

PART B-08: LINE INSPECTION TOOLS AND EQUIPMENT

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TITLE: LINE INSPECTION TOOLS AND EQUIPMENT

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AMENDMENTS/REVISIONS

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1. SCOPE

This document provides a guideline for the minimum requirements for routine inspections and maintenance tools and equipment.

2. GENERAL REQUIREMENTS

2.1 Responsibilities when implementing this guide

2.1.1 *The Licensee is responsible to:*

Ensure that all overhead line inspections in the areas of their accountability, are included in the maintenance plan and scheduled accordingly.

Ensure that all maintenance interventions required and emanating from a condition assessment (Line Inspection) is identified, prioritised, specified (including the material requirements) and planned through the creation and management of work orders and ad-hoc Job Plans.

Develop line inspection reports in spreadsheets, separating the line components (High Fault Level Zones to T-Offs) as specified in this guide onto separate spread sheets.

Ensure that all inspection and consequential maintenance information provided by the inspection authority is secured as history of network and frequently analysed.

Ensure that line inspections and maintenance specified and scheduled by work order execution conform to the requirements of this Guideline. Issuing the inspecting authority with material, tools and equipment specified in this Guideline prior to the job commencing.

Ensure that all conditions of statutory non-conformance or dangerous conditions be secured and corrected immediately on notification and/or identification. Immediate correction of statutory non-conformance minimizes Distributions' liability. Normalize life-threatening conditions with the issuing of dispatched work orders. Where possible, restoration of substandard conditions is part of the inspection work order. In both cases, capture the information on the inspection report.

Ensure that competent persons execute inspections as directed by this Guideline. Ensure that any material required to effect normalisation of the condition variance be specified on the provided reports.

2.2 Line inspection process

2.2.1 *Standardizing the Technical Requirement*

2.2.1.1 *Component Analysis*

- Identify and maintain a list/matrix of all power line components. (I.e. structures, insulators, way leaves and servitudes, line hardware, earthing systems, conductors and anti-climbing devices)

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Note: *The material types in all possible assembly permutations.*

- List the component functional requirements associated (legal, regulatory) of every component and associated failure mode.
- With due consideration for the environmental factors which contribute to premature failure, list all component failure mechanisms
- Identify all possible assembly failure mechanisms at the integration points.
- Identify the critical inspection points.
- For every failure mechanism identified, describe the clinical representation and failure progression criteria to be reported.
- Specify the follow-up action required on notification, (Scheduled rework or scheduled reject task)

2.2.1.2 Line Inspection formats

Establish line inspection reports that will optimize the inspection process, dissemination and evaluation of the data contained therein.

Revise the above as the need may arise.

2.2.1.3 Line Inspection Guide

Line inspection guides will be established extracting all the references required by the inspection authority as may be necessary during the inspection. It will contain a List of all structure types.

- Reflect structure design drawings.
- Contain lists/tables of regulatory requirements (I.e. safety clearances) applicable to lines.
- Contain general engineering specifications where applicable.

2.2.2 Planning the inspection

The Licensee should provide a line inspection program with due consideration for line segmentation, priority classifications and recent line performance indicators and schedule line inspection via work orders and to the following requirements.

Line inspection and consequential maintenance is labour intensive. Where resources (staff, contractors, time and funds) are scarce, line segment priorities will dictate what will be inspected first and what last according to the criteria established in this guide.

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Inspections will be executed at frequencies consistent with table 1, modified by the environmental factor contributing to network deterioration in the table provided as well as with line performance indicators, indicating poor line performance.

2.2.3 Executing the inspection

Licensee appointed inspectors or an approved inspection contractor will execute the inspection complying with ECB standards and procedures. The following staff or contractor equivalent will inspect lines to ensure that all line types are attended to by the staff with the correct competence.

Medium Voltage lines – Inspected by a competent person, understanding the unique electrical phenomena and mechanical requirements for a MV lines.

Low Voltage lines – Inspected by a competent person, understanding the unique electrical phenomena and mechanical requirements for a LV lines.

On completion of the inspection, the data on hard copy format will be transferred onto the original line inspection report in digital format.

2.2.4 Inspection practice

Inspections on foot have been demonstrated to be the most effective. On foot inspections should be conducted where possible assisted by an appropriate workstation (vehicle configured for the purpose).

It is important that the inspector is equipped with vision enhancing equipment to conduct an effective inspection of the structure tops and line components at a distance at the top of structures. Binoculars and or spotting scopes are essential inspection tools.

First line maintenance that can be done safely without de-energising the line will be conducted as part of the inspection itself. This includes but is not limited to securing labels, repairing earth wires and anti-climbing devices, clearing encroaching vegetation with appropriate technology. Data management is to be done on site as well. This should include “red-lining” of single line and operating diagrams, correcting customer data where applicable.

2.3 Line Inspection tools, equipment and documentation required

Below are examples of some of the line inspection tools, equipment and documentation required for the inspection of overhead lines.

2.3.1 Documentation Required

- a) Latest revision of Single Line diagrams for the line section
- b) Prepared inspection report
- c) Referenced standards and procedures

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2.3.2 *Line Inspection/Construction Tools Required*

- a) Spade
- b) Pick
- c) Approved compaction device
- d) Ropes at least 15 meters
- e) Measuring stick
- f) Plum bob or Builders spirit level
- g) 3 m Measuring tape
- h) Pair of binoculars
- i) Conductor shunt (to ensure earth continuity where it is suspect)
- j) Crimping tool for repairing earth wires
- k) Bandit strapping tool
- l) Micrometre

2.3.3 *Vegetation Control tools*

- a) Medium size bow saw
- b) Small Axe or machete
- c) Pruning sheer (Link stick mounted)

2.4 *Material in support of line inspection*

- a) Nails
- b) Electrical warning labels
- c) Coach screws
- d) Clout nails/Staples

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- e) Short loop of barbed wire
- f) Lugs and ferrules to repair earth wires
- g) Bandit strapping
- h) Long cable ties
- i) Wedge clamps and pigtails (service connection repairs)
- j) Binding Wire
- k) Drop out fuses
- l) Restricted area Locks
- m) Surge arrestors
- n) Meter seals and sealing wire.

2.5 Inspection Frequencies

Frequency of inspections should be determined by Reliability Centred Maintenance techniques (RCM) and if RCM studies/criticality analysis has not been conducted the minimum requirements specified on table 1 will apply.

This analysis will be conducted for each line and unique sections of the line with due consideration for environmental factors impacting poorly on line conditions and the most recent performance ratings. Special attention must be given to maintain barriers like anti-climbing devices and fences that could possibly expose the public to live conductors. High risk areas need to be inspected more frequently, depending on the probability of an event occurring and the severity of the outcome should the risk realise.

Table 1 Inspection frequencies

Line type	Inspection frequency (minimum)		
	Detail Inspection	Handover inspection	After handover
Medium and low voltage	Annually	On commissioning	± 10 months