

Equipment Technical Specification

Pole Nails

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MAINS DESIGN INSTRUCTION

ASSET STANDARDS AND DESIGN

Document No : ETS 0057
 Amendment No : 1
 Approved By : MASD
 Approval Date : 17/08/2017

ETS 0057 POLE NAILS

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1.0 PURPOSE

To specify the requirements for Pole Nails used to reinstate timber poles on the Endeavour Energy's Electrical Network.

2.0 SCOPE

This specification covers the design, engineering, manufacture and testing of Pole Nails installed as part of the Endeavour Energy network.

3.0 REFERENCES

Internal

Mains Design Instruction MDI 0031 – Overhead distribution: Design standards manual
Mains Maintenance Instruction MMI 0001 – Pole and Line Inspection and Treatment Procedures
Annexure 1 – Pole Details

External

Electricity Supply Act 1995 (NSW)
Electricity Supply (General) Regulation 2014 (NSW)
Australian Standard AS/NZS 4680 – Hot-dip galvanised (zinc) coatings on fabricated ferrous articles
Australian Standard AS/NZS 1554 – Structural steel welding
ENA DOC 032 – Groundline Pole Reinforcement – Guideline for the Selection, Installation, Identification, Performance, Inspection and Maintenance of Pole Reinforcement Methods
ENA National Electricity Network Safety Code (Doc 01-2008)

4.0 DEFINITIONS AND ABBREVIATIONS

Pole Nail

A pole reinforcement system used for the reinstatement of the ground line strength of timber poles.

Inspection Cycle

The maintenance cycle in which pole nails are inspected as specified in MMI 0001.

5.0 ACTIONS

5.1 General

Designs are to be in accordance with “*ENA DOC 032 – Groundline Pole Reinforcement*”. Where the requirements of *ENA DOC 032* and this document differ, the requirements of this document will take precedence.

Pole Nails must be designed to cover the range of timber poles listed in Annexure 1. Pole Nails for additional pole length / strength combinations may be required, details of such poles will be provided by Endeavour Energy Mains Assets Manager on a case by case basis

The system of pole reinstatement must allow for the installation of the Pole Nail to be carried out with the attached transmission and/or distribution conductors energised, and take into consideration the existence of other pole hardware and attachments.

All Pole Nail products and installation systems are to be approved by the Mains Assets Manager prior to use on the network. The following details are to be provided with the submission of each type of Pole Nailing system:

- the attachment methodology (e.g. bolted or banded arrangement);

- mechanical strength design / validation process (for each Pole Nail type and size);
- failure testing / infield experience; and,
- detailed installation procedures.

The Pole Nail should not facilitate the unauthorised climbing of a pole.

5.2 Strength

The strength of the Pole Nail is to be determined on the basis that the pole to be reinstated has no remaining strength at ground line.

The Pole Nail must provide sufficient strength for the pole to support the attached load with the minimum safety factors shown in Table 1. The selection of the appropriate safety factor is determined by whether working stress or limit state design methodology is used for the calculation of the load attached to the pole.

Method of calculating attached load	Safety Factor
Working Stress	1.4
Limit State Design	1.15

Table 1 – Pole Nail Safety Factors

Details of the attached load calculation method are to be provided demonstrating methods used to determine all parameters such as conductor type, conductor tension, attachment height, pole strength (in absence of a pole disc) as well as wind loading parameters for both the conductor and pole etc.

5.3 Failure Mode

The failure mode of the Pole Nail is to be engineered so that catastrophic failure is avoided. The system must be designed so that it yields before the pole fails.

5.4 Wall Thickness Criteria

The minimum wall thickness criteria of the timber pole that the pole nail is attached to, must be 30mm, measured anywhere between ground line and 1200mm above ground.

Alternate criteria may be suggested; such alternate options are to be provided to the Mains Assets Manager with supporting test results and certified engineers reports to show the proposal conforms with the minimum requirements of this document and will be assessed to determine impact on the number of poles that may be reinstated in Endeavour Energy's network.

It is intended that all poles satisfying the above wall thickness criteria will be considered for reinstatement including pole substations, switching poles and poles supporting underground cables.

5.5 Environmental Considerations

The Pole Nail is to be designed to be as discreet as possible with the intent of blending in with the local environment and should not limit/protrude footpath space or create hazards for the public.

The materials used for the pole nails should:

- not be damaging to the environment in which it is installed (by not releasing harmful chemicals into the soil); and
- not have a detrimental effect on the pole or pole treatments (which could cause accelerated decay).

Information is to be provided demonstrating if each component of the product can be recycled and/or disposed of at the end of products life. Any materials that cannot be recycled are to be listed and recommended disposal / handling processes provided.

5.6 Galvanising

Pole Nail components made from steel (not including stainless steel) must be hot-dip galvanised and comply with AS/NZS 4680.

Galvanising is to be done after the completion of all marking, cutting, machining, punching, drilling, bending, welding or any other manufacturing procedure, except for tapping of holes as required. Steelwork is to be galvanised in individual pieces, and both inner and outer surfaces galvanised.

5.7 Welding

All welding is to be in accordance with AS/NZS 1554 and can withstand the mechanical forces that the pole will be subjected to during the nails serviceable life.

5.8 Surface Finish

The Pole Nail are to be designed and installed so that the finished product is free from significant protrusions and sharp edges that may be hazardous when contacted by either members of the public or Endeavour Energy employees. The submitted details of the proposed pole nails must address this requirement specifically.

5.9 Pole Nail Labelling

The Pole Nails are to be permanently marked with the following:

- the date of manufacture;
- the ultimate strength rating of the system; and,
- the series designation.

Markings are to be in an easily read position, such as the top external face.

5.10 Structural drawings

Structural drawings must be provided with the offer for all the pole nails offered. The drawings are to show typical markings, basic dimensions and attachment points.

5.11 Testing Requirements

The following type tests must be performed as a minimum to demonstrate the long-term serviceability of the Pole Nailing system:

Test Name	Test Purpose / Description
Ground line strength test	No sound timber at ground and maximum rated load applied in multiple directions relative to the position of the pole nail.
Torsional load test	Simulate wind loading on large pole attachments.
Wall Thickness test	Minimum timber wall thickness required at point(s) of attachment to satisfy ultimate strength of the pole nail.
Fatigue Test	Cyclic loading of the pole at varied loads when attached to the pole nail to measure fatigue of materials and any loss in tension.
Temperature Test	Cooling/heating of the pole nail attachment system to simulate the temperature range of weather seasons to measure any loss in tension due to expansion or contraction.
Destructive test	Testing to destruction to determine failure mode(s).

5.12 Nail Strength calculations

The following is to be provided with each Pole Nailing system offered.

Detailed calculations supporting the reported strength of the reinstatement system. Calculations provided must be complete in all ways to allow Endeavour Energy to independently employ a certified Structural Engineer to produce theoretical Pole Nail capacity reports to determine that all pole nails meet the technical requirements of this specification.

5.13 Life Expectancy

It is expected that reinstated poles will have an extended life of at least 13.5 years (approximately 3 inspection cycles).

Details of the guarantees and warranty offered for the proposed reinstatement system are to be submit along with the proposed reinstatement system. Additional information (e.g. required maintenance requirements / inspection cycles) are also to be clearly stated within the guarantee / warranty.

5.14 Quality Assurance

The supplier / manufacturer is to provide with the offer a certificate of Quality Management System in accordance with AS/NZS ISO 9001 or similar and an Environmental Management System in accordance with AS/NZS ISO 14001 or similar.

5.15 Service History

Information is to be provided, demonstrating:

- the period of service of the items being offered within the Australian environmental conditions;

- Australian Customers/Electricity Supply Authorities who have a service history of the items being offered; and.
- contact names and telephone numbers of relevant employees of those customers/electricity supply authorities who can verify the service performance claimed.

6.0 AUTHORITIES AND RESPONSIBILITIES

General Manager Asset Management has the authority and responsibility for:

- approving this Specification, including any variations;
- making all decisions concerning compliance in respect of this Specification; and,
- delegating any of these authorities and responsibilities to the Manager Asset Standards and Design.

Manager Asset Standards and Design has the authority and responsibility for:

- approving this Specification, including any variations;
- reviewing this Specification and making recommendations to the General Manager Asset Management; and,
- making recommendations concerning compliance in respect of this Specification.

Mains Assets Manager has authority and responsibility for:

- clarifying all the technical aspects of this Specification with stakeholders; and,
- updating the relevant actions required and outlined in this Specification.

7.0 DOCUMENT CONTROL

Documentation Content Coordinator : Mains Assets Manager

Documentation Distribution Coordinator : Branch Process Coordinator

Annexure 1 – Typical Pole Details

Pole size (Length/ working load)	UTS (kN)	Minimum diameters of poles - Strength Group 1 (100 MPa)			Minimum diameters of poles - Strength Group 2 (85 MPa)		
		Top (mm)	Groundline (mm)	Butt (mm)	Top (mm)	Groundline (mm)	Butt (mm)
9.5m/4kN	19	170	248	263	184	262	277
9.5m/8kN	35	226	304	319	243	321	336
9.5m/12kN	52	267	345	360	287	365	380
11m/8kN	36	231	322	339	250	341	358
11m/12kN	53	275	366	383	296	387	404
12.5m/4kN	20	174	278	296	190	294	312
12.5m/8kN	37	236	340	358	255	359	377
12.5m/12kN	54	281	385	403	303	407	425
12.5m/18kN	77	325	418	448	351	444	474
14m/8kN	38	238	356	376	259	377	397
14m/12kN	55	285	403	423	308	426	446
15.5m/8kN	38	240	371	392	262	393	414
15.5m/12kN	56	288	419	440	313	444	465
17m/8kN	39	242	386	409	265	409	432
17m/12kN	56	292	436	459	317	461	484
18.5m/8kN	40	243	400	424	267	424	448
18.5m/12kN	58	294	451	475	321	478	502
20m/8kN	41	243	414	439	268	439	464
20m/12kN	59	295	466	491	323	494	519
21.5m/8kN	42	243	427	454	270	454	481
21.5m/12kN	59	296	480	507	325	509	536
23m/12kN	60	297	494	522	327	524	552