

Title: **SUBSTATION AND NETWORK
EQUIPMENT LABEL
SPECIFICATION**

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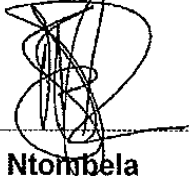
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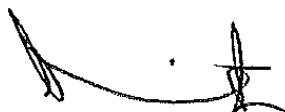
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1. Introduction

This standard is based and complies with OHS Act requirements and was originally prepared in order to standardize the Design, Manufacturing and Installation of electrical equipment labels for Eskom Wires Business.

Labelling is a statutory requirement of the Occupational Health and Safety Act (OHS Act) No 85 of 1993. The act states that all controlling apparatus shall be permanently marked so as to identify the system or part of the system it is made up of.

2. Supporting clauses

2.1 Scope

2.1.1 Purpose

The purpose of this document is to ensure that Design, Manufacturing and Installation of Eskom Wires Business Equipment Labels by the service provider or employees is made and carried out uniformly.

2.1.2 Applicability

This procedure is applicable to all Design, Manufacturing and Installation service provider, Eskom Wires employees and the contractors employed by operating units or grids.

2.2 Normative/informative references

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

- [1] Occupational Health and Safety Act and Regulations (OHS Act);
- [2] ISO 9001:2000 Quality Management Systems;
- [3] SANS 141, Glass-reinforced polyester (GRP) laminates;
- [4] SANS 121 (ISO 1461), Hot-dip galvanised coatings on fabricated iron and steel articles - Specifications and test methods;
- [5] SANS 1091, National colour standards for paint;
- [6] SANS 1186-1, Symbolic safety signs Part 1: Standard signs and general requirements;
- [7] SANS 1274, Coatings applied by the powder-coating process;
- [8] ST_240-114967625, Operating regulations for high voltage systems (ORHVS);
- [9] EPL_32-727, Rev 0, Safety, Health, Environment, And Quality (SHEQ) Policy;
- [10] 240-120804300, The Standard For The labelling Of Electrical Equipment within Eskom Wires Network.
- [11] 240-103414344: Eskom Corporate Identity Manual– Section5: Signage;
- [12] 0.54/404: Electrical equipment enamelled labels details;
- [13] 0.54/5577: Electrical equipment enamelled labels text layout;
- [14] D-DT-5047: Substation name board – Sizes & Legend layout
- [15] D-DT-5047: Substation primary plant label – Sizes & Legend layout
- [16] D-DT-5047: Substation primary plant label – Vitreous Enamel manufacturing details

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- [17] D-DT-5047: Substation primary plant label – Fibreglass manufacturing details
 - [18] D-DT-5047: Substation primary plant label – Chromadek / Chromaprep manufacturing details
 - [19] D-DT-5050: Sub-transmission line label – HV Line Designation & Structure Identification Label
 - [20] D-DT-5050: Sub-transmission line label – HV Line Crossing Label
 - [21] D-DT-5050: Low voltage line label – LV Structure Identification Label (Optional to D-DT-3049)
 - [22] D-DT_3202: Sign, Danger;
 - [23] 240-62629353: Specification For Panel Labelling Standard;
 - [24] 240-56030635: General Information And Requirements For Medium-Voltage Cable Systems
 - [25] 240-56362221: Standard for safety signs used in dc applications;
 - [26] RAL Colour chart; and
 - [27] Manufacturers manual.

2.2.2 Informative

- [28] DST_34-4, Procedure For The Preparation And Administration Of Distribution Standards.

2.3 Definitions

All definitions in the OHS Act 85 and EPC_34-846 as well as the following are applicable:

2.3.1 General

Definition	Description
Cable designation labels	Label installed on each end of a power cable to identify the designation of the cable.
Legend	The text or any other makings that is to be displayed by the completed label.
Line designation	Text (alphas) on a label indicating the source and/or destination of a line.
Line crossing label	Labels that are installed on a sub-transmission line structure to indicate location on a line that is regarded as hazardous to aircraft during aerial inspections.
LV service cable identification label	Label installed on a pole top box identifying the customer service cable is connected to.
Operating equipment label	Labels that identify all substation and line equipment including, line isolators (links), sectionalisers, auto reclosers, voltage regulators, fuses and breakers.
Structure identification labels	Labels that are installed on overhead line support structures to uniquely identify each structure of a specific line.
Substrate	The base material that the label is manufactured from, on which the legend is applied to.
Text	The wording/numbers required on the labels.
Helvetica Compact	The trademarked name for a font type.

2.3.2 Disclosure classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

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2.4 Abbreviations

All abbreviations in ORHVS and NRS 082, as well as the following, are applicable:

Abbreviation	Description
DRG	Drawing
HV	High Voltage
LV	Low Voltage
OHS Act	Occupational Health and Safety Act
SED	Substation Engineering Department
TX	Transmission
DX	Distribution
NRS	National Rationalized Specification
SCOT	Steering Committee of Technology

2.5 Roles and responsibilities

- The designated person or his delegate shall ensure that all labels comply with the requirements of this specification.
- Nothing in this specification shall lessen the obligations of the supplier that may be detailed in any other document forming part of a contract.
- This specification provides the minimum manufacturing requirements for different types of labels. The regional Change Control Committee shall be responsible for selecting the label substrate specified in this specification and any other additional specifications applicable to the specific region.

2.6 Process for monitoring

Document number	Document title
DPC_34-04	Procedure For Management Of Technical Documents For SCOT.

2.7 Related/supporting documents

This specification supersedes all other documents pertaining to the design, manufacture and installation of equipment labels including the following:

Document number	Document title
DSP_34-254	Manufacturing Specification for Distribution Equipment Labels
TSP_41-655 (TRMSCABL6, TRMSCAAC5).	Specification For The Design, Manufacture And Installation Of Outdoor High Voltage Equipment Labels For Eskom Transmission Substations

3. Requirements

3.1 General

- a) No variations / concessions from this specification shall be allowed in any form unless approved by Eskom or requested by Eskom in writing.
- b) Nothing in this specification shall lessen a supplier's obligation as detailed in any other documents forming part of a contract
- c) The relevant manufacturer shall be fully responsible for his product and the sub-sequential service performance. Approval by Eskom does not relieve the manufacturer of any obligation regarding the product quality, dimensions, details, etc.
- d) Manufacturer's catalogues shall not refer to any product as "Eskom approved". Eskom may only be mentioned as a reference.
- e) Prior to the manufacturing of the labels a completed printout of labels that are to be manufactured shall be submitted to Eskom for the approval by the duly appointed project manager.
- f) The supplier shall be fully responsible for the product and its performance in service. Approval by an Eskom appointed representative does not relieve the supplier of any responsibility for the adequacy of the product quality, dimensions and detail.
- g) The back of each label shall be clearly marked with the supplier's identification and date of manufacture.

3.2 Substation Label Requirements

3.2.1 Substation Name Board

3.2.1.1 Legend

- a) The logo shall be in accordance with the Eskom Corporate Identity Manual (240-103414344) and shall be obtained from the Corporate Communications Department in electronic format.
- b) The specific size of the sign and legend layout shall be according to D-DT-5047 Sheet 1 (see Annex E).
- c) The font style for the substation name board shall be GILL SANS REGULAR as specified in the Eskom Corporate Identity Manual (240-103414344). The name of the substation shall be detailed in the Schedule of Quantities, supplied by the responsible person(s).
- d) The legend of Chromadek / Chromaprep labels shall be of cast vinyl having a guarantee of 7-10 years. Any other material shall be subject to approval by Eskom.
- e) The legend shall be aligned on intervals as shown on D-DT 5047 Sheet 1. The size of the legend shall be 60mm for the large name board and 45mm for the small name board as shown on D-DT-5047 Sheet 1.
- f) The first character of the substation name shall be uppercase and the remaining characters of the legend shall be lowercase.
- g) The voltage unit shall be abbreviated as kV. There shall be a space, having a maximum width of 50% of the normal character width, between the voltage magnitude and unit, e.g.: 132/11 kV and not 132/11kV.

Note: The abbreviation requirements shall be as stipulated in the document referenced 240-120804300 under "Labelling Abbreviations Usage".

3.2.1.2 Substrate

- a) Substation name boards shall be manufactured from a hot-dip galvanised steel sheet, coated with a high quality, flexible and corrosion inhibiting chrome free primer on both sides of the sheet, "ArcelorMittal;_Chromaprep (Z200)" is the equivalent material, it must have a minimum thickness of 1.0mm for the large substation name board and a minimum thickness of 0.6mm for the small substation name board. Other material shall be subject to approval by Eskom.
- b) The label sizes and manufacturing details shall be in accordance with drawing D-DT-5047 Sheet 1.

Note: The substation name board has a size for a small name board and large name board.

- c) The primary colours of the name board shall be spray painted 2K gloss onto the substrate to match Eskom Gold Background colour. The thickness of the spray painted coating shall not be less than 70µm.
- d) After the cast vinyl legend is positioned on the coloured substrate the name board shall be coated in 2K UV stabilised clear coat over the entire sign.

3.2.1.3 Colour (Refer to Annex B for colour code references)

- a) Substation name board colours shall be according to the Eskom Corporate Identity Manual (240-103414344) – Section 5: Signage and in accordance to Table 1 below:

Table 1: Colours for Substation Name Boards

1	2
Legend Type	Colour code
Gold Background	PANTONE 8004C
Eskom Blue – Legend, logo and signage legs	PANTONE 287C

3.2.1.4 Mounting of name board

- a) The name board shall be mounted on a frame in accordance with D-DT 5273 Sheet 4.
- b) The angle iron support frame shall be riveted to the label substrate before final spraying.
- c) The small substation name board does not require to be fixed to a frame and can be fixed using binding wire for fence mounting or masonry anchor screws for wall mounting.

3.2.2 Transmission Electrical Equipment Label

3.2.2.1 Legend / Text

- a) All text must be in vitreous enamel.
- b) "HELVETICA COMPACT" style lettering shall be used as follows
- Letters shall be: HELVETICA COMPACT condensed.
 - Numbers shall be: HELVETICA COMPACT.
- c) The size of the label text shall be as designated in Annex G.
- d) Suppliers shall only use approved abbreviations as listed in the document referenced 240-120804300 under "Labelling Abbreviations Usage".

3.2.2.2 Substrate

- a) The base material shall be mild steel plate with thickness of 1.6mm.
- b) The size and details of the labels shall be in accordance with the Eskom drawings in Annex G & H.

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- c) Labels shall have all burrs and sharp edges removed before enamelling. Exposed metal edges will not be acceptable.
- d) All labels shall be finished in vitreous enamel evenly coated using a two coat process, the outer coat shall have a gloss finish. Bare metal spots and thin spot blemishes between coats will not be accepted.
- e) Except for phasing discs, the back of all labels shall be finished in black. The front of the labels (text background) shall be finished in the colour designated in Table 2.
- f) Phasing discs shall be finished back and front in the colour designated in Table 2.
- g) Baked enamel is not acceptable.

3.2.2.3 Colours for labels

- a) The designated colours of the labels shall be in accordance with SANS 1091:2004.
- b) Colours for labels to be used for different substation equipment and phasing discs are listed in Table 2.
- c) The orange, red and blue colours as recommended may not be available in vitreous colours and alternative colours shall be subject to Eskom approval

Table 2: Colour requirements for substation equipment and substation phasing discs labels

COLOUR SCHEME	LETTERING	LABEL SIDES	BACKGROUN D	LABEL SIDES	APPLICATION
1.	BLACK	-	ORANGE – Spectrum B25	-	All primary plant excluding earth switches.
2.	WHITE	-	BLACK	-	Earth Switches
3.	BLACK	-	WHITE	-	Junction Boxes
4.	BLACK	Lettering only One side	RED - A11	Background Both Sides	Phasing Discs
5.	BLACK	Lettering only One side	WHITE	Background Both Sides	
6.	BLACK	Lettering only One side	BLUE – Ultramarine F09	Background Both Sides	

3.2.3 Distribution Equipment labels – Power Plant

3.2.3.1 Legend

- a) The font for the legend shall be HELVETICA COMPACT. The inscription shall be detailed in the Schedule of Quantities, supplied by the responsible person(s).
- b) All alphabetical legends and abbreviations shall be capital letters, except the abbreviation for kilovolts (kV). There shall be a space between the voltage/current magnitude and unit, e.g. 11 kV and not 11 kV. The maximum width of the space shall be 50% of the character width.
- c) The legend for Chromadek / Chromaprep labels shall be of cast vinyl having a guarantee of 7-10 years. Any other material shall be subject to approval by Eskom.
- d) The legend for fibreglass labels shall be of “Easy Step Printing®” (Black on clear) having 2K gloss clear lacquers “(Dulux)” spray finish having a minimum guarantee of 10 years. Any other materials shall be subject to approval by Eskom.
- e) The legend layout shall be according to D-DT-5047 Sheet 2 for all types of label substrates.
- f) The minimum legend height shall be in accordance with Table 3.

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Table 3: Minimum height of legend text

1	2
Legend Type	Legend min. height
Indicating panel/bay of specific plant.	50mm
Indicating voltage and function of a specific plant.	30mm
Phase identification label	100mm
Overhead strung busbar label	100mm
Tubular busbar label / MV busbar	50mm

- g) The legend text shall be centre justified and have a minimum line spacing of 20mm between lines and a minimum margin of 30mm from the edges of a label.
- h) The character spacing shall not be more than 15% of the legend height.

3.2.3.2 Substrate – Vitreous enamel labels

- a) Labels shall be finished in vitreous enamel having a minimum guarantee of 25 years.
- b) The vitreous enamel labels shall be manufactured from mild steel plates of thickness specified in Table 4

Table 4: Thickness of substrate for vitreous enamel labels

1	2	3
Label type	Mild steel thickness	
	1.2mm	1.6mm
Label 2	X	
Label 3		X
Label 4		X
Label 5	X	

- c) The label sizes and manufacturing details shall be in accordance with drawing D-DT-5047 Sheet 2 and D-DT-5047 Sheet 3 respectively.
- d) All holes shall be drilled before enamelling.
- e) All holes shall be fitted with proper brass eyelets after enamelling. The size of the holes and the brass eyelet must be such to suit one M10 bolt.
- f) Each label shall be supplied with two fibre/nylon washers per hole.
- g) Only the labels as indicated by the Schedule of Quantities, shall be supplied with a "J" mounting bracket according to D-DT-5273 Sheet 3.

3.2.3.3 Substrate – Fibreglass labels

- a) The reinforcing material shall be Coremat or Swirlmat or an approved alternative (Cloth-mat density shall be 450 gram/square metre)
- b) The method of manufacture shall be the Hand Lay Laminate Construction or Resin Transfer Moulding Method.
- Hand Lay Method:
Polyester Gelcoat 0,4 to 0,6mm thick (spray applied). The Gelcoat shall be of the 'A' range type, light fast & ultraviolet inhibited.

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Laminate - 4 layers of 1 x 450-g/m-glass type 21 chopped strand mat. Resin to glass ratio 70% - 30%

- **Resin Transfer Moulding Method:**

A male and female mould shall be prepared. With 3 layers of Coremat or Swirlmat in place between the two moulds, resin is injected into the moulds utilising the Resin Transfer Moulding Method.

The label is to be finished by spray painting with UV Stabilised (Twin Pack) Poly Acrythane paint.

- c) The nominal wall thickness shall be 3mm.
- d) All metal shall be hot dipped galvanised in accordance with to SANS 121 (ISO 1461).
- e) Fibreglass shall be in accordance with SANS 141.
- f) The label sizes and manufacturing details shall be in accordance with drawing D-DT-5047 Sheet 2 and D-DT-5047 Sheet 4 respectively.

3.2.3.4 Substrate – Chromadek / Chromaprep labels

- a) Labels shall be manufactured from a material equivalent to ArcelorMittal Chromaprep (Z200) having a minimum thickness 1.0mm. Other material shall be subject to approval by Eskom.
- b) The primary colour of the label shall be powder-coated on both sides of the substrate with an exterior type powder-coating according to SANS 1274 (Type 6) with a minimum thickness of 70µm.
- c) After the cast vinyl legend is positioned on the coloured substrate the label shall be powder-coated on both sides of the label with an exterior type clear coat powder coating according to SANS 1274 (Type 6) with a minimum thickness of 70µm.
- d) The label sizes and manufacturing details shall be in accordance with drawing D-DT-5047 Sheet 2 and D-DT-5047 Sheet 5 respectively.
- e) All holes and slots shall be drilled and/or punched before powder coating.
- f) All holes shall be fitted with proper brass eyelets after powder coating. The size of the holes and the brass eyelet must be such to suit one M10 bolt.
- g) Only the labels as indicated by the Schedule of Quantities, shall be supplied with a “J” mounting bracket according to D-DT-5273 Sheet 2.

3.2.3.5 Colour (Refer to Annex B) for colour code references)

- a) Equipment labels shall have Black lettering on an Orange background.
- b) Earthing labels shall have White lettering on a Black background.
- c) Danger labels shall have White lettering on a Red background.
- d) Phase labels shall have Black lettering on a Red, a White or a Blue background, whichever is applicable.

3.2.4 Distribution Substation Safety Signs (OHS Act)

- a) The safety signs for DC applications (battery room and battery cabinets) shall be in accordance with DSP_34-479.
- b) The specification for substation safety signs is given in the following Distribution Technology Buyer's Guide drawings, listed in Table 5 below.

Table 5: Substation safety signs (OHS Act)

1	2	3
BG drawing number	Sign description	Layout drawing Number
D-DT-6072	SIGN, ABC – UNAUTH. ENTRY/INTERF. APP	D-DT-5015
D-DT-6073	SIGN, DE – PROC. IN CASE FIRE/NO H2O	D-DT-5016
D-DT-6074	SIGN, F – PROHIBITIVE (VARIOUS)	D-DT-5017
D-DT-6075	SIGN, G – HARD HAT AREA	D-DT-5018
D-DT-6077	SIGN, LC – LIVE CHAMBER	D-DT-5021
D-DT-6112 Sht 1	SIGN, DCSS1 – BATTERY ROOM	D-DT-5022 Sht 1
D-DT-6112 Sht 2	SIGN, DCSS2 – BATTERY CABINET	D-DT-5022 Sht 2
D-DT-6112 Sht 2	SIGN, DCSS3 – COMBINED BATTERY ROOM	D-DT-5022 Sht 3
D-DT-6113 Sht 1	SIGN, GA20 – EMERGENCY SHOWER	D-DT-5023 Sht 1
D-DT-6113 Sht 2	SIGN, GA19 – EYE WASH	D-DT-5023 Sht 2
D-DT-6113 Sht 2	SIGN, PV5 – DRINKING WATER PROHIB	D-DT-5023 Sht 3

3.2.5 Distribution Substation Equipment Labels – Control Plant

- For the manufacturing specification for this type of label refer to 240-62629353- Specification For Panel Labelling Standard.
- The sizes of the Secondary plant labels shall be in accordance with drawing D-DT-5049.

3.3 Overhead Lines Label Requirements

3.3.1 Tower labels

3.3.1.1 Substrate

All tower labels shall be made of a material approved by Eskom. Preference is given to the use of ArcelorMittal Chromadek / Chromaprep and vitreous enamel, but if any other material offers the same or higher quality than the preferred listed above, then this new material will be considered.

- The Chromadek / Chromaprep label shall have a minimum guaranteed life of 10 years and the vitreous enamel labels a minimum guaranteed life of 25 years.
- The ArcelorMittal Chromadek / Chromaprep label shall be 0,6 mm thick with a minimum gloss of 75 %, while the substrate used for the vitreous enamel shall be cold rolled sheets from 1,2 mm to 1,6 mm thick.
- All labels supplied shall have a standard background colour of GOLDEN YELLOW: SABS B49 in accordance with SABS 1091.

3.3.1.2 Size and length of label

- The tower label shall be manufactured in accordance with the drawings in annexes M and N. The label shall have slots for the banded straps. The details of these slots are shown in the drawings in annexes M and N. Label sizes and slots shall be manufactured as indicated on the relevant drawings.

3.3.1.3 Legends

- a) Plain block letters (HELVETICA MEDIUM) shall be used for the legend. The inscription shall be detailed in the Works Information of the relevant contract.
- b) The legend sizes shall be as indicated in the table below.

Legend	Size
1. Line number designation	75 mm
2. Line name designation	75 mm
3. Tower number designation	140 mm

- c) The legends for the Chromodek / Chromaprep labels shall use cast vinyl having a guarantee of 7-10y lettering
- d) The equivalent lettering shall be subject to Eskom approval.

3.3.2 Line Designation Labels

This section covers transmission, sub-transmission and distribution lines.

Size and length of specific line designation labels shall be in accordance with the details specified in annex O & P (TX) or Q (DX).

3.3.2.1 Legend

- a) The font for the legend shall be HELVETICA MEDIUM. The inscription shall be detailed in the Schedule of Quantities / Works Information of the relevant contract, supplied by the responsible person(s).
- b) All alphabetical inscriptions shall only be capital letters.
- c) The legend of Chromadek / Chromaprep labels shall be of cast vinyl having a guarantee of 7-10 years.
- d) The minimum height of the legend shall be 75mm for DX and 150 mm high for TX.
- e) The equivalent lettering shall be subject to Eskom approval.

3.3.2.2 Substrate – Vitreous enamel labels

Note: The substrate of specific line designation labels shall be manufactured in accordance with the details specified in annex O & P (TX) or Q (DX).

- a) Labels shall be finished in vitreous enamel having a minimum guarantee of 25 years. The primary colour needs to be on the same side of the substrate where the legend is going to be applied.
- b) The vitreous enamel labels shall be manufactured from mild steel plates having a minimum thickness of 1.2mm-1.6mm.
- c) The label sizes and manufacturing details shall be in accordance with drawing D-DT-5050.
- d) All holes and slots shall be punched before enamelling. The slot shall be between 3mm and 5mm wide and 15mm long.

3.3.2.3 Substrate – Chromadek / Chromaprep labels

- a) Labels shall be manufactured from a material equivalent to “ArcelorMittal Chromaprep (Z200)” having a minimum thickness 0.6mm-1.0mm with a minimum gloss of 75 %. Other material shall be subject to approval by Eskom.

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- b) The primary colour of the label shall be powder coated with an exterior type powder coating according to SANS 1274 (Type 6) with a minimum thickness of 70µm. The primary colour needs to be on the same side of the substrate where the legend is going to be applied.
- c) After the cast vinyl legend is positioned on the coloured substrate the label shall be powder coated on both sides of the label with an exterior type clear coat powder coating according to SANS 1274 (Type 6) with a minimum thickness of 70µm.
- d) The label sizes and manufacturing details shall be in accordance with drawing D-DT-5050.
- e) All slots shall be punched before powder coating. The slot shall be between 3mm and 5mm wide and 15mm long.

3.3.3 Line crossing labels

3.3.3.1 Substrate

Note: The line crossing labels shall be manufactured in accordance with the drawing in annex R (TX) or S (DX).

- a) Line crossing labels shall be manufactured from a material equivalent to a “ArcelorMittal Chromadek / Chromaprep (Polar White N14112 - Z200 or Frost White N14017 - Z200 or Fish Eagle White N14128 - Z200)” having a minimum thickness 0.6mm. Other material shall be subject to approval by Eskom.
- b) The label shall be manufactured in such a way that the white finished side shall be facing the back of the label.
- c) The primed side of the Chromadek / Chromaprep label shall be covered with a 3M™ Diamond Grade™ DG³ Reflective Sheeting 4083 Fluorescent Yellow Green. Any other material shall be subject to approval by Eskom.
- d) Should the manufacturer decide to space the Reflective Sheeting on a black background to achieve the effect of the black cross, the primed surface of the Chromadek / Chromaprep shall be powder coated in accordance with 3.3.2.3.
- e) The line crossing label shall have a cross, placed diagonally on the label. The minimum width of the cross shall be 70mm.
- f) The label sizes and manufacturing details shall be in accordance with drawing D-DT-5050.

3.3.4 Colour (Refer to Annex B for colour code references)

- a) Structure identification and operating equipment labels shall have Black Cast Vinyl lettering on Yellow background.
- b) Line crossing labels shall have a Black cross on a 3M™ Diamond Grade™ DG³ Reflective Sheeting 4083 Fluorescent Yellow Green background (Black Cast Vinyl strips applied on fluorescent background or fluorescent spaced on a Black background). Any other material shall be subject to approval by Eskom.

3.4 MV structure identification labels

3.4.1 Legend

Note: The MV line structure identification labels shall be manufactured in accordance with the drawing in annex T.

- a) Capital letters (HELVETICA MEDIUM) must be used for the legend. The inscription shall be detailed in the Schedule of Quantities, supplied by the responsible person(s).
- b) The legend shall be mechanically permanently stamped / engraved onto the label and be clearly legible after stamping/engraving is complete.
- c) The legend size shall be between 7mm and 10mm.

- d) A margin of 10mm from the two side edges of the label must be maintained when the legend is stamped onto the substrate.

3.4.2 Substrate

The substrate shall be according to D-DT-3049.

3.5 LV structure identification labels

3.5.1 Legend

Note: The LV line structure identification labels shall be manufactured in accordance with the drawing in annex T.

- a) The legend that is mechanically permanently stamped / engraved on the label substrate shall comply with the requirements of 3.4.1.
- b) For Chromadek / Chromaprep substrates, the legend shall (subject to clause (c).) comply with the requirements of 3.3.2.3.
- c) The minimum height of the legend for the structure number shall be 30mm.

3.5.2 Substrate – Aluminium labels

The substrate shall be according to D-DT-3049.

3.5.3 Substrate – Chromadek / Chromaprep labels

- a) Subject to clause (b), the substrate shall comply with 3.3.2.3.
- b) The label shall be manufactured from a material equivalent to ArcelorMittal Chromadek / Chromaprep (Z200) having a minimum thickness 0.6mm.

3.5.4 Colour (Refer to Annex B for colour code references)

Chromadek / Chromaprep LV Structure identification labels shall have **Black Cast Vinyl** lettering on Polar White (N14112 - Z200) or Frost White (N14017 - Z200) background.

3.6 MV & LV operating equipment labels

3.6.1 Legend

- a) The legend could either be horizontally or vertically laid out on the label. The font for horizontally laid out legends shall be HELVITICA MEDIUM COMPACT. For vertically laid out labels where only one character per line is used, the font for the legend shall be HELVETICA MEDIUM. For all other vertical laid out legends the font shall be HELVITICA MEDIUM COMPACT.
- b) All legends shall be in capital letters, except the abbreviation for kilovolts (kV). The inscription shall be detailed in the Schedule of Quantities, supplied by the responsible person(s).
- c) A space shall be provided between the voltage/current magnitude and unit, e.g. 11 kV and not 11kV. The maximum width of the space shall be 50% of the character width.
- d) The legend for Chromadek / Chromaprep labels shall be of cast vinyl having a guarantee of 7-10 years. Any other material shall be subject to approval by Eskom.
- e) The legend for fibreglass labels shall be of "Easy Step Printing®" quality (Black on clear) having 2K gloss clear lacquers (Dulux) spray finish having a minimum guarantee of 10 years. Any other materials shall be subject to approval by Eskom.
- f) The minimum legend height for MV and LV operating equipment labels shall be 50mm and 30mm respectively.

- g) The legend layout shall be according to D-DT-5047 Sheet 2 and D-DT-5050 Sheet 3 for horizontal and vertical legend layouts respectively.
- h) The legend text shall be centre justified and have a minimum line spacing of 20mm between lines and a minimum margin of 30mm from the edges of a label.
- i) The character spacing shall not be more than 15% of the legend height.

3.6.2 Substrate – Vitreous enamel labels (horizontal laid out legend only)

- a) Labels shall be finished in accordance with 3.2.3.2 having a mild steel sheet thickness of at least 1.2mm.

3.6.3 Substrate – Fibreglass labels (horizontal laid out legend only)

- a) The label substrate shall be manufactured in accordance with 3.2.3.3

3.6.4 Substrate – Chromadek / Chromaprep labels (horizontal and vertical laid out legend)

- a) Labels for vertical laid out legend shall be manufactured from a material equivalent to ArcelorMittal Chromadek / Chromaprep (Number Plate Yellow – N04008 -Z200) having a minimum thickness 0.6mm. Other material shall be subject to approval by Eskom.
- b) Labels for horizontal laid out legend shall be manufactured from a material equivalent to “ArcelorMittal Chromaprep (Z200)” having a minimum thickness 1.0mm. Other material shall be subject to approval by Eskom. The primary colour of the label shall be powder-coated on both sides of the substrate with an exterior type powder-coating according to SANS 1274 (Type 6) with a minimum thickness of 70µm. The primary colour needs to be on the same side of the substrate where the legend is going to be applied.
- c) After the cast vinyl legend is positioned on the coloured substrate the label shall be powder-coated on both sides of the label with an exterior type clear coat powder coating according to SANS 1274 (Type 6) with a minimum thickness of 70µm.
- d) The label sizes and manufacturing details shall be in accordance with drawing D-DT-5047 Sheet 2 and D-DT-5047 Sheet 5 respectively for horizontal laid out legends.
- e) The label sizes and manufacturing details shall be in accordance with drawing D-DT-5050 Sheet 3 for vertical laid out legends.
- f) All holes and slots shall be drilled and/or punched before powder coating.
- g) All holes shall be fitted with proper brass eyelets after powder coating. The size of the holes and the brass eyelet must be such to suit one M10 bolt.
- h) Only the labels as indicated by the Schedule of Quantities, shall be supplied with a “J” mounting bracket according to D-DT-5273 Sheet 3.
- i) Colour (Refer to Annex B for colour code references)
- j) MV operating equipment labels shall have Black lettering on Yellow background.
- k) LV operating equipment labels shall have Black lettering on a White background.

3.7 Cable designation labels

3.7.1 Legend

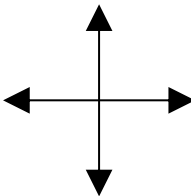
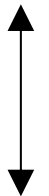
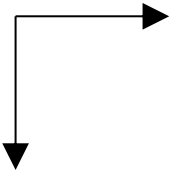


- a) The legend shall be mechanically permanently punched / engraved onto the substrate.
- b) Only capital letters shall be used for the legend.
- c) The legend size shall have a minimum height of 7mm.

3.7.2 Substrate

- a) The substrate shall be a flat aluminium plate of dimensions 150 mm x 25 mm x 0,9 mm (see D-DT-3049) tied to the cable with tinned copper binding wire onto which the Information is scribed/punched in a font size of 7 mm.
- b) The shall be a 12mm stainless steel, brass, aluminium or copper strap having a minimum thickness of not less than 0,35mm.
- c) Labels shall be strapped at both ends (Source and Destination) of the cable using galvanised steel binding wire.

3.8 Cable route markers**3.8.1 Legend**

- a) Arrows shall be punched on the aluminium plate to indicate the cable route as per the following examples:

 <p>Cable crossing</p>	 <p>Straight</p>	 <p>Bend</p>
 <p>Direction change</p>	 <p>Cable joint</p>	

- b) Addition to 3.8.1(a) above, the following information shall also be permanently punched on the plate per cable:

- Cable voltage rating (without unit) followed by a forward slash (/),
- Three digit cable size (e.g. **050** or **185**),
- Conductor material **CU** for copper and **AL** for aluminium, followed by a forward slash (/),
- Depth cable is buried in millimetres.

E.g.: A cable route marker installed above 2x 11kV 185 CU cables buried at a depth of 1000mm and a 22kV 95 AL cable buried 1500mm will have the following code stamped on the cable route marker plate:

- 11/185CU/1000
- 11/185CU/1000
- 22/095AL/1500

3.8.2 Concrete block

- a) The concrete shall be pre-cast concrete (Salberg type or equivalent) mixture 1:2:4.

-
- b) A blank visible aluminium plate (100 x 100 x 2mm) shall be permanently fixed on top of the cable route marker per drawing D-DT-8012.
- c) The dimensions and manufacturing detail of the cable route marker shall comply with drawing D-DT-8012.

3.9 Quality Assurance

3.9.1 General

- a) To ensure that the quality of equipment labels meet the requirements specified the manufacturer shall comply with the provisions of ISO 9001 or ISO 9008.
- b) Eskom will carry out auditing, at random, to ensure that quality requirements are being adhered to.
- c) ISO / SABS accreditation mark shall be visible on the equipment labels.
- d) Notifications of any deviation or non-conformance shall be given to Eskom in writing.
- e) The manufacturer shall furnish detailed drawings of all equipment when tendering. The drawings shall include details such as critical dimensions, clamping ranges etc.

3.9.2 Records

The manufacturer shall keep and make available the acceptance test records and the test results to Eskom, in accordance with the manufacturer's quality control procedure.

4. Tests

Not applicable.

5. Marking, labelling and packaging

5.1 Identification and marking

- a) The manufacturer shall mark each label/sign/route marker for manufacturer and batch identification.
- b) All identification markings shall be marked with the following information:
- Logo / Name of the manufacturer.
 - Batch date of manufacturing (mm/yyyy).

5.2 Packaging

- a) The labels shall be packed and transported in a suitable manner that facilitates easy stacking, handling and prevent or minimize damages.
- b) The packaging shall protect labels against damage from normal handling, which can be expected from the point of dispatch to the point of final installation.
- c) Labels that are damaged during transportation or handling due to unsuitable packaging, shall be replaced by the manufacturer at his own expense. This includes chipping of enamelled or painted surfaces and damage to brass eyelets and nylon washers.
- d) The packaging method shall be such that the nylon washers for substation labels are not lost during transportation or storage.
- e) When phase labels are ordered the manufacturer shall supply equal quantities of each phase colour as a set, bound together.
- f) Labels must be packed per bay / line as listed in Annexure E.

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- g) Individual packages shall not exceed 25 kg.
- h) A waterproof tag shall be bound to each consignment of labels indicating the following information:
- Supplier's Name
 - Project / substation / Line Name
 - Order Number

6. Samples

Should Eskom require a sample label for inspection and/or evaluation purposes, the supplier shall submit any relevant samples in accordance with the made request.

7. Supply and Delivery

- a) Each delivery shall in addition to the stipulated requirements below include the individual order specified requirements.
- b) Delivery address (substation name) and dates shall be advised at the time of purchase of the labels.
- c) Each delivery of labels shall be properly tagged and shall indicate the following information:
- Supplier's name
 - Project / substation / Line Name
 - Order number

8. Forms, Records and Certificates

The manufacturer testing certificate or user's manual (including the technical specification) shall be included in the package.

9. Installation

- a) The labels shall be fitted to the frames / brackets using the bolts, nuts and washers as specified on DRG. No. 0.54/404 (See Annex H).
- b) Nuts, bolts and washers shall be supplied by the manufacturer.
- c) Nuts, bolts and metal washers must be hot-dipped galvanised.
- d) The nuts must be turned to firm finger tight and then tightened with a spanner one full turn. (Over-tightening will result in damage to the vitreous enamel coating).
- e) The label frames / brackets will be attached to the existing support steelwork or equipment with the bolts, nuts and washers provided. The nuts must be tightened to normal spanner tightness.
- f) Labels will be positioned in accordance with the Substation Operating Diagram provided.

10. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Prince Moyo	Power Delivery Engineering General Manager
Colin Smith	DBM & O Manager
Riaz Vajeth	Snr Manager Engineering

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Amelia Mtshali	Senior Manager Power Delivery
Phineas Tlhatlhetji	Senior Manager Engineering
Archie Jaykaran	SCOT/SC Chairperson
Solly Matlala	Senior Manager Safety Risk M
Raymond Kodi	Regional Business Process Manager
Andre Kotze	Chief Engineer
Thinus Du Plessis	Chief Engineer
Promise Quluba	Zone Manager
Derik Sadler	Middle Manager HV Plant

11. Revisions

This revision (DST_ 240-75660336) cancels and replaces all revisions of document number DSP_ 34-254, TRMSCABC9 & 41-655.

Date	Rev	Compiler	Remarks
April 2017	1	DM Ntombela	Rationalized Distribution and Transmission documents referenced DSP_34-254 and TSP_41-655.

12. Development team

The following people were involved in the development of this document:

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Shalen Goonoa	Engineer Prof Electrical	KZNOU
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13. Acknowledgements

Not applicable.

Annex A – List of drawings

Drawing No	Sheet	Description
D-DT-3049	-	Plate, Blank Alu Pole Mk 25x150
D-DT-5015	-	Sign ABC – Unauthorized entry prohibited
D-DT-5016	-	Sign DE – Procedure in case of fire
D-DT-5017	-	Sign F – Prohibitive sign
D-DT-5018	-	Sign G – Hard hat area
D-DT-5021	-	Sign LC – Live chamber
D-DT-5022	1	Sign DCSS1 – Battery room
D-DT-5022	2	Sign DCSS2 – Battery cabinet
D-DT-5022	3	Sign DCSS3 – Combined battery room
D-DT-5023	1	Sign GA20 – Emergency shower
D-DT-5023	2	Sign GA19 – Eye wash
D-DT-5023	3	Sign PV5 – Drinking water prohibited
D-DT-5047	1	Substation name board – Sizes & Legend layout
D-DT-5047	2	Substation primary plant label – Sizes & Legend layout
D-DT-5047	3	Substation primary plant label – Vitreous Enamel manufacturing details
D-DT-5047	4	Substation primary plant label – Fibreglass manufacturing details
D-DT-5047	5	Substation primary plant label – Chromadek / Chromaprep manufacturing details
D-DT-5273	1	Post Support and Foundation
D-DT-5273	2	Label Mounting Bracket
D-DT-5273	3	Mounting bracket for Phase Identification Labels
D-DT-5273	4	Substation Name Board – Mounting details
D-DT-5049	-	Substation secondary plant label – Sizes
D-DT-5050	1	Sub-transmission line label – HV Line Designation & Structure Identification Label
D-DT-5050	2	Sub-transmission line label – HV Line Crossing Label
D-DT-5050	3	Low voltage line label – LV Structure Identification Label (Optional to D-DT-3049)
D-DT-6072	-	Sign ABC – Unauthorised entry prohibited
D-DT-6073	-	Sign DE – Procedure in case of fire
D-DT-6074	-	Sign F – Prohibitive sign
D-DT-6075	-	Sign G – Hard hat area
D-DT-6077	-	Sign LC – Live Chamber
D-DT-6112	1	Sign DCSS1 – Battery room
D-DT-6112	2	Sign DCSS2 – Battery cabinet
D-DT-6112	2	Sign DCSS3 – Combined battery room
D-DT-6113	1	Sign GA20 – Emergency shower
D-DT-6113	2	Sign GA19 – Eye wash
D-DT-6113	2	Sign PV5 – Drinking water prohibited
D-DT-8012	-	Cable route marker
0.54/404	-	Electrical equipment enamelled labels details
0.54/5577	-	Electrical equipment enamelled labels text layout

Annex B – List of colour references

The following colour references are used in this specification:

Colour Name	SANS 1091 (NCS)	RAL	PANTONE
Orange	2075-Y70R	RAL 2011	-
Red	1580-Y90R	RAL 3000	-
Blue	4050-B	RAL 5015	-
Yellow	1070-Y20R	RAL 1003	-
Gold Background	-	-	8004C
Terracotta	-	-	174C
Eskom Blue	-	-	287C

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Annex C – List of primary plant labels & sizes

1	2	3	4	5
Label Type	Label Size			Typical Usage
	VE	CD	FG	
Label 2	1000 x 245	1000 x 245	1000 x 250	Isolator, Voltage Transformer, Current Transformer, Breaker, Transformer, Busbar
Label 3	600 x 245	600 x 245	600 x 250	Isolator, Voltage Transformer, Current Transformer, Breaker, Transformer, Medium Voltage operating equipment
Label 4	450 x 245	450 x 245	450 x 250	Isolator, Voltage Transformer, Current Transformer, Breaker, Transformer, Medium Voltage operating equipment
Label 5	150 x 245	150 x 245	150 x 245	Phase Identification labels
Label 6	300 x 245	300 x 245	-	Isolator, Voltage Transformer, Current Transformer, Breaker, Transformer, Medium Voltage operating equipment

VE - Vitreous Enamel

CD - Chromadek

FG - Fibreglass

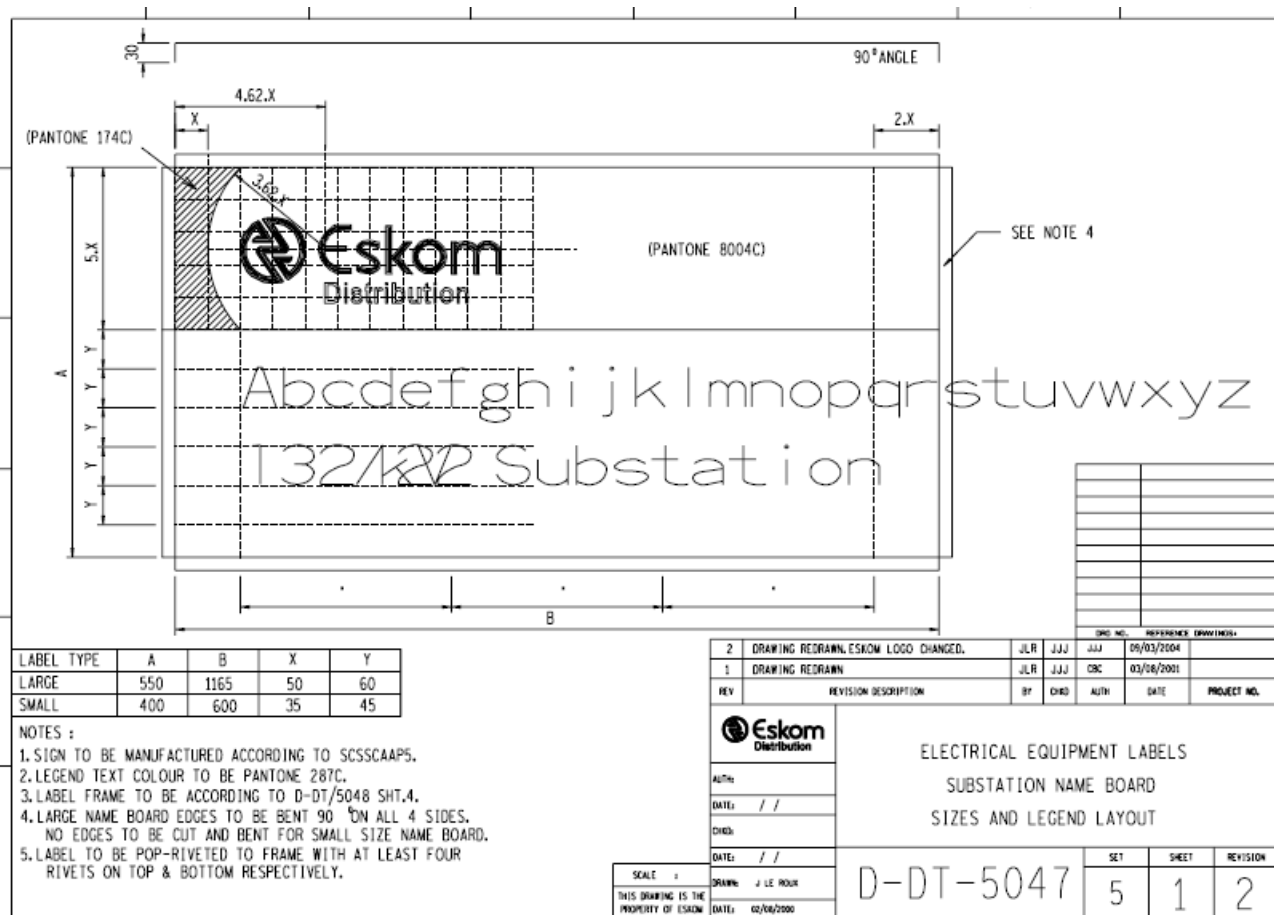
Annex D – List of label substrate types

1	2	3	4	5
Label Type	Vitreous Enamel	Chromadek / Chromaprep	Fibreglass	Aluminium
Substation name board	-	X	-	-
Substation primary plant labels	X	X	X	-
Sub-transmission line structure identification labels	X	X	-	-
Sub-transmission line crossing label	-	X	-	-
MV structure identification labels	-	-	-	X
LV structure identification labels	-	X	-	X
MV operating labels	X	X	-	-
LV operating labels	X	X	-	-
Substation safety signs	X	X	-	-

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Annex E – Substation Name Board



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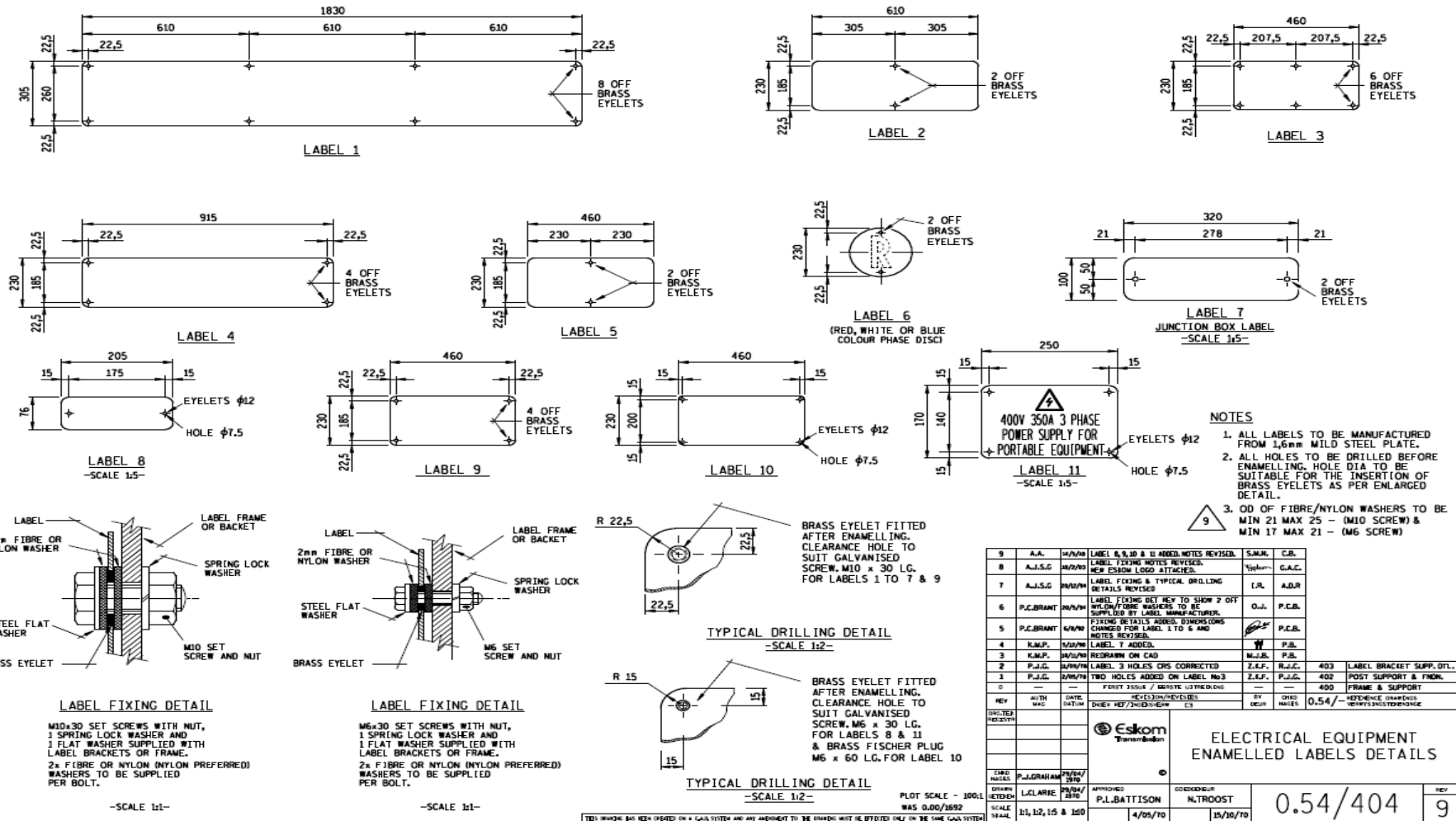
Annex F – - Example Of Labels Required**KRUISPUNT SUBSTATION****TRANSFORMER 4 - 275kV SIDE**

LABEL WORDING	LETTER SIZE mm	LABEL TYPE AND SIZE mm	COLOUR SCHEME	QUANTITY
R	150	6 230 DIA	4	3
W	150	6 230 DIA	5	3
B	150	6 230 DIA	6	3
TRANSFORMER 31 275kV BUSBAR 1 ISOLATOR	30 25 25	5 460 x 230	1	1
TRANSFORMER 31 275kV BUSBAR 2 ISOLATOR	30 25 25	5 460 x 230	1	1
TRANSFORMER 31 275kV BREAKER	100 75	1 1830 x 305	1	1
TRANSFORMER 31 275kV CB	30 25	7 320 x 100	3	1
TRANSFORMER 31 275kV EARTH SWITCH BUSBAR SIDE	30 25 25	5 460 x 230	2	1
TRANSFORMER 31 275kV EARTH SWITCH TRANSFORMER SIDE	30 25 25	5 460 x 230	2	1

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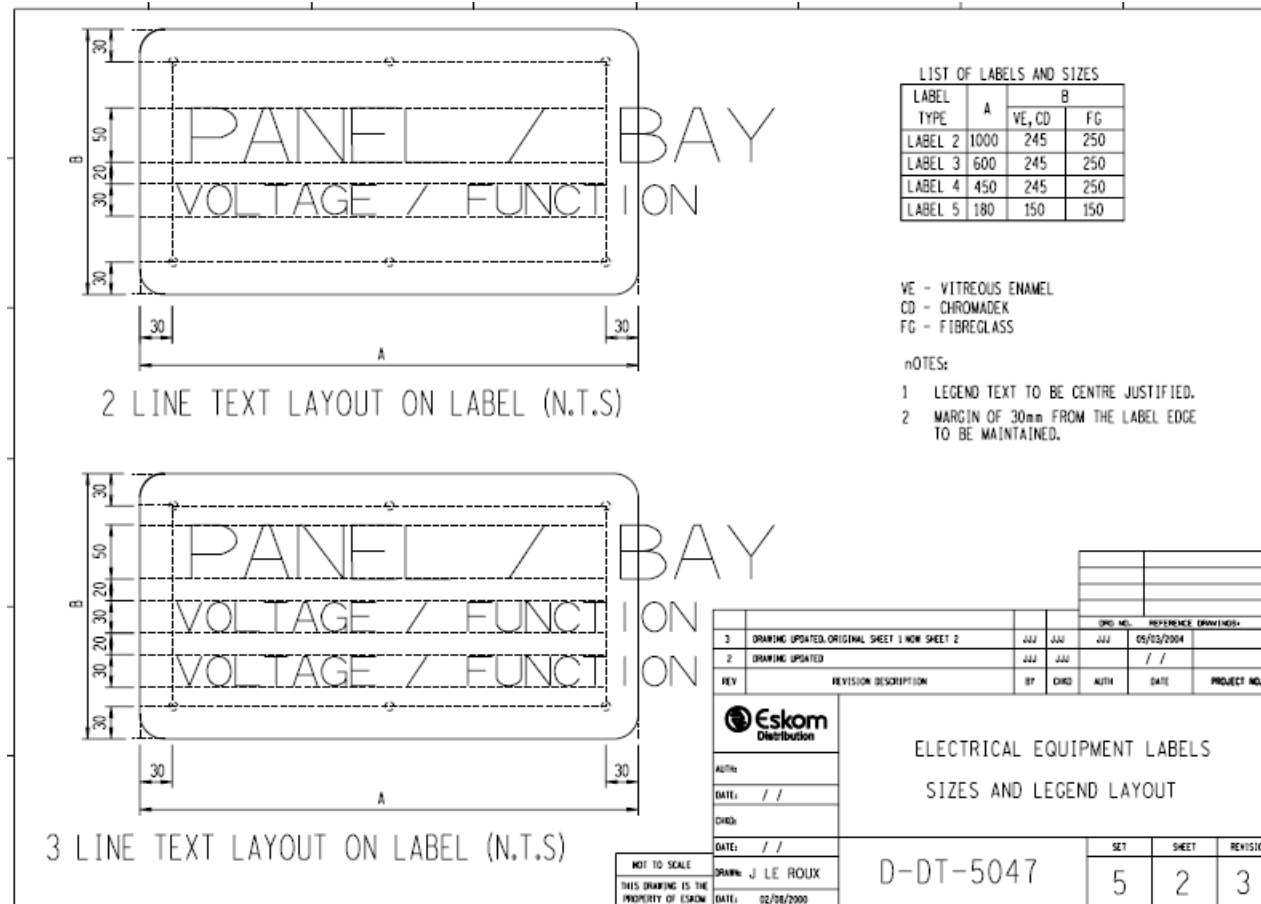
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Annex H – Enamelled Labels Details



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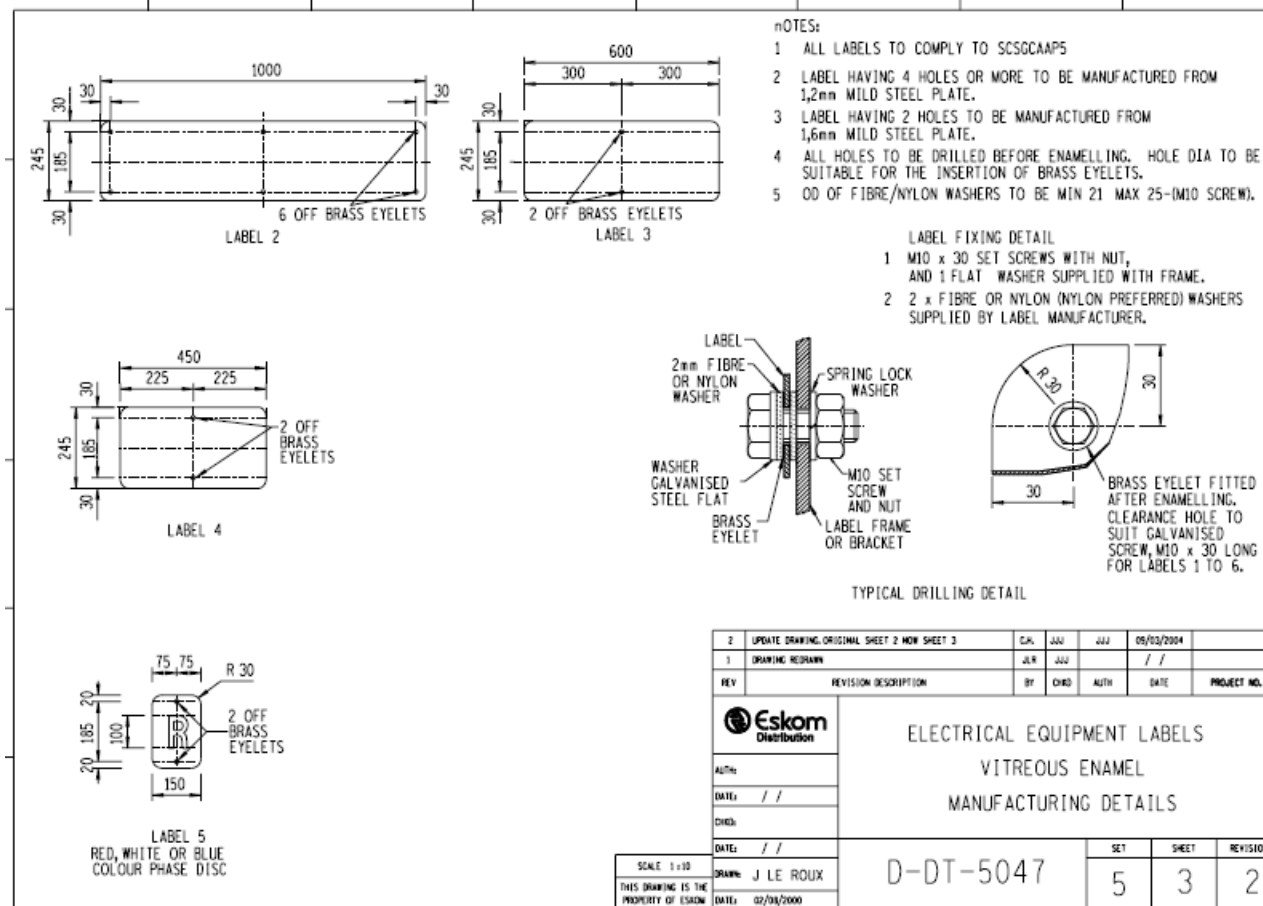
Annex I – Substation Primary Plant Label – Sizes & Legend Layout



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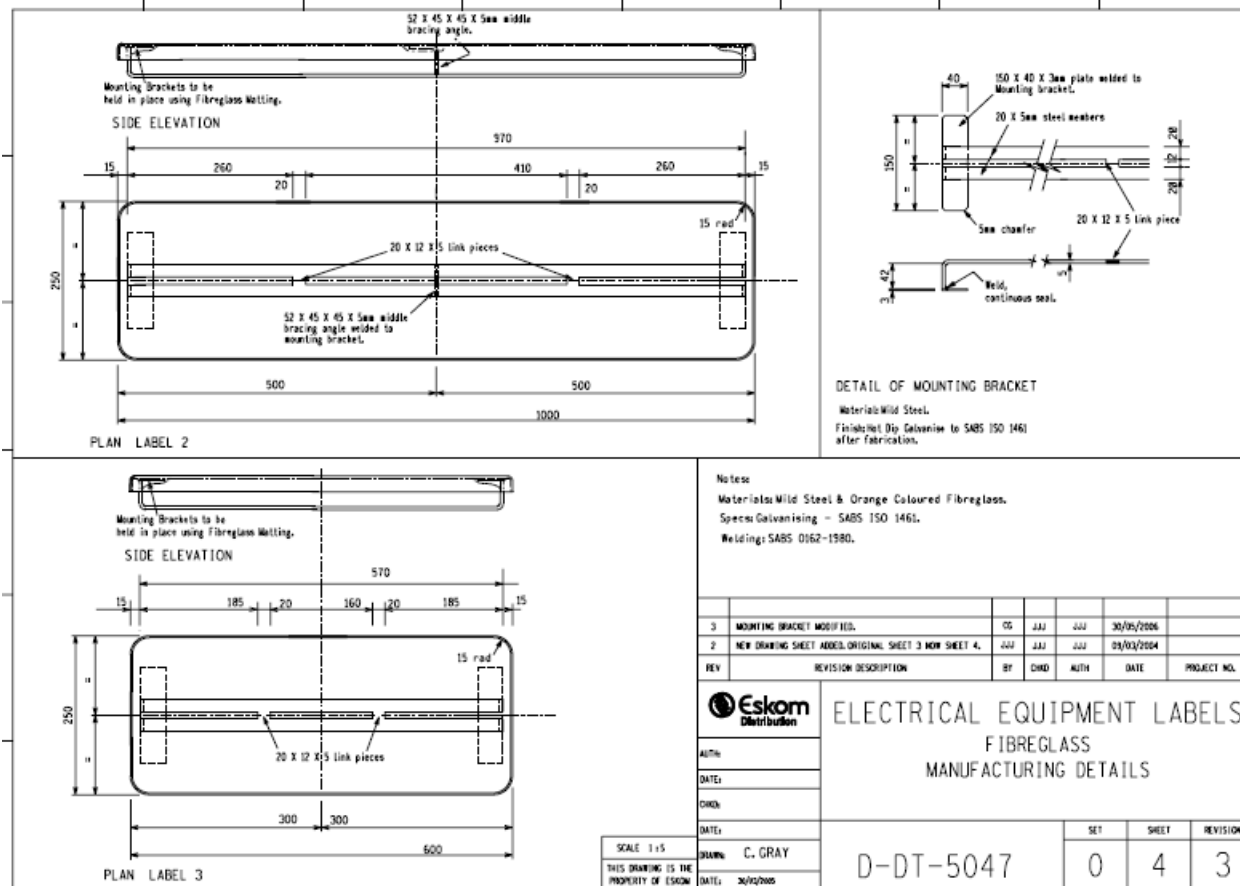
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Annex J – Substation Primary Plant Label – Sizes & Legend Layout



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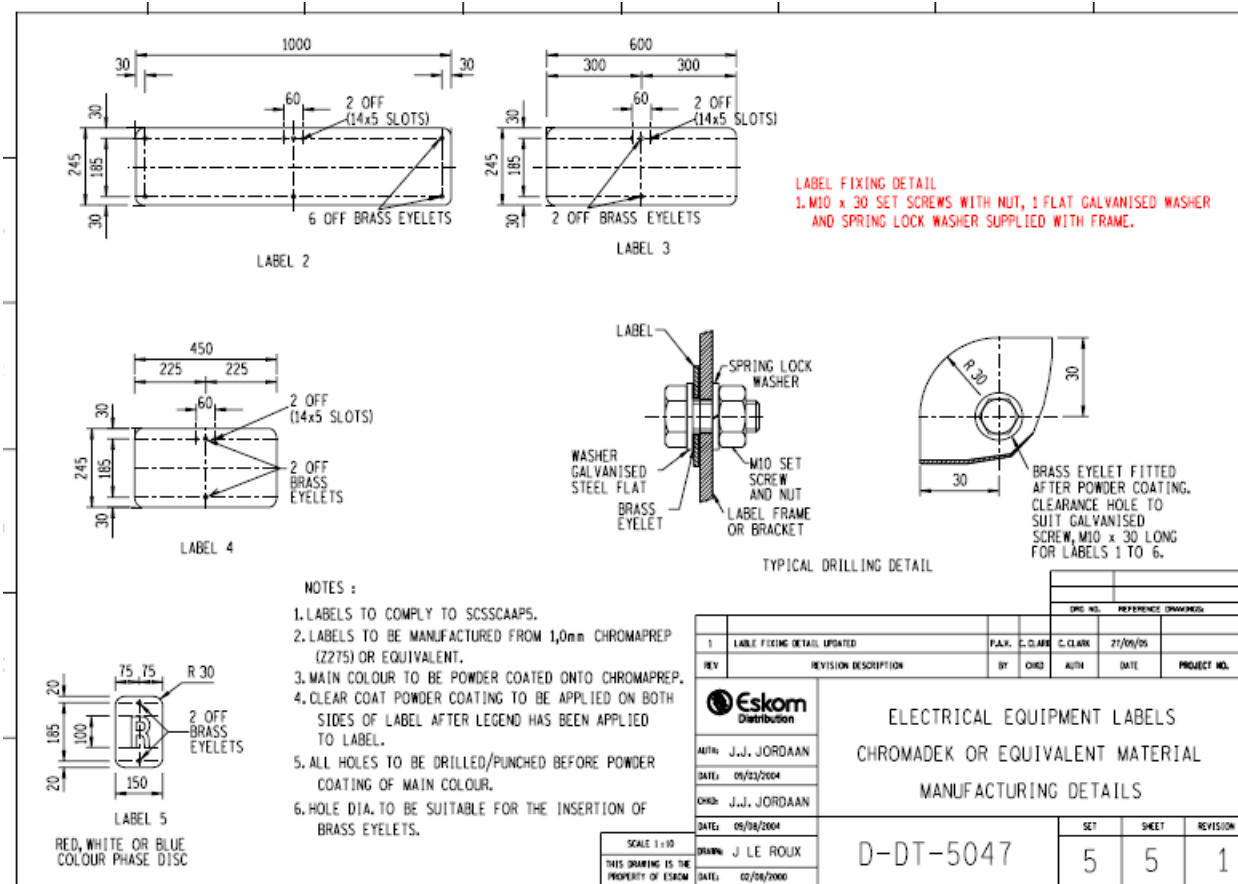
Annex K – Substation Primary Plant Label – Fibreglass Manufacturing Details



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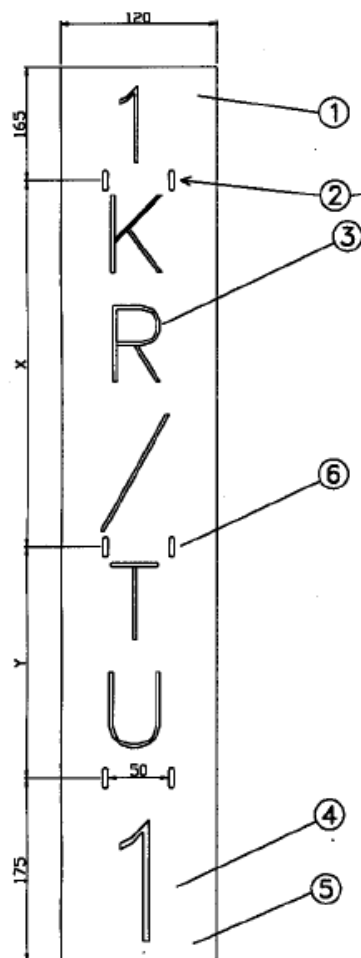
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Annex L – Substation Primary Plant Label – Chromadek / Chromaprep Manufacturing details



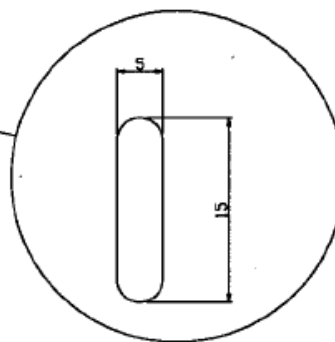
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Annex M – -Tower label for Transmission lines - Vertical configuration



0.6

Slot Details



Lettering on this side.

Material Description

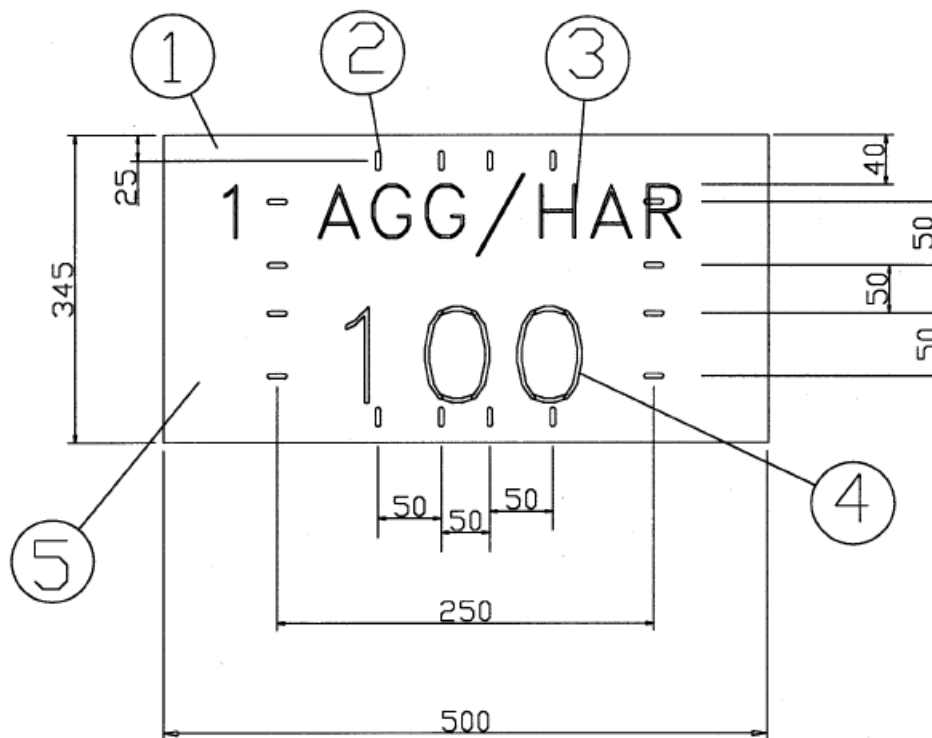
1. Iscor Chromadek 0,6mm yellow 75% gloss or alternatively vitreous enamel. Other material subject to approval by Eskom.
2. Mounting slots (See slot details).
3. 75mm high 3M Scotchcal 7725-12 lettering (line name designation), or 75mm vitreous enamel painted letters in the case of vitreous enamel labels.
4. 140mm high 3M Scotchcal 7725-12 lettering (tower designation number), or 140mm vitreous enamel painted letters in the case of vitreous enamel labels
5. Background colour = (Golden Yellow SABS: B49) according to SABS 1091.
6. Mounting slots for banded straps.

NOTE:

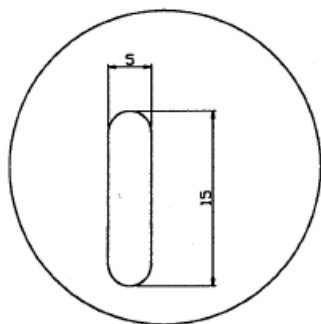
All dimensions in mm.
The length of X & Y will vary
Depending on the number of letters
& numbers. Add 100mm extra per
extra letter & 165mm per extra
number.

Annex N – - Tower label for Transmission lines - Horizontal configuration.

Tower label for Transmission Lines



Slot Details



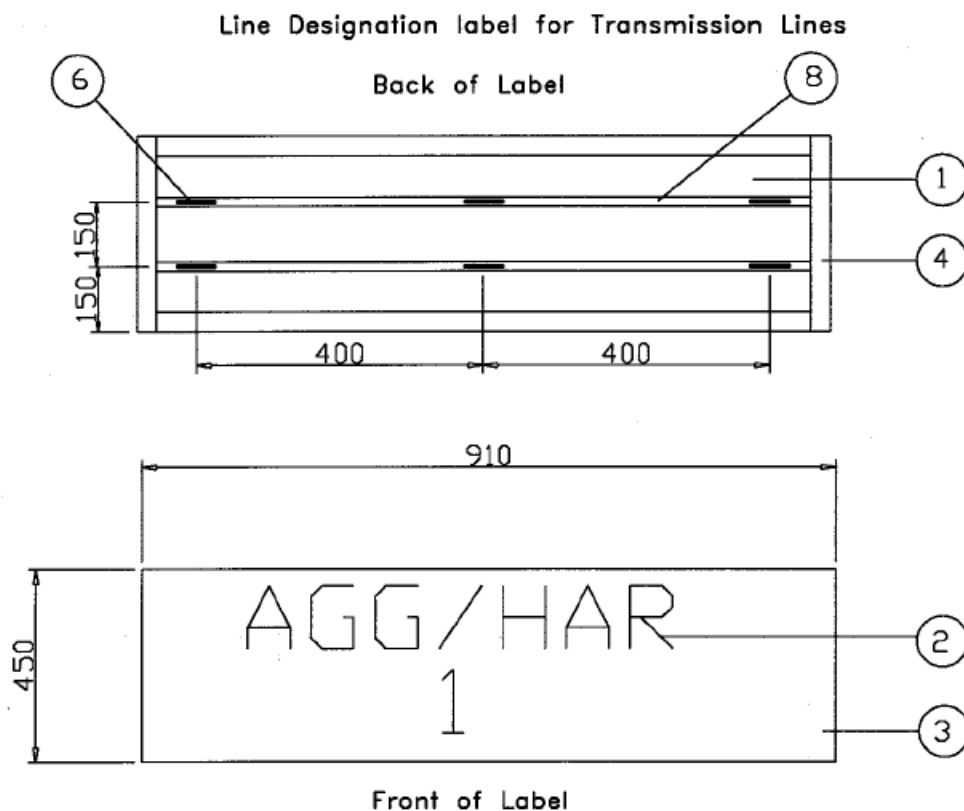
NOTE:
All dimensions in mm.

Material Description

1. Iscor Chromadek 0,6mm yellow 75% gloss or alternatively vitreous enamel. Other material subject to approval by Eskom.
2. Mounting slots (See slot details).
3. 75mm high 3M Scotchcal 7725-12 lettering (line name designation), or 75mm vitreous enamel painted letters in the case of vitreous enable labels.
4. 140mm high 3M Scotchcal 7725-12 lettering (tower designation number), or 140mm vitreous enamel painted letters in the case of vitreous enable labels.
5. Background colour = (Golden Yellow SABS: B49) according to SABS 1091.

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Annex O – - Line designation labels.



Material Description

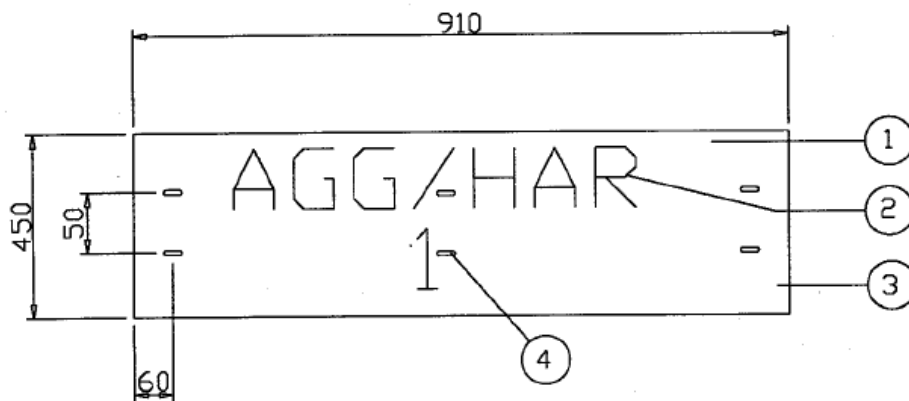
1. Iscor Chromadek 0,6mm yellow
75% gloss.
Other material subject to Eskom approval.
2. 150mm high 3M Scotchcal 7725-12
lettering.
3. Background colour = (Golden Yellow
SABS: B49) according to SABS 1091.
4. Hot dip galvanised square tubing
20mm x 20mm x 1.6mm frame
5. Metal sheeting to be pop riveted onto steel frame by using
twelve 4.8mm pop rivets evenly spaced.
6. 20 x 4mm chain links (6 off), welded to frame,
for attachment points.
7. All machining, including drilling, welding cutting and grinding
must be done before galvanising.
8. 10mm diameter steel bar.

NOTE:
All dimensions in mm.

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Annex P -- Line designation labels - Vitreous Enamel substrate.

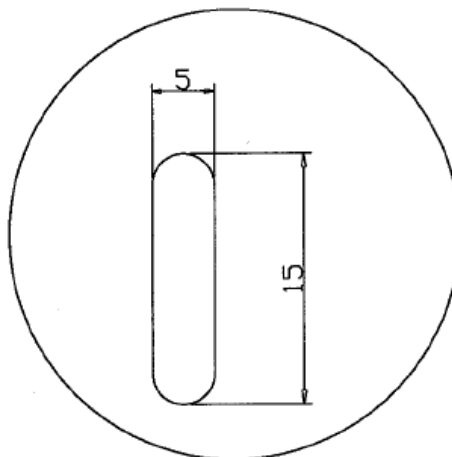
Line Designation label for Transmission Lines



Material Description

1. Vitreous enamel substrate. Other material subject to approval by Eskom.
2. 150mm vitreous enamel painted letters
3. Background colour = (Golden Yellow SABS: B49) according to SABS 1091.
4. Mounting slots (See slot details).

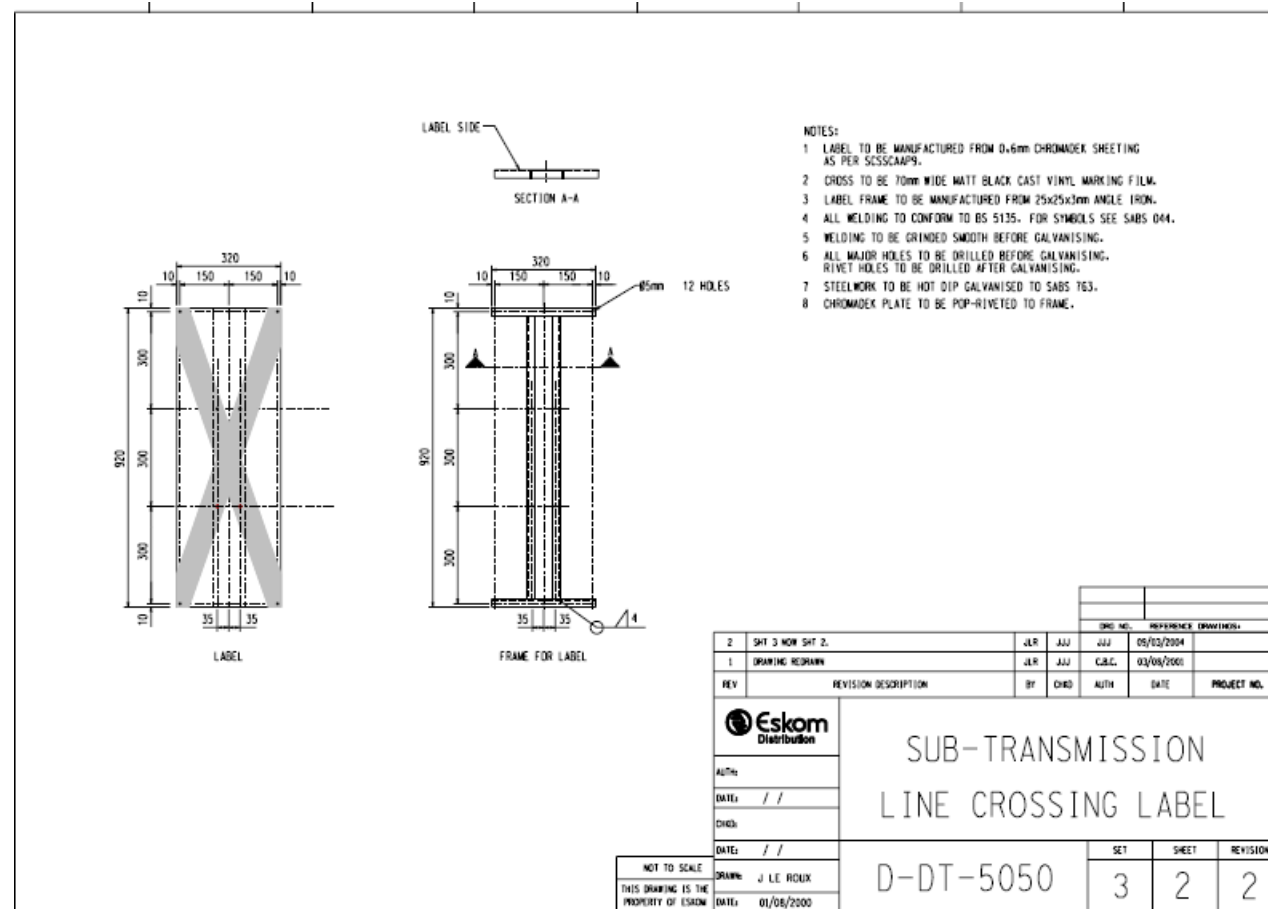
Slot Details



NOTE:
All dimensions in mm.

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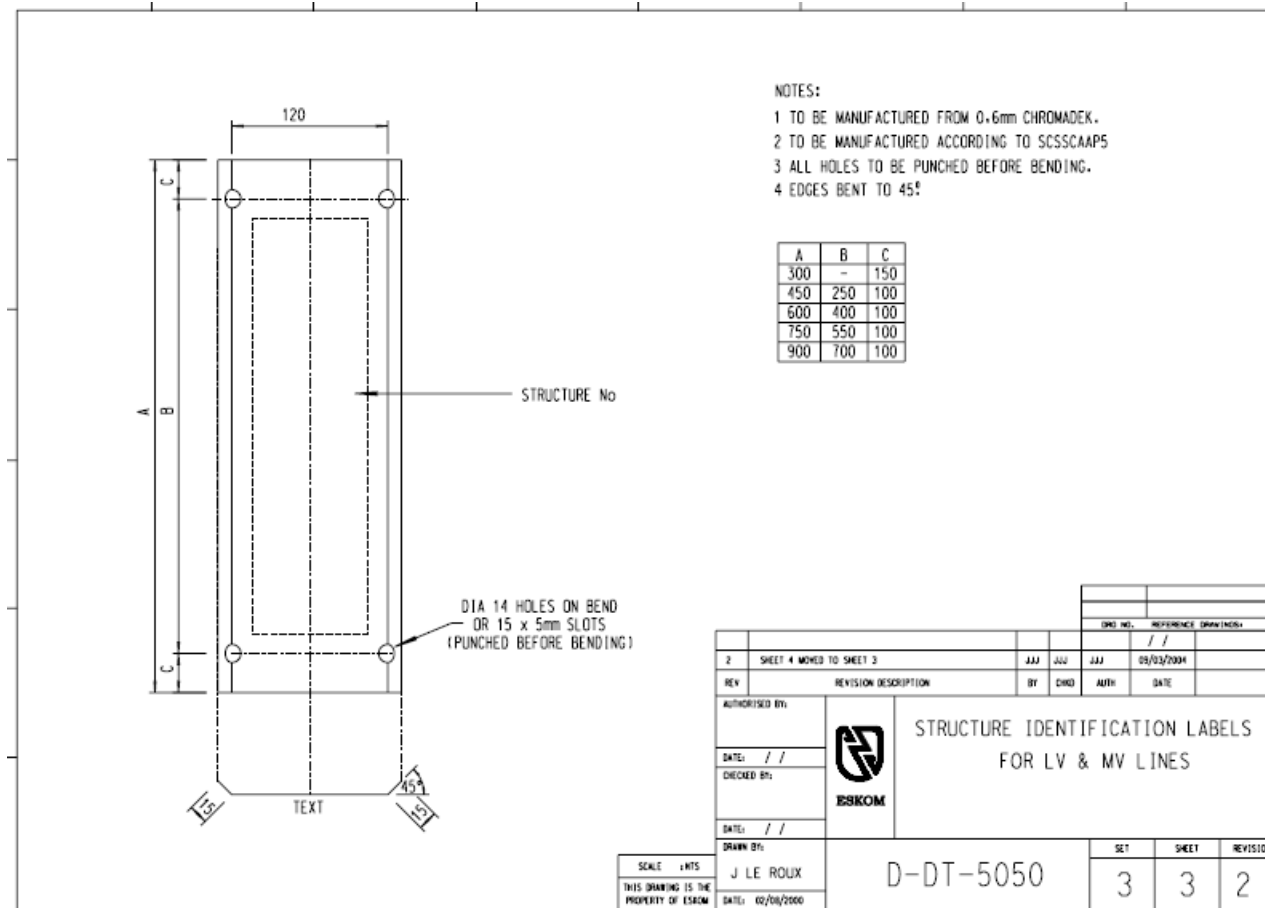
Annex S – Sub-Transmission Line Label – HV Line Crossing Label



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Annex T – Low Voltage Line Label – LV Structure Identification Label



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