



Specification – Technical Requirements for
Overhead Conductors up to and including
33 kV

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STAKEHOLDERS The following positions shall be consulted if an update or review is required:	NOTIFICATION LIST The following positions shall be notified if an update or review is required:
<i>Manager Engineering Services</i>	<i>Engineering & Projects</i>
<i>Manager Engineering Systems Planning</i>	<i>Operations</i>
<i>Manager Assets and Works</i>	<i>Procurement</i>

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1 SCOPE

This specification covers Horizon Power's requirements for the testing and supply of overhead conductor used on AC systems up to and including 33 kV.

Tests prescribed will evaluate the performance of these conductors and shall comply with 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, though 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 1222.1	Steel conductors and stays – Bare overhead – Galvanised (SC/GZ)
AS 1222.2	Steel conductors and stays – Bare overhead – Aluminium clad (SC/AC)
AS 1746	Conductors - Bare Overhead - Hard Drawn Copper
AS 1931.1	High Voltage Testing Techniques - General Definitions and Test Requirements
AS 2841	Galvanised Steel Wire Strand
AS/NZS 1170.2	Structural design actions Part 2: Wind actions
AS/NZS 1531	Conductors - Bare Overhead - Aluminium and aluminium alloy
AS/NZS 1660	Test methods for electric cables, cords and conductors. Part 1 - Conductors and metallic components Part 3- Electrical tests

STANDARD	DESCRIPTION
AS/NZS 2857	Timber Drums for Insulated Electric Cables and Bare Conductors
AS/NZS 3607	Conductors — Bare Overhead, aluminium and aluminium alloy— Steel
AS/NZS 3822	Test methods for bare overhead conductors
AS/NZS 3983	Metal drums for insulated electric cables and bare conductors
AS/NZS 4534	Zinc and zinc/aluminium-alloy coatings on steel wire
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 4791	Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process.
AS/NZS 4792	Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process
IEC 61089	Round wire concentric lay overhead electrical stranded conductors

2.2 Definitions and Abbreviations

For the purposes of this specification the following definitions apply:

2.2.1 Definitions

- 1) **All aluminium alloy conductors (AAAC):** A conductor comprising helically wound aluminium alloy wire.
- 2) **Aluminium conductors (AAC):** A conductor comprising helically wound hard drawn aluminium wire.
- 3) **Aluminium conductor, steel reinforced (ACSR):** A conductor comprising hard drawn aluminium strands helically wound around steel reinforcing strands.
- 4) **Bare conductor:** A conductor without any insulation.
- 5) **Conductor:** An electrical conductor arranged to be electrically connected to a source of electrical energy.
- 6) **Equipment:** means conductor in relation to this specification.
- 7) **Steel conductor, aluminium clad (SC/AC):** A conductor comprising helically wound aluminium clad steel wires.
- 8) **Steel conductor, zinc galvanised (SC/GZ):** A conductor comprising helically wound zinc galvanised steel wires.

2.2.2 Abbreviations

- 1) AAAC: All aluminium alloy conductor
- 2) AAC: All aluminium conductor
- 3) AC: alternating Current
- 4) ACSR: Aluminium conductor steel reinforced
- 5) AMF: Approved Manufacturing Facility
- 6) AS: Australian Standard

- 7) EDT: Everyday tension
- 8) GSW: Galvanised steel wire
- 9) MV: Medium Voltage >1000 volts ac; <36 000 volts ac
- 10) OPGW: Optical cable ground wire
- 11) SC/AC: Steel conductor aluminium clad
- 12) SC/GZ: Steel conductor zinc galvanised
- 13) UTS: Ultimate tensile strength

2.3 Drawings

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

- 1) HPA-SD-E-00020-01 (ACSR Conductor)
- 2) HPA-SD-E-00021-01 (SC/AC Conductor)
- 3) HPA-SD-E-00022-01 (SC/GZ Conductor)
- 4) HPA-SD-E-00023-01 (Copper Conductor)
- 5) HPA-SD-E-00024-01 (ACC/1350 & AAAC/11120 Conductor)

3 REQUIREMENTS

3.1 Power System Particulars

No requirements.

3.2 Service Conditions

3.2.1 Environmental Conditions

The Conductor shall be suitable for use throughout the state of Western Australia in conditions where a wide range of solar radiation, pollution (salt bearing, industrial and agricultural) and wind velocities are experienced. The Conductor shall be suitable for continuous operation under the following environmental conditions:

Table 2: Environmental Conditions

Condition	Requirement
Air Temperature:	55°C maximum -5°C minimum
Black Body Temperature in sunlight:	80°C maximum
Relative Humidity:	0% to 100%, wet/condensing
Maximum Intensity of Solar Radiation:	1.1 kW/m ²
Maximum Wind Velocities:	240 km/hr North West cyclonic gust

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 ² per month.
Isokeraunic Levels:	Activity varies from 60-80 thunder days per year in the Kimberley, to 30 thunder days per year in the Pilbara, and 5-10 thunder days per year along the South Coast.
Altitude:	Not exceeding 1000 m above mean sea level.
Treatment:	Live line washing with water having a resistivity above 600 Ω.cm

3.3 Description of Conductor

Conductors 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 conductors. In addition, a discrete means of identification of stolen conductors 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 conductor.

3.4 Materials and Construction

3.4.1 Construction

The conductor construction shall be one of the following:

Table 3: Fabrication

Conductor	Fabrication requirements
ACSR	Aluminium, zinc coated (galvanised) steel reinforced conductors constructed in accordance to AS 3607
AAC/AAAC	AS 1531, which shall be constructed of aluminium or aluminium alloy wires complying with the alloy designation 1350 or 1120, the compositions of which are specified in AS 2848.1
HDBC	Hard drawn bare copper conductors constructed in accordance to AS 1746
SC/AC	Aluminium-clad steel conductors constructed in accordance to AS 1222.2
SC/GZ	Galvanised steel conductors constructed in accordance to AS 1222.1

3.4.2 Welds & Joints

All joints made during the stranding operation shall be free from visible defects.

There shall be no joints in any individual wire of a steel core conductor containing less than seven wires. No butt welds of the aluminium clad steel wires, after cladding, shall be contained in any drum of conductor.

Butt welding shall be carried out for aluminium conductors as per the appropriate Australian Standard.

The location of all welds in individual aluminium wires shall be recorded. Copies of these records shall be forwarded to Horizon Power when the conductor is dispatched.

3.4.3 **Rigidity of Conductor**

The wire shall be so stranded that the conductor is essentially free from the tendency to untwist or spring apart when cut.

The complete conductor shall be uniformly cylindrical and shall be capable of withstanding normal handling during manufacturing, transportation and installing without being deformed from its cylindrical form.

3.4.4 **Grease Requirements**

The following conductors shall not be greased:

- 1) All bare copper conductors; and
- 2) All 3-strand bare conductors;

All remaining bare overhead conductors not already specified shall be greased for additional corrosion protection as specified in Appendix G, in accordance with the respective Standard AS 1531, AS 1222.1 or AS 1222.2 or AS 3607.

The grease shall be suitable for use over a temperature range of -5 degree Celsius to 160 degree Celsius without becoming hard or brittle and the grease shall remain non migratory.

Fully Greased shall have the same meaning as defined in the respective Standards AS 1531, AS 1222.1, AS 1222.2 or AS 3607 (i.e. grease is applied to all wires with the exception of the outermost layer).

3.4.5 **Lay Ratio**

Lay ratio of conductors shall be as indicated in Table 4.

Table 4: Lay Ratio

Conductor	Lay
ACSR	AS 3607 for aluminium steel reinforced conductors, where the direction of lay for the outermost layer shall be right-handed
AAC/AAAC	AS 1531 for aluminium and aluminium alloy conductors, where the direction of lay for the outermost layer shall be right-handed
HDBC	AS 1746 for copper conductors, where the direction of lay for the outermost layer shall be right-handed
SC/AC	AS 1222.2 for aluminium-clad steel conductors, where the direction of lay for the outermost layer shall be left-handed
SC/GZ	AS 1222.1 for galvanised steel conductors, where the direction of lay for the outermost layer shall be right-handed

3.5 Conductor Length

Conductors shall be supplied in drum lengths specified in Appendix F of the document.

The conductor length on a drum shall not vary by more than +2% and -0% from the nominal length.

4 CONDUCTOR DRUMS/ COILS

4.1 Timber Drums

Conductor drum reels shall be constructed generally in accordance with the requirements of AS 2857.

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. Barrel supports shall be provided as per Section 3 of AS 2857.

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.

Conductor drums shall be suitably lagged with timber for transportation, either by rail, road or ship.

Conductor ends shall be securely affixed to the drum flange to prevent them from being dislodged. Any conductor 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 conductor during transit.

4.2 Steel Drum

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

Heavy weatherproof paper, cardboard or other suitable material shall be placed between the conductor and barrel and flange surfaces of steel drums. This material shall remain attached to the drum during unreeling.

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

4.3 Coil Packaging

Stay wire shall be supplied suitably packaged in coils and arranged on pallets. Coils shall be of the lengths and diameter as specified in Appendix F. Coils may be packaged in heat shrink plastic wrap, polyester wrap or other approved wrapping.

4.4 Drum Marking

Drums shall be clearly stencilled with the following information:

- 1) Manufacturers name;
- 2) Manufacturers drum traceability number;
- 3) Week and Year of manufacture;
- 4) Size, type and name of conductor;
- 5) Total gross weight of conductor, drum and lagging;
- 6) Arrow to indicate direction of rotation of the drum marked with the words "ROLL THIS WAY";
- 7) Specification Number;
- 8) Stock number;
- 9) Order number;
- 10) Length of conductor; and
- 11) Batch number.

4.5 Coil Marking

The following information shall be legibly and durably marked on a waterproof label securely attached to the coil:

- 1) Manufacturers name;
- 2) Manufacturers drum traceability number;
- 3) Week and Year of manufacture;
- 4) Size, type and name of conductor;
- 5) Specification Number;
- 6) Stock number;
- 7) Order number;
- 8) Length of conductor; and
- 9) Batch number.

5 STORAGE

All drums shall be suitable for outdoor storage for a minimum period of 36 months under the environmental conditions of Section 3.2. If steel drums are used the vendor shall comment on the longevity of the measures adopted as described in AS 3983 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 30 years minimum** under the specified field of application and conditions of service.

Information provided shall evidence the claimed reliability and performance for the Equipment offered.

6.1 Life Cycle Model

The vendor shall provide a life cycle model with proposed inspection schedules for the operating conditions in Section 3.2. Also it shall provide information on Failure Mode and Effect Analysis describing the various failure modes the conductor may be susceptible to during its operational lifetime.

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 3822.

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

9.1.1 *Type Tests*

Representative selection of conductors 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 made available 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 on Conductors of an identical design.

Where Conductor has been tested to International Standards only, sufficient type test evidence shall be submitted to confirm equivalence of Conductor 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 be assured of the competence of the manufacturing facility to deliver consistently conforming Conductor. 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 to the witnessing of tests.

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

10 DOCUMENTATION AND SAMPLES

10.1 Type Test Certificates/Reports

Test certificates, test reports or any other supporting documents supplied as evidence for compliance to relevant standards shall be made available in English for review by Horizon Power.

10.2 Samples

Any deviations between the Conductor supplied as a sample to Horizon Power and the Conductor 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 conductor sample lengths of each conductor category with the Proposal. The conductor 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) Conductor Number;
- 3) Stock Code;
- 4) Batch number; and
- 5) Appropriately identified in Schedule D of this Specification.

When requested, 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 conductor 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 **DM:3654309**, 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
18/10/2013	0	Original Issue

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

DOCUMENT NUMBER		HPC-8DJ-03-0005-2012					QUALITY ASSURANCE		DM NUMBER	
DEVICE DESCRIPTION		LABEL MATERIAL NO.					OVERHEAD CONDUCTOR 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	Manufacturer Drum Trace Number						*****			
1.3	Week & Year of Manufacture						*****			
1.4	Conductor Information									
1.4.1	Size and Type Conductor						*****			
1.5	Gross Weight Conductor/Drum & Lagging						*****			
1.6	Arrow (ROLL THIS WAY)						*****			
1.7	Specification Number						*****			
1.8	Stock Number						*****			
1.9	Order Number						*****			

1.10	Length of Conductor					*****		
1.11	Batch Number					*****		
1.12	Welding certificate provided					*****		
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

	SPECIFICATION ENQUIRY	HPC-8DJ-03-0005-2012
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES A & B


ITEM 1: Aluminium AAAC/1120 Conductor

VOLTAGE	N/A	N/A	N/A			
ITEM	1.1	1.2	1.3			
TYPE	7/2.50	7/4.75	19/3.25			
SIZE (mm²)	35	120	150			

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-0012	xxxx
1		Conductor Construction		
1.1	3.4.1	Conductor Size: mm ² Diameter: mm	Aluminium	xxxxx xxxxx
1.2	3.4.2	Welds and Joints >15 m apart (Yes/No)	xxxx	
1.3	3.4.4	Grease (Yes/No)	xxxx	
1.4	3.4.5	Lay Ratio		xxxx
1.5	3.5	Conductor Length m		xxxx
2		Drum Size		
	4	Flange x Barrel x Width mm	xxxx	
3		Type test certificate requirements		
	9.1	Test certificate provided according to AS/NZS 3822	xxxx	
4		Manufacturer	xxxx	
		Brand / Catalogue No. / Model	xxxx	
		Country of Manufacture	xxxx	

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	DATE	

TECHNICAL SCHEDULES A & B


ITEM 2: Aluminium AAC/1350 Conductor

VOLTAGE	N/A	N/A	N/A			
ITEM	2.1	2.2	2.3			
Type	7/4.75	19/3.25	37/3.75			
SIZE (mm²)	120	150	400			

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-0012	xxxx
1		Conductor Construction		
1.1	3.4.1	Conductor Size: mm ² Diameter: mm	Aluminium xxxx	xxxxx xxxxx
1.2	3.4.2	Welds and Joints >15 m apart (Yes/No)	xxxx	
1.3	3.4.4	Grease (Yes/No)	xxxx	
1.4	3.4.5	Lay Ratio		xxxx
1.5	3.5	Conductor Length m		xxxx
2		Drum Size		
	4	Flange x Barrel x Width mm	xxxx	
3		Type test certificate requirements		
	9.1	Test certificate provided according to AS/NZS 3822	xxxx	
4		Manufacturer	xxxx	
		Brand / Catalogue No. / Model	xxxx	
		Country of Manufacture	xxxx	

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	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES A & B


ITEM 3: Aluminium Clad or Galvanised Steel Reinforced (ACSR/AC or GZ) Conductor

VOLTAGE	N/A				
ITEM	3.1				
Type	6/3.0 1/3.0				
SIZE (mm²)	9				

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-0008	xxxx
1		Conductor Construction		
1.1	3.4.1	Core Conductor Size: mm ² Protection –Aluminium or Galvanised	Steel	xxxxx xxxxx
1.2	3.4.1	Conductor Size: mm ² Diameter: mm	xxxx Aluminium	xxxxx xxxxx
1.3	3.4.2	Welds and Joints >15 m apart (Yes/No)	xxxx	
1.4	3.4.4	Grease (Yes/No)	xxxx	
1.5	3.4.5	Lay Ratio		xxxx
1.6	3.5	Conductor Length m		xxxx
2		Drum Size		
	4	Flange x Barrel x Width mm	xxxx	
3		Type test certificate requirements		
	9.1	Test certificate provided according to AS/NZS 3822	xxxx	
4		Manufacturer	xxxx	
		Brand / Catalogue No. / Model	xxxx	
		Country of Manufacture	xxxx	

	SPECIFICATION ENQUIRY	HPC-8DJ-03-0005-2012
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	DATE	

TECHNICAL SCHEDULES A & B


ITEM 4: Hard Drawn Bare Copper (HDBC) Conductor

VOLTAGE	N/A	N/A				
ITEM	4.1	4.2				
Type	19/2.14	37/2.50				
SIZE (mm²)	70	180				

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-0011	xxxx
1		Conductor Construction		
1.1	3.4.1	Conductor Size: mm ² Diameter: mm	Copper	xxxxx xxxxx
1.2	3.4.2	Welds and Joints >15 m apart (Yes/No)	xxxx	xxxx
1.3	3.4.5	Lay Ratio		xxxx
1.4	3.5	Conductor Length m		xxxx
2		Drum Size		
	4	Flange x Barrel x Width mm	xxxx	
3		Type test certificate requirements		
	9.1	Test certificate provided according to AS/NZS 3822	xxxx	
4		Manufacturer	xxxx	
		Brand / Catalogue No. / Model	xxxx	
		Country of Manufacture	xxxx	

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TECHNICAL SCHEDULES A & B

ITEM 5: Steel Core Aluminium Clad or Galvanised (SC/AC OR SC/GZ) Conductor

VOLTAGE	N/A	N/A	N/A	N/A	N/A	
ITEM	5.1	5.2	5.3	5.4	5.5	
Type	3/2.75 AC	3/2.75 GZ	7/2.00 GZ	19/2.00 GZ	19/2.75 GZ	
SIZE (mm²)	5.93	5.93	6	10	13.8	

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-0009 & HPA-SD-E-0010	xxxx
1		Conductor Construction		
1.1	3.4.1	Conductor Size: mm ² Diameter: mm	Steel xxxx	xxxxx xxxxx
1.2	3.4.2	Welds and Joints >15 m apart (Yes/No)	xxxx	
1.3	3.4.5	Lay Ratio		xxxx
1.4	3.5	Conductor Length m		xxxx
2		Drum Size		
	4	Flange x Barrel x Width mm	xxxx	
3		Type test certificate requirements		
	9.1	Test certificate provided according to AS/NZS 3822	xxxx	
4		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			
3.2	Service Conditions			
3.2.1	<i>Environmental Conditions</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3	Description of Conductor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4	Materials and Construction			
3.4.1	<i>Construction</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.2	<i>Weld & Joints</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3	<i>Rigidity of Conductor</i>			
3.4.4	<i>Grease Requirements</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.5	<i>Lay Ratio</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5	Conductor Length			
4	CONDUCTOR 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	Coil Packaging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4	Drum Marking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.5	Coil 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"/>

CLAUSE NUMBER		YES	NO	ATT.
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 and Sample Tests</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	DOCUMENTATION AND SAMPLES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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 – CONDUCTOR DESCRIPTION

Drum dimensions stated in this section shall be maximum values for Flange diameter and External Width and shall be minimum values for Barrel Diameter. Drums having weight of 2 ton or more shall be as specified in Appendix G, however not exceeding flange and external width dimensions stated herein.

Stay wires (Item 5.4 and 5.5) are to be supplied in coils as per description.

ITEM	DESCRIPTION	DISTRIBUTION STANDARD DRAWING
1	Aluminium AAAC/1120 Conductor	
1.1	Short Description: WIRE ELECT 35 SQ AAAC/1120 3400M Technical Description: WIRE ELECT; 35 mm SQ (7/2.50) AAAC/1120 (CHLORINE); FULLY GREASED; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 850mm x 280mm x 620mm	HPA-SD-E-00024-01
1.2	Short Description: WIRE ELECT 120 SQ AAAC/1120 2000M Technical Description: WIRE ELECT; 120 mm SQ (7/4.75) AAAC/1120 (IODINE); FULLY GREASED; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 1050 mm x 500 mm x 920 mm	HPA-SD-E-00024-01
1.3	Short Description: WIRE ELECT 150 SQ AAAC/1120 2000M Technical Description: WIRE ELECT; 150 mm SQ (19/3.25) AAAC/1120 (KRYPTON); FULLY GREASED; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 1250 mm x 600 mm x 850 mm	HPA-SD-E-00024-01
2	AAC/1350 Conductor	
2.1	Short Description: WIRE ELECT 120 SQ AAC/1350 2000M Technical Description: WIRE ELECT; 120 mm SQ (7/4.75) AAC/1350 (MOON); FULLY GREASED; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 1000mm x 400 mm x 740 mm	HPA-SD-E-00024-01
2.2	Short Description: WIRE ELECT 150 SQ AAC/1350 1000M Technical Description: WIRE ELECT; 150 mm SQ (19/3.25) AAC/1350 (NEPTUNE); FULLY GREASED; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 1000mm x 500 mm x 700 mm	HPA-SD-E-00024-01
2.3	Short Description: WIRE ELECT 400 SQ AAC/1350 1000M Technical Description: WIRE ELECT; 400 mm SQ (37/3.75) AAC/1350 (TRITON); FULLY GREASED; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 1580 mm x 740 mm x 900 mm	HPA-SD-E-00024-01
3	Aluminium Clad Steel Reinforced ACSR Conductor	
3.1	Short Description: WIRE ELECT 9 SQ ACSR 3400M	HPA-SD-E-00020-01

ITEM	DESCRIPTION	DISTRIBUTION STANDARD DRAWING
	Technical Description: WIRE ELECT; 9 mm SQ (6/1/3.00) ACSR; FULLY GREASED; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 850mm x 280mm x 620mm	
4	Hard Drawn Bare Copper (HDBC) Conductor	
4.1	Short Description: WIRE ELECT 70 SQ HDBC 100M Technical Description: WIRE ELECT; 70 mm SQ (19/2.14) HDBC; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 450 mm x 250 mm x 380 mm	HPA-SD-E-00023-01
4.2	Short Description: WIRE ELECT 180 SQ HDBC 100M Technical Description: WIRE ELECT; 180 mm SQ (37/2.50) HDBC; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 450 mm x 250 mm x 380 mm	HPA-SD-E-00023-01
5	Steel Core Aluminium Clad or Galvanised (SC/AC OR SC/GZ) Conductor	
5.1	Short Description: STRAND ELECT 5.93 SQ SC/AC 3000M Technical Description: WIRE ELECT; 5.93 mm SQ (3/2.75) SC/AC; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 750 mm x 450 mm x 550 mm	HPA-SD-E-00021-01
5.2	Short Description: STRAND ELECT 5.93 SQ SC/GZ 3000M Technical Description: WIRE ELECT; 5.93 mm SQ (3/2.75) SC/GZ; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 750 mm x 450 mm x 550 mm	HPA-SD-E-00022-01
5.3	Short Description: STRAND ELECT 6 SQ SC/GZ 440M Technical Description: WIRE ELECT; 6 mm SQ (7/2.00) SC/GZ; AERIAL CONDUCTOR UNINSULATED; Drum Size: (Flange x Barrel x Width) 750 mm x 450 mm x 550 mm	HPA-SD-E-00022-01
5.4	Short Description: STRAND ELECT 10 SQ STAY SC/GZ 15M Technical Description: WIRE ELECT; 10 mm SQ (19/2.00) SC/GZ; AERIAL CONDUCTOR UNINSULATED; To be supplied in coil packaging Maximum Coil Diameter: 800 mm	HPA-SD-E-00022-01
5.5	Short Description: STRAND ELECT 13.8 SQ STAY SC/GZ 15M Technical Description: WIRE ELECT; 13.8 mm SQ (19/2.75) SC/GZ; AERIAL CONDUCTOR UNINSULATED; To be supplied in coil packaging Maximum Coil Diameter: 800 mm	HPA-SD-E-00022-01


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 board 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

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 boar thickness (mm)	Number of intermediate supports			Square washers (or equivalent round washers)
						Number	Size (mm)		Number	Minimum diameter (mm)					
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 – SPECIFICATION DRAWINGS

1	2	3	4	5	6
A					A
B					B
C					C
D	 (6/1/3.00)				D
E					E
F					F
G					G
H					H

CONDUCTOR CODE NAME AND PRODUCT CODE	STRANDING AND WIRE DIAMETER		APPROX. OVERALL DIAMETER	CROSS-SECTIONAL AREA	APPROX. MASS	CALCULATED BREAKING LOAD	COEFFICIENT OF LINEAR EXPANSION	CALCULATED FINAL MODULUS OF ELASTICITY	PRACTICAL FINAL MODULUS OF ELASTICITY	DC RESISTANCE AT 20 °C
	ALUMINIUM	STEEL								
	(NO./mm)		(mm)	(mm ²)	(kg/km)	(kN)	(x10 ⁻⁴ PER °C)	(GPa)	(GPa)	(OHM/km)



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)	

HORIZON POWER ITEM	:	
MATERIAL SPECIFICATION	:	
CORROSION SPECIFICATION	:	
STANDARD SPECIFICATION	:	AS/NZS1531
HORIZON POWER SPECIFICATION	:	HPC-8DJ-03-0005-2012
TEST & CERTIFICATION REQUIREMENTS	:	AS/NZS3822
INSPECTION		RELEASE NOTE
HORIZON POWER IDENTIFICATION : CABLE POWER ELECT		

SCALE:	2:1	OVERHEAD CONDUCTOR (ACSR)	
SHEET:	1 OF 1		
DRN:	A. WALLING		
CHK'D:	V. EASWARAN		
APP'D:	P. SAVIG		
FILEPATH:		DRAWING NUMBER: HPA-SD-E-00020-01	REV: 0

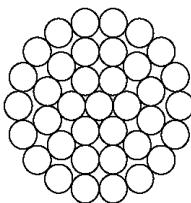
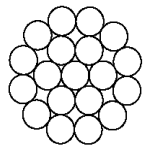

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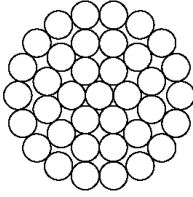
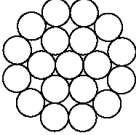




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