

 Eskom	Task Manual	Technology
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Title: **INSTALL EARTH AND EARTH MATT IN SUB-STATIONS**

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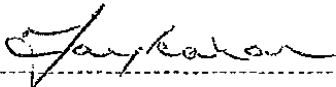
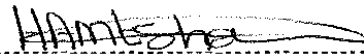
Engineering

Next Review Date:

STABILISED

COE Acceptance

DBOUS Acceptance

Archie Jaykaran

Amelia Mtshali

Power Delivery Maintenance Study
Committee Chairperson

DBOUS Senior Manager

Date: 28-02-18

Date: 07/03/2018

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


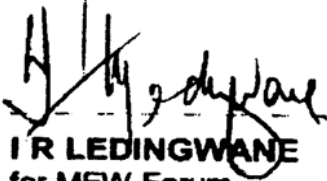


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COMPILED BY	APPROVED BY	FUNCTIONAL RESP	AUTHORISED BY
 J MYBURGH PCO MEW	 I R LEDINGWANE for MEW-Forum	 C SMITH for TESCO	 MN BAILEY CMDT for MD (Dx)
DATE: <u>04-11-2010</u>	DATE: <u>04/11/2010</u>	DATE: <u>26/11/2010</u>	DATE: <u>19.1.2011</u>

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Foreword

This document has been developed to meet the Safety, Health, Environment and Quality requirements in construction of the lines and substations

Revision history

This revision cancels and replaces revision no 0 of document no. **DWN_34-280**.

Date	Rev.	Clause	Remarks
Jan 2011	1	-	Compiled By: J Myburgh
		Compiled by	J Nezar as the compiler is replaced by J Myburgh Document number change to DMN 34-280.
		Development team	Included and remove names under development team
		Clause no.2	Changed the document reference numbers under normative references
		Clause no.4	Changed Task manual to task manual
		Clause no.	Draft watermark added.
Sept 2007	0		Document approved

Authorisation

This document has been seen and accepted by:	
Name	Designation
MN Bailey	Corporate Manager Divisional Technology
C D Smith	Engineering Processes Manager
I Ledingwane	MEW-Forum

This task manual shall apply throughout Eskom Holdings Limited, its divisions, subsidiaries and entities wherein Eskom has a controlling interest.

Development team

Major Engineering Works Documentation Standardisation Work Group:

Bertie Kotze	William Sehako	Ishmael Ledingwane	Ashley Tsineng
Vuy Lutshaba	Philemon Mzobe	Johan Myburgh	
Piet Pretorius	Tom Claasen	Tommy Meyer	
Josiah Tshabangu	Neil Williams	Kholeka Dyakala	

Keywords

Installation, earthing, earthmat

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1 Scope

1.1 Purpose

The purpose of this document is to guide persons to correctly install earth and earth mat in Sub-stations.

1.2 Applicability

This task manual is applicable to all the Major Engineering Works persons installing earth and earth mat in substations.

2 Normative References

The following documents contain provisions that, through reference in the text, constitute requirements of this task manual. 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 instruction are encouraged to investigate the possibility of applying the most recent editions of the documents listed below. Information on currently valid national and international standards and specifications can be obtained from the Information Centre and Technology Standardization Department at Megawatt Park: Definitions and abbreviations

OSHA Construction Regulations

PC 32 -846: Rev. 0, *Operating regulations for high voltage systems (ORHVS)*.

DSP 34-323: Rev 1 : *Personal protective equipment specification*.

DST 34-1717 Rev 0 : *Provision and use of personal protective equipment*

DPC_34-227 : Rev.1, *Pre-task planning and feedback process*.

EPL_32-94 : rev 0 , *Safety, Health and Environment (SHE) policy*.

ETE 34-1005 Rev 0: *Distribution Environmental management policy*.

DST 34-1209 – Rev.0 *Soils compactions for poles and stays*

DPC 34-333: Rev 0. , *OHS Act requirements to be met by principal contractors employed by Eskom distribution*

DPC 34-228 : Rev 1. , *Health and Safety representative's inspection reports and guidelines*

DST 34-1195: Rev. 5, *Quality control process for the checking of distribution substation construction before handing over for commercial operation*.

Note: *Each entity to research DT standards applicable to their own function.*

3 Definitions and abbreviations

3.1 Definitions

Trained: means to be trained, assessed and found competent

3.2 Abbreviations

MEW: Major Engineering Works

RAS: Risk Audit System

4 Task manual

4.1 Risk Assessment

Risk assessment shall be done on site for each new task and in accordance with DPC_34-227 : Rev.1. Risks identified shall be recorded together with the steps to be taken to minimize such risks.

4.1.1 The risk assessment shall cover risks associated with at least the following:

- Working in close proximity of live equipment
- Roadside work
- Noise levels and effectiveness of communication
- Work in elevated positions
- Condition of Poles , structures, hardware and conductors
- Weight of conductors to be lifted or displaced
- Rating of equipment (SWL, kV)
- Integrity of line
- Integrity of structures
- Integrity of holes and foundation
- Bystanders
- Weather conditions
- Equipment and tools
- Material or spares
- Work position of workers and specific tasks
- Overall supervision
- Complete workers register and sign

4.1.2 Safety Requirements

Note: The workers retain the right to refuse to work on grounds of health and safety

- Sufficient material to bond and connect earth leads
- Enough person to perform the task safely
- PPE as per Matrix
- Ensure adequate steps undertaken to protect exposed underground services.

-
- Special care must be taken to safeguard person from electrical contact in existing Sub-station yards.
 - Ensure the oxy-acetylene is stored upright.

4.2 Installing Earth

4.2.1 Pre-Planning

4.2.1.1 Tools and equipment

Truck with vehicle mounted crane /bucket	Oxy-acetylene set
Hand tools	Silver-alloy rods
Shovels/pick	Bitumen paint
Exoweld equipment	

4.2.1.2 Preparations

- Ensure that work is done within the limits of ORHVS authorisation only.
- Ensure trenches are excavated according to specifications.
- Conduct verification checks with the clerk of works prior to casting concrete
- Ensure joints to be welded are clean.
- Ensure joints are done according to specifications
- Ensure correct material is available as per the scope of work.

4.2.2 Install Earth and Earth mat

- Install earth according to the specifications and design document.
- Conduct the earth resistivity test and fill in the details on the test sheet

4.3 Record keeping

- A record of all risk analysis and tool box talks
- A record of all quality checks and tests shall be kept in the project file by MEW
- A record of earth results measurements are kept in the project file
- A record of all on job task observation shall be kept in the RAS file by the relevant person.

5 Tests

5.1 Responsibilities

The Designated Person or his delegate shall ensure that persons are trained and equipped to install earth and earth mat

5.1.1 The Principal Construction Official or his delegate shall ensure that:

5.1.1.1 Quality inspections are carried out and the quality report is completed

5.1.1.2 All environmental requirements are met

5.1.1.3 Applicable drawings, scope of work and specifications are on site

5.1.2 The responsible person on site shall ensure that:

5.1.2.1 All joints are welded correctly

5.1.2.2 The earth-mat is installed according to layout drawings.

5.1.2.3 All safety requirements are met

5.1.2.4 Risk analysis is done on site

5.1.2.5 Adequate supervision on all persons is done to ensure their safety

6 Process for monitoring

This document shall be reviewed every three years if necessary. The MEW managers and or the IARC representative (for MEW) may at any time request a revision of this document. This document shall also be revised if major changes to technology, legal requirements or best practices necessitate it.

Minor changes that will affect the outcomes detailed in this document if recorded in the MEW manager's forum decision log will be valid till date of next revision.

Annex A - Impact assessment

(Normative)

Impact assessment form to be completed for all documents.

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: This document has been developed to ensure that the method of working in the MEW environment is aligned to the latest safety, health, environmental and quality requirements and technology and that all work is standardised through out Eskom Distribution

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 enhances the existing statutory or legal compliance requirements.

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

Comment: The existing commercial practices are applicable at the implementation of the document.

2.4 When will new stock be available?

Comment: N/A. The prevailing stock arrangements will be applicable at implementation of the document.

2.5 Has the interchangeability 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. The document deals more with construction methods and not with products.

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: The staff should have been adequately trained in the execution of the work as this does not constitute a training manual.

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

Comment: The document was developed by the regional MEW subject matter experts (SME's)

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Annex A
(continued)

3 Implementation timeframe

3.1 Time period for implementation of requirements.

Comment: N/A The time frame for the implementation of the out puts will be ongoing on both the existing and to all new work.

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

Comments : N/A .The document does not introduce new practices.

4 Buyers Guide and Power Office

4.1 Does the Buyers Guide or Buyers List need updating?

Comment: N/A All resources envisaged in the document are expected to be as listed previously.

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

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

Comment: N/A .No assessment is required.

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. No new services or products are required from the Suppliers.

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

Comment: N/A.. No new services or products are required from the Suppliers.

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Annex A

(continued)

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

Comment: N/A. There will be no impact on any product

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

Comment: N/A. There is no impact on any product.

5.5 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. No products and services from the suppliers are affected

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

Comment: N/A .Existing conditions will apply.

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

Comment: N/A. None

6 Training or communication

6.1 State the level of training or communication required to implement this document. (E.g. none, communiqués, awareness training, practical / on job, module, etc.)

Comment: Awareness of the requirements of the standard are to be discussed as part of pre-task planning during the toolbox talk.

6.2 State designations of personnel that will require training.

Comment: All the designation as indicted in the roles and responsibility section of the document which include PCO, SCO and CO.

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

Comment: The document itself shall be used for personnel awareness.

6.4 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: The document is to be made available at each instance where the activity is to be executed. The document is formulated around the construction activities.

6.5 Was Training & Development Section consulted w.r.t training requirements?

Comment: N/A. The services of the Training and Development Section are not required.

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INSTALL EARTH AND EARTH MAT IN SUB-STATIONS

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Annex A

(continued)

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. The existing resources are applicable.

7.2 Are there stock numbers available for the new equipment?

Comment: N/A. No new equipment is to be introduced to implement this document.

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

Comment: None.

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: N/A. No major costs are incurred.

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Impact assessment completed by:

Name: J MYBURGH

Designation: PCO- MEW