

 <b>Eskom</b>	<b>Terms of Reference</b>	<b>Transmission</b>
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Title: **TECHNICAL EVALUATION  
CRITERIA FOR HIGH  
TEMPERATURE LOW SAG  
(HTLS) CONDUCTORS**

Unique Identifier: **240-170000679**

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Area of Applicability: **Engineering**



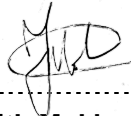
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## 1. Introduction

The intention of this document is to:

- Obtain HTLS conductor information from suppliers
- Evaluate and prequalify suppliers, based on the submitted mandatory information in Table A.1 and the qualitative scoring method indicated in Table A.2, **please refer to Annexure A**. In the next phase of the project, the pre-qualified suppliers will be requested to provide a quotation for practical demonstrations on hardware and conductor installations, as well as to provide classroom training on installations of specific HTLS conductors. Eskom will thereafter review and evaluate the responses and contact successful suppliers.

This note confirms that the technical evaluation of the HTLS conductors (Classroom training and practical demonstrations on conductor and hardware jointing), for the detailed phase, will be conducted in 3 stages:

- **Stage 1:** Evaluation of mandatory requirements
- **Stage 2:** Evaluation of submitted information and scoring assessment
- **Stage 3 :** Identification and pre-qualification of successful candidates

## 2. Supporting clauses

### 2.1 Scope

The purpose of this document is to describe the criteria which are to be used when evaluating tender submissions for the classroom training and practical demonstrations of HTLS conductor and hardware jointing.

#### 2.1.1 Purpose

This document consists of the technical evaluation criteria on which suppliers will be assessed. Passing submissions will be pre-qualified for the next phase of the project. A minimum score of 50% is required for suppliers to pass this phase of the project. In the next phase, suppliers will be asked to provide Eskom with a quotation for classroom training and practical demonstrations for hardware and conductor jointing procedures. These responses will thereafter be evaluated and suppliers will be nominated.

#### 2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions.

### 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] ISO 9001 Quality Management Systems.
- [2] SANS 61089: 1991, Round wire concentric lay overhead electrical stranded conductors
- [3] IEC 60888: 1987, Zinc-coated steel wires for stranded conductors
- [4] IEC 60889: 1987, Hard-drawn aluminium wire for overhead line conductors
- [5] IEC 61394: 1997, Characteristics of greases for aluminium, aluminium alloy and steel bare conductors
- [6] Cspr TR 18-2:2017, Radio interference characteristics of overhead power lines and high voltage equipment – Part 2: Methods of measurement and procedure for determining limits.

### 2.2.2 Informative

N/A

## 2.3 Definitions

### 2.3.1 General

N/A

### 2.3.2 Disclosure classification

**Public domain:** published in any public forum without constraints (either enforced by law, or discretionary).

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

**Confidential:** the classification given to information that may be used by malicious/opposing/hostile elements to **harm** the objectives and functions of Eskom Holdings Limited.

**Secret:** the classification given to information that may be used by malicious/opposing/hostile elements to **disrupt** the objectives and functions of Eskom Holdings Limited.

**Top Secret:** the classification given to information that may be used by malicious/opposing/hostile elements to **neutralize** the objectives and functions of Eskom Holdings Limited.

## 2.4 Abbreviations

Abbreviation	Description
HTLS	High temperature low sag
ACSR	Aluminium conductor steel reinforced
AAC	All aluminium conductors
AAC	All aluminium alloy conductors
IEC	International Electrotechnical Commission

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## 2.5 Roles and responsibilities

N/A

## 2.6 Process for monitoring

N/A.

## 2.7 Related/supporting documents

N/A.

# 3. Technical Tender Evaluation Procedure

**Section 3.1 and Section 3.2 require responses** from suppliers and will be evaluated accordingly. The technical evaluation procedure is specific to each type of high temperature low sag (HTLS) conductor. The items include, but are not limited to, composite cores, alloyed cores, steel core and high temperature mechanically compacted ACSR (plastically deformed) conductor technology submissions.

**Note** - A type of conductor technology is referring to the overall model of the conductor, including the core and stranding. Example; an HTLS conductor with a solid composite core and a concentric stranding is considered a different technology to the HTLS conductor with a solid core and trapezoidal stranding. Likewise, a solid composite core and a stranded composite core are considered different conductor technologies. The same is implied for alloyed core, steel core and high temperature mechanically compacted ACSR (plastically deformed) conductor technologies.

In Section 3.1, information is to be submitted for a particular HTLS technology type **closest to 3 diameter equivalent conductors, ACSR Chickadee, IEC 315, and ACSR Tern conductors**. Section 3.2 focuses on a questionnaire for the submitted conductor technology. Suppliers are not limited to submit one type of HTLS conductor technology. Should suppliers provide multiple conductor technology submissions, sections 3.1 and 3.2, for each technology submission will be evaluated independently. This implies that different conductor technology submissions will be evaluated and assessed individually and treated as separate submissions.

## Evaluation Stages

The complete evaluation of any potential supplier will be in three stages for this phase of the project. **This three stage approach** will follow the Eskom evaluation approach, and will entail:

1. **The evaluation of the mandatory responses.** Suppliers who submit this information will thereafter proceed to the scoring assessment. Omission of mandatory information will result in disqualification.
2. **Evaluation and scoring assessment of potential suppliers.** A minimum score of 50% is required for successful candidates.
3. **Identification and pre-qualification of successful candidates.** Successful candidates will be prequalified for the next phase of the project.

**The next phase will consist of a request for quotation (RFQ).** Pre-qualified suppliers will be requested to provide a quotation. Eskom will evaluate responses and successful candidates will be contacted.

During this process, the tender documentation submitted by **potential suppliers is evaluated against the criteria listed in Table A.1 and Table A.2 outlined in Annexure A of this report.** Sections 3.1 and 3.2 are indicated in this document, but the full schedules and tick sheets will also be available in excel format with the tender enquiry package. The Eskom evaluating representatives will go through the details of the returnable submissions that are required and will, firstly, ensure that the mandatory criteria are met. Mandatory information that is omitted from the submission will receive a “No” on the mandatory criteria. The supplier/s will thereafter not be able to proceed to the scoring assessment and will therefore fail the technical evaluation.

## Returnable information and Mandatory list

### Mandatory Requirements

In order for the suppliers to progress to the technical evaluation scoring assessment, mandatory information indicated in Table A.1 must be provided. If the information is not provided, the supplier will be disqualified and will not proceed to the technical scoring assessment of the evaluation. Please refer to Annexure A, Table A.1 for mandatory and scoring information.

**Sections 3.1 and Section 3.2 will now be discussed.**

## 3.1 Table Inputs

Please provide the following information:

**Description:** Eskom requires information on HTLS conductors that can match or are closest in diameter size to the conventional ACSR conductors. The ACSR conductors and their diameters that are mentioned in row 1 of **Table 3.1**, Error! Reference source not found. Error! Reference source not found. **and** Error! Reference source not found. are:

- ACSR Chickadee – 18.87 mm
- ACSR IEC 315 – 23.90 mm
- ACSR Tern – 27.00 mm

Table 3.1 refers to information required for HTLS **composite core conductors**, Error! Reference source not found. refers to **alloyed core conductors** and Error! Reference source not found. refers to **steel core conductors** and Table 3.1.4 refers to the **high temperature mechanically compacted ACSR (plastically deformed) conductor technology** . Please **populate the tables with the relevant HTLS conductor information**. The HTLS conductor should be equivalent to or closest in diameter size to the ACSR/IEC conductor diameter mentioned in the column heading of the table. The required stranding information is also indicated in the column heading of the tables.

**Example** – An HTLS diameter equivalent conductor to ACSR Tern should have a diameter close to 27.00 mm. The information for the diameter equivalent HTLS conductor should be provided.

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**Ampacity ratings** – Information to be provided based on the weather conditions provided (page 7)

\*This is the maximum amount of current that a conductor can handle under normal continuous operation. The following deterministic weather conditions have to be considered, for the calculation of a rating at 75°C, 90°C and 150°C. Please indicate what the maximum operating temperature that the conductor is rated for and indicate the weather condition parameters used to obtain this rating.

***Weather Conditions to be used for ampacity rating calculations at 75°C, 90°C and 150°C***

Wind speed - 0.40m/s  
Wind direction - 90° (across the conductor direction)  
Solar - 1120 W/m<sup>2</sup>  
Ambient temperature - 40°C

### **3.1.1 Diameter equivalent conductors**

This refers to the overall outer diameter of the conductor, which mostly serves as an input to wind loading calculations on a tower, but also has a bearing on the corona performance.

**Document Classification: Controlled Disclosure****TECHNICAL EVALUATION CRITERIA FOR HIGH TEMPERATURE LOW SAG (HTLS) CONDUCTORS**Unique Identifier: **240-170000679**Revision: **1**Page: **8 of 34****Table 3.1.1 Composite core conductors**

Overall diameter in mm Type of Core and stranding	18.87 Solid core, Concentric stranding	18.87 Solid core Trapezoidal stranding	18.87 Stranded core, Concentric stranding	18.87 Stranded core Trapezoidal stranding	23.90 Solid core, Concentric stranding	23.90 Solid core Trapezoidal stranding	23.90 Stranded core, Concentric stranding	23.90 Stranded core Trapezoidal stranding	27.00 Solid core, Concentric stranding	27.00 Solid core Trapezoidal stranding	27.00 Stranded core, Concentric stranding	27.00 Stranded core Trapezoidal stranding	Comments
IEC Code													
Composite core equivalent conductor													
Conductor overall diameter (mm)													
Core diameter (mm) and strand diameter (if applicable)													
Aluminum strand diameter (mm)													
Total Area (mm <sup>2</sup> )													
Area of core or composite (mm <sup>2</sup> )													
Area of Aluminium (mm <sup>2</sup> )													
Total mass (kg/km)													
Mass of core (kg/km)													
Mass of Aluminium (kg/km)													
UTS (kN)													
Roughness factor if available													
Ampacity Rating * 75° 90° 150° Max operating temp													

**\*Please refer to section 3.1, page 7. Ampacity ratings to be calculated based on the environmental conditions provided.****ESKOM COPYRIGHT PROTECTED**

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Mechanical inputs/ PLS Cad inputs													
ALCAN chart equivalent													
Final modulus of elasticity of outer strands(MPa/100)													
Final modulus of elasticity of core (MPa/100)													
Thermal expansion coefficient for outer strands (/100 °)													
Thermal expansion coefficient for core (/100 °)													
Polynomial coefficients for stress-strain in outer strands. Strain in %. Stress in MPa. $a_0, a_1$   $a_2, a_3$													
Polynomial coefficients for stress-strain in the core. Strain in %. Stress in MPa. $b_0, b_1$   $b_2, b_2$													
Polynomial coefficients for creep in outer strands. Strain in %. Stress in MPa. $c_0, c_1$													

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<i>c<sub>2</sub>,c<sub>3</sub></i>													
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Polynomial coefficients for creep in the core. Strain in %. Stress in MPa. <i>d<sub>0</sub>,d<sub>1</sub></i> <i>d<sub>2</sub>,d<sub>3</sub></i>													
Thermal ratings													
DC resistance at 20°C(ohm/km)													
DC Resistance at 180°C (ohm/km)													
DC Resistance at 200°C(ohm/km)													
Emissivity coefficient													
Solar absorption coefficient													
Core heat capacity (Watt-s/m-° C)													
Outer strands heat capacity (Watt-s/m-° C)													

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**Document Classification: Controlled Disclosure****TECHNICAL EVALUATION CRITERIA FOR HIGH TEMPERATURE LOW SAG (HTLS) CONDUCTORS**Unique Identifier: **240-170000679**Revision: **1**Page: **11 of 34****Table 3.1.2- Alloyed core conductors**

Overall diameter in mm Type of Core and stranding	18.87 Solid core, Concentric stranding	18.87 Solid core Trapezoidal stranding	18.87 Stranded core, Concentric stranding	18.87 Stranded core Trapezoidal stranding	23.90 Solid core, Concentric stranding	23.90 Solid core Trapezoidal stranding	23.90 Stranded core, Concentric stranding	23.90 Stranded core Trapezoidal stranding	27.00 Solid core, Concentric stranding	27.00 Solid core Trapezoidal stranding	27.00 Stranded core, Concentric stranding	27.00 Stranded core Trapezoidal stranding	Comments
IEC Code													
Composite core equivalent conductor													
Conductor overall diameter (mm)													
Core diameter (mm) and strand diameter (if applicable)													
Aluminum strand diameter (mm)													
Total Area (mm <sup>2</sup> )													
Area of core or composite (mm <sup>2</sup> )													
Area of Aluminium (mm <sup>2</sup> )													
Total mass (kg/km)													
Mass of core (kg/km)													
Mass of Aluminium (kg/km)													
UTS (kN)													
Roughness factor if available													
Ampacity Rating * 75° 90° 150° Max operating temp													

**\*Please refer to section 3.1, page 7. Ampacity ratings to be calculated based on the environmental conditions provided.****ESKOM COPYRIGHT PROTECTED**

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Mechanical inputs/ PLS Cad inputs													
ALCAN chart equivalent													
Final modulus of elasticity of outer strands(MPa/100)													
Final modulus of elasticity of core (MPa/100)													
Thermal expansion coefficient for outer strands (/100 °)													
Thermal expansion coefficient for core (/100 °)													
Polynomial coefficients for stress-strain in outer strands. Strain in %. Stress in MPa. $a_0, a_1$   $a_2, a_3$													
Polynomial coefficients for stress-strain in the core. Strain in %. Stress in MPa. $b_0, b_1$   $b_2, b_2$													
Polynomial coefficients for													

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creep in outer strands. Strain in %. Stress in MPa. <i>c<sub>0</sub>,c<sub>1</sub></i> <i>c<sub>2</sub>,c<sub>3</sub></i>													
---	--	--	--	--	--	--	--	--	--	--	--	--	--

Polynomial coefficients for creep in the core. Strain in %. Stress in MPa. <i>d<sub>0</sub>,d<sub>1</sub></i> <i>d<sub>2</sub>,d<sub>3</sub></i>													
Thermal ratings													
DC resistance at 20°C(ohm/km)													
DC Resistance at 180°C (ohm/km)													
DC Resistance at 200°C(ohm/km)													
Emissivity coefficient													
Solar absorption coefficient													
Core heat capacity (Watt-s/m-° C)													
Outer strands heat capacity (Watt- s/m-° C)													

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**Table 3.1.3 – Steel core conductors**

Overall diameter in mm Type of Core and stranding	18.87 Solid core, Concentric stranding	18.87 Solid core Trapezoidal stranding	18.87 Stranded core, Concentric stranding	18.87 Stranded core Trapezoidal stranding	23.90 Solid core, Concentric stranding	23.90 Solid core Trapezoidal stranding	23.90 Stranded core, Concentric stranding	23.90 Stranded core Trapezoidal stranding	27.00 Solid core, Concentric stranding	27.00 Solid core Trapezoidal stranding	27.00 Stranded core, Concentric stranding	27.00 Stranded core Trapezoidal stranding	Comments
IEC Code													
Composite core equivalent conductor													
Conductor overall diameter (mm)													
Core diameter (mm) and strand diameter (if applicable)													
Aluminum strand diameter (mm)													
Total Area (mm <sup>2</sup> )													
Area of core or composite (mm <sup>2</sup> )													
Area of Aluminium (mm <sup>2</sup> )													
Total mass (kg/km)													
Mass of core (kg/km)													
Mass of Aluminium (kg/km)													
UTS (kN)													
Roughness factor if available													
Ampacity Rating * 75° 90° 150° Max operating temp													

**\*Please refer to section 3.1, page 7. Ampacity ratings to be calculated based on the environmental conditions provided.**

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Mechanical inputs/ PLS Cad inputs													
ALCAN chart equivalent													
Final modulus of elasticity of outer strands(MPa/100)													
Final modulus of elasticity of core (MPa/100)													
Thermal expansion coefficient for outer strands (/100 °)													
Thermal expansion coefficient for core (/100 °)													
Polynomial coefficients for stress-strain in outer strands. Strain in %. Stress in MPa. $a_0, a_1$   $a_2, a_3$													
Polynomial coefficients for stress-strain in the core. Strain in %. Stress in MPa. $b_0, b_1$   $b_2, b_2$													
Polynomial coefficients for creep in outer strands. Strain in													

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% . Stress in MPa. <i>c<sub>0</sub>,c<sub>1</sub></i> <i>c<sub>2</sub>,c<sub>3</sub></i>													
--	--	--	--	--	--	--	--	--	--	--	--	--	--

Polynomial coefficients for creep in the core. Strain in %. Stress in MPa. <i>d<sub>0</sub>,d<sub>1</sub></i> <i>d<sub>2</sub>,d<sub>3</sub></i>													
Thermal ratings													
DC resistance at 20°C(ohm/km)													
DC Resistance at 180°C (ohm/km)													
DC Resistance at 200°C(ohm/km)													
Emissivity coefficient													
Solar absorption coefficient													
Core heat capacity (Watt-s/m-° C)													
Outer strands heat capacity (Watt-s/m-° C)													

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**Document Classification: Controlled Disclosure****TECHNICAL EVALUATION CRITERIA FOR HIGH TEMPERATURE LOW SAG (HTLS) CONDUCTORS**Unique Identifier: **240-170000679**Revision: **1**Page: **17 of 34****Table 3.1.4 - High temperature mechanically compacted ACSR (plastically deformed) conductor technology**

Overall diameter in mm Type of Core and stranding	18.87 Solid core, Concentric stranding	18.87 Solid core Trapezoidal stranding	18.87 Stranded core, Concentric stranding	18.87 Stranded core Trapezoidal stranding	23.90 Solid core, Concentric stranding	23.90 Solid core Trapezoidal stranding	23.90 Stranded core, Concentric stranding	23.90 Stranded core Trapezoidal stranding	27.00 Solid core, Concentric stranding	27.00 Solid core Trapezoidal stranding	27.00 Stranded core, Concentric stranding	27.00 Stranded core Trapezoidal stranding	Comments
IEC Code													
Composite core equivalent conductor													
Conductor overall diameter (mm)													
Core diameter (mm) and strand diameter (if applicable)													
Aluminum strand diameter (mm)													
Total Area (mm <sup>2</sup> )													
Area of core or composite (mm <sup>2</sup> )													
Area of Aluminium (mm <sup>2</sup> )													
Total mass (kg/km)													
Mass of core (kg/km)													
Mass of Aluminium (kg/km)													
UTS (kN)													
Roughness factor if available													
Ampacity Rating * 75° 90° 150° Max operating temp													

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**\*Please refer to section 3.1, page 7. Ampacity ratings to be calculated based on the environmental conditions provided**

Mechanical inputs/ PLS Cad inputs													
ALCAN chart equivalent													
Final modulus of elasticity of outer strands(MPa/100)													
Final modulus of elasticity of core (MPa/100)													
Thermal expansion coefficient for outer strands (/100 °)													
Thermal expansion coefficient for core (/100 °)													
Polynomial coefficients for stress-strain in outer strands. Strain in %. Stress in MPa. $a_0, a_1$   $a_2, a_3$													
Polynomial coefficients for stress-strain in the core. Strain in %. Stress in MPa. $b_0, b_1$   $b_2, b_2$													
Polynomial coefficients for creep in outer strands. Strain in													

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% . Stress in MPa. <i>c<sub>0</sub>,c<sub>1</sub></i> <i>c<sub>2</sub>,c<sub>3</sub></i>													
--	--	--	--	--	--	--	--	--	--	--	--	--	--

Polynomial coefficients for creep in the core. Strain in %. Stress in MPa. <i>d<sub>0</sub>,d<sub>1</sub></i> <i>d<sub>2</sub>,d<sub>3</sub></i>													
Thermal ratings													
DC resistance at 20°C(ohm/km)													
DC Resistance at 180°C (ohm/km)													
DC Resistance at 200°C(ohm/km)													
Emissivity coefficient													
Solar absorption coefficient													
Core heat capacity (Watt-s/m-° C)													
Outer strands heat capacity (Watt-s/m-° C)													

## 3.2 Questionnaire

### 3.2.1 Mechanical information

- 3.2.1.1 Populate Section 3.1 of the report and provide cable files to be used in software programs used to calculate creep and sag? If this cannot be provided now, will the supplier provide this information to Eskom if they are successful and nominated by Eskom to provide classroom training and practical demonstrations?
- 3.2.1.2 Does the core of the conductor require the use of standard ACSR hardware and fittings or are different hardware and fittings required?
- 3.2.1.3 Indicate the type of grease used for hardware attachments?
- 3.2.1.4 What detection methods should be used or followed to determine the mechanical integrity of the conductor once installed? Parameters to be checked include (but is not limited to) corrosion, internal damage due to conductor mechanical vibration etc.
- 3.2.1.5 What are the proposed methods of condition monitoring of their conductor? State the estimated lifespan of the conductor and under what conditions is this based on?
- 3.2.1.6 Does the core or conductor require tools and installation methods different to that of the standard ACSR, AAAC or AAC methods? If yes, please provide specifications and methods for installation. **(Mandatory requirement)**

**Please provide the following information as part of the specification:**

- Drawings for: mid span joints, compression dead-ends, spacer dampers and clamps.
  - Information on bolted and/or preformed type, rigid spacers for jumpers, repair sleeves etc. must also be provided.
  - Material used for manufacture,
  - Dimensions,
  - Mechanical strength of end fittings,
  - Any special inserts required for end – fittings
- 3.2.1.7 What are the recommended gripping technologies to be used during different stringing activities if the conductor needs to be pulled to the correct tension during regulating? As an example; provide guidelines for construction clamps to be used and how they differ compared to equipment used for ACSR conductors.
- 3.2.1.8 What are the handling characteristics to adhere to in terms of bending radius and tension compared to ACSR conductor?
- 3.2.1.9 Are the repair procedures for the conductors different to that of ACSR? Please provide supporting documentation.
- 3.2.1.10 When routine tensile tests are performed on Eskom conductors the guidelines of IEC 61089 are followed. Do we continue following the same specification for HTLS conductor, alternatively provide the relevant specification(s) to be used?

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3.2.1.11 Provide confirmation of compatibility of conductor and hardware for electrolytic corrosion when exposed to marine pollution to at least C5 corrosion level. Please refer to ISO12944.

3.2.1.12 Please provide historical documentation or references from utilities regarding the performance and maintenance of the conductor? Maintenance procedures to be clearly indicated.

### **3.2.2 Electrical information**

3.2.2.1 Has the conductor been tested for corona performance? If yes, please provide test reports stating which conductor surface temperatures and environmental conditions the tests were conducted at. Also, what was the maximum conductor electric field surface gradient (kV/cm)?

3.2.2.2 If available, please provide the roughness factor for the conductor.

### **3.2.3 Test reports and standards**

3.2.3.1 Have the conductors been tested in an independent accredited testing laboratory? Certificate to be provided.

3.2.3.2 Show evidence of Type testing of the HTLS conductor in accordance to applicable IEC standards. Latest type test report to be submitted.

3.2.3.3 Show evidence of Sample testing of the HTLS conductor on each individual product in accordance to applicable IEC standards. Sample test report to be submitted.

3.2.3.4 Show evidence of Production testing of the HTLS conductor on each individual product in accordance to applicable IEC standards. Production sample test report to be submitted.

3.2.3.5 Show evidence of material checking and verification from raw to final product stages. Report or certificate to be provided.

If standards other than IEC have been used, please provide this information. If possible, attach test certificates.

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### 3.2.4 Construction Information

- 3.2.4.1 Provide transportation and handling requirements for the conductors.
- 3.2.4.2 Please include minimum storage protocols for the conductors when being stored on site before use.
- 3.2.4.3 Please include lifespan of conductors being stored in drums and provide damage mitigation measures to the core and strands?
- 3.2.4.4 Specify drum material type (wood, steel or either), and whether the drums can be stored outside, exposed to weather elements.
- 3.2.4.5 Provide information on the construction processes when installing the conductor. Please provide detailed information on the processes, such as the use of running blocks and pulleys. **Submission of a stringing and regulating method statement is advised.** The method statement must clearly describe the construction process when installing the conductor, from start to the end of construction. **(Mandatory Requirement)**

**Please provide the following information as part of the stringing and regulating method statement:**

- Correct equipment to be used such as tensioner, drums, running blocks, pulley and pilot wires.
- Diagrams of the suggested positioning of conductor drums behind the tensioner, maximum angle of deviation (offset angle) between center line of tensioner and conductor drums, distance between drums and tensioner etc.
- Details on the regulation / clamping in of conductor to the tower (dead – ending of the conductor)
- Recommended pulling speed during stringing.
- Technical details for tensioner and puller, including braking operation during stringing.
- Details on the pilot wires that can be used for the different types of conductor.
- Drawing showing the attachment of the pilot wire to the conductor bundle, including the pulling sock and swivel

**Note :** When providing information on stringing and regulating, please make reference to the tower outline drawings attached in the Annexure B of this document. These are the, 518 self-support and strain towers and the guyed towers (520B Guyed Vee and 529C cross rope structures)

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3.2.4.6 Is the disposal of the HTLS type of conductor different to the disposal of ACSR conductors? If yes, please indicate the process that should be followed.

3.2.4.7 Indicate the requirements/certification required by individuals that partake in the construction activities? Please indicate the training and accreditation process to be followed.

### **3.2.5 Manufacturing (For information purposes only, not to be scored)**

3.2.5.1 Are the conductors manufactured in South Africa? Please indicate if the core and/or the conductive strands are manufactured/ produced in South Africa or if either needs to be imported? Please indicate the names of suppliers used in either case?

3.2.5.2 Has the organization previously conducted training on conductor installation processes and construction activities for South African contractors/installers?

3.2.5.3 Is there a facility in South Africa that does the conductor stranding? If not, please advise how this service will be provided?

3.2.5.4 What is the lead time for delivery? What are the possible risks that could impact the lead time?

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### 3.3 Summary of Conductor Evaluation

The tenderers will be scored according to the summarized score sheet indicated in table A.1, once they meet the mandatory requirements, indicated in table A.1. Please refer to Annex A.

From a technical perspective, the submitted documentations should consist of but not be limited to:

- Submission of electrical inputs requested for either tables 3.1.1, 3.1.2 , 3.1.3 or 3.1.4 of section 3.1.
- Submission of mechanical inputs and cable files for either tables 3.1.1, 3.1.2 , 3.1.3 or 3.1.4 of section 3.1.
- Submission of thermal inputs requested for either tables 3.1.1, 3.1.2 , 3.1.3 or 3.1.4 of section 3.1.

**Suppliers are not limited to providing one type of conductor submission. Different conductor technologies will be evaluated independently.**

- Suppliers are expected to provide clear responses to all questions in section 3.2. Where indicated, supporting documents to be provided.
- Submission of a specification including installation methods and processes for the conductor and hardware jointing (Question 3.2.1.6 of the manufacturing questionnaire in section 3.2). **A mandatory requirement.**
- A stringing and regulating methodology document to be submitted (Question 3.2.4.5 of the construction questionnaire in section 3.2). **A mandatory requirement.**
- Test reports, as part of the electrical and mechanical questionnaire, to be submitted. Standards followed to be provided.
- An indication of the manufacturing location and lead times to be provided (Eskom information purposes).

**Note** – Multiple responses may be submitted for different conductor technologies. Please provide information describing the technology. If a supplier submits multiple technologies, the supplier should complete all sections for each type of technology. Eskom will evaluate the different technologies independently. The evaluation process will be followed.

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### 3.4 Supplier estimated training quotation

This section is for information purposes only. The supplier will **not be evaluated** on this section.

#### Training Quotation

Please note that Eskom will provide the location for the classroom training and practical demonstration sessions. As part of the training offered to Eskom, the supplier should provide the items mentioned below:

**Supplier Training to include:**

- Conductor samples. Please indicate the type of HTLS conductors and length of samples.
- Midspan joints, dead-end joints, suspension clamps. All hardware equipment and material required for the conductor and hardware jointing.
- Training manuals and videos of detailed conductor and hardware installation processes. (100 manuals, 10 videos)
- Live videography and photography of the conductor and hardware jointing processes.
- Supplier to cater for their own accommodation and travel costs.

**Considering the information mentioned above, please provide an estimated cost for classroom training and practical demonstrations for conductor and hardware jointing. (Cost per trainee/day)**

Cost of training/trainee/day	Supplier Quotation	Conversion to SA Rands

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### 3.5 Authorization

This document has been seen and accepted by:

Name and surname	Designation
Raeesa Khan	Senior Engineer
Gavin Strelec	Chief Engineer
Ravi Singh	Chief Engineer
Arthur Burger	Chief Engineer
Prashant Mathuradas	Senior Engineer
Kiresh Singh	Senior Engineer
Kaveer Ramharak	Senior Engineer
Nompumelelo Bofu	Senior Engineer
Bertie Jacobs	Chief Engineer
Bharat Haridass	Senior Consultant
Jonathan Chetty	Senior Engineer

### 5. Revisions

Date	Rev.	Compiler	Remarks
October 2021	1	R. Khan	HTLS Tender evaluation – Terms of reference

### 6. Development team

Raeesa Khan	Project leader and Compiler - LES
Gavin Strelec	Project leader - RT&D
Ravi Singh	Electrical
Arthur Burger	Electrical & Construction
Prashant Mathuradas	Electrical
Kiresh Singh	Electrical
Kaveer Ramharak	Electrical & Construction
Nompumelelo Bofu	Electrical & Construction
Bertie Jacobs	Mechanical & Construction
Bharat Haridass	Mechanical
Jonathan Chetty	Mechanical

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## **7. Acknowledgements**

N/A

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**Annexure A – Technical Evaluation scoring information****Table A.1 - Summary of returnable information indicating the Mandatory requirements**

Item	Section Number	Description	Criteria	Total Score /Section	Breakdown of Scoring (Based on the submission of 1 type of conductor technology)	Mandatory
1.1	Section 3.1	Electrical Inputs	Information provided for either tables 3.1.1, 3.1.2, 3.1.3, 3.1.4	22.5	19.5 points (0.5 points per input , 6.5 points for submission of 13 inputs for 1 diameter equivalent conductor type, 19.5 points for submission of 3 diameter equivalent conductor types)	No
			Ampacity ratings submitted using the provided weather conditions.		3 points (0.25 points for each ampacity rating input, 1 point for 1 diameter equivalent conductor type , 3 points for submission of 3 diameter equivalent conductor inputs). Suppliers submitting inputs without using the Eskom environmental requirements will receive a score of 0.	No
1.2	Section 3.1	Mechanical Inputs	Mechanical inputs - Provision of Mechanical inputs and submission of cable files.	13.5	13.5 points (0.5 points per input , 4.5 points for submission of 9 inputs for 1 diameter equivalent conductor type, 13.5 points for submission of 3 diameter equivalent conductor types).	No
1.3	Section 3.1	Thermal Inputs	Thermal ratings	10.5	10.5 points (0.5 points per input , 3.5 points for submission of 7 inputs for 1 diameter equivalent conductor type, 10.5 points for submission of 3 diameter equivalent conductor types)	No
<b>Maximum Score for Section 3.1</b>				<b>46.5</b>		
1.4	Section 3.2	Mechanical Questionnaire	Responses	27	22 points ( 2 points per response, excluding Question 3.2.1.6 )	No
			Submission of specifications including methods used for conductor and hardware installation (Question 3.2.1.6)		5 points (Points will be allocated according to the information, depth and clarity of the specification received)	Yes
1.5	Section 3.2	Electrical Questionnaire	Responses	4	4 points (2 points per response)	No
1.6	Section 3.2	Test reports and standards Questionnaire	Provision of test reports	5	5 points (1 point for each question, that is 0.5 points per response and 0.5 points for the submission of the supporting report or certificate per question)	No
1.7	Section 3.2	Construction Questionnaire	Responses	17.5	12 points ( 2 points per response, excluding Question 3.2.4.5)	No
			Submission of Stringing and regulating method statement (Question 3.2.4.5)		5.5 points (Points will be allocated according to the information, depth and clarity of the method statement received)	Yes
1.8	Section 3.2	Manufacturing Questionnaire	This is for Eskom information. It is not a mandatory and the supplier will not be scored on this.		Information purposes	No
<b>Maximum Score for Section 3.2</b>				<b>53.5</b>		
<b>Maximum Score for Sections 3.1 and 3.2</b>				<b>100</b>		

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### ▪ Assessment Methodology

The assessment will only be conducted:

- If the mandatory requirements indicated in section 3.2 have been met.
- Submissions will thereafter be evaluated and scored. In order to pass the technical assessment, the minimum score of 50% must be achieved for each of the requested sections. An overall minimum score of 50% is required to meet the technical assessment threshold criteria.
- Once the evaluation assessment is complete, suppliers will be pre-qualified for the next phase of the project ( The Execution phase)
- Pre-qualified suppliers will be contacted, via the Eskom Commercial team, to provide a quotation for the conductor and hardware demonstrations.
- Submissions will thereafter be evaluated and successful candidates will be contacted.

**Table A.2 - Technical Scoring Assessment**

Item	Section Number	Description	Final Scoring/Desktop	Scoring /Section	Criteria
1.1	Section 3.1	Electrical Inputs	Acceptably submitted/submitted	22.5	Must meet 50% threshold to proceed
1.2		Mechanical Inputs	Acceptably submitted/submitted	13.5	
1.3		Thermal Inputs	Acceptably submitted/submitted	10.5	
1.4	Section 3.2	Mechanical Questionnaire	Acceptably submitted/submitted	27	Must submit mandatory information and must meet 50% threshold to proceed
1.5		Electrical Questionnaire	Acceptably submitted/submitted	4	
		Test reports and Standards	Acceptably submitted/submitted	5	
1.6		Construction Questionnaire	Acceptably submitted/submitted	17.5	
1.8		Manufacturing Questionnaire	Information Purposes	N/A	N/A
Total				100	
Overall minimum threshold for qualifications				50	

A minimum score of 50% is required for the suppliers to pass. Eskom will review the passing submissions and, pre-qualify the suppliers. Pre-qualified suppliers will be requested to provide a quotation. This information will also be evaluated. Successful candidates will be contacted.

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## Annexure B – Tower Drawings

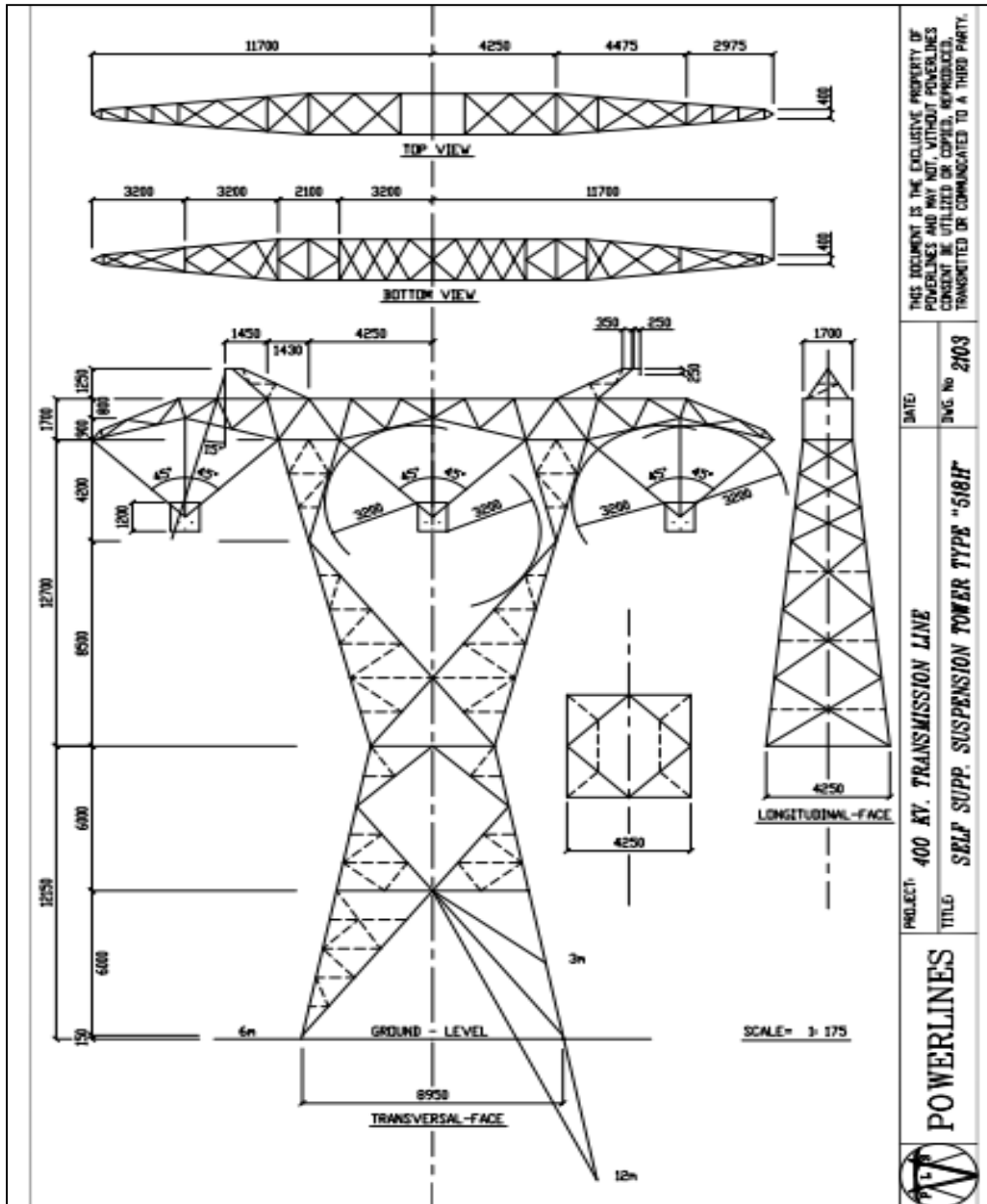


Figure B.1: 518H Self-support suspension structure outline drawing

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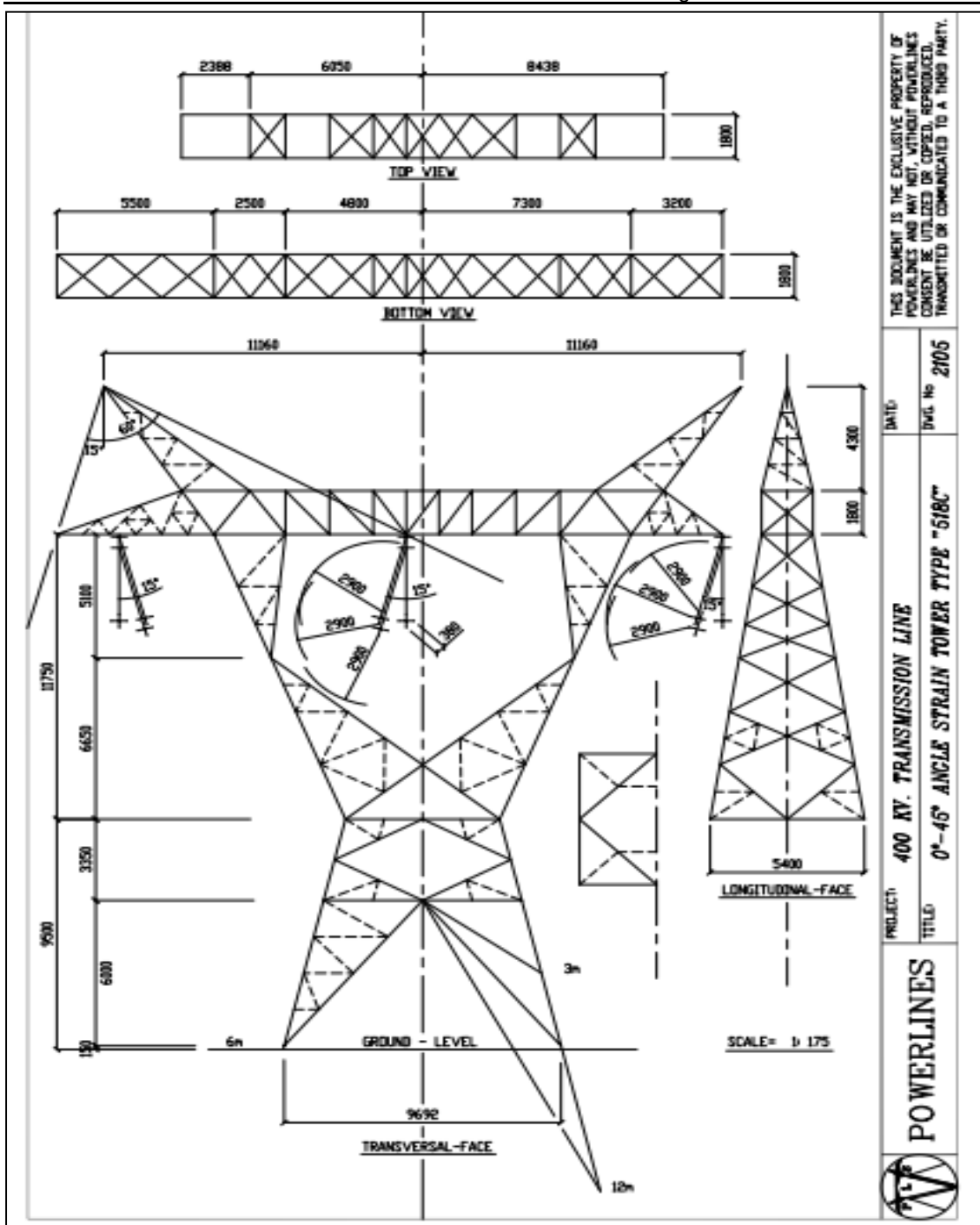


Figure B.2: 518C Self-support strain structure outline drawing

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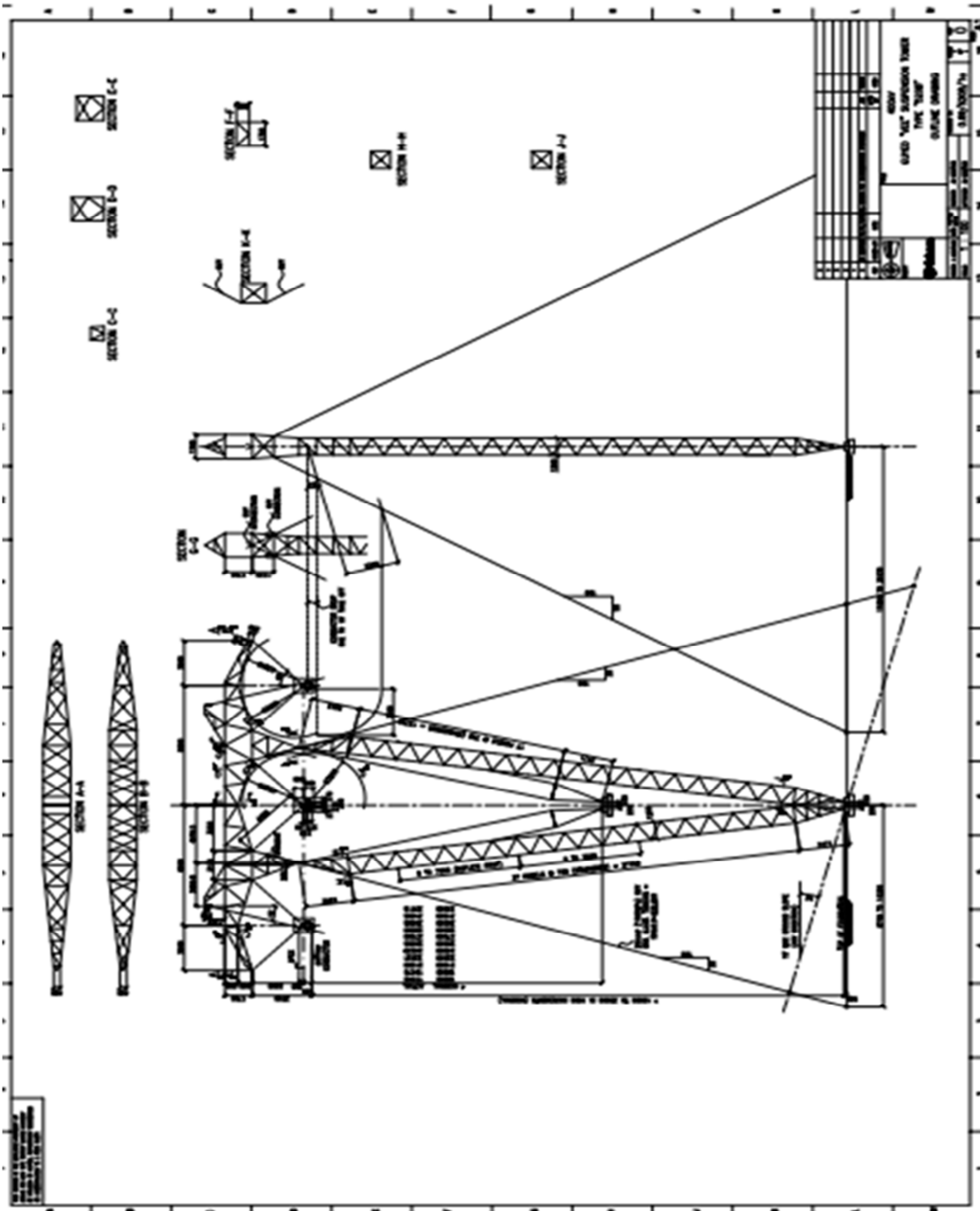
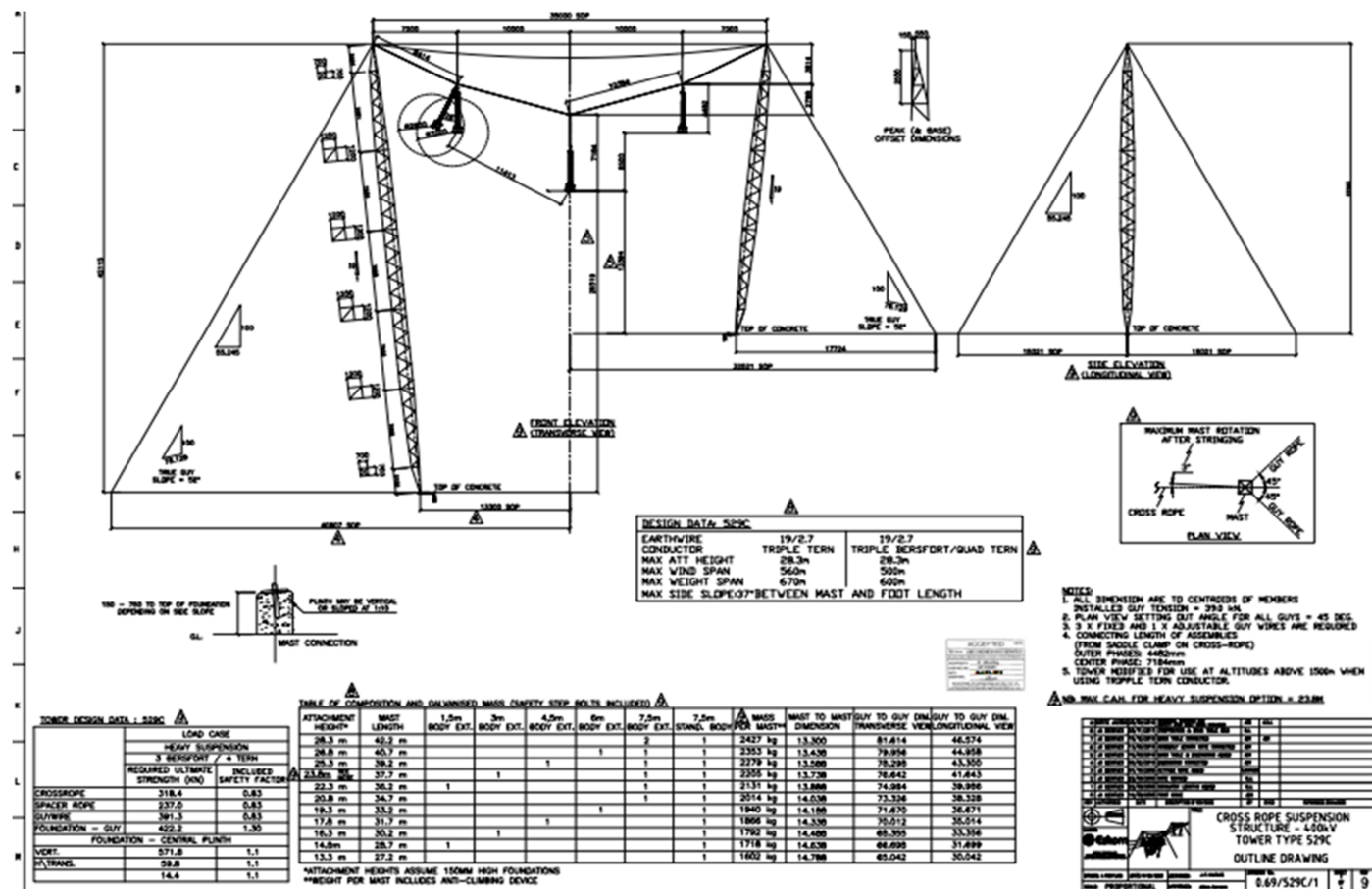


Figure B.3: 520B Guyed Vee structure outline drawing

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**Figure B.4: 529C Guyed Cross rope structure outline drawing**

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