

Network Standard

NETWORK

Document No : NW000-S0094
Amendment No : 3
Approved By : GM AM&O
Approval Date : 07/09/2017

Minor Amendments approved on 07/02/2022

NW000-S0094

NS146 INSPECTION PROCEDURE FOR WORKING ON POLES



ISSUE

For issue to all Ausgrid and Accredited Service Providers' staff who work on power poles and the associated inspection procedures for steel, concrete, fibre composite and wood poles, and is for reference by field, technical and engineering staff.

Ausgrid maintains a copy of this and other Network Standards together with updates and amendments on www.ausgrid.com.au.

Where this standard is issued as a controlled document replacing an earlier edition, remove and destroy the superseded document.

DISCLAIMER

As Ausgrid's standards are subject to ongoing review, the information contained in this document may be amended by Ausgrid at any time. It is possible that conflict may exist between standard documents. In this event, the most recent standard shall prevail.

This document has been developed using information available from field and other sources and is suitable for most situations encountered in Ausgrid. Particular conditions, projects or localities may require special or different practices. It is the responsibility of the local manager, supervisor, assured quality contractor and the individuals involved to make sure that a safe system of work is employed and that statutory requirements are met.

Ausgrid disclaims any and all liability to any person or persons for any procedure, process or any other thing done or not done, as a result of this Standard.

All design work, and the associated supply of materials and equipment, must be undertaken in accordance with and consideration of relevant legislative and regulatory requirements, latest revision of Ausgrid's Network Standards and specifications and Australian Standards. Designs submitted shall be declared as fit for purpose. Where the designer wishes to include a variation to a network standard or an alternative material or equipment to that currently approved the designer must obtain authorisation from the Network Standard owner before incorporating a variation to a Network Standard in a design.

External designers including those authorised as Accredited Service Providers will seek approval through the approved process as outlined in NS181 Approval of Materials and Equipment and Network Standard Variations. Seeking approval will make sure Network Standards are appropriately updated and that a consistent interpretation of the legislative framework is employed.

Notes: 1. Compliance with this Network Standard does not automatically satisfy the requirements of a Designer Safety Report. The designer must comply with the provisions of the Workplace Health and Safety Regulation 2011 (NSW - Part 6.2 Duties of designer of structure and person who commissions construction work) which requires the designer to provide a written safety report to the person who commissioned the design. This report must be provided to Ausgrid in all instances, including where the design was commissioned by or on behalf of a person who proposes to connect premises to Ausgrid's network, and will form part of the Designer Safety Report which must also be presented to Ausgrid. Further information is provided in Network Standard (NS) 212 Integrated Support Requirements for Ausgrid Network Assets.

2. Where the procedural requirements of this document conflict with contestable project procedures, the contestable project procedures shall take precedent for the whole project or part thereof which is classified as contestable. Any external contact with Ausgrid for contestable works projects is to be made via the Ausgrid officer responsible for facilitating the contestable project. The Contestable Ausgrid officer will liaise with Ausgrid internal departments and specialists as necessary to fulfil the requirements of this standard. All other technical aspects of this document which are not procedural in nature shall apply to contestable works projects.

INTERPRETATION

In the event that any user of this Standard considers that any of its provisions is uncertain, ambiguous or otherwise in need of interpretation, the user should request Ausgrid to clarify the provision. Ausgrid's interpretation shall then apply as though it was included in the Standard, and is final and binding. No correspondence will be entered into with any person disputing the meaning of the provision published in the Standard or the accuracy of Ausgrid's interpretation.

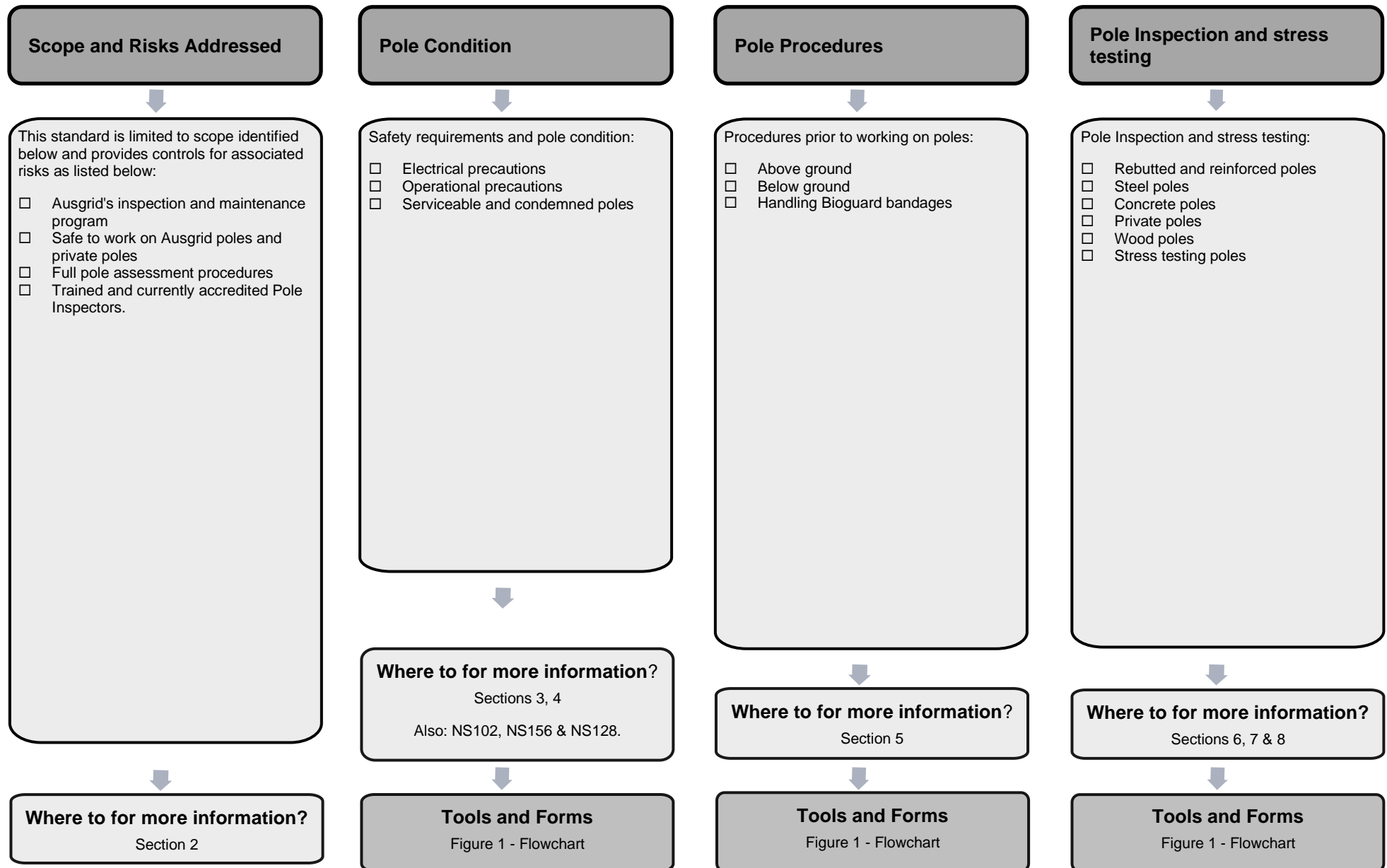
KEY POINTS

This standard has a summary of content labelled "KEY POINTS FOR THIS STANDARD". The inclusion or omission of items in this summary does not signify any specific importance or criticality to the items described. It is meant to simply provide the reader with a quick assessment of some of the major issues addressed by the standard. To fully appreciate the content and the requirements of the standard it must be read in its entirety.

AMENDMENTS TO THIS STANDARD

Where there are changes to this standard from the previously approved version, any previous shading is removed and the newly affected paragraphs are shaded with a grey background. Where the document changes exceed 25% of the document content, any grey background in the document is to be removed and the following words should be shown below the title block on the right hand side of the page in bold and italic, for example, Supersedes – document details (for example, "Supersedes Document Type (Category) Document No. Amendment No.").

KEY POINTS OF THIS STANDARD



Network Standard NS146 Inspection Procedure for Working on Poles

Contents

1.0	PURPOSE	6
2.0	SCOPE	6
3.0	GENERAL HEALTH AND SAFETY PRECAUTIONS.....	7
3.1	General precautions.....	7
3.1.1	Asbestos containing paint	7
3.2	Operational precautions	8
3.3	Falling objects	8
3.4	Electrical precautions	9
3.4.1	Step and touch voltages.....	9
4.0	POLE CONDITION AND LOADING	11
4.1	General.....	11
4.2	Conditionally serviceable and condemned poles.....	11
4.3	Staying or supporting poles	11
4.4	Loading and altering loading on a pole	12
4.4.1	General.....	12
4.4.2	Reinforced (nailed) poles	16
5.0	PROCEDURES TO BE FOLLOWED BEFORE WORKING ON A POLE	17
5.1	Procedural requirements.....	17
5.2	Above ground pole inspection.....	21
5.2.1	Inspection	21
5.2.2	Does the pole look and sound OK above ground?	22
5.2.3	Is it a CCA pole less than 15 years old?	22
5.3	What are you going to do on the pole?	23
5.3.1	Type of work.....	23
5.3.2	'High stress work' on poles	23
5.4	Below ground inspection of unreinforced wood poles	24
5.4.1	Process	24
5.4.2	Procedure.....	24
5.4.3	Is the pole OK?.....	26
5.4.4	Pole is OK to work on.....	26
5.5	Handling, removal and disposal of used Bioguard bandages	26
6.0	REBUTTED AND REINFORCED POLES	27
6.1	Rebutted poles	27
6.2	Reinforced poles	27
6.3	Changing loads on reinforced poles	27
7.0	STEEL, CONCRETE, COMPOSITE AND PRIVATE POLES	28
7.1	General Requirements	28
7.2	Steel line poles.....	28
7.2.1	Direct buried steel poles:.....	28
7.2.2	Rag bolt assembly steel poles:	29
7.3	Concrete line poles	29

7.4 Fibre composite poles 29

7.5 Private poles including Customer’s “A” poles 29

 7.5.1 General..... 29

 7.5.2 Wood poles less than 200 mm diameter (or 175 mm square section) 30

 7.5.3 Private Pole with concrete to groundline or other in-ground obstruction 30

 7.5.4 Steel rag-bolt mounted private poles 30

7.6 Pole owned by other Authorities 31

8.0 STRESS TESTING A POLE 31

9.0 FIRE-DAMAGED OR BURNING CCA TIMBER POLES 31

10.0 AUTHORITIES AND RESPONSIBILITIES 32

11.0 RELATED DOCUMENTS 32

 11.1 General..... 32

 11.2 Ausgrid documents 32

 11.3 Other standards and documents..... 32

 11.4 Acts and regulations..... 32

12.0 DEFINITIONS 33

13.0 RECORDKEEPING 34

14.0 DOCUMENT CONTROL..... 34

ANNEXURE A - SAFETY REQUIREMENTS FOR WORK ON OR NEAR PRIVATE POLES 35

ANNEXURE B - INSPECTION OF THE HEAD OF WOOD POLES 36

 B1 Background 36

 B2 Pole defects 36

 B3 Pole defects above ground 36

 B4 Pole Head – failure modes..... 36

 B5 Inspection of the head of the pole 36

 B6 Inspection procedure..... 37

 B7 Training and Qualifications 38

ANNEXURE C – SAMPLE COMPLIANCE CHECKLIST 39

1.0 PURPOSE

This Network Standard applies to all staff, contractors, Accredited Service Providers (ASPs), Telecommunication workers and any other personnel who have authority to work on Ausgrid power poles. It also applies when Ausgrid's staff or Ausgrid's contractors work on privately owned power poles, or poles belonging to other Authorities when working on behalf of Ausgrid.

This Network Standard has been prepared on a consultative basis with the relevant staff, Unions and other organisations that access Ausgrid power poles in accordance with the principles of the Work Health and Safety Regulation 2011.

2.0 SCOPE

Ausgrid has a comprehensive inspection and maintenance program in place to maintain poles in a serviceable condition. This program however should not be relied upon to guarantee a pole's suitability to be worked on without a more immediate inspection because some pole failure mechanisms (such as termite attack and vehicle impacts etc.) can affect a pole between scheduled inspections.

Accordingly, before working on any pole, personnel must satisfy themselves that it is safe to work on and in no danger of collapsing during the course of work. Where work carried out on one or more poles will change the loading on poles nearby during the course of the work, these other poles must also be inspected in accordance with this procedure to make sure they are not in danger of collapse. For example, when all conductors are removed from one or both sides of a pole, the pole or poles that will carry the conductor load during the course of the work must also be inspected.

Work on a pole includes linework either by climbing or elevating work platform (EWP), as well as substation, telecommunications, service and operating work which may be carried out from a pole platform, pole steps, ladder, EWP, etc.

Full pole assessment procedures involve the internal inspection of poles, the measurement of any internal defect, and calculation of residual strength. You must not carry out any procedure requiring boring of poles unless you are a trained and currently accredited Pole Inspector.

3.0 GENERAL HEALTH AND SAFETY PRECAUTIONS

3.1 General precautions

Poles are installed in all types of terrain, from suburban to mountainous to coastal marine. It is therefore not possible for this Network Standard to account for all specific safety precautions for every situation.

Under the Work Health and Safety Regulation 2011, it is each individual worker's responsibility to take all reasonable precautions in the interests of safety and welfare of oneself as well as that of fellow workers. The Regulation also assigns the responsibility of the safety of all persons that enter the work site to the worker in charge of the work site.

The following key points shall be considered when planning and carrying out work on or adjacent to poles:

- Effective use of road safety and traffic control measures can lower the risks of traffic entering the work site. Such measures include the wearing of high-visibility vests when working on or near roadways;
- Electrical safety clearances (refer to Electrical Safety Rules) shall be observed at all times;
- Personal safety items (e.g. face masks when drilling Copper Chrome Arsenic (CCA) poles, hard hat, gloves, and eye protection) shall be used when required;
- Effective use of environmental safety control measures can prevent contamination of the surrounding environment.

All relevant legislations, Ausgrid's Electrical Safety Rules and NS102 Working on Poles with Mobile Phone Transmitter Installations shall be complied with when working on or near poles.

3.1.1 Asbestos containing paint

Work must not occur on poles confirmed as containing asbestos paint, or those identified as having a similar appearance except under emergency or special provisions.

Where work has to proceed under emergency provisions (work less than 1 hours), Level 3 Emergency Response PPE must be worn by all workers.

At the time of writing this standard the confirmed instances of remnants of friable asbestos paint on Ausgrid's poles occur within the former St George County Council Area and include:

- poles with a band of white paint at ground level
- poles with 'grey' paint
- poles with 'black' paint at ground level.

Note: Examples of poles with remnant friable asbestos containing paint are provided in Figure 1 below.

All poles tested have been recorded on the Asbestos Register and in GIS including those where no asbestos was present. Where a pole is found with 'grey' 'white' or 'black' paint and it is not listed in the Asbestos Register or GIS, contact Environmental Services Hazardous Materials Hotline on 02-9394 6961 to arrange testing before planned work is undertaken.



Figure 1: Examples of poles with remnant friable asbestos containing paint

3.2 Operational precautions

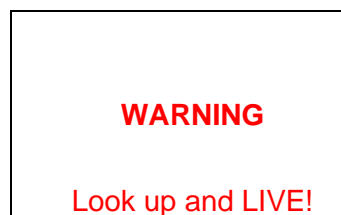
Traffic management requirements shall be observed in accordance with legislative requirements and AS 1742 Set - Manual of Uniform Traffic Control Devices, the WorkCover Code of Practice for Working near Traffic and Mobile Plant, and the Roads and Maritime Services Traffic Control at Worksites Manual (Guidance for Ausgrid personnel may be found in NEG SE10 Traffic Management).

3.3 Falling objects

Appropriate personal protective equipment (e.g. hard hat) shall be used when working at the base of a pole. Persons performing inspections shall also be aware that falling objects presents a hazard to other parts of the body, as more of the body is exposed to falling objects when working in a bent over position than a standing position.

A pre-work visual inspection shall be conducted to identify above ground hazardous objects such as:

- loose sapwood
- loose streetlights
- loose nuts
- loose vertical construction
- tools left on crossarms
- defective insulators.
- loose pole caps.



Notes:

- the use of a drop hazard zone around the work area will reduce the risk to other members of the work team or the general public.
- Ausgrid personnel should refer to the Be Safe System for guidance on controlling the risk of falling objects.

3.4 Electrical precautions

Electrical hazards may exist ABOVE or BELOW ground level. The following clauses list examples of such hazards.

3.4.1 Step and touch voltages

Workers shall be aware that it is possible for voltage gradients to exist on or near a pole in the event of conductor breakage or insulation breakdown. They shall take precautions to safeguard themselves and others against inadvertent contact with step and touch voltages.

3.4.1.1 Above ground

Workers shall be aware of safety risks that may exist above ground:

- Conductors not properly fixed to insulators (broken tie). Conductors that are not properly fixed to insulators may fall on to the crossarm or to the ground when disturbed. Prior to working on or near a pole, the overhead installation shall be visually inspected to confirm that all conductors are properly attached to insulators. If a conductor is in contact with the crossarm or pole, the pole shall be assumed live and the situation shall be reported to the appropriate Ausgrid Supervisor or Ausgrid's Emergency Line on 13 13 88 (unless the installation has been proven to be de-energised and isolated). Streetlight conductors shall be considered as alive at all times unless they are proven to be de-energised and isolated.
- Cracked or damaged insulators. Overhead mains and its associated hardware shall be visually inspected prior to working on a pole. Defective insulators may cause the pole to become "alive" without operating protective devices. Refer to Clause 3.4.1.3 for information on how to detect for voltages caused by electrical leakage currents.
- Trees or other conductive foreign objects. Objects such as pieces of fencing wire, in contact with conductors, metal conduits, or apparatus on poles may be alive. Visual inspection shall be conducted to confirm that no conductive objects are in contact with, or are likely to come in to contact with, live conductors.
- Low ground clearance of conductors. Visual inspection shall be carried out to confirm that the conductors have adequate ground clearance so that people or vehicles may not inadvertently come in contact with conductors (take particular care with vehicle radio aerials).
- Broken earth wires: Refer to Clause 3.4.1.2.

Reporting of the above defects are not in the scope of the pole inspection process unless otherwise stated in this Network Standard, or a dangerous situation that may cause a bushfire or harm to human life has been identified.

3.4.1.2 Above ground visual inspection of earth wires

Earth wires form a part of an earthing system and they can become damaged in many ways.

If earth wires are present on a pole, the above ground condition of the earth wire shall be assessed by a visual inspection prior to making initial contact with the pole.

Any broken earth wires (or exposed earth wires between groundline and 3m) shall be reported immediately as a dangerous situation. Any damaged earth wire shall be reported for corrective maintenance. Workers shall report to their immediate supervisor or Ausgrid's Emergency Line on 13 13 88.

WARNING

Workers SHALL NOT attempt to re-join broken earth wires. Full phase to earth voltage may exist between the severed ends.

Note: Workers who are qualified and authorised to repair broken earth wires may do so after completing the inspection procedure prescribed in this Network Standard and a review of the pre-work written risk work assessment (HAC). All relevant legislations, Ausgrid's Electrical Safety Rules and NS102 Working on Poles with Mobile Phone Transmitter Installations shall be complied with when working on or near poles.

3.4.1.3 Apply voltage detector on pole

Testing shall be performed to confirm the absence of hazardous voltages prior to initial contact in accordance with the Ausgrid's Electrical Safety Rules (ESR).

3.4.1.4 Below ground

Workers shall be aware of safety risks that may exist below ground:

- Broken earth wires. Refer to Clause 3.4.1.5.
- Underground cables. Workers shall be aware that below ground electrical installations, including communications cables may exist close to the pole(s) that is being worked on. Some communications installations may be operating at voltages up to 500V. Underground power cables forming part of an underground to overhead connection (UGOH) can exist at a shallow depth near power poles. These cables can be easily damaged by digging implements and this may cause a hazardous situation. For guidance refer to NS156 Working Near or Around Underground Cables.

Note: UGOH cables do not always run from the pole back to the adjacent Distribution Substation in a straight line, nor do they always radiate out from the pole at 90°. UGOH cables may coil around the pole to provide spare cable in case of a pole change over or re-termination and they may be adjacent to poles that do not have these above ground cable installations (UGOHs) on them. Where it is suspected or confirmed that such cables exist near the pole that is being worked on, then hand excavation shall be carried out with care. If there is a high risk of cable damage, then the work shall not proceed. The Contract Officer or supervisor shall be contacted to determine the most appropriate course of action before work can proceed.

3.4.1.5 Below ground visual inspection of earth wires

Earth wires form a part of an earthing system and they can become damaged in many ways.

If earth wires are present on a pole, the below ground condition of the earth wire shall be assessed and continuously monitored by visual inspections as excavation takes place.

WARNING

Electrical Hazard: Full phase to earth voltage may exist between the severed ends of broken earth wires.

Workers who are qualified and authorised to repair broken earth wires may do so after completing the inspection procedure prescribed in this Network Standard and a review of the pre-work written work assessment (HAC). All relevant legislations, Ausgrid's Electrical Safety Rules and NS102 Working on Poles with Mobile Phone Transmitter Installations shall be complied with when working on or near poles.

Any broken earth wires that are to be left unrepaired shall be reported immediately as a dangerous situation. Any damaged earth wire shall be reported for corrective maintenance. Workers shall report to their immediate supervisor or Ausgrid's Emergency Line on 13 13 88.

4.0 POLE CONDITION AND LOADING

4.1 General

The condition of a pole is described as serviceable, conditionally serviceable or condemned (unserviceable). A serviceable pole is defined as having greater than 50 per cent residual strength and is safe to climb and to work on. A conditionally serviceable pole has between 25 per cent and 50 per cent residual strength. A condemned pole has less than 25 per cent residual strength.

Note 1: The condition and rating of a pole relates to the structure as a whole, which includes a pole re-butt or pole reinforcement (eg. a pole nail or splint), where applicable.

Note 2: Residual strength is calculated based on the condition of the pole within the NS145 Pole Inspection area (ie. from 400mm below groundline to approximately 2m above groundline). In most cases, the figure provides a good representation of the overall condition of a pole. However, workers shall be aware that it is possible for defects to exist above or below the inspection area, which would not be factored into residual strength calculations.

4.2 Conditionally serviceable and condemned poles

Poles classed as conditionally serviceable or condemned shall not be worked on unless they are adequately stayed or supported. They are identified by either an industry standard orange band with black crosses and Ausgrid's name on it wrapped around the pole, and “/” or “X”, or a diagonal mark such as “/” or “\” (a slanted slash), painted with white paint or marked with a waterproof lumber crayon. The orange band will be located between 2.4m and 3.0m above ground, and the slashes or crosses approximately 1.5m above the ground on the road side and footpath side faces of the pole.

4.3 Staying or supporting poles

Staying or supporting conditionally serviceable and condemned poles can be accomplished by various methods, or by using a combination of methods, depending on the particular circumstances.

These poles can be supported by using an appropriate vehicle (eg. Borer/Erector), lashing to a replacement pole or by utilising stays (either temporary or permanent). In addition the conductors attached to a pole may support a pole, for example:

- A LV Athwartship Pole – holds the pole four ways.
- Conductors attached to an angle pole partially support a pole requiring the addition of a single support to be added.
- A service cable can balance the forces applied by other service cables or the forces applied to a pole by a person climbing the pole.

Ausgrid does not have standard designs for temporary pole supporting devices, as Ausgrid do not use such devices in its regular business activities.

ASPs wishing to deploy temporary pole supports shall submit structural engineering design and certification documents to the appropriate Ausgrid Network Services Region for approval. Designs and certification documents shall be:

- In compliance with Safe Work Australia “Safe Design of Structures Code of Practice”, Australian Standards and
- Specifically designed for each individual installation.

Ausgrid Network Service Region staff shall refer submissions to Civil Engineering for review.

Where conductors are determined to be providing the support needed for a pole to remain safe to work on, workers must consider the work they are undertaking (including the order of any tasks affecting the pole loading) and take into account how this work will impact on the effectiveness of the support provided by the conductors. For example job planning may require that while work may be able to be started on a project, at some time during the process additional support may need to be added to complete the work safely, or while the job may be able to be commenced while working from the pole, this may have to cease at some point and the work completed using an EWP. Refer to section 4.4 for some examples of what may occur to the resultant pole loading during pole top works.

For a pole to be adequately supported by conductor or stay attachment at the head, the net/total load on the head of the pole must be balanced. This requirement also applies to the forces imparted on a pole by a worker that works from a pole or from a ladder supported by a pole.

Refer to NS128 Specification for Pole Installation and Removal for additional information on support methods.

4.4 Loading and altering loading on a pole

4.4.1 General

Poles are selected in the design stage of any new or replacement project to suit the loading. The design parameters include the forces on a pole due to conductors and the wind forces on the pole.

In figure 2 the forces due to the conductors shown are balanced if the spans either side are supporting the load on the opposite side. This is the situation for many network poles. Poles that have differences in tension between spans, such as may occur on termination construction (as opposed to straight through construction), will not have balanced forces applied to the head and will require additional support when the pole is defective. Where the cable related forces are balanced and the pole is conditionally serviceable or condemned, the pole would need to have additional support added to protect against a worker climbing the pole if the work was to be carried out from the pole rather than an EWP.

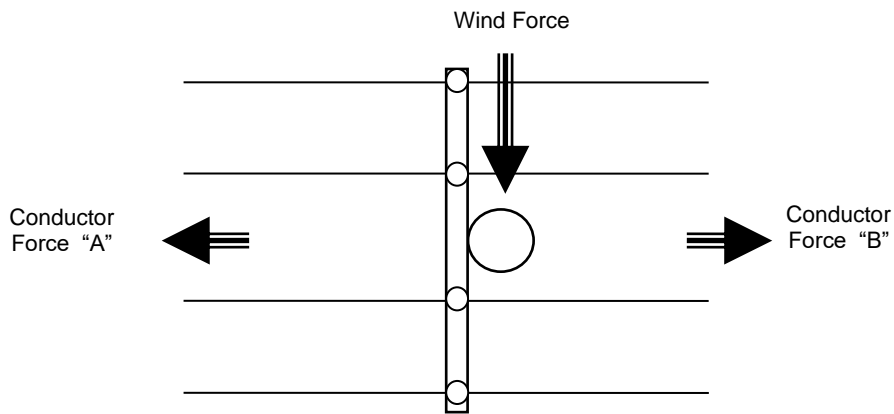


Figure 2

The forces produced by the conductors will vary depending on the construction. Straight through constructions should have balanced loading. Where spans either side are not even in length a simple check by undoing one insulator tie (using appropriate controls against sudden slippage and allowing loading to be restored) will identify if the pole top loading is even (if the cable slips though the pin/tie the loading is not even). Straight through constructions with uneven (different) span tensions due to uneven span lengths will result in a force on the pole in the direction of the longer span. Termination poles will be highly loaded in the direction of the attached conductors.

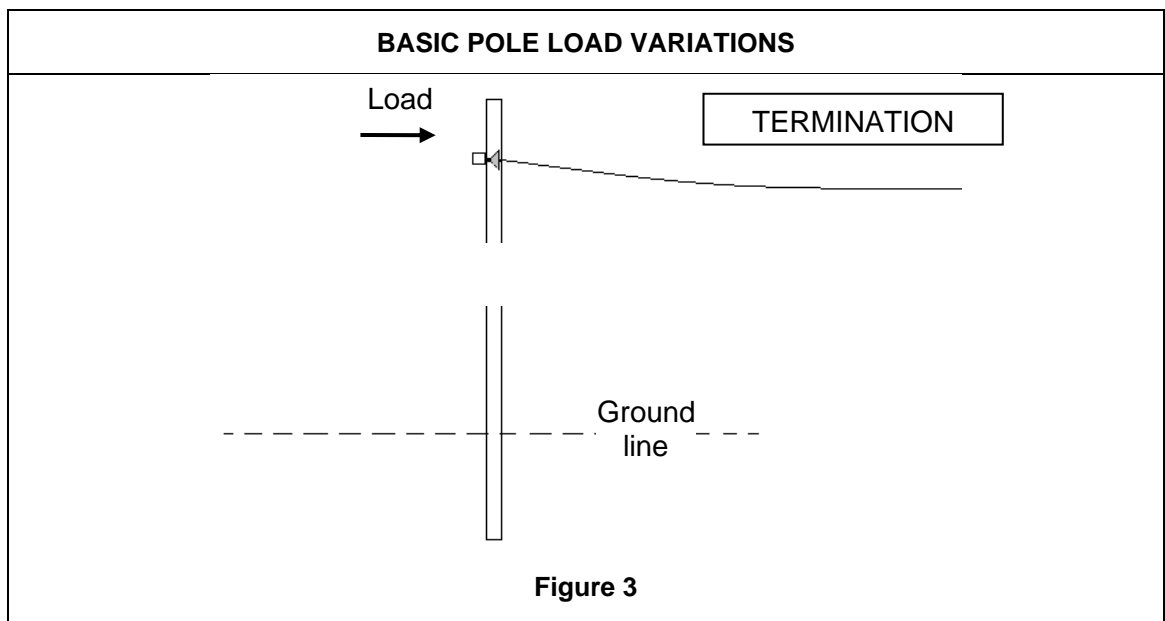
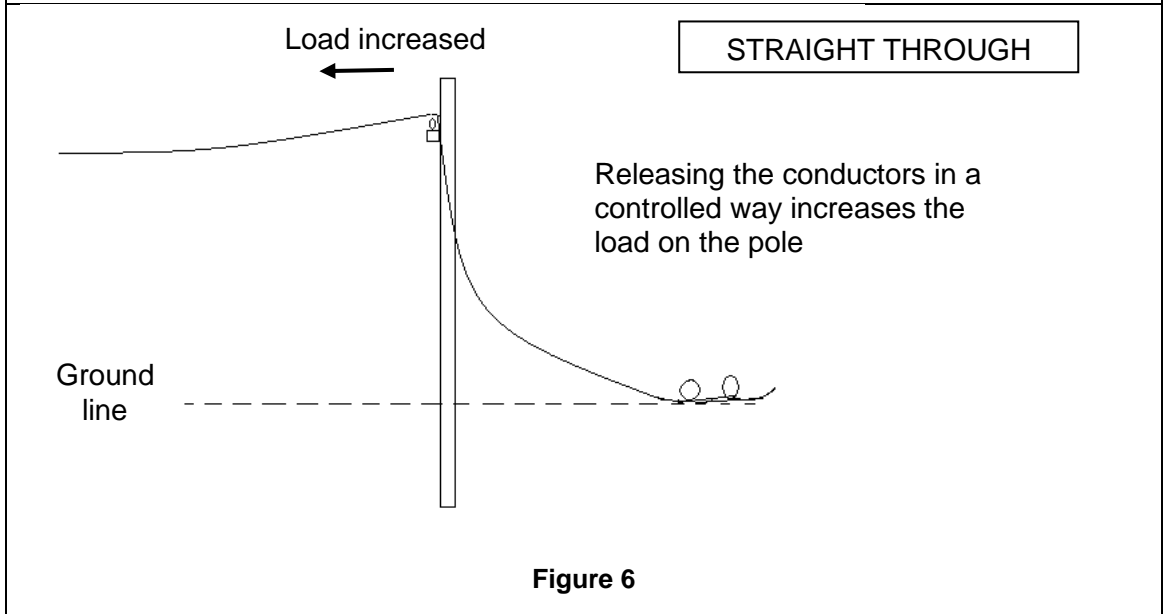
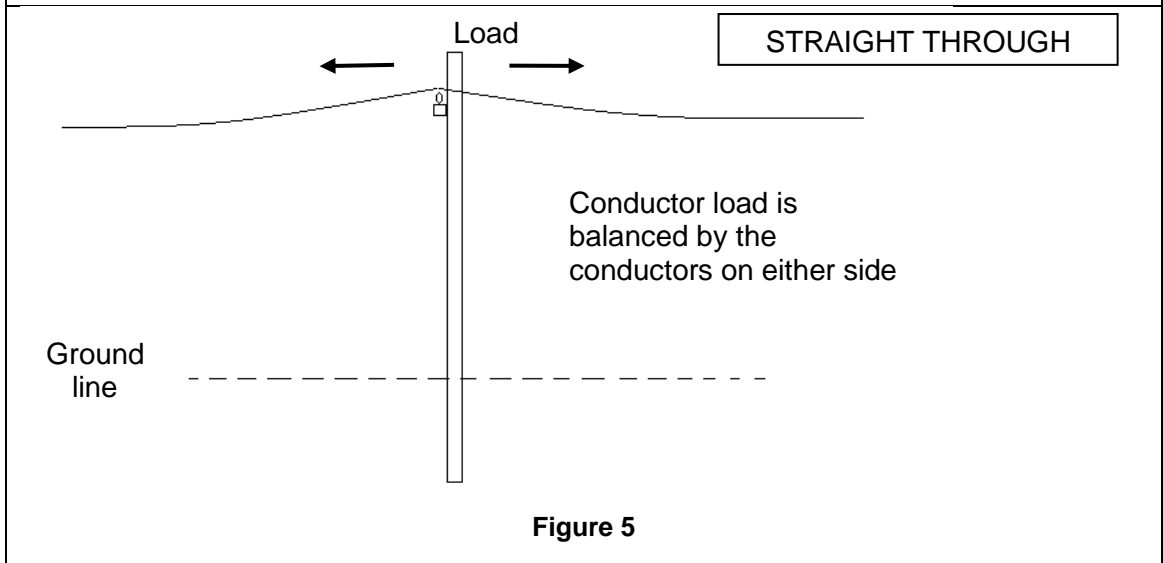
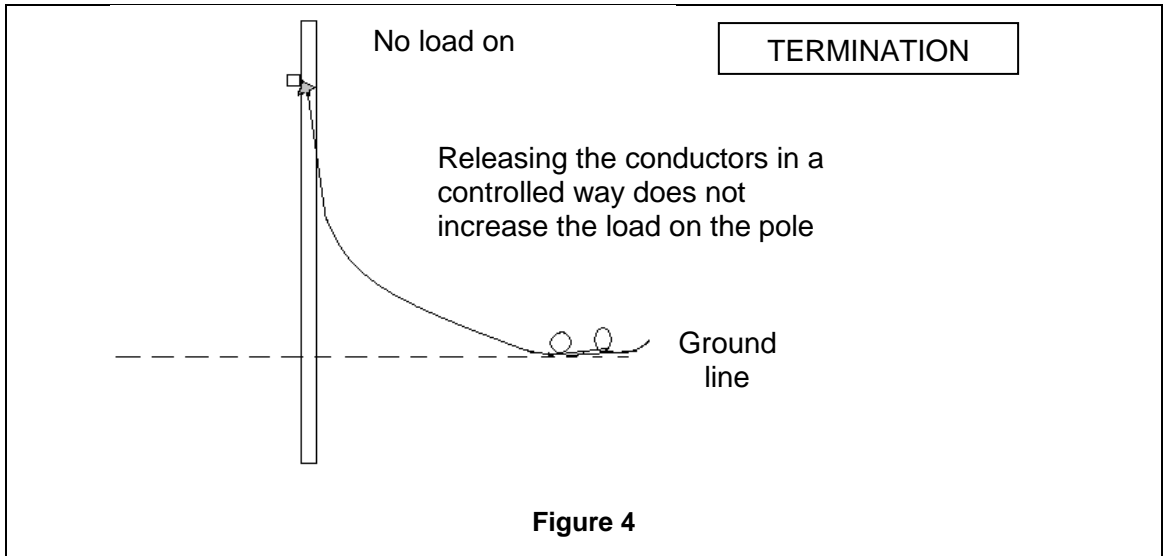
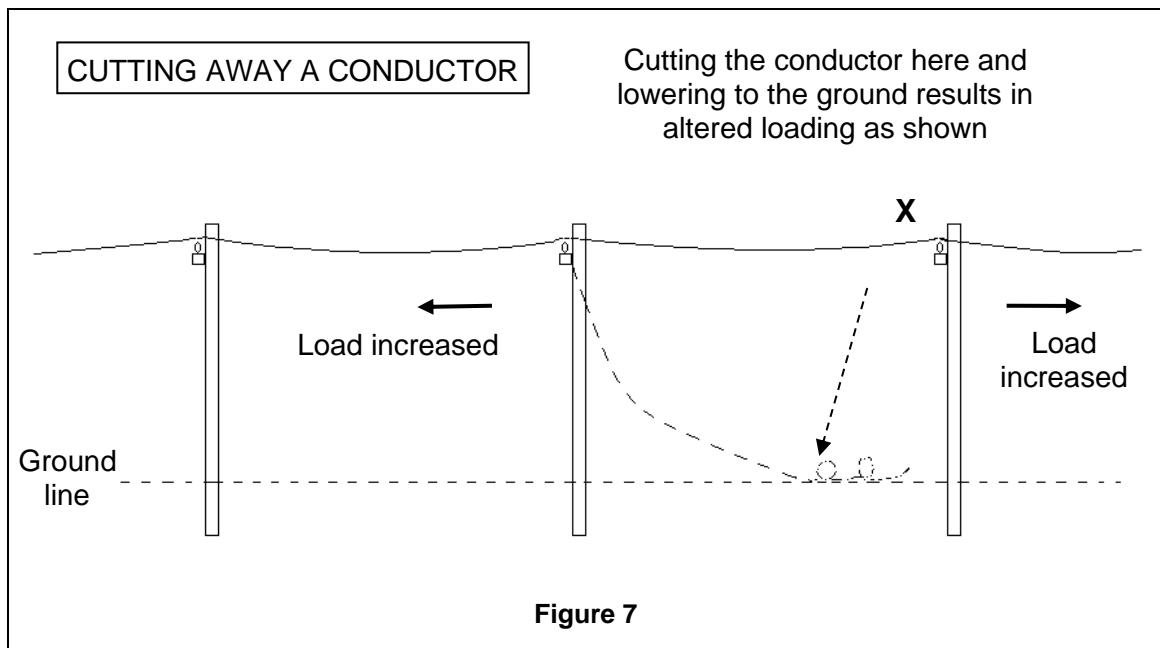


Figure 3





When working on a pole at no time during a task is the load on a pole to exceed the design capacity of the pole. An approach to the work must be employed that does not overload the strength of the pole worked on or any adjacent pole. In many cases the combination of the conductor type and short span lengths will mean that poles in a serviceable condition rating or better will not be overloaded during normal work providing techniques are used to make sure shock loading of the pole/s does not occur. Where there is any doubt about the pole's capacity to support the loading that will be applied while performing different tasks/steps in the work proceedings or where the condition of the pole is rated as less than serviceable, the pole must be secured against the load applied at all times during the work process (note that the load applied may vary throughout the work process). Conditionally serviceable or condemned poles are assumed to have no additional design capacity than that required to hold the network in its current state.

Note: Certain maintenance and construction activities, while technically altering pole tip loading, will not alter loads to a degree which results in a risk of overloading the pole. Examples of such work include:

- taking up tension and releasing a conductor for the purpose of creating slack to allow the insertion of a sleeve and/or replacing termination equipment (eg insulation discs) using a lugall, service puller or other similar device
- removing or replacing of streetlight mains cable
- removing or replacing service lines from serviceable poles (nailed poles are technically serviceable poles)
- untying conductors from a straight through pole where the load in adjacent bays is similar (ie. comparable span length, sag and conductor type/size) for the purposes of insulator or crossarm replacement.

It is very important that the concepts of 'rating of a pole', 'capacity of a pole' and the 'pole foundation' are understood. For example: when new, a wood pole has a capacity of 4 times that of its rating. The foundation of a pole should have been designed to meet the rating of the pole. However, work practices in some areas may have resulted in the foundation only being designed for the original loads on the pole. If the rating of a pole is exceeded or it is not in the ground deep enough to support the load applied it is likely that the pole will move in the ground and lean.

WARNING

Shock loading can cause failure of sound poles. The tension on the conductors must be released in a controlled manner. Under NO circumstances is it allowable to cut down unsecured conductors that are under tension and allow them to fall in an uncontrolled manner.

As a pole ages its strength will degrade. This reduction in strength reduces the capacity of the pole but not its rating. Once a pole degrades to a point where its strength is reduced to more than 50% of what it was when new (the factor of safety has reduced to less than 2 and it is considered conditionally serviceable) Ausgrid then nails the pole increasing the nailed pole strength and making certain that the strength of the nailed pole never drops below 50% while the serviceability conditions for nailed poles continues to be met (Ref NS 145 Pole Inspection and Treatment for information on pole serviceability criteria).

Where doubt exists about a pole's attached load, local overhead design personnel should be consulted to calculate the existing loading. There is conductor loading data and load calculations examples available in NS220 Overhead Design Manual - (Section 12) to assist in estimating the amount of load alteration to the pole tip load. Scheduled work is usually not performed on unusually windy days so the wind force load would be negligible.

4.4.2 Reinforced (nailed) poles

Poles selected for nailing are limited life poles (conditionally serviceable or condemned) which are strength degraded in the below ground area but which are essentially in acceptable condition elsewhere. The nail replaces the degraded material restoring much of the poles lost strength.

Reinforced (nailed) poles are reinforced to support the load currently attached to the pole at the time of reinforcement. The "nail" selected will be the closest strength rating "nail" that equals or exceeds the capacity to support the current load on the pole. The outcome of this means the reinforced pole will carry the current load and may have some additional capacity.

When planning work involving a "nailed" pole the strength rating of the reinforced pole must be established and considered against the work to be undertaken before adding any additional load to the pole.

Once nailed, the result is a structure with a rating which identifies it as being able to manage the current loads on the pole. However, it should be noted that a nail is designed with a factor of safety of two ie. a pole, once nailed, will have a capacity of at least twice this amount. This factor of safety of 2 means the nailed pole is considered serviceable and remains so until the conditions for serviceability for the nailed pole are no longer met.

Note: the minimum sized nail used provides sufficient strength to manage any change in loading caused by service work involving cables up to 25mm².

The reinforced poles strength can be calculated using the height of the highest conductor attached on the pole and the strength of the attached nail (reinforcement). The strength of the attached reinforcing nail should be stamped into the top of the nail's flange. Information on the reinforced strength of the pole (Tip Load Capacity (kN)) or the nail rating information found in the long text of M7- Minor capital; Pole x Reinstate Notification may be provided in the SAP database.

Example – Cutting away of ABC Conductor on a Nailed Pole

Tip load Capacity = Nail rating (kNm) / height of highest conductor above ground

Eg Tip Load Capacity = 36kNm / 8.4 = 4.3kN

Nail rated (stamped) at 36 kN and will have adequate strength

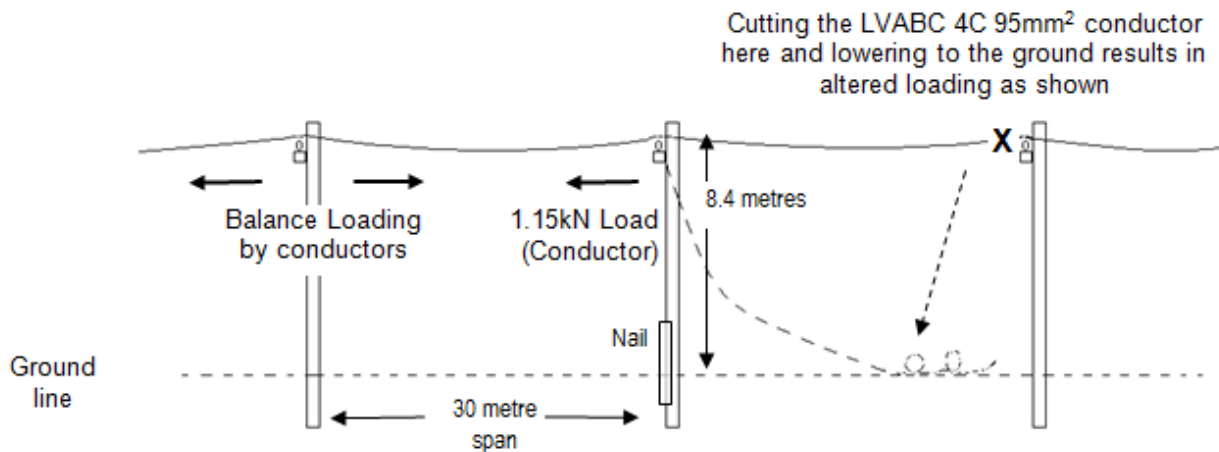


Figure 8

Note: In the drawing the conductor is LV ABC 4C 95mm² – 30 meter span, Sustained 5°C (Static load), Slack tension 2% UTS = 1.15kN (refer table NS220 Clause 12.1.5). Cutting the conductor as shown above changes the nailed pole from a straight through pole to a termination pole. Scheduled work is usually not performed on unusually windy days so the wind force would be negligible.

It is fundamentally important when working on reinforced pole that its strength rating is not exceeded.

Remember work processes must not impose loads beyond the pole's rating and it is particularly important when releasing or attaching conductors where the pole is not counter balanced by other conductors or stays. Additional information is available in the Network Engineering Guideline NEG-OH06 Load Alterations to Reinforced Poles.

Where there is any doubt about a pole's attached load, local overhead design personnel should be consulted to calculate the existing loading.

5.0 PROCEDURES TO BE FOLLOWED BEFORE WORKING ON A POLE

5.1 Procedural requirements

Before working on any pole, personnel must satisfy themselves that it is safe to work on and in no danger of collapsing during the course of work. Work carried out on one or more poles may change the loading on poles nearby during the course of the work. These other effected poles must also be inspected in accordance with this procedure to make sure they are not in danger of collapse. For example, when all conductors are removed from one or both sides of a pole, the pole or poles either side that will carry the altered conductor load during the course of the work must also be inspected.

Note: The load on the pole is not to exceed the pole rating (kilo-Newton) at any time.

Work on a pole includes linework either by climbing or elevating work platform (EWP), as well as substation, telecommunications, service and operating work which may be carried out from a pole platform, pole steps, ladder, EWP, etc.

When working on a wood pole, you must follow the procedures described in this Standard and the flow chart (Figure 8 below) with its associated notes. The flow chart has been developed to help you make a decision about whether or not you should work on a wood pole.

Refer to Section 6 for pole inspection for Rebutted and Reinforced Poles.

Refer to Section 7 for Pole Inspection Process - Steel, Concrete, Fibre Cement and Private Poles (including 'A' Poles).

SAFETY INSPECTION PROCEDURE FOR WORK ON WOOD POLES

For full details to refer to Network Standard NS 146 Inspection procedure for working on poles, section 5.
For concrete, steel, nailed, splinted or rebuttet poles refer to the full Network Standard (sections 6 & 7).

**STEP 1
ABOVE GROUND INSPECTION AND SOUNDING**

General Safety

- Check for step and touch voltages in accordance with clause 3.4.1
- Check the pole for asbestos as required by clause 3.1.1

Pole Condition

- Check for rot, termites and damage (vehicle, fire, storm etc)
- Check pole top for loose fittings that may fall

Pole loading

- Unusually tight or slack wires? (including service mains)
- Pole leaning/moved in ground?

Pole Foundations

- Sinking depth OK?
- Poor soil compaction?
- Change in level (eg, local erosion or excavation.)

Sounding

- Sound with ball of ballpeen hammer all around pole from groundline to your reach.

Carry out additional requirements of Clause 7.5 as appropriate to the pole

Refer to NS146 Clause 5.3.2

**STEP 2
BELOW GROUND INSPECTION**

**STEP 3
BACK-FILL**

- REMEMBER:**
- DO NOT disturb termites.
 - DO NOT drill the pole.

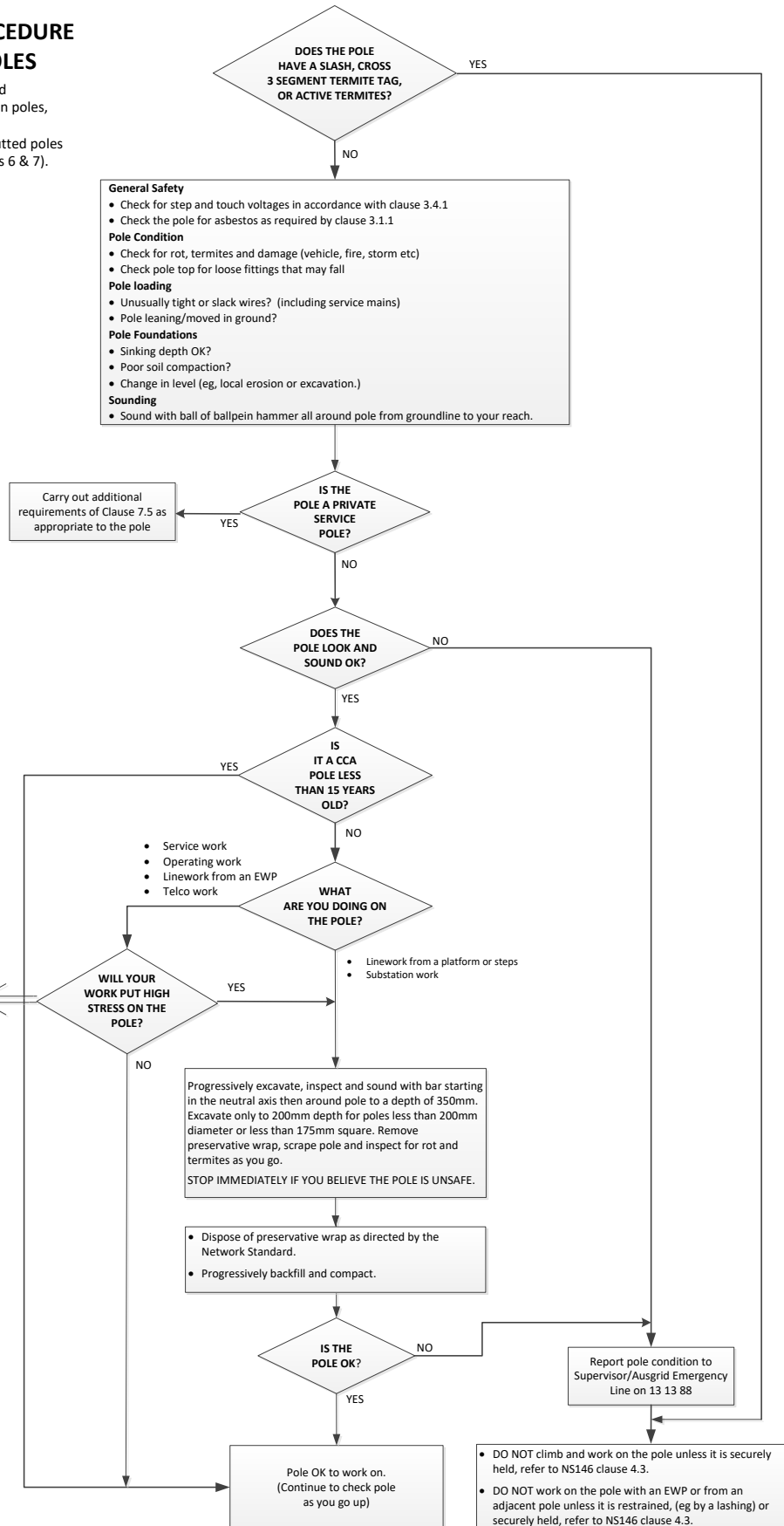


Figure 9 – Flowchart

Figure 9 - Flow Chart (Safety Inspection Procedure for Work on Wood Poles)

Associated Notes

Does the wood pole have an orange band, slash, cross, or termite disc or 3 segment Termite Tag?

You are looking for evidence that the pole has previously been identified as defective or as having active termites in the pole. Ausgrid uses a single orange self-adhesive band 75mm wide, encircling the whole pole, marked with Black 'X X X's and the organisation's name (see Figure 10 below), to identify defective poles, and the orange band plus two diagonal lines forming an 'X' to identify condemned poles.

A single slash mark as shown in Figure 12 below is the old defective pole marking and if found should be taken to also indicate a defective pole.



Poles known to have active termites are identified with a 3 segment Termite Tag as illustrated below in Figures 13 to 16, or with circular aluminium disc with a 'T' stamped into it, which was the old system prior to the introduction of the 3-segmented tags.

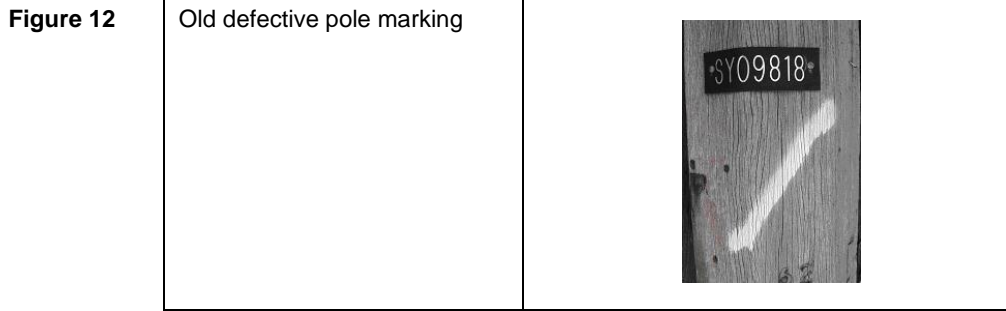
The pole must not be climbed, unless adequately stayed or supported, if:

- active termites are present as indicated by a Termite Tag with all 3 segments attached (see Figures 13 and 14 below), or
- you identify active termites during your inspection.





A Termite Tag with either the top only, or the top and the middle segments (T2) attached (see Figures 15 and 16 below) indicates the pole has been treated for termites and subsequently inspected and found free from active termites and in a serviceable condition.

Note: The circular "T" disc is the old method to identify a pole with termites and consequentially then treated for termites. The discs have not been used for eight years. These poles are to be treated in the same way as poles that have a single termite tag.

<p>Figure 10</p>	<p>Defective pole marking - Orange band</p>	
<p>Figure 11</p>	<p>Condemned pole cross (will have orange band above X)</p>	



Segment Termite Tag:

<p>Figure 13</p>	<p>As found on a pole when termites are first identified. No treatment has been carried out. (no date stamped in top segment) Active termites in pole.</p>	
<p>Figure 14</p>	<p>Termite treatment has been carried out in the month and year stamped onto the top tag. Active termites in pole.</p>	
<p>Figure 15</p>	<p>Pole has been fully inspected and found to be free of active termites and in a serviceable condition. No active termites.</p>	
<p>Figure 16</p>	<p>12 month follow up termite inspection has been carried out and no active termites identified. No active termites.</p>	

5.2 Above ground pole inspection

5.2.1 Inspection

Inspect poles for defects such as:

(a) General pole defects including:

- asbestos in paint ref: clause 3.1.1
- vehicle damage
- loose pole cap
- attached mains and hardware
- cracked or damaged insulators
- lightning damage
- excessive splits (barrel checks)
- excessive knots and grub holes
- loose sapwood.

Controls must be put in place to manage the risk associated with any hazard identified and defects that indicate the potential for hidden damage must be further explored to determine the extent of any degrade or the pole treated as conditionally serviceable until it is proved to be in good condition.

- (b) Electrical voltage due to leakage current using a proximity type voltage detector capable of detecting voltages of 50V and above. See NEG-SE05-06 Safety Equipment – Care, Use and Inspection, for further information.
- (c) Fire damage (especially untreated burnt (charred) areas on CCA poles). All charred material must be removed to expose the remaining sound timber so that the external diameter measurement can be taken.

Important: Refer to Section 9 Burn or Burning CCA Timber Poles for precautions where exposure to burnt CCA is possible.

- (d) Foundation failure. For example; washed away soil, or undercutting of ground line. Is there, or has there recently been excavation work in close proximity to the pole? An open trench within 1.5 metres of a pole has the potential to destabilise the pole.
- (e) Pole leaning. Has it moved in the ground? Has it moved due to excessive load or due to weakening of the pole below ground? A lean of 5 to 10 degrees caused but the static loading on the pole is acceptable provided there is no evidence of a gap at the back of the pole indicating recent movement. Poles showing evidence of recent movement must be treated as conditionally serviceable until proved otherwise.
- (f) Unusually tight or loose conductors, including service mains. This may indicate the pole is being held up by the conductors due to failure of the pole at or below ground line. Never “let a conductor off” lessen the tension by undoing the termination and letting it slip through. All conductors must be held against the load using an appropriate attachment and line or winching device prior to loosening off a termination (or tie on a pin insulator where there is risk of uneven tensions in adjacent spans).
- (g) Sinking depth. Is the pole disc about 2 metres or less above ground (some smaller poles will have their disc about 2.3 metres above ground line). Is there a ‘tide’ mark on the pole indicating the ground line has been lowered due to road works or similar activities? If the pole is not in the ground deep enough due to a change in the local environment it must be treated as conditionally serviceable until proved otherwise.
- (h) Termite activity in wooden poles. Any pole with active termites present must be treated as conditionally serviceable.

- (i) Internal defects: Test wooden poles by sounding as part of the above ground inspection in accordance with the directions in NS145 Pole Inspection and Treatment Procedures (Wood poles are also sounded as part of the below ground inspection if you perform one). Do not strike any pole with active termites in it. Any pole with active termites must be treated as conditionally serviceable and reported to your Supervisor or contact Ausgrid's Emergency Line on 13 13 88 immediately. Any area on a pole where sounding indicated there is a significant defect such as excessive rot must be treated as conditionally serviceable until it is internally inspected and proved to be in sound condition.
- (j) Pole head defects: Visually inspect the pole above ground up to and including the head. Carry out a detailed assessment following the visual assessment where uncertainty exists about the condition of the pole near the head of the pole. The inspection of the head of wood poles process is provided in Annexure B.

If areas of a pole are identified that require internal inspection, contact the work Supervisor or Ausgrid's Emergency Line on 13 13 88 immediately to request an inspection by a Pole Inspector. These poles must be treated as conditionally serviceable until an inspection proves they are not or they are re-instated. Conditionally serviceable poles must not be climbed or worked on from an elevating work platform unless adequately stayed or supported.

5.2.2 Does the pole look and sound OK above ground?

No: Do no further work on the pole and tell your Supervisor or contact Ausgrid's Emergency Line on 13 13 88 immediately.

Yes: Continue with a below ground inspection in accordance with clause 5.4.

5.2.3 Is it a CCA pole less than 15 years old?

Work may proceed if the pole is CCA treated and less than 15 years old and has passed the above ground inspection. CCA treated poles under 15 years of age have proven sufficiently resistant to fungal decay and termite attack to not require excavation and below ground inspection. However, any pole with active termites must be treated as conditionally serviceable and reported. If the pole is not CCA treated or over 15 years old, further inspection is necessary.

The age of CCA poles may be determined from the pole disk, refer to NS145 Pole Inspection and Treatment Procedures, Annexure A for details on the various poles disks used on the poles in Ausgrid's network.

CCA poles are a green colour with a natural round shape. Non CCA poles do not have the green colour and if they have been desapped by machining they may have an 8 or 16 sided shape. The age of the pole can be determined from the year of felling stamped into the pole disc. The year is indicated by 2 numerals only. Poles without a disc are over 15 years old.

Note: There are a small number of poles (approximately 59 poles with a 2003 year disc which were only installed in the Oatley district area) that have been desapped by machining to an 8 or 16 sided shape but have been through the CCA treatment process. These poles must be treated as non CCA impregnated desapped durable poles because without the sapwood to retain the chemical there can be no effective protection for the pole.

5.3 What are you going to do on the pole?

5.3.1 Type of work

The type of work you will be carrying out on the pole is indicative of the stress you will place on the pole. Information on stresses that can be applied to poles due to loading or altering the load on a pole is found in Clause 4.4. Telecommunications work, linework from an EWP, System Operation work and some types of service work may not place high stress on a pole, however you must carefully assess how you will carry out your work before you arrive at this decision. Most other types of work, eg. linework from a platform, could stress a pole sufficiently that the pole may fail if in a weakened condition and therefore must be dug out and inspected.

Note: The risk assessment of the work and the agreed work methodology and controls must be clearly stated on the pre-work Hazard Assessment Check (HAC) form.

5.3.2 'High stress work' on poles

Work that places 'high stress' on a pole is any work that increases the total load (resultant of the vector sum of forces) on a pole. Dynamic or sudden changes in loading such as that caused by cutting away or dropping conductors that are in tension will place significant high stress loads on poles.

Work that may result in high stress being applied to poles includes:

- work where the pole's attached construction will be changed
- where the attached load on the pole will be changed
- where the direction of the attached load will be changed.

Examples of high stress work include:

- The addition of telecommunication cables such as Optus overhead infrastructure can significantly alter the resultant load on a pole.
- Removing overhead conductors in any direction (regardless of the size of the conductor) when there are other conductors in tension in the opposite side of the pole and adding conductors where the pole is not supported against the pull.
- Changing or replacing an existing service wire with a new service wire (when there are other service wires in tension in the opposite side of the pole), which will involve the old service wire being dropped temporarily on one side of the pole and a new service wire being pulled up.
- Climbing or working from a private service pole where the load applied by climbing is not supported (eg. by service conductors).
- Tensioning a service connected to a private service pole where the pole is a termination pole such as an "A" pole (even a small increase in tension may cause a degraded customer pole to fail).

Notes: Upgrading a service (when there are other service wires in tension in the opposite side of the pole) is classified as 'High stress work' because cables must be released and pulled up ie. The load is temporarily increased.

Private service poles may be of variable construction, including material quality and sinking depth and may not have been maintained to the same standard that Ausgrid's poles are.

Poles are placed under significant stress when personnel working near the pole head cause the pole to sway due to a dynamic load. A dynamic pole load is commonly generated when a pole's construction is changed. For example, a rocking motion is created by personnel using a hand saw near the pole head, or by trying to free an item of equipment attached to the pole, such as an old crossarm. Where a dynamic load is likely to be applied to a pole, the associated work is classified as 'High stress work'.

5.4 Below ground inspection of unreinforced wood poles

5.4.1 Process

If the flowchart has taken you to the point of requiring a below ground inspection then the following process is to be followed.

1. Poles with concrete or bituminous paving at ground level **MUST** have this material removed for a below ground inspection to be carried out. If this cannot be done these poles must be treated as conditionally serviceable and reported. You should be particularly wary of poles that have been concreted in at ground line. This practise encourages fungal decay and may hide a dangerous pole.
2. Do not fully excavate around a pole initially in case the pole has become dangerously degraded. Excavate only sufficient soil to allow an external inspection of a strip of the below ground section of the pole. The initial excavation should be at least 200mm deep, but no further than 350mm, and in the neutral axis of the pole (refer to NS145 Pole Inspection and Testing Procedures for information on finding the neutral axis).
3. Cut away any preservative wrap bandage (eg. Bioguard Bandage, Austplast Bandage) where fitted, to expose the below ground face of the pole. Refer Clause 5.5.
4. Use a rounded point bar to test the soundness of the exposed timber as explained in Clause 5.4.2. The rounded point bar is used to strike the pole from the bottom of the excavation up to ground line in sufficient steps to find any decay or areas of thin wall thickness.

Note any loss of sound timber on the below ground section of the pole.

5. Assess any loss of sound timber. If the loss of sound timber is 10 per cent or more, of the ground line pole diameter on the excavated side of the pole, then the pole is to be treated as conditionally serviceable, backfilled and reported. For example: If a pole has an original ground line diameter of 300mm, then a loss of 30mm (10 per cent) on the excavated side would mean the pole would have to be rated as conditionally serviceable. Note that the depth of penetration of the bar indicates where the sound timber starts, and any soft or decayed timber must be discounted when assessing the reduced diameter.
6. Excavation should only continue where adequate sound timber is found. Conditionally serviceable or potentially dangerous poles must be backfilled and the situation reported to your Supervisor or contact Ausgrid's Emergency Line on 13 13 88 immediately for the attention of a Pole Inspector.
7. Where the initial excavation indicates adequate sound timber, carefully continue the excavation so the section of the pole between ground line and 350mm below ground line is fully exposed. Remove any existing bandage and dispose of in accordance with Clause 5.5. The below ground inspection consists primarily of an impact test with a rounded point bar (5mm point radius and weighing approximately 6kg), however it should be supplemented by sounding with a ballpeen hammer to as far below ground line as possible.

5.4.2 Procedure

Strike the pole firmly at the base of the excavation so the bar strikes the pole where it meets the soil. The bar should deflect off the pole if it is solid, with the point embedding itself into the soil at the base of the excavation. After testing at the base of the excavation, the bar should then be used to impact the pole above this point. It is very important to perform the sounding with sufficient diligence that external defects or internal defects that are close to the outside surface of the pole are found so that they can be then further explored to determine their extent.

A guide on a systematic detailed pattern for the striking and sounding the pole using the bar is illustrated in Figure 17.

Persons working on poles must satisfy themselves that sufficient sounding of the poles using the bar is carried out so that areas of decay are not missed. The age and general condition of the pole could influence the amount of sounding carried out. The older a pole is, generally the more likely it will show some signs of decay, either internally or externally, as a result older poles should be given a more thorough sounding. Newer poles are less likely to be degraded to a degree that renders them defective. However, decay on poles can be hard to identify, and often patchy, and the appearance of the timber can be deceiving, a detailed sounding will identify a defective pole while poorly applied sounding may miss a defective pole.

Particular attention must be paid to any area below ground where the pole is covered by anything that may prevent the chemical treatment (applied to control fungi) from being applied correctly and reduce the effectiveness of the treatment. Such areas will include where:

- the timber of the pole is hard up against kerb and gutter or retaining walls and any area immediately adjacent.
- underground cables and their covers run up the side of the pole.

Areas that are not treated properly below ground with a fungicide are much more likely to decay than areas that are treated. The timber immediately adjacent to these sites must be carefully inspected as far as it is practicable to do.

This suggested method tests the pole from the base of the excavation to groundline in a thorough manner.

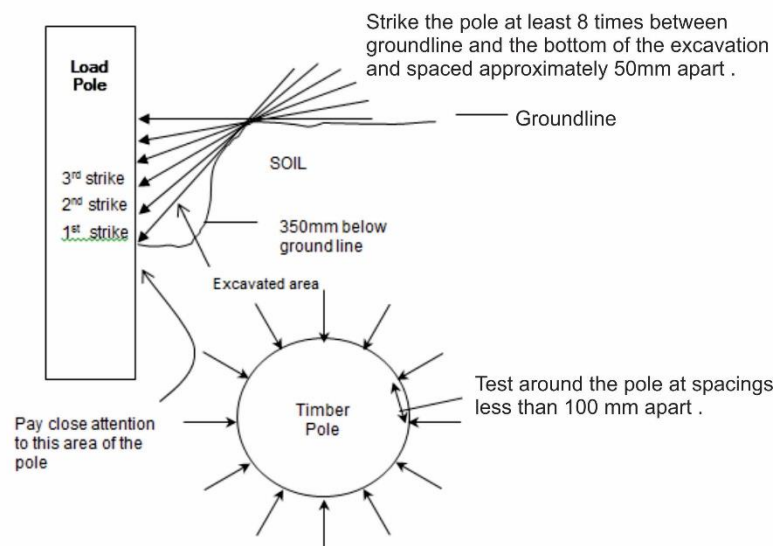


Figure 17: Guide to systematic detailed sounding of poles using the bar

You must pay particular attention to the area of the pole at, and below, the bottom of the excavation. If severe decay exists deep below the excavated area, there is often detectable decay near the bottom of the excavation. A pole with a significant defect below the bottom of the excavation may also be loose in the ground, and you should be alert for any movement of the pole in-ground when struck with a bar at the base of the excavation.

By testing a pole in the manner described, the point of the bar will penetrate decayed timber to reveal the true extent of any sound timber, or lack-there-of. In addition, where the pole sounds hollow, the bar should be driven vigorously into the suspect area. This will result in the bar penetrating a thin wall of sound timber or bouncing off if adequate sound timber exists.

This method of testing will identify timber degradation on the external surface of the pole, and internal defects close to the surface of the pole.

It is not necessary to hit the pole excessively hard unless a defect is suspected, in which case you may hit it as hard as you like. A bar with the correct point (5mm radius) and weighing approximately 6kg, will bounce off sound hardwood timber, but will penetrate defects existing close to the surface of the pole. This procedure is critical to ensuring confidence in the soundness of the pole.

- (a) Measure the minimum below ground diameter, discounting any decayed timber detected by the pointed bar.
- (b) Inspect for fungal decay at the bottom of the excavation. If the pole is affected with fungal decay at a depth greater than 350mm, treat the pole as conditionally serviceable and tell your Supervisor or contact Ausgrid's Emergency Line on 13 13 88 immediately.
- (c) If you are satisfied that the pole is serviceable, backfill the excavation in steps of 100mm, ramming each level until fully reinstated. Reinstated the surface around the pole leaving it neat and tidy, and in an 'as found' condition.

5.4.3 Is the pole OK?

Is the pole considered satisfactory from the checks carried out in accordance with Section 5?

5.4.4 Pole is OK to work on

Continue to check pole as you go up.

Your checks so far have indicated the pole is satisfactory in the ground line area. However you must continue inspecting the pole by careful observation as you ascend, continually looking for evidence of rot or termites. Any loose pole steps should be investigated, as they may indicate internal fungal decay or termite damage. If a possible defect is detected, it must be further investigated by sounding with a ballpein hammer, or the problem reported and the pole treated as conditionally serviceable unless adequately stayed or supported.

5.5 Handling, removal and disposal of used Bioguard bandages

CAUTION

Precautions should be taken to avoid contact with the skin and eyes. When handling a Bioguard bandage or a Ausplast bandage synthetic rubber/PVC gloves or nitrile disposable gloves must be worn.

Note: A new set of Nitrile gloves must be used following each exposure to the above chemical products

Bioguard bandages previously applied to poles are to be removed as part of the below ground line inspection. The bandage will be replaced by the Pole Inspector at the next scheduled maintenance. Bandages and any loose residue are to be put back around the pole and buried so that none of the bandage is visible above ground.

Ausmose 'Ausplast' bandage is commonly utilised instead of the Bioguard bandage where the ground is persistently wet. The Ausplast bandage is biodegradable and no waste is expected to require removal at subsequent inspections however the paper backing may require removal in order to inspect the pole below ground line if it has only been recently installed and not degraded.

6.0 REBUTTED AND REINFORCED POLES

6.1 Rebutted poles

Inspect rebutted poles as follows:

- Inspect the pole and fittings above the steel sleeve for any signs of deterioration or damage. In particular sound the wood pole in accordance with Clause 5.2.
- Inspect the machined down timber immediately above the sleeve for any sign of fungal decay or termites.
- Inspect the timber visible through the three inspection holes for any sign of fungal decay or termites.
- Inspect the drain hole and clear out if blocked. The space between the top of the concrete and the bottom of the pole should be probed through the drainage hole for any signs of deterioration.
- Inspect the steel sleeve for any signs of corrosion or termite activity.
- Where sounding indicates a defect, treat the pole as conditionally serviceable. The timber within the sleeve should be inspected via the existing inspection holes in the steel sleeve. If fungal decay is detected or there are active termites in the pole, it must be treated as conditionally serviceable and referred to the Contracts Officer – Regional Contract Services (note: for level 1 contestable works contact should be made through the contestable works compliance officer – ASP Compliance).

6.2 Reinforced poles

Inspect reinforced poles as follows:

- Visually inspect the steel splint or nail for signs of rust or damage (poles supported by a reinforcement that is rusted to the degree that there is clear loss of steel section are to be reported and treated as conditionally serviceable). Confirm the bands around the splint and pole are tight, or that the nail is pulled tightly against pole by the bolts (loose splints are to be reported and treated as conditionally serviceable).
- Inspect the pole for active termites. You must pay particular attention to all checks and cracks in the pole, and along the edges of and behind the splint or nail. If termites are found treat the pole as conditionally serviceable and have it reported to the Contracts Officer – Regional Contract Services.
- If no termites are found, thoroughly sound the pole (in accordance with Clause 5.2) from 300mm above ground line to as high as you can comfortably reach, paying particular attention to the area around and above the top reinforcing bands or bolts.
- If sounding indicates a defect in the area of the pole at or above the lower attaching bands or bolts, treat the pole as conditionally serviceable.

6.3 Changing loads on reinforced poles

It is fundamentally important when working on reinforced pole that its strength rating is not exceeded. Where doubt exists about a pole's attached load, local overhead design personnel should be consulted to calculate the existing loading. Remember it is particularly important when releasing or attaching conductors where the pole is not balanced by other conductors or stays.

For addition information refer Clause 4.4.2.

7.0 STEEL, CONCRETE, COMPOSITE AND PRIVATE POLES

7.1 General Requirements

All poles must be fully inspected before it can be determined that they are safe to work on, partial inspections will generally not suffice. Unless the pole is known to be new, or specific current technical advice on the condition of the pole is available, there must be no part of the pole that cannot be inspected in the areas identified for inspection in the following clauses.

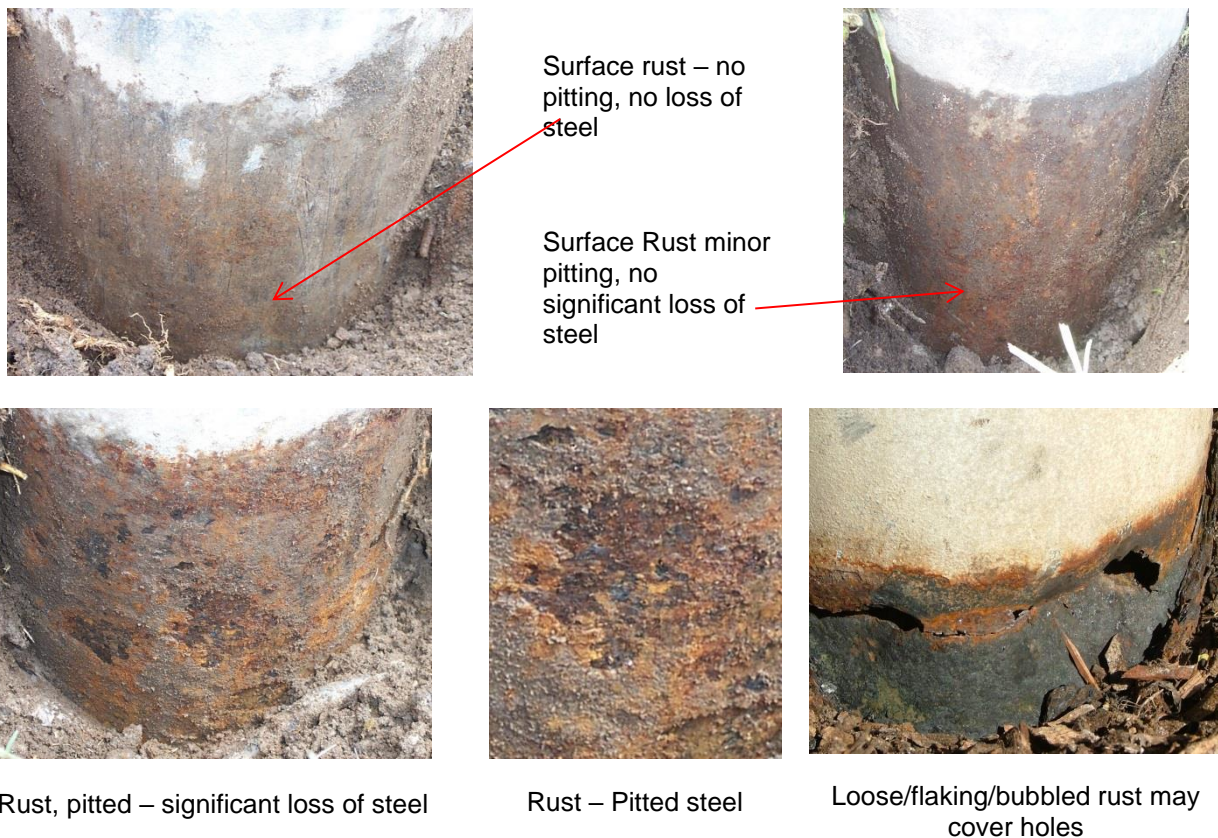
A covering on a pole may hide a serious defect as might an adjacent concrete mass or wall. Unless the person inspecting the pole can see under or between such obstructions and the pole and conclude that the pole is safe, or they know the pole to be new (and therefore in good condition) the pole must be treated as conditionally serviceable.

7.2 Steel line poles

7.2.1 Direct buried steel poles:

Direct buried steel poles carrying distribution cables should be inspected by visually looking for rust around ground line and by striking it firmly with the flat face of a hammer so as not to damage the protective galvanised coating. The purpose of striking steel poles is to dislodge both internal and external flaking or blistered rust and expose any perforations (holes) in the steel pole. All poles older than 5 years and those poles where rust is found above ground line are to be excavated to a depth of 100 mm and inspected for rust or damage. Where rust or damage extends beyond 100 mm excavate further to determine the full extent of the defect, but not beyond 350 mm. If any perforations are found in the steel pole it is to be treated as conditionally serviceable and reported to your Supervisor or Ausgrid's Emergency Line on 13 13 88 immediately.

Note: Do not strike the pole too firmly; it will only damage galvanised or painted surfaces. To detect defects in steel poles, a gentle tap in the degraded area is sufficient.



Figures 18 to 22 - Rusted steel poles

7.2.2 Rag bolt assembly steel poles:

The steel pole component above ground is to be inspected for rust as described in clause 7.1.1.

The base flange and associated welds and fastenings are to be inspected. Where loss of metal has occurred due to rust (rust bubbles/flaking exists and there is a clear loss of steel) or where securing nuts are missing the pole is to be treated as conditionally serviceable (until it has been evaluated by Ausgrid's Mechanical Engineering group) and reported to your Supervisor or Ausgrid's Emergency Line on 13 13 88 immediately. Loose nuts securing base plates are to be tightened prior to working on the pole.

Concrete rag bolt foundations are to be inspected above ground. Where concrete has broken away, or is cracked the pole is reported to your Supervisor or Ausgrid's Emergency Line on 13 13 88 and treated as conditionally serviceable.

7.3 Concrete line poles

Concrete line poles are visually inspected only. Concrete line poles are to be visually inspected above ground line for spalling of the concrete, vehicle or vibration damage and/or cracking. Spalling is the breaking off of pieces of the concrete pole surface due to weathering. It is generally caused by water infiltrating small surface cracks and causing the steel reinforcement to rust and swell. Poles showing evidence of spalling with exposed reinforcement should be treated as conditionally serviceable and reported to your Supervisor or Ausgrid's Emergency Line on 13 13 88 immediately.

7.4 Fibre composite poles

Fibre composite poles are visually inspected above ground line for vehicle or physical damage. Poles showing evidence of significant physical damage should be treated as conditionally serviceable and reported to your Supervisor or Ausgrid's Emergency Line 13-13-88 immediately.

7.5 Private poles including Customer's "A" poles

7.5.1 General

Private poles can be of unknown construction and may not have been maintained to the same procedures as Ausgrid poles. Therefore, great care must be exercised when working around private poles.

These poles are also often surrounded by other materials such as concrete, installed in landscaping features or hard up against walls and workers must not disturb these adjacent materials as they may be contributing to the support of the pole. However, anything installed up against the pole in the ground line area may prevent workers from carrying out a complete safety inspection. This section (7.5) provides requirements which, together with the detail in clauses 7.1 through 7.4, must be followed when making a decision about whether or not a private pole is safe. Note: Ausgrid employees must refer to Annexure A for additional requirements. These requirements may be summarised as:

To climb a private pole workers must either:

- be able to fully inspect a pole to be able to make a determination about whether it is safe, and have determined the pole is safe after completing the inspection, or
- know the pole to be new.

While a pole that has been identified as safe to climb may be climbed and worked on, workers must consider, through their use of the on-site pre-work risk assessment, whether alternatives to climbing (such as using an EWP or a platform ladder) and options for management of load alterations are available to further reduce any residual risk.

Private poles should be visually inspected and sounded above ground line as indicated in Clauses 7.1, 7.2, 7.3, 7.4 and 5.2 for steel, concrete, fibre composite or wood poles, and dug out as required. In addition all steel or wood direct buried private poles shall be inspected and sounded below ground line as previously described for steel and wood poles as described in Clause 7.1 and 5.4.

7.5.2 Wood poles less than 200 mm diameter (or 175 mm square section)

Wood Poles less than 200 mm Diameter (or 175 mm square section) must be either; not climbed or inspected as described in Clause 5.4 (but do not excavate deeper than 200 mm) and deemed to be safe. The inspection will include:

- a) Inspection for termite activity. A private pole under 200 mm in diameter (or 175 mm square section) that is infested with termites is to be classified as condemned and the pole reported so it can be defected* (tell your Supervisor or contact Ausgrid's Emergency Line on 13 13 88 immediately *).
- b) Testing the pole with a rounded point bar in accordance with Clause 5.4 (inspecting for external defects) and sounding the rest of the pole as high as can be reached with a ballpein hammer in accordance with the instruction given in NS145 Pole Inspection and Treatment Procedures.
- c) Inspection for external defects and investigate the extent of any found. If the below ground line external inspection reveals a diameter reduction of 10% or more, treat the pole as conditionally serviceable and report the pole so it can be defected (tell your Supervisor or contact Ausgrid's Emergency Line on 13 13 88 immediately *).
- d) Inspection for fungal decay at the bottom of the excavation. If the pole is affected with fungal decay at a depth greater than 200 mm, treat the pole as conditionally serviceable and tell your Supervisor or contact Ausgrid's Emergency Line on 13 13 88 immediately. These poles should be reported to the customer * for further inspection and maintenance.
- e) Backfilling the excavation in steps of 100 mm and ram each level until fully reinstated. Reinstated the surface around the pole leaving it neat and tidy, and in an 'as found' condition.

*Poles that are defected or that are to be reported to the customer for inspection and maintenance are to be referred to the Installations Inspectors for their review and action.

7.5.3 Private Pole with concrete to groundline or other in-ground obstruction

Steel or wood private poles considered to be in new condition (less than 5 years old), that are concreted in at ground line or which have other obstructions in the in-ground area which prevent a full inspection shall be visually inspected and sounded above ground line as indicated above for steel and wood poles. These may be climbed if assessed as safe. Where there is any doubt about the age of the pole it must be assumed it is older than 5 years.

Steel or wood private poles not considered to be in new condition (older than 5 years old) or where there is any doubt about the age of the pole, that are concreted in at ground line or which have other obstructions in the in-ground area which prevent a full inspection shall be visually inspected and sounded above ground line as indicated above for steel or wood poles. However, such poles are not to be climbed. Work on or near such poles should be completed from an EWP or similar vehicle. Services attached to such private poles are to be disconnected from the network supply pole first.

7.5.4 Steel rag-bolt mounted private poles

Steel rag-bolt mounted private poles are only to be climbed if an engineer's certificate is available and deems it safe to climb. Otherwise work on or near such poles should be completed from an EWP or similar vehicle. Services attached to such private poles are to be disconnected from the network supply pole first.

7.6 Pole owned by other Authorities

Ausgrid has agreements in place with Authorities such as those in the Communication and Transport industries to share pole assets. The use of these agreements enables the minimisation of pole in the footway/public areas. Where work is required to be undertaken on Ausgrid's assets supported by a pole owned by an authority other than Ausgrid workers must carry out the same pre-work inspections/assessment as for an Ausgrid pole. However, the following should be noted:

There is likely to be no below ground bandage.

While the construction will be acceptable, as for private poles the maintenance will not be to Ausgrid's standard.

No drilling of these poles is to be carried out. If it is believed that there is a defect of sufficient size that it requires an internal inspection. Report the pole in accordance with the requirement in NS145 and treat the pole as conditionally serviceable.

8.0 STRESS TESTING A POLE

Stress testing of poles is NOT to be carried out. The load that can be applied by hand is not representative of actual loadings under work conditions and therefore serves no purpose.

Therefore neither a rope pull or a push test whether by hand or aided by the use of a ladder is to be used as part of a pre-work inspection assessment.

9.0 FIRE-DAMAGED OR BURNING CCA TIMBER POLES

Handling Copper Chrome Arsenate (CCA) treated timber that has been fire-damaged (eg. Burnt), or attempting to extinguish CCA treated timber that is burning, presents hazards to the worker not found when working with other timber products.

Toxins normally locked in the timber cells during treatment are released, creating a hazard in the working environment. NEG-SE09 Management of CCA Impregnated Wood - Including Burning/Fire-Damaged CCA Poles provides advice to those workers who, in the course of their duties, may be exposed to either burning or burnt CCA treated timber.

Avoid smoke fumes and contaminated charred material by staying well clear of the immediate area and up wind.

If you are required to be in the area when CCA treated timber is burning or while fire-damaged material is being handled you must be appropriately trained.

In general no employee or contractor is to handle or disturb fire-damaged CCA treated material unless:

- the fire-damaged material can be moved or contained at that time (this may be either for safety reasons or work requirements),
- they have received the necessary training, and
- they have the required personal protective equipment.

Only appropriately trained workers should disturb CCA treated timber that is burning or has been fire-damaged. However all fire-damaged or partially fire-damaged CCA treated poles must be immediately reported to the Contract Officer – Regional Contract Services (note: for level 1 contestable works contact should be made through the contestable works compliance officer – ASP Compliance) to make sure the appropriate action is taken (ie containment / removal).

10.0 AUTHORITIES AND RESPONSIBILITIES

For this network standard the authorities and responsibilities of Ausgrid employees and managers in relation to content, management and document control of this network standard can be obtained from the Company Procedure (Network) – Production/Review of Network Standards. The responsibilities of persons for the design or construction work detailed in this network standard are identified throughout this standard in the context of the requirements to which they apply.

11.0 RELATED DOCUMENTS

11.1 General

All work covered in this document shall conform to all relevant Legislation, Standards, Codes of Practice and Network Standards. Current Network Standards are available on Ausgrid's Internet site at www.ausgrid.com.au.

11.2 Ausgrid documents

- Bushfire Risk Management Plan
- Company Form (Governance) - Network Document Endorsement and Approval
- Company Procedure (Governance) - Network Document Endorsement and Approval
- Company Procedure (Network) - Production / Review of Network Standards
- Customer Installation Safety Plan
- DG229 Inspection of the Head of Wood Poles
- Electrical Safety Rules
- Electricity Network Safety Management System Manual
- NEG SE05-06 Safety Equipment – Care, Use and Inspection - Low Voltage Instruments
- NEG-OH06 Load Alterations to Reinforced Poles
- NEG-SE09 Management of CCA Impregnated Wood - Including Burning/Fire-Damaged CCA Poles
- NEG SE10 Traffic Management
- NS102 Working on Poles with Mobile Phone Transmitter Installations
- NS128 Specification for Pole Installation and Removal
- NS145 Pole Inspection and Treatment Procedures
- NS156 Working Near or Around Underground Cables
- NS174 Environmental Procedures
- NS181 Approval of Materials and Equipment and Network Standard Variations
- NS212 Integrated Support Requirements for Ausgrid Network Assets
- NS220 Overhead Design Manual
- Public Electrical Safety Awareness Plan
- Public Lighting Management Plan
- Tree Safety Management Plan

11.3 Other standards and documents

- AS1742 Manual of uniform traffic control devices
- ENA Doc 001-2008 National Electricity Network Safety Code
- Roads and Maritime Service Guide - Traffic Control at Worksites

11.4 Acts and regulations

- Electricity Supply (General) Regulation 2014 (NSW)
- Electricity Supply (Safety and Network Management) Regulation 2014 (NSW)
- Work Health and Safety Act 2011 and Regulation 2011 (NSW)

12.0 DEFINITIONS

Accredited Service Provider (ASP)	An individual or entity accredited by the NSW Government Trade & Investment in accordance with the Electricity Supply (Safety and Network Management) Regulation 2014 (NSW).
Business Management System (BMS)	An Ausgrid internal integrated policy and procedure framework that contains the approved version of documents.
Document control	Ausgrid employees who work with printed copies of document must check the BMS regularly to monitor version control. Documents are considered "UNCONTROLLED IF PRINTED", as indicated in the footer.
Network Standard	A document, including Network Planning Standards, that describes the Company's minimum requirements for planning, design, construction, maintenance, technical specification, environmental, property and metering activities on the distribution and transmission network. These documents are stored in the Network Category of the BMS repository.
Pole Inspector	A person who has passed an Ausgrid approved course in pole inspection, and is currently accredited by Ausgrid as a Pole Inspector.
Review date	The review date displayed in the header of the document is the future date for review of a document. The default period is three years from the date of approval however a review may be mandated at any time where a need is identified. Potential needs for a review include changes in legislation, organisational changes, restructures, occurrence of an incident or changes in technology or work practice and/or identification of efficiency improvements.
Shock Loading	a sudden and drastic increase of load. In a pole this may cause the pole to fail in shear without warning.

13.0 RECORDKEEPING

The table below identifies the types of records relating to the process, their storage location and retention period.

Table 1 – Recordkeeping

Type of Record	Storage Location	Retention Period*
Approved copy of the network standard	BMS Network sub process Standard – Company	Unlimited
Draft Copies of the network standard during amendment/creation	TRIM Work Folder for Network Standards (Trim ref. 2014/21250/195)	Unlimited
Working documents (emails, memos, impact assessment reports, etc.)	TRIM Work Folder for Network Standards (Trim ref. 2014/21250/195)	Unlimited

* The following retention periods are subject to change eg. if the records are required for legal matters or legislative changes. Before disposal, retention periods should be checked and authorised by the Records Manager.

14.0 DOCUMENT CONTROL

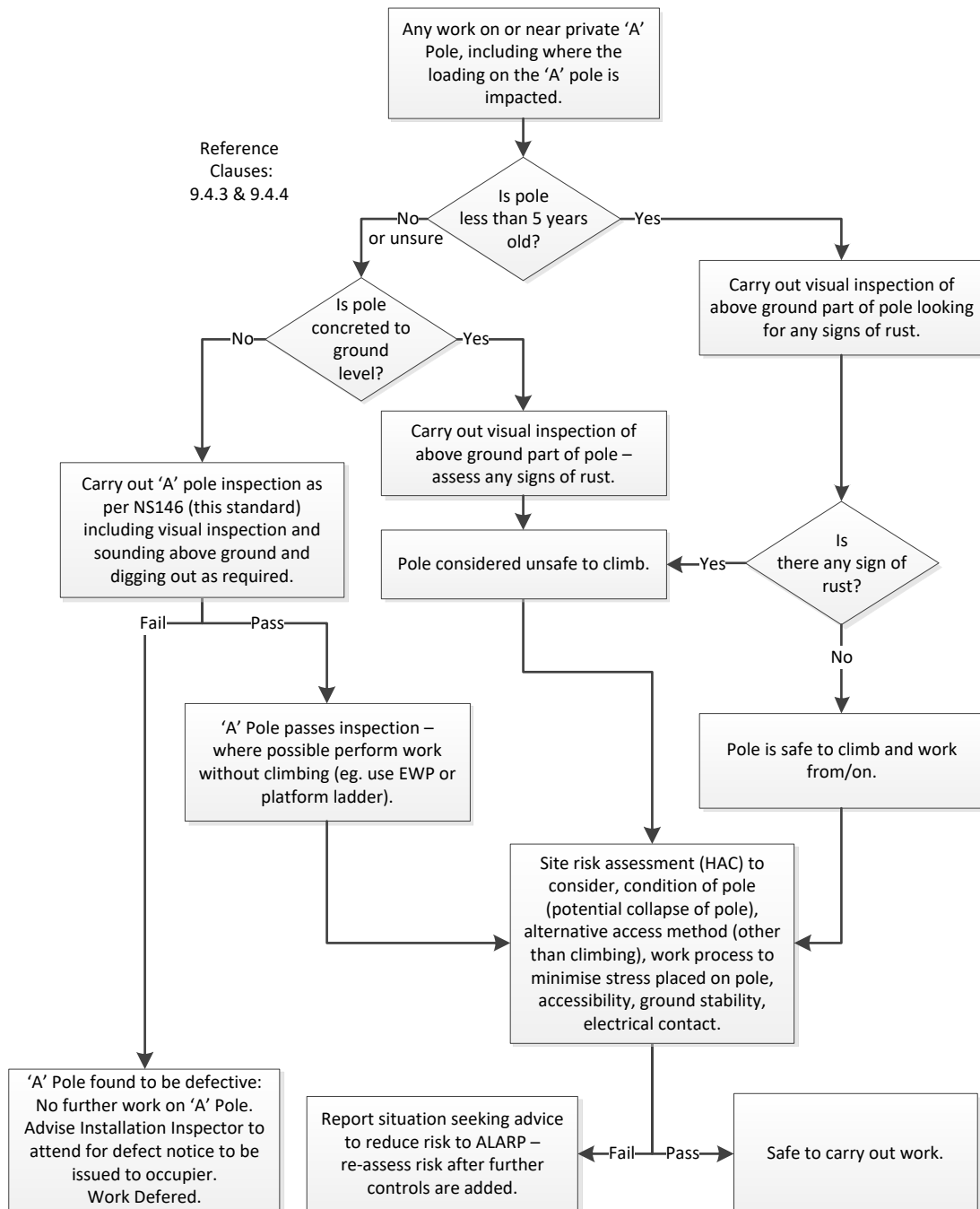
Content Coordinator : Manager – Transmission and Distribution Mains Engineering

Distribution Coordinator : Snr Engineer – Guidelines Policies and Standards

Annexure A - Safety Requirements for Work on or Near Private Poles

The process prescribed below applies to Ausgrid personnel and its contractors. Accredited Service Providers should refer to clause 7.4.3.

The safety requirements are in place to mitigate the risk of a private pole, such as an 'A' pole, collapsing as a result of an Ausgrid worker climbing on the pole.



Annexure B - Inspection of the Head of Wood Poles

B1 Background

Network Standard 145 details the inspection process for wood poles from below ground to approximately 2 metres above ground line. While wood poles most commonly degrade in the ground line area first, they also degrade higher up the pole particularly near the head.

This information has been taken from DG229 Inspection of the Head of Wood Poles and aims to provide guidance for inspection of wood poles near the head. This procedure is only intended to be carried out following a visual assessment and where uncertainty exists about the condition of the pole. It is to be carried out on an as needs basis only, and not as routine maintenance.

B2 Pole defects

Direct buried wood poles are most affected by degradation below ground, particularly in the area between ground line and approximately 350 mm below ground line due to favourable moisture and oxygen conditions, which promotes fungal decay and termite activity. The next most common area of degradation that leads to pole condemnation is the head, particularly where no pole cap is fitted.

B3 Pole defects above ground

The lower moisture content of the wood above ground virtually eliminates the likelihood of brown rot and soft rot occurring, and generally reduces the risk of termite damage, however it must be noted that these are general statements and there are exceptions. The predominant modes of degradation above ground line are white rot and termite infestation. White rot only occurs internally and cannot be identified by a visual inspection, and it can proliferate at any location within the pole regardless of moisture content. Termites can be internal or external and their presence can generally be identified by visual inspection, but not always.

Conditions that trap moisture such as old knot holes, and close fitting attachments which do not allow the wood to breathe (eg. close fitting possum guards and advertising material wrapped around the pole), can allow sufficient moisture to accumulate to allow the growth of a variety of types of fungal decay and promote termite problems higher up in the pole.

As a pole ages the area near the head can occasionally suffer extensive splitting which may affect the security of attachments such as cross arms. This is generally identified by visual inspection.

B4 Pole Head – failure modes

The most common modes of failure of the head of a wood pole are:-

- Loss of strength around attachment holes that allows bolts to pull through the pole allowing cross arms, street lighting brackets or other attachments to become loose and occasionally fall to ground. This type of failure is usually the result of white rot or termite infestation, or due to a split in the pole extending down, through and in line with the bolt securing the attachment, or a combination of these occurrences.
- Internal degradation within the head of the pole that in rare cases ends with the head breaking away from the lower section of the pole and falling to ground. The cross arm and / or street lighting bracket may fall with it. This is usually the result of white rot or termite activity. It is not uncommon in the case of termites to find a termite nest located at the point of failure.

B5 Inspection of the head of the pole

The head of the pole requires inspection from the head to 2 metres below the head, or from the head to 1 metre below the lowest crossarm, whichever is the greatest. The inspection shall consist of visual inspection, sounding with the ball of a ball pein hammer, and internally inspecting with a drill when sounding indicates an internal defect. The purpose of the inspection is to identify internal defects and their extent. Typical defects are white rot and termite damage, and splitting of the head that may allow pole attachments to become loose.

B6 Inspection procedure

1. Assess the pole in accordance with this network standard (NS146) to confirm pole is safe to work on.
2. Visually inspect and then sound the pole with the ball of a ball-pein hammer from 2 metres below the head to the head of the pole, or from 1 metre below the lowest crossarm to the head of the pole, whichever is greater. It is necessary to sound the pole at a minimum of 4 evenly spaced locations around the pole and repeat at intervals not exceeding 300 mm, and at other locations as identified by visual inspection. Some poles will need to be sounded at much closer intervals than the minimum specified above, particularly where defects such as fungal fruiting bodies, knots, checks, termite damage, loose sapwood, or other visual indicators are seen on the pole.
3. Following sounding of the pole, carry out an internal inspection at any point you consider a defect may exist. Where sounding indicates that the pole has suffered degradation and a defect exists, it must be internally inspected at the location where sounding indicates the wall thickness is least.
4. For the pole to remain serviceable it must have 40 mm or more of sound timber at any location in the area tested. If a wall thickness of less than 40 mm is found at any location, the pole is to be classified unserviceable and recommended for replacement. If the unserviceable area is near the head of the pole and there is sufficient length of pole to lower the crossarm/conductors (without compromising conductor clearances), and crop and cap, this is the preferred option where practical, providing that the remaining pole does not have less than 40 mm of sound timber at any point in the test area.
5. Visually inspect the head of the pole.
 - (a) Where a split exists in the head that:-
 - extends across the full diameter,
 - and passes through the centre of the pole
 - and is in line with the axis of the attaching bolts
 - and extends to any attachment bolt with which it aligns,
 - and is at least 10 mm wide at some point (you will generally be able to see daylight through such a split)
 - - then the pole is to be recommended for replacement. (see figure B1)
 - (b) Where a split or defect exists in the head that:-
 - is caused by degradation – termite damage and / or fungal decay, this clause does not refer to a simple split in the timber,
 - and it extends across the full diameter,
 - and passes approximately through the centre of the pole
 - and is roughly at right angle to the axis of the attaching bolts
 - and extends a minimum of 300 mm beyond any attachment bolt,
 - and is at least 10 mm wide at some point (you will generally be able to see daylight through such a split)
 - - then the pole is to be recommended for replacement. (see figure B1)
 - (c) Where there is a pipe in the head of the pole with a diameter half the diameter of the pole or greater, and
 - there are multiple splits that extend through the full width of the sound timber wall (not just checks in the pole), and
 - these splits extend from the head to or beyond any attaching bolts,
 - - then the pole is to be recommended for replacement.

Note: In the above situations in procedure 5 where conductor clearances allow and lowering of the crossarm/conductors and cropping and capping of the pole is a practical alternative, then this is preferable to pole replacement.

B7 Training and Qualifications

In order to inspect the head of a wood pole you must be trained and have demonstrated competency in Ausgrid's above ground pole inspection procedure. This will include demonstrated competency at using a drill to internal inspect a wood pole. No one is to internally inspect a wood pole by drilling test holes without having received the appropriate training and demonstrated competency.

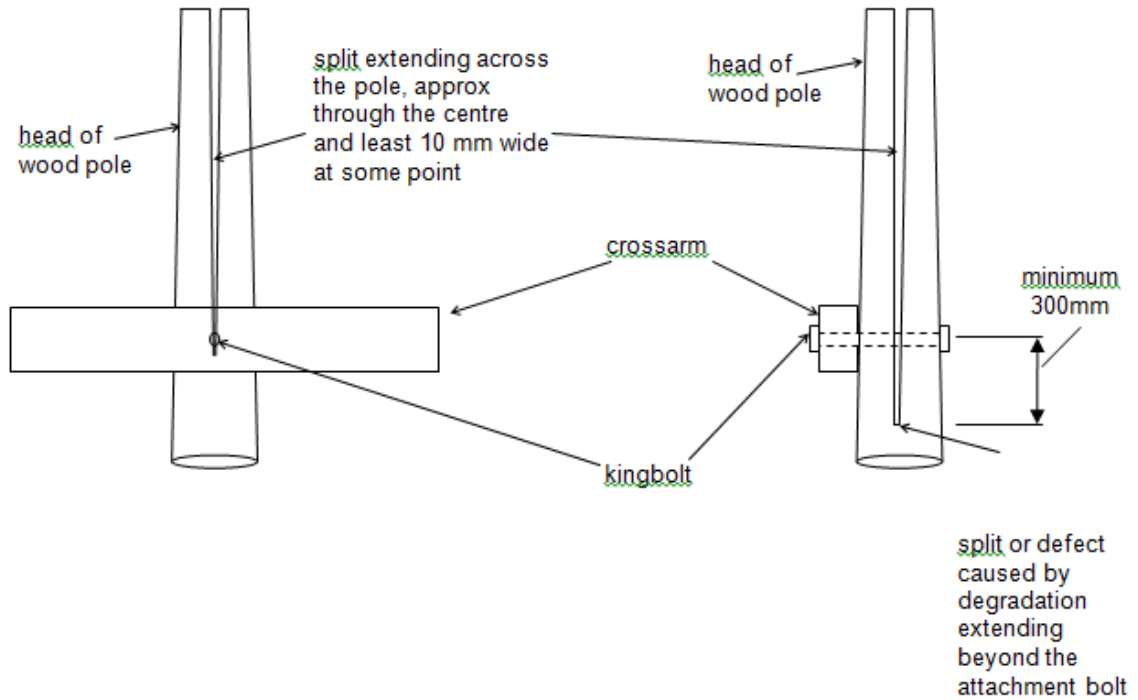


Figure B1

Annexure C – Sample Compliance Checklist



Network Standard Checklist Form

NS146 Inspection Procedure for Working on Poles

Project Identification:	
Prepared by: <Name & Position Title>	Date:

This checklist is for internal Ausgrid use only and does not apply to ASPs or contractors who have specific compliance requirements in relation to Contestable project works. The checklist is unique for each network standard and is available within BALIN and the BMS as a separate form that can be amended as required, completed and saved in TRIM with the other project documentation.

This section is used to identify compliance checks that when applied to the work associated with this Network Standard will satisfy an audit process to establish that the requirements of the standard have been followed. It is expected that applicable items would normally be checked as Comply (Yes) as non-compliance is generally not tolerated.

Where non-compliance is the result of specific site conditions or design decisions this needs to be identified in the notes section of the form for each non-compliance and approval sought from an appropriately authorised Ausgrid manager responsible for design approval per NS261 Compliance Framework for Network Standards.

Should additional information be available to document non-compliance decisions, these can be attached to the checklist form. The checklist and any attached explanatory notes should be saved in the project document repository.

Item	Description	Refer Clause	Completed/ Actioned
Scope			
	Ausgrid's inspection and maintenance program for working on poles.	2.0	
General Health and Safety Precautions			
1	Electrical Precautions (step and touch voltages)	5.2	Yes/No/NA
2	Falling objects	5.3	Yes/No/NA
3	Operational precautions	5.4	Yes/No/NA
Pole Condition			
4	Serviceable poles	6.2	Yes/No/NA
5	Condemned poles	6.2	Yes/No/NA
6	Supporting condemned poles	6.3	Yes/No/NA
Pole Procedures			
7	Performed procedures prior to climbing poles	7.1	Yes/No/NA
8	Above ground line inspection procedures	7.2	Yes/No/NA
9	Considered type of work/stress to be applied to pole.	7.3	Yes/No/NA
10	Below ground inspections	7.4	Yes/No/NA
11	Handling bioguard bandages	7.5	Yes/No/NA
Pole Inspection			
12	Appropriate procedures undertaken for rebutted and reinforced poles	8.1, 8.2	Yes/No/NA
13	Appropriate procedures undertaken for Steel poles	9.1	Yes/No/NA
14	Appropriate procedures undertaken for Concrete poles	9.2	Yes/No/NA

Item	Description	Refer Clause	Completed/ Actioned
15	Appropriate procedures undertaken for Fibre Composite poles	9.3	Yes/No/NA
16	Appropriate procedures undertaken for Private poles	9.4	Yes/No/NA
17	Appropriate procedures undertaken for small private wood poles	9.4.2	Yes/No/NA
Burnt or Burning CCA Poles			
18	Procedure when exposed to burning or burnt CCA treated timber poles	11.0	Yes/No/NA

Notes:

.....

.....

.....

.....

.....

.....

The signatures panel of this document has been removed for privacy considerations. The remainder of the document is unchanged.