

DOCUMENT NO.: KP1/13D/4/1/TSP/04/016



Kenya Power

**PORCELAIN STAY INSULATORS (LV, 11 kV and 33 kV) –
SPECIFICATION**

A Document of the Kenya Power & Lighting Co. Plc
July 2022



TITLE:
PORCELAIN STAY INSULATORS
(LV, 11 kV and 33 kV) -
SPECIFICATION

Doc. No.	KP1/13D/4/1/TSP/04/016
Issue No.	2
Revision No.	0
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0.1 CIRCULATION LIST

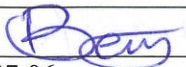

COPY NO.	COPY HOLDER
1	Manager, Standards
2	Electronic copy (pdf) on Kenya Power server (http://172.16.1.40/dms/browse.php?ffolderId=23)

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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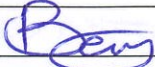



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0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 1 Rev 0	2016-08-30	1. Foreword: Replaced “manufacturer” with “supplier” 2. Marking, Labelling and Packing: Added Clause 6.1 (e) – KPLC PROPERTY 3. Changed title of spec to: PORCELAIN STAY INSULATORS (11 kV and 33 kV) - SPECIFICATION	Eng. Stephen Nguli	Dr. Eng. Peter Kimemia
Issue 2 Rev 0	2022-05-05	1. Changed title of spec to: PORCELAIN STAY INSULATORS (LV, 11 kV and 33 kV) - SPECIFICATION 2. Included clauses and drawing on requirements for Low Voltage (LV) Stay Insulators 3. Updated the GTPs to clause by clause format	Jean Otsyula Richard Kioko	Eng. Simon Kimitei

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FOREWORD

This Specification has been prepared by the Standards Department of the Kenya Power and Lighting Company Plc (KPLC) and it lays down requirements for Porcelain Stay Insulators for LV, 11 kV and 33 kV. It is intended for use by KPLC in purchasing the insulators.

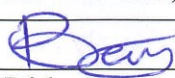
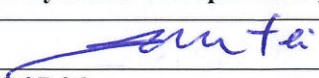
This specification stipulates the minimum requirements for Porcelain Stay Insulators acceptable for use in the company and it shall be the responsibility of the supplier and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC.

Good workmanship and good engineering practice shall be exhibited in the manufacture of the Porcelain Stay Insulators for KPLC.

Users of this KPLC specification are responsible for its correct interpretation and application.

The following are members of the team that developed this specification:

Name	Department
Richard Kioko	Network Management
Jean Otsyula	Standards

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1. SCOPE

- 1.1. This Specification is for Porcelain Stay Insulators for use on overhead power distribution lines operating at nominal voltage of up to 33 kV, 50 Hz.
- 1.2. The specification stipulates the minimum requirements, inspection and tests of the Porcelain Stay Insulators as well as a schedule of Guaranteed Technical Particulars.

2. NORMATIVE REFERENCES

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

- IEC 60383: Tests on insulators of ceramic material or glass for overhead lines with a nominal voltage greater than 1000V.
- IEC 60060-1: High-voltage test techniques. Part1: General definitions and test requirements.
- BS 137: Insulator of ceramic material or glass for overhead lines with a nominal voltage greater than 1000V.
- BS 183: Specification for general purpose galvanized steel wire strand.

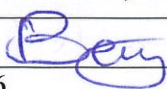

3. DEFINITIONS AND ABBREVIATIONS

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

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

- 4.1.1 The Porcelain Stay Insulators shall be suitable for use in both indoor and outdoor in tropical areas and harsh climatic conditions including areas exposed to:
 - a) Altitudes of up to 2200m above sea level;

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- 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.
- e) Isokeraunic levels of up to 180 thunderstorm days per year.

4.2. DESIGN, MATERIALS AND CONSTRUCTION

- 4.2.1. The insulator shall be designed for insulation of stays to reduce risk of dangerous potential gradients at ground level and, in the case of stays on earthed structures, to prevent electrolytic corrosion of stay rods.
- 4.2.2. The insulating material shall be porcelain.
- 4.2.3. The porcelain shall be sound, thoroughly vitrified and free from defects and blemishes which might adversely affect the life of the insulator. The exposed parts of the porcelain shall be smoothly glazed and shall be brown in colour.
- 4.2.4. The insulator shall be free from stresses due to expansion and contraction in any part which may lead to deterioration.
- 4.2.5. The holes in the insulator shall be smoothly radiused with as large a radius as practicable to present an even bearing surface to the stay strand loop.

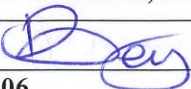
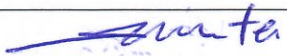
4.3. PARTICULAR REQUIREMENTS

4.3.1. Particular Requirements for Low Voltage (LV) Stay Insulators

- 4.3.1.1. The insulator shall be strain type suitable for stay wire size 4/4.00mm Grade 700 (4/8 SWG), stay wire to BS 183.
- 4.3.1.2. The minimum failing load of the insulator shall be: 80 kN
- 4.3.1.3. The minimum power frequency wet flashover voltage shall be: 18kV, r.m.s.
- 4.3.1.4. The minimum power frequency dry flashover voltage shall be: 35kV peak, positive.
- 4.3.1.5. The insulator shall be to the general arrangement drawing shown in DRG. NO. TSP/04/016/03.

4.3.2. Particular Requirements for 11 kV Stay Insulators

- 4.3.2.1. The insulator shall be strain type suitable for stay wire size 7/4.00mm Grade 700 (7/8 SWG), stay wire to BS 183.
- 4.3.2.2. The minimum failing load of the insulator shall be: 110 kN.

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4.3.2.3. The minimum power frequency wet flashover voltage shall be: 20 kV r.m.s.

4.3.2.4. The minimum impulse withstand voltage shall be: 60 kV peak, positive.

4.3.2.5. The insulator shall be to the general arrangement drawing shown in DRG. NO. TSP/04/016/01.

4.3.3. Particular Requirements for 33 kV Stay Insulators

4.3.3.1. The insulator shall be strain type suitable for stay wire size 19/3.55mm Grade 700 (19/10 SWG), stay wire to BS 183 and its respective guy grip.

4.3.3.2. The minimum failing load of the insulator shall be: 110 kN

4.3.3.3. The minimum power frequency wet flashover voltage shall be: 48kV,r.m.s.

4.3.3.4. The minimum impulse withstand voltage shall be: 100 kV peak, positive.

4.3.3.5. The insulator shall be to the general arrangement drawing shown in DRG. NO. TSP/04/016/02.

5. TESTS REQUIREMENTS

The Porcelain Stay Insulators shall be inspected and tested in accordance with the requirements of relevant standards and provisions of this specification.

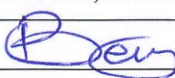
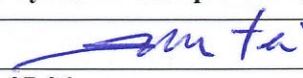
6. MARKING AND PACKING

6.1. MARKING

The following information shall be marked legibly and indelibly on each insulator:

- The manufacturer's name or trade mark;
- The year of manufacture
- The batch or serial number
- The mechanical failing load
- The words "**KPLC PROPERTY**"

The marking may be printed or impressed provided such impressions do not impair the performance of the insulator.

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6.2. PACKING

- 6.2.1. The insulators shall be packed in wooden crates which are reinforced and held closed by external steel wire bindings. Each crate shall be internally braced to permit stacking and the steel wire bindings shall be designed to keep the crate firmly closed and permit easy and rapid opening at the time of installation.
- 6.2.2. The crates shall then be stacked on a sturdy wood pallet. The assembly shall be held tightly in place with steel bands and protected against moisture by a complete covering of heat-shrinkable polyethylene film.

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APPENDICES

A: TESTS AND INSPECTION (Normative)

- A.1 The insulators shall be inspected and tested in accordance with the requirements of IEC 60383, IEC 60060-1, BS 137 and the requirements of this specification. It shall be the responsibility of the manufacturer 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 and scope of accreditation 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.

Copies of type test certificates and type test reports for the insulators offered to be submitted shall include:

- Dry lightning impulse withstand voltage test
- Wet power-frequency withstand voltage test
- Verification of dimensions
- Porosity test
- Test for mechanical strength

NOTE: *Type test reports for stay insulator of similar or higher voltage rating and similar or higher mechanical failing load shall be accepted as representative for any of the stay insulators on tender.*

- A.3 A sample of each type of stay insulator offered shall be submitted with the bid documents for evaluation.
- A.4 The Porcelain Stay Insulators shall be subjected to acceptance tests at the manufacturer's works before dispatch. Acceptance tests shall be witnessed by two Engineers appointed by KPLC and shall include the following:
- Impulse withstand voltage test
 - Wet power-frequency withstand voltage test
 - Verification of dimensions
 - Porosity test
 - Test for mechanical strength
- A.5 On receipt of the Porcelain Stay Insulators 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 manufacturer shall replace without charge to Kenya Power, any insulators which upon examination, test or use fail to meet any or all of the requirements in the specification.

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B: QUALITY MANAGEMENT SYSTEM (Normative)

- B.1 The bidder shall submit a quality assurance plan (QAP) that will be used to ensure that the Porcelain Stay Insulators' 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 insulators, manufacturer's monthly & annual production capacity and experience in the production of Porcelain Stay Insulators being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the Porcelain Stay Insulators sold as well as reference letters from at least four of the customers shall be submitted with the tender for evaluation.

C: DOCUMENTATION (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:
- Fully filled clause by clause guaranteed technical particulars (GTP) signed and stamped by the manufacturer;
 - Copies of the Manufacturer's catalogues, brochures, drawings and technical data;
 - Sales records and customer reference letters;
 - Details of manufacturing capacity and the manufacturer's experience;
 - Copies of required type test reports by a third party testing laboratory accredited to ISO/IEC 17025;
 - Copy of accreditation certificate to ISO/IEC 17025 for the third party testing laboratory;
 - Manufacturer's ISO 9001:2015 certificate, and other technical documents required in the tender.
- C.2 The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:
- Fully filled clause by clause guaranteed technical particulars (GTP) stamped and signed by the manufacturer;

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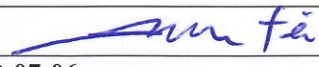


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- a) Design Drawings and construction details of the stay insulator.
- b) Product manuals and brochures,
- c) Quality assurance plan (QAP) based on ISO 9001.
- d) Test program to be used after manufacture.
- e) Marking details and method to be used in marking the insulators.
- f) Packaging details (including packaging materials).

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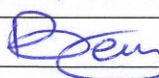
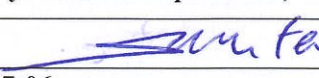
D: GUARANTEED TECHNICAL PARTICULARS (Normative)

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, customer reference letters, details of manufacturer's 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	State
4.	Requirements	
4.1	Service Conditions	State
4.2	Design, Materials and Construction	
4.2.1	Insulator design	State
4.2.2	Insulating material	State
4.2.3	Finish and colour of insulating material	State
4.2.4	Insulator free from stresses	State
4.2.5	Design of hole in the insulator	State
4.3.1	Particular Requirements for Low Voltage (LV) Stay Insulators	
	Type of insulator offered	State
	Size and grade of stay wire to be used	State
	Minimum failing load of insulator (kN)	State
	Minimum power frequency wet flashover voltage (kV, r.m.s.)	State
	Minimum power frequency dry flashover voltage (kV peak, positive)	State
	Drawing of insulator submitted (indicate drawing number)	State
4.3.2	Particular Requirements for 11 kV Stay Insulators	
	Type of insulator offered	State
	Size and grade of stay wire to be used	State
	Minimum failing load of insulator (kN)	State
	Minimum power frequency wet flashover voltage (kV, r.m.s.)	State
	Minimum impulse withstand voltage (kV peak, positive)	State
	Drawing of insulator submitted (indicate drawing number)	State

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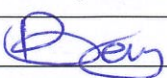



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Clause number	Requirement	Bidder's offer
4.3.3	Particular Requirements for 33 kV Stay Insulators	
	Type of insulator offered	State
	Size and grade of stay wire to be used	State
	Minimum failing load of insulator (kN)	State
	Minimum power frequency wet flashover voltage (kV, r.m.s.)	State
	Minimum impulse withstand voltage (kV peak, positive)	State
	Drawing of insulator submitted (indicate drawing number)	State
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 certificates & reports, accreditation certificate, and scope of accreditation to ISO/IEC 17025 to submitted with tender	Provide
A.3	Sample of the stay insulator offered submitted with the bid documents for evaluation	Provide
A.4	Acceptance tests to be witnessed by KPLC at the factory before shipment	State
A.5	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
	Manufacturing capacity (units per month)	Provide
	Manufacturer's experience	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	List
	Statement of compliance to specification (indicate deviations if any & supporting documents)	State compliance

.....
Manufacturer's Name, Signature, Stamp and Date

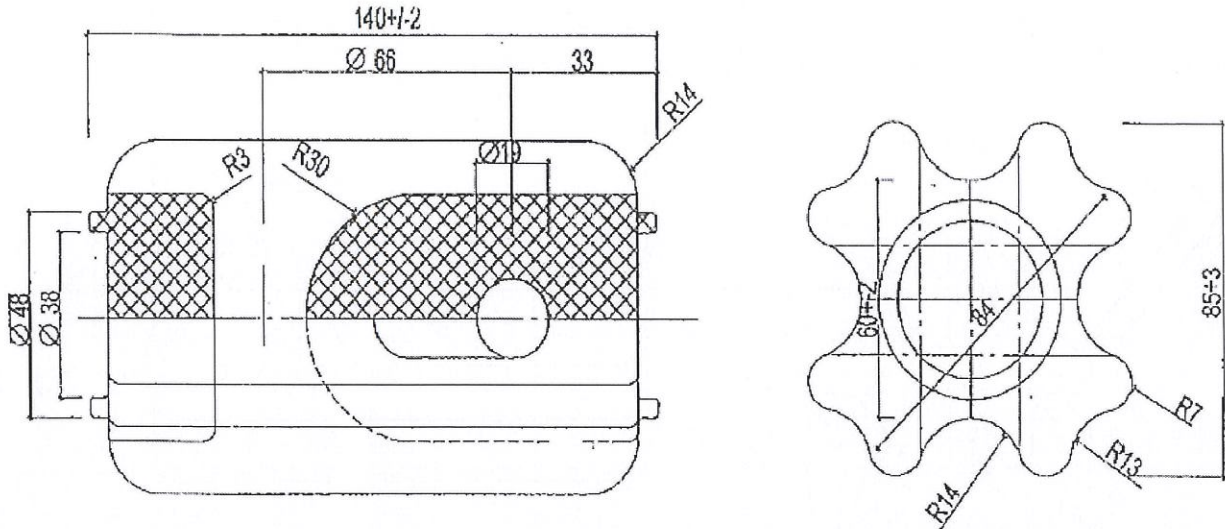
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E: DRAWINGS (Normative)



- Technical specification
1. part shows without glaze, the other parts are all in brown glaze.
 2. Mechanical failing load: 110KN
 3. power frequency wet flashover voltage: 20KV
 4. Impulse withstand voltage: 60Kv
 5. standard: BS137
 6. Transition: All transition between surface must be smooth to provide even bearing for stay wire.

NO	DATE	NAME	SYN

11KV porcelain insulator stay

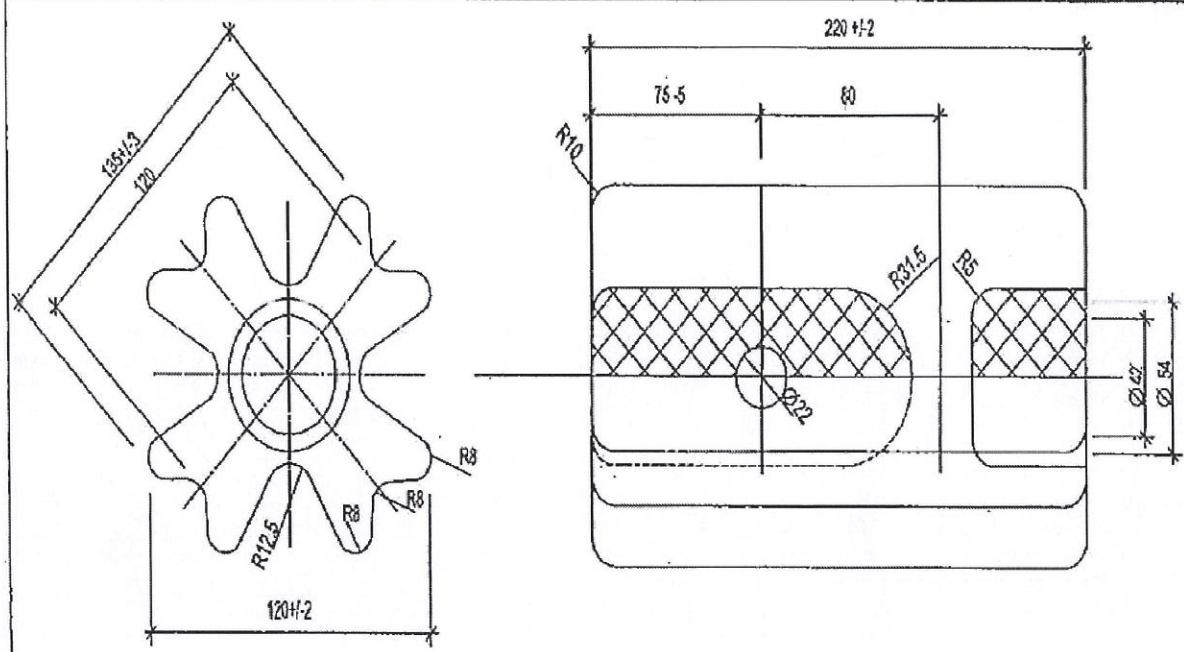
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TECHNICAL SPECIFICATION

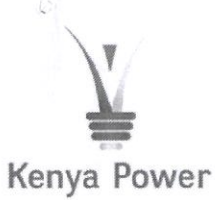
1. part shows without glaze, the other parts are all in brown glaze.
2. Mechanical falling load: 110KN
3. Power frequency wet flashover voltage: 40KV
4. Impulse withstand voltage: 100KV
5. Standard: BS137
6. Transitions: All transition between surface must be smooth to provide even bearing for stay wire.

DATE	NAME	SR

33kv porcelain insulator stay

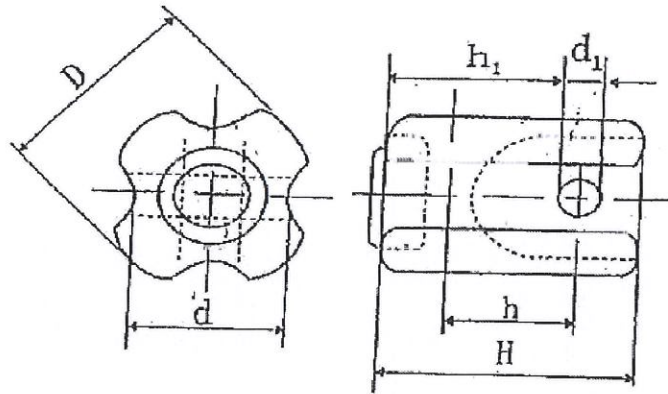
K. P. & L. Co. Ltd
DRG NO: TSP/04/016/02

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2022-07-06	Date: 2022-07-06



TITLE:
PORCELAIN STAY INSULATORS
 (LV, 11 kV and 33 kV) -
SPECIFICATION

Doc. No.	KP1/13D/4/1/TSP/04/016
Issue No.	2
Revision No.	0
Date of Issue	2022-07-06
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DIMENSIONS (mm)	REQUIREMENT, nominal
H	103
h	49
h ₁	62
D	82
d	49
d ₁	22

DRG. NO. TSP/04/016/03: Low Voltage Stay Insulator

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2022-07-06

Date: 2022-07-06

