

## Documentation To Be Provided As Part Of Tender Submission

- 1 **Tender Form**
- 2 **Schedule of Offer (Part One)**
- 3 **Schedule of Offer (Part Two)**
- 4 **Company Credentials**
  - **Statement of Financial Capability**
  - **Statement of Relevant Technical Capability**
  - **Statement of PNG Experience**
  - **Statement of Previous PPL Dealings**
- 5 **Company Certifications (PNG Based Companies)**
  - **IPA Registration No**
  - **GST Registration No**
  - **COC Number**
- 6 **Company Certifications (Overseas Based Companies)**
  - **Certificate of Accreditation / Quality Assurance**
- 7 **Product Technical Credentials**
  - **Product Brand Name**
  - **Name / Location of Manufacturer**
  - **Quality Assurance Certification of Manufacturer**
  - **Technical Specification / Drawings/ Catalogues as available**
  - **Confirmation of Compliance with PPL Technical Specification**
  - **Advice of any variations to PPL Technical Specification**
- 8 **Other Supporting Documentation**

Tenderers should provide any other documentation that supports the Authenticity/Capability of their Supplier / Manufacturer.





**PAPUA NEW GUINEA POWER LTD.**  
**SCHEDULE OF FORECAST REQUIREMENTS AND OFFER**

ANNEX A TO:  
CONDITIONS OF TENDER

LOCATION: PORT MORESBY, LAE, RABAU, GOROKA

PAGE: 1

PART 1		REQUIREMENT					OFFER			
Item No.	Vocab No.	Description	Spec. App No.	Unit of Issue	Forecast Requirement	Unit Price	STD Pack	Comment	Reserved for internal use	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	
1	132090	Splice, 7/1.75 Copper Preformed Full Tension	1	Each	300					
2	132091	Splice, 7/2.00 Copper Preformed Full Tension		Each	300					
3	132092	Splice, 7/2.75 Copper Preformed Full Tension		Each	200					
4	132093	Splice, 19/2.00 Copper Preformed Full Tension		Each	200					
5	132166	Splice, 3/2.75 Galvanised Steel, Preformed, Full Tension		Each	400					
6	132167	Splice, 6/4.75-7/1.60 ACSR Cherry Galvanised Steel, Preformed, Full Tension		Each	1,500					
7	132168	Splice, 37/3.00 Saturn, Preformed, Full Tension		Each	250					
8	132169	Splice, 3/4/2.50 ACSR, Raisin, Preformed, Full Tension		Each	400					
9	132170	Splice, 6/1/3.00 ACSR, Apple Preformed, Full Tension		Each	2,000					

10	132171	Splice, 6/1/3.75 ACSR Banana, Preformed, Full Tension		Each	300					
11	132171A	Splice, 7/3.75 AAC Mars, Preformed, Full Tension	2	Each	250					
12	132173	Splice, 30/7/2.50 Grape Preformed, Full Tension	3	Each	100					
13	132173A	Splice, 37/2.50 AAC Preformed, Full Tension	4	Each	100					



**PAPUA NEW GUINEA POWER LIMITED**  
**(FAILURE TO COMPLETE AND SIGN THIS PART WILL INVALIDATE THE TENDER)**

**PART 2**

A		BASIS OF PRICING			
Line No.	Supplier Category	DESTINATION DEPOTS			
(a)	(b)	POMI (c)	LAE (d)	RABAUL (e)	GOROKA (f)
1.	In Country				
2.	Overseas	Ex Wks/FOB	Ex Wks/FOB	Ex Wks/FOB	Ex Wks/FOB

**1. EXPLANATORY NOTES:**

The destination depot for this tender appears at columns c, d, e, or f. Please complete as follows:

**2. OVERSEAS SUPPLIERS:**

Your pricing options are already entered at line 2. Delete one option and leave that on which your price has been based under the destination depot of this Tender. If no deletion has been made, the contract will be FOB costs.

**3. PNG SUPPLIERS:**

Where your supply is sourced locally to the destination enter "FIS" on line 1 under that depot. Where your supply is sourced from another province to that of the destination depot, enter "FOB" under the destination depot with the Port of shipment.

3.1 Please note last line of paragraph 7 of the "Conditions and specifications for the supply of goods and materials" on "GST". This is a vital condition of your offer and failure to observe this condition may result in your offer declared informal and not included for consideration.

B		PRODUCT ORIGIN	
Line No.	Schedule Item Number	Country of Manufacturer	
	(a)	(b)	
1.			
2.			

**C DECLARATION**

In respect of the offer in Part 1 of the schedule, I make the following declaration.

1. Supply will conform with the conditions of Tender as specified.
2. The price basis of the offer has been clearly identified in Part 2 - A in accordance with explanatory notes.
3. The country of manufacturer of the product is given at Part 2 - B.
4. In accordance with paragraph 3.1 of the explanatory notes, GST of.....% has been included.

Company Name.....  
 & Address:.....  
 Fax No.....Phone:.....  
 Email:.....  
 NAME:..... Signature:.....

Title:..... Date:.....



## MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132090	Splice, 7/1.75 Copper Preformed Full Tension

### SPECIFICATION DETAILS

- Helical tension fitting for mid-span jointing of 7/1.75 hard drawn copper conductor to AS 1746 – 1991.
- The fitting shall comply with AS 1154.3 - 2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
- Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
- Full technical description, 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.

*Drawing References:*

*Manufacturer's Product Code:*


### STANDARDS COMMITTEE APPROVAL

Approval by Alex Oa  
Chairman

Signature: 

Date: 17/1/17

### DATA REVIEW ENDORSEMENT

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader Standards and Material		16/12/16

## MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132091	SPLICE, 7/2.00 CU PREFORMED FULL TENSION

### SPECIFICATION DETAILS

- Helical tension fitting for mid-span jointing of 7/2.00 hard drawn copper conductor to AS 1746 - 1991.
  - The fitting shall comply with AS 1154.3 - 2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
  - Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
  - Full technical description, 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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### STANDARDS COMMITTEE APPROVAL

Approval by Alex Oa  
Chairman

Signature: 

Date: 17/1/17

### DATA REVIEW ENDORSEMENT

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader Standards and Material		16/12/16



## MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132092	SPLICE, 7/2.75 CU PREFORMED FULL TENSION

### SPECIFICATION DETAILS

- Helical tension fitting for mid-span jointing of 7/2.75 hard drawn copper conductor to AS 1746 – 1991.
- The fitting shall comply with AS 1154.3 - 2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
- Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
- Full technical description, 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.

**Drawing References:**

**Manufacturer's Product Code:**


### STANDARDS COMMITTEE APPROVAL

Approval by Alex Oa  
Chairman

Signature: 

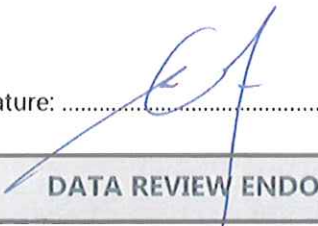

Date: 17/1/17

### DATA REVIEW ENDORSEMENT

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader Standards and Material		16/12/16



## MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION		
132093	Splice, 19/2.00 Copper Preformed Full Tension		
SPECIFICATION DETAILS			
<p>1. Helical tension fitting for mid-span jointing of 19/2.00 hard drawn copper conductor to AS 1746 – 1991.</p> <p>2. The fitting shall comply with AS 1154.3 - 2009 and shall hold not less 85% of the nominated breaking load of the conductor.</p> <p>3. Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.</p> <p>4. Full technical description, test reports and installation instructions shall be included with the tender.</p> <ul style="list-style-type: none"> <li>• <b>Unit of Measure:</b> Each</li> <li>• <b>Rejection:</b> 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.</li> </ul>			
<i>Drawing References:</i>		<i>Manufacturer's Product Code:</i>	
STANDARDS COMMITTEE APPROVAL			
Approval by Alex Oa Chairman		Signature: 	Date: 17/1/17
DATA REVIEW ENDORSEMENT			
NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader Standards and Material		16/12/16

## MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132166	SPLICE, 3/2.75 GALVANISED STEEL, PREFORMED, FULL TENSION

### SPECIFICATION DETAILS

1. Helical tension for mid-span jointing of 3/2.75 SC/GZ galvanised steel to AS 1222.1 - 1992.
2. The fittings shall comply with AS 1154.3-2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
3. Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
4. Full technical description including minimum diameter of hardware to which the fitting can be applied, test reports and installation instructions shall be included with the tender.

**(NB: FOR ATTACHMENTS REF VOCAB. NO. 132090)**

- **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: 17/1/17

### DATA REVIEW ENDORSEMENT

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader - Standards and Materials		16/12/16

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132166**

Tenders are invited for the Supply and Delivery to PNG Power Limited main PNG 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS - 132166**

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 band.

**3.1.2 Mechanical Performance**

Armour rods shall be capable of imparting to:

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132166**

- 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132166**

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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132166**

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.

## MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132167	SPLICE, 6/4.75-7/1.60 ACSR CHERRY PREFORMED, FULL TENSION

### SPECIFICATION DETAILS

1. Helical tension for mid-span jointing of 6/4.75-7/1.60 ACSR to AS 3607-1989.
2. The fittings shall comply with AS 1154.3 - 2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
3. Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
4. Full technical description including minimum diameter of hardware to which the fitting can be applied, test reports and installation instructions shall be included with the tender.

**(NB: FOR ATTACHMENTS REF VOCAB. NO. 132090)**

- **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:**

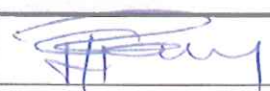
### STANDARDS COMMITTEE APPROVAL

Approval by Alex Oa  
**Chairman**

Signature: 

Date: 17/1/17

### DATA REVIEW ENDORSEMENT

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader - Standards and Materials		16/12/16



**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132167**

Tenders are invited for the Supply and Delivery to PNG Power Limited main PNG 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS - 132167**

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 band.

**3.1.2 Mechanical Performance**

Armour rods shall be capable of imparting to:

## SPECIFICATION FOR PREFORMED LINE FITTINGS – 132167

- 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132167**

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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132167**

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.

## MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132168	SPLICE, 37/3.00 AAC, SATURN, PREFORMED, FULL TENSION

### SPECIFICATION DETAILS

1. Helical tension for mid-span jointing of 37/3.00 AAC to AS 3607-1989.
2. The fittings shall comply with AS 1154.3 - 2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
3. Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
4. Full technical description including minimum diameter of hardware to which the fitting can be applied, test reports and installation instructions shall be included with the tender.

**(NB: FOR ATTACHMENTS REF VOCAB. NO. 132090)**

- **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:**

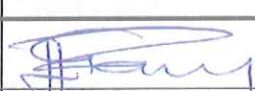
### STANDARDS COMMITTEE APPROVAL

Approval by Alex Oa  
Chairman

Signature: 

Date: 17/1/17

### DATA REVIEW ENDORSEMENT

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader - Standards and Materials		16/12/16

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132168**

Tenders are invited for the Supply and Delivery to PNG Power Limited main PNG 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS - 132168**

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 band.

**3.1.2 Mechanical Performance**

Armour rods shall be capable of imparting to:



**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132168**

- 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132168**

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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132168**

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.

# MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132169	SPLICE, 3/4/2.50 ACSR, RAISIN PREFORMED, FULL TENSION

**SPECIFICATION DETAILS**

1. Helical tension for mid-span jointing of 3/4/2.50 ACSR to AS 3607-1989.
2. The fittings shall comply with AS 1154.3 - 2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
3. Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
4. Full technical description including minimum diameter of hardware to which the fitting can be applied, test reports and installation instructions shall be included with the tender.

**(NB: FOR ATTACHMENTS REF VOCAB. NO. 132090)**

- **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:**

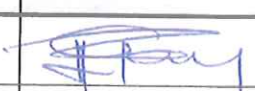
**STANDARDS COMMITTEE APPROVAL**

Approval by Alex Oa  
**Chairman**

Signature: 

Date: 17/1/17

**DATA REVIEW ENDORSEMENT**

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader - Standards and Materials		16/12/16

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132169**

Tenders are invited for the Supply and Delivery to PNG Power Limited main PNG 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132169**

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 band.

**3.1.2 Mechanical Performance**

Armour rods shall be capable of imparting to:

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132169**

- 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 centre 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132169**

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.



**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132169**

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.

## MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132170	SPLICE, 6/1/3.00 ACSR, APPLE PREFORMED, FULL TENSION

### SPECIFICATION DETAILS

- Helical tension for mid-span jointing of 6/1/3.00 ACSR/GZ to AS 3607-1989.
- The fittings shall comply with AS 1154.3 - 2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
- Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
- Full technical description including minimum diameter of hardware to which the fitting can be applied, test reports and installation instructions shall be included with the tender.

(NB: FOR ATTACHMENTS REF VOCAB. NO. 132090)

- 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: 17/1/17

### DATA REVIEW ENDORSEMENT

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader - Standards and Materials		16/12/16

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132170**

Tenders are invited for the Supply and Delivery to PNG Power Limited main PNG 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS - 132170**

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 band.

**3.1.2 Mechanical Performance**

Armour rods shall be capable of imparting to:

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132170**

- 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132170**

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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132170**

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.

## MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132171	SPLICE, 6/1/3.75 ACSR BANANA, PREFORMED, FULL TENSION

### SPECIFICATION DETAILS

1. Helical tension for mid-span jointing of 6/1/3.75 ACSR to AS 3607-1989.
2. The fittings shall comply with AS 1154.3 - 2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
3. Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
4. Full technical description including minimum diameter of hardware to which the fitting can be applied, test reports and installation instructions shall be included with the tender.

**(NB: FOR ATTACHMENTS REF VOCAB. NO. 132090)**

- **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:**

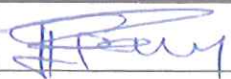
### STANDARDS COMMITTEE APPROVAL

Approval by Alex Oa  
Chairman

Signature: 

Date: 17/1/17

### DATA REVIEW ENDORSEMENT

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader - Standards and Materials		16/12/16



**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132171**

Tenders are invited for the Supply and Delivery to PNG Power Limited main PNG 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132171**

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 band.

**3.1.2 Mechanical Performance**

Armour rods shall be capable of imparting to:

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132171**

- 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 centre 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132171**

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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132171**

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.

# MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132171A	SPLICE, 7/3.75 AAC MARS, PREFORMED, FULL TENSION

**SPECIFICATION DETAILS**

1. Helical tension for mid-span jointing of 7/3.75 AAC to AS 3607-1989.
2. The fittings shall comply with AS 1154.3 - 2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
3. Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
4. Full technical description including minimum diameter of hardware to which the fitting can be applied, test reports and installation instructions shall be included with the tender.

**(NB: FOR ATTACHMENTS REF VOCAB. NO. 132090)**

- **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: 17/1/17

**DATA REVIEW ENDORSEMENT**

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader - Standards and Materials		16/12/16

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132171A**

Tenders are invited for the Supply and Delivery to PNG Power Limited main PNG 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132171A**

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 band.

**3.1.2 Mechanical Performance**

Armour rods shall be capable of imparting to:



**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132171A**

- 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 centre 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132171A**

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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS – 132171A**

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.

# MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132173	SPLICE, 30/7/2.50 GRAPE PREFORMED, FULL TENSION

**SPECIFICATION DETAILS**

1. Helical tension for mid-span jointing of 30/7/2.50 ACSR/GZ to AS 3607-1989.
2. The fittings shall comply with AS 1154.3 - 2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
3. Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
4. Full technical description including minimum diameter of hardware to which the fitting can be applied, test reports and installation instructions shall be included with the tender.

**(NB: FOR ATTACHMENTS REF VOCAB. NO. 132090)**

- **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:**

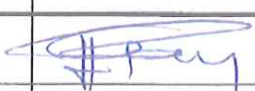
**STANDARDS COMMITTEE APPROVAL**

Approval by Alex Oa  
**Chairman**

Signature: 

Date: 17/1/17

**DATA REVIEW ENDORSEMENT**

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader - Standards and Materials		16/12/16

**SPECIFICATION FOR PREFORMED LINE FITTINGS - 132173**

Tenders are invited for the Supply and Delivery to PNG Power Limited main PNG 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS - 132173**

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 band.

**3.1.2 Mechanical Performance**

Armour rods shall be capable of imparting to:

**SPECIFICATION FOR PREFORMED LINE FITTINGS - 132173**

- 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.

**SPECIFICATION FOR PREFORMED LINE FITTINGS - 132173**

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.



**SPECIFICATION FOR PREFORMED LINE FITTINGS - 132173**

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.

## MATERIAL SPECIFICATION

VOCAB NUMBER	ITEM DESCRIPTION
132173A	SPLICE, 37/2.50 AAC PREFORMED, FULL TENSION

### SPECIFICATION DETAILS

1. Helical tension for mid-span jointing of 37/2.50 AAC to AS 1531-1991.
2. The fittings shall comply with AS 1154.3 - 2009 and shall hold not less than 85% of the nominated breaking load of the conductor.
3. Each fitting shall be clearly marked with the conductor size and type for which it is designed to be used.
4. Full technical description including minimum diameter of hardware to which the fitting can be applied, test reports and installation instructions shall be included with the tender.

**(NB: FOR ATTACHMENTS REF VOCAB. NO. 132090)**

- **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: 17 / 1 / 17

### DATA REVIEW ENDORSEMENT

NAME	TITLE	SIGNATURE	DATE
Grevasias Peni	Team Leader - Standards and Materials		16/12/16