

DOCUMENT NO. KP1/13D/4/1/TSP/07/002



Kenya Power

CONCRETE PRODUCTS – SPECIFICATION

A Document of the Kenya Power & Lighting Co. Ltd.
September 2021



**CONCRETE PRODUCTS –
SPECIFICATION**

Doc. No.	KP1/13D/4/1/TSP/07/002
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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)

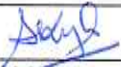
0.2 AMENDMENT RECORD

Rev No.	Date (yy-mm-dd)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue1 Rev 2	2021-09-17	(i)Clause 4.1.4: cable covers to stay blocks (ii)Clause4.2.1: Delete Portland Cement to avoid brands. (iii)Clause 4.2.1.3: Specify type of reinforcement required (iv) GTPs scope: Correct conductor to stay block (iv)To update the ISO standards requirement Clause B.4: Add sampling procedure and acceptance criteria	S. Nguli	Dr. Eng. Peter Kimemia

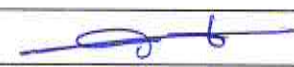
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REVISION OF KPLC STANDARDS

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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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 concrete products (Hatari Slabs and Stay Blocks). It is intended for use by KPLC in purchasing the concrete products.

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

This specification stipulates the minimum requirements for concrete products 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.

The manufacturer shall exhibit good workmanship and good engineering practice in the manufacture of the concrete products for KPLC.

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

The other specifications in this series is;

KP1/6C/4/1/TSP/03/005: Specification for Concrete Poles

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

Name	Department
Stephen Nguli	Standards

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1. SCOPE

1.1. This specification is for Concrete Products Hatari Slabs (concrete cable covers) and Stay Blocks.

1.2. This specification covers the following sizes:

- (i) Hatari slab, LV
- (ii) Hatari slab, HT
- (iii) Stay block, 1/2" (12.5mm)
- (iv) Stay block, 3/4" (19mm)
- (v) Stay block, 1" (25mm)

1.3. The specification also covers inspection and test of the concrete products as well as schedule of Guaranteed Technical Particulars to be filled, signed by the manufacturer and submitted together with other required details for tender evaluation.

1.4. The specification stipulates the minimum requirements for concrete products acceptable for use in the company and it shall be the responsibility of the supplier to ensure adequacy of the design, good workmanship, good engineering practice and adherence to standards, specifications and applicable regulations in the manufacture of the concrete products for the Kenya Power & Lighting Company Plc.

1.5. The concrete products shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation up to the bidder's guarantee in a manner acceptable to the KPLC,

Note: The concrete products to be procured shall be specified in the tender



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.

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

ESI 43-- 91-2016: Stay Strands and Stay Fittings for Overhead Lines

BS 2484: British Standard Specification for Straight Concrete and Clayware Cable Covers.

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- BS 4483: Steel Fabric for the Reinforcement of Concrete
- KS 02-95: Kenya Standard Specification for Natural Aggregates for Concrete
- KS EAS 18-1: Kenya Standard Specification for Cement
Part1: Composition, Specifications and Conformity Criteria for
Common Cement
- ISO/IEC 17025: General requirements for the competence of testing and calibration
laboratories
- ISO 9001:2015: Quality management systems — Requirements

Note: Unless otherwise stated, the latest editions (including amendments) apply.

3. Terms and Definitions

The definitions given in the reference standards shall apply.

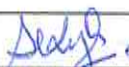
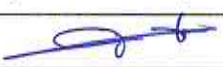
4. REQUIREMENTS

4.1 OPERATING CONDITIONS

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

- a) Altitude: up to 2,200m 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) for inland and “Very Heavy” (Pollution level IV) for coastal applications in accordance with IEC 60815.
- e) Isokeraunic level: 180 thunderstorm days per year

4.1.1 The stay block shall be buried at depths of up to 2m in soils of various types to act as an anchor for stay wire on overhead lines.

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4.1.2 The concrete stay blocks shall be used with stay rod sizes indicated in the table below

Table 1: Correlating Stay blocks with Stay Rods

Stay Block Size	Stay Rod	
	Size	Minimum Failing Load, (kN)
½"	6ft x 5/8" & 6ft x ½"	52
¾"	8ft x 3/4" of	71.3
1"	9ft x 1"	145

4.1.3 The Hatari Slabs (cable covers) shall be laid above power cables buried underground in soils of various types. High voltage cables are buried at depths of up to 1.6m while low voltage cables are buried at depths of 0.5m.

4.1.4 The cable covers designated LV shall be used to cover cables operating at 242/420V (low voltage) while those designated HT shall be used to cover cables operating at higher voltages up to 66kV

4.1.5 The concrete products shall be designed for reliable service life of at least 30 years.

4.2. DESIGN AND CONSTRUCTION

4.2.1. Design

4.2.1.1 The products shall be made using common cement of strength class, at least 42.5N conforming to KS EAS 18-1, coarse aggregates not exceeding 10mm nominal size and conforming to KS 02-95, clean river sand and drinking quality water free from any visual contamination.

4.2.1.2 The products shall not contain additional admixtures and pigments. The composition of cement, sand and coarse aggregates shall be such as to satisfy the requirement for transverse strength and ultimate failing load.

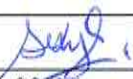
4.2.1.3 The concrete stay blocks shall be reinforced while the cable covers shall contain no steel reinforcement.

4.2.1.4 Steel molds shall be used in the manufacture of the products so as to ensure a smooth texture externally. The mold shall be accurately made to produce units of the dimensions, profiles and shapes shown in the drawings.

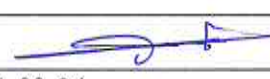
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- 4.2.1.5 The product shall be vibrated while on molds to ensure a dense mass free from honeycombs or segregation and fill the forms and spaces between reinforcement (for concrete stay blocks) compactly and without voids.
- 4.2.1.6 The vibrator used shall have a frequency of not less than 5000 cycles/minute and shall not be attached to or allowed to touch reinforcement during compacting.
- 4.2.1.7 Lettering shown on the drawings (*for cable covers*) shall be formed using accurately placed formers securely fixed in position. Cutting either uncured or hardened concrete shall not be permitted.
- 4.2.1.8 Freshly placed concrete shall be suitably protected and shall be kept constantly damp for a period of at least four days after concreting.
- 4.2.1.9 The concrete shall be allowed to dry slowly over a period of at least three days after wet curing is completed and further open to bring the total to twenty-one days.
- 4.2.1.10 Steel reinforcement rods shall be welded at all points of crossing and all dimensions shall be as per the attached drawings. Alternatively, a welded reinforcing fabric of No. 5 SWG x 75mm square with the wires symmetrically placed about the center would be accepted.
- 4.2.1.11 The underside of the cable cover and stay block shall be flat while the upper sides shall be peaked as shown on drawings.
- 4.2.1.12 The concrete cable cover shall have one end concave, the other convex (as shown in drawings) to provide a concave/convex joint resisting lateral displacement.

4.2.2. Dimensions

- 4.2.2.1 The cable covers are required in two sizes with dimensions as shown in table 1 and drawing SK No. 08424/1 and 2. Tolerances on length (L), width (W) and thickness at outer edges (H) shall be $\pm 3\text{mm}$ and $\pm 2\text{mm}$ respectively.
- 4.2.2.2 When tested the hatari slabs (concrete cable covers) shall withstand, without breaking, the loads given in table 2 below.

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Table 2: Cable Cover Sizes

Category	Dimensions(WxLxH) mm	Ultimate Breaking Load (kN)
HT	610 x 230 x 50	7.4
LV	305 x 150 x 40	3.0

4.2.2.3 The concrete stay blocks are required in three sizes with dimensions (including hole size) as shown in table 3. Tolerances on length (L), width (W) and thickness at outer edges (H) shall be ±3mm and ±2mm respectively.

4.2.2.4 When tested in accordance with ESI 43 - 91 the concrete stay blocks shall withstand, for a period of 1 minute, the ultimate failing loads given in table 2 below.

Table 3: Concrete Stay Blocks- Sizes and Ultimate Failing Load.

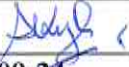
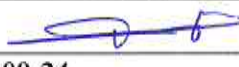
Category (size of center hole)	Dimensions (WxLxH) mm	Ultimate failing load (kN)
½" (12.5mm)	500 x 380 x 50, Drg No. 3	65
¾" (19mm)	500 x 380 x 50, Drg No. 3	65
1" (25mm)	660 x 480 x 60, Drg No. 4	65

APPENDIX A: QUALITY MANAGEMENT SYSTEM

A.1 The bidder shall submit a quality assurance plan (QAP) that will be used to ensure that the concrete products 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 9001:2015.

A.2 The Manufacturer’s Declaration of Conformity to reference standards and copies of quality management certifications including copy of valid and relevant ISO 9001: 2015 or KEBS standardization certificate shall be submitted with the tender for evaluation.

A.3 The bidder shall indicate the delivery time of the concrete products, manufacturer’s monthly & annual production capacity and experience in the production of the type and size of concrete products being offered. A detailed list & contact addresses (including e-mail) of the manufacturer’s previous customers for similar rating of cables sold in the last

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five years as well as reference letters from at least four of the customers shall be submitted with the tender for evaluation.

APPENDIX B: FACTORY ACCEPTANCE TESTS

- B.1. The concrete products shall be manufactured and tested according to Bs2484 and ESI43-91 and requirements of this specification
- B.2. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified on the concrete products in accordance with ESI 43-91. Tenderers shall confirm the manufacturer’s capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.
- B.3. 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 to ISO/IEC 17025 for the testing laboratory shall also be submitted. Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Laboratory that carried out the tests.
- B.4. Kenya Power shall conduct compulsory inspection and testing of the concrete products at the manufacturer’s factory, and thereafter post-delivery to selected sites, installation, testing, and commissioning.
- B.5. Upon completion of manufacturing, the concrete products shall be subject to acceptance tests at the manufacturer’s works before dispatch. This shall be witnessed by two or more Engineers appointed by The Kenya Power and Lighting Company Plc (KPLC).
- B.6. **The method of sampling**
 - B.6.1. In a consignment, 500 concrete products or a part thereof of the same overall length, same dimensions and belonging to the same batch of manufacture shall be grouped together to constitute a lot.
 - B.6.2. For ascertaining the conformity of the concrete products in the consignment to the requirements of this specification, samples shall be tested from each lot separately.
 - B.6.3. The number of concrete products to be selected from the lot shall depend on the size of the lot and shall be according to the sampling table 4 below.
 - B.6.4. For ascertaining the conformity of the concrete products in the consignment to the requirements of this specification, samples shall be tested from each lot separately.

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- B.6.5. The number of poles to be selected from the lot shall depend on the size of the lot and shall be according to the sampling Table 6 below.
- B.6.6. All the concrete products selected according to B.6.4 shall be tested for defects, physical dimensions and straightness as per BS 2484. A concrete product failing to satisfy one or more of these requirements shall be considered as defective. All the concrete product in the lot shall be considered as conforming to these requirements if the number of defective concrete product found in the sample is less than or equal to the corresponding acceptance number given in Column 3 of the sampling table.
- B.6.7 The lot having been found satisfactory according to B.6.4 shall be further tested for ultimate load of the concrete product. For this purpose, the number of concrete product given in column 4 of the sampling table shall be tested, these products may be selected from those already tested according to B.6.4 and found satisfactory.
- B.6.8 All these concrete products tested for working load shall satisfy the corresponding specification requirements. If one or more product fail, twice the number of the product required for loading tests shall be selected from the lot again and subjected to this test. If there is no failure among these concrete products, the lot shall be considered to have satisfied the requirements of this test. If there is failure, then the entire lot shall be rejected.

Table 4: Sampling Table

No. of concrete products in the lot	Sample size	Defects and Dimensional Requirements acceptance number	Ultimate load test
Up to 100	10	1	1
101 to 200	15	1	1
201 to 300	20	2	1
301 to 500	30	3	2

- B.7 The manufacturer/supplier shall give one months' notice to Kenya Power on intended dates to conduct the Factory Acceptance Tests (FATs).

APPENDIX C: INSPECTION AT DELIVERY POINT

- C.1. On receipt of the cables, KPLC shall inspect the concrete products for acceptance at stores and may perform or have tests performed to verify compliance of the concrete products with this specification.

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C.2. The supplier shall replace/rectify without charge to KPLC, any concrete products which upon examination, test or use, fail to meet any or all of the requirements in this specification.

APPENDIX D: WARRANTY

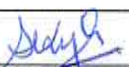
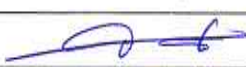
- D.1. The supplier/manufacturer warrants the purchaser that all goods supplied under this contract shall have no defect arising from design, materials or workmanship.
- D.2. A warranty of 60 months from the date of delivery of the concrete products to Kenya Power store shall be offered by the manufacturer.

APPENDIX E: MARKING & LABELING

- E.1 The following information shall be marked legibly and in a permanent manner on the concrete product;
- The manufacturer’s name;
 - The type of concrete products
 - The year of manufacture;
 - The words **“PROPERTY OF KENYA POWER & LIGHTING CO.”**

APPENDIX F: DOCUMENTATION (NORMATIVE)

- F.1. The bidder shall submit its tender complete with technical documents required by Appendix M (Guaranteed Technical Particulars) for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:
- Guaranteed Technical Particulars signed by the manufacturer;
 - Copies of the Manufacturer’s catalogues, brochures, and technical data sheets (including ratings)
 - Sales records for the last five years and at least four 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;
 - Manufacturers letter of authorization, ISO 9001:2015 certificate and other technical documents required in the tender.

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

- (i) Fully filled clause by clause Guaranteed Technical Particulars (GTP) signed by the manufacturer;
- (ii) Design drawings and technical details;
- (iii) Quality assurance plan (QAP) that shall be used to ensure that the design, material; workmanship, tests, service capability, maintenance and documentation shall 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 9001:2015;
- (iv) Detailed test program to be used during factory testing;
- (v) Marking details;
- (vi) Packaging
- (vii) Manufacturer’s undertaking to ensure adequacy of the design, good engineering practice, adherence to the specification and applicable standards and regulations as well as ensuring good workmanship in the manufacture of the concrete products c for the Kenya Power & Lighting Company.

F.3. The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the concrete products to KPLC stores.

F.4 Routine and sample test reports to be submitted to Kenya Power for approval before shipment/delivery of the goods.

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APPENDIX G: GUARANTEED TECHNICAL PARTICULARS (GTPS)

(to be filled, stamped and signed by the Supplier/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 test certificates and test reports for tender evaluation or approval, all in English Language)

Tender No.

Bidder’s Name.....

Clause number	Guaranteed Technical Particulars	Bidder’s offer
	Name and address of the Manufacturer	state
	Country of manufacture	state
	Manufacturer’s Letter of Authorization	provide
	Model/Type Reference No. of the offered transformer	state
	Drawing Reference Number	state
1	Scope of supply, Type and Size	provide
2	Reference Standard of manufacture	state
3.	Terms and definitions	State (if any)
4.1	Service Conditions	specify
4.1.1	Application of the concrete products	state
4.1.2	Stay block and stay block(where applicable)	state
4.1.3	Depth at which cable covers are to laid	state
4.1.4	Voltage rating of cable covers	HT state LV state
4.1.5	Design life of product	30years State
4.2.1.1	Material and Standard of manufacture	state
4.2.1.2	Composition of Concrete mixtures	state
4.2.1.3	Reinforcement of stay block	state
4.2.1.4	Material and Design of molds	state
4.2.1.5	Method of compaction	Specify
4.2.1.6	Vibration frequency, cycles/minute	State
4.2.1.7	Method of permanent marking	state
4.2.1.8	Method of curing the stay block	specify

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4.2.1.9	Method drying and period	Specify
4.2.1.10	Material for reinforcement of stay blocks	specify
4.2.1.11	Design of the underside for cable covers and stay block	specify
4.2.1.12	Design for cable covers and stay block	specify
4.2.2.1	Sizes and dimensions and tolerances	Provide drawings
4.2.2.2	Design loads of tendered cable covers(where applicable)	specify
4.2.2.3	Concrete stay block dimensions and tolerances	specify
4.2.2.4	Concrete stay block size design loads(KN)	State
APPENDICES		
A	QUALITY MANAGEMENT SYSTEM	
A.1.	Submit QAP for the concrete products manufacturing	Attach
A.2.	Copy of valid and relevant ISO 9001: 2015 / KEBS certificate	Attach
A.3.	Manufactures lead in time, monthly & annual production capacity Experience in the production of the type and size of cable being offered.	specify
	A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar rating of cables sold in the last five years as well as reference letters from at least four of the customers	List
B.1.	Manufacturing and Test standard(s)	state
B.2.	Responsibility of Testing and Testing Standard	specify
B.3.	Type test certificates submitted with tender for evaluation and tests covered	State/List
	Valid Accreditation Certificate of the Testing Laboratory as per ISO/IEC 17025:2017	Attach
B.4.	Kenya Power to inspect the factory and post-delivery inspection at sites during installation	State
B.5.	Kenya Power to witness FATs	State compliance
B.6.	Mode of sampling during testing and acceptance criteria.	State
C	Inspection at Delivery Point	
C.1.	Inspection of concrete products at KPLC stores	State compliance
C.2.	Supplier shall replace/rectify without charge to KPLC any concrete product found not compliant to any specification	State compliance
D	Warranty	

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D.1.	Warranty that goods are new and without defects	provide
D.2.	Warranty period	State
E.	Packaging & Labeling	
E.1.	Mode of Packaging	Specify
	Markings on the concrete product	List
F	DOCUMENTATION	
F.1.	Technical documentation submitted with tender	List
F.2.	Documents to be submitted Kenya Power for approval before manufacture/supply	State
F.3.	Submit recommendations for use, detailed user's installation guide, etc. during delivery	State
F.4.	Routine and sample test reports to be submitted to Kenya Power for approval before shipment/delivery of the goods	State

****Note**

Words like 'agreed', Yes; 'confirmed', 'As per KPLC specifications', etc. shall not be accepted and shall be considered non-responsive.

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

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2021-09-24

Date: 2021-09-24

APPENDIX H: Drawings

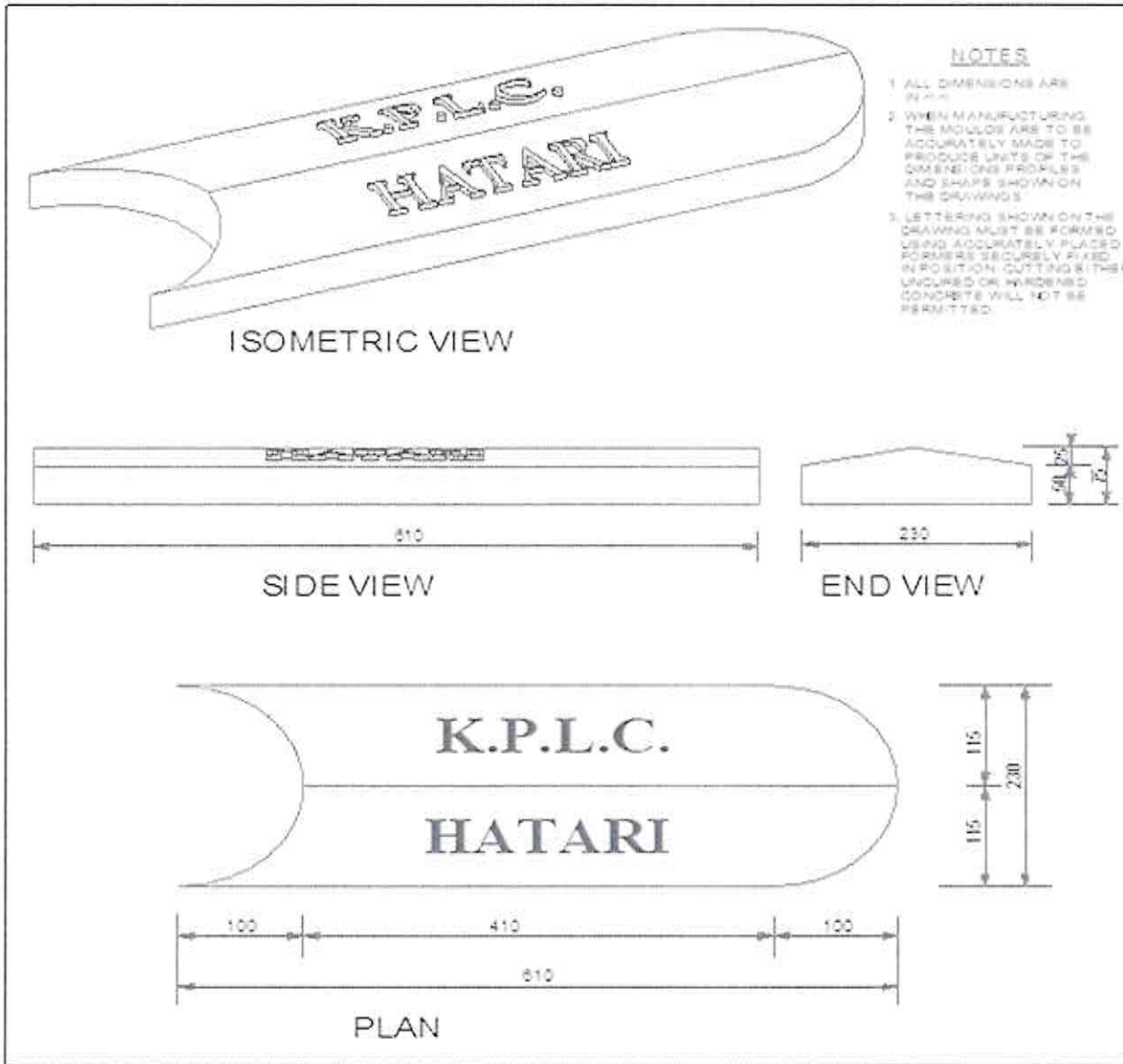
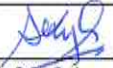
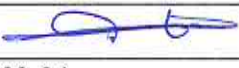


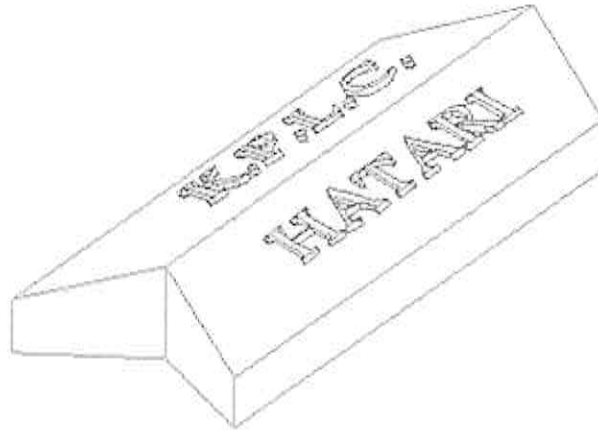
FIG :1 CONCRETE HATARI SLAB TO COVER H.T. CABLES

	DATE	SIGN	ISSUE	DESCRIPTION	DATE	SIGN
APPROVED						
CHECKED	26/03/22	S.K.K.				
DRAWN	17/11/21	J.M.K.				
SCALE						

K. P. & L. Co LTD

SK. NO. 08424 / 1

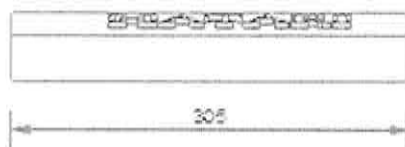
Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed: 	Signed: 
Date: 2021-09-24	Date: 2021-09-24



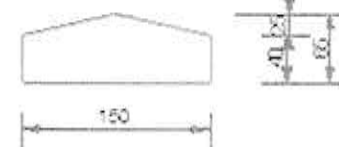
ISOMETRIC VIEW

NOTES

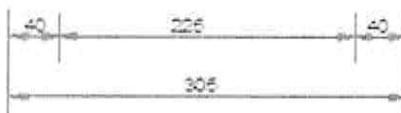
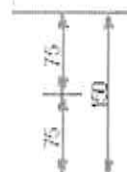
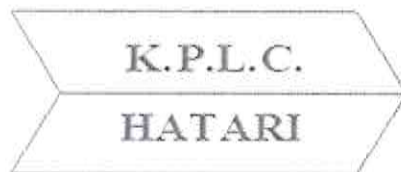
1. ALL DIMENSIONS ARE IN mm
2. WHEN MANUFACTURING THE MOLDS ARE TO BE ACCURATELY MADE TO PRODUCE UNITS OF THE DIMENSIONS, PROFILES AND SHAPE SHOWN ON THE DRAWING.
3. LETTERING SHOWN ON THE DRAWING MUST BE FORMED USING ACCURATELY PLACED FORMERS SECURELY FIXED IN POSITION CUTTING EITHER UNCOURED OR HARDENED CONCRETE WILL NOT BE PERMITTED.



SIDE VIEW



END VIEW



PLAN

FIG: 2 CONCRETE HATARI SLAB TO COVER L.V. CABLES

	DATE	SIGN	ISSUE	DESCRIPTION	DATE	SIGN	<p>K. P. & L. Co LTD</p> <p>SK. NO. 08424 / 2</p>
APPROVED							
CHECKED	26/09/22	S.K.K.					
DRAWN	16/11/21	J.N.K.					
SCALE							

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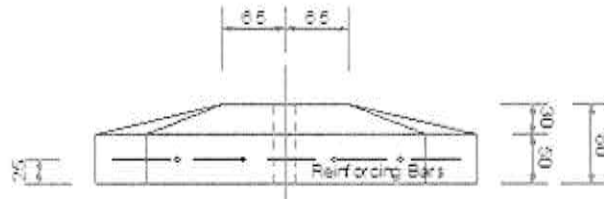
Signed: 

Signed: 

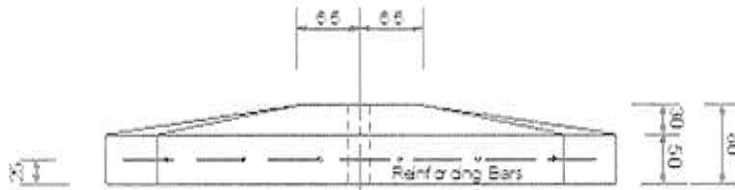
Date: 2021-09-24

Date: 2021-09-24

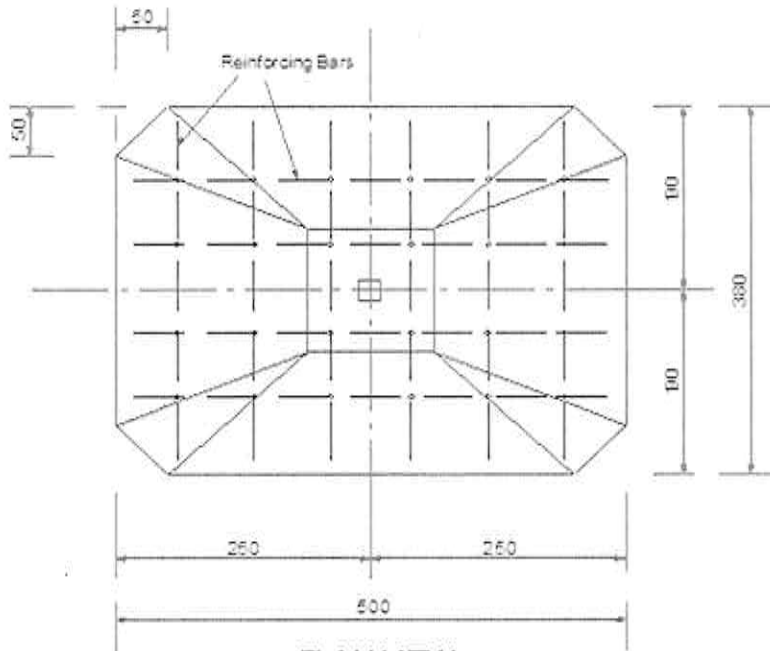
REINFORCED CONCRETE STAY BLOCK FOR M.V. O/H LINE



SIDE ELEVATION



FRONT ELEVATION



PLAN VIEW

Notes

1. All dimensions are in mm.
2. Reinforcing rods should be welded at all points of contact of crossing. Alternatively a welded reinforcing fabric of No. 5 gauge x 2" square could be used.
3. Concrete to be vibrated during manufacture.

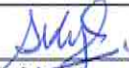
SCALE : 1:5

Drg. No. 3		MANUFACTURING FALLING LOAD	
REINFORCEMENT			
NUMBER			
	LENGTH	CROSS	8.5 KNTON
1/2"	4	6	

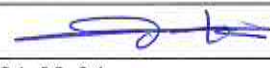
Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:



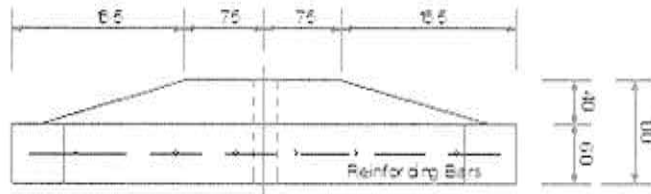
Signed:



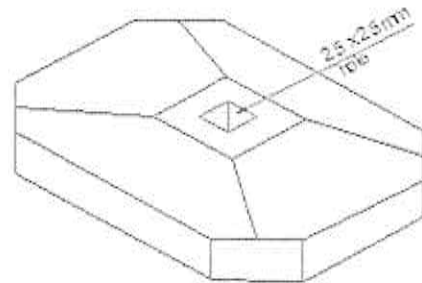
Date: 2021-09-24

Date: 2021-09-24

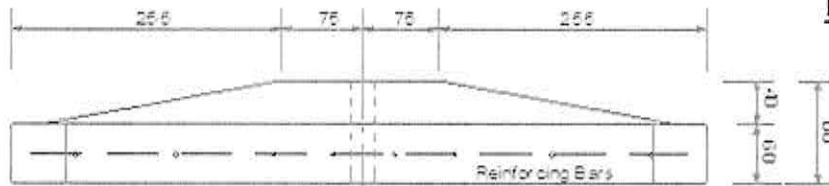
REINFORCED CONCRETE STAY BLOCK FOR H. T. LINE



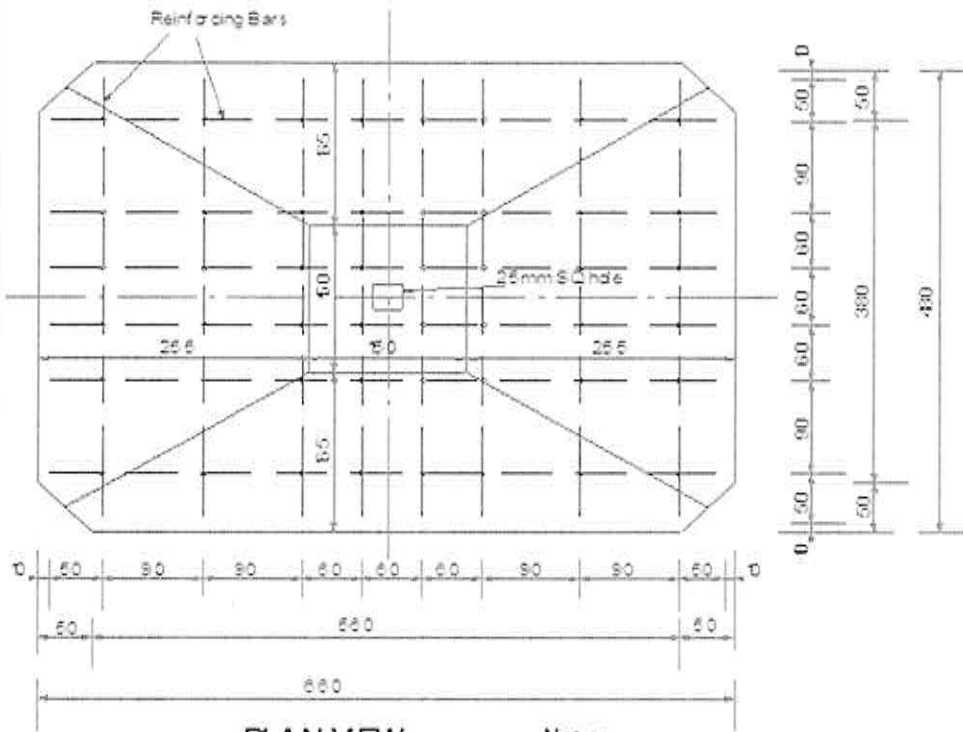
SIDE ELEVATION



PERSPECTIVE VIEW



FRONT ELEVATION



PLAN VIEW

Notes

- All dimensions are in mm.
- Reinforcing rods shall be welded at all points of points of crossing. As an alternative welded reinforcing fabric of No. 5 gauge x 2" square could be used.
- Concrete to be vibrated during manufacture.

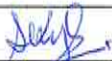
SCALE : 1 : 5

Drg. No. 4		
REINFORCEMENT		
	NUMBER A	
	LENGTH	CROSS
1/2"	8	6

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:



Signed:



Date: 2021-09-24

Date: 2021-09-24

