Specification – MV Power Cables

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** Must 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.*

Revision Control		
Revision	**Date**	**Description**
0	28/05/2013	First issue
1	17/02/2016	Cypermethrin residue limit added
2	5/09/2022	Review and reformat to new template

STAKEHOLDERS *The following positions shall be consulted if an update or review is required:*	
Manager Engineering & Project Services	Regional Asset Managers
Manager Capacity Management Services	
Manager Asset Management Services	

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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

2.1.1 Horizon Power Standards

[1]. *Horizon Power Environmental Conditions*, standard number HPC-9EJ-01-0001-2013, available at http://horizonpower.com.au/contractors-suppliers/contractors/manuals-and-standards/ under the ‘Standards’ heading.

[2]. *Horizon Power Technical Rules*, standard number HPC-9DJ-01-0001-2012, available at http://horizonpower.com.au/contractors-suppliers/contractors/manuals-and-standards/ under the ‘Manuals; heading.

2.1.2 Australian Standards

The following standards are available at http://www.saiglobal.com.

[3]. *AS/NZS 1125 Conductors in insulated electric cables and flexible cords*, Standards Australia, 2001 (R2017)

[4]. *AS/NZS 1429.1 Electric cables – Polymetric insulated – For voltages 1.9/3.3 (3.6) kV up to and including 19/33 (36) kV*, Standards Australia, 2006 (R2017)

[5]. *AS/NZS 1660.1 Test methods for electric cables, cords and conductors – Conductors and metallic components*, Standards Australia, 1998 (R2017)

[6]. *AS/NZS 1660.2.1 Test methods for electric cables, cords and conductors – Insulation, extruded semi-conductive screens, and non-metallic sheaths – Methods for general application*, Standards Australia, 1998 (R2017)

[7]. *AS/NZS 1660.2.2 Test methods for electric cables, cords and conductors – Insulation, extruded semi-conductive screens, and non-metallic sheaths – Methods specific to elastomeric, XLPE and XLPVC materials*, Standards Australia, 1998 (R2017)

[8]. *AS/NZS 1660.2.5 Test methods for electric cables, cords, and conductors – Insulation, extruded semi-conductive screens, and non-metallic sheaths – Methods specific to cables above 1 KV*, Standards Australia, 1998 (R2017)

[9]. *AS/NZS 1660.3 Test methods for electric cables, cords, and conductors – Electrical tests*, Standards Australia, 1998 (R2017)

[10]. *AS/NZS 1660.4 Test methods for electric cables, cords, and conductors – Complete cable and flexible cord*, Standards Australia, 1998 (R2017)

[11]. *AS 2067 Substations and high voltage installations exceeding 1 kV a.c.*, Standards Australia, 2016

[12]. *AS/NZS 2857 Timber drums for insulated electric cables and bare conductors*, Standards Australia, 1996 (R2017)

[13]. *AS/NZS 3808 Insulating and sheathing materials for electric cables*, Standards Australia, 2000 (R2017)

[14]. *AS/NZS 3983 Metal drums for insulated electric cables and bare conductors*, Standards Australia, 1991 (R2016)

2.1.3 International Standards

The following standards are available at http://www.saiglobal.com.

[15]. *IEC 60812 Analysis techniques for system reliability—Procedure for failure mode and effects analysis (FMEA)*, International Electrotechnical Commission, 2006

[16]. *ICEA S-94-649-2004 Concentric neutral cables rated 5 through 46 kV,* Insulated Cable Engineers Association, 2021

2.1.4 Compliance with Standards

Various Standards are referenced in this Specification. The Standards have reference to the year they were published. If over the life of the Tender the Standards change, the Vendor is required to conform to the new edition of the Standard.

Unless otherwise specified herein, the *Equipment* shall be designed, manufactured and type and routine tested in accordance with the referenced Australian Standards, including all amendments. Where there is no Australian Standard equivalent, International Standards or Codes as defined in this specification shall be used. The specified documents contain provisions that, through reference in the text, constitute requirements of this Specification. At the time of publication of this Specification, the editions indicated were valid. Information on currently valid national and international standards may be obtained from the Australian Standards website. http://www.saiglobal.com.

2.2 Definitions and Abbreviations

For the purposes of this specification, definitions shall apply as in the relevant Australian Standards with the addition of a few general definitions listed below in alphabetical order.

2.2.1 Definitions

***Equipment*:** means cable in relation to this specification.

Nominal Voltage: according to AS/NZS 3808 [13], the voltage designation for cables is specified as **U_0/U (U_m),** where:

1) **U_0** is the r.m.s. power frequency voltage to earth of the supply system or d.c. voltage of the supply system for which the cable is designed.

2) **U** is the r.m.s. power frequency voltage between phases of the supply system and for which the cable is designed, for 3-phase $U = \sqrt{3}U_0$.

3) **U_m** is the maximum r.m.s. power frequency voltage between any two-phase conductors for which the cables and accessories are designed. It is the highest voltage that can be sustained under normal operating conditions at any time and at any point in a system. It excludes voltage variations due to fault conditions and sudden disconnection of large loads.

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

2.2.2 Abbreviations

AS: Australian Standard

HDPE: High Density Polyethylene

MV: Medium Voltage >1000 volts ac; <36 000 volts ac

PVC: Polyvinyl Chloride

R.M.S.: Root Mean Squared

TR-XLPE: Tree retardant cross-linked polyethylene

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 [4].

3.1.2 Fault Rating

The maximum fault levels, as specified by the Horizon Power Technical Rules [2] are as follows:

1) 13.1 kA rms/1s for 33 kV
2) 16 kA rms/1s for 22 kV
3) 25 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 [4] 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) as per AS 2067 [11] are as follows:

Table 1: System Insulation Levels

Nominal System Voltage, U (kV rms)	System Highest Voltage, Um (kV rms)	Lightning Impulse withstand Voltage, Up (kV peak)	Power Frequency withstand Voltage, Ud (kV rms)
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 performance of the *Equipment* must meet the requirements set out in Section 4.1 of the *Horizon Power Environmental Conditions* [1].

3.2.2 Operating Conditions

Table 2: Operating Conditions of Cables

Condition	Requirement
Soil Condition:	Waterlogged with up to 2 m head of water.
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 [4] unless otherwise specified.

3.4.2 Cable Construction

The cable construction shall comply with AS/NZS 1429.1 [4].

3.4.3 Conductor

Conductors shall be stranded circular compacted aluminium or copper in accordance with AS/NZS 1125 [3], as stated in Appendix C: Schedule A, and comply with the requirements of AS/NZS 1429.1 [4].

3.4.4 Conductor Screen

The conductor screen shall comply with the requirements of AS/NZS 1429.1 [4].

3.4.5 Insulation

3.4.5.1 Material

The insulation material shall be of dry-cured tree retardant cross-linked polyethylene (TR-XLPE) compound in accordance with AS/NZS 3808 [13] and shall be tested with methods set out in AS/NZS 1660.2.2 [7].

3.4.5.2 Thickness

The minimum insulation thickness at any point shall be determined in accordance with AS/NZS 1429.1 [4] 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 [4] and the maximum stripping force requirement as specified in Table 3. All strippability testing shall be done with methods stipulated in AS/NZS 1660.2.5 [8].

Table 3: Stripping Force Requirement

Nominal System Voltage, (kV rms)	Stripping Force Requirement
≤22	Up to 45 N
>22	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 [4] to meet the following single phase to earth fault current for 1 second as stated in Table 4.

Table 4: Single-Phase Fault Current Design Requirements

Conductor Material	Cross-sectional Area of Core Conductor (mm^2)	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 [4]. The screen wires shall not indent the insulation by more than that allowed by Standard ICEA S-94-649-2021 [16]. 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 [4] 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 [4] 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 [13] 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 [4].

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 [13] 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 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 [4].

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., TR-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 2nd 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 or TCD for termicide.

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 [4] 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.

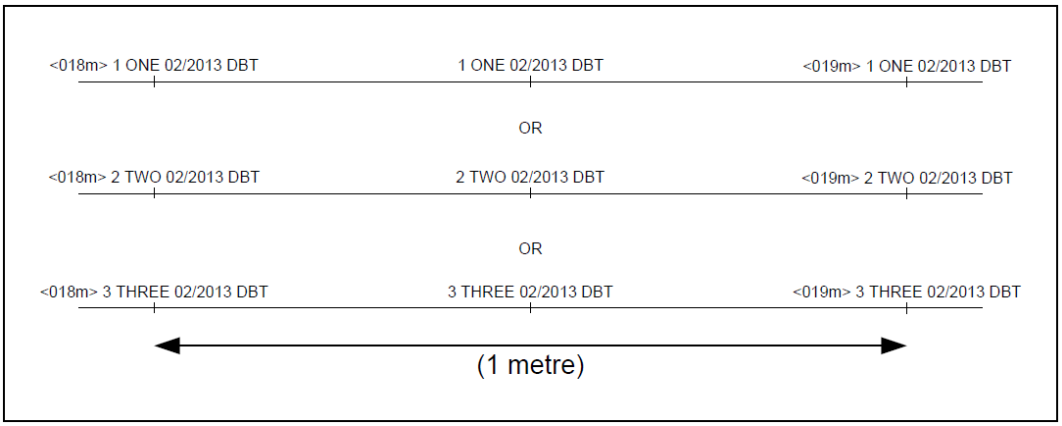


Figure 1: Cable Marking

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/m² determined by a controlled swab test over a minimum test sample of area 0.01 m².

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/NZS 2857 [12].

Nominal drum dimensions shall be in accordance with Table 3.1 of AS/NZS 2857 [12] 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. Barrel supports shall be provided as per Section 3 of AS/NZS 2857 [12].

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.

Cable drums shall be suitably lagged with timber for transportation, either by rail, road or ship. They shall give complete protection from damage to the cable during transit.

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.

4.2 Steel Drums

Steel drum construction and preparation shall comply with the requirements of AS/NZS 3983 [14] for the supply of cables 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

12) Length of cable

5 STORAGE

All drums shall be suitable for outdoor storage for a temperature range of -10 °C to + 45 °C for at least 24 months under the environmental conditions of Section 4.1 of the *Horizon Power Environmental Conditions* [1]. If steel drums are used the vendor shall comment on the longevity of the measures adopted as described in AS/NZS 3983 [14] to prevent galvanic reaction between metals.

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 details on Failure Mode and Effect Analysis, carried out in accordance with IEC 60812 [15]. Failure modes should be described; taking cantilever mechanical failure as an example, the failure may be excessive deflection, or brittle fracture. Electrical failure may be material damage such as puncture, polymer degradation, carbonisation, loss of hydrophobicity, etc.

Vendors may offer their standard *Equipment* but any variation to the foregoing standards must be clearly stated in writing at the time of the proposal. The products offered in the standing offer should be equal to or better in quality and performance than the existing items as listed under this Specification.

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 are required to provide information on the environmental soundness of the design and the materials used in the manufacture of the Equipment offered. Vendors shall provide a detailed outline of the steps that have been put in place to fulfil any obligations that may be required pursuant to the *Waste Avoidance and Resource Recovery Act 2001* and any amendments. In particular:

1) Management of waste reduction

2) The use of re-usable packing

3) Extended producer responsibility for the safe disposal of materials at the end of their life

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/NZS 1429.1 Section 3 [4] using the methods stated in AS/NZS 1125 [3], AS/NZS 1660.1 [5], AS/NZS 1660.2.1 [6], AS/NZS 1660.2.2 [7], AS/NZS 1660.2.5 [8], AS/NZS 1660.3 [9], and AS/NZS 3808 [13].

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.

The Vendor shall advise Horizon Power if there is any change in the composition of the material and/or processed used to manufacture the cables. Any cables supplied without changes being approved will be deemed as non-conforming.

9.2 Test Certificates

At the time of submitting the offer on the tender, single copies of test certificates, in English, shall be provided and shall be clearly marked and contain a reference number. If all the required test certificates are not submitted the tender will be rated incomplete and may not be considered.

Electronic copies of type test certificates shall be arranged in the order set out in this Specification and shall be marked clearly with the identifier and description in the contents Section. Any extra test certificates shall be marked with “extra tests” and kept separate from the required test certificates.

All test certificates shall be submitted in electronic form and Adobe Acrobat (.pdf) format.

9.3 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.

Certified type test results shall be submitted with the Proposal, these type tests shall include those outlined in AS/NZS 1429.1 Section 3 [4]. The Vendor shall, in their evaluation submission, state which tests the *Equipment* have passed.

9.4 Routine and Sample Tests

9.4.1 Routine

Routine tests are intended to eliminate defective units and shall be carried out during the manufacturing process. Routine tests shall be carried out on every *Equipment* and should not consist of visual examination only, these routine tests shall include those outlined in AS/NZS 1429.1 Section 3 [4].

The Vendor shall supply duly certified copies of the routine tests performed on the *Equipment* to Horizon Power, either prior to or upon delivery.

9.4.2 Sample

In addition to the test requirements of AS/NZS 1429.1 [4], the following tests must be carried out on every completed cable drum:

1) Insulation

   a) An insulation resistance test between the cable conductor core and the metallic screen. The test shall be carried out at 5 kV DC and the result recorded after 10 minutes.

2) Sheath

   a) An insulation resistance test between the metallic screen and the outermost sheath. The test shall be carried out at 2.5 kV DC and the result recorded after 10 minutes or,

   b) In cases where the cable has two insulated metallic layers (cable screen and brass tape termite protection), insulation resistance test shall be carried out for the PVC and HDPE layers. The test shall be carried out at 2.5 kV DC and the result recorded after 10 minutes.

The test results shall be submitted with each delivery.

10 DOCUMENTATION AND SAMPLES

10.1 Documentation to be provided with Proposals

Submitted proposals shall provide all documentation and information as requested in this specification, including any further relevant information on the *Equipment* offered. The proposal must be complete in all respects. Failure to comply may cause the proposal to be considered incomplete and hence informal.

The vendor shall provide an electronic version of all documents in Adobe Acrobat (.pdf) format containing the information detailed below with their offer:

- Any non-compliance of the Specification shall be detailed in the Technical Deviation schedule;
- All information provided in Technical Requirements shall be in English and measurement units shall be in metric units;
- Material Safety Data Sheets;
- CAD drawings (Micro station preferred DGN format) of all *Equipment* showing all critical dimensions;
- *Equipment* data sheets showing the weight, material type, protective coatings, mechanical & electrical properties (Combined Load Charts shall be included);
- Installation instructions included in the packaging; and
- A copy of the Vendor's current Quality Assurance accreditation and category.

Should the preferred vendor submit drawings for approval by Horizon Power, this will in no way exonerate it from being responsible for the correct and proper function of the *Equipment*.

10.2 Type Test Certificates / Reports

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

10.3 Service history

Vendors shall state:

- Other Australian electricity supply authorities who have a service history of the items offered; and
- Contact details of those supply authorities who can verify the service performance claimed.

10.4 Training Materials

Training material in the form of drawings, instructions and/or audio-visuals must be provided for the items accepted under the offer.

Vendors shall state the availability of training materials which could include but is not limited to the following topics:

- Handling and storage;
- Application (particularly in areas of heavy coastal pollution);
- Installation;
- Maintenance;
- Environmental performance;
- Electrical performance;
- Mechanical performance;
- Disposal at the end of service life; and
- Production process and testing.

10.5 Samples

Samples of all proposed *Equipment* types are to be provided upon request of Horizon Power as part of the submitted proposals.

APPENDIX A – REVISION INFORMATION

(Informative) Horizon Power has endeavoured to provide standards of the highest quality and would appreciate notification of errors or queries.

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 **DM# 1790858** can be used to record any errors or queries found in or pertaining to this standard. This comment sheet will be referred to each time the standard is updated.

Date	Rev No.	Notes
28/05/2013	0	Initial Document Creation
17/02/2016	1	Cypermethrin residue limit added
5/09/2022	2	Review and reformat to new template

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

DOCUMENT NUMBER	HPC-8DJ-03-0004-2013		QUALITY ASSURANCE	DM NUMBER	
DEVICE DESCRIPTION	LABEL MATERIAL NO.		MV POWER CABLE PURCHASE	ASSET OWNER	
	ASSET ID/ STOCK NO				
MANUFACTURER		DIMENSION			

ITEM	OPERATION/EQUIPMENT/FACILITY	DOCUMENT REF.	WHO CHECKS	INITIAL	DATE/ TIME	QUALITY ASSURANCE CRITERIA	PASS Y/N	COMMENTS
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

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-03-0004-2013**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES A & B

ITEM 1: Single Core Distribution Power Cables

VOLTAGE	12.7/22 kV	12.7/22 kV	12.7/22 kV	12.7/22 kV	12.7/22 kV	12.7/22 kV	
ITEM	1.1	1.2	1.3	1.4	1.5	1.6	
TYPE	3 x 1C Triplex	3 x 1C Triplex	3 x 1C Triplex	3 x 1C Triplex	3 x 1C Triplex	1C	
SIZE (mm^2)	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
1	3.1.2	**Ratings**			
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	
2		**Cable Dimensions**			
2.1	3.4.2	Cable Construction			xxxxx
2.2	3.4.3	Conductor	Aluminium/Copper		xxxxx
		Size:	mm^2		xxxxx
		Diameter:	mm	xxxx	
2.3	3.4.5	Insulation			
		Material:		TR-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^2	xxxx	
		Fault Current Level	kA	xxxx	
2.6	3.4.10	Water Blocking			
2.7	3.4.11	Outer-Sheath			
		Material		HDPE	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 Setting mm	 xxxx xxxx	
2.13	3.7	Cable Pulling Tension kN	xxxx	
2.14	3.8	Cable End Sealing	xxxx	
3		**Drum Size**		
	4	Flange x Barrel x Width mm Gross mass per standard drum length kg	xxxx xxxx	
4		**Type test certificate requirements**		
	9.1	Test certificate provided according to AS/NZS 1429.1, Table 3.1	xxxx	
5		Manufacturer	xxxx	
		Brand / Catalogue No. / Model	xxxx	
		Country of Manufacture	xxxx	

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-03-0004-2013**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES A & B

ITEM 2: Single Core Distribution Power Cables

VOLTAGE	19/33 kV	19/33 kV	19/33 kV	19/33 kV	19/33 kV		
ITEM	2.1	2.2	2.3	2.4	2.5		
TYPE	3 x 1C Triplex	3 x 1C Triplex	3 x 1C Triplex	1C	1C		
SIZE (mm^2)	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
1	3.1.2	**Ratings**			
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	
2		**Cable Dimensions**			
2.1	3.4.2	Cable Construction			xxxxx
2.2	3.4.3	Conductor	Aluminium/Copper		xxxxx
		Size:	mm^2		xxxxx
		Diameter:	mm	xxxx	
2.3	3.4.5	Insulation			
		Material:		TR-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^2	xxxx	
		Fault Current Level	kA	xxxx	
2.6	3.4.10	Water Blocking			
2.7	3.4.11	Outer-Sheath			
		Material		HDPE	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 Setting mm	 xxxx xxxx	
2.13	3.7	Cable Pulling Tension kN	xxxx	
2.14	3.8	Cable End Sealing	xxxx	
3		**Drum Size**		
	4	Flange x Barrel x Width mm Gross mass per standard drum length kg	xxxx xxxx	
4		**Type test certificate requirements**		
	9.1	Test certificate provided according to AS/NZS 1429.1, Table 3.1	xxxx	
5		Manufacturer	xxxx	
		Brand / Catalogue No. / Model	xxxx	
		Country of Manufacture	xxxx	

APPENDIX D – TECHNICAL 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. Details of departure shall be provided in Schedule D Appendix E.

	CLAUSE NUMBER	YES	NO	ATT.
3.	Requirements			
3.1	Power System Particulars			
3.1.1	Rated Voltages	☐	☐	
3.1.2	Fault Rating	☐	☐	
3.1.3	Maximum Conductor Temperature	☐	☐	
3.1.4	Nominal System Frequency	☐	☐	
3.1.5	System Insulation Levels	☐	☐	
3.2	Service Conditions			
3.2.1	Environmental Conditions	☐	☐	
3.2.2	Operating Conditions	☐	☐	
3.3	Description of Cable	☐	☐	
3.4	Materials and Construction			
3.4.1	General	☐	☐	
3.4.2	Cable Construction	☐	☐	
3.4.3	Conductor	☐	☐	
3.4.4	Conductor Screen	☐	☐	
3.4.5	Insulation			
3.4.5.1	Material	☐	☐	
3.4.5.2	Thickness	☐	☐	
3.4.6	Insulation Screen	☐	☐	
3.4.7	Metallic Screen	☐	☐	
3.4.8	Laying-up	☐	☐	
3.4.9	Bedding / Fillers	☐	☐	
3.4.10	Water Blocking	☐	☐	
3.4.11	Outer-Sheath	☐	☐	
3.4.12	Core Marking	☐	☐	
3.4.13	Cable Markings	☐	☐	
3.4.14	Protection from Insect Attack	☐	☐	
3.5	Cable Length	☐	☐	

	CLAUSE NUMBER	YES	NO	ATT.
3.6	Cable Bending Radius	☐	☐	
3.7	Cable Pulling Tension	☐	☐	
3.8	Cable-end Sealing	☐	☐	
4.	Cable Drums			
4.1	Timber Drums	☐	☐	
4.2	Steel Drums	☐	☐	
4.3	Drum Marking	☐	☐	
5.	Storage	☐	☐	
6.	Reliability	☐	☐	
7.	Safety	☐	☐	
8.	Environmental Considerations	☐	☐	
9.	Tests			
9.1	Test Requirements	☐	☐	
9.2	Test Certificates	☐	☐	
9.3	Type Tests	☐	☐	
9.4	Routine and Sample Tests			
9.4.1	Routine	☐	☐	
9.4.2	Sample	☐	☐	
10.	Documentation and Samples			
10.1	Documentation to be provided with proposals	☐	☐	
10.2	Type Test Certificates / Reports	☐	☐	
10.3	Service History	☐	☐	
10.4	Training Materials	☐	☐	
10.5	Samples	☐	☐	

APPENDIX E – SCHEDULE D: DEPARTURES FROM TECHNICAL SPECIFICATION

The Vendor shall nominate the Clause and describe the departure:

CLAUSE NO.	DEPARTURE

APPENDIX F – CABLE DESCRIPTION

ITEM	DESCRIPTION	DISTRIBUTION STANDARD DRAWING
1	**12.7/22 kV Single-Core MV Distribution Power Cable**	
1.1	Short Description: CABLE POWER ELECT 3 x 1C AL 12.7/22 kV 35 SQ TR-XLPE Technical Description: CABLE POWER ELECT; 35 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 12.7/22 kV TR-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 TR-XLPE Technical Description: CABLE POWER ELECT; 95 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 12.7/22 kV TR-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 TR-XLPE Technical Description: CABLE POWER ELECT; 185 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 12.7/22 kV TR-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 TR-XLPE Technical Description: CABLE POWER ELECT; 240 mm SQ; 3 x 1C COPPER TRIPLEX 12.7/22 kV TR-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 TR-XLPE Technical Description: CABLE POWER ELECT; 400 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 12.7/22 kV TR-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 TR-XLPE Technical Description: CABLE POWER ELECT; 630 mm SQ; 1C COPPER 12.7/22 kV TR-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	**19.1/33 kV Single-Core MV Distribution Power Cable**	
2.1	Short Description: CABLE POWER ELECT 3 x 1C AL 19.1/33 kV 50 SQ TR-XLPE Technical Description: CABLE POWER ELECT; 50 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 19.1/33 kV TR-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 TR-XLPE Technical Description: CABLE POWER ELECT; 185 mm SQ; 3 x 1C ALUMINIUM TRIPLEX 19.1/33 kV TR-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 TR-XLPE Technical Description: CABLE POWER ELECT; 240 mm SQ; 3 x 1C COPPER TRIPLEX 19.1/33 kV TR-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 TR-XLPE Technical Description: CABLE POWER ELECT; 630 mm SQ; 1C COPPER 19.1/33 kV TR-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 TR-XLPE Technical Description: CABLE POWER ELECT; 1000 mm SQ; 1C ALUMINIUM 19.1/33 kV TR-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 × 35		3	8	19		40 × 4	370	60
700 / 400 / 400	700	35	400	400	25	3	100 × 35		3	8	19		40 × 4	470	60
800 / 400 / 350	800	35	400	350	25	3	100 × 35		3	8	19		40 × 4	420	60
800 / 400 / 450	800	35	400	450	25	3	100 × 35		3	8	19		40 × 4	520	60
900 / 500 / 500	900	45	500	500	35	4	100 × 35		4	12	32		50 × 4	590	60
900 / 500 / 600	900	45	500	600	35	4	100 × 35		4	12	32		50 × 4	690	60
1000 / 500 / 550	1000	45	500	550	35	4	100 × 35		4	12	32		50 × 4	640	95
1000 / 700 / 650	1000	45	700	650	35	4	100 × 35		4	12	32		50 × 4	740	95
1100 / 600 / 650	1100	45	600	650	35	4	100 × 35		4	12	32		50 × 4	740	95
1200 / 600 / 650	1200	60	600	650	35	4	100 × 35		4	12	32		50 × 4	770	95
1200 / 600 / 800	1200	60	600	800	35	4	100 × 35		4	12	32		50 × 4	920	95
1200 / 800 / 550	1200	60	800	550	35	5	100 × 35		5	12	32		50 × 4	670	95
1200 / 800 / 700	1200	60	800	700	35	5	100 × 35		5	12	32		50 × 4	820	95
1300 / 900 / 800	1300	70	900	800	35	5	100 × 35		5	12	32		75 × 6	940	95
1400 / 700 / 750	1400	70	700	750	35	4	200 × 35		4	12	32		75 × 6	890	95
1400 / 1000 / 900	1400	70	1000	900	35	6	200 × 35		6	16	32		75 × 6	1040	95
1600 / 800 / 750	1600	70	800	750	35	5	200 × 35		5	16	32		75 × 6	890	95
1600 / 1100 / 850	1600	70	1100	850	35	6	200 × 35		6	16	32		75 × 6	990	95
1600 / 1100 / 1100	1600	70	1100	1100	35	6	200 × 35		6	16	32	1	75 × 6	1240	95
1600 / 800 / 950	1600	70	800	800	35	5	200 × 35		5	16	32	1	75 × 6	1090	95
1800 / 900 / 950	1800	70	900	950	35	5	200 × 35		5	16	32	1	75 × 6	1090	110
1800 / 900 / 1200	1800	70	900	1200	35	5	200 × 35		5	12	32	2	75 × 6	1340	110
1800 / 1200 / 1000	1800	70	1200	1000	35	6	200 × 35		6	16	32	1	75 × 6	1140	110
2000 / 1000 / 950	2000	70	1000	950	35	6	200 × 35		6	16	32	1	75 × 6	1090	110
2000 / 1000 / 1200	2000	70	1000	1200	35	6	200 × 35		6	16	32	2	75 × 6	1340	110
2000 / 1400 / 1150	2000	70	1400	1150	35	8	200 × 35	4	8	16	32	1	75 × 6	1290	110
2200 / 1100 / 950	2200	70	1100	950	35	6	200 × 35	4	6	16	32	1	75 × 6	1090	110
2200 / 1100 / 1300	2200	70	1100	1300	35	6	200 × 35	4	6	16	32	2	75 × 6	1440	110
2200 / 1500 / 1300	2200	70	1500	1300	35	8	200 × 35	4	8	16	32	2	75 × 6	1440	110
2400 / 1200 / 1400	2400	95	1200	1400	35	6	200 × 35	4	6	16	32	2	75 × 6	1590	110
2400 / 1400 / 1200	2400	95	1400	1200	35	8	200 × 35	4	8	16	32	2	75 × 6	1390	110
2400 / 1400 / 1400	2400	95	1400	1400	35	8	200 × 35	4	8	16	32	2	75 × 6	1590	110
2600 / 1400 / 1300	2600	95	1400	1300	35	12	200 × 35	6	12	16	32	2	75 × 6	1490	110
2600 / 1600 / 1300	2600	95	1600	1300	35	12	200 × 35	6	12	16	32	2	75 × 6	1490	110

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

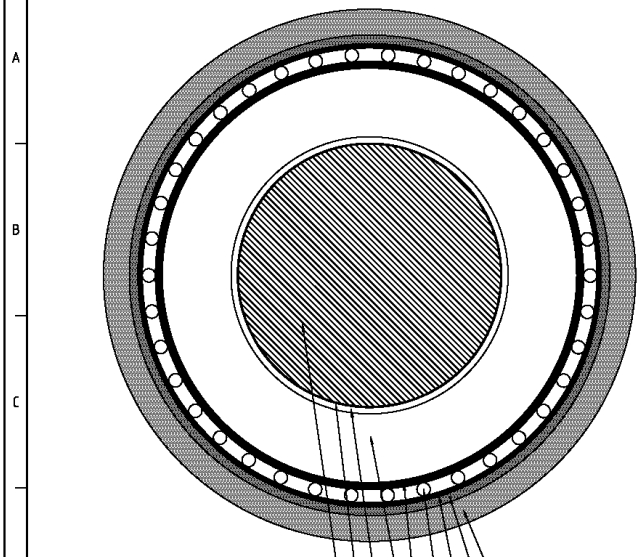
APPENDIX H – SCHEDULE E: TEST REPORT REQUIREMENTS FOR CHEMICAL PROTECTION

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) Polyarnide 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



No.	CONSTRUCTION	MATERIAL NAME	THICKNESS NOM (mm)	THICKNESS MIN AVG (mm)	THICKNESS MIN (mm)	NOM. DIAMETER (mm)
1						
2						
3						
4						
5						
6						
7						
8						
9						

MAXIMUM SUSTAINED CURRENT RATING	GROUND	
	AIR	
	DUCTS	
SHORT-CIRCUIT RATINGS	SYMMETRICAL	
	EARTH	
CABLE MASS (kg/m)		
GROSS MASS PER STANDARD DRUM LENGTH (kg)		
THE 50Hz a.c. RESISTANCE AT MAXIMUM SUSTAINED CONDUCTOR OPERATING TEMPERATURE (ohm/km)		
REACTANCE PER PHASE (ohm/km)		
CAPACITANCE PER PHASE (nF/km)		
ZERO SEQUENCE IMPEDANCE AND CAPACITANCE PER PHASE AT MAXIMUM SUSTAINED CONDUCTOR OPERATING TEMPERATURE (ohm/km)		
MAX DIAMETER FOR 3 SINGLE CORE IN TRIPLEX		
PULLING TENSION		
BENDING RADIUS	INSTALL	
	SET	

HORIZON POWER ITEM :
MATERIAL SPECIFICATION :
CORROSION SPECIFICATION :
STANDARD SPECIFICATION : AS/NZS1429
HORIZON POWER SPECIFICATION : HPC-8DJ-03-0004-2013
TEST & CERTIFICATION REQUIREMENTS : AS/NZS1429 TABLE 3.1
INSPECTION | RELEASE NOTE
HORIZON POWER IDENTIFICATION : CABLE POWER ELECT

SCALE:	1.5:1
SHEET:	1 OF 1
DRN:	A. WALLING
CHK'D:	A. SENEVIRATNE
APP'D:	P. SAVIG

CABLE DETAILS
MV 1C POWER CABLES

HORIZON POWER

DRAWING NUMBER: HPA-SD-E-01010-01
REV: 0

FILEPATH:
DATE: 10/05/2013 9:32:49 AM BY: H087248