Eskom Transmission	SPECIFICATION	Document Classification : PUBLIC

Title: **DESIGN, MANUFACTURING AND INSTALLATION SPECIFICATION FOR TRANSMISSION LINE LABELS**

Reference: **TSP41-604**
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Contents

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1 Scope

The purpose of this specification is to detail the design, manufacturing and installation of Transmission line labels. This specification does not cover any sub-station labels.

2 Normative references

The following documents contain provisions that, through reference in the text, constitute requirements of this specification. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below. Information on currently valid national and international standards and specifications can be obtained from the Information Centre and Technology Standardization Department at Megawatt Park.

SABS ISO 1461:1991, *Hot-dip galvanised coatings on fabricated iron and steel articles: specification and test methods.*

SABS 1091:1975, *National colour standards for paint*.

SABS 1519: Part 1 & Part 2- Road Signs.

3 Definitions

3.1 substrate: The type of material used to manufacture labels.

3.2 line crossing label: A label used on the bridge or leg of a tower to notify or warn airborne inspectors of a line crossing ahead.

3.3 line designation label A label placed at the start and end of a line which identifies the designation and line number.

3.4 tower label: A label, which identifies the line and the number of the tower/pole.

4 Authorisation

This document has been seen and accepted by:

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5 Revisions

Date	Rev	Remarks
Nov 2005	1	4.3.4 and 4.4.2.3 Added Annex 3A – new design of backing frame for Line Crossing Label

6 Requirements

6.1 General

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.

6.2 Responsibility

6.2.1 Eskom's responsibility

6.2.1.1 The Project Manager or his delegate shall ensure that all labels comply with the requirements of this specification.

6.2.1.2 The orientation of the label (vertical or horizontal) shall be manufactured in accordance with the Eskom's requirement.

6.2.2 Contractor's/Supplier's responsibility

Nothing in this specification shall lessen the obligations of the supplier that are detailed in any other document forming part of a contract.

6.3 Eskom approval

6.3.1 Prior to manufacturing of the labels, a complete sample label ready for installation, shall be prepared by the manufacturer and submitted to Eskom for approval.

6.3.2 The supplier shall be fully responsible for his product and the performance in service. Approval by Eskom does not relieve the supplier of the responsibility for the adequacy of the product, dimensions and details.

6.3.3 Manufacturer's catalogues shall not refer to any product as "Eskom approved". Eskom may only be mentioned as a reference.

6.3.4 If a new product has been approved by Eskom, a guarantee will be offered by the supplier to replace the new approved product in the case of any damage or non-performance.

6.4 Design requirements for transmission line labels

6.4.1 Tower labels

6.4.1.1 Substrate

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

a) The Chromadek label shall have a minimum guaranteed life of 10 years and the vitreous enamel labels a minimum guaranteed life of 25 years.

b) The Iscor Chromadek 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.

c) All labels supplied shall have a standard background colour of **GOLDEN YELLOW: SABS B49** in accordance with SABS 1091.

6.4.1.2 Size and length of label

The tower label shall be manufactured in accordance with the drawings in annexes 1 and 2. The label shall have slots for the banded straps. The details of these slots are shown in the drawings in annexes 1 and 2. Label sizes and slots shall be manufactured as indicated on the relevant drawings.

6.4.1.3 Legends

6.4.1.3.1 Plain block letters **(HELVETICA MEDIUM)** shall be used for the legend. The inscription shall be detailed in the Works Information of the relevant contract.

6.4.1.3.2 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

6.4.1.3.3 The legends for the Chromodek labels shall use **3M Scotchal 7725-12** lettering or equivalent. The equivalent lettering shall be subject to Eskom approval.

6.4.2 Line crossing label

6.4.2.1 Philosophy of the line crossing label

A line crossing label shall be attached to each transverse face of the bridge, on the first, second and third poles/ towers on all sides of a crossing as indicated in the drawing below.

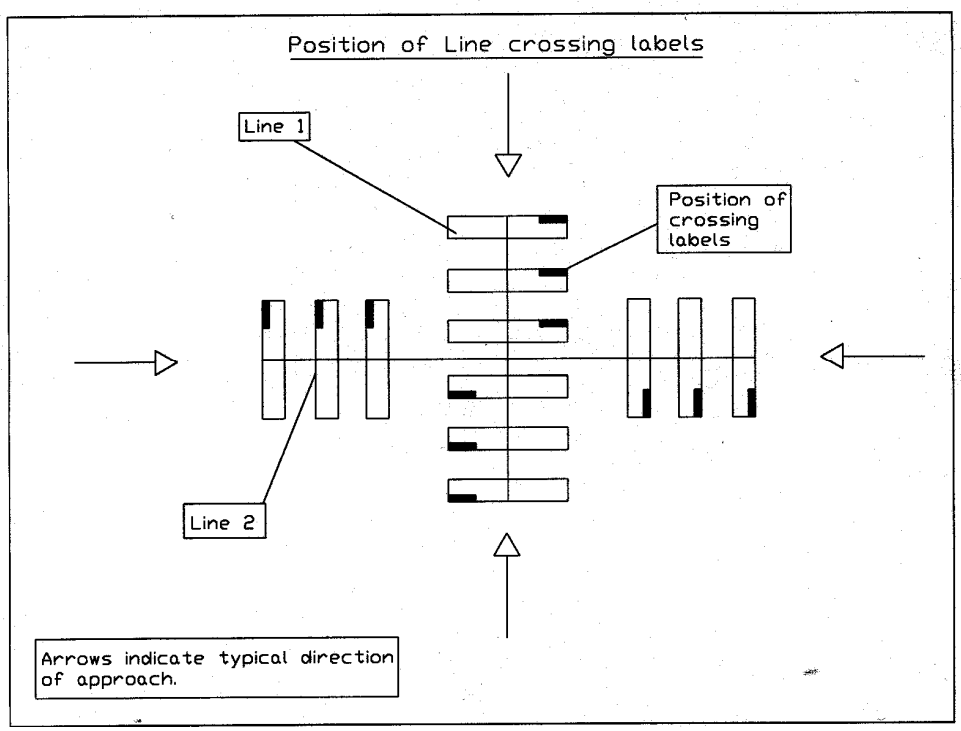
Line crossing labels shall be used when:

a) one line crosses over another line

b) two lines converge to run parallel with each other in a single servitude

c) there are tee-off points

d) there is a situation that could pose a danger to a helicopter during inspections.



6.4.2.2 Substrate

The line crossing labels shall be manufactured in accordance with the drawing in annex 3.

6.4.2.3 Legends and background

The line-crossing label shall contain a cross,that shall have a minimum width of 70 mm. This label shall be covered with *Scotchlite reflective sheeting, fluorescent diamond grade or an equivalent reflective material.* This reflective material must have the following minimum requirements.

Property	**Minimum Requirements**			
Colour	**FLUORESCENT YELLOW GREEN (3M Ref. No 3963)**.			
Specular Gloss- test according to ASTM D523 using an 85º glossmeter.	>50			
Adhesion- 800g weight hang free at an angle of 90º to the panel surface for 5 min.	Under 50mm movement.			
Total Luminance Factor Y_T (%)	Min 60			
Fluorescence Y_F (%)	Min 35 for new sheeting.			
Coefficients of Retroreflection (R_A)	**Observation angle**	**Entrance angle**		
		-4º	**30º**	**45º**
	0.1º	800	595	245

	0.2º	725	375	160
	0.5º	220	105	60
	1.0º	11	9.0	10
Liner removal	Able to peel without adhesive residuum.			
Shrinkage	< 0.8mm in 10min or not more than 3.2mm in 24hours.			
Resistance to Accelerated weathering Reflectivity Shrinkage Colour fastness Adhesion	 Weather-O-Meter 1800hrs- not less than 80% of value Weather-O-Meter 1800hrs- not more than 0.8mm Weather-O-Meter 1800hrs- Good or better colour fastness Weather-O-Meter 1800hrs- Not to be removed.			
Warranty	**10 years.**			
Other features to be met	**Must be able to provide high nighttime sign brightness and higher daytime brightness.**			

6.4.3 Line designation labels

6.4.3.1 Substrate

The substrate used shall be exactly as that specified for the tower label in 4.4.2.3. The line designation label shall be manufactured in accordance with the details specified in annex 4 or 4A.

6.4.3.2 Size and length of line designation label

See annex 4 or 4A.

6.4.3.3 Legends for line designation labels

6.4.3.3.1 Plain block letters **(HELVETICA MEDIUM)** shall be used for the legend. The inscription shall be detailed in the Works Information of the relevant contract.

6.4.3.3.2 The legend shall be 150 mm high.

6.4.3.3.3 The legends for the Chromodek labels shall use **3M Scotchal 7725-12** lettering or equivalent. The equivalent lettering shall be subject to Eskom approval.

6.4.4 Lettering

No abbreviations shall be used on the labels. The lettering used on the line labels shall be approved before manufacturing begins. The lettering shall start with the first letter of the power station or substation in alphabetical order. The letters to be used shall be as follows:

a) When a line is between two power stations or HV Yards – the first **two** letters of each power station, shall be used starting with the station having alphabetical precedence.

   Example: Duvha- Majuba = **DU/MA**

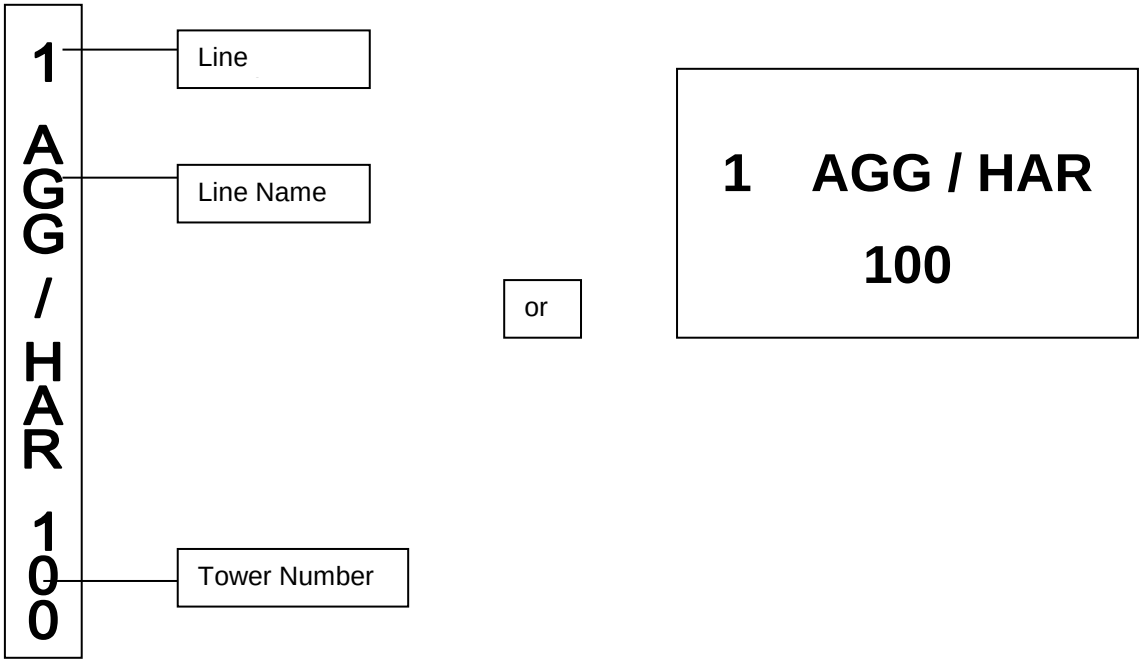
b) When a line is between a power station and a substation – the first two letters of the power station shall be used followed by the first **three** letters of the substation.

Example: Majuba- Klaarwater = **MA/KLA**

c) When a line is between two substations – the first **three** letters of each substation, shall be used starting with the substation having alphabetical precedence.

Example: Sol- Zeus = **SOL/ZEU**

Example: If the line name is, **Aggeneis Harib No 1**, at tower 100, the label shall read as follows:



6.5 Installation of labels on towers

6.5.1 Position of tower labels on tower

6.5.1.1 All line labels shall be positioned on the tower at a height easily viewed from both the ground and air (typically from a helicopter during aerial inspections). This height shall correspond roughly to the lowest conductor height and be near the waist in the case of lattice towers.

When positioning labels, maintenance requirements shall be considered. The label shall be positioned so that maintenance or replacement are possible without interfering with the line operation.

Annex 5 shows the basic positions of the tower labels for different tower types.

6.5.1.2 Only one tower label will be supplied for each tower. The labels shall be positioned so that all odd numbers face the direction of the substation having alphabetical precedence and that all even numbers face the other substation.

6.5.2 Methods of attaching labels to towers

All labels shall be attached to the tower using three stainless steel banded straps inserted through slots in the labels. The label shall then be attached to a member of the tower in the specified position. The most common size of strap to be used shall be the 12,7 mm $\times$ 0,7 mm strap. The contractor shall ensure that all straps used are tightened evenly without damaging or distorting the label. All strap buckles are stainless steel.

Care shall be taken not to damage or chip the vitreous enamel labels during transport and installation.

6.5.3 Position of line crossing labels on tower

All line crossing labels shall be positioned on the tower bridge where they will be clearly visible from the helicopter or aircraft. On crossrope suspension towers, the crossing labels shall be fitted as high as practical on one leg. The position of the crossing label on the crossrope tower should be at least within the first ¼ of the entire length of the leg from the top. As the pilots in the majority of helicopters sit on the right hand side, labels shall be fitted on the left hand side of the tower when facing in the direction of flight that will encounter the crossing.

When positioning labels, maintenance requirements shall be considered. The label shall be positioned so that maintenance or replacement are possible without interfering with the line operation.

6.5.4 Methods of attaching line crossing labels to towers

All line crossing labels shall be attached to the tower using three stainless steel banded straps inserted through chain links welded to 10 mm round bars attached onto the frame of the label. The label shall then be attached to a member of the tower in the specified position. The most common size of strap to be used shall be 12,7 mm $\times$ 0,7 mm strap. The contractor shall ensure that all straps used are tightened evenly without damaging or distorting the label. All strap buckles shall be stainless steel.

Annex A
(informative)

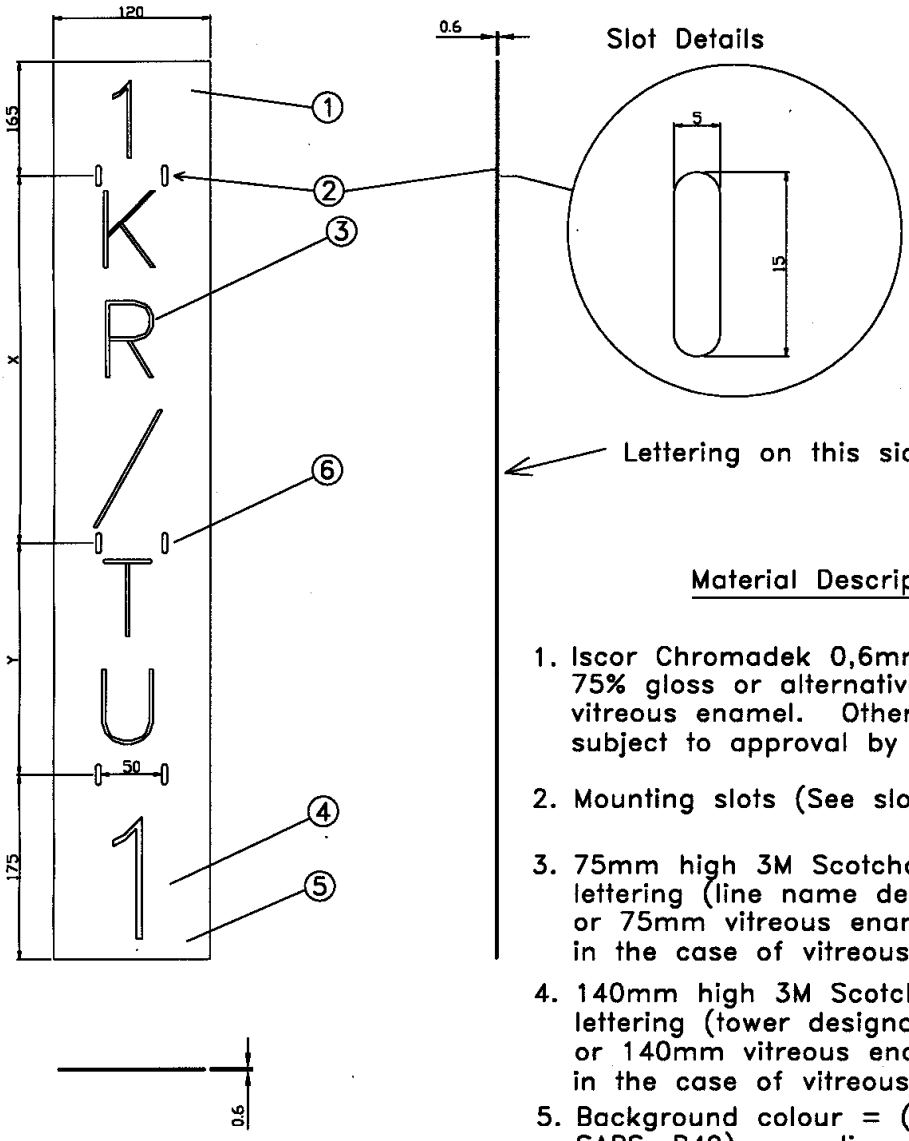
List of drawings

The following drawings form part of this annex:

Number	Title
1	Tower label for Transmission lines- Vertical configuration
2	Tower label for Transmission lines- Horizontal configuration.
3	Line crossing labels.
3A	Line crossing labels – new design for backing frame
4	Line designation labels.
4A	Line designation labels- Vitreous Enamel substrate.
5	Position of labels on towers.

ANNEXE 1

Tower label for Transmission Lines



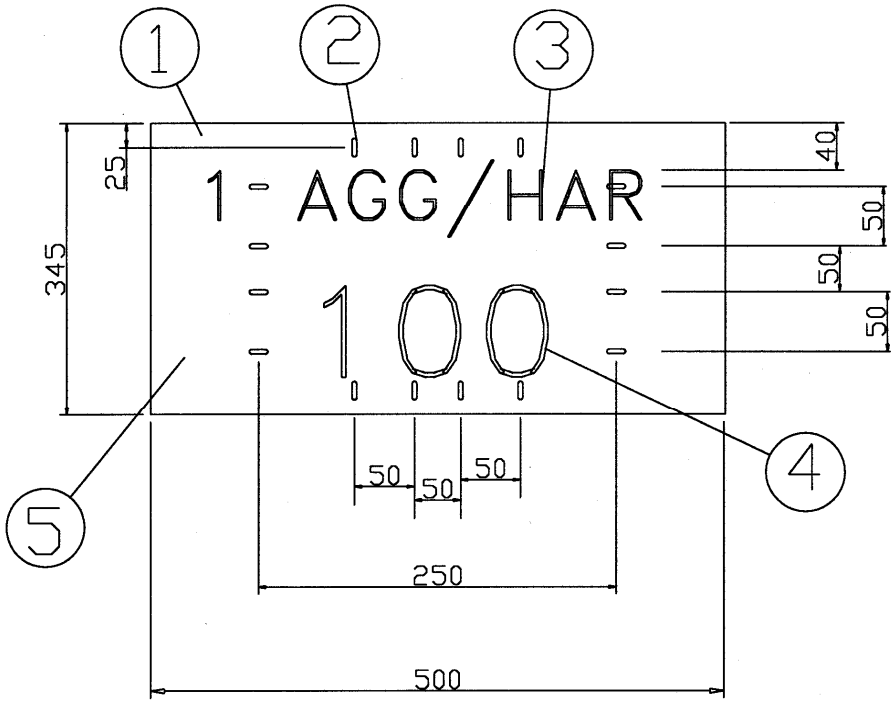
Material Description

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.

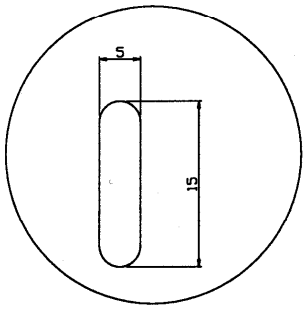
NOTE:
All dimensions in mm.
The length of X & Y will vary Depending on the number of letters & numbers. Add 100mm extra per extra letter & 165mm per extra number.

ANNEXE 2

Tower label for Transmission Lines



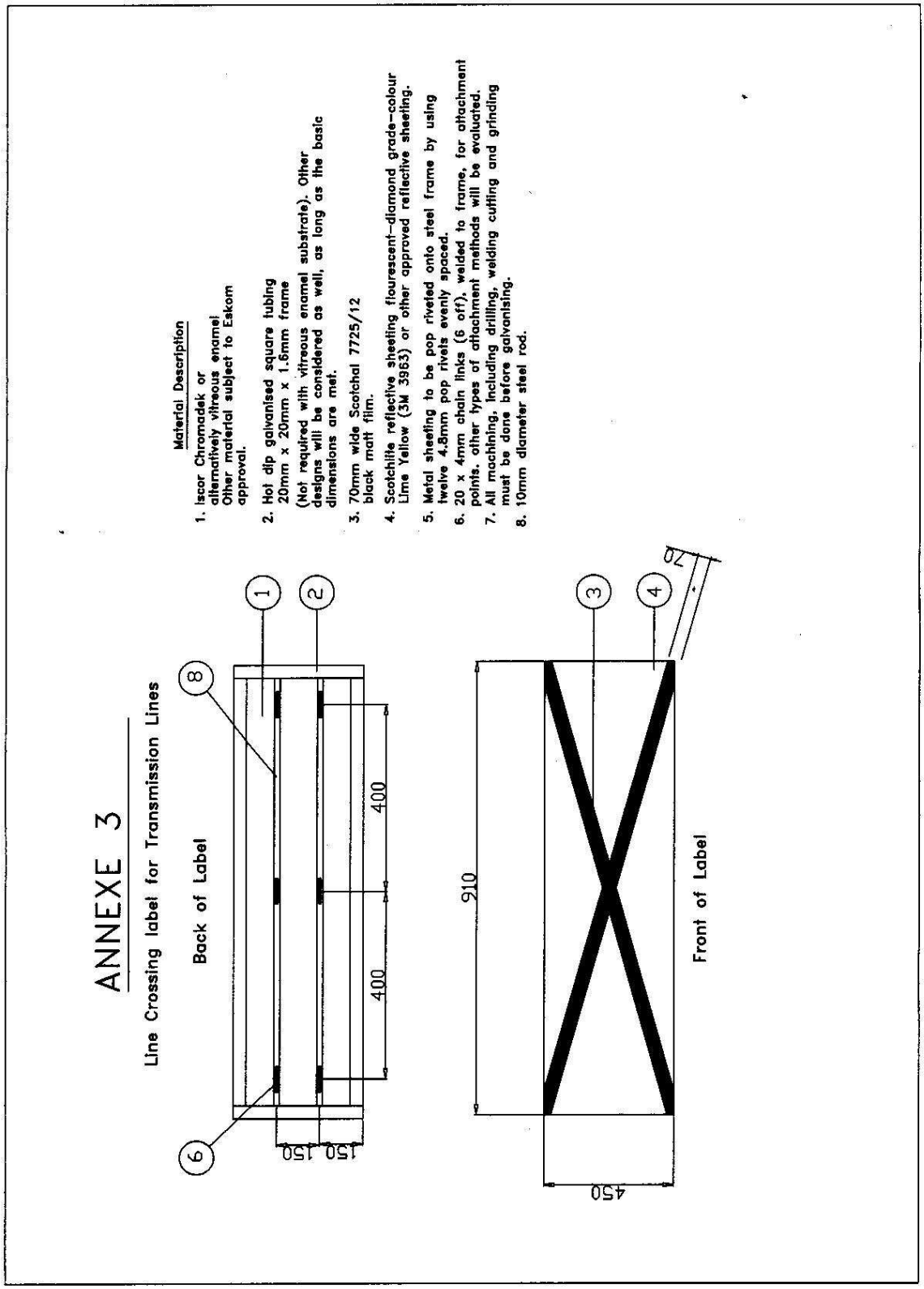
Slot Details



NOTE:
All dimensions in mm.

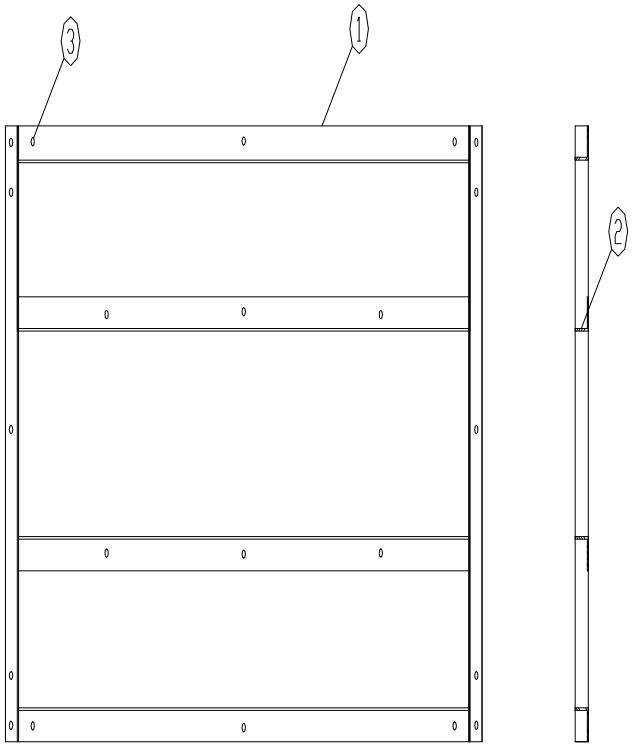
Material Description

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.


ANNEXE 3
Line Crossing label for Transmission Lines
Material Description
1. Iscor Chromadek or alternatively vitreous enamel Other material subject to Eskom approval.
2. Hot dip galvanised square tubing 20mm x 20mm x 1.6mm frame (Not required with vitreous enamel substrate). Other designs will be considered as well, as long as the basic dimensions are met.
3. 70mm wide Scotchal 7725/12 black matt film.
4. Scotchlite reflective sheeting flourescent-diamond grade-colour Lime Yellow (3M 3963) or other approved reflective sheeting.
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. other types of attachment methods will be evaluated.
7. All machining, including drilling, welding cutting and grinding must be done before galvanising.
8. 10mm diameter steel rod.
Back of Label
400
400
150
150
910
450
70
Front of Label

ANNEXE 3 A

Line Crossing label- new design of backing frame



Material Description

1. Hot dip galvanised 25mm x25mm angle iron frame 20mm x 20mm x 1.6mm frame

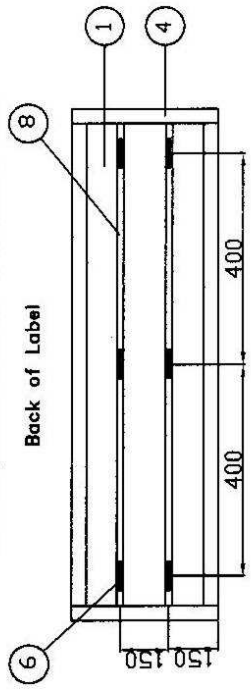
   (Not required with vitreous enamel substrate). Other designs will be considered as well, as long as the basic dimensions are met.

2. cross bracing made of 25mmx 25mm angle iron with slots for banded straps.

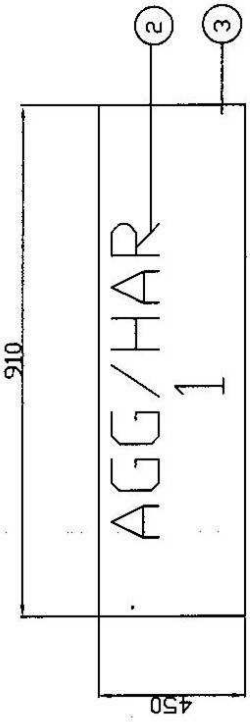
3. Metal sheeting to be pop riveted onto steel frame by using twelve 4.8mm pop rivets evenly spaced.

ANNEXE 4

Line Designation label for Transmission Lines



Back of Label



Front of Label

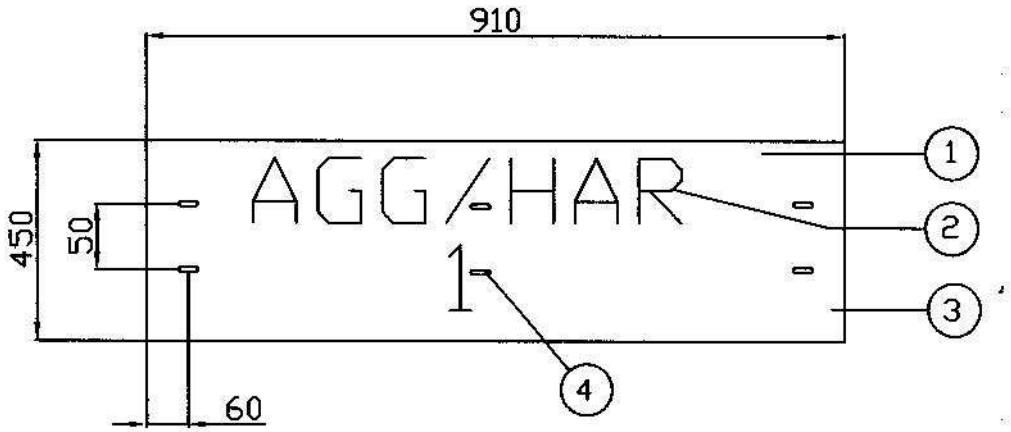
NOTE:
All dimensions in mm.

Material Description

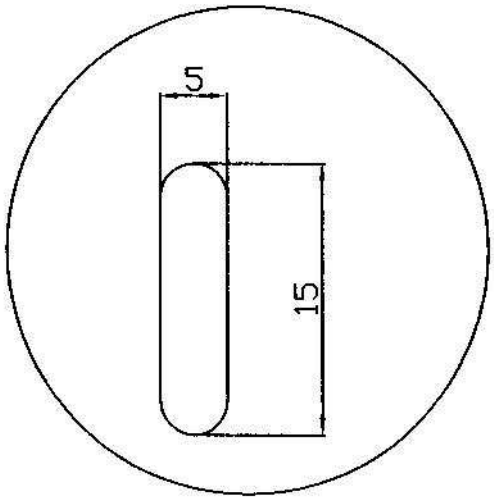
1. Iscor Chromadek 0,6mm yellow
   75% gloss.
   Other material subject to Eskom approval.
2. 150mm high 3M Scotchcal 7725-12
   lettering.
3. Background colour = (Golden Yellow
   SABS: B49) according to SABS 1091.
4. Hot dip galvanised square tubing
   20mm x 20mm x 1.6mm frame
   Other designs will be considered
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.

ANNEXE 4A

Line Designation label for Transmission Lines



Slot Details

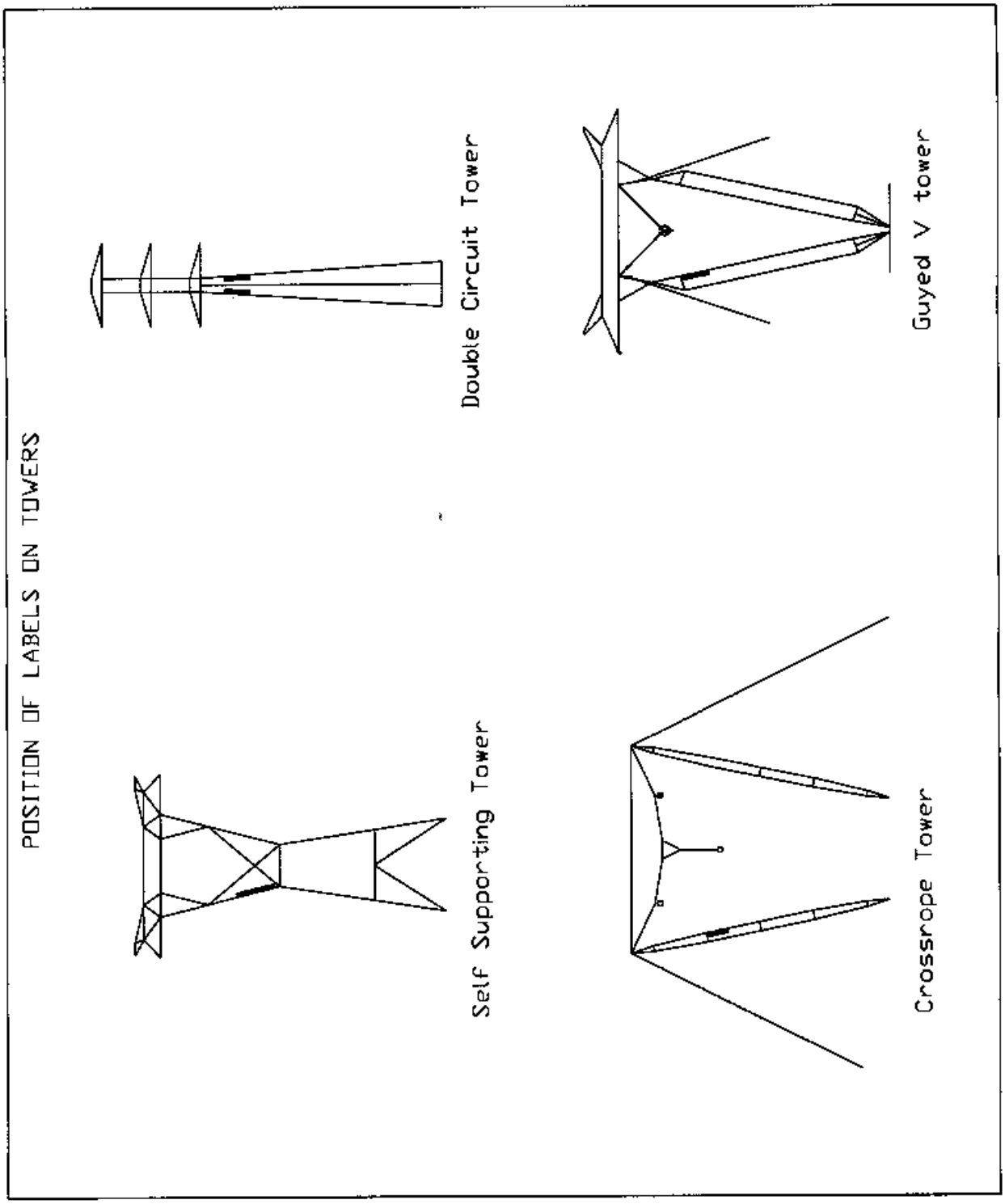


NOTE:
All dimensions in mm.

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).

ANNEXE 5


POSITION OF LABELS ON TOWERS
Double Circuit Tower
Guyed V tower
Self Supporting Tower
Crossrope Tower