

MATERIAL SPECIFICATION

| VOCAB NUMBER | ITEM DESCRIPTION |
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| 132062 | GUYLOCK, PREFORMED, WOOD POLE 7/2.75 GALVANISED STEEL STAYWIRE |

| SPECIFICATION DETAILS |
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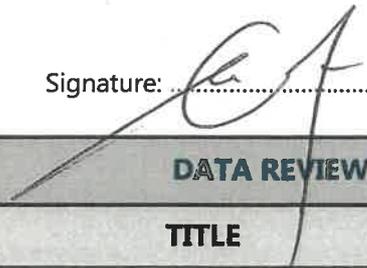
1. Helical termination and splicing fitting for 7/2.75 SC/GZ galvanised staywire to AS 1222.1 – 1992 used for wrap around information on timber poles. The fitting shall Comply with AS 1154 – 1991 and shall hold not less than 85% of the breaking load of the staywire.
2. Each fitting shall be clearly marked with the staywire size for which it is designed to be used.
3. A full technical description, mechanical test reports, and installation instructions shall be included with the Tender.

- **Unit of Measure:** Each
- **Rejection:** PNG Power Ltd reserves all rights to reject whole or part of the order not complying with this specification and is not liable for any cost or loss with the return of rejects to the Supplier. Facilitation of Invoice Credit must commence between the supplier and PNG Power Ltd through the process of PNG Power Ltd Discrepancy Report provisions.

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| Drawing References: | Manufacturer's Product Code: |
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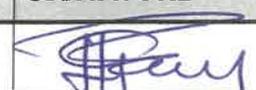
STANDARDS COMMITTEE APPROVAL

Approval by Alex Oa
Chairman

Signature: 

Date: 30, 6, 2015

DATA REVIEW ENDORSEMENT

| NAME | TITLE | SIGNATURE | DATE |
|----------------|--|--|----------|
| Grevasias Peni | Team Leader Standards and Materials |  | 29/6/15 |
| G. Peni | ✓ |  | 22/1/19. |
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SPECIFICATION FOR PREFORMED LINE FITTINGS, VOCAB: 132062**1. Scope and Definition****1.1 Scope**

This specification applies to helically-formed armour rod, dead ends, insulator ties and tension splices (including termination splices) for overhead line conductors and stays.

1.2 Definitions

For the purpose of this specification, the following shall apply;

"Conductors" means any overhead line component which is designed to carry current.

"Direction of lay" may be "right hand" or "left hand". With right hand lay, the slope of the wires seen by the observer is in the direction of the central part of the letter Z when the conductor is held vertically.

"Fitting" means one complete appliance consisting of one more helically formed rod. (Note: the enclosed schedule contains descriptions of the types of fittings to which this specification applies).

"Rods" means metallic or non-metallic helically-formed element of the fitting.

"Set" means a group of rods which together comprise one fitting.

"Sub-set" means a group of rods fastened together ready for application and comprising less than one complete set. Two or more sub-sets may comprise one set.

2. General Requirements

The following requirements are applicable to all fittings covered by this Specification.

2.1 Standard Specification

Where reference is made to standard specifications, these shall be the specifications (including amendments) current to date of Tender.

2.2 Materials

The material from which the fittings are manufactured shall be suitable for use in the environment to be encountered in service and shall conform to the following requirements. The tenderer may submit alternative offers of several materials.

2.2.1 Galvanised steel shall be galvanised in accordance with the relevant portions of the current Australian standard.

2.2.2 Aluminium coatings on steel shall comply with the minimum requirements specified in Appendix "C".

2.2.3 Aluminium alloy. The alloy shall be quoted by the tenderer. (the copper content of the alloy shall be kept to minimum consistent with manufacturing requirements and shall not exceed 0.04%).

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2.2.4 Plastic and rubber-like materials shall satisfactorily withstand all relevant tests specified in the current Australian standard.

2.2.5 Other material. Full details including standard specification applied (if any), shall be quoted by the Tenderer.

2.3 Dimensions

The followings details of the fittings shall be quoted by the tenderer. All dimensions apply to the finished fitting before application.

- (a) Overall length
- (b) Length of fittings gripping the conductor or stay.
- (c) Number and diameter of rods in each fitting..
- (d) Number of sub-sets (if any) and number of rods in each sub-set.
- (e) Direction of the lay helix. (as defined in clause 1.2).
- (f) Number and description of filler rods (if any).

2.4 Finish

Where the outside diameter of the conductor or any stay exceeds 18mm, the ends of each rod of the fitting shall be substantially hemispherical with a smooth tangential transition between the end and the cylindrical end surface, or the ends shall be otherwise treated by a method acceptable to the purchaser, so that they cannot, during installation or in service, scratch the conductor, rendering it susceptible to fatigue failure.

Where the outside diameter of the conductor or stay does not exceed 18mm, the ends of each rod shall be free from burrs and sharp edges which could scratch the conductor, rendering it susceptible to fatigue failure.

2.5 Identification

All rods of each fitting shall be fastened together to form a separate bundle, the fastening being able to withstand normal handling. Each fittings or group of not more than six fittings otherwise as required by the purchaser shall be securely banded with a weatherproof material on which is legibly and indelibly marked a full description of the conductor or stay for which the fitting is supplied.

2.6 Packing

Fittings shall be packed in durable packs labelled in the outside with the maker's name, the complete description of the contents, and the full description including lay of the conductor or stay for which the fittings are intended.

2.7 Permanence

All fittings, when applied according to manufacturer's conditions, shall remain fully effective under all conditions of service for which they are supplied.

SPECIFICATION FOR PREFORMED LINE FITTINGS, VOCAB: 132062**3. Specific Types of Fittings**

The following of particular types of fittings are additional to the general requirements set out in Section 2.

3.1 Armour Rods**3.1.1 Marking**

The centre of each rods or sub-set shall be marked with durable coloured band.

3.1.2 Mechanical Performance

Armour rods shall be capable of imparting to:

- (a) Steel and hard drawn copper conductor at supports, not less than the same resistance to fatigue, from the aeolian vibration to be expected when the conductor is tensioned in service at 30% of its ultimate tensile strength (UTS) as the same conductor has when not protected by the fittings and tensioned to 25% of its UTS under otherwise similar conditions.
- (b) Hard drawn cadmium copper, hard drawn aluminium conductor, aluminium alloy conductor, and aluminium conductor, steel reinforced, at supports, not less than the same resistance to fatigue, from aeolian vibration of its UTS as the same conductor has when not protected by the fittings and tensioned to 18% of its UTS under otherwise similar conditions.

Submission of performance reports. Tenders shall be supported by reports of field experience with the type of fitting offered as such reports giving comparative results for similar conductors not protected by the fittings and erected with not more than the tensions nominated above for such unprotected conductors. Alternatively, test reports from qualified laboratory may be offered.

3.2 Lineguards**3.2.1 Marking**

The centre of each rod or sub-set shall be marked with a durable coloured band

3.2.2 Mechanical Performance

Line guards shall cover their full length completely envelop the conductor.

3.3 Deadends**3.3.1 Marking**

Each fitting shall be marked at points where the wrapping on shall commence during installation with a durable coloured band.

3.3.2 Mechanical Performance

The completed termination shall be capable of withstanding under all of the following test conditions without slip or damage to the conductor or stay, the maximum withstand load specified by the purchaser. In each test, the load shall be sustained for one minute. A new fitting may be used for each test provided that all fittings tested in any one test series are taken from the same production batch.

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- (a) Fitting as manufactured and at room temperature.
- (b) At a temp of 75 degree Celsius after having been maintained at that temperature for 30 minutes.
- (c) At room temperature after the fitting has been immersed in water at room temperature for 10 minutes and then immediately applied to clean conductor or stay, removed and re-applied to a new clean portion of the conductor or stay. This process shall be continued until 10 successive applications of the fitting have been made; the load being applied after the tenth.

3.3.3 Conditions

- 3.3.3.1 If the fittings incorporate a suitable grit glued to those section of the helics which grip the conductor or stay, the gluing shall be such that any loss of grit during transport or store and field handling shall not affect the effectiveness if the fittings
- 3.3.3.2 The tenderer shall state which , if any of the following measures are necessary for the achievement of the mechanical performance specified in clause 3.3.2
 - (a) Removal of core grease o greased core ACSR conductor.
 - (b) Application of grip enhancing compound to the conductor or stay.
 - (c) Two or more concentric layers of helically formed rods.

3.3.4 Type Testing

Type tests shall be performed in a laboratory registered by the National Association of Testing Authorities Australia and the fittings shall meet the requirements specified in clause 3.3.2

3.3.5 Sample Testing

If required by the purchaser at the time of ordering, the Tenderer shall arrange for testing of sample fittings selected at random from each batch or production run. The fitting shall meet the requirement specified in clause 3.3.2. Normally 0.5% of each production runs but not more than 10 but no fewer than 2 from each production run shall be tested. The purchaser shall supply a suitable length of conductor or stay for tests.

In the event of a fitting failing to meet requirements of clause 3.3.2 the whole of the production run may be rejected.

3.4 Tension Splices**3.4.1 Marking**

The centre of each rod or sub-set shall be marked with a durable coloured band.

3.4.2 Mechanical Performance

The completed joint shall be capable of withstanding all of the following test conditions without slip or damage to the conductor or stay, the maximum withstand load specified by the purchaser. In each test the load shall be sustained for one minute. A new fitting maybe used for each test provided that all fittings tested in any one test series are taken from the same production.

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- (a) Fitting as manufactured and at room temperature.
- (b) At room temperature of 75 degree C after having been maintained at the temperature for 30 minutes.
- (c) At room temperature after the fitting has been immersed in water for 10 minutes and then immediately applied to clean conductor or stay, removed and re-applied to a new clean portion of the conductor or stay. This process shall be continued until 10 successive applications of the fitting have been made, the load being applied after the tenth.

3.4.3 Conditions

- 3.4.3.1 If the fittings incorporate a suitable grit glued to the section of the helics which grip the conductor or stay, the gluing shall be such that any loss of grit during transport or store and field handling shall not affect the effectiveness of the fittings.
- 3.4.3.2 The tenderer shall state which, if any, of the following measures are necessary for the achievement of the performances specified in Clause 3.4.2 and 3.4.4.
 - (a) Removal of core grease of greased core ACSR conductor
 - (b) Application of grip-enhancing compound grit, or oxidant compound or stay.
 - (c) Two or more concentric layers of helically formed rods.

3.4.4 Electrical Performance

The joint section of the conductor shall have a conductance not less than that of an equal length of unjoint conductor, the conductance being measured between points on the conductor adjacent to the extremities of the joints before any tension has been applied to the jointed conductor, and also with all tensions up to the tension specified in Clause 3.4.2.

If any fitting offered does not meet this requirement, the tenderer shall state in Schedule of Particulars, full details of such variations. Unless the purchaser specifies "limited fault" splices, the calculated conductance per unit length of the fittings across the butt joint of the Conductors jointed shall not be less than that of the conductor.

"Limited fault" splices may have a lower conductance per unit length across the butt joint than the conductor provided that the conductance of the whole joint is not less than that of a similar length of unjointed conductor.

"Limited fault" splices shall be legibly branded 'Limited Fault Splices'.

The proceeding requirements of this clause shall not apply to termination splices.

All splices, including termination splices, shall be suitable for temperatures up to 72 degrees C and at this operating temperature shall not be annealing, suffer a greater loss of strength than the conductor for which they are supplied