Eskom	Task Manual	Technology

Title: **Cable Testing – Control Plant**

240-46425213

Alternative Reference Number: <n/a>

Area of Applicability: **Engineering**

Next Review Date: **STABILISED**

COE Acceptance	DBOUS Acceptance
Archie Jaykaran	Amelia Mtshali
Middle Manager	Senior Manager: Power Delivery Engineering (DBOUS)
Date: 16 Jan 18	Date: 20/03/2018

This document is **STABILISED.** The technical content in this document is not expected to change because the document covers: *(Tick applicable motivation)*

1	A specific plant, project or solution	
2	A mature and stable technical area/technology	x
3	Established and accepted practices.	x

PCM Reference: **<xxxxxx>**
SCOT Study Committee Number/Name: **<Number or name>**

Eskom	Task Manual	Group Technology

Title: **CABLE TESTING – CONTROL PLANT**

Unique Identifier:	**240-46425213**
Part	**11 - Maintenance**
Area of Applicability:	**Distribution Engineering** **Transmission Engineering**
Documentation Type:	**Task Manual**
Revision:	**1**
Total Pages:	**17**
Next Review Date:	**September 2017**
Disclosure Classification:	**Controlled Disclosure**

Compiled by	Approved by
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Protection Specialist	**Protection and Automation Study Committee Chairperson**
Date: 25 May 2012	Date: 26 June 2012

Functional Responsibility (Dx)	Functional Responsibility (Tx)	Authorized by
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Date: 24 August 2012	Date: 4 September 2012	Date: 17 September 2012

Content

Foreword

This Task manual was compiled to document the procedure for **CABLE TESTING – CONTROL PLANT** to ensure that commissioning tasks are carried out in a safe manner. This document was compiled to comply with the OHSAct 85 of 1993 requirements.

Revision history

This revision cancels and replaces revision no 0 of document no. **DMN_420-46425213.**

Date	Rev.	Compiled By	Clause	Remarks
Sept 2012	1	P Gounder	2.1 4.3.2	Updated Normative references (late comments- acronyms used in the document but documents not listed in the normative reference section) Reconstructed the clause (late comments)
July 2012	0	P Gounder	Clause no.	First issue published as 240-46425213

Acceptance

This document has been seen and accepted by:	
Name	**Designation**
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C Smith	Manager Design Base (Maintenance)
G Topham	Protection and Automation Study Committee Chairperson
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Development team

This Task manual was developed by:

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Introduction

This Task manual was compiled from the analysis that was done on critical tasks that are being performed when carrying out Cable Testing to identify risks and hazards attached so that they could be addressed or remedied. This is done to prevent/avoid damage on equipment or injuries to staff.

Keywords

Risk Assessment, Requirements, Preplanning, Spares, Materials, Tools, Equipment, Personal, Protective, Safety, Preparation, Execution, Task, Completion, Documents and Cable,

Bibliography

Manufactures specifications

1 Scope

1.1 Purpose

The purpose of this document is to standardize the commissioning steps and ensure safe working when testing control Plant Cables.

1.2 Applicability

This document shall apply throughout Eskom Distribution EDFS TSS and the contractors employed to test control Plant Cables.

1.3 Roles and Responsibilities

a) The designated person or his delegate shall ensure that this procedure is implemented and adhered to. The authorised / responsible person is responsible for the safe execution of all work and activities as set out in this procedure.

b) Only people authorized for activities in this task manual shall perform those duties.

2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed below:

2.1 Normative

NOTE 1: When issuing an enquiry based on this specification, it should be stated in the enquiry that the editions of the normative references that are current at the *date of issue* of the enquiry shall apply, unless otherwise agreed with Eskom. However in special cases, the responsible engineer may rule that the editions of one or more normative references applicable at the effective date of the Eskom specification shall apply.

South African national document(s)

Document number	Document title	Preparer/author	Revision or date of issue
OHS Act No. 85	Occupational health and safety act and regulations	-	1993
NRS 082	Recommended maintenance policy for electricity networks	Eskom	Latest

Eskom national document(s)

Document number	Document title	Preparer/author	Revision or date of issue
EPC_32-93	Vehicle and driver safety management	Eskom	0
EPC_32-846	Operating regulations for high voltage systems	Eskom	0

Eskom divisional document(s)

Document number	Document title	Preparer/author	Revision or date of issue
DGL_34-256	Scheduling of driving activities	Eskom	1
DMN_34-2208	Access to work sites	Eskom	0
DST_34-1146	Risk of trip assessment	Eskom	1
DPC_34-380	Identifying, analyzing, documenting and observing tasks according to criticality	Eskom	0
DMN_34-101	Usage Of Extension, Single,"A" Frame Ladders Or Two Step Platform.	Eskom	1
DST_34-1245	Substation Earthing	Eskom	0
DST_34-669	Distribution Standard For The Maintenance Of Protection Equipment	Eskom	1

Other document(s)

Manufacturers manuals

2.2 Informative references

Document number	Document title	Preparer/author	Revision or date of issue
32-9	Definition of Eskom documents	Eskom Document Centre	Latest

Document number	Document title	Preparer/author	Revision or date of issue
32-644	Eskom documentation management standard	Eskom Document Centre	Latest
474-65	Operating manual of the Steering Committee of Technologies (SCOT)	Vinod Singh	Latest
DST_34-1710	Provision and use of personal protective equipment	Eskom	0
DPL_32-727	Safety, health, environment, and quality (SHEQ) policy	Eskom	0
DPC_34-227	Pre-task planning and feedback process	Eskom	0
DST_34-1005	Environmental management policy	Eskom	0
DPC_34-925	Procedure for refusal to work on the grounds of health, safety and environmental concerns	Eskom	0
DST_34-4	Procedure for the Preparation and Administration of Distribution Standards	Eskom	3

3 Definitions and abbreviations

3.1 Definitions

a) Control Plant: Protection, Metering, DC & Tele-control equipment (previously known as Secondary Plant).

b) Power Plant: This is Power Plant, which is connected to the Control Plant, via electrical cabling. (e.g. Transformer and NECRT MIB's, Circuit Breaker mechanism boxes, Isolator mechanism boxes and so on.

c) Control Panel; panel panel on which control switches and other equipment are mounted for controlling the operation of the apparatus

d) Control Plant Cabling: Multi core, armoured cabling, rated at a voltage less than 1000 V ac / dc.

3.2 Abbreviations

EDFS Electricity Delivery Field Services

TSS Technical Specialist Section

PPE Personal Protective Equipment

SS-TSS: Senior Supervisor

NMC Network management centre

OTDR Optical Time Domain Reflectometer

RTC	Request to commission
MIB	Marshalling Interface Box
NECRT	Neutral electo-magnetic coupler (NEC) with neutral earthing resistor (NER) and auxiliary transformer.
FAS	Fall Arrest System

4 Requirements

4.1 Roles and Responsibilities

The designated person or his delegate shall ensure that this procedure is implemented, adhered to and the observation for this task shall be in accordance to the observation form in Annexure B.

The designated person shall also ensure that the authorised / responsible person who is responsible for the safe execution of all work and activities as set out in this procedure shall be authorised in terms of DPC_32-846.

4.2 Pre-planning

a) Do an assessment to determine the resources that would be required (people, PPE, applicable manuals, equipment, relay settings information, drawings, etc.) as per DPC_34-227.

b) Ensure that where long distances are travelled when going to work site preparations are done and guidelines given in DGL_34-256 and EPC_32-93 are observed.

c) Plan work and resources.

d) Check weather conditions.

e) Check plant application drawings.

4.2.1 Spares and Materials

a) Cable ties;

b) Cable number;

c) Ferrules numbers;

d) Bare copper wire (shorting core during insulation / continuity testing)

e) Lugs; and

f) Various Terminals;

4.2.2 Tools and equipment

a) Insulation tester;

b) Standard set of tools; and

c) Multimeter.

4.2.3 Personal protective equipment

All personal protective equipment shall be in accordance with DST_34-1710 and PPE identified from Risk assessment (DPC_34-227) performed.

4.3 Task Execution

4.3.1 Safety and Preparation

NOTE 1: Ensure that when preparing for driving to site hot spot like hijacking or accident areas are also identified.

a) Obtain work permit, perform risks assessment prior to the commencement of work and ensure that permit and workers register are complied with.

b) Ensure that when visiting the work site the general inspection is done as per DMN_34-2208 (Access to Work Site).

c) Ensure that the plant/equipment is safe to work on or open, isolated and earthed in accordance with EPC_32-846 where required.

d) Ensure that the necessary barricading is in place.

e) Sign the work permit

f) Use a Ladder as per DMN_34-101 - if the work to be carried out is above 2m from the ground use FAS

4.3.2 Testing

NOTE 1: Where vandalism is occurring, all cables / cable trench cover must be checked for damages.

a) Using cable schedule / cable block diagrams to ensure that the cables are in accordance with this (number of cores, wire size, ferruling / lugging etc.).

b) Ensure that all cores are lugged, ferruled and crimped properly.

NOTE 2: There must not be any insulation breakdown between cores, or between any core and earth. If such insulation breakdown or open circuit is detected a non-conformance must be logged with the manufacturer.

c) Test all cable cores with an insulation tester at a voltage of 500V between cores and to earth by:

- Connecting all cable cores together at one end (near end) and to earth.
- Ensuring that the cores are isolated from each other at the other end (far end)
- Applying the test voltage between the cores to be tested and earth (at far end) to ensure continuity of that core.
- Disconnect the cores at the near end for identification and insulation testing.

d) Repeat the above steps to check all the cables.

e) Record the insulation resistance value (The secondary to earth insulation resistance must not be less than 20 MΩ.

NOTE 3: These values are not official standards but approximate values based on experience.

NOTE 4: Control cables shall not be joined and if cables are damaged a new length of cable free of joints must be installed.

f) Report all the defects to the relevant departments

g) Record proof of continuity or any insulation breakdown

NOTE 5: Inform the cable contractor and the project manager that the cable must be replaced due to the insulation failure between cores.

h) Ensure that tested core is marked or held separate at both ends.

i) Remove test voltage

j) Discharge all cores to earth.

k) Reconnect the cable that was just tested to the terminal strip.

NOTE 6: Ensure that all unused / spare cores are ring lugged, bolted together, labeled according to the cable number and earthed,

NOTE 7: Spare cores must be earthed at source of electrical potential side only DST34-1245 ie. Spare cores between control plant equipment and the power plant equipment must be earthed at the power plant equipment.

NOTE 8: All spare cores must be able to reach the furthermost termination point in the particular cubicles / panels on both ends, and must be shown on the drawings.

4.3.3 Task Completion

NOTE 1: Completing relevant documentation on completion of work and / or submitting the feed back to all relevant stakeholders ensure that proper or good decisions are made about the future planning, maintenance, refurbishment etc. which will improve network performance.

NOTE 2: Not recording, capturing or submitting feedback information defeat the purpose of doing maintenance.

a) Remove and discard all refuse material in accordance with an approved environmental policy (DPL_34-1005).

b) Remove all personnel, tools from the site

c) Ensure that all Workers clear or sign off the Workers Register

d) Check all Control Panels for status of Flags / abnormalities

e) Complete / Fill in the Station Logbook.

f) Inform Control (All relevant Control Centres) and NMC when leaving the station.

g) Close/lock Gates

h) Complete relevant documents

Annex A - Impact assessment

(Normative)

1 Guidelines

- All comments must be completed.
- Motivate why items are N/A (not applicable)
- Indicate actions to be taken, persons or organisations responsible for actions and deadline for action.
- Change control committees to discuss the impact assessment, and if necessary give feedback to the compiler of any omissions or errors.

2 Critical points

2.1 Importance of this document. E.g. is implementation required due to safety deficiencies, statutory requirements, technology changes, document revisions, improved service quality, improved service performance and optimised costs.

Comment: Statutory requirements and or document revisions.

2.2 If the document to be released impacts on statutory or legal compliance - this need to be very clearly stated and so highlighted.

Comment: The document is developed to comply with statutory or legal requirements in section 8 of OHSAct.

2.3 Impact on stock holding and depletion of existing stock prior to switch over.

Comment: N/A - No new equipment or item need to be acquired for implementation of this document.

2.4 When will new stock be available?

Comment: N/A –see 2.3 above

2.5 Has the interchange ability of the product or item been verified - i.e. when it fails is a straight swap possible with a competitor's product?

Comment: N/A – It is a maintenance document and also see 2.3 above

2.6 Identify and provide details of other critical (items required for the successful implementation of this document) points to be considered in the implementation of this document.

Comment: It is necessary to consult / refer to DST_34-669 when implementing the document.

2.7 Provide details of any comments made by the Regions regarding the implementation of this document.

Comment: None

Annex A
(continued)

3 Implementation timeframe

3.1 Time period for implementation of requirements.

Comment: N/A – No technical changes were made to this document

3.2 Deadline for changeover to new item and personnel to be informed of DX wide change-over.

Comment: None

4 Buyers Guide and Power Office

4.1 Does the Buyers Guide or Buyers List need updating?

Comment: NO

4.2 What Buyer's Guides or items have been created?

Comment: NONE

4.3 List all assembly drawing changes that have been revised in conjunction with this document.

Comment: NONE – The configuration hasn't changed

4.4 If the implementation of this document requires assessment by CAP, provide details under 5

Comment: N/A – New Issue.

4.5 Which Power Office packages have been created, modified or removed?

Comment: NONE

5 CAP / LAP Pre-Qualification Process related impacts

5.1 Is an ad-hoc re-evaluation of all currently accepted suppliers required as a result of implementation of this document?

Comment: NO

5.2 If NO, provide motivation for issuing this specification before Acceptance Cycle Expiry date.

Comment: N/A – The document doesn't specify but stipulated the maintenance procedures on the existing equipment.

5.3 Are ALL suppliers (currently accepted per LAP), aware of the nature of changes contained in this document?

Comment: N/A – The specification is supplied to the suppliers not this document.

Annex A
(continued)

5.4 Is implementation of the provisions of this document required during the current supplier qualification period?

Comment: Yes – This is a maintenance document.

5.5 If Yes to 5.4, what date has been set for all currently accepted suppliers to comply fully?

Comment: N/A – see 5.4 above

5.6 If Yes to 5.4, have all currently accepted suppliers been sent a prior formal notification informing them of Eskom's expectations, including the implementation date deadline?

Comment: N/A – see 5.4 above

5.7 Can the changes made, potentially impact upon the purchase price of the material/equipment?

Comment: N/A – No new material is required

5.8 Material group(s) affected by specification: (Refer to Pre-Qualification invitation schedule for list of material groups)

Comment: N/A – No new material is required

6 Training or communication

6.1 Is training required?

Comment: Yes

6.2 State the level of training required to implement this document. (E.g. awareness training, practical / on job, module, etc.)

Comment: Practical / On job and training module

6.3 State designations of personnel that will require training.

Comment: AFWEPROT, FWEPROT & Supervisors in ED environment.

6.4 Is the training material available? Identify person responsible for the development of training material.

Comment: Yes

Annex A
(continued)

6.5 If applicable, provide details of training that will take place. (E.G. sponsor, costs, trainer, schedule of training, course material availability, training in erection / use of new equipment, maintenance training, etc).

Comment: Comment: Safety and Maintenance training

6.6 Was Technical Training Section consulted w.r.t module development process?

Comment: Yes

6.7 State communications channels to be used to inform target audience.

Comment: Training Forums.

7 Special tools, equipment, software

7.1 What special tools, equipment, software, etc will need to be purchased by the Region to effectively implement?

Comment: NONE

7.2 Are there stock numbers available for the new equipment?

Comment: N/A – No new equipment is required

7.3 What will be the costs of these special tools, equipment, software?

Comment: N/A – No new equipment is required.

8 Finances

8.1 What total costs would the Regions be required to incur in implementing this document? Identify all cost activities associated with implementation, e.g. labour, training, tooling, stock, obsolescence

Comment: No costs other than the training will be incurred by the regions and this will depend on the arrangements made for training ie Training is held regionally or nationally.

Impact assessment completed by:

Name: David M. Ntombela

Designation: Consultant

Annex B - Task Observation

(Informative)

Eskom Distribution	FORM TITLE	OBSERVATION FORM		
	FORM NUMBER	240-46425213	REV DATE	As Required
	DOCUMENT TITLE	Cable Testing - Control Plant		

1. OBSERVER'S PARTICULARS

Task observer's name: _____

Section / department: _____

Occupation: _____

Date: _____

Time with task: _____

Task observed: Pole Mounted Recloser Protection Commissioning

Location: _____

Is there a procedure / task manual for this task? YES [ ] NO [ ]

Task Manual ref. __240-46425277_____

Work order no.: _____

2. REASON FOR OBSERVATION

Planned: [ ] Follow-up: [ ]

Name of employee being observed:

3. TASK OBSERVATION

Did employee adhere to the procedure/practice requirements?

	Yes	No	N/A		Yes	No	N/A
1. Preplanning carried out correctly				4. Use of correct PPE			
2. Emergency contacts numbers Obtained				5. Ensure that the panel / equipment to be commissioned is isolated and earthed in accordance with EPC_32-846			

Annex B
(continued)

	3. Tools equipment:				6. Commissioning done as per task manual (240-46425213)			
	a) Used correctly				7. Task completion done as per task manual (240-46425213)			
	b) In good and safe condition							
	c) Test instrument calibrated							
	4. Toolbox Talk:							
	a) Task manuals used							
	b) Complete Worker's register							
	c) Risk Assessment been done							
	d) Valid work permits available							
	Could observed practices / conditions lead to:							
	1. Injury:				2. Illness (fumes, gas, etc.)			
	a) Risk of getting caught by				3. Costs (delays)			
	b) Risk of striking against/get struck by				4. Poor quality (non-conformance)			
	c) Risk of fall from same level							
	d) Risk of fall from different level							
	e) Risk of slip, trips and falls							
	f) Risk of electrocution							
4.	**NON COMPLIANCE PRACTICE OBSERVATION**							
		Yes	No	N/A		Yes	No	N/A
	1. Working at unsafe speed				7.Failure to warn			
	2. Using unsafe equipment				8. Taking chances			
	3. Using equipment unsafely				9. Failure to identify hazards			
	4. Unsafe loading, placing & lifting				10.Failure to secure lock-out			

Annex B
(continued)

	5. Taking unsafe position				11. Safety signs ignored				
	6. Safety rules ignored								
	NOTE: ALL OBSERVED CLASS HAZARDS SHALL REQUIRE IMMEDIATE INTERVENTION								
5.	**OBSERVED DEVIATIONS / NON-CONFORMANCES**								
6.	**RISK BEHAVIOURS**								
7.	**PROPOSED CONTROLS**								
	Compile a procedure for this task				Issue a standing instruction				
	Revise present procedure				Change work methods				
	Retraining of employees				Professional referral				
	Engineering revision				Coaching				
8.	**ANALYSIS**								
	IAC – inadequate capability		ABU – abuse or misuse / equip / drugs or alcohol		MAIN – inadequate maintenance				
	KNO – lack of knowledge		NAT – natural factors		EQU – inadequate equipment				
	SKI – lack of skill		LEA – inadequate leadership		STA – inadequate work / train Standards				
	STR – stress		ENG – inadequate engineering		WEA – wear & tear				
	MOT – improper motivation		PUR – inadequate purchasing		CON – inadequate control				

Annex B
(continued)

9.	**DISCUSSION BETWEEN SUPERVISOR/OBSERVER AND EMPLOYEE**	
	1. EMPLOYEE EXPLANATION FOR RISK BEHAVIOUR:	
	2. AGREEMENT TO CHANGE AT RISK BEHAVIOUR:	
10.	**FOLLOW-UP ACTIONS**	**WHEN / WHO**

Person being Observed signature: _____ Date: _____

Signature (Task Observer): _____ Date: _____

Signature Chairperson Safety Committee: _____ Date: _____
(if deviations were found)