Specification – MV Surge Arrester

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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.*

*** This person will have the power to grant the process owner the authority and responsibility to manage the process from end to end.*

**** 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	27/04/2022	First issue

STAKEHOLDERS *The following positions shall be consulted if an update or review is required:*	
Manager Engineering & Project Services	Asset Managers
Manager Systems & Network Planning	Manager Assets Services
Manager Health and Safety	

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1 SCOPE

This Specification sets out the technical (electrical and mechanical) requirements for the performance, testing and supply of medium voltage surge arresters for the distribution system only.

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.

Tenderers must state any non-compliance with the specification in any tender submission and any alternative offers must be submitted in full and separately from any main offer.

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.

2.1.2 Australian Standards

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

[2]. *AS 1307.2 Surge arresters – Metal oxide surge arresters without gaps for a.c. system*, Standards Australia, 1996 (R2015)

[3]. *AS 1627.0 Metal finishing – Preparation and pre-treatment of surfaces – Method selection guide*, Standards Australia, 1997 (R2017)

[4]. *AS 2700S Colour standards for general purposes – (T33) Smoke Blue*, Standards Australia, 2011

[5]. *AS 4436 Guide for the selection of insulators in respected of polluted conditions, Standards Australia, 1996*

[6]. *AS/NZS 4680 Hot dip galvanised (zinc) coatings on fabricated ferrous articles*, Standards Australia, 2006

[7]. *AS 62271.1 High voltage switchgear and controlgear – Common specifications*, Standards Australia, 2019

[8]. *AS 62271-201 High-voltage switchgear and controlgear – Part 201: AC solid-insulation enclosed switchgear for rated voltages above 1 kV and up to and including 52 kV*, Standards Australia, 2019

[9]. *AS 62271-301 High voltage switchgear and control gear – Dimensional standardisation of terminals*, Standards Australia, 2005

2.1.3 International Standards

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

[10]. *IEC 60099.4 Surge arresters – Part 4: Metal-oxide surge arresters without gaps for a.c. systems*, International Electrotechnical Committee, 2014

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

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://saiglobal.com.

2.2 Definitions and Abbreviations

For the purposes of this specification, definitions shall apply as in the relevant Australian Standards (AS 1307.2 [2] & IEC 60099.4 [10]) with the addition of a few general definitions listed below in alphabetical order.

EE: Effective Earth - system neutral earthing conditions are effective

***Equipment*:** Surge Arrester

Max.: maximum

MPSL: Maximum permissible service load

NE: Non-Effective Earth - system neutral earthing conditions are not effective

NS: Non-shattering

PCD: Pitch circle diameter

SSL: Static service load

TOV: Temporary Over Voltages are **undamped or little damped power-frequency over-voltages of relatively long duration** (i.e., seconds, even minutes). These over-voltages are typically caused by faults to ground,

resonance conditions, load rejection, energisation of unloaded transformers, or a combination of these.

3 REQUIREMENTS

3.1 General

The surge arresters specified in this instruction are to be used for over voltage protection of distribution transformers, outdoor busbars, overhead lines, cables or any other equipment generally used in a distribution network.

Standard Horizon Power surge arresters and descriptions are listed in Table 3 of Section 11.

The surge arresters offered that are found on inspection not to conform to this Specification shall be replaced by the Vendor at no cost to Horizon Power.

3.2 Environmental Conditions

The performance of the surge arresters must meet the requirements set out in Section 4.1 of the *Horizon Power Environmental Conditions* [1].

3.3 Technical Requirements

The surge arresters shall be suitable for outdoor use and only connected in a phase to earth arrangement. Outdoor surge arresters may be mounted on steel, concrete, wood, composites or any other structure and be bonded to earth.

The technical performance of the surge arresters must as a minimum met AS 1307.2 [2] and IEC 60099.4 [10].

3.3.1 Electrical Requirements

The surge arresters shall be suitable for use on the 33 kV, 22 kV and 11 kV 3-phase 50 Hz distribution systems and have non-linear voltage-current characteristics. The surge arresters must be suitable for operation under the defined operating conditions and must meet the required performance requirements as set out in the table below:

Table 1: Electrical Requirements

Description		11 kV	22 kV	33 kV
Maximum system voltage	kV	12	24	36
Max. continuous operating voltage[1]	kV	7.3	14.5	21.8
Lightning impulse withstand (8/20 μs wave)	kV_{Peak}	95	150	200
Max. residual voltage across surge arrester[2]	kV_{Peak}	68	107	143
Power frequency withstand (1 min)	kV_{RMS}	28	50	70

[1] using 5% harmonic content and maximum system voltage, U_m
[2] at surge diverter assuming a 10 kA 8/20 μs impulse current

Max. prospective short circuit current (kA/1 second)	kA	20	20	20
System neutral earthing conditions		**NE**	**NE**	**NE**
Duty Requirements				
Min. rated voltage	kV	15	30	45
Arrester Classification (New)		SL	SL	SL
Line discharge class (Old)		2	2	2
High current pressure relief test current (0.2 sec)	kA	50	50	50

3.3.2 Mechanical Requirements

The surge arrester design and manufacturing process must confirm that the performance characteristics of the surge arresters are not affected by changes in the ambient conditions, such as temperature or humidity, see Section 3.2 Environmental Conditions. The vendor shall submit the detail design, materials used and manufacturing process of the surge arresters and shall also demonstrate suitability of arrester for installation in cyclonic area with wind speed up to 72 m/s through submission of wind withstand calculation.

The arrester should be non-shattering (Class NS) as stated in AS 1307.2 [2]. Means shall be provided to either pressure relieve (see Section 3.4) or otherwise prevent the arrester from shattering, in case the arrester malfunctions. Failure of the arrester must be easily visible from outside without any electrical testing.

The surge arresters shall be metal oxide assembled in its housing in such a way that there is no air gap between the block and the housing walls. This is required to preclude any pressure build-up within the housing. The housing must be impervious to moisture and dust, and shall have proven performance under specified conditions.

The preferred housing of the arresters shall be light grey silicone rubber, similar to smoke blue colour T33 to AS 2700 S [4]. Other colours may be acceptable at the discretion of Horizon power's representative.

The arresters shall be suitable for use under the following conditions as set out in the table below:

Table 2: Mechanical Requirements

Description		**11 kV**	**22 kV**	**33 kV**
Creepage (≥31 mm/kV) [3]	mm	>372	>744	>1176
Pressure relief class		NS	NS	NS
Static service load (SSL)	Nm	≥350	≥350	≥350

[3] for very heavy pollution level as per Table II of AS 4436 [5]

Maximum permissible service load (MPSL) Nm	≥500	≥500	≥500
Housing	silicon	silicon	silicon
Colour	grey	grey	grey

3.3.3 Mounting Requirements

The surge arrester shall be supplied fully assembled ready for mounting. The vendor shall specify the maximum permissible terminal loads relevant for installation and service, such as cantilever, torque and tensile loads.

3.3.3.1 Mounting

The 33 kV, 22 kV and 11 kV surge arresters are normally mounted on steel support structures in a switchyard. These surge arresters shall be supplied with all accessories required for pedestal mounting. The base of the pedestal mounting shall be insulated with pitch circle diameter (PCD), bolt and stud sizes and hole diameters.

Note: PCD to be 240 mm, number of holes to be 4 x Ø14, tapped size M12 with a depth of 20 mm.

The vendor shall submit complete detail and drawings of the pedestal mounting assembly.

Some of the surge arresters are of the pole mounted type and shall be suitable for mounting vertically upright or inverted, horizontally or at any angle in between. Mounting to the poles shall be means of the earth terminal, see Section 3.3.4.

3.3.4 Terminals

The surge arresters shall be provided with suitable terminals for connection to the line and to earth in concordance with AS 62271-301 [9]. The terminals on the line side and on the earth side, shall be of stainless steel grade 304 or 316 and shall be supplied with all required nuts, bolts and washers.

The line terminals shall be suitable for stranded conductors up to 61/3.25 AAC or 95 mm^2 copper cable. The earth terminals shall be 14mm hole or M12 stud to connect cable lugs for 95 mm^2 or 120 mm^2 cables or 50 mm x 3 mm copper straps. The vendor shall submit complete details and drawings of the line and earth terminals.

All ferrous nuts, bolts, washers and clamps used for any purpose other than for current carrying shall be hot dip galvanised.

All bolts, washers and clamps attached to current carrying parts shall be manufactured from stainless steel grade 304, and all nuts shall be from stainless steel grade 316.

All bolts and clamps, which may be required to carry an electrical current, shall be fitted with stainless steel spring washers.

3.4 Painting and Galvanising

All painting and galvanising shall conform to this specification and to AS/NZS 4680 [6]. The galvanising coating shall be smooth, clean and of uniform thickness, free from defects.

3.5 Name Plate

Each surge arrester shall be provided with a nameplate incorporating details in accordance with clause 3.1 of AS 1307.2 [2]. These details shall be clearly visible and shall preferably be marked on the housing. The marking shall be permanent, weatherproof and corrosion proof.

The following minimum information shall be provided:

1) Continuous operating voltage
2) Rated voltage
3) Rated frequency
4) Nominal discharge current
5) Pressure relief rated current in kA_{RMS}
6) Manufacturer's name or trademark, type and identification
7) Year of manufacture
8) Serial number

4 PACKAGING REQUIREMENTS

The *Equipment* shall be suitably packaged, such that it is "fit for use" at any location in Horizon Power's operational area and specifically include all accessories needed. Packaging shall be capable of preventing damage whilst in storage and during transit to remote locations. The Vendor is required to nominate standard pack quantities and standard packs shall be clearly marked with the following information:

1) Manufacturer's name;
1) Manufacturer's part reference number;
2) Batch Number;
3) Horizon Power Order Number;
4) Horizon Power Stock Number;
5) *Equipment* description (voltage rating); and
6) Package weight.

Very strong consideration shall be given to appropriate packaging provided with any *Equipment* offered under this specification, with respects to satisfying the "fit for use" criteria mentioned above.

The combined height of the pallet and *Equipment* of a standard pack shall not exceed 1,050 mm.

Each shipment shall be provided with box labels stating the part, stock and contract number as well as the routine test reports.

Each package is to have an identifying bar code and number which identifies as a minimum the:

- Manufacturers part number;
- Manufacturer;
- Factory of manufacture; and
- Month and year of manufacture.

The bar code should be code 128 and can be applied either by spray or on a plastic tag. The bar code and number does not have to be indelible beyond installation.

Note: The vendor is required to identify the cost of providing bar coding as specified in this Section separately from the other cost requirements of this specification.

5 STORAGE

The *Equipment* shall be capable of being stored without deterioration within the temperature range of -10°C to +45°C for no less than 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 50 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, carried out in accordance with IEC 60812 [11]. 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 items 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:

a) Management of waste reduction;

b) The use of re-usable packing; and

c) 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 design, type, routine, sample and special tests and inspections as required by the relevant Australian or IEC standard.

The passing of such tests does not prejudice the right of Horizon Power to reject the *Equipment* or fitting if it does not comply with this Specification when installed.

Note: A condition of acceptance on imported products shall be to perform landing routine and sample tests completed in Australia on each batch imported. In these cases each batch must obtain a passed landing test in order that the batch acceptance will be reflected on an acceptance list.

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 tests required by the relevant Australian or International standards shall be carried out. The requirements for these are outlined in Appendix E Test Certificates. Test certificates shall be submitted in electronic format and shall be in Adobe Acrobat (.pdf) format.

Tests that shall be performed on the *Equipment* with follow-up documentation are as follows:

- Type tests;
- Routine tests;
- Acceptance tests;
- Batch tests.

9.3 Type Tests

The tests are intended to verify the main characteristics and suitability of the design, dimensions, materials and method of manufacture (technology). When the *Equipment* is subjected to the type tests, the results shall be considered valid for the whole class of *Equipment* which are represented by the one tested and having the following characteristics:

a) same materials for the core, and housing and same manufacturing method;

b) same material for the end fittings, same design, and same method of attachment;

c) same or greater minimum layer thickness of the housing material over the core (including a sheath where used) *;

d) same or smaller ratio of all mechanical loads to the smallest core diameter between fittings *;

e) same or smaller ratio of the highest system voltage to insulation length *; and

f) same or greater diameter of the core.

The tested *Equipment* shall be identified by a drawing giving all the dimensions with the manufacturing tolerances. Subsequently, if there are small variations in the design data of not more than 15 % for characteristics marked with *, the tests do not need to be repeated.

Certified type test results shall be submitted with the Proposal. The Vendor shall, in their evaluation submission, state which tests the *Equipment* have passed.

Table 3: Type Tests

Description	Standard
	IEC 60099.4 Clause/s
Insulation withstand tests	8.2.6 & 8.2.8
Residual voltage tests	8.3.2, 8.3.3 & 8.3.4
Operating duty tests	10.8.7
Power frequency voltage versus time	10.8.8
Arrester disconnector/fault indicator (if fitted)	8.9
Short-circuit tests	10.8.10
Bending moment test	10.8.11
Seal leak rate test	10.8.13
Radio interference voltage test	8.14
Dielectric withstand of internal components verification test	8.15
Internal grading components test	8.16
Weather ageing test	10.8.17

9.4 Routine Tests

Routine tests are intended to eliminate defective units and shall be carried out during the manufacturing process. Routine tests shall be carried out accordance with IEC 60099.4 [10], Clauses 7.2 and 9.1 and should not consist of visual test only.

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

Table 4: Routine Tests

Description	Standard
	IEC 60099.4 Clause/s
Residual voltage test	7.2
Internal partial discharge test	9.1 c), d)
Seal test	9.1 e)

9.5 Acceptance Tests

Equipment shall be acceptance tested to AS 1307.2 [2] and IEC 60099.4 [10]. Two percent or two surge arresters, whichever is the greater, shall be selected as samples for lot sizes of less than 300 surge arresters. For lot sizes greater than 300, the sample sizes specified in the relevant Australian Standard shall be applicable.

Table 5: Routine Tests

Description	Standard
	AS 1307.2 Clause/s
Seal leakage test	8.2.3
	IEC 60099.4 Clause/s
Measurement of power frequency voltage at the reference current	9.2.1 (a)
Lightning impulse residual voltage	9.2.1 (b)
Partial discharge test	9.2.1 (c)
Special thermal stability test	9.2.2

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, dimensions, shed profile, total and protected creepage distance, method of fixing and mechanical & electrical properties (Combined Load Charts shall be included);
- Evidence of ability to withstand the service conditions specified including Wind withstand calculations
- Test certificates as detailed in section 9;
- Detailed outline of quality control procedures
- Installation instructions included in the p*a*ckaging; 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 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.

10.3 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;
- Production process and testing; and
- DVD.

10.4 Samples

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

11 *EQUIPMENT* LIST AND DESCRIPTION

Table 6: Standard *Equipment* list and descriptions

Specification Item No.	Description
1.1	STUD MOUNT SURGE ARRESTER 33 kV METAL OXIDE GAPLESS POLYMER/SILICON OUTDOOR NDC-10 kA LINE DISCHARGE CLASS 2 PRESSURE RELIEF CLASS NS; SSL – 350 Nm
1.2	PEDESTAL MOUNT SURGE ARRESTER 33 kV METAL OXIDE GAPLESS POLYMER/SILICON OUTDOOR NDC-10 kA LINE DISCHARGE CLASS 2 PRESSURE RELIEF CLASS NS; SSL – 350 Nm
2.1	STUD MOUNT SURGE ARRESTER 22 kV METAL OXIDE GAPLESS POLYMER/SILICON OUTDOOR NDC-10 kA LINE DISCHARGE CLASS 2 PRESSURE RELIEF CLASS NS; SSL – 350 Nm
2.2	PEDESTAL MOUNT SURGE ARRESTER 22 kV METAL OXIDE GAPLESS POLYMER/SILICON OUTDOOR NDC-10 kA LINE DISCHARGE CLASS 2 PRESSURE RELIEF CLASS NS; SSL – 350 Nm
3.1	STUD MOUNT SURGE ARRESTER 11 kV METAL OXIDE GAPLESS POLYMER/SILICON OUTDOOR NDC-10 kA LINE DISCHARGE CLASS 2 PRESSURE RELIEF CLASS NS; SSL – 350 Nm
3.2	PEDESTAL MOUNT SURGE ARRESTER 11 kV METAL OXIDE GAPLESS POLYMER/SILICON OUTDOOR NDC-10 kA LINE DISCHARGE CLASS 2 PRESSURE RELIEF CLASS NS; SSL – 350 Nm

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# 23800427** 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
27/04/2022	0	Initial Document Creation

APPENDIX B QUALITY ASSURANCE (TO BE COMPLETED BY STORES)

DOCUMENT NUMBER	HPC-8DJ-07-0006-2021		**QUALITY ASSURANCE**	**DM NUMBER**	
DEVICE DESCRIPTION	**LABEL MATERIAL NO.**		**INSULATOR 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	LABELLING							
1.1	Name of Manufacturer					*******		
1.2	Manufacturer's part reference number					*******		
1.3	Batch Number					*******		
1.4	Horizon Power Order Number					*******		
1.5	Horizon Power Stock Number					*******		
1.6	Surge Arrester description					*******		
1.7	Package Weight					< 20 kg		
2	CONTENTS							
2.1	Installation Instructions					Clear, Legible and in English		
2.2	Bill of Materials					Clear, Legible and in English		
2.3	Material Safety Data Sheets (if required)					Clear, Legible and in English of all materials		

ITEM	OPERATION/EQUIPMENT/FACILITY	DOCUMENT REF.	WHO CHECKS	INITIAL	DATE/ TIME	QUALITY ASSURANCE CRITERIA	PASS Y/N	COMMENTS
2.4	Accessories (if required)					As per Bill of Materials		
2.5	Test and Inspection Reports					As per Standards referenced in the specification.		
3	PACKAGING							
3.1	Suitably stacked and secured on pallet					Packages suitably packed and prevented from coming loose		
3.2	Physical damage					Packages do not show puncture marks or other signs of damage		
3.3	Surge Arrester/s in suitable packaging					Strong enough to prevent mechanical damage		
3.4	Packaging clearly labelled					Each package easily identifiable as per Section 4		
3.5	Items Individually Marked					Items clearly designated and marked as per Section 3.8		

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

C1 Technical Schedules

Completion of the listed schedules in Appendix B2 by the vendor shall indicate the product offered is fully compliant with the nominated Clauses in this specification. All information provided shall be in English and measurement units shall be in metric units.

Any deviation from the specification shall be listed on the "Technical Deviation Schedule C", provided in Appendix D with motivation to Horizon Power for consideration and written approval.

C2 Technical Requirements

Schedule A: Purchaser's specific requirements.

Schedule B: Particulars of *Equipment* to be supplied.

C2.1 Technical schedules A and B for 33 kV Surge Arresters

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-25-0001-2021**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES A & B

ITEM 1.1: 33 kV Stud Mount Surge Arrester

Item	Sub-clause	Description		Schedule A	Schedule B
1.		Manufacturer/ vendor of insulator		xxxxxx	
2.		Manufacturer's/ vendor's catalogue number		xxxxxx	
3.		Manufacturer's/ vendor's drawing number		xxxxxx	
4.	3.3.1	Electrical Requirements			
4.1		Rated voltage	kV	33	
4.2		Max. system voltage	kV	36	
4.3		Max. continuous operating voltage	kV	21.8	
4.4		Lightning impulse withstand (8/20 μs wave)	kV	200	
4.5		Max. residual voltage	kV	143	
4.6		Power frequency withstand	kV	70	
4.7		Max. prospective short circuit current (kA/1 sec.)	kA	20	
4.8		System frequency	Hz	50	
4.9		Min. rated voltage	kV	45	
4.10		Arrester Classification (New)		SL	

Item	Sub-clause	Description		Schedule A	Schedule B
4.11		Line discharge class (Old)		2	
4.12		High current impulse withstand	kA	50	
5	3.3.2	Mechanical Requirements			
5.1		Class		outdoor	
5.2		Minimum creepage distance (≥31 mm/kV)	mm	>1176	
5.3		Pressure relief class		NS	
5.4		Static service load (SSL)	Nm	≥350	
5.5		Maximum permissible service load (MPSL)	Nm	≥500	
5.6		Housing		Silicon	
5.7		Colour		grey	
5.8		Length	mm	*****	
5.9		Weight	kg	*****	
6	3.3.3	Mounting Requirements		bracket	
6.1		Line terminal connection		M12 stud	
6.2		Ground terminal connection		M12 Stud	

ITEM 1.2: 33 kV Pedestal Mount Surge Arrester

Item	Sub-clause	Description		Schedule A	Schedule B
1.		Manufacturer/ vendor of insulator		xxxxxx	
2.		Manufacturer's/ vendor's catalogue number		xxxxxx	
3.		Manufacturer's/ vendor's drawing number		xxxxxx	
4.	3.3.1	Electrical Requirements			
4.1		Rated voltage	kV	33	
4.2		Max. system voltage	kV	36	
4.3		Max. continuous operating voltage	kV	21.8	
4.4		Lightning impulse withstand (8/20 □s wave)	kV	200	
4.5		Max. residual voltage	kV	143	
4.6		Power frequency withstand	kV	70	

Item	Sub-clause	Description		Schedule A	Schedule B
4.7		Max. prospective short circuit current (kA/1 sec.)	kA	20	
4.8		System frequency	Hz	50	
4.9		Min. rated voltage	kV	45	
4.10		Arrester Classification (New)		SL	
4.11		Line discharge class (Old)		2	
4.12		High current impulse withstand	kA	50	
5	3.3.2	Mechanical Requirements			
5.1		Class		outdoor	
5.2		Minimum creepage distance (≥31 mm/kV)	mm	>1176	
5.3		Pressure relief class		NS	
5.4		Static service load (SSL)	Nm	≥350	
5.5		Maximum permissible service load (MPSL)	Nm	≥500	
5.6		Housing		Silicon	
5.7		Colour		grey	
5.8		Length	mm	*****	
5.9		Weight	kg	*****	
6	3.3.3	Mounting Requirements		pedestal	
6.1		Line terminal connection		M12 stud	
6.2		Ground terminal connection		Type 5	

C2.2 Technical schedules A and B for 22 kV Surge Arresters

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-25-0001-2021**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES A & B

ITEM 2.1: 22 kV Stud Mount Surge Arrester

Item	Sub-clause	Description	Schedule A	Schedule B
1.		Manufacturer/ vendor of insulator	xxxxxx	

Item	Sub-clause	Description		Schedule A	Schedule B
2.		Manufacturer's/ vendor's catalogue number		xxxxxx	
3.		Manufacturer's/ vendor's drawing number		xxxxxx	
4.	3.3.1	Electrical Requirements			
4.1		Rated voltage	kV	22	
4.2		Max. system voltage	kV	24	
4.3		Max. continuous operating voltage	kV	14.5	
4.4		Lightning impulse withstand (8/20 □s wave)	kV	150	
4.5		Max. residual voltage	kV	107	
4.6		Power frequency withstand	kV	50	
4.7		Max. prospective short circuit current (kA/1 sec.)	kA	20	
4.8		System frequency	Hz	50	
4.9		Min. rated voltage	kV	30	
4.10		Arrester Classification (New)		SL	
4.11		Line discharge class (Old)		2	
4.12		High current impulse withstand	kA	50	
5	3.3.2	Mechanical Requirements			
5.1		Class		outdoor	
5.2		Minimum creepage distance (≥31 mm/kV)	mm	>744	
5.3		Pressure relief class		NS	
5.4		Static service load (SSL)	Nm	≥350	
5.5		Maximum permissible service load (MPSL)	Nm	≥500	
5.6		Housing		Silicon	
5.7		Colour		grey	
5.8		Length	mm	*****	
5.9		Weight	kg	*****	
6	3.3.3	Mounting Requirements		bracket	
6.1		Line terminal connection		M12 stud	

Item	Sub-clause	Description	Schedule A	Schedule B
6.2		Ground terminal connection	M12 Stud	

ITEM 2.2: 22 kV Pedestal Mount Surge Arrester

Item	Sub-clause	Description		Schedule A	Schedule B
1.		Manufacturer/ vendor of insulator		xxxxxx	
2.		Manufacturer's/ vendor's catalogue number		xxxxxx	
3.		Manufacturer's/ vendor's drawing number		xxxxxx	
4.	3.3.1	Electrical Requirements			
4.1		Rated voltage	kV	22	
4.2		Max. system voltage	kV	24	
4.3		Max. continuous operating voltage	kV	14.5	
4.4		Lightning impulse withstand (8/20 □s wave)	kV	150	
4.5		Max. residual voltage	kV	107	
4.6		Power frequency withstand	kV	50	
4.7		Max. prospective short circuit current (kA/1 sec.)	kA	20	
4.8		System frequency	Hz	50	
4.9		Min. rated voltage	kV	30	
4.10		Arrester Classification (New)		SL	
4.11		Line discharge class (Old)		2	
4.12		High current impulse withstand	kA	50	
5	3.3.2	Mechanical Requirements			
5.1		Class		outdoor	
5.2		Minimum creepage distance (≥31 mm/kV)	mm	>744	
5.3		Pressure relief class		NS	
5.4		Static service load (SSL)	Nm	≥350	
5.5		Maximum permissible service load (MPSL)	Nm	≥500	
5.6		Housing		Silicon	
5.7		Colour		grey	

Item	Sub-clause	Description	Schedule A	Schedule B
5.8		Length mm	*****	
5.9		Weight kg	*****	
6	3.3.3	Mounting Requirements	pedestal	
6.1		Line terminal connection	M12 stud	
6.2		Ground terminal connection	Type 5	

C2.3 Technical schedules A and B for 11 kV Surge Arresters

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-25-0001-2021**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES A & B

ITEM 3.1: 11 kV Stud Mount Surge Arrester

Item	Sub-clause	Description	Schedule A	Schedule B
1.		Manufacturer/ vendor of insulator	xxxxxx	
2.		Manufacturer's/ vendor's catalogue number	xxxxxx	
3.		Manufacturer's/ vendor's drawing number	xxxxxx	
4.	3.3.1	Electrical Requirements		
4.1		Rated voltage kV	11	
4.2		Max. system voltage kV	12	
4.3		Max. continuous operating voltage kV	7.3	
4.4		Lightning impulse withstand (8/20 □s wave) kV	95	
4.5		Max. residual voltage kV	68	
4.6		Power frequency withstand kV	28	
4.7		Max. prospective short circuit current (kA/1 sec.) kA	20	
4.8		System frequency Hz	50	
4.9		Min. rated voltage kV	15	
4.10		Arrester Classification (New)	SL	
4.11		Line discharge class (Old)	2	

Item	Sub-clause	Description		Schedule A	Schedule B
4.18		High current impulse withstand	kA	50	
5	3.3.2	Mechanical Requirements			
5.1		Class		outdoor	
5.2		Minimum creepage distance (≥31 mm/kV)	mm	>372	
5.3		Pressure relief class		NS	
5.4		Static service load (SSL)	Nm	≥350	
5.5		Maximum permissible service load (MPSL)	Nm	≥500	
5.6		Housing		Silicon	
5.7		Colour		grey	
5.8		Length	mm	*****	
5.9		Weight	kg	*****	
6	3.3.3	Mounting Requirements		bracket	
6.1		Line terminal connection		M12 stud	
6.2		Ground terminal connection		M12 Stud	

ITEM 3.2: 11 kV Pedestal Mount Surge Arrester

Item	Sub-clause	Description		Schedule A	Schedule B
1.		Manufacturer/ vendor of insulator		xxxxxx	
2.		Manufacturer's/ vendor's catalogue number		xxxxxx	
3.		Manufacturer's/ vendor's drawing number		xxxxxx	
4.	3.3.1	Electrical Requirements			
4.1		Rated voltage	kV	11	
4.2		Max. system voltage	kV	12	
4.3		Max. continuous operating voltage	kV	7.3	
4.4		Lightning impulse withstand (8/20 □s wave)	kV	95	
4.5		Max. residual voltage	kV	68	
4.6		Power frequency withstand	kV	28	
4.7		Max. prospective short circuit current (kA/1 sec.)	kA	20	

Item	Sub-clause	Description		Schedule A	Schedule B
4.8		System frequency	Hz	50	
4.9		Min. rated voltage	kV	15	
4.10		Arrester Classification (New)		SL	
4.11		Line discharge class (Old)		2	
4.12		High current impulse withstand	kA	50	
5	3.3.2	Mechanical Requirements			
5.1		Class		outdoor	
5.2		Minimum creepage distance (≥31 mm/kV)	mm	>372	
5.3		Pressure relief class		NS	
5.4		Static service load (SSL)	Nm	≥350	
5.5		Maximum permissible service load (MPSL)	Nm	≥500	
5.6		Housing		Silicon	
5.7		Colour		grey	
5.8		Length	mm	*****	
5.9		Weight	kg	*****	
6	3.3.3	Mounting Requirements		pedestal	
6.1		Line terminal connection		M12 stud	
6.2		Ground terminal connection		Type 5	

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 Appendix E.

CLAUSE NUMBER		YES	NO	ATT.
3	Requirements			
3.1	General	☐	☐	
3.2	Environmental Conditions	☐	☐	
3.3	Technical Requirements			
3.3.1	Electrical Requirements	☐	☐	
3.3.2	Mechanical Requirements	☐	☐	
3.3.3	Mounting Requirements	☐	☐	
3.3.4	Terminals	☐	☐	
3.4	Pressure Relief	☐	☐	
3.5	Painting and Galvanising	☐	☐	
3.6	Name Plate	☐	☐	
4	Packaging Requirements	☐	☐	
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 Tests	☐	☐	
9.5	Acceptance Tests	☐	☐	
10	Documentation and Samples			
10.1	Documentation to be provided with Proposals	☐	☐	
10.2	Service history	☐	☐	
10.3	Training Materials	☐	☐	
10.4	Samples	☐	☐	

APPENDIX E SCHEDULE D: DEPARTURES FROM TECHNICAL SPECIFICATION

The Vendor shall nominate the Clause and describe the departure:

CLAUSE NO.	DEPARTURE