



AUSTRALIAN RAIL TRACK CORPORATION LTD

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Engineering Standard - NSW

Category

Electrical

Title

Wood Pole Condemning Policy

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About This Standard

This document sets out the Condemning Policy for Wood Poles owned by the Australian Rail Track Corporation of New South Wales.

Statutory Safety requirements for electricity transmission, distribution and utilisation are contained in the Electricity Safety Act (1945) and Regulations under the Act.

This Standard Specification sets out the minimum practices which will allow an organisation, or individual, to fulfil the regulatory requirements and shall be detailed in that organisations maintenance procedures.

The routine assessment of wood poles above ground, at and below ground line shall be carried out to prevent their premature failure by detecting any degradation present and to assess the remaining strength and service life.

Document History

Primary Source – RIC Standard EP 10 01 00 01 SP Version 2.0

List of Amendments –

| ISSUE | DATE | CLAUSE | DESCRIPTION |
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1 References

[1] Electricity Act (1945) and Regulations under the Act.

2 Definitions

| | |
|--|---|
| Annulus: | Ring shaped object. |
| Condemned Pole: | <p>A pole which, at the time of inspection and evaluation has;</p> <p>a risk exposure cost greater than the replacement cost or</p> <p>for an Unsupported Pole a factor of safety in regard to its design load of less than 1.0 or</p> <p>for a Supported Pole a minimum wall thickness of sound wood of less than 20 mm.</p> |
| Conditionally Serviceable Pole: | <p>A pole which, at the time of inspection and evaluation is considered;</p> <p>to be capable of bearing its design load with a factor of safety of less than or equal to 2 but not less than 1.0 for an Unsupported Pole or</p> <p>has a wall thickness of sound wood of less than 40mm but not less than 20mm for a Supported Pole.</p> |
| Dangerous Pole: | A pole satisfying the criteria as a Condemned Pole and is considered at the time of inspection and assessment to be at risk of imminent failure and there is a high risk of injury or damage to property should the pole fail. |
| Design Load: | The calculated load imposed upon a pole under the wind loading conditions adopted by the Australian Rail Track Corporation. |
| Factor of Safety: | The ratio of assessed Pole Bending Strength to its Design Load. |
| Pole: | A overhead line or lighting fixture support, the foundation of which consists of wood. |
| Pole and Line Inspector: | A person trained and accredited as a Pole and Line Inspector. |
| Serviceable Pole: | <p>A pole which, at the time of inspection and assessment is;</p> <ul style="list-style-type: none">considered to be capable of bearing its design load with a factor of safety greater than 2 for an Unsupported Pole or |

- has a wall thickness of sound timber not less than 40mm for a Supported Pole.

| | |
|--------------------------|---|
| Shall: | The word “ <i>shall</i> ” is to be understood as mandatory. |
| Should: | The word “ <i>should</i> ” is to be understood as non mandatory ie. advisory or recommended. |
| Stay Pole: | A short pole used to support a main pole via a stay wire. These poles are to be treated as unsupported poles. |
| Supported Pole: | A pole which is held in balance by the conductors and / or stay wires connected to the pole. |
| Unsupported Pole: | A pole which is not held in balance by the conductors and / or stay wires connected to the pole. |
| Pole Marks: | A durable and readily visible mark placed on conditionally serviceable, condemned or dangerous poles at the time of inspection and assessment to identify the pole condition. |

3 Serviceability Criteria

Routine inspection and assessment of a pole is to be carried out below, at and above ground line to detect any degradation present and to assess the remaining strength and service life.

The above ground line inspection should identify external indicators of internal condition.

Typical external indicators are (but not limited to):

- mature fungal fruiting is usually associated with internal white or brown rot.
- shaggy external appearance and missing pole cap is usually associated with advanced white rot accelerated by water ingress.
- knot holes, checks and splitting allow the ingress of moisture and promotes the growth of fungal decay.
- the build up of mud in vertical pole cracks, surface checks and an earth (mud) mound with termite galleries are indicators of termite infestation.

Any of these indicators should be thoroughly investigated and assessed by the pole and line inspector and the serviceability category of the pole determined.

Of equal importance is the inspection and assessment of the pole at and below ground line and poles are to be categorised in accordance with the criteria set out in section 3 and 4 of this document.

4 Unsupported Poles

At the time of inspection the bending strength of an unsupported pole should be determined for comparison with its design load and a factor of safety calculated.

Poles shall be classified as either serviceable, conditionally serviceable, condemned or dangerous in accordance with the respective *Factor of Safety* (F) limits given in table 1.

When a pole, satisfying the criteria as condemned, is considered at the time of inspection to be at risk of imminent failure and where the circumstances are such that there is a high risk of injury or damage to property if the pole fails, it shall be classified as *dangerous* and priority must be given to take action to remove the immediate danger.

Subsequent to the determination of the serviceability classification of a pole, the following action shall be taken as specified in table 1.

| Pole Classification | Factor of Safety (F) | Subsequent Action |
|----------------------------|---|--|
| Serviceable | F greater than 2 | If factor of safety is greater than or equal to 3.5 then no further action until next routine assessment. If factor of safety is less than 3.5 then carry out full risk analysis. If risk exposure cost is greater than replacement cost then condemn the pole. |
| Conditionally Serviceable | F greater or equal to 1 and less than or equal to 2 | Mark the pole and carry out full risk analysis. If risk exposure cost is greater than replacement cost then condemn the pole. If the pole is conditionally serviceable check pole more frequently at a period determined by the Pole and Line Inspector to ensure pole security. |
| Condemned | F less than 1 | Mark the pole and carry out full risk analysis. Replace the pole within six (6) months. |
| Dangerous | F less than 1 and a risk of imminent failure | Mark the pole and immediately support and replace within 48 hours. |

Table 1

5 Supported Poles

5.1 Poles Supported By Conductors and Stay Wires

As resultant pole top forces are balanced between changed tensions in conductors and / or stay wires attached to a supported pole there is little or no bending load created at the ground line as a result of wind loading. Hence the bending “factor of safety” method is not appropriate for assessing the serviceability of a supported

pole. These poles may be retained in service with minimal ground line bending strength provided that the tensile limits of attachments are not exceeded under the design pole top loading conditions and the ground line sheer strength is adequate.

5.2 Poles Supported By Low Voltage Service Lines

These poles shall be treated as an unsupported pole.

Attached low voltage service lines may provide support to a pole and reduce ground line bending loads. However, the limited tensile strength of low voltage service cables and termination attachments minimise the allowance which can be made for a reduction in the required bending strength for such poles.

5.3 Minimum Dimensions

For a supported pole the minimum wall thickness of sound wood (annulus) shall be 20 mm, otherwise the pole shall be classified as *Condemned*. This annulus of sound wood is required to provide structural stability.

5.4 Classification of Supported Poles

At the time of inspection the minimum thickness of sound wood should be determined so that the pole may be classified as either serviceable, conditionally serviceable, condemned or dangerous in accordance with the thickness of the *annulus of sound wood* remaining given in table 2.

When a pole, satisfying the criteria as condemned, is considered at the time of inspection to be at risk of imminent failure and where the circumstances are such that there is a high risk of injury or damage to property if the pole fails, it shall be classified as *dangerous* and priority must be given to take action to remove the immediate danger.

Subsequent to the determination of the serviceability classification of a pole, the following action shall be taken as specified in table 2.

| Pole classification | Thickness of the annulus of sound wood | Subsequent actions |
|---------------------------|---|--|
| Serviceable | Greater or equal to 40 mm | No further action until next routine assessment |
| Conditionally Serviceable | Greater or equal to 20 mm and less than 40 mm | Mark the pole and check more frequently at a period determined by the Pole and Line Inspector to ensure pole security. |
| Condemned | Less than 20 mm | Mark the pole and replace within six (6) months |
| Dangerous | Less than 20 mm and risk of imminent failure | Mark the pole, immediately support and replace within 48 hours |

Table 2

6 Frequency

Poles shall be inspected and assessed at regular intervals not exceeding the time intervals shown in table 3.

| | | |
|---|----------------------------|--------------------------------|
| Poles <i>without</i> preservative impregnation | Durability class 1 species | 3 years, latitude + 6 months |
| Poles <i>with</i> preservative impregnation | All species | 4.5 years, latitude + 6 months |

Table 3

In addition poles shall be visually examined to detect any visual signs of degradation or termite attack during the twelve (12) weekly transmission line patrol.

7 Deferral Option

The routine pole inspections and assessments nominated in sections 2 and 3 of this policy document may be varied where quality assurance procedures are in place for the purchase of wood poles and new pole bases are treated with an approved wood preservative applied in an approved manner at the time of the pole installation.

The deferral options apply to the *first routine inspection and assessment only* and are listed in table 4.

| | | |
|---|----------------------------|----------------------------|
| Poles <i>without</i> preservative impregnation | Durability class 1 species | 6 years latitude 1.5 years |
| Poles <i>with</i> preservative impregnation | All species | 6 years latitude 1.5 years |

Table 4

8 Marking of poles

Conditionally serviceable, condemned and dangerous poles shall be marked in a durable and readily visible manner at the time of inspection and assessment. Marking shall be a single mark in the form of a half of an "X", ie."/"/ on conditionally serviceable poles and a second related mark to form an "X" on condemned and dangerous poles.

When poles are re-classified the marking shall be adjusted to indicate the new classification.

9 Records

A reference system shall be developed and maintained to identify each pole in order to confirm when inspection, assessment and maintenance has been carried out on each pole. The reference system shall also record the results of the assessment process. These records are to be available to the Australian Rail Track Corporation, or its nominated representative, for purposes such as (but not limited to) compliance audits, incident investigations or asset renewal planning.