. All parts of the switchgear shall be rodent and vermin proof.

4.2.10 Corresponding parts liable to be replaced shall be interchangeable.

4.2.11 All components, including insulators with their mountings, shall be designed so as to avoid pockets in which water can collect.

4.2.12 All connections and contacts shall be of ample section and surface for carrying continuously the specified currents without undue heating and fixed connections shall be secured by bolts or set screws of ample size, adequately locked. Lock nuts shall be used on stud connections carrying current.

4.2.13 All ferrous parts shall be galvanized by the hot-dip process to ISO 1461 and for all parts other than steel wires shall consist of a thickness of zinc coating equivalent to

not less than 610g of zinc per square meter of surface. The zinc coating shall be smooth, clean and of uniform thickness and free from defects. The preparation of galvanizing and the galvanizing itself shall not adversely affect the mechanical properties of the coated material. The quality will be established by tests as per ISO 1461.

4.2.14 Each phase shall be mounted on a spiral type solid core porcelain post insulator conforming to IEC 60273, and shall be fitted with clamp connector for ACSR conductor of 18.2 mm overall diameter and AAAC conductor of 24.7mm overall diameter. The clamp connectors shall be of ample cross-section and surface for carrying continuously the specified current of 800A.

4.2.15 The isolator shall be designed such that in fully open position, it shall provide adequate electrical isolation between the contacts on all the three switches.

4.2.16 All current carrying parts shall be made of electrolytic high conductivity hard drawn copper with switch contacts silver plated. Five spare male and five spare female contacts shall be supplied with each disconnector.

4.2.17 The disconnector shall be provided with a padlocking facility such that the mechanism can be locked in OPEN or CLOSED position. The facility shall be suitable for padlocks with 8mm steel shackle.

4.2.18 The disconnector shall have an earthing point for connection to the earth.

4.3 Ratings

The rating of the complete disconnector shall be as indicated below.

Nominal Voltage and frequency		66kV, 50Hz
Highest Voltage of equipment		72.5kV
Normal current, minimum		800 Amps
Rated short circuit withstand current & time		12.5kA, 3s
Rated short circuit making current		31kA
Lightning impulse withstand voltage, 1.2/50µs, dry, +ve	With contacts closed	380 kV peak
	Across open contacts	435kV peak
One minute power frequency withstand voltage, 50Hz, 60s	With contacts closed	150kV r.m.s.
	Across open contacts	185kV
Minimum creepage distance of insulator		1800mm

Minimum clearance phase-to-phase (phase centres)	1000mm
Minimum clearance phase-to-earth	1000mm
Mechanical endurance (number of close-open cycles without using spare parts)	2000 (minimum)

4.4. QUALITY MANAGEMENT SYSTEM

4.4.1 The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the disconnector design, material, workmanship, tests, service capability, maintenance and documentation, will fulfil the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfil the requirements of ISO 9001:2008.

4.4.2 The Manufacturer's Declaration of Conformity to reference standards and copies of quality management certifications including copy of relevant and valid ISO 9001: 2008 certificate shall be submitted with the tender for evaluation.

5. TESTS AND INSPECTION

5.1 The Disconnector shall be inspected and tested in accordance with the requirements of IEC 62271-102 and this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.

5.2 Copies of previous Type Test Certificates and Type Test Reports issued by the relevant International or National Testing/ Standards Authority or Independent and ISO/IEC 17025 accredited testing laboratory shall be submitted with the offer for evaluation (all in English Language). A copy of the accreditation certificate for the laboratory shall also be submitted. Any translations of type test certificates and type test reports into English language shall be signed and stamped by the Testing Authority.

Copies of type test certificates and type test reports to IEC 62271-102 for the disconnector offered to be submitted for tender evaluation shall include:

- Dielectric tests (Lightning Impulse and Power Frequency Withstand Tests),
- Short time withstand and peak withstand current tests,
- Temperature rise test,
- Measurement of the resistance of circuits,
- Verification of the protection,
- Tightness tests,
- Electromagnetic compatibility tests,
- Operation and mechanical endurance tests,

- Operation at the temperature limits.

5.3 The disconnector shall be subject to acceptance tests at the manufacturer's works before dispatch. Acceptance tests shall be witnessed by two Engineers appointed by The Kenya Power and Lighting Company Limited (KPLC) and shall include the following Routine Tests to IEC 62271-102:

- Dielectric test on main circuit,
- Measurement of the resistance of the main circuit,
- Tightness test,
- Design and visual checks and
- Mechanical operating tests.

5.4 Testing Facility

The bidder shall provide current e-mail address, fax and telephone numbers and contact person at the International or National Standards/Testing Facility or testing laboratory of the country where the disconnector is manufactured and tested.

5.5 Test reports for each disconnector (including its individual components) shall be submitted to The Kenya Power and Lighting Company for approval before shipment.

5.6 On receipt of the disconnector, KPLC will inspect it and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The supplier shall replace/rectify without charge to KPLC, equipment which upon examination, test or use fail to meet any or all of the requirements in the specification.

6. MARKING, LABELLING AND PACKING

6.1 The disconnector and associated components shall be packed in a manner as to protect it from any damage in transportation and handling.

6.2 Each assembly and package of items associated with the disconnector shall be suitably marked for ease of identification.

6.3 In addition to markings and labels required elsewhere in the specification, each equipment and component shall be marked in accordance with the relevant IEC standard. Each disconnector shall be provided with a rating plate of weatherproof material, fitted in a visible position, showing the appropriate details listed in IEC 62271-102. The entries on the plate shall be indelibly marked (either by etching, engraving or stamping).

Annex A

SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS FOR DISCONNECTOR OFFERED (pls indicate units of measure)

No.	REQUIREMENTS			GUARANTEED PARTICULARS	COMMENTS
1.	Name of the manufacturer and country of manufacture				
2.	Applicable standards				
3.	Service (indoor/outdoor), altitude, temperature range, humidity, environment (pollution severity level), wind speed etc				
4.	Type	Model/Type Reference Number			
		Breaking medium			
5.	Steelwork & components to be supplied (including components and mounting stalk for mounting on wooden or concrete poles at a height of 12m above ground level)				
6.	Operating mechanism				
7.	Contacts	Materials			
		Thickness of silver coating			
		Contact resistance			
		Current Density	Moving blade		
			Terminal pad		
			Contacts		
			Terminal connector		
		Spare contacts (five male & five female)			
8.	Rating				
	Nominal System Voltage and frequency*				
	Highest System Voltage of equipment				
	Rated continuous current				
	Rated short circuit withstand current & time				
	Rated short circuit making current				
	Breaking capacity of capacitive current				
	Rated inductive current switching capacity				
	Max temperature rise under rated voltage and current				
	Breaking capacity at rated voltage				
	Lightning impulse withstand voltage,	With contacts closed			
		Across open contacts			

	1.2/50μs, dry, +ve			
	One minute power frequency withstand voltage, 50Hz, 60s	With contacts closed		
		Across open contacts		
	Creepage distance of insulator			
	Minimum clearance between phases (phase centres)			
	Minimum clearance to earth			
	Mechanical endurance (number of close-open cycles without using spare parts)			
9.	Padlocking facility in both open and closed position			
10.	Degree of protection			
11.	Any special assembly tools			
12.	Corona prevention			
13.	Manufacturer's Guarantee and Warranty			
14.	List catalogues, brochures, technical data, drawings submitted to support the offer.			
15.	List customer sales records submitted to support the offer.			
16.	List Type Test Certificates and Type Test Reports submitted with tender (indicate test report numbers, date, Testing Institution and contact addresses) • Dielectric tests (Lightning Impulse and Power Frequency Withstand Tests), • Short time withstand and peak withstand current tests, • Temperature rise test, • Measurement of the resistance of circuits, • Verification of the protection, • Tightness tests, • Electromagnetic compatibility tests, • Operation and mechanical endurance tests, • Operation at the temperature limits.			
17.	List Acceptance Tests to be witnessed by KPLC Engineers at the factory			
18.	List test reports (for disconnector and components) to be submitted to KPLC for approval before shipment			
19.	Copy of ISO 9001:2008 Certificate submitted (indicate relevance and validity)			
20.	Quality Assurance Plan			
21.	Manufacturer's Declaration of Conformity to Standards (including IEC 62271-102)			
22.	Statement of compliance to tender specifications			
23.	Guaranteed reliability and maintenance indicators: a) reliability (MTBF)			

	b) availability (A) c) maintainability (MTTR) d) service life e) warranty period of actuating under normal service conditions without maintenance		
24.	Deviations from tender specifications and supporting data, test reports, technical documents etc.		
25.	Inspection of the disconnector and components at KPLC stores/site.		
26.	List and details of auxiliaries, fittings, components and accessories included in scope of supply.		

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Manufacturer's Name, Signature, Stamp and Date