




Specification – Technical Requirements for MV  
Power Cables with Rated Voltage from  
3.81/6.6(7.2) kV to 19/33(36) kV

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\* Shall be the Process Owner and is the person assigned authority and responsibility for managing the whole process, end-to-end, which may extend across more than one division and/or functions, in order to deliver agreed business results.

\*\* Frequency period is dependent upon circumstances– maximum is 5 years from last issue, review, or revision whichever is the latest. If left blank, the default shall be 1 year unless otherwise specified.

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0	28/05/2013	First Issue
1	17/02/2016	Cypermethrin residue limit added

STAKEHOLDERS	
The following positions shall be consulted if an update or review is required:	
Manager Engineering & Project Services	Regional Asset Managers
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# 1 SCOPE

This specification covers Horizon Power's requirements for the supply and testing of medium-voltage distribution power cables used on AC systems from 3.81/6.6(7.2) kV to and including 19/33(36) kV.

Tests prescribed will evaluate the performance of these cables, and shall comply with this specification.

**NOTE:** Submersible cables are not included as part of this specification.

Approval in terms of this specification shall be obtained by one or a combination of the following:

- a) successful completion of the appropriate tests required by this specification by an independent and accredited test authority.
- b) provision of test certificates from an independent and accredited test authority based upon an alternative specification, with test requirements at least equivalent to this specification.

**NOTE:** Verification of accreditation of the test authority shall be provided by NATA (National Association of Testing Authorities) accredited test house or by a test house possessing accreditation from a NATA MRA (Mutual Recognition Agreement) partner.

# 2 NORMATIVE REFERENCES

## 2.1 Standards

The following documents contain provisions that, through reference in the text, constitute requirements of this specification. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below. Information on currently valid national and international standards and specifications can be obtained from SAI Global – Standards On-Line data base or equivalent standards database.

**Table 1: List of Applicable Standards**

STANDARD	DESCRIPTION
AS/NZS 1125	Conductors in insulated electric cables and flexible cords
AS/NZS 1429:1	Electric Cables – Polymeric Insulated – For voltages 1.9/3.3(3.6) kV up to and including 19/33/(36) kV

STANDARD	DESCRIPTION
AS/NZS 1660	Test methods for electric cables, cords and conductors. Part 2.2 - Insulation, extruded semi-conductive screens and non-metallic sheaths. Methods specific to elastomeric and XLPE compounds Part 2.3 - Insulation, extruded semi-conductive screens and non-metallic sheaths. Methods specific to PVC and halogen free thermoplastic compounds Part 2.4 - Insulation, extruded semi-conductive screens and non-metallic sheaths. Methods specific to polyethylene and polypropylene compounds Part 3- Electrical tests Part 4 - Complete cable and flexible cord
AS 1824.2	Insulation Coordination: Part 2 – Phase to Earth and Phase to Phase above 1 kV
AS 1931.1	High Voltage Testing Techniques - General Definitions and Test Requirements
AS 2067	Substations and high voltage installations exceeding 1 kV a.c.
AS/NZS 2857	Timber Drums for Insulated Electric Cables and Bare Conductors
AS/NZS 3000	Electrical Installations (known as Australian/New Zealand Wiring Rules)
AS/NZS 3008	Electrical installations - Selection of cables Part 1 - Cables for alternating voltages up to and including 0.6/1 kV
AS/NZS 3599.2	Electric cables — Aerial bundled — Polymeric insulated — Voltages 6.35/11(12) kV and 12.7/22(24) kV - Part 2: Non-metallic screened
AS/NZS 3808	Insulating and sheathing materials for electrical cables
AS/NZS 3983	Metal drums for insulated electric cables and bare conductors
AS/NZS 4026	Electric Cables – For underground residential distribution systems
ICEA S-94-649-2004	Standard for Concentric Neutral Cables Rated 5 through 46 kV
IEC 60183	Guide to the selection of high-voltage cables
VDE 0298	Part 4 – General Current Ratings for flexible cables

In addition to the above, *Horizon Power Environmental Conditions HPC-9EJ-01-0001-2013* shall be referred to for environmental conditions, in addition to those stated in section 3.2.

## 2.2 Definitions and Abbreviations

For the purposes of this specification the following definitions apply:

### 2.2.1 Definitions

- 1) **nominal voltage:** according to DIN VDE 0298 cables are specified as  $U_0/U (U_m)$  where:
  - a)  $U_0$  is the cable nominal voltage between the conductor and the metal covering or earth;
  - b)  $U$  is the cable nominal voltage between the phase conductors, for 3-phase  $U = \sqrt{3}U_0$ ;

- c)  $U_m$  is the maximum permissible voltage.

This defines the voltages of cables and wires, by which the construction and the tests in respect of electrical characteristics are to be referred.

- 2) **Equipment:** means cable in relation to this specification.

### 2.2.2 **Abbreviations**

- 1) AC: Alternating Current
- 2) AMF: Approved Manufacturing Facility
- 3) AS: Australian Standard
- 4) AWA: Aluminium-wire armoured
- 5) HDPE: High Density Polyethylene
- 6) MRA: Mutual Recognition Agreement
- 7) MV: Medium Voltage >1000 volts ac; <36 000 volts ac
- 8) NATA: National Association of Testing Authorities, Australia
- 9) PVC: Polyvinyl Chloride
- 10) SWA: Steel-wire armoured
- 11) XLPE: Cross-linked polyethylene

### 2.3 **Drawings**

The drawing listed below form part of this specification, see Appendix I:

- 1) HPA-SD-E-01010-01 (MV 1C Power Cable)

## 3 **REQUIREMENTS**

### 3.1 **Power System Particulars**

The Equipment shall be suitable for continuous connection to a power system with the characteristics covered by this Section.

#### 3.1.1 **Rated Voltages**

The rated voltages  $U_o/U$  ( $U_m$ ) of cables considered in this specification shall be as specified in AS/NZS 1429.1.

#### 3.1.2 **Fault Rating**

The cables shall be rated to withstand the following 3 phase fault currents:

- 1) 13.1 kA rms/1s for 33 kV
- 2) 18.4 kA rms/1s for 22 kV
- 3) 18.4 kA rms/1s for 11 kV
- 4) 21.9 kA rms/1s for 6.6 kV

### 3.1.3 **Maximum Conductor Temperatures**

The cables shall be suitable for use with conductor temperatures specified in AS/NZS 1429.1 for normal operation and under fault conditions.

### 3.1.4 **Nominal System Frequency**

The nominal system frequency is 50 Hz.

### 3.1.5 **System Insulation Levels**

The system Basic Impulse Insulation Levels (BIL) are as follows:

**Table 2: System Insulation Levels**

Nominal System Voltage (kV <sub>rms</sub> )	System Highest Voltage (kV <sub>peak</sub> )	Lightning Impulse withstand Voltage (kV <sub>peak</sub> )	Power Frequency withstand Voltage (kV <sub>peak</sub> )
6.6	7.2	75	20
11.0	12.0	95	28
22.0	24.0	150	50
33.0	36.0	200	70

## 3.2 **Service Conditions**

### 3.2.1 **Environmental Conditions**

The Equipment shall be suitable for use throughout the state of Western Australia in conditions where a wide range of solar radiation and pollution (salt bearing, industrial and agricultural) are experienced. The Equipment shall be suitable for continuous operation under the conditions stated in *Horizon Power Environmental Conditions HPC-9EJ-01-0001-2013* and the following environmental conditions:

**Table 3: Environmental Conditions**

Condition	Requirement
Pollution:	Wind borne dust deposits may accumulate over a number of months followed by high humidity with heavy dew or light rain.
Salt:	At points along a 4 km wide West Coast strip, salt deposits can reach levels as high as 40 mg/100 cm <sup>2</sup> per month.

### 3.2.2 **Operating Conditions**

**Table 4: Operating Conditions of Cables**

Condition	Requirement
Soil Condition	Waterlogged with up to 2 m head of water



Condition	Requirement
Depth of Laying	850 mm measured from ground surface to top of a cable/trefoil or duct

### 3.3 Description of Cable

Cables shall have a method of identification for asset management purposes i.e. a means of capturing batch information for traceability of any future problems with the cables. In addition, a discrete means of identification of stolen cable shall be proposed. Full details of the application of the identification marking and method to read or retrieve the information shall be provided with the submission. The identification marking shall be indelible and difficult to remove from the cable.

### 3.4 Materials and Construction

Cable sizes used by Horizon Power are captured in Appendix F.

#### 3.4.1 General

All 22 kV and 33 kV medium voltage underground distribution cables shall comply with AS/NZS 1429.1 unless otherwise specified.

#### 3.4.2 Cable Construction

The cable construction shall comply with AS/NZS 1429.1.

#### 3.4.3 Conductor

Conductors shall be stranded circular compacted aluminium or copper as stated in Appendix C Schedule A and comply with the requirements of AS/NZS 1429.1.

Core conductors shall be as stated in Appendix C Schedule A.

#### 3.4.4 Conductor Screen

The conductor screen shall comply with the requirements of AS/NZS 1429.1.

#### 3.4.5 Insulation

##### 3.4.5.1 Material

The insulation material shall be of dry-cured cross-link polyethylene (XLPE) compound in accordance with AS/NZS 3808.

##### 3.4.5.2 Thickness

The average insulation thickness shall be determined in accordance with AS/NZS 1429.1 Tables 2.1 and 2.2.

##### 3.4.6 Insulation Screen

The extruded semi-conductive insulation screen shall meet the minimum stripping force as defined in AS/NZS 1429.1 and the maximum stripping force requirement as specified in Table 5.

**Table 5: Stripping force requirement**

Nominal System Voltage (kV <sub>rms</sub> )	Stripping Force Requirement
22	Up to 45 N
33	Up to 65 N

**3.4.7 Metallic Screen**

The gross cross-sectional area of screen wires shall be not less than that calculated by the adiabatic method as specified in AS/NZS 1429.1 to meet the following single phase to earth fault current for 1 second as stated in Table 6:

**Table 6: Single-phase fault current design requirements**

Conductor Material	Cross-sectional Area of Core Conductor (mm <sup>2</sup> )	Fault Current Level (kA) – Copper Wire Screen
Aluminium	35	3.3
Aluminium	50	4.8
Aluminium	95	9.1
Aluminium	185-1000	10
Copper	240	10
Copper	630	10

The screen wires shall comprise plain or tinned annealed copper wires in accordance with AS/NZS 1429.1. The screen wires shall not indent the insulation by more than that allowed by Standard ICEA S-94-649-2004. The diameter of the screen wires shall not be greater than 1.7 mm.

**3.4.8 Laying-up**

For triplex cables, AS/NZS 1429.1 shall be adhered to.

**3.4.9 Bedding/Fillers**

Not required.

**3.4.10 Water Blocking**

Medium voltage underground cables shall have a non-biodegradable longitudinal moisture barrier in the form of a water-swellable tape, applied over the metallic screen wires and shall meet the water blocking test requirements of AS/NZS 1429.1 Appendix C.

The water-swellable tape shall be easily removable and shall separate cleanly from the screen wires.

**3.4.11 Outer-Sheath**

Outer-sheath materials shall comply with the requirements of AS/NZS 3808 and shall be of a composite construction comprising an inner 5V-90 orange PVC

layer and an outer black HDPE layer. The HDPE layer shall be UV stabilised with a minimum of 2% carbon black. The minimum average thickness of the outer HDPE layer shall be not less than 2 mm. The combined PVC and HDPE average sheath thickness shall be not less than 3.2 mm and shall comply with all other requirements of AS/NZS 1429.1.

The HDPE sheath shall have a high resistance to stress cracking (i.e. the Environmental Stress Crack Resistance) and the Elongation at Break (without ageing) must be in excess of the minimum requirements specified in Table 10 of AS/NZS 3808) and the Vendor is requested to provide specific assurance in this regard.

The Vendor shall specify the:

- 1) resistance to corrosion; and
  - 2) permeability to water
- of the HDPE sheath.

**NOTE:** The colour orange shall be within the range of colours described by RAL colour standards 2003, 2004, 2005, 2007, 2008, 2009, 2011. Variations in colour intensity are expected and shall not be a reason for rejection.

#### **3.4.12 Core Marking**

Core (phase) identification marking on the semi-conductive insulation screen and outer sheath shall only be applied where specified in Appendix C Schedule A.

Where core (phase) identification is specified in Appendix C Schedule A, the height of core (phase) identification marking on the semi-conductive insulation screen shall be at least 5 mm and all other core (phase) identification aspects shall be in accordance with AS/NZS 1429.1.

#### **3.4.13 Cable Markings**

The outer sheath shall be indelibly marked:

- 1) By dual embossing (approximately diametrically opposed lines for distribution power cables) and single line embossing (for service cables) at intervals of not more than 500 mm showing:
  - a) Manufacturer's name
  - b) Place of manufacture
  - c) Voltage rating
  - d) Phase conductor size and material
  - e) Designation of insulation (i.e. XLPE)
  - f) Batch Number
  - g) The word "UNDERGROUND"

- 2) Additionally, in a single line, at intervals of one metre there shall be at least three sets of the following marking in a contrasting colour equally spaced as practicable within the one metre interval:
  - a) Week and year of manufacture e.g. 02/2013 for the 2<sup>nd</sup> week in year 2013
  - b) Where relevant, a minimum of 3-letter identification for cable as having protection from insect attack i.e. DBT for double brass tape, NYL for Nylon or TCD for termiticide.
- 3) Metre marking, e.g. <018M> representing 18 -metres, shall be provided on the cable in a contrasting colour.

All of these sheath markings shall comply with the requirements of AS/NZS 1429.1 except that the minimum height shall be 5 mm.

Example of cable marking on outer sheath of the cable with protection from insect attack (double brass tape) for a 1 m interval shall be as shown in Figure 1, as appropriate, with phase marking as specified in Appendix C Schedule A.



**Figure 1: Cable Marking**

**3.4.14 Protection from Insect Attack**

Protection from insect attack shall be provided in the form of one, or a combination of the following options:

- 1) Double Brass Tape
 

Where double brass tape is provided, it shall consist of two overlapping layers of tape having the same width, helically applied. The layers shall be applied such that:

  - a) A nominal design gap of 25% is maintained between consecutive helical windings on each of the layers

- b) The top layer shall be centrally applied over the design gaps of the bottom layer.
- c) The double brass tape shall be applied directly over the 5V-90 insulating sheath and covered by an outer sheath of HDPE material containing a minimum of 2% carbon black.

2) Chemical Protection

Where chemical protection is offered, it shall be incorporated into an outer sheath comprising of HDPE material which contains a minimum of 2% carbon black.

Unless the use of the chemical has been approved at the time of issue of this specification, the Vendor shall provide the following information:

- a) Material safety data sheet refer to Appendix H Schedule E;
- b) Test reports;
- c) Letter of approval from an authorised environmental representative;
- d) Indication of the period the chemical will remain effective;
- e) Limits or restrictions imposed on the installation of chemically treated cables;
- f) Explanation in the manner/mechanism by which the chemical functions to protect the cable from insects; and
- g) Cypermethrin residue on the cable surface shall not exceed 3.0 mg/m<sup>2</sup> determined by a controlled swab test over a minimum test sample of area 0.01 m<sup>2</sup>.

**3.5 Cable Length**

Cables shall be supplied in drum lengths of 250 m as a minimum unless otherwise indicated in Appendix C Schedule A.

**3.6 Cable Bending Radius**

The Vendor shall provide the minimum bending radius for the installing and setting of cables in Appendix C Schedule B.

**3.7 Cable Pulling Tension**

The Vendor shall provide the maximum pulling tension for cables offered in Appendix C Schedule B.

**3.8 Cable-end Sealing**

Cables shall be free of water or corrosion at the time of dispatch from the manufacturer's premises.

All cable ends shall be sealed to prevent moisture ingress. This shall seal the individual layers of the cable construction from one another to avoid water transfer to the conductor strands in the event of damage to the outer sheaths.

Vendors shall provide full details of the method used for sealing the cables ends with the tender documentation. The minimum requirements for seals at the cable

ends shall be an air-tight seal fitted with a pressure release valve (allowing airflow from inside the cap to the outside only).

## 4 CABLE DRUMS

### 4.1 Timber Drums

Cable drum reels shall be constructed generally in accordance with the requirements of AS 2857, including/in addition to the following:

- 1) Flange layers shall be fastened with flat head nails complying with the requirements of AS 2334. Nails shall be positioned concentrically with the flange on pitch circles and the heads of nails shall be punched below the surface on the inside of the flange.
- 2) The nails shall be of sufficient length to provide an effective clinch of no less than 10 mm. Clinches shall be so driven that the points of the nails are below the outer surface of the flange.
- 3) Barrel and flanges shall be securely clamped together with barrel bolts. Bolt threads may be rolled or cut. Bolts shall be evenly spaced and shall not project more than 12 mm beyond the nuts after the nuts have been fully tightened.
- 4) Barrel supports shall be provided as per Section 3 of AS 2857.
- 5) When lagging is required, battens shall be secured with steel tape banding adjacent to each flange and secured with nails or staples that will not protrude through the battens. Banding shall be painted or galvanized and shall be no less than 0.65 mm thick and 32 mm wide.
- 6) Nominal drum dimensions shall be in accordance with Table 3.1 of AS/NZS 2857 and as extended in range by the table in Appendix G (Note actual drum dimensions may vary slightly from those listed in Appendix G and in such cases the requirements of the closest nominal size shall prevail meeting the requirements of Appendix F). Maximum flange diameter acceptable is 2.45 m.

Cables drums shall be suitably lagged with timber for transportation.

Cable ends shall be securely affixed to the drum flange to prevent them from being dislodged. Any cable ends that project from the drum flanges shall be adequately protected against mechanical damage during transport and storage. They shall give complete protection from damage, to the cable during transit.

### 4.2 Steel Drum

Steel drum construction and preparation shall comply with the requirements of AS 3983 for the supply of cables and conductors with the exception of drum dimensions, which shall meet the minimum barrel diameter and maximum flange and width specified in Appendix F.

Clearance between the top layer of cable and periphery of drum flange shall be equal to the overall diameter of the cable or 50 mm, whichever is the greater.

### 4.3 Drum Marking

Drums shall be clearly labelled/stencilled with the following information:

- 1) Manufacturers name;
- 2) Manufacturers drum traceability number;
- 3) Week and Year of manufacture;
- 4) Appropriate identification/information of the cable in the form of:
  - a) Number of cores, phase conductor size and material
  - b) Designated voltage expressed in the form of  $U_o/U$
  - c) Insulation, sheath and other protective covering materials
  - d) Where the cable is metre marked, the start and finish numbers of the cable's metre marking
- 5) Batch Number
- 6) Total gross weight of cable, drum and lagging;
- 7) Arrow to indicate direction of rotation of the drum marked with the words "ROLL THIS WAY";
- 8) Directions to indicate correct methods of lifting and transporting cable drums;
- 9) Specification Number;
- 10) Stock number;
- 11) Order number; and
- 12) Length of cable.

## 5 STORAGE

The Equipment shall be capable of being stored without deterioration within the temperature range of -10 °C to + 45 °C for at least 24 months.

## 6 RELIABILITY

Vendors shall provide information on the reliability of the Equipment and the performance of the materials offered over **an operational life of 65 years** under the specified field of application and conditions of service.

Information provided shall evidence the claimed reliability and performance for the Equipment offered, including information on Failure Mode and Effect Analysis.

## 7 SAFETY

Material Safety Data Sheets (MSDS) applicable for each different Equipment or chemical ingredient in the Equipment which is considered harmful to personnel or environment in any manner shall be supplied with the Proposal.



## 8 ENVIRONMENTAL CONSIDERATIONS

Vendors shall provide information on the environmental soundness of the design and the materials used in the manufacture of the Equipment offered. In particular, information must address such issues as recyclability and disposability at the end of service life as well as disposability of materials supplied.

## 9 TESTS

### 9.1 Test Requirements

The Vendor shall, prior to first Delivery, complete the type, routine, sample and special tests and inspections as required by the relevant Australian Standards including AS 1429.1 Section 3.

The passing of such tests shall not prejudice the right of Horizon Power to reject the cable if it does not comply with the Specification when installed.

#### 9.1.1 *Type Tests*

A representative selection of cables shall be Type tested in accordance with this specification and the relevant Australian Standards. Horizon Power reserves the right to witness Type Tests and shall be given advance notice by the Vendor to be available to witness such tests.

Type Testing shall be undertaken by a NATA (National Association of Testing Authorities) accredited test house or by a test house possessing accreditation from a NATA MRA (Mutual Recognition Agreement) partner. A formal report covering the outcome of the testing shall be provided to Horizon Power.

Evidence shall be submitted by the Vendor indicating that all type tests required by the relevant Australian Standards listed in Table 1 have been satisfactorily carried out.

Where Cable has been tested to International Standards only, sufficient type test evidence shall be submitted to confirm equivalence of Cable performance to the relevant Australian standard.

#### 9.1.2 *Routine and Sample Tests*

Horizon Power reserves the right to witness an agreed program of Routine Tests to assure of the competence of the manufacturing facility to deliver consistently conforming Cable. The Vendor shall in all cases make all necessary provisions with the testing and/or manufacturing facilities to enable witnessing to take place. An Inspection and Test Plan (ITP) shall be provided to Horizon Power prior witnessing of tests.

Prior to first delivery of Cable, the Vendor shall submit to Horizon Power all routine and sample tests performed on that batch of Cable.



## **10 DOCUMENTATION AND SAMPLES**

### **10.1 Type Test Certificates/Reports**

Test certificates, test reports or any other supporting documents supplied shall be made available in English.

### **10.2 Samples**

Any deviations between the Cable supplied as a sample to Horizon Power and the Cable offered in the Proposal shall be detailed by the Vendor.

#### **10.2.1 Test Samples**

For the purpose of evaluation, the Vendor shall submit 1 m cable sample lengths of each cable category with the Proposal. The cable construction lay up of the samples shall meet the requirements of this Technical Specification. Each sample shall be labelled with a robust tag stating:

- 1) Vendor Name;
- 2) Cable Number;
- 3) Stock Code;
- 4) Batch Number; and
- 5) Appropriately identified, as in Appendix F of this Specification.

The Vendor shall supply Horizon Power test samples free of charge and within 4 weeks of the request.

#### **10.2.2 Display Samples**

The Preferred Vendor shall submit a sample of each cable awarded. The sample, displaying longitudinal and radial section and comprising a description legend, shall be suitable for display purposes. The samples shall be submitted to the Horizon Power Representative on delivery of the first shipment against the first order under the Standing Offer or as agreed by the Horizon Power Representative.

## APPENDIX A – REVISION INFORMATION


(Informative) Horizon Power has endeavoured to provide standards of the highest quality and would appreciate notification if any errors are found or even queries raised.

Each Standard makes use of its own comment sheet which is maintained throughout the life of the standard, which lists all comments made by stakeholders regarding the standard.

A comment sheet found in **CS10# 1790858**, can be used to record any errors or queries found in or pertaining to this standard, which can then be addressed whenever the standard gets reviewed.


Date	Rev No.	Notes
28/05/2013	0	First Issue
15/04/2016	1	Cypermethrin residue limit added to clause 3.4.14, added requirement for end caps with valves to clause 3.8.

## APPENDIX B – QUALITY ASSURANCE (TO BE COMPLETED BY STORES)

<b>DOCUMENT NUMBER</b>		HPC-8DJ-03-0004-2013					<b>QUALITY ASSURANCE</b>		<b>DM NUMBER</b>		
<b>DEVICE DESCRIPTION</b>		<b>LABEL MATERIAL NO.</b>					<b>MV POWER CABLE PURCHASE</b>			<b>ASSET OWNER</b>	
		<b>ASSET ID/ STOCK NO</b>									
<b>MANUFACTURER</b>				<b>DIMENSION</b>							
<b>ITEM</b>	<b>OPERATION/EQUIPMENT/FACILITY</b>		<b>DOCUMENT REF.</b>	<b>WHO CHECKS</b>	<b>INITIAL</b>	<b>DATE/TIME</b>	<b>QUALITY ASSURANCE CRITERIA</b>	<b>PASS Y/N</b>	<b>COMMENTS</b>		
1	DRUM LABELLING										
1.1	Name of Manufacturer						*****				
1.2	Week & Year of Manufacture						*****				
1.3	Manufacturer Drum Trace Number						*****				
1.4	Cable Information										
1.4.1	Number of Cores/Phase conductor size/Material						*****				
1.4.2	Rated Voltage						___/___ kV				
1.4.3	Insulation/Sheath/Protective Covering Materials						*****				
1.4.4	Cable Metre Mark/Start & Finish Numbers						*****				
1.4.5	Batch Number						*****				
1.4.6	Termite/Water Protection						*****				

1.5	Gross Weight Cable/Drum & Lagging					*****		
1.6	Arrow (ROLL THIS WAY)					*****		
1.7	Directions for Lifting and Transport					*****		
1.8	Specification Number					*****		
1.9	Stock Number					*****		
1.10	Order Number					*****		
1.11	Length of Cable					*****		
2	DOCUMENTATION							
2.1	Installation Instructions					Clear, Legible and in English		
2.2	Material Safety Data Sheets					Clear, Legible and in English of Chemical Protection		
2.3	Test and Inspection Reports					As per Standards referenced in the specification.		
SYMBOLS AND ABBREVIATIONS								
H = HOLD POINT		S = SUPERVISOR						
W = WITNESS POINT		T = TECHNICIAN, EL = ELECTRICIAN		REVISION				
V = VERIFICATION POINT		E = ENGINEER		DATE				
S/C = SUBCONTRACTOR		PM = PROJECT MANAGER		APPROVED BY				

## APPENDIX C – SCHEDULES A & B: ENQUIRY DOCUMENT

	<b>SPECIFICATION ENQUIRY</b>	HPC-8DJ-03-0004-2013
	<b>VENDOR'S NAME</b>	
	<b>DATE</b>	

### TECHNICAL SCHEDULES A & B

#### ITEM 1: Single Core Distribution Power Cables


<b>VOLTAGE</b>	12.7/22 kV	12.7/22 kV	12.7/22 kV	12.7/22 kV	12.7/22 kV	12.7/22 kV	
<b>ITEM</b>	1.1	1.2	1.3	1.4	1.5	1.6	
<b>TYPE</b>	3 x 1C Triplex	3 x 1C Triplex	3 x 1C Triplex	3 x 1C Triplex	3 x 1C Triplex	1C	
<b>SIZE (mm<sup>2</sup>)</b>	35	95	185	240	400	630	

#### SCHEDULE A: Horizon Power's specific requirements

#### SCHEDULE B: Particulars of equipment to be supplied (to be completed by Vendor)

No.	Clause	Description	Schedule A	Schedule B
		Distribution Standard Buyers Guide drawing	HPA-SD-E-0002	xxxx
<b>1</b>	<b>3.1.2</b>	<b>Ratings</b>		
1.1		Phase fault level	kA	xxxx
1.2		Earth fault level	kA	xxxx
1.3		Max Sustained Current @ 20°C in Ground (25°C and 35°C)		xxxx
		Air		xxxx
		Ducts		xxxx
1.4		Resistance at max sustained operating temp.	Ω/km	xxxx
		Reactance per Phase	Ω/km	xxxx
		Capacitance per Phase	Ω/km	xxxx
		Zero Sequence at max sustained operating temp	Ω/km	xxxx
		Impedance per Phase	Ω/km	xxxx
		Capacitance per Phase	Ω/km	xxxx
<b>2</b>		<b>Cable Dimensions</b>		
2.1	3.4.2	Cable Construction		xxxxx
2.2	3.4.3	Conductor	Aluminium/Copper	xxxxx
		Size:	mm <sup>2</sup>	xxxxx
		Diameter:	mm	xxxx
2.3	3.4.5	Insulation		
		Material:	XLPE	xxxx
		Thickness:	mm	xxxx
2.4	3.4.6	Insulation Screen		xxxx
2.5	3.4.7	Metallic Screen	Copper	xxxx
		Area of screen	mm <sup>2</sup>	xxxx
		Fault Current Level	kA	xxxx
2.6	3.4.10	Water Blocking		
2.7	3.4.11	Outer-Sheath		
		Material	XLPE	xxxx
		Thickness	mm	xxxx
		Corrosion Resistance	xxxx	xxxx
		Permeability to water	xxxx	xxxx
2.8	3.4.12	Core Marking		
2.9	3.4.13	Cable Marking	Yes	xxxx
2.10	3.4.14	Insect Protection	Yes	xxxx
2.11	3.5	Cable Length	m	≥250
		Cable mass	kg/m	xxxx

2.12	3.6	Cable Bending Radius (Triplex / 1 core cable)		
		Installation	mm	xxxx
		Setting	mm	xxxx
2.13	3.7	Cable Pulling Tension	kN	xxxx
2.14	3.8	Cable End Sealing		xxxx
<b>3</b>		<b>Drum Size</b>		
	4	Flange x Barrel x Width	mm	xxxx
		Gross mass per standard drum length	kg	xxxx
<b>4</b>		<b>Type test certificate requirements</b>		
	9.1	Test certificate provided according to AS/NZS 1429.1, Table 3.1		xxxx
<b>5</b>		Manufacturer		xxxx
		Brand / Catalogue No. / Model		xxxx
		Country of Manufacture		xxxx

	<b>SPECIFICATION ENQUIRY</b>	HPC-8DJ-03-0004-2013
	<b>VENDOR'S NAME</b>	
	<b>DATE</b>	

**TECHNICAL SCHEDULES A & B**

**ITEM 2: Single Core Distribution Power Cables**

<b>VOLTAGE</b>	19/33 kV	19/33 kV	19/33 kV	19/33 kV	19/33 kV		
<b>ITEM</b>	2.1	2.2	2.3	2.4	2.5		
<b>TYPE</b>	3 x 1C Triplex	3 x 1C Triplex	3 x 1C Triplex	1C	1C		
<b>SIZE (mm<sup>2</sup>)</b>	50	185	240	630	1000		

**SCHEDULE A: Horizon Power's specific requirements**

**SCHEDULE B: Particulars of equipment to be supplied (to be completed by Vendor)**

No.	Clause	Description	Schedule A	Schedule B
		Distribution Standard Buyers Guide drawing	HPA-SD-E-0002	xxxx
<b>1</b>	<b>3.1.2</b>	<b>Ratings</b>		
1.1		Phase fault level	kA	xxxx
1.2		Earth fault level	kA	xxxx
1.3		Max Sustained Current @ 20°C in Ground (25°C and 35°C)		xxxx
		Air		xxxx
		Ducts		xxxx
1.4		Resistance at max sustained operating temp.	Ω/km	xxxx
		Reactance per Phase	Ω/km	xxxx
		Capacitance per Phase	Ω/km	xxxx
		Zero Sequence at max sustained operating temp	Ω/km	xxxx
		Impedance per Phase	Ω/km	xxxx
		Capacitance per Phase	Ω/km	xxxx
<b>2</b>		<b>Cable Dimensions</b>		
2.1	3.4.2	Cable Construction		xxxxx
2.2	3.4.3	Conductor	Aluminium/Copper	xxxxx
		Size:	mm <sup>2</sup>	xxxxx
		Diameter:	mm	xxxx
2.3	3.4.5	Insulation		
		Material:	XLPE	xxxx
		Thickness:	mm	xxxx
2.4	3.4.6	Insulation Screen		xxxx
2.5	3.4.7	Metallic Screen	Copper	xxxx
		Area of screen	mm <sup>2</sup>	xxxx
		Fault Current Level	kA	xxxx
2.6	3.4.10	Water Blocking		
2.7	3.4.11	Outer-Sheath		
		Material	XLPE	xxxx
		Thickness	mm	xxxx
		Corrosion Resistance	xxxx	
		Permeability to water	xxxx	
2.8	3.4.12	Core Marking		
2.9	3.4.13	Cable Marking	Yes	xxxx
2.10	3.4.14	Insect Protection	Yes	xxxx
2.11	3.5	Cable Length	m	≥250
		Cable mass	kg/m	xxxx

2.12	3.6	Cable Bending Radius (Triplex / 1 core cable)			
		Installation	mm	xxxx	
		Setting	mm	xxxx	
2.13	3.7	Cable Pulling Tension	kN	xxxx	
2.14	3.8	Cable End Sealing		xxxx	
<b>3</b>		<b>Drum Size</b>			
	4	Flange x Barrel x Width	mm	xxxx	
		Gross mass per standard drum length	kg	xxxx	
<b>4</b>		<b>Type test certificate requirements</b>			
	9.1	Test certificate provided according to AS/NZS 1429.1, Table 3.1		xxxx	
<b>5</b>		Manufacturer		xxxx	
		Brand / Catalogue No. / Model		xxxx	
		Country of Manufacture		xxxx	



## APPENDIX D – SCHEDULE C: COMPLIANCE DOCUMENT

The Vendor shall indicate below whether this offer is fully compliant with the nominated clause in this Specification. A YES shall ONLY be indicated if the offer is 100% compliant with the relevant Clause. If NO is indicated and supporting documents are submitted, then mark the ATT box with the attachment number

CLAUSE NUMBER		YES	NO	ATT.
1.	SCOPE			
2.	NORMATIVE REFERENCES			
2.1	Standards			
2.2	Definitions and Abbreviations			
2.2.1	<i>Definitions</i>			
2.2.2	<i>Abbreviations</i>			
2.3	Drawings			
3	REQUIREMENTS			
3.1	Power System Particulars			
3.1.1	<i>Rated Voltages</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.1.2	<i>Design Fault Levels</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.1.3	<i>Maximum Conductor Temperatures</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.1.4	<i>Nominal System Frequency</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.1.5	<i>System Insulation Levels</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2	Service Conditions			
3.2.1	<i>Environmental Conditions</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2.2	<i>Operating Conditions</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3	Description of Cable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4	Materials and Construction			
3.4.1	<i>General</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.2	<i>Cable Construction</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3	<i>Conductor</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.4	<i>Conductor Screen</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.5	<i>Insulation</i>			
3.4.5.1	<i>Material</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.5.2	<i>Thickness</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.6	<i>Insulation Screen</i>			
3.4.7	<i>Metallic Screen</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.8	<i>Laying Up</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.9	<i>Bedding / Fillers</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.10	<i>Water Blocking</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.11	<i>Outer Sheath</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.12	<i>Core Marking</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.13	<i>Cable Markings</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.14	<i>Protection from Insect Attack</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5	<i>Cable Length</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CLAUSE NUMBER		YES	NO	ATT.
3.6	Cable Bending Radius	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.7	Cable Pulling Tension	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.8	Cable-end Sealing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	CABLE DRUMS			
4.1	Timber Drums	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2	Steel Drums	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.3	Drum Marking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	STORAGE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	RELIABILITY	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	SAFETY	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	ENVIRONMENTAL CONDITIONS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	TESTS			
9.1	Test Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.1.1	<i>Type Tests</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.1.2	<i>Routine Tests</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	DOCUMENTATION AND SAMPLES			
10.1	Type Test Certificates/Reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.2	Samples			
10.2.1	<i>Tests Samples</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.2.2	<i>Display Samples</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



## APPENDIX F – CABLE DESCRIPTION

ITEM	DESCRIPTION	DISTRIBUTION STANDARD DRAWING
1	<b>12.7/22 kV Single-Core MV Distribution Power Cable</b>	
1.1	Short Description: CABLE POWER ELECT 3 x 1C AL 12.7/22 kV 35 SQ XLPE Technical Description: CABLE POWER ELECT; 35 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 12.7/22 kV XLPE INSULATED WHITE CORE; COPPER SCREEN; WATER BLOCK TAPE; ORANGE PVC 5V-90 & BLACK HDPE; TERMITE PROTECTION Drum Size: (Flange x Barrel x Width) 2200 mm x 840 mm x 1100 mm	HPA-SD-E-0002
1.2	Short Description: CABLE POWER ELECT 3 x 1C AL 12.7/22 kV 95 SQ XLPE Technical Description: CABLE POWER ELECT; 95 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 12.7/22 kV XLPE INSULATED WHITE CORE; COPPER SCREEN; WATER BLOCK TAPE; ORANGE PVC 5V-90 & BLACK HDPE; TERMITE PROTECTION Drum Size: (Flange x Barrel x Width) 2450 mm x 1000 mm x 1450 mm	HPA-SD-E-0002
1.3	Short Description: CABLE POWER ELECT 3 x 1C AL 12.7/22 kV 185 SQ XLPE Technical Description: CABLE POWER ELECT; 185 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 12.7/22 kV XLPE INSULATED WHITE CORE; COPPER SCREEN; WATER BLOCK TAPE; ORANGE PVC 5V-90 & BLACK HDPE; TERMITE PROTECTION Drum Size: (Flange x Barrel x Width) 2450 mm x 1000 mm x 1450 mm	HPA-SD-E-0002
1.4	Short Description: CABLE POWER ELECT 3 x 1C CU 12.7/22 kV 240 SQ XLPE Technical Description: CABLE POWER ELECT; 240 mm SQ; 3 x 1C COPPER TRIPLEX 12.7/22 kV XLPE INSULATED WHITE CORE; COPPER SCREEN; WATER BLOCK TAPE; ORANGE PVC 5V-90 & BLACK HDPE; TERMITE PROTECTION Drum Size: (Flange x Barrel x Width) 2450 mm x 1210 mm x 1450 mm	HPA-SD-E-0002
1.5	Short Description: CABLE POWER ELECT 3 x 1C AL 12.7/22 kV 400 SQ XLPE Technical Description: CABLE POWER ELECT; 400 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 12.7/22 kV XLPE INSULATED WHITE CORE; COPPER SCREEN; WATER BLOCK TAPE; ORANGE PVC 5V-90 & BLACK HDPE; TERMITE PROTECTION Drum Size: (Flange x Barrel x Width) 2450 mm x 1210 mm x 1450 mm	HPA-SD-E-0002

ITEM	DESCRIPTION	DISTRIBUTION STANDARD DRAWING
1.6	Short Description: CABLE POWER ELECT 1C CU 12.7/22 kV 630 SQ XLPE Technical Description: CABLE POWER ELECT; 630 mm SQ; 1C COPPER 12.7/22 kV XLPE INSULATED WHITE CORE; COPPER SCREEN; WATER BLOCK TAPE; ORANGE PVC 5V-90 & BLACK HDPE; TERMITE PROTECTION Drum Size: (Flange x Barrel x Width) 2450 mm x 1210 mm x 1450 mm	HPA-SD-E-0002
2	<b>19.1/33 kV Single-Core MV Distribution Power Cable</b>	
2.1	Short Description: CABLE POWER ELECT 3 x 1C AL 19.1/33 kV 50 SQ XLPE Technical Description: CABLE POWER ELECT; 50 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 19.1/33 kV XLPE INSULATED WHITE CORE; COPPER SCREEN; WATER BLOCK TAPE; ORANGE PVC 5V-90 & BLACK HDPE; TERMITE PROTECTION Drum Size: (Flange x Barrel x Width) 2450 mm x 1000 mm x 1450 mm	HPA-SD-E-0002
2.2	Short Description: CABLE POWER ELECT 3 x 1C AL 19.1/33 kV 185 SQ XLPE Technical Description: CABLE POWER ELECT; 185 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 19.1/33 kV XLPE INSULATED WHITE CORE; COPPER SCREEN; WATER BLOCK TAPE; ORANGE PVC 5V-90 & BLACK HDPE; TERMITE PROTECTION Drum Size: (Flange x Barrel x Width) 2450 mm x 1210 mm x 1450 mm	HPA-SD-E-0002
2.3	Short Description: CABLE POWER ELECT 3 x 1C CU 19.1/33 kV 240 SQ XLPE Technical Description: CABLE POWER ELECT; 240 mm SQ; 3 x 1C COPPER TRIPLEX 19.1/33 kV XLPE INSULATED WHITE CORE; COPPER SCREEN; WATER BLOCK TAPE; ORANGE PVC 5V-90 & BLACK HDPE; TERMITE PROTECTION Drum Size: (Flange x Barrel x Width) 2450 mm x 1210 mm x 1450 mm	HPA-SD-E-0002
2.4	Short Description: CABLE POWER ELECT 1C CU 19.1/33 kV 630 SQ XLPE Technical Description: CABLE POWER ELECT; 630 mm SQ; 1C COPPER 19.1/33 kV XLPE INSULATED WHITE CORE; COPPER SCREEN; WATER BLOCK TAPE; ORANGE PVC 5V-90 & BLACK HDPE; TERMITE PROTECTION Drum Size: (Flange x Barrel x Width) 2450 mm x 1210 mm x 1450 mm	HPA-SD-E-0002

ITEM	DESCRIPTION	DISTRIBUTION STANDARD DRAWING
2.5	Short Description: CABLE POWER ELECT 1C AL 19.1/33 kV 1000 SQ XLPE Technical Description: CABLE POWER ELECT; 1000 mm SQ; 1C ALUMINIUM 19.1/33 kV XLPE INSULATED WHITE CORE; COPPER SCREEN; WATER BLOCK TAPE; ORANGE PVC 5V-90 & BLACK HDPE; TERMITE PROTECTION Drum Size: (Flange x Barrel x Width) 2450 mm x 1210 mm x 1450 mm	HPA-SD-E-0002

## APPENDIX G – STANDARD TIMBER DRUM DIMENSIONS

### Construction Details for Standard Timber Drums with Barrel-end Supports (2 to 6 Tonne)

Drum reference number (arranged in ascending order of barrel diameter)	Flange details		Barrel details										Overall drum width (excl. bolt projections) (mm)	Spindle hole diameter (mm)	
	Diameter (mm)	Nominal thickness (mm)	Diameter (mm)	Internal width (mm)	End support minimum thickness (mm)	Stretchers		Number of diagonal crow braces	Bolts		Minimum bore thickness (mm)	Number of intermediate supports			Square washers (or equivalent round washers)
						Number	Size (mm)		Number	Minimum diameter (mm)					
700 / 400 / 300	700	35	400	300	25	3	100 x 35		3	8	19		40 x 4	370	60
700 / 400 / 400	700	35	400	400	25	3	100 x 35		3	8	19		40 x 4	470	60
800 / 400 / 350	800	35	400	350	25	3	100 x 35		3	8	19		40 x 4	420	60
800 / 400 / 450	800	35	400	450	25	3	100 x 35		3	8	19		40 x 4	520	60
900 / 500 / 500	900	45	500	500	35	4	100 x 35		4	12	32		50 x 4	590	60
900 / 500 / 600	900	45	500	600	35	4	100 x 35		4	12	32		50 x 4	690	60
1000 / 500 / 550	1000	45	500	550	35	4	100 x 35		4	12	32		50 x 4	640	95
1000 / 700 / 650	1000	45	700	650	35	4	100 x 35		4	12	32		50 x 4	740	95
1100 / 600 / 650	1100	45	600	650	35	4	100 x 35		4	12	32		50 x 4	740	95
1200 / 600 / 650	1200	60	600	650	35	4	100 x 35		4	12	32		50 x 4	770	95
1200 / 600 / 800	1200	60	600	800	35	4	100 x 35		4	12	32		50 x 4	920	95
1200 / 800 / 550	1200	60	800	550	35	5	100 x 35		5	12	32		50 x 4	670	95
1200 / 800 / 700	1200	60	800	700	35	5	100 x 35		5	12	32		50 x 4	820	95
1300 / 900 / 800	1300	70	900	800	35	5	100 x 35		5	12	32		75 x 6	940	95
1400 / 700 / 750	1400	70	700	750	35	4	200 x 35		4	12	32		75 x 6	890	95
1400 / 1000 / 900	1400	70	1000	900	35	6	200 x 35		6	16	32		75 x 6	1040	95
1600 / 800 / 750	1600	70	800	750	35	5	200 x 35		5	16	32		75 x 6	890	95
1600 / 1100 / 850	1600	70	1100	850	35	6	200 x 35		6	16	32		75 x 6	990	95
1600 / 1100 / 1100	1600	70	1100	1100	35	6	200 x 35		6	16	32	1	75 x 6	1240	95
1600 / 800 / 950	1600	70	800	800	35	5	200 x 35		5	16	32	1	75 x 6	1090	95
1800 / 900 / 950	1800	70	900	950	35	5	200 x 35		5	16	32	1	75 x 6	1090	110
1800 / 900 / 1200	1800	70	900	1200	35	5	200 x 35		5	12	32	2	75 x 6	1340	110
1800 / 1200 / 1000	1800	70	1200	1000	35	6	200 x 35		6	16	32	1	75 x 6	1140	110
2000 / 1000 / 950	2000	70	1000	950	35	6	200 x 35		6	16	32	1	75 x 6	1090	110
2000 / 1000 / 1200	2000	70	1000	1200	35	6	200 x 35		6	16	32	2	75 x 6	1340	110
2000 / 1400 / 1150	2000	70	1400	1150	35	8	200 x 35	4	8	16	32	1	75 x 6	1290	110
2200 / 1100 / 950	2200	70	1100	950	35	6	200 x 35	4	6	16	32	1	75 x 6	1090	110
2200 / 1100 / 1300	2200	70	1100	1300	35	6	200 x 35	4	6	16	32	2	75 x 6	1440	110
2200 / 1500 / 1300	2200	70	1500	1300	35	8	200 x 35	4	8	16	32	2	75 x 6	1440	110
2400 / 1200 / 1400	2400	95	1200	1400	35	6	200 x 35	4	6	16	32	2	75 x 6	1590	110
2400 / 1400 / 1200	2400	95	1400	1200	35	8	200 x 35	4	8	16	32	2	75 x 6	1390	110
2400 / 1400 / 1400	2400	95	1400	1400	35	8	200 x 35	4	8	16	32	2	75 x 6	1590	110
2600 / 1400 / 1300	2600	95	1400	1300	35	12	200 x 35	6	12	16	32	2	75 x 6	1490	110
2600 / 1600 / 1300	2600	95	1600	1300	35	12	200 x 35	6	12	16	32	2	75 x 6	1490	110

2800 / 1600 / 1200	2800	110	1600	1200	35	12	200 x 35	6	12	22	32	2	75 x 6	1420	110
2800 / 1800 / 1400	2800	110	1800	1400	35	12	200 x 35	6	12	22	32	2	75 x 6	1620	110
3000 / 1600 / 1200	3000	110	1600	1200	35	12	200 x 35	6	12	22	32	2	75 x 6	1420	110
3000 / 1800 / 1400	3000	110	1800	1400	35	12	200 x 35	6	12	22	32	2	75 x 6	1620	110



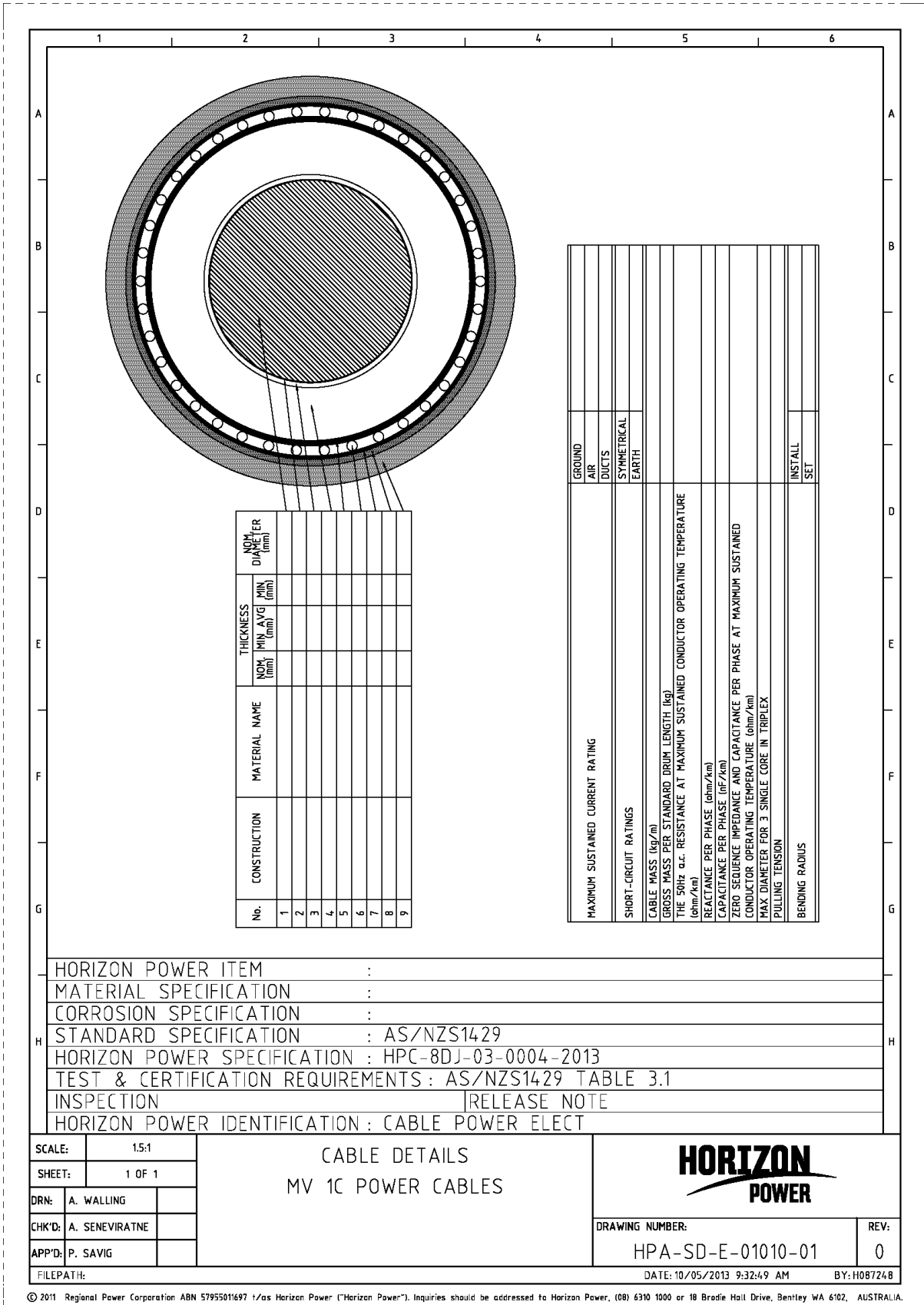
## APPENDIX H – SCHEDULE E: TEST REPORT REQUIREMENTS FOR CHEMICAL PROTECTION

An investigation and test report shall be submitted for cables offered with chemical protection against insect attack. The report shall demonstrate and address (but not limited to) the items listed below, including any further testing undertaken on the chemically treated cable ONLY. Vendors shall state reasons and justifications for all comments made to qualify their response.

Horizon Power will evaluate to its satisfaction the information and make a determination to accept or reject the cables offered with chemical protection against insect attack. If rejected, the Vendor shall offer alternative cables with mechanical protection that may include (and not limited to) Polyamide coverings or metallic tapes to achieve the required protection from insect attack.

No	Criteria	Submitted (Y/N)
1	Process of Manufacture and Product Stability	
2	Quality assurance and consistency of chemical in cable	
3	Accelerated aging tests	
4	Surface blooming of chemical	
5	Tests to show how much chemical is adsorbed by different types of soil particles (low and high pH) and the quantity of chemical that may flow into wetlands / rivers etc.	
6	Leachate tests with different pH fluids (leach rate per day) declaring the amount of dissolved chemical (free flowing in water) and what reaction the available chemical will have on aquatic organisms.	
7	Impact of chemical/vapour by-products during power cable failure	
8	Efficacy tests of the chemical in the cable against insect attack (differing chemical concentrations)	
9	Behaviour of the chemical and life-span whilst in the cable due to heat, UV, water of varying pH and other expected exposure factors	
10	Mechanism by which chemical protects cable from insect attack and any dependencies	
11	OH&S requirements for handling, installation, jointing (flame brushing), disposing and other related items	
12	Exposure mechanisms of chemical from cable, including quantitative impact on humans, land and aquatic organisms	
13	Dangerous goods classification and shipping requirements	
14	Impact on organic growers	
15	NICNAS (National Industrial Chemicals Notification and Assessment Scheme) and APVMA (Australian Pesticides and Veterinary Medicines Authority) approvals required	
16	Comparative studies with PVC and Polyamide techniques	
17	Any declared restrictions relating to use of the chemically treated cable	
18	Any type of surface residue is not acceptable	
	Additional Vendor Information	

**APPENDIX I – SPECIFICATION DRAWINGS**



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