



TITLE **SPECIFICATION FOR PILOT  
CABLES**

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**FOREWORD**

This standard was prepared by the following Work Group members:

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2016

## INTRODUCTION

Pilot cables are critical to the correct operation of protection equipment protecting medium and high voltage networks. It is therefore important to ensure that pilot cables comply with the required specifications and are of acceptable quality. As this is difficult to manage within the present City Power business structures it has been decided that NRS support structures will be relied upon to manage compliance to specification as well as quality. The implication to suppliers is that City Power will only purchase cables that bear the relevant SANS mark.

## 1 SCOPE

This specification covers City Power's requirements for pilot cables in accordance with NRS 011.

## 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.

NRS 011: Pilot Cables

## 3 DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations in NRS 011 shall apply to this specification.

## 4 REQUIREMENTS

### 4.1 General

The pilot cables shall comply fully with the requirements of NRS 011, except where amended by this specification.

### 4.2 Conductors

The conductors shall be solid annealed copper with the diameters specified in table 1:

Construction	Conductor diameter (mm)
6 pair	1,8
10 pair	1,8
20 pair	0,9

Table 1 – Standard conductor diameters

### 4.3 Construction

The construction of the pilot cables shall comply with the requirements of NRS 011 with the specific additional requirements:

- a) Polyethylene insulated (0,8 mm thick);
- b) Petroleum jelly filled;
- c) Overall aluminium foil screened;
- d) Galvanised steel wire armoured; and
- e) 6, 10 or 20 pair construction.

### 4.4 Colour coding

The conductor insulation colour coding shall comply with the requirements of Table 2:

Pair number	A wire	B wire	Pair number (continued)	A wire	B wire
1	Blue	White	11	Blue	Black
2	Orange	White	12	Orange	Black
3	Green	White	13	Green	Black
4	Brown	White	14	Brown	Black
5	Grey	White	15	Grey	Black
6	Blue	Red	16	Blue	Yellow
7	Orange	Red	17	Orange	Yellow
8	Green	Red	18	Green	Yellow
9	Brown	Red	19	Brown	Yellow
10	Grey	Red	20	Grey	Yellow

**Table 2 – Standard conductor colour coding**

**Note:** The table details the colour code for up to 20 pairs. For 6 and 10 pair cables, the first 6 and 10 pairs respectively are to be used.

## 5 TESTS

Type and routine tests shall be conducted in accordance with the requirements of NRS 011.

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**6 MARKING, LABELING AND PACKAGING**

All marking, labelling and packing shall comply with the requirements of NRS 011.

**7 DOCUMENTATIONS**

Documentation pertaining to the items offered shall be submitted in a catalogue format. All relevant documentation including constructional details and certified copies of type tests, in English, shall also be provided.

**8 QUALITY MANAGEMENT**

A quality management plan shall be set up in order to assure the proper quality management of the pilot cables during design, development, production, installation and servicing phases. Guidance on the requirements for a quality management plan may be found in the ISO 9001:2015. The details shall be subject to agreement between City Power and the Supplier.

**9 HEALTH AND SAFETY**

A health and safety plan shall be set up in order to ensure proper management and compliance of the pilot cables during installation, operation, maintenance, and decommissioning phases. Guidance on the requirements of a health and safety plan may be found in ISO 45001:2018 standards. This is to ensure that the asset conforms to standard operating procedures and City Power SHERQ Policy. The details shall be subject to agreement between City Power and the Supplier.

**10 ENVIRONMENTAL MANAGEMENT**

An environmental management plan shall be set up in order to assure the proper environmental management of the pilot cables throughout its entire life cycle (i.e. during design, development, production, installation, operation and maintenance, decommissioning and disposal phases). Guidance on the requirements for an environmental management 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.

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## **ANNEX A - BIBLIOGRAPHY**

Specification for pilot cables – Ivan Bright (City Power)

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**ANNEX B - REVISION INFORMATION**

DATE	REV. NO.	NOTES
August 2005	0	First issue
September 2018	1	Format changed
		General editing
		Inclusion of Quality Management
		Inclusion of Health and Safety Management
		Inclusion of Environmental Management
May	2	General editing
		Updating study committee members



**ANNEX C - TECHNICAL SCHEDULES A & B: ITEM No. 1****SAP No. 5041: CAB LV PE 1,8 6PCU****Schedule A: Purchaser's specific requirements****Schedule B: Guarantees and technical particulars of equipment offered**

Item	Sub-clause of NRS 011	Description	Schedule A	Schedule B
1		Manufacturer's name	XXXXXX	
2		Country of manufacture	XXXXXX	
3	4.1.1	Induced voltage for which cable system is designed kV	5 to 15	
4	4.1.8	Number of pairs	6	
5	4.2.2	Conductor diameter mm	1,8	
6	4.4.1	Colour coding as required in Table 2 of CP_TSSPEC_034 Yes/No	Yes	
7	4.3.1	Conductor insulation material	Polyethylene	
8	4.3.2	Thickness of insulation mm	0,8	
9	4.5.2	Blown tube for fibre optic core Yes/No	No	
10	4.4.2	Length of lay mm	150	
11	4.7.1	Overall aluminium foil screen applied Yes/No	Yes	
12	4.8	Filling offered	Petroleum jelly	
13	4.9	Bedding/undersheath material	Polyethylene	
14	4.10.2	Type of armouring	Steel (SWA)	
15	4.11.1	Outer sheath material	Polyethylene	
16	6.2.2	Cable length required on drum m	500	
17	6.2.2	Maximum drum mass kg	XXXX	

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: \_\_\_\_\_

**DEVIATION SCHEDULE: ITEM No. 1****SAP No. 5041: CAB LV PE 1,8 6PCU**

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 No.	Sub-clause of CP_TSSPEC_034	Proposed deviation

Tender Number: \_\_\_\_\_

Tenderer's Authorised Signatory: \_\_\_\_\_  
Name in block letters Signature

Full name of company: \_\_\_\_\_

## TECHNICAL SCHEDULES A & B: ITEM No. 2

### SAP No. 5042: CAB LV PE 1,8 10PCU

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause of NRS 011	Description	Schedule A	Schedule B
1		Manufacturer's name	XXXXXX	
2		Country of manufacture	XXXXXX	
3	4.1.1	Induced voltage for which cable system is designed kV	5 to 15	
4	4.1.8	Number of pairs	10	
5	4.2.2	Conductor diameter mm	1,8	
6	4.4.1	Colour coding as required in Table 2 of CP_TSSPEC_034 Yes/No	Yes	
7	4.3.1	Conductor insulation material	Polyethylene	
8	4.3.2	Thickness of insulation mm	0,8	
9	4.5.2	Blown tube for fibre optic core Yes/No	No	
10	4.4.2	Length of lay mm	150	
11	4.7.1	Overall aluminium foil screen applied Yes/No	Yes	
12	4.8	Filling offered	Petroleum jelly	
13	4.9	Bedding/undersheath material	Polyethylene	
14	4.10.2	Type of armouring	Steel (SWA)	
15	4.11.1	Outer sheath material	Polyethylene	
16	6.2.2	Cable length required on drum m	500	
17	6.2.2	Maximum drum mass kg	XXXX	

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: \_\_\_\_\_

**DEVIATION SCHEDULE: ITEM No. 2****SAP No. 5042: CAB LV PE 1,8 10PCU**

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 No.	Sub-clause of CP_TSSPEC_034	Proposed deviation

Tender Number: \_\_\_\_\_

Tenderer's Authorised Signatory: \_\_\_\_\_  
Name in block letters Signature

Full name of company: \_\_\_\_\_

## TECHNICAL SCHEDULES A & B: ITEM No. 3

### SAP No. 5043: CAB LV PE 0,9 20PCU

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

Item	Sub-clause of NRS 011	Description	Schedule A	Schedule B
1		Manufacturer's name	XXXXXX	
2		Country of manufacture	XXXXXX	
3	4.1.1	Induced voltage for which cable system is designed kV	5 to 15	
4	4.1.8	Number of pairs	20	
5	4.2.2	Conductor diameter mm	0,9	
6	4.4.1	Colour coding as required in Table 2 of CP_TSSPEC_034 Yes/No	Yes	
7	4.3.1	Conductor insulation material	Polyethylene	
8	4.3.2	Thickness of insulation mm	0,8	
9	4.5.2	Blown tube for fibre optic core Yes/No	No	
10	4.4.2	Length of lay mm	150	
11	4.7.1	Overall aluminium foil screen applied Yes/No	Yes	
12	4.8	Filling offered	Petroleum jelly	
13	4.9	Bedding/undersheath material	Polyethylene	
14	4.10.2	Type of armouring	Steel (SWA)	
15	4.11.1	Outer sheath material	Polyethylene	
16	6.2.2	Cable length required on drum m	500	
17	6.2.2	Maximum drum mass kg	XXXX	

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: \_\_\_\_\_

**DEVIATION SCHEDULE: ITEM No. 3****SAP No. 5043: CAB LV PE 0,9 20PCU**

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 No.	Sub-clause of CP_TSSPEC_034	Proposed deviation

Tender Number: \_\_\_\_\_

Tenderer's Authorised Signatory: \_\_\_\_\_  
Name in block letters Signature

Full name of company: \_\_\_\_\_

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**ANNEX D - STOCK ITEMS****Material Group: CABLE PT**

Item	SAP No:	SAP Short Description	SAP Long Description
1	5041	CAB LV PE 1,8 6PCU	CABLE, PILOT, 1,8 MM DIAMETER SOLID ANNEALED COPPER CONDUCTORS, POLYETHYLENE INSULATED, 6 PAIR, POLYETHYLENE BEDDED AND SHEATHED, PETROLEUM JELLY FILLED, OVERALL ALUMINIUM FOIL SCREENED, GALVANISED STEEL WIRE ARMoured. ITEM SPECIFICATION NO. CP_TSSPEC_034.
2	5042	CAB LV PE 1,8 10PCU	CABLE, PILOT, 1,8 MM DIAMETER SOLID ANNEALED COPPER CONDUCTORS, POLYETHYLENE INSULATED, 10 PAIR, POLYETHYLENE BEDDED AND SHEATHED, PETROLEUM JELLY FILLED, OVERALL ALUMINIUM FOIL SCREENED, GALVANISED STEEL WIRE ARMoured. ITEM SPECIFICATION NO. CP_TSSPEC_034.
3	5043	CAB LV PE 0,9 20PCU	CABLE, PILOT, 0,9 MM DIAMETER SOLID ANNEALED COPPER CONDUCTORS, POLYETHYLENE INSULATED, 20 PAIR, POLYETHYLENE BEDDED AND SHEATHED, PETROLEUM JELLY FILLED, OVERALL ALUMINIUM FOIL SCREENED, GALVANISED STEEL WIRE ARMoured. ITEM SPECIFICATION NO. CP_TSSPEC_034.