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TITLE	SPECIFICATION FOR BARE OVERHEAD ALUMINIUM CONDUCTOR.	REFERENCE		REV	
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FOREWORD

Recommendations for corrections, additions or deletions should be addressed to the:

Technology Services Manager
City Power Johannesburg (Pty) Ltd
P O Box 38766
Booyens
2016

INTRODUCTION

Bare overhead aluminium conductors are widely used on City Power's overhead networks. There are many different sizes and types of conductors available in the market, which are specified by different national and international standards. To achieve standardization and rationalization within City Power, only items specified in this specification shall be supplied.

1 SCOPE

This specification covers the technical requirements for bare overhead aluminium conductors for use on City Power's overhead system designed for up to and including 275 kV.

The requirements for the aluminium wires, aluminium alloy wires, reinforcing steel wires and the complete conductor are specified.

2 NORMATIVE REFERENCES

The following documents contain provisions that, through reference in the text, constitute requirements of this specification. 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.

SANS 61089, *Round wire concentric lay overhead electric stranded conductors*.

SANS 182-2, *Conductors for overhead electrical transmission lines – Part II (Stranded aluminium conductors)*.

SANS 182-3, *Conductors for overhead electrical transmission lines – Part III (Aluminium conductors, steel reinforced)*.

3 DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations in the above documents shall apply to this specification.

ACSR - Aluminium Conductor Steel Reinforced

ACSR GOAT shall only be used for maintenance purpose

AAAC - All Aluminum Alloy Conductor

AAC – All aluminium conductor

HTLS - High Temperature Low Sag Conductor

4 REQUIREMENTS

4.1 ACSR, AAAC and AAC

4.1.1 General

- 4.1.1.1 Nothing in this specification shall lessen the obligations of the supplier. The supplier shall be fully responsible for the design and its satisfactory performance in service. Acceptance by City Power shall not relieve the supplier of the responsibility for the adequacy of the design.
- 4.1.1.2 This specification covers the requirements for bare aluminium conductors. The bare aluminium conductors shall be manufactured in accordance with SANS 61089. Where conflicting requirements with SANS 61089 occur, this specification shall take precedence.

4.1.2 Material

- 4.1.2.1 Aluminium from which the wires are drawn shall be in the H9 condition and shall comply with the requirements for aluminium A1-EC (99, 6) of SANS 712.
- 4.1.2.2 Stranded conductors shall be made up of round aluminium wires and, when applicable, of round zinc-coated steel wires.
- 4.1.2.3 The surface of the conductor shall be free from all imperfections visible to the unaided eye such as nicks, indentations.
- 4.1.2.4 The characteristics of all wires shall meet the requirements of SANS 61089 before stranding.

4.1.3 Joints

- 4.1.3.1 There shall be no joints of any kind made in the zinc-coated steel core wire or wires during stranding.
- 4.1.3.2 The joints in aluminium wires shall not exceed those specified in table 1 of SANS 61089.
- 4.1.3.3 The joints shall not be closer than 15 m from a joint in the same wire or in any other aluminium wire of the completed conductor.
- 4.1.3.4 The joints shall be made by electric butt welding methods and shall not increase the strand diameter.

4.1.4 Stranding

- 4.1.4.1 All wires of the conductor shall be concentrically stranded, adjacent wire layers shall be stranded with reverse lay directions.
- 4.1.4.2 The wires in each layer shall be evenly and closely stranded around the underlying wire.

4.1.5 Lay ratio

The lay ratio shall be within the appropriate limits given in table 2 of SANS 182-2.

4.1.6 Conductor sizes

- 4.1.6.1 The conductor sizes shall be in accordance with SANS 182-2 and SANS 182-3.
- 4.1.6.2 The conductor sizes in table 1 shall be the only standard items supplied.
- 4.1.6.3 All conductors shall be supplied without any protective grease applied.

4.1.7 Conductor Strength

The rated tensile strength of aluminium conductor shall be according to clause 5.7 of SANS 61089.

4.1.7 Length

The length of the conductor on a drum shall at least be equal to the nominal length and shall not vary by more than +/- 2 % from the nominal length. Only one continuous length of conductor per drum shall be permitted.

4.2 HTLS

4.2.1 General

4.2.1.1 Nothing in this specification shall lessen the obligations of the supplier detailed in any other specifications. The supplier shall be fully responsible for the design and its satisfactory performance in service. Acceptance by City Power shall not relieve the supplier of the responsibility for the adequacy of the design.

4.2.1.2 This specification covers the requirements for bare aluminium conductors. The bare aluminium conductors shall be manufactured in accordance with SANS 61089. Where conflicting requirements with SANS 61089 occur, this specification shall take precedence.

4.2.2 Material

4.2.2.1 Aluminium from which the wires are drawn shall be in the 1350-H19 condition and shall comply with the requirements for aluminium A1-EC (99, 6) of SANS 712.

4.2.2.2 The aluminium strands shall be 1350-H19 annealed Trapezoidal wire.

4.2.2.3 The surface of the conductor shall be free from all imperfections visible to the unaided eye such as nicks, indentations.

4.2.2.4 The characteristics of all wires shall meet the requirements of SANS 61089 before stranding.

4.2.3 Joints

4.2.3.1 There shall be no joints of any kind made in the carbon and fibre glass core during stranding.

4.2.3.2 The joints in aluminium wires shall not exceed those specified in table 1 of SANS 61089.

4.2.3.3 The joints shall not be closer than 15 m from a joint in the same wire or in any other aluminium wire of the completed conductor.

4.2.3.3 The joints shall be made using splice assembly kit which includes: two threaded internal collet housings, two collets, splice coupling, collet retainer, two aluminium inner sleeves, outer aluminium sleeve, high temperature oxidation inhibitor and sanding medium.

4.2.4 Stranding

4.2.4.1 All aluminium trapezoidal shaped strands layers/wires of the conductor shall be helically stranded using the same lay lengths and lay directions as ACSR.

4.2.4.1 The wires in each layer shall be evenly and closely stranded around the underlying wire.

4.2.5 Lay ratio

4.2.5.1 The lay ratio shall be within the appropriate limits given in table 2 of SANS 182-2.

4.2.5.2 In a stranded conductor having multiple layers of wires, the lay ratio of any layer shall not be greater than the lay ratio of the layer immediately beneath it

The lay ratio - Outer layer of Aluminium Wires: Minimum-10 Maximum-13

The lay ratio - Inner layer of Aluminium Wires: Minimum-10 Maximum-16

4.2.5 Conductor sizes

4.2.5.1 The conductor sizes shall be in accordance with SANS 182-2 and SANS 182-3.

4.2.5.2 The conductor sizes in table 2 shall be the only standard items supplied.

4.2.5.3 All conductors shall be supplied without any protective grease applied.

4.2.7 Conductor Strength

The rated tensile strength of aluminum conductor shall be taken as the sum of minimum tensile strength of all wires

According to clause 5.7.4 of SANS 61089, the tensile strength of any single wire shall be given by the product of its nominal area and the appropriate minimum stress given in the standards IEC 104, IEC 888 and IEC 889

4.2.8 Length

The actual length of the conductor on a drum shall not vary by more than $\pm 2\%$.

The variation in length between conductors forming a matched set shall not exceed 20m. Only one continuous length of conductor per drum shall be permitted. The accuracy of measurement shall be $\pm 2\%$.

5 TESTS

The following tests on the conductor shall be carried out and shall comply with the requirements of SANS 61089.

5.1 Type tests

5.1.1 Stress-strain curves shall be supplied as a type test and shall represent the best knowledge of the behaviour of the conductor.

5.1.2 Stress-strain tests shall be performed on the conductor

5.1.3 The breaking strength of conductors shall be determined by pulling a conductor in a suitable tensile testing machine having an accuracy of at least $\pm 1\%$.

5.1.4 Tests for breaking strengths of a conductors shall withstand, without the fracture of any wire not less than 95% of their rated tensile strength calculated according to clause 5.7 of SANS 61089

5.1.5 The manufacturer shall supply recent test results or perform the necessary tests to show that the method used for jointing aluminium wires meets the strength requirement according to clause 5.5.5 of SANS 61089

5.2 Sample test

5.2.1 The cross-sectional area of the aluminium portion of a stranded conductor shall be taken as the sum of the areas of the aluminium wires composing the conductor based on the diameter measurements made.

5.2.2 This area shall not vary from the nominal value by more than $\pm 2\%$ in any sample

5.2.3 The diameter of the conductor shall not vary by $\pm 1\%$ for diameters larger than or equal to 10mm, ± 0.1 mm for diameters smaller than 10 mm

5.2.4 The mass of the conductor per unit length without grease shall not vary from its nominal value given by more than $\pm 2\%$

6 MARKING, LABELING AND PACKAGING

6.1 Marking and Labeling

Each reel or drum shall bear the following information legibly and indelibly marked on a firmly attached label or printed drum:

-
- 6.1.1 The manufacturer's trade name or trade mark or both;
 - 6.1.2 Reference area and material of conductors;
 - 6.1.3 Nominal length in meters;
 - 6.1.4 Gross mass in kg;
 - 6.1.5 Year of manufacture.

6.2 Packaging

- 6.2.1 All conductors shall be supplied on returnable steel drums or non-returnable wooden drums as specified on Table 1
- 6.2.2 For multi-layered construction the conductor shall be wound onto the drums to form complete layers. Each layer shall fill the width of the drum before the succeeding layer is wound on. Drums not wound in this manner will be rejected.
- 6.2.3 An acceptable method of holding the conductor end shall be used, to ensure that no relative movement of conductor occurs between the uppermost uncompleted layer and the completed layer directly below it, during transportation.
- 6.2.4 Weather-proof heavy paper, cardboard or other suitable material shall be placed between the conductor and barrel flange surfaces of drums. This material shall remain attached to the drum during unreeling.
- 6.2.5 Wood lagging shall be used to protect the conductor. Four steel straps shall be used to secure the lagging on steel drums. Wooden lagging should be uniformly spaced with atmost 10mm spacing between adjacent lagging.
- 6.2.6 The moisture content of wood used for the fabrication of drums and reels shall not exceed 150g/kg (15%)
- 6.2.7 Wooden drums shall be preserved from biological attack (insect attack and mould) by adopting either the heat treatment (Kiln drying-CPI indicated by HT) or Mythyl Bromide Fumigation (indicate by MB).

6.3 Storage

- 6.3.1 If the conductor is to be stored for an extended period of time before use, the reel Containing the conductor should be kept off of the ground and otherwise protected from possible damage. It is recommended that steel reels be used for storage of backup Conductor.
- 6.3.2. Identification tags and other markings should be retained on all packages until such time as the conductor is to be used. Identification tags should be protected from weather to retain information.
- 6.3.3 The reels are delivered from the factory with a cardboard cover held down with steel

Bends over the outermost layer of conductor. It is recommended that the cover be left on the reels if they are going to be stored for an extended period of time.

- 6.3.4 Recommended storage temperature
Maximum storage temperature +45°C
Minimum storage temperature -40°C

7 Documentation

- 7.1 Technical product catalogue and installation manuals shall be provided.
7.2 Full detailed dimensions drawings shall be provided.
7.3 A copy of all type test certificates in English shall be provided.
7.4 A copy of the proposed routine test certificates in English shall be provided.

8 TRAINING

- 8.1 The following certified training courses, for City Power's staff, shall be provided:

- a) operating,
- b) installation,
- c) Maintenance.

- 8.2 The associated costs for the certified training courses in 8.1 shall be given per person and shall be fixed for the period of the contract.

9 QUALITY MANAGEMENT

A Quality Management Plan/System shall be set up in order to assure the quality of bare overhead aluminium conductors during design, development, production and servicing. Guidance on the requirements for a quality management system may be found in the following standards: ISO 9001:2015. The details shall be subject to agreement between the City Power and Supplier/Contractor.

10 ENVIRONMENTAL MANAGEMENT

An Environmental Management Plan/System shall be set up in order to ensure the proper environmental management and compliance of the of bare overhead aluminium conductors during their entire life cycle (i.e. during design, development, production, installation, operation and maintenance, decommissioning as well as Rehabilitation, Recycling or Disposal phase/s). Guidance on the requirements for an environmental management plan/system may be found in ISO 14001:2015 standards. The details shall be subject to agreement between City Power and the Supplier. This is to ensure that the asset created conforms to environmental standards and City Power SHERQ Policy

11 HEALTH AND SAFETY

A Health and Safety Plan/System shall be set up in order to ensure proper management and compliance of the bare overhead aluminium conductors during installation, operation, maintenance, and decommissioning phase/s. Guidance on the requirements of a Health and Safety Plan/System may be found in OHSAS 18001:2007 standards. This is to ensure that the asset/service conforms to standard operating procedures and City Power SHERQ Policy. The details shall be subject to agreement between City Power and the Supplier/Contractor.

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Table 1: Standard Conductor Sizes

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Table 2: Standard conductor sizes for HTLS

Conductor Name	Overall Diameter(mm)	Diameter of Composite Core(mm)	Mass (kg/km)			Ultimate Tensile Strength(kN)	AC Resistance(ohm/km)	Current rating at 180°C
			Aluminum	Core	Total			
HTLS	Min = 21 Max = 22	Min = 7 Max = 8	Min = 799 Max = 872	Min = 76 Max = 134	Min = 933 Max = 948	Min = 92 Max = 104	Min = 0.14 Max = 0.17 at a minimum of 180°C	Min = 1227 Max = 1282

Annex A – Bibliography

DSD 34-377, Phase conductor for distribution lines

Annex B – Revision information

DATE	REV.NO	NOTES
June 2003	0	First Issue
Jun 2004	1	Inclusion of ACSR FOX, AAC BULL and SQUIRREL conductors.
October 2006	2	Page 1: Revised to new format. Foreword: Update committee members. Normative References: Included SANS 61089. Clause 4.2; 4.3; 4.4, 4.6: Updated. Inclusion of clause 4.5, 4.7. Inclusion of Environmental management. Inclusion of ACSR ZEBRA conductor.
September 2008	3	Foreword : Update committee members Normative References: Exclusion of BS 125-2 Bibliography : Change SCSSCAAY5 to DSP 34 - 377 Inclusion of clause 4.8 Edition on table 1
June 2016	4	Foreword : Update committee members Inclusion of high temperature low sag conductor specification Edition of Table 2 Edition of Technical Schedule for HTLS Conductor
Nov 2018	5	General Editing

Annex C – ITEM 1: ACSR SQUIRREL – SAP 7286

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause	Description	Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard	IEC 61089	
2		Quantity m		
3	4.51	Strand configuration Al/Steel	6/1	
4	4.51	Wire/strand diameter mm	2.11	
5	4.51	Diameter of steel wires mm	2.11	
6	4.51	Overall diameter mm	6.33	
7	4.51	Aluminium area mm ²	20.98	
8	4.51	Steel area mm ²	3.50	
9	4.51	Total conductor area mm ²	24.48	
10	4.51	Mass of aluminium wires kg/km	57.70	
11	4.51	Mass of steel wires kg/km	27.50	
12	4.51	Total conductor mass kg/km	85.20	
13	4.51	Ultimate tensile strength KN	8.02	
14	4.51	DC Resistance at 20°C Ω/km	1.368	
15	4.51	Current rating Amps	130	
16	4.51	Standard drum length m	3000	
17	5	Conductor tested as per IEC 61089 or SABS 182-3 Yes/No	Yes	
18	6.1.	Gross mass of cable drum kg	Required	
19	6.1	Conductor identification and marking as per IEC 61089 Yes/No	Yes	
20	7	Type test certificates required Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

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ITEM 1: ACSR SQUIRREL – SAP 7286

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

Annex C – ITEM 2: ACSR FOX – SAP 901

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause	Description	Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard	IEC 61089	
2		Quantity m		
3	4.51	Strand configuration Al/Steel	6/1	
4	4.51	Wire/strand diameter mm	2.79	
5	4.51	Diameter of steel wires mm	2.79	
6	4.51	Overall diameter mm	8.37	
7	4.51	Aluminium area mm ²	36.68	
8	4.51	Steel area mm ²	6.11	
9	4.51	Total conductor area mm ²	42.80	
10	4.51	Mass of aluminium wires kg/km	101	
11	4.51	Mass of steel wires kg/km	48.10	
12	4.51	Total conductor mass kg/km	149	
13	4.51	Ultimate tensile strength kN	13.1	
14	4.51	DC Resistance at 20°C Ω/km	0.782	
15	4.51	Current rating Amps	190	
16	4.51	Standard drum length m	2500	
17	5	Conductor tested as per IEC 61089 or SABS 182-3 Yes/No	Yes	
18	6.1.	Gross mass of cable drum kg	Required	
19	6.1	Conductor identification and marking as per IEC 61089 Yes/No	Yes	
20	7	Type test certificates required Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

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Tenderer's Authorised Signatory: _____
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ITEM 2: ACSR FOX – SAP 901

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____

Name in block letters

Signature

Full name of company: _____

Annex C – ITEM 3: ACSR MINK – SAP 7289

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause	Description	Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard	IEC 61089	
2		Quantity m		
3	4.51	Strand configuration Al/Steel	6/1	
4	4.51	Wire/strand diameter mm	3.66	
5	4.51	Diameter of steel wires mm	3.66	
6	4.51	Overall diameter mm	10.98	
7	4.51	Aluminium area mm ²	63.13	
8	4.51	Steel area mm ²	10.52	
9	4.51	Total conductor area mm ²	73.65	
10	4.51	Mass of aluminium wires kg/km	174	
11	4.51	Mass of steel wires kg/km	82.8	
12	4.51	Total conductor mass kg/km	257	
13	4.51	Ultimate tensile strength kN	21.9	
14	4.51	DC Resistance at 20°C Ω/km	0.455	
15	4.51	Current rating Amps	260	
16	4.51	Standard drum length m	1500	
17	5	Conductor tested as per IEC 61089 or SABS 182-3 Yes/No	Yes	
18	6.1.	Gross mass of cable drum kg	Required	
19	6.1	Conductor identification and marking as per IEC 61089 Yes/No	Yes	
20	7	Type test certificates required Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

Tender Number: _____

Tenderer's Authorised Signatory: _____
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Full name of company: _____

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ITEM 3: ACSR MINK – SAP 7289

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

Annex C – ITEM 4: ACSR HARE – SAP 1512

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause	Description		Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard		IEC 61089	
2		Quantity	m		
3	4.51	Strand configuration	Al/Steel	6/1	
4	4.51	Wire/strand diameter	mm	4.72	
5	4.51	Diameter of steel wires	mm	4.72	
6	4.51	Overall diameter	mm	14.16	
7	4.51	Aluminium area	mm ²	104.98	
8	4.51	Steel area	mm ²	17.5	
9	4.51	Total conductor area	mm ²	122.48	
10	4.51	Mass of aluminium wires	kg/km	289	
11	4.51	Mass of steel wires	kg/km	138	
12	4.51	Total conductor mass	kg/km	427	
13	4.51	Ultimate tensile strength	kN	36.0	
14	4.51	DC Resistance at 20°C	Ω/km	0.273	
15	4.51	Current rating	Amps	260	
16	4.51	Standard drum length	m	1500	
17	5	Conductor tested as per IEC 61089 or SABS 182-3	Yes/No	Yes	
18	6.1.	Gross mass of cable drum	kg	Required	
19	6.1	Conductor identification and marking as per IEC 61089	Yes/No	Yes	
20	7	Type test certificates required	Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

ITEM 4: ACSR HARE – SAP 1512

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

Annex C – ITEM 5: ACSR WOLF – SAP 902

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause	Description	Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard	IEC 61089	
2		Quantity m		
3	4.51	Strand configuration Al/Steel	30/7	
4	4.51	Wire/strand diameter mm	2.59	
5	4.51	Diameter of steel wires mm	7.77	
6	4.51	Overall diameter mm	18.13	
7	4.51	Aluminium area mm ²	158.06	
8	4.51	Steel area mm ²	36.88	
9	4.51	Total conductor area mm ²	194.94	
10	4.51	Mass of aluminium wires kg/km	438	
11	4.51	Mass of steel wires kg/km	292	
12	4.51	Total conductor mass kg/km	730	
13	4.51	Ultimate tensile strength kN	69.2	
14	4.51	DC Resistance at 20°C Ω/km	0.183	
15	4.51	Current rating Amps	470	
16	4.51	Standard drum length m	2000	
17	5	Conductor tested as per IEC 61089 or SABS 182-3 Yes/No	Yes	
18	6.1.	Gross mass of cable drum kg	Required	
19	6.1	Conductor identification and marking as per IEC 61089 Yes/No	Yes	
20	7	Type test certificates required Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

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Tenderer's Authorised Signatory: _____
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ITEM 5: ACSR WOLF – SAP 902

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

Annex C – ITEM 6: ACSR GOAT – SAP 903

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause	Description		Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard		IEC 61089	
2		Quantity	m		
3	4.51	Strand configuration	Al/Steel	30/7	
4	4.51	Wire/strand diameter	mm	3.71	
5	4.51	Diameter of steel wires	mm	11.13	
6	4.51	Overall diameter	mm	25.97	
7	4.51	Aluminium area	mm ²	324.31	
8	4.51	Steel area	mm ²	75.67	
9	4.51	Total conductor area	mm ²	399.98	
10	4.51	Mass of aluminium wires	kg/km	899	
11	4.51	Mass of steel wires	kg/km	598	
12	4.51	Total conductor mass	kg/km	1500	
13	4.51	Ultimate tensile strength	kN	136.0	
14	4.51	DC Resistance at 20°C	Ω/km	0.089	
15	4.51	Current rating	Amps	730	
16	4.51	Standard drum length	m	2000	
17	5	Conductor tested as per IEC 61089 or SABS 182-3	Yes/No	Yes	
18	6.1.	Gross mass of cable drum	kg	Required	
19	6.1	Conductor identification and marking as per IEC 61089	Yes/No	Yes	
20	7	Type test certificates required	Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

ITEM 6: ACSR GOAT – SAP 903

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____

Name in block letters

Signature

Full name of company: _____

Annex C – ITEM 7: ACSR ZEBRA – SAP 1852

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause	Description	Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard	IEC 61089	
2		Quantity m		
3	4.51	Strand configuration Al/Steel	54/7	
4	4.51	Wire/strand diameter mm	3,18	
5	4.51	Diameter of steel wires mm	9,54	
6	4.51	Overall diameter mm	28,62	
7	4.51	Aluminium area mm ²	428,88	
8	4.51	Steel area mm ²	55,60	
9	4.51	Total conductor area mm ²	484,48	
10	4.51	Mass of aluminium wires kg/km	1190	
11	4.51	Mass of steel wires kg/km	440	
12	4.51	Total conductor mass kg/km	1630	
13	4.51	Ultimate tensile strength kN	133	
14	4.51	DC Resistance at 20°C Ω/km	0,067	
15	4.51	Current rating Amps	860	
16	4.51	Standard drum length m	1500	
17	5	Conductor tested as per IEC 61089 or SABS 182-3 Yes/No	Yes	
18	6.1.	Gross mass of cable drum kg	Required	
19	6.1	Conductor identification and marking as per IEC 61089 Yes/No	Yes	
20	7	Type test certificates required Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

ITEM 7: ACSR ZEBRA – SAP 1852

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

Annex C – ITEM 8: AAC HORNET – SAP 974**Schedule A: Purchaser's specific requirements****Schedule B: Guarantees and technical particulars of equipment offered**

Item	Sub-clause	Description	Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard	IEC 61089	
2		Quantity m		
3	4.51	Strand configuration Al	19	
4	4.51	Wire/strand diameter mm	3,53	
5	4.51	Overall diameter mm	16,25	
6	4.51	Total conductor area mm ²	157.95	
7	4.51	Total conductor mass kg/km	435	
8	4.51	Ultimate tensile strength kN	26	
9	4.51	DC Resistance at 20°C Ω/km	0,183	
10	4.51	Current rating Amps	457	
11	4.51	Standard drum length m	2000	
12	5	Conductor tested as per IEC 61089 or SABS 182-3 Yes/No	Yes	
13	6.1.	Gross mass of cable drum kg	Required	
14	6.1	Conductor identification and marking as per IEC 61089 Yes/No	Yes	
15	7	Type test certificates required Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

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ITEM 8: AAC HORNET – SAP 974

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

Annex C – ITEM 9: AAAC UPAS – SAP 904

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause	Description	Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard	IEC 61089	
2		Quantity m		
3	4.51	Strand configuration Al	19	
4	4.51	Wire/strand diameter mm	3,53	
5	4.51	Overall diameter mm	16,25	
6	4.51	Total conductor area mm ²	157.95	
7	4.51	Total conductor mass kg/km	435	
8	4.51	Ultimate tensile strength kN	26	
9	4.51	DC Resistance at 20°C Ω/km	0,183	
10	4.51	Current rating Amps	457	
11	4.51	Standard drum length m	2000	
12	5	Conductor tested as per IEC 61089 or SABS 182-3 Yes/No	Yes	
13	6.1.	Gross mass of cable drum kg	Required	
14	6.1	Conductor identification and marking as per IEC 61089 Yes/No	Yes	
15	7	Type test certificates required Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

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ITEM 9: AAAC UPAS – SAP 904

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

Annex C – ITEM 10: AAC CENTIPEDE – SAP 973

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause	Description	Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard	IEC 61089	
2		Quantity m		
3	4.51	Strand configuration Al	37	
4	4.51	Wire/strand diameter mm	3,37	
5	4.51	Overall diameter mm	26,46	
6	4.51	Total conductor area mm ²	415,22	
7	4.51	Total conductor mass kg/km	1150	
8	4.51	Ultimate tensile strength kN	67,2	
9	4.51	DC Resistance at 20°C Ω/km	0,069	
10	4.51	Current rating Amps	833	
11	4.51	Standard drum length m	1000	
12	5	Conductor tested as per IEC 61089 or SABS 182-3 Yes/No	Yes	
13	6.1.	Gross mass of cable drum kg	Required	
14	6.1	Conductor identification and marking as per IEC 61089 Yes/No	Yes	
15	7	Type test certificates required Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

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ITEM 10: AAC CENTIPEDE – SAP 973

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____
Name in block letters Signature

Full name of company: _____

Annex C – ITEM 11: AAC BULL – SAP 971**Schedule A: Purchaser's specific requirements****Schedule B: Guarantees and technical particulars of equipment offered**

Item	Sub-clause	Description		Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard		IEC 61089	
2		Quantity	m		
3	4.51	Strand configuration	Al	61	
4	4.51	Wire/strand diameter	mm	4,25	
5	4.51	Overall diameter	mm	38,25	
6	4.51	Total conductor area	mm ²	865,36	
7	4.51	Total conductor mass	kg/km	2400	
8	4.51	Ultimate tensile strength	kN	139	
9	4.51	DC Resistance at 20°C	Ω/km	0,033	
10	4.51	Current rating	Amps	1300	
11	4.51	Standard drum length	m	1000	
12	5	Conductor tested as per IEC 61089 or SABS 182-3	Yes/No	Yes	
13	6.1.	Gross mass of cable drum	kg	Required	
14	6.1	Conductor identification and marking as per IEC 61089	Yes/No	Yes	
15	7	Type test certificates required	Yes/No	Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

Tender Number: _____

Tenderer's Authorised Signatory: _____
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Annex C – ITEM 11: AAC BULL – SAP 971

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____

Name in block letters

Signature

Full name of company: _____

Annex C – ITEM 12: HTLS– SAP 3654

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause	Description	Schedule A	Schedule B
1	4.1.1	Conductor manufacturing standard	IEC 61089	
2	4.51	Strand configuration	Al H-19	
3	4.51	Overall diameter	mm Min = 21 Max = 22	
4	4.51	Diameter of composite core	mm Min = 7 Max = 8	
5	4.51	Total conductor area	mm ² Min = 328 Max = 350	
	4.51	Aluminium area	mm ² Min = 289 Max = 310	
6	4.51	Total conductor mass	kg/km Min = 933 Max = 948	
		Core mass	kg/km Min = 76 Max = 134	
		Aluminum mass	kg/km Min = 799 Max = 872	
7	4.51	Ultimate tensile strength	kN Min = 92 kN Max = 104	
8	4.51	DC Resistance at 20°C	Ω/km Min = 0.0916 Max = 0.0956	
9	4.51	Current rating	Amps Min = 1227 Max = 1282	
10	5	Conductor tested as per IEC 61089 or SABS 182-3	Yes/No Yes	
11	6.1	Conductor identification and marking as per IEC 61089	Yes/No Yes	
12	7	Type test certificates required	Yes/No Yes	

NOTE: TICKS [✓✗], ASTERISK [*], WORD [NOTED], OR TBA [TO BE ADVISED] WILL NOT BE ACCEPTED.

Tender Number: _____

Tenderer's Authorised Signatory: _____
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ITEM 12: HTLS– SAP 3654

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item	Sub-clause	Proposed deviation

Tender Number: _____

Tenderer's Authorised Signatory: _____
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Annex D – Stock Items

Material Group: COND-ACSR,AAAC,AAC, and HTLS

Item	SAP No.	SAP Short Description	SAP Long Description
1	7286	ACSR SQUIRREL, 130 A, 6.33 MM DIAMETER	BARE OVERHEAD CONDUCTOR. ALUMINIUM CONDUCTOR STEEL REINFORCED (ACSR). SQUIRREL. 130 AMPS CURRENT RATING. 6.33 MM OVERALL DIAMETER ITEM SPECIFICATION NO. CP_TSSPEC_061
2	901	ACSR FOX, 190 A, 8.37 MM DIAMETER	BARE OVERHEAD CONDUCTOR. ALUMINIUM CONDUCTOR STEEL REINFORCED (ACSR). FOX. 190 AMPS CURRENT RATING. 8.37 MM OVERALL DIAMETER ITEM SPECIFICATION NO. CP_TSSPEC_061
3	7289	ACSR MINK, 260 A, 10.52 MM DIAMETER	BARE OVERHEAD CONDUCTOR. ALUMINIUM CONDUCTOR STEEL REINFORCED (ACSR). MINK. 260 AMPS CURRENT RATING. 10.52 MM OVERALL DIAMETER. ITEM SPECIFICATION NO. CP_TSSPEC_061
4	1512	ACSR HARE, 360 A, 14.16 MM DIAMETER	BARE OVERHEAD CONDUCTOR. ALUMINIUM CONDUCTOR STEEL REINFORCED (ACSR). HARE. 360 AMPS CURRENT RATING. 14.16 MM OVERALL DIAMETER. ITEM SPECIFICATION NO. CP_TSSPEC_061
5	902	ACSR WOLF, 470 A, 18.13 MM DIAMETER	BARE OVERHEAD CONDUCTOR. ALUMINIUM CONDUCTOR STEEL REINFORCED (ACSR). WOLF. 470 AMPS CURRENT RATING. 18.13 MM OVERALL DIAMETER. ITEM SPECIFICATION NO. CP_TSSPEC_061
6	903	ACSR GOAT, 730 A, 25.97 MM DIAMETER	BARE OVERHEAD CONDUCTOR. ALUMINIUM CONDUCTOR STEEL REINFORCED (ACSR). GOAT. 730 AMPS CURRENT RATING. 25.97 MM OVERALL DIAMETER. ITEM SPECIFICATION NO. CP_TSSPEC_061
7	1852	ACSR ZEBRA, 860 A, 28,62 MM DIAMETER	BARE OVERHEAD CONDUCTOR. ALUMINIUM CONDUCTOR STEEL REINFORCED (ACSR). ZEBRA. 860 AMPS CURRENT RATING. 28,62 MM OVERALL DIAMETER. ITEM SPECIFICATION NO. CP_TSSPEC_061
8	974	AAC, HORNET 457 A, 16,25 MM DIAMETER	BARE OVERHEAD CONDUCTOR. ALL ALUMINIUM CONDUCTOR (AAC). HORNET. 457 AMPS CURRENT RATING. 16,25 MM OVERALL DIAMETER. ITEM SPECIFICATION NO. CP_TSSPEC_061
9	904	AAAC UPAS, 718 A, 24,71 MM DIAMETER	BARE OVERHEAD CONDUCTOR. ALL ALUMINIUM ALLOY CONDUCTOR (AAAC). UPAS. 718 AMPS CURRENT RATING. 24,71 MM OVERALL DIAMETER. ITEM SPECIFICATION NO. CP_TSSPEC_061
10	973	AAC CENTIPEDE, 833 A, 26,46 MM DIAMETER	BARE OVERHEAD CONDUCTOR. ALL ALUMINIUM CONDUCTOR (AAC). CENTIPEDE. 833 AMPS CURRENT RATING. 26,46 MM OVERALL DIAMETER. ITEM SPECIFICATION NO. CP_TSSPEC_061
11	971	AAC BULL, 1300 A, 38,25 MM DIAMETER	BARE OVERHEAD CONDUCTOR. ALUMINIUM CONDUCTOR (AAC). BULL. 1300 AMPS CURRENT RATING. 38,25 MM OVERALL DIAMETER. ITEM SPECIFICATION NO. CP_TSSPEC_061

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12	3654	HTLS, 1227A, 21,79MM DIAMETER	HIGH TEMPERATURE, LOW SAG CONDUCTOR WITH MAXIMUM WEIGHT OF 950KG/KM WITH CONTINUOUS MINIMUM CURRENT OF 1227A AT A MAXIMUM TEMPERATURE OF 180°C. ITEM SPECIFICATION NO. CP_TSSPEC_061
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