

**Transnet freight rail**, a division of

**TRANSNET SOC LTD**

Registration Number 1990/000900/30  
[hereinafter referred to as **Transnet**]

**REQUEST FOR QUOTATION [RFQ] No RME CPT 354/2015**

**FOR THE SUPPLY AND DELIVERY OF: SIGNALS CABLES**

**FOR DELIVERY TO: BELLVILLE SQUARE, ELECTRICAL STORES**

**ISSUE DATE: 30 OCTOBER 2015**

**CLOSING DATE: 10 NOVEMBER 2015**

**CLOSING TIME: 10:00**

**"PREVIEW COPY ONLY"**

RFQ for the Supply and delivery of [SIGNALS CABLES]

## Section 1 NOTICE TO BIDDERS

Quotations which must be completed as indicated in Section 2 of this RFQ are to be submitted as follows:

**METHOD:** [email / post and/or courier]  
**CLOSING VENUE:** SEE BELOW FOR CLOSING VENUE

Proposals must reach the Secretariat, Acquisition Council before the closing hour on the date shown below, and must be enclosed in a sealed envelope which must have inscribed on the outside:

**RFQ No:** **RME CPT 354/2015**  
**Description:** **SUPPLY AND DELIVERY OF SIGNALS CABLES**  
**Closing date and time:** **10<sup>TH</sup> November 2015 At 10:00 Sharp**  
**Closing address:** *[Refer to options in Delivery Instructions for RFQ below]*

All envelopes must reflect the return address of the Respondent on the reverse side.

### A. DELIVERY INSTRUCTIONS FOR RFQ

#### Delivery by hand

If delivered by hand, the envelope is to be deposited in the Transnet tender box which is located at the main entrance of Transnet Park, ROBERT SOBUKWE Road, Bellville, and should be addressed as follows:

THE SECRETARIAT  
 ACQUISITION COUNCIL  
 TRANSNET PARK  
 TENDER BOX (located in the foyer of the building)  
 ROBERT SOBUKWE ROAD  
 BELLVILLE 7535

- a) The measurements of the "border slot" are 400mm wide x 100mm high, and Respondents must please ensure that response documents or files are no larger than the above dimensions. Responses which are too bulky [i.e. more than 100mm thick] must be split into two or more files, and placed in separate envelopes, each such envelope to be addressed as above.

#### Dispatch by courier

If dispatched by courier, the envelope must be addressed as follows and delivered to the Office of The Secretariat, Acquisition Council and a signature obtained from that Office:

THE SECRETARIAT  
 TRANSNET ACQUISITION COUNCIL  
 6TH FLOOR  
 TRANSNET PARK  
 ROBERT SOBUKWE ROAD  
 BELLVILLE

Please note that this RFQ closes punctually at **10:00 on 10<sup>th</sup> November 2015**.

RFQ for the Supply and delivery of [SIGNALS CABLES]

1. If responses are not delivered as stipulated herein, such responses will not be considered and will be treated as "NON-RESPONSIVE" and will be disqualified.
2. No email or facsimile responses will be considered, unless otherwise stated herein.
3. The responses to this RFQ will be opened as soon as practicable after the expiry of the time advertised for receiving them.
4. Transnet shall not, at the opening of responses, disclose to any other company any confidential details pertaining to the Proposals / information received, i.e. pricing, delivery, etc. The names and locations of the Respondents will be divulged to other Respondents upon request.

Envelopes must not contain documents relating to any RFQ other than that shown on the envelope.

## **1 Responses to RFQ**

Responses to this RFQ [**Quotations**] must not include documents or reference relating to any other quotation or proposal. Any additional conditions must be embodied in an accompanying letter.

## **2 COMPULSORY LOCAL CONTENT THRESHOLD**

In terms of section 9(1) of the Preferential Procurement Regulations, 2011, and the Instruction Note issued by National Treasury on the "Invitation and Evaluation of Bids based on a stipulated minimum threshold for local content and production for the **Electrical and Telecom Cables** Sector," Transnet is required to set a stipulated minimum threshold be set for this RFQ.

### **2.1 Local Content Threshold**

A Local Content threshold of **90%** [**NINETY** percent] will be required for all Goods to be manufactured by a successful Respondent.

For further guidance with regard to the determination of "Local Content," Respondents must refer to the following documentation:

- SABS approved technical specification number SATS 1286:2011
- Guidance on the calculation of Local Content

[available on the DTI website: <http://www.thedti.gov.za>]

### **2.2 Mandatory RFQ Annexures**

The regulatory and mandatory RFQ Annexures, which must be completed by all Respondents in order to declare Local Content, are as follows:

- Annexure B – Declaration Certificate for Local Production and Content [SBD 6.2]
- Annexure C – Local Content Declaration: Summary Schedule

Annexures D and E are Supporting Schedules to Annexure C. They are named as follows:

- Annexure D – Imported Content Declaration: Supporting Schedule to Annexure C
- Annexure E – Local Content Declaration: Supporting Schedule to Annexure C



RFQ for the Supply and delivery of [SIGNALS CABLES]

## 5 Legal Compliance

The successful Respondent shall be in full and complete compliance with any and all applicable national and local laws and regulations.

## 6 Changes to Quotations

Changes by the Respondent to its submission will not be considered after the closing date and time.

## 7 Pricing

All prices must be quoted in South African Rand on a fixed price basis, excluding VAT.

## 8 Prices Subject to Confirmation

Prices quoted which are subject to confirmation will not be considered.

## 9 Binding Offer

Any Quotation furnished pursuant to this Request shall be deemed to be an offer. Any exceptions to this statement must be clearly and specifically indicated.

## 10 Disclaimers

Transnet is not committed to any course of action as a result of its issuance of this RFQ and/or its receipt of a Quotation in response to it. Please note that Transnet reserves the right to:

- modify the RFQ's goods / service(s) and request Respondents to re-bid on any changes;
  - reject any Quotation which does not conform to instructions and specifications which are detailed herein;
  - disqualify Quotations submitted after the stated submission deadline;
  - not necessarily accept the lowest priced Quotation or an alternative bid;
  - reject all Quotations, if it so decides;
  - place an order in connection with this Quotation at any time after the RFQ's closing date;
  - award only a portion of the proposed goods / service/s which are reflected in the scope of this RFQ;
  - split the award of the order/s between more than one Supplier/Service Provider should it at Transnet's discretion be more advantageous in terms of, amongst others, cost or developmental considerations ;
- or
- make no award at all.

Should a contract be awarded on the strength of information furnished by the Respondent, which after conclusion of the contract, is proved to have been incorrect, Transnet reserves the right to cancel the contract.

Transnet reserves the right to undertake post-tender negotiations [PTN] with selected Respondents or any number of short-listed Respondents, such PTN to include, at Transnet's option, any evaluation criteria listed in this RFQ document.

Transnet reserves the right to award business to the highest scoring bidder/s unless objective criteria justify the award to another bidder.

RFQ for the Supply and delivery of [SIGNALS CABLES]

Should the preferred bidder fail to sign or commence with the contract within a reasonable period after being requested to do so, Transnet reserves the right to award the business to the next highest ranked bidder, provided that he/she is still prepared to provide the required goods at the quoted price.

**11 Specification/Scope of Work**

**APPENDIX. A**

**APPENDIX. B**

**APPENDIX. C**

**Transnet urges its clients, suppliers and the general public to report any fraud or corruption to**

**TIP-OFFS ANONYMOUS : 0800 003 056**

**"PREVIEW COPY ONLY"**

**RFQ FOR THE SUPPLY AND DELIVERY OF: SIGNALS CABLES**  
**CLOSING VENUE: TRANSNET PARK, ROBERT SOBUKWE ROAD, BELLVILLE**  
**CLOSING DATE & TIME: 10 NOVEMBER 2015 10:00AM SHARP**  
**VALIDITY PERIOD: 30 Business Days**

**SECTION 2**  
**EVALUATION CRITERIA AND RETURNABLE DOCUMENTS**

**1 Evaluation Criteria**

Transnet will utilise the following criteria [not necessarily in this order] in choosing a Supplier/Service Provider, if so required:

Criterion/Criteria	Explanation
<b>Administrative responsiveness</b>	Completeness of response and returnable documents
<b>Substantive responsiveness</b>	<p>Prequalification criteria, if any, must be met and whether the Bid materially complies with the scope and/or specification given.</p> <p>Bidders must submit the following documents with their Bid, failure to submit these documents will result in the Bid being disqualified</p> <ul style="list-style-type: none"> <li><b>ANNEXURE G:</b> Technical Compliance Sheet</li> <li><b>ANNEXURE B:</b> Declaration Certificate for Local Production and Content</li> <li><b>ANNEXURE C:</b> Local Content Declaration Summary Schedule</li> </ul>
<b>Local Content Threshold</b>	<p>This RFQ is subject to regulation 9 (1) of the Preferential Procurement Policy Framework Act as [<b>Electrical and Telecom Cables</b>] has been designated for local production and content. As such, Respondents will be required to meet a stipulated minimum threshold for local production and content as stipulated in the relevant Instruction Note issued by National Treasury. The stipulated minimum threshold/s applicable is/are as follows:</p> <p><b>90%.</b></p>
<b>Functionality Threshold</b>	<p>As prescribed in terms of the Preferential Procurement Policy Framework Act (PPPFA), Act 5 of 2000 and its Regulations, Respondents are to note that functionality is included as a threshold with a prescribed percentage threshold of <b>80%</b>. Compliance to specification will be considered as part of the technical evaluation [<b>Complete Annexure G – Technical Compliance Sheet</b>] The minimum threshold of 80% must be met or exceeded for a Bidder's proposal to progress to the next stage of evaluation</p>
<b>Final weighted evaluation based on 80/20 preference point</b>	<ul style="list-style-type: none"> <li>Pricing and price basis [firm]</li> <li>B-BBEE status of company - Preference points will be awarded to a bidder for attaining the B-BBEE status level of contribution in accordance with the table indicated in Annexure A: B-BBEE Claim Form.</li> </ul>

**Broad-Based Black Economic Empowerment criteria** [Weighted score 20 points]

- B-BBEE - current scorecard / B-BBEE Preference Points Claims Form [Annexure A]

Preference points will be awarded to a bidder for attaining the B-BBEE status level of contribution in accordance with the table indicated in Annexure A:

B-BBEE Status Level of Contributor	Number of Points [Maximum 20]
1	20
2	18
3	16
4	12
5	8
6	6
7	4
8	2
Non-compliant contributor	0

Evaluation Criteria	Final Weighted Scores
Price	80
B-BBEE - Scorecard	20
<b>TOTAL SCORE:</b>	<b>100</b>

**2 Validity Period**

Transnet desires a validity period of 30 [thirty] Business Days from the closing date of this RFQ.

This RFQ is valid until \_\_\_\_\_.

**3 Disclosure of Prices Quoted**

Respondents must indicate here whether Transnet may disclose their quoted prices and conditions to other Respondents:

YES  NO

**4 Returnable Documents**

**Returnable Documents** means all the documents, Sections and Annexures, as listed in the tables below.

**All Returnable Sections, as indicated in the header and footer of the relevant pages, must be signed, stamped and dated by the Respondent.**

- a) Respondents are required to submit with their Quotations the **mandatory Returnable Documents**, as detailed below.



***Failure to provide all these Mandatory Returnable Documents at the Closing Date and time of this RFQ will result in a Respondent's disqualification. Respondents are therefore urged to ensure that all these Documents are returned with their Quotations.***

Please confirm submission of these mandatory Returnable Documents by so indicating [Yes or No] in the tables below:

<b>Mandatory Returnable Documents</b>	<b>Submitted [Yes or No]</b>
SECTION 3 : Quotation Form	
ANNEXURE G: Technical Compliance Sheets	
ANNEXURE B – Declaration Certificate for Local Production and Content [SBD6.2]	
ANNEXURE C – Local Content Declaration: Summary Schedule	

- b) In addition to the requirements of section (a) above, Respondents are further required to submit with their Quotations the following **essential returnable Documents** as detailed below.

***Failure to provide all these Returnable Documents may result in a Respondent's disqualification. Respondents are therefore urged to ensure that all these documents are returned with their Quotations***

<b>Essential Returnable Documents</b>	<b>Submitted [Yes or No]</b>
SECTION 2 : Evaluation criteria and list of returnable documents	
- SECTION 4 : RFQ Declaration and Breach of Law Form	
- Valid and original, or a certified copy, of your entity's B-BBEE Verification Certification as per the requirements stipulated in Annexure A: B-BBEE Claims Form Note: failure to provide these required documents at the closing date and time of the RFQ will result in an automatic score of zero being allocated for preference	
- Original valid Tax Clearance Certificate [Consortia / Joint Ventures must submit a separate Tax Clearance Certificate for each party]	
ANNEXURE D – Imported Content Declaration: Supporting Schedule to Annexure C	
ANNEXURE E – Local Content Declaration: Supporting Schedule to Annexure C	
ANNEXURE A – B-BBEE Preference Points Claim Form	

**c) Additional Documents**

In addition to the requirements of paragraphs (a) and b) above, Respondents are further requested to submit with their Proposals the following **additional documents** as detailed below. Please confirm submission of these additional documents by so indicating [Yes or No] in the table below:

<b>ADDITIONAL DOCUMENTS</b>	<b>SUBMITTED [Yes or No]</b>
ANNEXURE F : Local Content Additional Instruction document	
APPENDIX A, B, and C : Specification CSE-1164-002 and CSE-1164-005	

**CONTINUED VALIDITY OF RETURNABLE DOCUMENTS**

The successful Respondent will be required to ensure the validity of all returnable documents, including but not limited to its Tax Clearance Certificate and valid B-BBEE Verification Certificate, for the duration of any contract emanating from this RFQ. Should the Respondent be awarded the contract [**the Agreement**] and fail to present Transnet with such renewals as and when they become due, Transnet shall be entitled, in addition to any other rights and remedies that it may have in terms of the eventual Agreement, to terminate such Agreement forthwith without any liability and without prejudice to any claims which Transnet may have for damages against the Respondent.

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### SECTION 3 QUOTATION FORM

I/We \_\_\_\_\_  
hereby offer to supply the goods/services at the prices quoted in the Price Schedule below, in accordance with the conditions related thereto.

I/We agree to be bound by those terms and conditions in:

- the Standard RFQ Terms and Conditions for the Supply of Goods or Services to Transnet; and
- any other standard or special conditions mentioned and/or embodied in this Request for Quotation.

I/We accept that unless Transnet should otherwise decide and so inform me/us, this Quotation [and, if any, its covering letter and any subsequent exchange of correspondence], together with Transnet's acceptance thereof shall constitute a binding contract between Transnet and me/us.

I/We further agree that if, after I/we have been notified of the acceptance of my/our Quotation, I/we fail to deliver the said goods/service/s within the delivery lead-time quoted, Transnet may, without prejudice to any other legal remedy which it may have, cancel the order and recover from me/us any expenses incurred by Transnet in calling for Quotations afresh and/or having to accept any less favourable offer.

#### Price Schedule

I/We quote as follows for the Supply and delivery of Signals Cables as per Appendix A, B and C for delivery to Bellville Square, Bellville South Western Cape, excluding VAT:

Item No	Description of Goods /Services	Unit of Measure	Quantity	Unit Price (ZAR)	Total Price (ZAR)
1	0.71mm X 20CR CU PVC GREY SPOOR CABLE - 300 meter per drum (3900m) <b>NB. Cables to be inspected and tested before delivery.</b>	Meter	3900		
2	0.9mm X 10CR CU PVC GREY SPOOR CABLE - 300meter per drum (300m) <b>NB. Cables to be inspected and tested before delivery.</b>	Meter	300		
3	0.71 mm X SINGLE CORE PVC 105°C GREY 300meter per reel (4200m) <b>NB. Cables to be inspected and tested before delivery.</b>	Meter	4200		

\_\_\_\_\_  
Respondent's Signature

\_\_\_\_\_  
Date & Company Stamp

**Delivery Lead-Time from date of purchase order:** \_\_\_\_\_ [days/weeks]

**Notes to Pricing:**

- a) All Prices must be quoted in South African Rand, exclusive of VAT
- b) To facilitate like-for-like comparison bidders must submit pricing strictly in accordance with this price schedule and not utilise a different format. Deviation from this pricing schedule could result in a bid being disqualified.

Please note that should you have offered a discounted price(s), Transnet will only consider such price discount(s) in the final evaluation stage if offered on an unconditional basis.

**By signing this Quotation Form the Respondent is deemed to acknowledge that he/she has made himself/herself thoroughly familiar, and agrees, with all the conditions governing this RFQ, including those contained in any printed form stated to form part hereof, including but not limited to the documents stated below and Transnet SOC Ltd will recognise no claim for relief based on an allegation that the Respondent overlooked any such condition or failed properly to take it into account for the purpose of calculating tendered prices or otherwise:**

- 1. Specifications and drawings included in this RFQ - if applicable; and
- 2. The following documents all of which are available on Transnet's website or upon request:
  - 2.1. General Bid Conditions;
  - 2.2. Standard RFQ Terms and Conditions for the Supply of Goods or Services to Transnet;
  - 2.3. Supplier Integrity Pact;
  - 2.4. Non-disclosure Agreement; and
  - 2.5. Vendor Application Form and all supporting documents (first time vendors only)

Alternatively, for all existing vendors, please provide vendor number(s) here:

Transnet Operating Division	Unique Vendor Number	Yes / No
Transnet Group		
TFR, etc.		

In the Yes/No column above, please confirm that all the information e.g. company address and contact details, banking details etc. are still correct as at the time of allocation of the vendor number(s). Alternatively, Respondents are required to provide the updated information with their bid submission.

SIGNED at \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_

SIGNATURE OF WITNESSES

ADDRESS OF WITNESSES

1 \_\_\_\_\_  
Name \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

2 \_\_\_\_\_  
Name \_\_\_\_\_

SIGNATURE OF RESPONDENT'S AUTHORISED REPRESENTATIVE: \_\_\_\_\_

NAME: \_\_\_\_\_

DESIGNATION: \_\_\_\_\_

**SECTION 4**

**RFQ DECLARATION AND BREACH OF LAW FORM**

NAME OF ENTITY: \_\_\_\_\_

We \_\_\_\_\_ do hereby certify that:

1. Transnet has supplied and we have received appropriate responses to any/all questions [as applicable] which were submitted by ourselves for RFQ Clarification purposes;
2. we have received all information we deemed necessary for the completion of this Request for Quotation [RFQ];
3. we have been provided with sufficient access to the existing Transnet facilities/sites and any and all relevant information relevant to the Supply of the Goods as well as Transnet information and Employees, and has had sufficient time in which to conduct and perform a thorough due diligence of Transnet's operations and business requirements and assets used by Transnet. Transnet will therefore not consider or permit any pre- or post-contract verification or any related adjustment to pricing, service levels or any other provisions/conditions based on any incorrect assumptions made by the Respondent in arriving at his Bid Price.
4. at no stage have we received additional information relating to the subject matter of this RFQ from Transnet sources, other than information formally received from the designated Transnet contact(s) as nominated in the RFQ documents;
5. we are satisfied, insofar as our entity is concerned, that the processes and procedures adopted by Transnet in issuing this RFQ and the requirements requested from Bidders in responding to this RFQ have been conducted in a fair and transparent manner; and
6. furthermore, we declare that a family, business and/or social relationship **exists / does not exist** [delete as applicable] between an owner / member / director / partner / shareholder of our entity and an employee or board member of the Transnet Group including any person who may be involved in the evaluation and/or adjudication of this Bid.
7. In addition, we declare that an owner / member / director / partner / shareholder of our entity **is / is not** [delete as applicable] an employee or board member of the Transnet Group.

\_\_\_\_\_  
Respondent's Signature

\_\_\_\_\_  
Date & Company Stamp

8. If such a relationship as indicated in paragraph 6 and/or 7 exists, the Respondent is to complete the following section:

FULL NAME OF OWNER/MEMBER/DIRECTOR/  
PARTNER/SHAREHOLDER:

ADDRESS:

\_\_\_\_\_

\_\_\_\_\_

Indicate nature of relationship with Transnet:

\_\_\_\_\_

\_\_\_\_\_

*[Failure to furnish complete and accurate information in this regard will lead to the disqualification of a response and may preclude a Respondent from doing future business with Transnet]*

9. We declare, to the extent that we are aware or become aware of any relationship between ourselves and Transnet [other than any existing and appropriate business relationship with Transnet] which could unfairly advantage our entity in the forthcoming adjudication process, we shall notify Transnet immediately in writing of such circumstances.

**BREACH OF LAW**

10. We further hereby certify that I/we **have/have not been** [delete as applicable] found guilty during the preceding 5 [five] years of a serious breach of law, including but not limited to a breach of the Competition Act, 89 of 1998, by a court of law, tribunal or other administrative body. The type of breach that the Respondent is required to disclose excludes relatively minor offences or misdemeanours, e.g. traffic offences. This includes the imposition of an administrative fine or penalty.

Where found guilty of such a serious breach, please disclose:

NATURE OF BREACH:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

DATE OF BREACH: \_\_\_\_\_

Furthermore, I/we acknowledge that Transnet SOC Ltd reserves the right to exclude any Respondent from the bidding process, should that person or entity have been found guilty of a serious breach of law, tribunal or regulatory obligation.

SIGNED at \_\_\_\_\_ on this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_

For and on behalf of _____ duly authorised hereto	AS WITNESS:
---	-------------

Name:	Name:
Position:	Position:
Signature:	Signature:
Date:	Registration No of Company/CC _____
Place:	Registration Name of Company/CC _____

**APPENDIX A, B and C: SIGNALS CABLES SPECIFICATION**

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## ANNEXURE G

### TECHNICAL COMPLIANCE SHEET FOR RME CPT 354/2015 SUPPLY AND DELIVERY OF SIGNALS CABLES

The compliance response is to contain ONLY the following statements, **“Comply”**, or **“Do not comply”**.

Noted is to be applied against statements and either of the other responses for all other clauses. Where either “Partial Compliance” is inserted, remarks as to the reason for the deviation from the requirement is required

<b>Main Specification: CSE-1164-002-0.71mm 20C PVC Grey Spoor Cable. APPENDIX A.</b>			
Item	Specification Clause No.	Compliance Response	Explanation / Deviation / Reason
1	Clause 1		
2	Clause 2		
3	Clause 3		
4	Clause 4		
5	Clause 5		
6	Clause 6		
7	Clause 7		
8	Clause 8		

<b>Main Specification: CSE-1164-002-0.9mm 10C PVC Grey Spoor Cable. APPENDIX B.</b>			
Item	Specification Clause No.	Compliance Response	Explanation / Deviation / Reason
1	Clause 1		



2	Clause 2		
3	Clause 3		
4	Clause 4		
5	Clause 5		
6	Clause 6		
7	Clause 7		
8	Clause 8		

**Main Specification: CSE-1164-002-0.71mm PVC Grey  
Single Core Spool Cable. APPENDIX C.**

Item	Specification Clause No.	Compliance Response	Explanation / Deviation / Reason
1	Clause 1		
2	Clause 2.1		
3	Clause 2.3		
4	Clause 3		
5	Clause 4		
6	Clause 6		
7	Clause 7		
8	Clause 8		

**Respondent's Signature  
Stamp**

**Date & Company**

SPOORNET

A Division of Transnet Limited

INFRASTRUCTURE (SIGNALS)

SPECIFICATION

FOR

"PREVIEW COPY ONLY"

<p>PVC INSULATED MULTI- CORE INDOOR CABLES</p>
--

Drawn up by : Sen. Eng. Tech. (R&D) H.J. Fourie .....

Checked by : Senior Engineer (R&D) B.M. Steyn .....

Authorised by : Senior Manager (R&D) G. Paverd .....

<p>© This document as a whole is protected by copyright. The information contained herein is the sole property of Transnet Limited. It may not be used, disclosed or reproduced in part or in whole in any manner whatsoever, except with the written permission of and in a manner permitted by the proprietors.</p>	<p>Total No. of pages</p> <p style="font-size: 1.2em;">10</p>
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1.0. Scope:

This specification covers the requirements for indoor railway signalling cables for use in the Republic of South Africa

1.1 Classification:

The specification covers 300/500 and 600/1 000 volt PVC insulated cables, with extruded bedded PVC sheathing of multicore construction with copper conductors and are used as set out in guideline CSE-1133-105.

2.0. Applicable documents:

Except where specifically called for otherwise in this specification, the cables shall comply with all the relevant requirements of the latest issue of the specifications listed here, and inclusive of all official amendments issued by the SABS Cable Committee, current at the time of tendering.

2.1. SABS 1507: Standard specification for Electric cables with extruded solid dielectric insulation for fixed installations (300/500V to 1 900/ 3 3000V)

2.2. Other applicable Standard:

2.2.1. SABS 1411: Materials of insulated electrical cable and flexible cords.:

Part I: Conductors

2.2.2. SABS 1411: Materials of insulated electrical cables and flexible cords.:

Part II: Polyvinylchloride (PVC)

2.3. References:

2.3.1. Guidelines for the use of cables in signalling installations: CSE-1133-105  
Category N98.

3.0. Requirements:

Both the outer sheath and the bedding must be impenetrable to moisture. Individual cables shall conform to all the requirements as set out in the relevant tables of SABS 1507 and with the specific requirements of clause 4.5 of SABS 1507 unless stated otherwise in this specification.

3.1. Cable construction:

3.1.1. Conductors:

The conductor(s) shall consist of stranded or solid, circular shaped, uncompacted, annealed copper wires. Solid conductors shall be constructed in accordance with SABS 1411 Part I. Use SABS 1507 Table 6 for standard solid conductor sizes from 0,5 mm diameter to 1,6 mm diameter and Table 8 or Table 6 for standard stranded conductor

sizes from 0,196 mm<sup>2</sup> to 1200,00 mm<sup>2</sup> .

The stranded conductor shall conform to the requirements of Class 2 Conductors as in SABS 1411 Part I.

### 3.1.2. Dielectric:

The D2 PVC dielectric, as set out in SABS 1411 Part II, must be used and the nominal thickness and isolation resistance of the dielectric shall comply with the relevant requirements of Table 8 of SABS 1507 for stranded conductors with sizes ranging from 1,00 mm<sup>2</sup> to 1200,00 mm<sup>2</sup>. For stranded conductors with sizes ranging from 0,196 mm<sup>2</sup> to 1,00 mm<sup>2</sup> Table 6 of SABS 1507 must be used. Table 6 of SABS 1507 must also be used for all cables with solid conductors with sizes from 0,5 mm diameter to 1,6 mm diameter. Where the conductor cross-sectional area lies between two stranded values as specified in Table 6 of SABS 1507 the larger of the two values must be used. When Table 8 is used the larger of the two values for the 300/500 voltage or 600/1000 voltage range must be used.

### 3.1.3. Core:

Each core of a multicore cable shall have substantially the same profile and the cable shall have no crossed cores. The cores shall be identified by colour and position.

The dielectric of multicore cables shall be colour coded sequentially in accordance with the following international ten colour code:

Brown, Red, Orange, Yellow, Green, Blue, Violet, Grey, White and Black.

The sequence shall commence at the centre with brown, and shall continue uninterruptedly from layer to layer, with consistent rotational direction.

Where there are more than one brown core per layer, the first one in sequence shall have a marker band (not less than 1 mm wide) of a distinctive colour (preferably WHITE) which completely encircles the core at intervals of no more than 25mm.

Alternatively, the marker shall be identified by a longitudinal stripe (preferably WHITE).

NB: In the case of 64-core cables, the colour code shall exclude WHITE and BLACK (i.e. an eight colour code is required), but shall in all other respects comply with the above.

#### 3.1.3.1. Multilayer core assemblies:

Circulation Restriction : Transnet and relevant third parties.

In Multilayer core assemblies the direction of lay of consecutive layers shall be alternate, and the lay length factors shall strictly conform to the following:

In the case of left-hand and right-hand lay, the lay length factor for a circular core with respect to the pitch circle diameter shall not exceed the appropriate of the following values:

Two-core, circular conductor cables .....	30
Multi-core, circular cables.....	25

There shall be no turned cores in the assembly of shaped conductor cores.

3.2. Assembly

3.2.1. Fillers and dummy cores:

If fillers and/or dummy cores are used in the core assembly they shall be made of PVC type D2. Dummy cores shall be black, and placed immediately preceding the reference core.

3.3. Bedding:

Bedding shall comply with SABS 1507 clause 3.2.5.2. The bedding must be of PVC, type B.

3.4. Core assembly types:

Core assembly types shall be in accordance with clause 3.2.5.1. of SABS 1507.

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The application of PVC, polypropylene, tape over the laid-up cores or between the core layers shall be optional. The thickness of any core assembly tape shall be ignored in deriving nett calculated diameters.

3.5. Outer sheathing:

All multicore cables shall have applied overall a sheath of PVC, type S2 of S5, dielectric and coloured as stated in section 8 of this specification. The sheath shall comply with clause 3.2.5.4. of SABS 1507 and the dimension requirements of Table 12 of SABS 1507.

4.0. Qualification:

4.1. Differentiating requirements:

All test shall be performed according to SABS 1507 clause 6. Tests shall be carried out by an independent organisation approved by Infrastructure (Signals) Spoonnet. If this is not possible, the manufacturer shall submit a certified copy of all the relevant tests carried out, as well as the name of the independent organisation by whom the tests were performed, for approval by this office.

4.2. Test methods:

Tests shall be carried out in accordance with SABS 1507 clauses 6.3, 6.4, 6.7, 6.8, 6.9, 6.10, 6.11 and 6.12.

5.0. Quality assurance provisions:

## 5.1. Responsibility for inspection:

A Spoomet Quality assurance officer shall be responsible for the inspection of the final product as delivered by the manufacturer.

6.0. Preparation for delivery:

## 6.1. Marketing of cables:

Locally manufactured cables shall bear the SABS mark. Imported cables not bearing the SABS mark, require batch certification for each tender by any independent organisation, approved by Spoomet, for compliance to SABS 1507. Any costs shall be for the suppliers account. Where batch certification is used, the name of the proposed independent organisation shall be specified for approval by this office (see paragraph 4).

The cables shall be marked in accordance with the requirements of SABS 1507, together with the year of manufacture and the legend "Spoomet", except that in the case the manufacturer not holding a permit to apply the SABS mark, the cable shall not be marked SABS 1507. Such markings shall be legibly and indelibly applied as follows:

As required for 600/1 000 volt single-core cables, tape applied to the sheath or to a tape of PVC type D2, polypropylene terephthalate or other acceptable material incorporated in the cable. The marking on multicore cable shall include the appropriate cable identification i.e. 12-core, 21-core etc. on the outer sheath. To determine the remaining length of cable on partly used drums of cable, the cable shall be marked numerically on the outer sheath at one metre intervals, starting with "1", "2", "3", "4", etc. on the inner winding of the cable on the drum and finishing with the total length of the cable on the also outer winding on the drum.

The marking of the cable on the drum shall be done by means of:

- (i) indenting the numerals on the sheath
- (ii) a thermic process
- (iii) indelible colour markings

In the case of a manufacturer not holding a permit to apply the SABS mark, the cable shall not be marked SABS 1507.

## 6.2. Packing

All cables shall be supplied on drums, the periphery of which shall be closed for transport from the manufacturer's works. Both ends of all cables having 3 or more cores shall be marked with a band of coloured, durable, self-adhesive, plastic tape. The tape colour shall be red at the end where the core counting sequence described in clause 3.1 of this specification is in a clockwise direction and green for the anti-clockwise direction.



6.3. Marking of drums:

Where batch certification is used (see clause 6.1.1. of this specification) the drums shall be numbered numerically, starting from one for each individual tender. The numbers of the drums for batch certification shall appear on the certificate issued by the independent organisation.

The gross kilogram mass of the cable and the drum shall be clearly and separately marked on the outside of the drum.

6.4. Lengths:

The cables shall be supplied in the following standard lengths:

300 ± 30 m drums

The length of the last drum of each item of every order shall be adjusted to ensure that the total length supplied is as specified on the order.

7.0. Notes:

7.1. Compliance:

Tenders shall submit a clause by clause statement of compliance with every quotation. Where the cable offered differs from the requirements of this specification, the relevant information must be given in a covering letter. If the tenderer is not the manufacturer of the cable offered, the full identity of the manufacturer must be disclosed. Failure to comply with these requirements will render quotations invalid.

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8.0. Information supplied by customer:

8.1. The conductors must be tinned ~~Yes~~ \ No

8.2. The conductor diameter ..... 0.71..... mm.

~~TABLE 6~~ (See Appendix A)  
~~SABS 1507~~

8.3. Insulation thickness ..... 0.45 - 0.55.....mm.

~~TABLE 6~~ (See Appendix A)  
~~SABS 1507~~

8.4. Number of cores in the cable ..... 20..... cores

8.5. Total length of cable ..... 3900..... m

8.6. Length of cable per roll/drum.....m/drum

8.7. Conductor Solid / ~~Stranded~~

8.8. Insulation voltage 300/500 or 600 / ~~300/500~~

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SPECIFICATION CSE-1164-002

CATEGORY X47

8.9. Colour of sheath

*GARY*.....

Office of the Chief Engineer  
(Signals)(Infrastructure)  
Johannesburg

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(SABS 1507)  
TABLE 6 - REQUIREMENTS FOR SINGLE-CORE UNSHEATHED PANEL/CUBICLE CABLES (300/500 v)

Type of cable	Conduct or size, mm <sup>2</sup>	Diameter of wire(s) in conductor, mm	Approximate diameter of conductor, mm	Thickness of insulation, mm		Conductor resistance at 20 °C Ω/km, max.	Insulation resistance per km at 23 °C or per 7 m at 60 °C, MΩ, min.		
				Normal	Min		D1	HFD1	HFD2
Non - flexible	Calculate d	Normal							
	0,196	0,5	0,50	0,40	89,6	10	100	10	10
	0,312	0,63	0,53	0,40	56,4	10	100	10	10
	0,396	0,71	0,71	0,45	44,4	10	100	10	10
	0,504	0,8	0,8	0,45	35,0	10	100	10	10
	0,636	0,9	0,9	0,45	27,6	10	100	10	10
	0,785	1,0	1,0	0,45	22,4	10	100	10	10
	0,985	1,12	1,12	0,45	17,9	10	100	10	10
	1,227	1,25	1,25	0,45	14,3	10	100	10	10
	1,539	1,40	1,40	0,45	11,4	10	100	10	10
2,011	1,60	1,60	0,45	8,75	10	100	10	10	
Flexible	Normal	Maximum							
	0,5	0,31	0,93	0,5	35,9	10	100	10	10
	0,75	0,31	1,14	0,5	23,9	10	100	10	10
	1,0	0,31	1,32	0,5	17,9	10	100	10	10
	1,5	0,31	1,57	0,5	11,9	10	100	10	10
D2-D6									

## Appendix A

(SABS 1507)  
TABLE 8 - THICKNESS AND INSULATION RESISTANCE OF  
PVC INSULATION OF TYPES D1, D2, D3, D4, D5 AND D6

Conductor size mm <sup>2</sup>	Voltage rating												
	300/500 V			600/1 000 V			1 900/3 300 V						
	Thickness of insulation, mm	Insulation resistance per km at 23 °C, MΩ, min.	Thickness of insulation, mm	Thickness of insulation, mm	Insulation resistance per km at 23 °C, MΩ, min.	Thickness of insulation, mm	Thickness of insulation, mm	Insulation resistance per km at 23 °C, MΩ, min.	Thickness of insulation, mm	Thickness of insulation, mm	Insulation resistance per km at 23 °C, MΩ, min.	Thickness of insulation, mm	Insulation resistance per km at 23 °C, MΩ, min.
1,0	0,6	0,44	0,8	0,62	20	0,8	0,62	0,8	0,62	25	-	-	-
1,5	0,7	0,53	0,8	0,62	22	0,8	0,62	0,8	0,62	24	-	-	-
2,5	0,8	0,62	0,8	0,62	20	0,8	0,62	0,8	0,62	20	-	-	-
4,0	0,8	0,62	1,0	0,8	16	1,0	0,8	1,0	0,8	19	-	-	-
6,0	0,8	0,62	1,0	0,8	14	1,0	0,8	1,0	0,8	17	-	-	-
10,0	0,9	0,71	1,0	0,8	12	1,0	0,8	1,0	0,8	14	2,2	1,88	25
16,0	0,9	0,71	1,0	0,8	10	1,0	0,8	1,0	0,8	11	2,2	1,88	21
25,0	-	-	1,2	0,98	11	1,2	0,98	1,2	0,98	11	2,2	1,88	18
35,0	-	-	1,4	0,98	9	1,4	0,98	1,4	0,98	9	2,2	1,88	16
50,0	-	-	1,4	1,16	9	1,4	1,16	1,4	1,16	8	2,2	1,88	14
70,0	-	-	1,4	1,16	8	1,4	1,16	1,4	1,16	8	2,2	1,88	12
95,0	-	-	1,6	1,34	8	1,6	1,34	1,6	1,34	8	2,2	1,88	10
120,0	-	-	1,6	1,34	7	1,6	1,34	1,6	1,34	7	2,2	1,88	9
150,0	-	-	1,8	1,52	7	1,8	1,52	1,8	1,52	7	2,2	1,88	8
185,0	-	-	2,0	1,70	7	2,0	1,70	2,0	1,70	7	2,2	1,88	8
240,0	-	-	2,2	1,88	7	2,2	1,88	2,2	1,88	7	2,2	1,88	7
280,0	-	-	2,3	1,97	7	2,3	1,97	2,3	1,97	7	2,3	1,97	7
300,0	-	-	2,4	2,06	7	2,4	2,06	2,4	2,06	7	2,4	2,06	7
380,0	-	-	2,5	2,15	6	2,5	2,15	2,5	2,15	6	2,5	2,15	6
400,0	-	-	2,6	2,24	6	2,6	2,24	2,6	2,24	6	2,6	2,24	6
480,0	-	-	2,7	2,33	6	2,7	2,33	2,7	2,33	6	2,7	2,33	6
500,0	-	-	2,8	2,42	6	2,8	2,42	2,8	2,42	6	2,8	2,42	6
600,0	-	-	2,8	2,42	5	2,8	2,42	2,8	2,42	5	2,8	2,42	5
630,0	-	-	2,8	2,42	5	2,8	2,42	2,8	2,42	5	2,8	2,42	5
740,0	-	-	2,8	2,42	5	2,8	2,42	2,8	2,42	5	2,8	2,42	5
800,0	-	-	2,8	2,42	5	2,8	2,42	2,8	2,42	5	2,8	2,42	5
960,0	-	-	2,9	2,51	4	2,9	2,51	2,9	2,51	4	2,9	2,51	4
1 000,0	-	-	3,0	2,6	4	3,0	2,6	3,0	2,6	4	3,0	2,6	4
1 200,0	-	-	3,2	2,78	4	3,2	2,78	3,2	2,78	4	3,2	2,78	4

SPOORNET

A Division of Transnet Limited

INFRASTRUCTURE (SIGNALS)

SPECIFICATION

FOR

"PREVIEW COPY ONLY"

PVC INSULATED MULTI-CORE INDOOR CABLES

Drawn up by : Sen. Eng. Tech. (R&D) H.J. Fourie .....

Checked by : Senior Engineer (R&D) B.M. Steyn .....

Authorised by : Senior Manager (R&D) G. Paverd .....

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1.0. Scope:

This specification covers the requirements for indoor railway signalling cables for use in the Republic of South Africa

1.1 Classification:

The specification covers 300/500 and 600/1 000 volt PVC insulated cables, with extruded bedded PVC sheathing of multicore construction with copper conductors and are used as set out in guideline CSE-1133-105.

2.0. Applicable documents:

Except where specifically called for otherwise in this specification, the cables shall comply with all the relevant requirements of the latest issue of the specifications listed here, and inclusive of all official amendments issued by the SABS Cable Committee, current at the time of tendering.

2.1. SABS 1507: Standard specification for Electric cables with extruded solid dielectric insulation for fixed installations (300/500V to 1 900/ 3 3000V)

2.2. Other applicable Standard:

2.2.1. SABS 1411: Materials of insulated electrical cable and flexible cords.:

Part I: Conductors

2.2.2. SABS 1411: Materials of insulated electrical cables and flexible cords.:

Part II: Polyvinylchloride (PVC)

2.3. References:

2.3.1. Guidelines for the use of cables in signalling installations: CSE-1133-105  
Category N98.

3.0. Requirements:

Both the outer sheath and the bedding must be impenetrable to moisture. Individual cables shall conform to all the requirements as set out in the relevant tables of SABS 1507 and with the specific requirements of clause 4.5 of SABS 1507 unless stated otherwise in this specification.

3.1. Cable construction:

3.1.1. Conductors:

The conductor(s) shall consist of stranded or solid, circular shaped, uncompacted, annealed copper wires. Solid conductors shall be constructed in accordance with SABS 1411 Part I. Use SABS 1507 Table 6 for standard solid conductor sizes from 0,5 mm diameter to 1,6 mm diameter and Table 8 or Table 6 for standard stranded conductor



sizes from 0,196 mm<sup>2</sup> to 1200,00 mm<sup>2</sup> .

The stranded conductor shall conform to the requirements of Class 2 Conductors as in SABS 1411 Part I.

3.1.2. Dielectric:

The D2 PVC dielectric, as set out in SABS 1411 Part II, must be used and the nominal thickness and isolation resistance of the dielectric shall comply with the relevant requirements of Table 8 of SABS 1507 for stranded conductors with sizes ranging from 1,00 mm<sup>2</sup> to 1200,00 mm<sup>2</sup> . For stranded conductors with sizes ranging from 0,196 mm<sup>2</sup> to 1,00 mm<sup>2</sup> Table 6 of SABS 1507 must be used. Table 6 of SABS 1507 must also be used for all cables with solid conductors with sizes from 0,5 mm diameter to 1,6 mm diameter. Where the conductor cross-sectional area lies between two stranded values as specified in Table 6 of SABS 1507 the larger of the two values must be used. When Table 8 is used the larger of the two values for the 300/500 voltage or 600/1000 voltage range must be used.

3.1.3. Core:

Each core of a multicore cable shall have substantially the same profile and the cable shall have no crossed cores. The cores shall be identified by colour and position.

The dielectric of multicore cables shall be colour coded sequentially in accordance with the following international ten colour code:

Brown, Red, Orange, Yellow, Green, Blue, Violet, Grey, White and Black.

The sequence shall commence at the centre with brown, and shall continue uninterruptedly from layer to layer, with consistent rotational direction.

Where there are more than one brown core per layer, the first one in sequence shall have a marker band (not less than 1 mm wide) of a distinctive colour (preferably WHITE) which completely encircles the core at intervals of no more than 25mm.

Alternatively, the marker shall be identified by a longitudinal stripe (preferably WHITE).

NB: In the case of 64-core cables, the colour code shall exclude WHITE and BLACK (i.e. an eight colour code is required), but shall in all other respects comply with the above.

3.1.3.1. Multilayer core assemblies:

In Multilayer core assemblies the direction of lay of consecutive layers shall be alternate, and the lay length factors shall strictly conform to the following:

In the case of left-hand and right-hand lay, the lay length factor for a circular core with respect to the pitch circle diameter shall not exceed the appropriate of the following values:

- Two-core, circular conductor cables .....30
- Multi-core, circular cables.....25

There shall be no turned cores in the assembly of shaped conductor cores.

3.2. Assembly

3.2.1. Fillers and dummy cores:

- I- fillers and/or dummy cores are used in the core assembly they shall be made of PVC type D2.
- Dummy cores shall be black, and placed immediately preceding the reference core.

3.3. Bedding:

Bedding shall comply with clause 3.2.5.2. The bedding must be of PVC, type B.

3.4. Core assembly types:

Core assembly types shall be in accordance with clause 3.2.5.1. of SABS 1507.

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The application of PVC, polypropylene, tape over the laid-up core or between the core layers shall be optional. The thickness of any core assembly tape shall be ignored in deriving nett calculated diameters.

3.5. Outer sheathing:

All multicore cables shall have applied overall a sheath of PVC, type S2 of S5, dielectric and coloured as stated in section 8 of this specification. The sheath shall comply with clause 3.2.5.4. of SABS 1507 and the dimension requirements of Table 12 of SABS 1507.

4.0. Qualification:

4.1. Differentiating requirements:

All test shall be performed according to SABS 1507 clause 6. Tests shall be carried out by an independent organisation approved by Infrastructure (Signals) Spoomet. If this is not possible, the manufacturer shall submit a certified copy of all the relevant tests carried out, as well as the name of the independent organisation by whom the tests were performed, for approval by this office.

4.2. Test methods:

Tests shall be carried out in accordance with SABS 1507 clauses 6.3, 6.4, 6.7, 6.8, 6.9, 6.10, 6.11 and 6.12.

5.0. Quality assurance provisions:

5.1. Responsibility for inspection:

A Spoornet Quality assurance officer shall be responsible for the inspection of the final product as delivered by the manufacturer.

6.0. Preparation for delivery:

6.1. Marketing of cables:

Locally manufactured cables shall bear the SABS mark. Imported cables not bearing the SABS mark, require batch certification for each tender by any independent organisation, approved by Spoornet, for compliance to SABS 1507. Any costs shall be for the suppliers account. Where batch certification is used, the name of the proposed independent organisation shall be specified for approval by this office (see paragraph 4).

The cables shall be marked in accordance with the requirements of SABS 1507, together with the year of manufacture and the legend "Spoornet", except that in the case the manufacturer not holding a permit to apply the SABS mark, the cable shall not be marked SABS 1507. Such markings shall be legibly and indelibly applied as follows:

As required for 600/1 000 volt single-core cables, to be applied to the sheath or to a tape of PVC type D2, polypropylene terephthalate or other acceptable material incorporated in the cable. The marking on multicore cable shall include the appropriate cable identification, i.e., 2-core, 21-core etc. on the outer sheath. To determine the remaining length of cable on partly used drums of cable, the cable shall be marked numerically on the outer sheath at one metre intervals, starting with "1", "2", "3", "4", etc. on the inner winding of the cable on the drum and finishing with the total length of the cable on the also outer winding on the drum.

The marking of the cable on the drum shall be done by means of:

- (i) indenting the numerals on the sheath
- (ii) a thermic process
- (iii) indelible colour markings

In the case of a manufacturer not holding a permit to apply the SABS mark, the cable shall not be marked SABS 1507.

6.2. Packing

All cables shall be supplied on drums, the periphery of which shall be closed for transport from the manufacturer's works. Both ends of all cables having 3 or more cores shall be marked with a band of coloured, durable, self-adhesive, plastic tape. The tape colour shall be red at the end where the core counting sequence described in clause 3.1 of this specification is in a clockwise direction and green for the anti-clockwise direction.

12 March 1997

CATEGORY X47

## 6.3. Marking of drums:

Where batch certification is used (see clause 6.1.1. of this specification) the drums shall be numbered numerically, starting from one for each individual tender. The numbers of the drums for batch certification shall appear on the certificate issued by the independent organisation.

The gross kilogram mass of the cable and the drum shall be clearly and separately marked on the outside of the drum.

## 6.4. Lengths:

The cables shall be supplied in the following standard lengths:

300 ± 30 m drums

The length of the last drum of each item of every order shall be adjusted to ensure that the total length supplied is as specified on the order.

## 7.0. Notes:

## 7.1. Compliance:

Tenders shall submit a clause by clause statement of compliance with every quotation. Where the cable offered differs from the requirements of this specification, the relevant information must be given in a covering letter. If the tenderer is not the manufacturer of the cable offered, the full identity of the manufacturer must be disclosed. Failure to comply with these requirements will render quotations invalid.

## 8.0. Information supplied by customer:

8.1. The conductors must be tinned ~~Yes~~ \ No         

8.2. The conductor diameter 0.9..... mm.

TABLE 6 (See Appendix A)  
SAB 5 1507

8.3. Insulation thickness 0.45 - 0.55 mm.

TABLE 6 (See Appendix A)  
SAB 5 1507

8.4. Number of cores in the cable ..... 10..... cores

8.5. Total length of cable ..... 400..... m

8.6. Length of cable per roll/drum..... 200.....m/drum

8.7. Conductor Solid / ~~Stranded~~

8.8. Insulation voltage 300/500 ~~300/500~~

Circulation Restriction : Transnet and relevant third parties.

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CATEGORY X47

8.9. Colour of sheath

*Grey*.....

Office of the Chief Engineer  
(Signals)(Infrastructure)  
Johannesburg

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(SABS 1507)  
TABLE 6 - REQUIREMENTS FOR SINGLE-CORE UNSHEATHED PANEL/CUBICLE CABLES (300/500 v)

Type of cable	Conduct or size, mm <sup>2</sup>	Diameter of wire(s) in conductor, mm	Approximate diameter of conductor, mm	Thickness of insulation, mm		Conductor resistance at 20 °C $\Omega$ /km, max.	Insulation resistance per km at 23 °C or per 7 m at 60 °C, M $\Omega$ , min.		
				Normal	Min		D1	HFD1	HFD2
Non - flexible	Calculate d	Normal							
	0,196	0,5	0,50	0,40	89,6	10	100	10	
	0,312	0,63	0,63	0,40	56,4	10	100	10	
	0,396	0,71	0,71	0,45	44,4	10	100	10	
	0,504	0,8	0,8	0,45	35,0	10	100	10	
	0,636	0,9	0,9	0,45	27,6	10	100	10	
	0,785	1,0	1,0	0,45	22,4	10	100	10	
	0,985	1,12	1,12	0,45	17,9	10	100	10	
	1,227	1,25	1,25	0,45	14,3	10	100	10	
	1,539	1,40	1,40	0,45	11,4	10	100	10	
	2,011	1,60	1,60	0,45	8,75	10	100	10	
Flexible	Normal	Maximum							
	0,5	0,31	0,93	0,5	35,9	10	100	10	
	0,75	0,31	1,14	0,5	23,3	10	100	10	
	1,0	0,31	1,32	0,5	17,8	10	100	10	
	1,5	0,31	1,67	0,5	11,9	10	100	10	

## Appendix A

(SABS 1507)  
TABLE 8 - THICKNESS AND INSULATION RESISTANCE OF  
PVC INSULATION OF TYPES D1, D2, D3, D4, D5 AND D6

Con- ductor size mm <sup>2</sup>	Voltage rating									
	300/500 V			600/1 000 V			1 900/3 300 V			Insulation resistance per km at 23 °C, MΩ, min.
	Thickness of insulation, mm	Insulation resistance per km at 23 °C, MΩ, min.	Thickness of insulation, mm	Insulation resistance per km at 23 °C, MΩ, min.	Thickness of insulation, mm	Insulation resistance per km at 23 °C, MΩ, min.	Thickness of insulation, mm	Insulation resistance per km at 23 °C, MΩ, min.	Thickness of insulation, mm	
	Nom.	Min.	Nom.	Min.	Nom.	Min.	Nom.	Min.	Nom.	Min.
1,0	0,6	0,44	0,8	0,62	0,8	0,62	20	25	-	-
1,5	0,7	0,53	0,8	0,62	0,8	0,62	22	24	-	-
2,5	0,8	0,62	0,8	0,62	0,8	0,62	20	20	-	-
4,0	0,8	0,62	1,0	0,8	1,0	0,8	16	19	-	-
6,0	0,8	0,62	1,0	0,8	1,0	0,8	14	17	-	-
10,0	0,9	0,71	1,0	0,8	1,0	0,8	12	14	2,2	1,88
16,0	0,9	0,71	1,0	0,8	1,0	0,8	11	11	2,2	1,88
25,0	-	-	1,2	0,98	1,2	0,98	11	11	2,2	1,88
35,0	-	-	1,4	0,98	1,4	0,98	9	9	2,2	1,88
50,0	-	-	1,4	1,00	1,4	1,00	9	9	2,2	1,88
70,0	-	-	1,4	1,16	1,4	1,16	8	8	2,2	1,88
95,0	-	-	1,6	1,34	1,6	1,34	8	8	2,2	1,88
120,0	-	-	1,6	1,34	1,6	1,34	7	7	2,2	1,88
150,0	-	-	1,8	1,52	1,8	1,52	7	7	2,2	1,88
185,0	-	-	2,0	1,70	2,0	1,70	7	7	2,2	1,88
240,0	-	-	2,2	1,88	2,2	1,88	7	7	2,2	1,88
280,0	-	-	2,3	1,97	2,3	1,97	7	7	2,3	1,97
300,0	-	-	2,4	2,06	2,4	2,06	7	7	2,4	2,06
380,0	-	-	2,5	2,15	2,5	2,15	6	6	2,5	2,15
400,0	-	-	2,6	2,24	2,6	2,24	6	6	2,6	2,24
480,0	-	-	2,7	2,33	2,7	2,33	6	6	2,7	2,33
500,0	-	-	2,8	2,42	2,8	2,42	6	6	2,8	2,42
600,0	-	-	2,8	2,42	2,8	2,42	5	5	2,8	2,42
630,0	-	-	2,8	2,42	2,8	2,42	5	5	2,8	2,42
740,0	-	-	2,8	2,42	2,8	2,42	5	5	2,8	2,42
800,0	-	-	2,8	2,42	2,8	2,42	5	5	2,8	2,42
960,0	-	-	2,9	2,51	2,9	2,51	4	4	2,9	2,51
1 000,0	-	-	3,0	2,6	3,0	2,6	4	4	3,0	2,6
1 200,0	-	-	3,2	2,78	3,2	2,78	4	4	3,2	2,78

**SPOORNET**

A Division of Transnet Limited

INFRASTRUCTURE (SIGNALS)

SPECIFICATION

FOR

**PVC INSULATED  
SINGLE CORE INDOOR  
CABLES**

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**Drawn up by** : **Sen. Eng. Tech. (R&D)** **H.J. Fourie** .....

**Checked by** : **Senior Engineer (R&D)** **B.M. Steyn** .....

**Authorised by** : **Senior Manager (R&D)** **G. Paverd** .....

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1.0. Scope:

This specification covers the requirements for indoor railway signalling cables for use in the Republic of South Africa.

1.1. Classification:

The specification covers 300/500 and 600/1 000 volt PVC insulated cables of single core construction with extruded bedded PVC isolation, with annealed copper conductors and are used as set out in guideline CSE-1133-105.

2.0. Applicable documents:

Except where specifically called for otherwise in this specification, the cables shall comply with all the relevant requirements of the latest issue of the specifications listed here, and inclusive of all official amendments issued by the SABS Cable Committee, current at the time of tendering.

2.1. SABS 1507: Standard specification for Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1900/3 300 V)

2.2. Other applicable Standards:

2.2.1. SABS 1411: Materials of insulated electrical cables and flexible cords:  
Part I: Conductors

2.2.2. SABS 1411: Materials of insulated electrical cables and flexible cords:  
Part II: Polyvinylchloride (PVC)

2.3 References:

2.3.1. Guidelines for the use of cables in signalling installations: CSE-1133-105  
Category N98

3.0. Requirements:

The dielectric must be impenetrable to moisture. Individual cables shall conform to all the requirements as set out in the relevant tables of SABS 1507 and with the specific requirements of clause 4.8 of SABS 1507 unless stated otherwise in this specification.

3.1. Cable construction:

3.1.1. Conductors:

The conductor shall consist of stranded or solid, circular shaped, uncompacted, annealed copper wires, constructed in accordance with SABS 1411 Part I.

The stranded conductor shall conform to the requirements of Class 4 conductors as specified in SABS 1411 Part I.

3.1.2. Dielectric:

D2 or D5 type PVC dielectric, as set out in SABS 1411 Part II, must be used. Where standard stranded conductors are used and the specified core cross sectional area (Section 8 of this specification) is less than 1mm, D5 PVC dielectric must be used and the nominal thickness and insulation resistance of the dielectric shall comply with the relevant requirements of Table 6 of SABS 1507. Where the standard stranded conductor cross sectional area is more than 1mm<sup>2</sup>, D2 PVC dielectric shall be used and comply with Table 8 of SABS 1507. If the conductor size lies between two standard values as specified in Table 6 of SABS 1507 or Table 8 of SABS 1507, the larger of the two values shall be used.

Where solid conductors are used and the specified core diameter (Section 8 of this specification) is less than 1mm, D5 PVC dielectric must be used and the nominal thickness and insulation resistance of the dielectric shall comply with the relevant requirements of Table 6 of SABS 1507. If the core diameter is more than 1 mm, D2 PVC dielectric shall be used and comply with Table 8 of SABS 1507.

Under special circumstances (e.g. unit wiring), the insulation thickness may be reduced to a minimum of 0,3mm, but the cable shall still comply with the requirements of Table 11 and 17 of SABS 1507. In cases like this an authorization number must be obtained from the Chief Engineer Signals.

3.1.3. Core:

The core of a cable shall have substantially the same profile. The core shall be identified by colour and the colour of the dielectric shall be as set out in section 8 of this specification.

4.0. Qualification:

4.1. Differentiating requirements:

All tests shall be performed according to SABS 1507 clause 6. Tests shall be carried out by an independent organisation approved by Infrastructure (Signals) Spoornet. If this is not possible, the manufacturer shall submit a certified copy of all the relevant tests carried out, as well as the name of the independent organisation by whom the tests were performed, for approval by this office.

4.2. Test methods:

Tests shall be carried out in accordance with SABS 1507 clauses 6.3, 6.4, 6.7, 6.8, 6.9, 6.10, 6.11 and 6.12.

5.0. Quality assurance provisions:

5.1. Responsibility for inspection:

A Spoornet Quality assurance officer shall be responsible for the inspection of the final product as

delivered by the manufacturer.

6.0. Preparation for delivery:

6.1. Marketing of cables:

Locally manufactured cables shall bear the SABS mark. Imported cables not bearing the SABS mark, require batch certification for each tender by any independent organisation, approved by Spoornet, For compliance to SABS 1507. Any costs shall be for the suppliers account. Where batch certification is used, the name of the proposed independent organisation shall be specified for approval by this office (see paragraph 4).

The cables shall be marked in accordance with the requirements of SABS 1507, together with the year of manufacture and the legend "Spoornet", except that in the case the manufacturer not holding a permit to apply the SABS mark, the cable shall not be marked SABS 1507. Such markings shall be legibly and indelibly applied to the coil or reel label.

6.2. Packing:

All cables shall be packed on reels or in rolls.

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6.3. Lengths:

The cables shall be supplied in the following standard lengths:

100m coils or 300m reels, as ordered (see paragraph 8)

7.0. Notes:

7.1. Compliance:

Tenderers shall submit a clause by clause statement of compliance with every quotation. Where the cable offered differs from the requirements of this specification, the relevant information must be given in a covering letter.

If the tenderer is not the manufacturer of the cable offered, the full identity of the manufacturer must be disclosed.

8.0 Information supplied by customer:

8.1. The conductors must be tinned

~~NO~~

8.2. The conductor diameter

0.7 mm

(see Appendix A)

(Min. Diameter = 0,5 mm)

8.3. Dielectric colour

GREY

8.4. Total length of cable

1500 m (300 M REELS)  
(300 kcr / 500 kcr)

8.5. Conductor

Solid / ~~stranded~~

8.6. Insulation thickness

0,45 TO 0,55 mm

(see Appendix A)

(Authorization number)

.....

Office of the Chief Engineer  
(Signals)(Infrastructure)  
Johannesburg

## 9.0 Appendix A

## (SABS 1507)

TABLE 6 - REQUIREMENTS FOR SINGLE-CORE UNSHEATHED PANEL/CUBICLE CABLES (300/500 v)

Type of cable	Conduct or size, mm <sup>2</sup>	Diameter of wire(s) in conductor, mm	Approximate diameter of conductor, mm	Thickness of insulation, mm		Conductor resistance at 20 °C Ω/km, max.	Insulation resistance per km at 23 °C or per 7 m at 60 °C, MΩ, min.		
				Normal	Min		D1	HFD1	HFD2
Non - flexible	<u>Calculated</u>	<u>Normal</u>							
		0,5	0,50	0,50	0,40	89,6	10	100	10
	0,196	0,63	0,63	0,50	0,40	56,4	10	100	10
	0,312	0,71	0,71	0,55	0,45	44,4	10	100	10
	0,396								
		0,8	0,8	0,55	0,45	35,0	10	100	10
	0,504	0,9	0,9	0,55	0,45	27,6	10	100	10
	0,636	1,0	1,0	0,55	0,45	22,4	10	100	10
	0,785								
		1,12	1,12	0,55	0,45	17,9	10	100	10
	0,985	1,25	1,25	0,55	0,45	14,3	10	100	10
	1,227	1,40	1,40	0,55	0,45	11,4	10	100	10
	1,539	1,60	1,60	0,55	0,45	8,75	10	100	10
	2,011								
							D2-D6		
Flexible	<u>Normal</u>	<u>Maximum</u>							
	0,5	0,31	0,93	0,6	0,5	35,9	10	100	10
	0,75	0,31	1,14	0,6	0,5	23,9	10	100	10
	1,0	0,31	1,32	0,6	0,5	17,9	10	100	10
	1,5	0,31	1,7	0,7	0,5	11,9	10	100	10

(SABS 1507)  
TABLE 8 - THICKNESS AND INSULATION RESISTANCE OF  
PVC INSULATION OF TYPES D1, D2, D3, D4, D5 AND D6

Con- ductor size mm <sup>2</sup>	Voltage rating								
	300/500 V			600/1 000 V			1 900/3 300 V		
	Thickness of insulation, mm		Insulation resistance per km at 23 °C, MΩ, min.	Thickness of insulation, mm		Insulation resistance per km at 23 °C, MΩ, min.	Thickness of insulation, mm		Insulation resistance per km at 23 °C, MΩ, min.
	N o m.	Min.		Nom.	Min.		Nom.	Min.	
1,0	0,	0,44	20	0,8	0,62	25	-	-	-
1,5	6	0,53	22	0,8	0,62	24	-	-	-
2,5	0,	0,62	20	0,8	0,62	20	-	-	-
7									
4,0	0,	0,62	16	1,0	0,8	19	-	-	-
6,0	8	0,62	14	1,0	0,8	17	-	-	-
10,0	0,	0,71	12	1,0	0,8	14	2,2	1,88	25
16,0	8	0,71	10	1,0	0,8	11	2,2	1,88	21
25,0	0,	-	-	1,2	0,98	11	2,2	1,88	18
35,0	8	-	-	1,2	0,98	9	2,2	1,88	16
50,0	0,	-	-	1,4	1,16	9	2,2	1,88	14
70,0	8	-	-	1,4	1,16	8	2,2	1,88	12
95,0	0,	-	-	1,6	1,34	8	2,2	1,88	10
120,0	9	-	-	1,6	1,34	7	2,2	1,88	9
150,0	-	-	-	1,8	1,52	7	2,2	1,88	8
185,0	-	-	-	2,0	1,70	7	2,2	1,88	8
240,0	-	-	-	2,2	1,88	7	2,2	1,88	7
280,0	-	-	-	2,3	1,97	7	2,3	1,97	7
300,0	-	-	-	2,4	2,06	7	2,4	2,06	7
380,0	-	-	-	2,5	2,15	6	2,5	2,15	6
400,0	-	-	-	2,6	2,24	6	2,6	2,24	6
480,0	-	-	-	2,7	2,33	6	2,7	2,33	6
500,0	-	-	-	2,8	2,42	6	2,8	2,42	6
600,0	-	-	-	2,8	2,42	5	2,8	2,42	5
630,0	-	-	-	2,8	2,42	5	2,8	2,42	5
740,0	-	-	-	2,8	2,42	5	2,8	2,42	5
800,0	-	-	-	2,8	2,42	5	2,8	2,42	5
960,0	-	-	-	2,9	2,51	4	2,9	2,51	4
1 000,0	-	-	-	3,0	2,6	4	3,0	2,6	4
1 200,0	-	-	-	3,2	2,78	4	3,2	2,78	4
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-