

Engineering Instruction Electrical Distribution Unit	EI D 15-18 V2.0
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This Engineering Instruction includes urgent engineering information. Adherence to the information in this Instruction is MANDATORY .	
Selection of new insulated tools for working On or Near 1500V equipment	
Audience: <ul style="list-style-type: none"> • Network Maintenance Division • Major Works Division • Infrastructure & Services, TfNSW • Authorised Persons I.A.W. PR D 78701 	Main Points: <ul style="list-style-type: none"> • Industry guidelines for purchase of insulated tools • Maintenance requirements of existing insulated tools
Primary Affected Document: PR D 78107 Insulated Sticks, Tools and Equipment Used for Work On, Near or In the Vicinity of Exposed Electrical Equipment – Inspection, Testing, Care and Maintenance	

Scope

This document sets out to clarify the requirements for the selection of insulated tools to be used On or Near 1500V equipment as well as re-enforces the existing criteria for continued service.

Background

The school of Electrical Engineering and Telecommunications prepared a report on “Tests of 1500V DC overhead line Survey Staves” which concluded that a 5kV insulation test was suitable for insulated sticks for use On or Near live 1500V DC equipment.

D2013/80872 *Inspection and Testing of Insulated Sticks, Tools and Equipment used for work On, Near or In the Vicinity of Exposed 1500V OHW or Equipment* sets out the requirement for new tools to be Type tested as per industry requirements and defines the ongoing inspection and testing of existing tools.

Industry Safety Steering Committee **ISSC14** *Guide to electrical workers, safety equipment* also stipulates the requirements for the construction and maintenance of insulated tools which requires that;

1. New tools are to be type tested to the International Electro technical Commission (IEC) standards

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2. The tool is to incorporate at least one insulating section that has a solid, foam filled or hollow that is designed to prevent moisture and contaminant ingress is to be incorporated into the construction and is to be type tested to **IEC60855**
3. Telescopic sticks and measuring sticks type tested to **IEC62193**
4. Live working – Hand tools for use up to 1000V a.c. and 1500V d.c. **IEC60900**

The majority of insulated tools are manufactured to the United States Department of Labour, Occupational Safety and Health Administration (OSHA) Standards which are not recognised by the Australian Industry Safety Steering Committee (ISSC).

The Network Maintenance Division (NMD) Safe Work Instruction **DSYD2014/21209** Appendix –A lists the current tools for work on the Over Head Wiring of which manufactures have produced certification of compliance to IEC standards.

NMD Existing tools are tested and certified on an annual frequency as per **D2013/80872** and **PR D 78107**.

Action required

- Existing tools to be used On or Near Exposed 1500V equipment are to continue the routine testing procedures as per **D2013/80872**.
- Purchase of new tools to be used On or Near LIVE 1500V DC equipment to have the manufacturer provide a Declaration of Conformity to **ISSC14**, and confirmation of Type testing to the appropriate IEC standards by an accredited National Association of Testing Authority (NATA) for the specific tool.
- Business units shall review their tool stocks to ensure only tools identified in **DSYD2014/21209** Appendix –A are available for use on LIVE 1500V DC equipment.
- A replacement program for the substation HTC testers **completed by 10 July 2019** with a voltage detector that meets the requirements of **SP E 70001 Voltage Detector for use on 1500V DC Equipment Inside Substations**.



Figure 1 – HTC Tester to be replaced by 10 July 2019

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Engineering Procedure
Electrical Distribution Unit

PR D 78107

Insulated Sticks, Tools and Equipment Used for Work On or Near Exposed Electrical Equipment - Inspection, Testing, Care and Maintenance

Version 1.1

Date in Force: 26 June 2018

Procedure

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Document control

Version	Date	Author/ Prin. Eng.	Summary of change
1.0	28 July 2015	Chris Leung	First issue as a Sydney Trains document, rebranded from previous RailCorp SMS-06-EN-0556 V1.2
1.1	26 June 2018	Chris Leung	3 Yearly Review

Summary of changes from previous version

Summary of change	Section
Minor updates	

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1. Purpose and Scope

This Procedure sets out the inspection, testing, care and maintenance requirements for insulated sticks, tools and equipment used for work on or near exposed electrical equipment, such as, but not limited to, the following:

- operating sticks
- height measuring sticks
- cleaning poles and
- measuring equipment

used on the Low and High Voltage AC, and 1500 Volt DC systems.

This Procedure also sets out the responsibilities of Managers, Supervisors and employees along with the requirements for training.

This Procedure is NOT applicable to:

- insulated tools and equipment used for High Voltage Live Working, or
- portable earthing equipment used for the High Voltage system, refer *PR D 78205*, or
- portable rail connecting equipment used for 1500 Volt Overhead Wiring, refer *PR D 78307*.

2. General

Insulated sticks, tools and equipment shall be maintained in accordance with this Procedure, with consideration of the manufacturers' guidelines to ensure they are fit for their intended purpose and function. Records of purchases, repairs, inspections and tests are to be maintained.

3. Responsibility

3.1. Responsibility of Managers and Supervisors

Managers and Supervisors are responsible for ensuring that:

- a) all staff required to inspect and maintain insulated sticks, tools and equipment are competent in the required skills and are trained in accordance with Section 4.
- b) Managers, Depot Supervisors, Supervisors, and Users are aware of their responsibilities for the regular inspection of such insulated sticks, tools and equipment.
- c) management systems are in place to ensure that regular inspections, testing and maintenance of such insulated sticks, tools and equipment are carried out and recorded. Such management systems shall include:
 - periodic checks to ensure that the required inspection, testing and maintenance tasks are being undertaken as required, and
 - where periodic maintenance is to be undertaken by suppliers or manufacturers, arrangements are in place to ensure that the equipment is inspected, tested and/or maintained prior to the respective due dates.
- d) insulated sticks, tools or equipment identified with a "Danger Do Not Use" tag is segregated and the tag is not removed until the item has been repaired or destroyed.

3.2. Responsibility of Employees

Employees are responsible for:

- a) carrying out their work in accordance with this Procedure.
- b) seeking guidance and/or supervision before attempting to carry out a task for which they have not demonstrated and maintained satisfactory competence.

4. Training

Persons inspecting, testing and maintaining insulated sticks tools and equipment shall be trained in carrying out the cleaning, inspection and maintenance described in this Procedure.

Training may take place in the field or in a specialised training environment.

Persons in training shall be supervised by a person competent in the skill being learned.

Competency in skills that are not practised is lost in time. Where competency is not maintained through practice, the skill shall be revised and assessed prior to the person again being considered competent.

5. Hazards

A person:

- cleaning badly damaged insulated stick components could be at risk of cutting their hand or have a protruding glass fibre penetrating the skin of the hand;
- utilising voltage sources to verify insulation properties or voltage readings of test equipment may be at risk of electric shock.

6. Insulated Stick Identification

Complete Insulated Sticks, Tools and Equipment that have an existing label shall be maintained.

Prefix "IS" to be used, and a suffix used to identify each segment of the stick, e.g. "T" or "B" added to identify Top or Bottom stick section.

The insulated stick is to be clearly and indelibly labelled with an identifier as above with lettering at least 5 mm tall.

Example: ST-IS-12345T and ST-IS-12345B

An insulated stick dedicated for use on the 1500V DC system requires additional wording on the label described above indicating "1500V DC ONLY".

**Example: ST-IS-12345T 1500V DC ONLY and
ST-IS-12345B 1500V DC ONLY**

An insulated stick dedicated for use on the 2.2kV AC system requires additional wording on the label described above indicating "2.2kV ONLY".

**Example: ST-IS-12345T 2.2kV ONLY and
ST-IS-12345B 2.2kV ONLY**

7. Care of Insulated Sticks, Tools and Equipment

All insulated sticks, tools equipment and all accessories shall be kept clean and dry.

Insulated stick or tool components shall not be laid directly on the ground or placed in a position where they can come into contact with other metal fittings or tools.

When equipment is to be used, it shall be removed from the carry/roll bag or box and either supported on a suitable tool rack, laid on a clean dry tarpaulin or left on their carry/roll bag or box.

Insulated sticks, tools and equipment shall always be transported in their carry/roll bag or box and in such a manner as to prevent mechanical damage or surface abrasion to the equipment from other tools and materials.

Insulated sticks, tools and equipment that are:

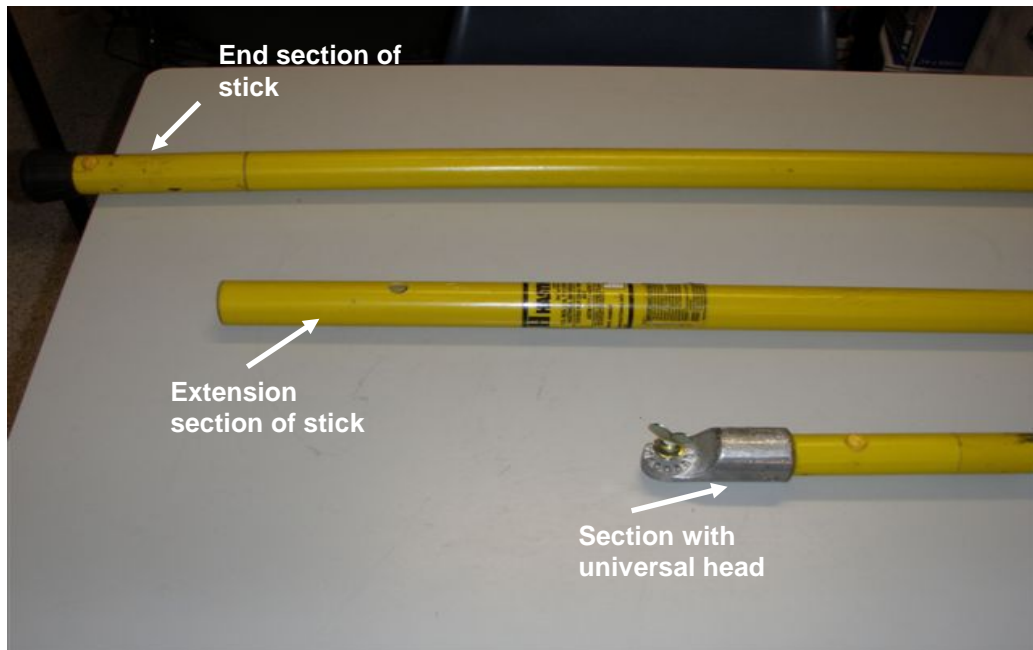
- damp shall be thoroughly dried, or
- wet e.g. saturated or having been immersed in water, shall be thoroughly dried and then subjected to the appropriate test of Section 11,

before being placed in the carry/roll bag or box.

Modifications shall not be made to any insulated stick, tool, equipment or their accessories.

8. Cleaning and Maintenance

Different sections of an insulated operating stick are shown in the photo below:



Before and after use and at inspections, the insulated universal head section, extension sections and insulated sections of sticks, tools equipment and accessories shall be wiped clean with a cloth. For items used on the High Voltage and 1500 Voltage system the cloth shall be silicon impregnated.

Whenever the insulated stick assembly or insulated sections of tools and equipment are contaminated by moisture and conductive materials, they shall be cleaned and the surface finish restored in accordance with the manufacturers' recommendations to retard future contamination.

The finish of the insulated stick, tool equipment and accessories shall be free of cracks, surface damage or mechanical defects.

Surface damage to the insulated stick assembly or insulated sections of tools and equipment, such as chips and deep scratches that expose the glass fibres shall be repaired as soon as they are noticed and the surface finish restored in accordance with the manufacturers' recommendations.

All tools, equipment and accessories shall be examined for loose bolts, connections or rivets, damaged or worn parts and cleaned and lubricated when necessary in accordance with manufacturers' instructions.

Tool rolls, carry bags and/or boxes shall be kept clean, dry and free of oil or other chemical contaminants to ensure the integrity of the contained equipment. Contaminated tool rolls, carry bags or boxes shall be effectively cleaned or replaced.

9. Inspection of Equipment - General

9.1. Records

Managers, supervisors and employees identified as being responsible for the inspection, testing and maintenance of insulated sticks, tools and equipment shall maintain records for all items covered by this Procedure for which they are responsible.

Records shall be kept for:

- a) item description and registered number where applicable
- b) all purchases
- c) all repairs
- d) date of routine Check/Test/Inspection (other than user inspections)
- e) the inspection or test and the result
- f) the due date for the next inspection or test
- g) date and method of disposal

Such records shall be kept until 12 months after the item is permanently removed from service.

9.2. Schedule

The scheduled inspection and tests shall be undertaken irrespective of any other inspection or test carried out on the equipment.

Where an inspection is specified "before use", the inspection shall be performed before each use, irrespective of any other inspection that may have been previously been carried out on the same day or shift, by the same user.

If the responsibility for an item of equipment is changed, care shall be taken to ensure that the intervals between periodic inspections or test for that item does not exceed those set out in this Procedure.

9.3. Segregation of Defective Items

If in the course of inspection or testing an item is found to be defective, it shall immediately be removed from service. The person removing the item from service shall affix a "DANGER- DO NOT USE" tag to the item. The tag shall describe the defect of concern.

The supervisor shall then decide if the item is to be repaired or destroyed.

Items that cannot be repaired shall be destroyed or disabled so they cannot be used.

The item shall not be used or re-issued for use until it has been repaired and successfully re-tested or re-inspected.



Warning


The "DANGER - DO NOT USE" tag shall not be removed before the defective item has been repaired or destroyed.

10. Inspections of Insulated Sticks, Tools and Equipment

10.1. Before Use Inspection

Each time before use, insulated sticks, tools, equipment and accessories shall be dry, wiped clean with a cloth and visually inspected for:

- signs of overstressing, cracking or damage to the protective surface/finish,
- couplings are functioning properly,
- legibility of warning labels, voltage rating and test dates, and
- currency of last test.

 **NOTE** For items used on the High Voltage and 1500 Voltage system the cloth shall be silicon impregnated.

The before-use inspection shall be carried out on all insulated sticks, tools, equipment and accessories. The finish of the insulated stick, tool, equipment or accessory shall be free of cracks, surface damage or mechanical defects.

The inspection shall be performed before use excepting that it need not be repeated if it has previously been carried out on the same day or shift, by the same user.

10.1.1. Universal Head Section and Extension Sections

Insulated sticks and extension sections shall be examined before use to ensure that they are satisfactory for their intended use and warning labels, voltage rating and test dates where applicable are current and legible.

The insulated stick and extension sections shall be inspected for signs of cracking or damage to the protective finish and the metal fittings examined for signs of excessive wear and other visible damage. Special attention shall be paid to metal fittings or tools permanently attached to the sticks.

10.1.2. Tools and Accessories

All tools and accessories shall be examined for loose bolts, connections, or rivets, damaged or worn parts. Particular attention shall be paid to metal fittings associated with attaching tools to ensure the metal fittings are secure.

10.2. Routine Inspections (Three Monthly) of High Voltage and 1500 Voltage insulated sticks, tools, equipment and accessories

All High Voltage and 1500 volt insulated sticks, tools, equipment and accessories shall be visually inspected as described in Section 10.1, and cleaned at intervals not exceeding 3 months, regardless of any other inspections.

All High Voltage and 1500 volt insulated sticks and associated components shall be wiped clean with a silicon impregnated cloth.

11. Routine Tests

11.1. General

Insulated sticks, tools, equipment and accessories are subjected to an annual Integrity and where relevant Calibration test to ensure that they are still fit for the purpose intended.

Each insulating section, item tool, equipment or accessory shall be:

- provided with a test certificate which states that it has passed the test,
- marked with a 'Calibration/Tested' label indicating; date tested, due date and tested by.

Only the most recent 'Calibration/Tested' label shall be displayed on each insulating section or item.

These tests shall be undertaken at intervals not exceeding 12 months, irrespective of any other inspections or tests.

NOTE



Before conducting the tests of Sections 11.2, 11.3 or 11.4 the insulated stick, tool, equipment or accessory shall be successfully subjected to the "Before Use Inspection" of Section 10.1.

11.2. Integrity Test for insulated items used on or near the High Voltage AC system

Each insulating section of an insulated stick assembly, tool or equipment and insulated accessories shall be subjected to minimum power-frequency voltage withstand test of 45kV per 300 millimetres for a period of one minute.

During the test the leakage current *shall* be constant and not exceed 100 micro-Amps on any tested section.

The power frequency voltage withstand test are to be conducted by either the manufacturer or alternatively a NATA accredited laboratory/calibration provider. Results of such tests are to be traceable to the relevant National Standards, generally done via recording of results in a NATA endorsed test certificate.

Notes: For the purpose of this Procedure, the above power-frequency voltage withstand test does not apply for items marked exclusively for use on the 2.2 kV AC system. Such items shall be tested in accordance with Section 11.3.

11.3. Integrity Test for insulated items used on or near the 1500 Volt DC or 2.2kV AC system

Dedicated insulated stick assemblies, tools (such as cleaning poles used near the 1500V DC OHW) or equipment and insulated accessories for use on the 1500V DC or 2.2kV AC system shall be subjected to a 5 kV DC insulation resistance test applied across the entire length of the stick for 1 minute. The insulation resistance measured shall not be less than 50 M-Ohm.

Insulation resistance tests can be performed by a National Association of Testing Authorities (NATA) accredited laboratory/calibration provider or a competent electrical person utilising test equipment that is "in calibration" and traceable back to national standards.

Note: Insulation resistance testing instructions are detailed in SMS-06-SW-0275 “Inspection and Testing of Insulated Sticks, Tools and Equipment used for work On, Near Exposed 1500V OHW or Equipment”



WARNING

Insulates sticks, tools and equipment dedicated for use on 1500V DC OHW or the 2.2kV system only shall be clearly marked in accordance with Section 6.

11.4. Calibration Test

Measuring equipment shall be tested for correct indication and operation. Measuring equipment shall be subjected to calibration tests to verify that the equipment is within manufacturer’s specifications and any applicable standards, i.e. display/readings are accurate, concise and repeatable.

High voltage detectors or phasing units shall be tested, where applicable, for correct:

- threshold voltage operation on all ranges,
- visual and/or audible operation,
- operation of the self test function.

Calibration tests are to be conducted by either the manufacturer or alternatively a NATA accredited laboratory/calibration provider. Results of such tests are to be traceable to the relevant National Standards, generally done via recording of results in a NATA endorsed test certificate

12. Replacement of Equipment

Replacement parts and accessories shall be acquired from the original manufacturers.

Standard universal heads and extension section from different manufacturers shall not be mixed to form an assembly.

13. References

ENA DOC 024-2009 (October 2009)	National guideline for management of tools and equipment used in the electricity supply industry
ISSC 14 (October 2010)	Guide to electrical workers’ safety equipment
PR D 78205	Inspection and Care of Portable Earthing Equipment for the High Voltage System
PR D 78307	Inspection and Care of Portable Rail Connecting Equipment for 1500 Volt Overhead Wiring
D2013/80872	Inspection and Testing of Insulated Sticks, Tools and Equipment used for work On or Near Exposed 1500V OHW or Equipment