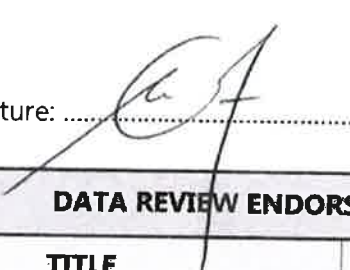





MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION		
132151	DEAD-ENDS FOR MULTI-CORE INSULATED SERVICE CABLE DOUBLE INSULATED TO TERMINATE 2 X 7/1.04 SERVICE CABLE		
SPECIFICATION DETAILS			
<ol style="list-style-type: none"> The Fittings are to be of the preformed helical type Manufactured of galvanised steel, coated with neoprene, gritted and provided with a neoprene sheathing to adequately cover the conductors. The complete unit to be suitable for terminating PVC coated copper services cables. Full technical description, installation techniques and test reports shall be included with the Tender Each fitting shall be clearly marked with the conductor size and catalogue number. To comply with A.S 1154 Parts 1, 2 and 3. <ul style="list-style-type: none"> 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. 			
Drawing References:	Manufacturer's Product Code:		
STANDARDS COMMITTEE APPROVAL			
Approval by Alex Oa Chairman	Signature:  Date: 26/9/16		
DATA REVIEW ENDORSEMENT			
NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader - Standards		20/9/16
	//		09/08/20

SPECIFICATION FOR PREFORMED LINE FITTINGS - 132151

Tenders are invited for the Supply and Delivery to PNG Power Limited Ports of Helically – Formed Line Fittings as per attached schedule.

1. SCOPE AND DEFINITIONS**1.1 Scope**

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

1.2 Definitions

For the purposes of this specification, the following definitions shall apply.

"Conductor" 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 observers is in the direction for the central part of the letter **Z** when the conductor is held vertically. With left hand lay, the slope of the wires seen by an observer is the direction of the central part of the letter **S** when the conductor is held vertically.

"Fitting" means one complete appliance consisting of one or more helically formed rods. (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 Specifications

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

2.2 Material

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 a minimum consistent with manufacturing requirements and shall not exceed 0.04%).
- 2.2.4 Plastic and rubber-like materials shall satisfactorily withstand all relevant tests specified in the current Australian Standard.

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

2.3 Dimensions

The following 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 fittings
- d) Number of sub-sets (if any) and number to rods in each sub-set
- e) Direction of the lay of 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 stay exceeds 18mm, the ends of each rod of the fittings shall be substantially hemispherical with a smooth tangential transition between the end and the cylindrical rod 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 or 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 on the outside with the marker'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 directions, shall remain effective under all conditions of service for which they are supplied.

3 SPECIFIC TYPES OF FITTINGS

The following requirements 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 center of each rods or sub-set shall be marked with durable coloured brand,

3.1.2 Mechanical Performance

Armour rods shall be capable of imparting to:

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- 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 the Aeolian Vibration to be expected when the conductor is tensioned in service at 22% 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 such unprotected conductors. Alternatively, test reports from a qualified laboratory may be offered.

3.2 Line Guards**3.2.1 Marking**

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

3.2.2 Mechanical Performance

Line guards shall over 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 provided that all fittings tested in any one test series are taken from the same production batch.

- a) Fitting as manufactured and at room temperature.
- b) At a temperature of 75°C 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 reapplied 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 sections 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.

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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 Clauses 3.3.2.

- a) Removal of core grease of greased core ACSR conductor
- b) Application of grip enhancing compound, grit or anti-oxidant compound to the conductor or stay.
- c) Two or more concentric layers or helically-formed rods.

3.3.4 Type Testing

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

All test reports shall bear the National Association of Testing Authorities endorsement and if requested by the purchaser the tenderer shall arrange for a copy of each report to be forwarded to the purchaser as soon as possible after completion of tests.

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 fittings shall meet the requirements specified in Clause 3.3.2. Nominally 0.5% of each production run, but not more than 10 and not fewer than two from each production run shall be thus tested. The purchaser shall supply a suitable length of conductor or stay for the tests.

3.3.6 Type Testing

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

3.4 Tension Splices (including termination 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 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.

- a) Fitting as manufactured and at room temperature.
- b) At a temperature of 75°C after having been maintained at the 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 reapplied to a new clean portion of the conductor or stay.

3.4.3 Conditions

3.4.3.1 If the fittings incorporate a suitable grit glued to those sections 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.

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3.4.3.2 The tenderer shall state which, if any of the following measures are necessary for the achievement of the mechanical performance specified in Clauses 3.3.2.

- d) Removal of core grease of greased core ACSR conductor
- e) Application of grip enhancing compound, grit or anti-oxidant compound to the conductor or stay.
- f) Two or more concentric layers or helically-formed rods.

3.4.4 Electrical Performance

The jointed section of conductor shall have a conductance not less than that of an equal length of unjointed conductor, the conductance being measured between points on the conductor adjacent to the extremities of the joint 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 variation. 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 proved that the conductance of the whole joint is not less than that of a similar length of unjointed conductor.

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

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