

Title: **SPECIFICATION FOR
WESKUSFLEUR 132KV CABLE
SYSTEM.**

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1. Introduction

The Koeberg Transmission station is currently equipped with 132 kV gas insulated switchgear (GIS) double busbar configuration systems that is used for emergency power supply to the Koeberg generating power station and to supply the Western Cape distribution operating unit. This document was compiled to provide the minimum technical requirements for the 132 kV Weskusfleur cable system that will replace the current 132kV Koeberg substation cable system.

The underground cable system connections shall require dry type GIS terminations at the above ground level new 132 kV GIS cable end, and:

- Transformer terminations for the Station transformer 1 and Station transformer 2 connections,
- Outdoor terminations to the overhead lines for the Dassenberg 1, Dassenberg 2, Blaauwberg, Acacia 2, and Ankerlig connections, and
- A cable joint to the existing cable for the Duine at the furthest cable end from the new 132 kV GIS.

An additional cable system will also be required for the Ankerlig interim relocation connection project. This project shall be to perform the jointing of the existing feeder to a temporary location outdoor termination.

The new 132 kV cable systems scope entails the complete 132 kV cable systems design; bill of quantities; design review; manufacturing; factory component sample and routine testing; factory system sample acceptance testing; supply; shipping; transportation; spares; cable trench (including concrete culvert or wall if required); bedding and blanket layers; backfill layers (including cover slabs or lids, soil, warning tape and reinstatement if required as part of the tender); cable termination steel supports (if required as part of the tender); cable racking and clamping (if required as part of the tender); installation and complete installation methodology (from cable termination end to cable termination end); installation quality controls and quality inspections; equipment interfacing, planning, timeline compliance and execution; after installation and commissioning testing; operational manual; maintenance manual; training; distributed temperature sensing system and dynamic cable rating system for each individual cable system.

The 132 kV cable systems shall be installed in the new cable route concrete culvert or wall cable trenches. These separate concrete culvert or wall trenches are required to prevent unforeseen multiple cable circuit failures and to allow future on site excavation work in close proximity to parallel running cable systems. The 132 kV cable connections shall require GIS terminations to the new Weskusfleur MTS GIS, direct transformer terminations to the station transformers, outdoor terminations to the existing overhead lines, and joints to the existing cable systems where applicable.. Designs shall include the supplier proposed termination position, termination method, joint position, joint method and cable racking design where applicable.

The list of the affected existing feeders that shall be replaced or extended as part of this project with their respective continuous load requirements shall be as follows:

- 1) 132 kV 40 MVA station trfr1 (estimated cable route length 910 m)
- 2) 132 kV 40 MVA station trfr2 (estimated cable route length 910 m)
- 3) 132 kV 180 MVA Acacia 2 (estimated cable route length 310 m)
- 4) 132kV 180 MVA Blaauwberg (estimated cable route length 310 m)
- 5) 132 kV 180 MVA Duine (estimated cable route length 760 m)
- 6) 132 kV 180 MVA Ankerlig (Temporary relocation – Phase 1) (estimated cable route length 320 m)
- 7) 132 kV 180 MVA Ankerlig (End state – Phase 2) (estimated cable route length 320 m)
- 8) 132 kV 348 MVA Dassenberg 1 (estimated cable route length 340 m)
- 9) 132 kV 348 MVA Dassenberg 2 (estimated cable route length 340 m)

The list of new coupling transformers cable systems that shall be installed as part of this project with their respective continuous load requirements shall be as follows:

- 1) 132 kV 250 MVA Coupling transformer 1 (estimated cable route length 190 m)

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2) 132 kV 250 MVA Coupling transformer 2 (estimated cable route length 190 m)

2. Supporting clauses

2.1 Scope

The scope of the document contains the minimum technical requirements for the design, manufacture, supply, delivering, installation and commissioning of the 132kV cable system for the Weskusfleur project.

2.1.1 Purpose

The purpose of the document is to specify the minimum technical requirements for the design, manufacture, supply, installation and commissioning of a 132kV cable system for the Weskusfleur project.

2.1.2 Applicability

This document shall apply only to Weskusfleur MTS project.

2.2 Normative/informative references

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

- [1] SANS/IEC 60840: Power cables with extruded insulation and their accessories for rated voltages above 30 kV (Um = 36 kV) up to 150 kV (Um = 170 kV) — Test methods and requirements
- [2] IEC 6227-209 High-voltage switchgear and controlgear - Part 209: Cable connections for gas-insulated metal-enclosed switchgear for rated voltages above 52 kV - Fluid-filled and extruded insulation cables - Fluid-filled and dry-type cable-terminations
- [3] IEC 60229: Test on cable over sheaths which have a special protective function and are applied by extrusion
- [4] IEC 61914 Cable cleats for electrical installations
- [5] IEC 60287: Calculation of the continuous rating of cables (100% load factor)
- [6] IEC 60811: Common test methods for insulation and sheathing materials of electric cables
- [7] IEC 61443: Short circuit temperature limits of electric cables with rated voltages above 30 kV (Um 36 kV)
- [8] SANS 986 Precast reinforced precast culverts
- [9] IEEE Std 400 IEEE Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems Rated 5 kV and Above

2.2.2 Informative

- [9] Drawing Ref: 1ZZA276004-B Female connector
- [10] Drawing Ref: 1ZXX460010-DXA_REVA2_Outline drawing
- [11] Drawing Ref: 1ZAA275008-JM

2.3 Definitions

2.3.1 General

Definition	Description
Cable system	Cable with installed accessories (i.e. joints if applicable, terminations, earthing and bonding system)

2.3.2 Disclosure classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

Abbreviation	Description
Al	Aluminium
CAS	Corrugated Aluminium Sheath
Cu	Copper
CV	Curriculum Vitae
DCR	Dynamic cable rating system
DTS	Distribute Temperature Sensing
ECC	Earth Continuity Conductor
GIS	Gas Insulated Switchgear
HV	High Voltage
kV	Kilo Volt
MTS	Main Transmission Station
OEM	Original equipment manufacturer
SVL	Sheath Voltage Limiter
XLPE	Cross-Linked Polyethylene

2.5 Roles and responsibilities

The appointed Eskom Technical representatives are responsible for the compilation and review of this document.

2.6 Process for monitoring

Not applicable.

2.7 Related/supporting documents

Refer to clause/ section 2.2.

3. General background and layout

The new 132 kV cable systems to be installed between the existing Koeberg MTS and new Weskusfleur MTS, shall be performed in accordance with the requirements of this document, and SANS (IEC) 60840. The cable systems offered shall be type tested and pre-qualification tested (if applicable) in accordance with the latest revision of SANS (IEC) 60840 as a complete system. Individual component pre-qualification tests (if applicable) and type tests shall only be considered in accordance with SANS (IEC) 60840. Where any conflicting information is stated, this document will take precedence.

The 132 kV cable systems shall be required to be installed in a cable trench concrete culvert or wall. If not provided at the time of tender, the cable trench concrete culvert or wall design and installation method shall be provided as part of this tender. After awarding of the tender it is required that the exact route and trench length be measured on-site and the cable trench length, order length, installation length and bill of quantity costs be adjusted to this measured and agreed length during the design and engineering phase.

The list of the affected existing feeders that shall be replaced or extended as part of this project with their respective continuous load requirements shall be as follows:

- 1) 132 kV 40 MVA station trfr1 (estimated cable route length 910 m)
- 2) 132 kV 40 MVA station trfr2 (estimated cable route length 910 m)
- 3) 132 kV 180 MVA Acacia 2 (estimated cable route length 310 m)
- 4) 132kV 180 MVA Blaauwberg (estimated cable route length 310 m)
- 5) 132 kV 180 MVA Duine (estimated cable route length 760 m)
- 6) 132 kV 180 MVA Ankerlig (Temporary relocation – Phase 1) (estimated cable route length 320 m)
- 7) 132 kV 180 MVA Ankerlig (End state – Phase 2) (estimated cable route length 320 m)
- 8) 132 kV 348 MVA Dassenberg 1 (estimated cable route length 340 m)
- 9) 132 kV 348 MVA Dassenberg 2 (estimated cable route length 340 m)

The list of new coupling transformers cable systems that shall be installed as part of this project with their respective continuous load requirements shall be as follows:

- 1) 132 kV 250 MVA Coupling transformer 1 (estimated cable route length 190 m)
- 2) 132 kV 250 MVA Coupling transformer 2 (estimated cable route length 190 m)

4. Civil Works (Culverts, walled trenches and Joint bays)

The related civil works for the culverts or walled trenches shall conform to the following requirements;

- a) Compilation of a Project plan/schedule for execution of the civil works detailing design engineering and all installation activities.
- b) Civil engineering design and installation organisation/project team composition and organogram.
- c) Appropriate civil design standards, such as SANS986 or equivalent national and international standards shall be used as basis of the culvert designs.
- d) Scanning and surveying of the proposed routes to detect any underground utilities and services.
- e) The culverts or walled trenches shall be designed by the tenderer to accommodate the required ampacity(load) rating of the cables.
- f) The culverts or walled trenches shall be designed with adequate drainage systems.
- g) The manufacturing and installation method shall include removable lids or covering slabs. Attachments such as lifting hooks or handles shall be provided to enable removal of the lids or covering slabs.

- h) In instances where the trenches cross under existing main or access roads, the design shall make provision for adequate reinforcement and fill to maintain and not compromise, the existing carrying capacity of those roads.
- i) Complete civil engineering designs inclusive of set of drawings complete with labels and dimensions for all sections of the concreted culverts and joint bays(where applicable) shall be provided.
- j) A complete Method statement for the civil works shall be provided after contract award.

5. Minimum cable system design and installation requirements

In the request for proposal, the cable systems suppliers are required to sufficiently optimise the 132kV XLPE cable system design, manufacture and installation, for the prevailing conditions and constraints that may arise from on-site conditions or specified in this document. All cable and accessories details, raw material information, datasheets, drawings, preliminary routing and configurations, trench designs where applicable, racking designs, applicable calculations with assumptions and results, test plans, quality inspection test plans and any other requirements contained in this specification shall be included in the final cable systems suppliers design package.

The cable systems shall be designed to comply with the following minimum criteria:

- a) Prequalified cable or that meeting the extension of prequalification in accordance with IEC60840 shall be accepted.
- b) Only cable having been type tested as a system, that is with the associated accessories supplied as part of this tender, in accordance with IEC60840 be accepted.
- c) No lead sheathed cables will be accepted. CAS, extruded, welded, lapped laminated sheaths with copper or aluminium wires are acceptable.
- d) The HV cable manufacturing facility shall have the following characteristics;
 - True triple head extrusion in a Continuous Vulcanising (CV) line.
 - Dry curing of XLPE extrusion.
 - In-production quality monitoring systems employed to monitor curing and scorching characteristics of XLPE compound as well as insulation and screen thickness.
 - Appropriate ISO class clean room/enclosures for handling of insulation compounds.
- e) Water blocking methods shall be applied to the cable and water penetration test shall have been conducted on the cable offered either as part of the type test report or separately.
- f) The XLPE cable system shall have a minimum design life of 40 years. When required, cable systems suppliers shall submit calculations and/or assumptions supporting the system design life criteria, considering thermal, electrical and mechanical ageing of the cable system, i.e. both the cable and accessories.
- g) Each XLPE cable system shall meet the specified maximum continuous current rating at a daily load factor of 1 (100%) for the Eskom defined maximum conductor continuous current temperature limit of 90°C. The emergency current ratings at 105 °C shall be provided and also for a four hour, two hour and one hour rating. The minimum symmetrical three phase fault level requirement is 40kA for 1 second and the minimum single phase to earth fault level requirement is 40kA for 1 second.

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- h) Calculation of the cable system ampacity (rating) shall show all the rating factors that were considered. The applicable ambient temperature range as stated in schedule A. Cable system ampacity (rating) calculations are required for an ambient temperature of 35°C and soil temperature of 25°C. For in-air culvert/tunnel installations an ambient temperature of 40°C shall be used.. Calculations with all relevant assumptions and conditions considered shall be submitted. The cable system design should be optimised to prevent using any cable joints and should be limited to a single core cable per phase circuit design arrangement. The proposed installation method, such as in air, buried, ducts, culverts etc. as well as configurations upon which the ampacity calculations are based, i.e. vertical or horizontally spaced, trefoil etc. shall be clearly stated or illustrated, with axial distances between cores indicated.
- i) For in air installation, the cable shall comply with the fire and flammability requirements of IEC 60332-1-2 and shall be low smoke halogen free in accordance with IEC 61034 and IEC 60754-1 respectively or equivalent standards. If the tests have not previously been conducted on the cable offered, the test shall be conducted at time of manufacturing to proof conformance.
- j) Insulation coordination and electrical studies shall be performed to ascertain the appropriate cable system behaviour under lightning impulse, switching, TOV, inrush and mitigation against resonance conditions which may arise.
- k) Special backfill materials may be used within the concreted culverts to optimise the cable system design. The backfill material used and its properties shall be stated.
- l) Single end point bonded methods shall be used to minimise sheath currents and maintain sheath voltages within acceptable limits. The open circuited sheath standing voltage should preferably not exceed 65 V. Where this level is exceeded, the tenderer shall specify and provide adequate touch and step potential mitigating measures
- m) The SVL shall be adequately rated to withstand temporary power frequency or transient over voltages induced during maximum fault current conditions, switching and lightning events. Detailed calculations shall be submitted for the sheath standing voltage for steady state and transient currents, and for the SVL rating selected.
- n) The cable system supplier and installation contractor shall be responsible for surveying the final cable route in accordance with the preliminary routing information provided.
- o) The cable length shall make provision for snaking, where applicable, of the cable along its route, bending, slack and passage of the cable through the termination support structures and at the termination ends.
- p) The cable system design shall make provision for all trenching where applicable, steel support frames, termination support structures, termination foundations, termination clamps, cable racking and cable cleats in accordance with IEC61914 and in accordance with the expected thermal mechanical behaviour of the cable. All final drawings, appropriately referenced, related to these items shall be provided as part of the final design package.
- q) Detailed calculations/finite element simulation shall be submitted to show the calculated electromechanical force design considerations where applicable for cable racking/support and cleat designs. Detailed calculations of the forces employed and mitigated during the installation of the cable shall be submitted.
- r) Bonding and earthing of all support frames and structures, cleats and clamps, inclusive of semiconductive surfaces as required, shall be done, in order to limit any adverse induced voltages due to various operating conditions such as inrush, loading rejection or switching.
- s) Transportation of all cable system components to site and removal of construction debris and waste to registered disposal sites.
- t) A DTS system with DCR tool shall be supplied and installed, to measure and display the real time cable system temperature and provide current ratings along the complete cable route. The DTS system shall be compatible, and integrated with, Eskom SCADA and control system architecture and protocols.

- u) Installation of fibre optic ducting and fibre optic cable for DTS system along all cable routes.
- v) Installation of 32mm fibre optic ducting and fibre optic cable for the cable protection system along all cable routes.
- w) Reinstatement of surfaces, buildings and related civil works, where applicable.

6. 132kV Cable Scope method statement

A method statement and procedure for the execution of the cable and accessories design, manufacturing, installation, testing and measurements shall be provided covering the following minimum aspects:

- a) Project Plan indicating time frames of all related activities including GIS works.
- b) Project team and roles for project management, supervising, installation and jointing must be provided. Organograms for all relevant project teams, and roles to be submitted.
- c) Final design, design review and engineering phase time allowance after contract award.
- d) In process inspections at the cable and the accessories manufacturing plants.
- e) Quality inspection test plans and factory acceptance tests for the cable and all cable accessories at the manufacturing plants.
- f) Final site and route surveying, site preparation and/or establishment.
- g) Erection of steel bracing and supporting structures and installation of foundations (civil works).
- h) Trenching, racking and installation design and on-site quality inspection plans.
- i) Jointing/splicing (if applicable) installation instructions and on-site quality inspection plans.
- j) Cable pulling methods to be employed.
- k) Sheath bonding arrangement, bonding lead, link disconnecting boxes, SVLs: Design, manufacturing, quality inspection test plan, installation, and on-site testing and commissioning.
- l) Outdoor, Transformer and GIS Cable terminations inclusive of female bushing: installation methods and on-site quality inspection plans.
- m) Quality assurance tests and measurements to be conducted during installation such as;
 - 1) Bonding lead current measurements.
 - 2) Sheath-bonding verification.
 - 3) Contact resistances for earth and bonding connections.
 - 4) Positive and zero sequence impedance measurement.
- n) After installation testing, and commissioning method.

7. Transformer termination

The following shall be provided for the transformer termination:

- a) Details of the cable to be terminated.
- b) Details of termination offered.
- c) Specialized tools required for termination.
- d) Materials required for oil transformer termination.
- e) Installation instruction for termination offered.

The following drawings shall be used to design the station transformer termination:

- 1ZZA276004-B Female connector

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- 1ZXX460010-DXA_REVA2_Outline drawing
- 1ZAA275008-JM

8. Other requirements

- a) A three (3) day training of Eskom personnel shall be offered locally pertaining to the following:
 - 1) Design and Engineering pertaining to this project
 - 2) Manufacturing and testing of HV and EHV cables
 - 3) Installation of cable and all accessories
 - 4) Maintenance and Operation of all associated equipment
 - 5) DTS and DCR operating principles overview
- b) DTS and DCR operating training for personnel pertaining to the configuration, operating and maintenance and analysis/diagnostics using the system.
- a) 10 year system guarantee will be required for the cable systems, supplied, installed and commissioned. This 10 year system guarantee will be required for the operating conditions as stipulated in this report and the normal scheduled maintenance prescribed and agreed to by Eskom for this project.
- b) Additional parameters and submissions that will be required at time of project execution are contained in Appendix L.

9. Type tests and Pre-qualification tests

- a) Type tests, including the water penetration tests, shall have been performed on the cable and accessories as a system, in accordance with clause 12 of IEC 60840. Range of approval covered by the type test shall be in accordance with clause 12.2 of IEC 60840. The type test reports shall clearly identify the cables and accessories according to clauses 6 and 7 of IEC 60840. The type test reports shall include fully detailed and dimensioned drawings of the cable and accessories tested. Including the raw materials used and the manufacturing line and manufacturing plant location used.
- b) Outdoor terminations with composite insulators shall be designed and tested according to IEC 61462.
- c) GIS/GIS dry-type terminations shall be designed and tested according to IEC 62271-209 for XLPE cables.
- d) Pre-qualification tests shall have been performed on cable and accessories tested as a system, in accordance with clause 13 of IEC 60840. Range of approval covered by the pre-qualification shall be in accordance with clause 13 of IEC 60840. The Pre-qualification reports shall clearly identify the cables and accessories according to clauses 6 and 7 of IEC 60840. Including the raw materials used and the manufacturing line and manufacturing plant location used. The Pre-qualification reports shall include fully detailed and dimensioned drawings of the cable and accessories tested.

10. Quality Assurance tests and measurements

The following quality assurance tests and measurements shall be conducted during or after installation as applicable;

- a) Bonding lead current measurements
- b) Sheath-bonding verification
- c) Contact resistances for earth and bonding connections.
- d) Positive and Zero sequence impedance measurements

11. The cable system after installation tests

The Contractor shall conduct the following after installation tests. These tests shall comply with SANS/IEC 60840, IEEE400 and its 'point' documents or as per the guidance provided in Cigre TB841 for the specific test methodologies used. These proposals, inclusive of method statement, shall be provided with the tender. All test and measurement data and results shall be provided to Eskom in a final report.

- a) DC over sheath integrity test
- b) AC Voltage withstand test.
- c) Partial discharge (PD) measurement. PD test methods, detection systems as well as pass/fail criteria to be provided.

12. Risks identified for the 132kV Cable system project:

- a) There are ongoing projects being executed at Koeberg Nuclear Power station which could influence the execution of this project.
- b) Various services and infrastructure may be located in the vicinity of the cable route, which can impact the works execution.
- c) Electrical clearances and safe working clearances need to be considered for the cable terminations to cater for the cable system installation and commissioning testing that will be performed on site.

13. Tender Submissions

The following documents must be submitted as part of the tender submissions.;

- 1) Completed Schedule Bs
- 2) Method statement for the HV cable scope and GIS works.
- 3) Experience and qualifications of technical specialists and/or designers responsible for cable system design and technical support shall be provided. A one page CV for each specialist will be sufficient. A minimum of two Engineers or Engineering Technologists are required.
- 4) Experience and certification of jointers and installation teams demonstrating relevant HV cable installation experience shall be provided. A one page CV for each team member will be sufficient. A minimum of three team members consisting of one jointer/installation supervisor and two jointers is required.
- 5) Preliminary outline drawings with dimensions and appropriately labelled of all key components.
- 6) Successfully passed Prequalification certification/report
- 7) Successfully passed Type Test Reports with water penetration test for cable and terminations
- 8) Cable construction drawing(s) with layer labels and dimensions
- 9) Ampacity calculations.
- 10) Preliminary cable supports and cleats drawings.
- 11) Outdoor, station transformer and GIS termination drawings with labels and dimensions.
- 12) Accessory drawings: link boxes, bonding leads, SVL and ECC.

14. Conclusion

This report is effective to recommend and specify the 132 kV cable systems technical requirements for the Weskusfleur MTS project. The cable system suppliers and installation companies shall complete all the technical schedule B's in Annex A, B, C, D, E, F, G, H, I, J and K as part of the tender deliverables.

15. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Bheki Ntshangase	Senior Manager: Asset Management: SE&D
Fernando Witbooi	Chief Technologist: Asset Management: SE&D

16. Revisions

Date	Rev.	Compiler	Remarks
November 2023	1	SM Msweli	Revise specification in line with new procurement strategy.

17. Development team

The following people were involved in the development of this document:

- Sihle Msweli

18. Acknowledgements

Not applicable.

Annex A – Schedules A and B for the 132kV Station Transformer 1: Purchaser's specific requirements

Schedule A: Purchaser's specific requirements.

Schedule B: Guarantees and technical particulars of equipment offered - to be completed by tenderer.

Item	Description		Schedule A	Schedule B
1	Ambient and installation parameters			
1.1	a) altitude	m	1000	xxxxxxxx
	b) ambient air temperature	°C	-5 °C to 35 °C	xxxxxxxx
	c) soil temperature	°C	-10 °C to 25 °C	xxxxxxxx
	d) soil thermal resistivity	K·m/W	1.2	xxxxxxxx
	e) depth of burial	m	1.2	xxxxxxxx
	f) configuration		Specify	
	g) special bonding applied		single end point bonded	
	h) lightning ground flash density		severe (14 flashes/km ² /yr)	xxxxxxxx
	i) solar radiation	W/m ²	1 100	xxxxxxxx
	j) ultraviolet radiation		High	xxxxxxxx
	k) relative humidity		10 % to 95 %;	xxxxxxxx
	l) wind pressure and seismic		+/-700 Pa (34 m/s) and 3g	xxxxxxxx
	m) pollution severity defined by IEC 60815:		Very heavy	xxxxxxxx
	n) specific creepage distance required for external insulation	mm/kV	31	
	o) maximum conductor operating temperature	°C	90°C (@ 40MVA)	
1.2	Load current (rating)	A	175 (40 MVA)	
1.3	Max Rated voltage cable and accessories (U _{max} as per IEC 60840)	kV	145	
1.4	Estimated required cable length	m	900	
2	Cable specifications			
2.1	Conductor cross-sectional area	mm ²	Specify	
2.2	Conductor material	Cu/Al	Specify	
2.3	Ampacity (at 90°C)		Specify	
	a) 100 % load factor	A	Specify	
	b) 110% for 4 hours	A	Specify	
	c) 120% for 2 hours	A	Specify	

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	d) 130% for 1 hour	A	Specify	
	e) 105°C rating	A	Specify	
2.4	a) Symmetrical short-circuit fault level	kA	40	
	b) Fault level duration	s	1	
2.5	Nominal thickness of XLPE insulation	mm	Xxxxxxx	
2.6	Conductor screen radial stress at U_0	kV/mm	Specify	
2.7	Core screen radial stress at U_0	kV/mm	Specify	
2.8	Type of Metallic sheath		Specify	
2.9	a) Earth fault level	kA	40	
	b) Fault level duration	s	1	
2.10	Detail of nominal thickness of Al or Cu sheath and/or nominal thickness of copper wire strands and number of copper wire strands		Provide drawing reference /description	
2.11	Details of water barriers/blocking applied		Provide drawing reference/description	
2.12	Type of outer sheath (PVC/PE/HDPE etc.)		Specify	
2.13	Outer sheath has flame retardance and low halogen		Yes	
2.14	Conductive coating applied		Graphite or alternative	
2.15	Other Cable parameters			
	a) mass of cable	kg/m	Specify	
	b) minimum installation bending radius	mm	Specify	
	c) d.c. resistance of conductor at 20 °C	Ω / km	Specify	
	d) a.c. resistance of conductor at 90°C	Ω / km	Specify	
	e) a.c. resistance of sheath with conductor at 90 °C	Ω / km	Specify	
	f) reactance per phase	Ω / km	Specify	
	g) capacitance per phase	nF/km	Specify	
	h) zero sequence impedance	Ω / km	Specify	
	i) zero sequence capacitance	nF/km	Specify	
3	Cable supporting structures, Cleats and Clamps			
3.1	Details of cable support structures		Drawing(s)/ document reference	
3.2	Details of cleats		Drawing(s)/ document reference	
3.3	Details of intermittent clamps		Drawing(s)/ document reference	

4	Terminations			
4.1	Details of the GIS/GIS cable terminations		Drawing(s) reference	
4.2	Details of the Transformer cable terminations		Drawing(s) reference	
4.3	Details of cable termination/ end support structure		Drawing(s) reference	
4.4	Pollution Severity		Very heavy	XXXXXXXXXX
4.5	Insulator material type		Silicone composite	
4.6	Required minimum specific creepage distance	mm/kV	31	
4.7	Measured creepage distance	mm	Provide	
5	ECC/Bonding Leads			
5.1	Type of ECC/bonding lead		Single core	
5.2	ECC/Bonding lead conductor material (Cu/Al)		Specify	
5.3	ECC/Bonding lead conductor cross-sectional area	mm ²	Specify	
5.4	Thickness of ECC/bonding lead insulation	mm	Specify	
5.5	Dimensional details of ECC/bonding lead		Drawing(s) reference	
5.6	Estimated length of ECC/bonding leads	m	900	
6	Other Accessories			
6.1	Details of Link disconnecting box		Drawing(s) reference	
6.2	Details of SVL link box		Drawing(s) reference	
6.3	Details of SVL		Drawing(s)/document reference	
6.4	Fibre optic cable duct installed		Yes	

Annex B – Schedules A and B for the 132kV Station Transformer 2: Purchaser's specific requirements

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered - to be completed by tenderer

Item	Description		Schedule A	Schedule B
1	Ambient and installation parameters			
1.1	a) altitude	m	1000	xxxxxxxx
	b) ambient air temperature	°C	-5 °C to 35 °C	xxxxxxxx
	c) soil temperature	°C	-10 °C to 25 °C	xxxxxxxx
	d) soil thermal resistivity	K·m/W	1.2	xxxxxxxx
	e) depth of burial	m	1.2	xxxxxxxx
	f) configuration		Specify	
	g) special bonding applied		single end point bonded	
	h) lightning ground flash density		severe (14 flashes/km ² /yr)	xxxxxxxx
	i) solar radiation	W/m ²	1 100	xxxxxxxx
	j) ultraviolet radiation		High	xxxxxxxx
	k) relative humidity		10 % to 95 %;	xxxxxxxx
	l) wind pressure and seismic		+/-700 Pa (34 m/s) and 3g	xxxxxxxx
	m) pollution severity defined by IEC 60815:		Very heavy	xxxxxxxx
	n) specific creepage distance required for external insulation	mm/kV	31	
	o) maximum conductor operating temperature	°C	90°C (@ 40MVA)	
1.2	Load current (rating)	A	175 (40 MVA)	
1.3	Max Rated voltage cable and accessories (U _{max} as per IEC 60840)	kV	145	
1.4	Estimated required cable length	m	910	
2	Cable specifications			
2.1	Conductor cross-sectional area	mm ²	Specify	
2.2	Conductor material	Cu/Al	Specify	
2.3	Ampacity (at 90°C)		Specify	
	a) 100 % load factor	A	Specify	
	b) 110% for 4 hours	A	Specify	
	c) 120% for 2 hours	A	Specify	

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	d) 130% for 1 hour	A	Specify	
	e) 105°C rating	A	Specify	
2.4	a) Symmetrical short-circuit fault level	kA	40	
	b) Fault level duration	s	1	
2.5	Nominal thickness of XLPE insulation	mm	Xxxxxxx	
2.6	Conductor screen radial stress at U_0	kV/mm	Specify	
2.7	Core screen radial stress at U_0	kV/mm	Specify	
2.8	Type of Metallic sheath		Specify	
2.9	a) Earth fault level	kA	40	
	b) Fault level duration	s	1	
2.10	Detail of nominal thickness of Al or Cu sheath and/or nominal thickness of copper wire strands and number of copper wire strands		Provide drawing reference /description	
2.11	Details of water barriers/blocking applied		Provide drawing reference/description	
2.12	Type of outer sheath (PVC/PE/HDPE etc.)		Specify	
2.13	Outer sheath has flame retardance and low halogen		Yes	
2.14	Conductive coating applied		Graphite or alternative	
2.15	Other Cable parameters			
	a) mass of cable	kg/m	Specify	
	b) minimum installation bending radius	mm	Specify	
	c) d.c. resistance of conductor at 20 °C	Ω / km	Specify	
	d) a.c. resistance of conductor at 90°C	Ω / km	Specify	
	e) a.c. resistance of sheath with conductor at 90 °C	Ω / km	Specify	
	f) reactance per phase	Ω / km	Specify	
	g) capacitance per phase	nF/km	Specify	
	h) zero sequence impedance	Ω / km	Specify	
	i) zero sequence capacitance	nF/km	Specify	
3	Cable supporting structures, Cleats and Clamps			
3.1	Details of cable support structures		Drawing(s)/ document reference	

3.2	Details of cleats		Drawing(s)/ document reference	
3.3	Details of intermittent clamps		Drawing(s)/ document reference	
4	Terminations			
4.1	Details of the GIS/GIS cable terminations		Drawing(s) reference	
4.2	Details of the Transformer cable terminations		Drawing(s) reference	
4.3	Details of cable termination/ end support structure		Drawing(s) reference	
4.4	Pollution Severity		Very heavy	XXXXXXXXXX
4.5	Insulator material type		Silicone composite	
4.6	Required minimum specific creepage distance	mm/kV	31	
4.7	Measured creepage distance	mm	Provide	
5	ECC/Bonding Leads			
5.1	Type of ECC/bonding lead		Single core	
5.2	ECC/Bonding lead conductor material (Cu/Al)		Specify	
5.3	ECC/Bonding lead conductor cross-sectional area	mm ²	Specify	
5.4	Thickness of ECC/bonding lead insulation	mm	Specify	
5.5	Dimensional details of ECC/bonding lead		Drawing(s) reference	
5.6	Estimated length of ECC/bonding leads	m	910	
6	Other Accessories			
6.1	Details of Link disconnecting box		Drawing(s) reference	
6.2	Details of SVL link box		Drawing(s) reference	
6.3	Details of SVL		Drawing(s)/document reference	
6.4	Fibre optic cable duct installed		Yes	

Annex C – Schedules A and B for the 132kV Acacia 2: Purchaser's specific requirements

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered - to be completed by tenderer

Item	Description		Schedule A	Schedule B
1	Ambient and installation parameters			
1.1	a) altitude	m	1000	xxxxxxxx
	b) ambient air temperature	°C	-5 °C to 35 °C	xxxxxxxx
	c) soil temperature	°C	-10 °C to 25 °C	xxxxxxxx
	d) soil thermal resistivity	K·m/W	1.2	xxxxxxxx
	e) depth of burial	m	1.2	xxxxxxxx
	f) configuration		Specify	
	g) special bonding applied		single end point bonded	
	h) lightning ground flash density		severe (14 flashes/km ² /yr)	xxxxxxxx
	i) solar radiation	W/m ²	1 100	xxxxxxxx
	j) ultraviolet radiation		High	xxxxxxxx
	k) relative humidity		10 % to 95 %;	xxxxxxxx
	l) wind pressure and seismic		+/-700 Pa (34 m/s) and 3g	xxxxxxxx
	m) pollution severity defined by IEC 60815:		Very heavy	xxxxxxxx
	n) specific creepage distance required for external insulation	mm/kV	31	
	o) maximum conductor operating temperature	°C	90°C (@ 180MVA)	
1.2	Load current (rating)	A	788 (180 MVA)	
1.3	Max Rated voltage cable and accessories (U _{max} as per IEC 60840)	kV	145	
1.4	Estimated required cable length	m	300	
2	Cable specifications			
2.1	Conductor cross-sectional area	mm ²	Specify	
2.2	Conductor material	Cu/Al	Specify	
2.3	Ampacity (at 90°C)		Specify	
	a) 100 % load factor	A	Specify	
	b) 110% for 4 hours	A	Specify	
	c) 120% for 2 hours	A	Specify	

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	d) 130% for 1 hour	A	Specify	
	e) 105°C rating	A	Specify	
2.4	a) Symmetrical short-circuit fault level	kA	40	
	b) Fault level duration	s	1	
2.5	Nominal thickness of XLPE insulation	mm	Xxxxxxx	
2.6	Conductor screen radial stress at U_0	kV/mm	Specify	
2.7	Core screen radial stress at U_0	kV/mm	Specify	
2.8	Type of Metallic sheath		Specify	
2.9	a) Earth fault level	kA	40	
	b) Fault level duration	s	1	
2.10	Detail of nominal thickness of Al or Cu sheath and/or nominal thickness of copper wire strands and number of copper wire strands		Provide drawing reference /description	
2.11	Details of water barriers/blocking applied		Provide drawing reference/description	
2.12	Type of outer sheath (PVC/PE/HDPE etc.)		Specify	
2.13	Outer sheath has flame retardance and low halogen		Yes	
2.14	Conductive coating applied		Graphite or alternative	
2.15	Other Cable parameters			
	a) mass of cable	kg/m	Specify	
	b) minimum installation bending radius	mm	Specify	
	c) d.c. resistance of conductor at 20 °C	Ω / km	Specify	
	d) a.c. resistance of conductor at 90°C	Ω / km	Specify	
	e) a.c. resistance of sheath with conductor at 90 °C	Ω / km	Specify	
	f) reactance per phase	Ω / km	Specify	
	g) capacitance per phase	nF/km	Specify	
	h) zero sequence impedance	Ω / km	Specify	
	i) zero sequence capacitance	nF/km	Specify	
3	Cable supporting structures, Cleats and Clamps			

3.1	Details of cable support structures		Drawing(s)/ document reference	
3.2	Details of cleats		Drawing(s)/ document reference	
3.3	Details of intermittent clamps		Drawing(s)/ document reference	
4	Terminations			
4.1	Details of the GIS/GIS cable terminations		Drawing(s) reference	
4.2	Details of the Outdoor cable terminations		Drawing(s) reference	
4.3	Details of cable termination/ end support structure		Drawing(s) reference	
4.4	Pollution Severity		Very heavy	XXXXXXXXXX
4.5	Insulator material type		Silicone composite	
4.6	Required minimum specific creepage distance	mm/kV	31	
4.7	Measured creepage distance	mm	Provide	
5	ECC/Bonding Leads			
5.1	Type of ECC/bonding lead		Single core	
5.2	ECC/Bonding lead conductor material (Cu/Al)		Specify	
5.3	ECC/Bonding lead conductor cross-sectional area	mm ²	Specify	
5.4	Thickness of ECC/bonding lead insulation	mm	Specify	
5.5	Dimensional details of ECC/bonding lead		Drawing(s) reference	
5.6	Estimated length of ECC/bonding leads	m	300	
6	Other Accessories			
6.1	Details of Link disconnecting box		Drawing(s) reference	
6.2	Details of SVL link box		Drawing(s) reference	
6.3	Details of SVL		Drawing(s)/document reference	
6.4	Fibre optic cable duct installed		Yes	

Annex D – Schedules A and B for the 132kV Blaauwberg: Purchaser's specific requirements

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered - to be completed by tenderer

Item	Description		Schedule A	Schedule B
1	Ambient and installation parameters			
1.1	a) altitude	m	1000	xxxxxxxx
	b) ambient air temperature	°C	-5 °C to 35 °C	xxxxxxxx
	c) soil temperature	°C	-10 °C to 25 °C	xxxxxxxx
	d) soil thermal resistivity	K·m/W	1.2	xxxxxxxx
	e) depth of burial	m	1.2	xxxxxxxx
	f) configuration		Specify	
	g) special bonding applied		single end point bonded	
	h) lightning ground flash density		severe (14 flashes/km ² /yr)	xxxxxxxx
	i) solar radiation	W/m ²	1 100	xxxxxxxx
	j) ultraviolet radiation		High	xxxxxxxx
	k) relative humidity		10 % to 95 %;	xxxxxxxx
	l) wind pressure and seismic		+/-700 Pa (34 m/s) and 3g	xxxxxxxx
	m) pollution severity defined by IEC 60815:		Very heavy	xxxxxxxx
	n) specific creepage distance required for external insulation	mm/kV	31	
	o) maximum conductor operating temperature	°C	90°C (@ 180MVA)	
1.2	Load current (rating)	A	788 (180 MVA)	
1.3	Max Rated voltage cable and accessories (U _{max} as per IEC 60840)	kV	145	
1.4	Estimated required cable length	m	310	
2	Cable specifications			
2.1	Conductor cross-sectional area	mm ²	Specify	
2.2	Conductor material	Cu/Al	Specify	
2.3	Ampacity (at 90°C)		Specify	
	a) 100 % load factor	A	Specify	
	b) 110% for 4 hours	A	Specify	
	c) 120% for 2 hours	A	Specify	

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	d) 130% for 1 hour	A	Specify	
	e) 105°C rating	A	Specify	
2.4	a) Symmetrical short-circuit fault level	kA	40	
	b) Fault level duration	s	1	
2.5	Nominal thickness of XLPE insulation	mm	Xxxxxxx	
2.6	Conductor screen radial stress at U_0	kV/mm	Specify	
2.7	Core screen radial stress at U_0	kV/mm	Specify	
2.8	Type of Metallic sheath		Specify	
2.9	a) Earth fault level	kA	40	
	b) Fault level duration	s	1	
2.10	Detail of nominal thickness of Al or Cu sheath and/or nominal thickness of copper wire strands and number of copper wire strands		Provide drawing reference /description	
2.11	Details of water barriers/blocking applied		Provide drawing reference/description	
2.12	Type of outer sheath (PVC/PE/HDPE etc.)		Specify	
2.13	Outer sheath has flame retardance and low halogen		Yes	
2.14	Conductive coating applied		Graphite or alternative	
2.15	Other Cable parameters			
	a) mass of cable	kg/m	Specify	
	b) minimum installation bending radius	mm	Specify	
	c) d.c. resistance of conductor at 20 °C	Ω / km	Specify	
	d) a.c. resistance of conductor at 90°C	Ω / km	Specify	
	e) a.c. resistance of sheath with conductor at 90 °C	Ω / km	Specify	
	f) reactance per phase	Ω / km	Specify	
	g) capacitance per phase	nF/km	Specify	
	h) zero sequence impedance	Ω / km	Specify	
	i) zero sequence capacitance	nF/km	Specify	
3	Cable supporting structures, Cleats and Clamps			

3.1	Details of cable support structures		Drawing(s)/ document reference	
3.2	Details of cleats		Drawing(s)/ document reference	
3.3	Details of intermittent clamps		Drawing(s)/ document reference	
4	Terminations			
4.1	Details of the GIS/GIS cable terminations		Drawing(s) reference	
4.2	Details of the Outdoor cable terminations		Drawing(s) reference	
4.3	Details of cable termination/ end support structure		Drawing(s) reference	
4.4	Pollution Severity		Very heavy	XXXXXXXXXX
4.5	Insulator material type		Silicone composite	
4.6	Required minimum specific creepage distance	mm/kV	31	
4.7	Measured creepage distance	mm	Provide	
5	ECC/Bonding Leads			
5.1	Type of ECC/bonding lead		Single core	
5.2	ECC/Bonding lead conductor material (Cu/Al)		Specify	
5.3	ECC/Bonding lead conductor cross-sectional area	mm ²	Specify	
5.4	Thickness of ECC/bonding lead insulation	mm	Specify	
5.5	Dimensional details of ECC/bonding lead		Drawing(s) reference	
5.6	Estimated length of ECC/bonding leads	m	310	
6	Other Accessories			
6.1	Details of Link disconnecting box		Drawing(s) reference	
6.2	Details of SVL link box		Drawing(s) reference	
6.3	Details of SVL		Drawing(s)/document reference	
6.4	Fibre optic cable duct installed		Yes	

Annex E – Schedules A and B for the 132kV Duine: Purchaser's specific requirements

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered - to be completed by tenderer

Item	Description		Schedule A	Schedule B
1	Ambient and installation parameters			
1.1	a) altitude	m	1000	xxxxxxxx
	b) ambient air temperature	°C	-5 °C to 35 °C	xxxxxxxx
	c) soil temperature	°C	-10 °C to 25 °C	xxxxxxxx
	d) soil thermal resistivity	K·m/W	1.2	xxxxxxxx
	e) depth of burial	m	1.2	xxxxxxxx
	f) configuration		Specify	
	g) special bonding applied		single end point bonded	
	h) lightning ground flash density		severe (14 flashes/km ² /yr)	xxxxxxxx
	i) solar radiation	W/m ²	1 100	xxxxxxxx
	j) ultraviolet radiation		High	xxxxxxxx
	k) relative humidity		10 % to 95 %;	xxxxxxxx
	l) wind pressure and seismic		+/-700 Pa (34 m/s) and 3g	xxxxxxxx
	m) pollution severity defined by IEC 60815:		Very heavy	xxxxxxxx
	n) specific creepage distance required for external insulation	mm/kV	31	
	o) maximum conductor operating temperature	°C	90°C (@ 180MVA)	
1.2	Load current (rating)	A	788 (180 MVA)	
1.3	Max Rated voltage cable and accessories (U _{max} as per IEC 60840)	kV	145	
1.4	Estimated required cable length	m	760	
2	Cable specifications			
2.1	Conductor cross-sectional area	mm ²	Specify	
2.2	Conductor material	Cu/Al	Specify	
2.3	Ampacity (at 90°C)		Specify	
	a) 100 % load factor	A	Specify	
	b) 110% for 4 hours	A	Specify	
	c) 120% for 2 hours	A	Specify	

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	d) 130% for 1 hour	A	Specify	
	e) 105°C rating	A	Specify	
2.4	a) Symmetrical short-circuit fault level	kA	40	
	b) Fault level duration	s	1	
2.5	Nominal thickness of XLPE insulation	mm	Xxxxxxx	
2.6	Conductor screen radial stress at U_0	kV/mm	Specify	
2.7	Core screen radial stress at U_0	kV/mm	Specify	
2.8	Type of Metallic sheath		Specify	
2.9	a) Earth fault level	kA	40	
	b) Fault level duration	s	1	
2.10	Detail of nominal thickness of Al or Cu sheath and/or nominal thickness of copper wire strands and number of copper wire strands		Provide drawing reference /description	
2.11	Details of water barriers/blocking applied		Provide drawing reference/description	
2.12	Type of outer sheath (PVC/PE/HDPE etc.)		Specify	
2.13	Outer sheath has flame retardance and low halogen		Yes	
2.14	Conductive coating applied		Graphite or alternative	
2.15	Other Cable parameters			
	a) mass of cable	kg/m	Specify	
	b) minimum installation bending radius	mm	Specify	
	c) d.c. resistance of conductor at 20 °C	Ω / km	Specify	
	d) a.c. resistance of conductor at 90°C	Ω / km	Specify	
	e) a.c. resistance of sheath with conductor at 90 °C	Ω / km	Specify	
	f) reactance per phase	Ω / km	Specify	
	g) capacitance per phase	nF/km	Specify	
	h) zero sequence impedance	Ω / km	Specify	
	i) zero sequence capacitance	nF/km	Specify	
3	Cable supporting structures, Cleats and Clamps			

3.1	Details of cable support structures		Drawing(s)/ document reference	
3.2	Details of cleats		Drawing(s)/ document reference	
3.3	Details of intermittent clamps		Drawing(s)/ document reference	
4	Terminations			
4.1	Details of the GIS/GIS cable terminations		Drawing(s) reference	
4.2	Details of the Outdoor cable terminations		Drawing(s) reference	
4.3	Details of cable termination/ end support structure		Drawing(s) reference	
4.4	Pollution Severity		Very heavy	XXXXXXXXXX
4.5	Insulator material type		Silicone composite	
4.6	Required minimum specific creepage distance	mm/kV	31	
4.7	Measured creepage distance	mm	Provide	
5	Joints			
5.1	Required type and number joints for:			
	a) Straight joints for connecting the new proposed cable to the existing 132kV 240 mm ² Cu XLPE cable. These will also be required for repair jointing of the new cable.			
5.2	Details of joints offered.		Drawing Reference	
6	ECC/Bonding Leads			
6.1	Type of ECC/bonding lead		Single core	
6.2	ECC/Bonding lead conductor material (Cu/Al)		Specify	
6.3	ECC/Bonding lead conductor cross-sectional area	mm ²	Specify	
6.4	Thickness of ECC/bonding lead insulation	mm	Specify	
6.5	Dimensional details of ECC/bonding lead		Drawing(s) reference	
6.6	Estimated length of ECC/bonding leads	m	760	
7	Other Accessories			
7.1	Details of Link disconnecting box		Drawing(s) reference	
7.2	Details of SVL link box		Drawing(s) reference	
7.3	Details of SVL		Drawing(s)/document reference	
7.4	Fibre optic cable duct installed		Yes	

**Annex F – Schedules A and B for the 132kV Ankerlig Temporary relocation:
Purchaser's specific requirements**

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered - to be completed by tenderer

Item	Description		Schedule A	Schedule B
1	Ambient and installation parameters			
1.1	a) altitude	m	1000	xxxxxxxx
	b) ambient air temperature	°C	-5 °C to 35 °C	xxxxxxxx
	c) soil temperature	°C	-10 °C to 25 °C	xxxxxxxx
	d) soil thermal resistivity	K·m/W	1.2	xxxxxxxx
	e) depth of burial	m	1.2	xxxxxxxx
	f) configuration		Specify	
	g) special bonding applied		single end point bonded	
	h) lightning ground flash density		severe (14 flashes/km ² /yr)	xxxxxxxx
	i) solar radiation	W/m ²	1 100	xxxxxxxx
	j) ultraviolet radiation		High	xxxxxxxx
	k) relative humidity		10 % to 95 %;	xxxxxxxx
	l) wind pressure and seismic		+/-700 Pa (34 m/s) and 3g	xxxxxxxx
	m) pollution severity defined by IEC 60815:		Very heavy	xxxxxxxx
	n) specific creepage distance required for external insulation	mm/kV	31	
	o) maximum conductor operating temperature	°C	90°C (@ 180MVA)	
1.2	Load current (rating)	A	788 (180 MVA)	
1.3	Max Rated voltage cable and accessories (U _{max} as per IEC 60840)	kV	145	
1.4	Estimated required cable length	m	320	
2	Cable specifications			
2.1	Conductor cross-sectional area	mm ²	Specify	
2.2	Conductor material	Cu/Al	Specify	
2.3	Ampacity (at 90°C)		Specify	
	a) 100 % load factor	A	Specify	
	b) 110% for 4 hours	A	Specify	
	c) 120% for 2 hours	A	Specify	

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	d) 130% for 1 hour	A	Specify	
	e) 105°C rating	A	Specify	
2.4	a) Symmetrical short-circuit fault level	kA	40	
	b) Fault level duration	s	1	
2.5	Nominal thickness of XLPE insulation	mm	Xxxxxxx	
2.6	Conductor screen radial stress at U_0	kV/mm	Specify	
2.7	Core screen radial stress at U_0	kV/mm	Specify	
2.8	Type of Metallic sheath		Specify	
2.9	a) Earth fault level	kA	40	
	b) Fault level duration	s	1	
2.10	Detail of nominal thickness of Al or Cu sheath and/or nominal thickness of copper wire strands and number of copper wire strands		Provide drawing reference /description	
2.11	Details of water barriers/blocking applied		Provide drawing reference/description	
2.12	Type of outer sheath (PVC/PE/HDPE etc.)		Specify	
2.13	Outer sheath has flame retardance and low halogen		Yes	
2.14	Conductive coating applied		Graphite or alternative	
2.15	Other Cable parameters			
	a) mass of cable	kg/m	Specify	
	b) minimum installation bending radius	mm	Specify	
	c) d.c. resistance of conductor at 20 °C	Ω / km	Specify	
	d) a.c. resistance of conductor at 90°C	Ω / km	Specify	
	e) a.c. resistance of sheath with conductor at 90 °C	Ω / km	Specify	
	f) reactance per phase	Ω / km	Specify	
	g) capacitance per phase	nF/km	Specify	
	h) zero sequence impedance	Ω / km	Specify	
	i) zero sequence capacitance	nF/km	Specify	
3	Cable supporting structures, Cleats and Clamps			

3.1	Details of cable support structures		Drawing(s)/ document reference	
3.2	Details of cleats		Drawing(s)/ document reference	
3.3	Details of intermittent clamps		Drawing(s)/ document reference	
4	Terminations			
4.1	Details of the GIS/GIS cable terminations		Drawing(s) reference	
4.2	Details of the Outdoor cable terminations		Drawing(s) reference	
4.3	Details of cable termination/ end support structure		Drawing(s) reference	
4.4	Pollution Severity		Very heavy	XXXXXXXXXX
4.5	Insulator material type		Silicone composite	
4.6	Required minimum specific creepage distance	mm/kV	31	
4.7	Measured creepage distance	mm	Provide	
5	ECC/Bonding Leads			
5.1	Type of ECC/bonding lead		Single core	
5.2	ECC/Bonding lead conductor material (Cu/Al)		Specify	
5.3	ECC/Bonding lead conductor cross-sectional area	mm ²	Specify	
5.4	Thickness of ECC/bonding lead insulation	mm	Specify	
5.5	Dimensional details of ECC/bonding lead		Drawing(s) reference	
5.6	Estimated length of ECC/bonding leads	m	320	
6	Other Accessories			
6.1	Details of Link disconnecting box		Drawing(s) reference	
6.2	Details of SVL link box		Drawing(s) reference	
6.3	Details of SVL		Drawing(s)/document reference	
6.4	Fibre optic cable duct installed		Yes	

**Annex G – Schedules A and B for the 132kV Ankerlig (End state – Phase 2):
Purchaser's specific requirements**

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered - to be completed by tenderer

Item	Description		Schedule A	Schedule B
1	Ambient and installation parameters			
1.1	a) altitude	m	1000	xxxxxxxx
	b) ambient air temperature	°C	-5 °C to 35 °C	xxxxxxxx
	c) soil temperature	°C	-10 °C to 25 °C	xxxxxxxx
	d) soil thermal resistivity	K·m/W	1.2	xxxxxxxx
	e) depth of burial	m	1.2	xxxxxxxx
	f) configuration		Specify	
	g) special bonding applied		single end point bonded	
	h) lightning ground flash density		severe (14 flashes/km ² /yr)	xxxxxxxx
	i) solar radiation	W/m ²	1 100	xxxxxxxx
	j) ultraviolet radiation		High	xxxxxxxx
	k) relative humidity		10 % to 95 %;	xxxxxxxx
	l) wind pressure and seismic		+/-700 Pa (34 m/s) and 3g	xxxxxxxx
	m) pollution severity defined by IEC 60815:		Very heavy	xxxxxxxx
	n) specific creepage distance required for external insulation	mm/kV	31	
	o) maximum conductor operating temperature	°C	90°C (@ 180MVA)	
1.2	Load current (rating)	A	788 (180 MVA)	
1.3	Max Rated voltage cable and accessories (U _{max} as per IEC 60840)	kV	145	
1.4	Estimated required cable length	m	320	
2	Cable specifications			
2.1	Conductor cross-sectional area	mm ²	Specify	
2.2	Conductor material	Cu/Al	Specify	
2.3	Ampacity (at 90°C)		Specify	
	a) 100 % load factor	A	Specify	
	b) 110% for 4 hours	A	Specify	
	c) 120% for 2 hours	A	Specify	

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	d) 130% for 1 hour	A	Specify	
	e) 105°C rating	A	Specify	
2.4	a) Symmetrical short-circuit fault level	kA	40	
	b) Fault level duration	s	1	
2.5	Nominal thickness of XLPE insulation	mm	Xxxxxxx	
2.6	Conductor screen radial stress at U_0	kV/mm	Specify	
2.7	Core screen radial stress at U_0	kV/mm	Specify	
2.8	Type of Metallic sheath		Specify	
2.9	a) Earth fault level	kA	40	
	b) Fault level duration	s	1	
2.10	Detail of nominal thickness of Al or Cu sheath and/or nominal thickness of copper wire strands and number of copper wire strands		Provide drawing reference /description	
2.11	Details of water barriers/blocking applied		Provide drawing reference/description	
2.12	Type of outer sheath (PVC/PE/HDPE etc.)		Specify	
2.13	Outer sheath has flame retardance and low halogen		Yes	
2.14	Conductive coating applied		Graphite or alternative	
2.15	Other Cable parameters			
	a) mass of cable	kg/m	Specify	
	b) minimum installation bending radius	mm	Specify	
	c) d.c. resistance of conductor at 20 °C	Ω / km	Specify	
	d) a.c. resistance of conductor at 90°C	Ω / km	Specify	
	e) a.c. resistance of sheath with conductor at 90 °C	Ω / km	Specify	
	f) reactance per phase	Ω / km	Specify	
	g) capacitance per phase	nF/km	Specify	
	h) zero sequence impedance	Ω / km	Specify	
	i) zero sequence capacitance	nF/km	Specify	
3	Cable supporting structures, Cleats and Clamps			

3.1	Details of cable support structures		Drawing(s)/ document reference	
3.2	Details of cleats		Drawing(s)/ document reference	
3.3	Details of intermittent clamps		Drawing(s)/ document reference	
4	Terminations			
4.1	Details of the GIS/GIS cable terminations		Drawing(s) reference	
4.2	Details of the Outdoor cable terminations		Drawing(s) reference	
4.3	Details of cable termination/ end support structure		Drawing(s) reference	
4.4	Pollution Severity		Very heavy	XXXXXXXXXX
4.5	Insulator material type		Silicone composite	
4.6	Required minimum specific creepage distance	mm/kV	31	
4.7	Measured creepage distance	mm	Provide	
5	ECC/Bonding Leads			
5.1	Type of ECC/bonding lead		Single core	
5.2	ECC/Bonding lead conductor material (Cu/Al)		Specify	
5.3	ECC/Bonding lead conductor cross-sectional area	mm ²	Specify	
5.4	Thickness of ECC/bonding lead insulation	mm	Specify	
5.5	Dimensional details of ECC/bonding lead		Drawing(s) reference	
5.6	Estimated length of ECC/bonding leads	m	320	
6	Other Accessories			
6.1	Details of Link disconnecting box		Drawing(s) reference	
6.2	Details of SVL link box		Drawing(s) reference	
6.3	Details of SVL		Drawing(s)/document reference	
6.4	Fibre optic cable duct installed		Yes	

Annex H – Schedules A and B for the 132kV Dassenberg 1: Purchaser's specific requirements

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered - to be completed by tenderer

Item	Description		Schedule A	Schedule B
1	Ambient and installation parameters			
1.1	a) altitude	m	1000	xxxxxxxx
	b) ambient air temperature	°C	-5 °C to 35 °C	xxxxxxxx
	c) soil temperature	°C	-10 °C to 25 °C	xxxxxxxx
	d) soil thermal resistivity	K·m/W	1.2	xxxxxxxx
	e) depth of burial	m	1.2	xxxxxxxx
	f) configuration		Specify	
	g) special bonding applied		single end point bonded	
	h) lightning ground flash density		severe (14 flashes/km ² /yr)	xxxxxxxx
	i) solar radiation	W/m ²	1 100	xxxxxxxx
	j) ultraviolet radiation		High	xxxxxxxx
	k) relative humidity		10 % to 95 %;	xxxxxxxx
	l) wind pressure and seismic		+/-700 Pa (34 m/s) and 3g	xxxxxxxx
	m) pollution severity defined by IEC 60815:		Very heavy	xxxxxxxx
	n) specific creepage distance required for external insulation	mm/kV	31	
	o) maximum conductor operating temperature	°C	90°C (@ 348 MVA)	
1.2	Load current (rating)	A	1523 (348 MVA)	
1.3	Max Rated voltage cable and accessories (U _{max} as per IEC 60840)	kV	145	
1.4	Estimated required cable length	m	340	
2	Cable specifications			
2.1	Conductor cross-sectional area	mm ²	Specify	
2.2	Conductor material	Cu/Al	Specify	
2.3	Ampacity (at 90°C)		Specify	
	a) 100 % load factor	A	Specify	
	b) 110% for 4 hours	A	Specify	
	c) 120% for 2 hours	A	Specify	

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	d) 130% for 1 hour	A	Specify	
	e) 105°C rating	A	Specify	
2.4	a) Symmetrical short-circuit fault level	kA	40	
	b) Fault level duration	s	1	
2.5	Nominal thickness of XLPE insulation	mm	Xxxxxxx	
2.6	Conductor screen radial stress at U_0	kV/mm	Specify	
2.7	Core screen radial stress at U_0	kV/mm	Specify	
2.8	Type of Metallic sheath		Specify	
2.9	a) Earth fault level	kA	40	
	b) Fault level duration	s	1	
2.10	Detail of nominal thickness of Al or Cu sheath and/or nominal thickness of copper wire strands and number of copper wire strands		Provide drawing reference /description	
2.11	Details of water barriers/blocking applied		Provide drawing reference/description	
2.12	Type of outer sheath (PVC/PE/HDPE etc.)		Specify	
2.13	Outer sheath has flame retardance and low halogen		Yes	
2.14	Conductive coating applied		Graphite or alternative	
2.15	Other Cable parameters			
	a) mass of cable	kg/m	Specify	
	b) minimum installation bending radius	mm	Specify	
	c) d.c. resistance of conductor at 20 °C	Ω / km	Specify	
	d) a.c. resistance of conductor at 90°C	Ω / km	Specify	
	e) a.c. resistance of sheath with conductor at 90 °C	Ω / km	Specify	
	f) reactance per phase	Ω / km	Specify	
	g) capacitance per phase	nF/km	Specify	
	h) zero sequence impedance	Ω / km	Specify	
	i) zero sequence capacitance	nF/km	Specify	
3	Cable supporting structures, Cleats and Clamps			

3.1	Details of cable support structures		Drawing(s)/ document reference	
3.2	Details of cleats		Drawing(s)/ document reference	
3.3	Details of intermittent clamps		Drawing(s)/ document reference	
4	Terminations			
4.1	Details of the GIS/GIS cable terminations		Drawing(s) reference	
4.2	Details of the Outdoor cable terminations		Drawing(s) reference	
4.3	Details of cable termination/ end support structure		Drawing(s) reference	
4.4	Pollution Severity		Very heavy	XXXXXXXXXX
4.5	Insulator material type		Silicone composite	
4.6	Required minimum specific creepage distance	mm/kV	31	
4.7	Measured creepage distance	mm	Provide	
5	ECC/Bonding Leads			
5.1	Type of ECC/bonding lead		Single core	
5.2	ECC/Bonding lead conductor material (Cu/Al)		Specify	
5.3	ECC/Bonding lead conductor cross-sectional area	mm ²	Specify	
5.4	Thickness of ECC/bonding lead insulation	mm	Specify	
5.5	Dimensional details of ECC/bonding lead		Drawing(s) reference	
5.6	Estimated length of ECC/bonding leads	m	340	
6	Other Accessories			
6.1	Details of Link disconnecting box		Drawing(s) reference	
6.2	Details of SVL link box		Drawing(s) reference	
6.3	Details of SVL		Drawing(s)/document reference	
6.4	Fibre optic cable duct installed		Yes	

Annex I – Schedules A and B for the 132kV Dassenberg 2: Purchaser's specific requirements

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered - to be completed by tenderer

Item	Description		Schedule A	Schedule B
1	Ambient and installation parameters			
1.1	a) altitude	m	1000	xxxxxxxx
	b) ambient air temperature	°C	-5 °C to 35 °C	xxxxxxxx
	c) soil temperature	°C	-10 °C to 25 °C	xxxxxxxx
	d) soil thermal resistivity	K·m/W	1.2	xxxxxxxx
	e) depth of burial	m	1.2	xxxxxxxx
	f) configuration		Specify	
	g) special bonding applied		single end point bonded	
	h) lightning ground flash density		severe (14 flashes/km ² /yr)	xxxxxxxx
	i) solar radiation	W/m ²	1 100	xxxxxxxx
	j) ultraviolet radiation		High	xxxxxxxx
	k) relative humidity		10 % to 95 %;	xxxxxxxx
	l) wind pressure and seismic		+/-700 Pa (34 m/s) and 3g	xxxxxxxx
	m) pollution severity defined by IEC 60815:		Very heavy	xxxxxxxx
	n) specific creepage distance required for external insulation	mm/kV	31	
	o) maximum conductor operating temperature	°C	90°C (@ 348 MVA)	
1.2	Load current (rating)	A	1523 (348 MVA)	
1.3	Max Rated voltage cable and accessories (U _{max} as per IEC 60840)	kV	145	
1.4	Estimated required cable length	m	330	
2	Cable specifications			
2.1	Conductor cross-sectional area	mm ²	Specify	
2.2	Conductor material	Cu/Al	Specify	
2.3	Ampacity (at 90°C)		Specify	
	a) 100 % load factor	A	Specify	
	b) 110% for 4 hours	A	Specify	
	c) 120% for 2 hours	A	Specify	

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	d) 130% for 1 hour	A	Specify	
	e) 105°C rating	A	Specify	
2.4	a) Symmetrical short-circuit fault level	kA	40	
	b) Fault level duration	s	1	
2.5	Nominal thickness of XLPE insulation	mm	Xxxxxxx	
2.6	Conductor screen radial stress at U_0	kV/mm	Specify	
2.7	Core screen radial stress at U_0	kV/mm	Specify	
2.8	Type of Metallic sheath		Specify	
2.9	a) Earth fault level	kA	40	
	b) Fault level duration	s	1	
2.10	Detail of nominal thickness of Al or Cu sheath and/or nominal thickness of copper wire strands and number of copper wire strands		Provide drawing reference /description	
2.11	Details of water barriers/blocking applied		Provide drawing reference/description	
2.12	Type of outer sheath (PVC/PE/HDPE etc.)		Specify	
2.13	Outer sheath has flame retardance and low halogen		Yes	
2.14	Conductive coating applied		Graphite or alternative	
2.15	Other Cable parameters			
	a) mass of cable	kg/m	Specify	
	b) minimum installation bending radius	mm	Specify	
	c) d.c. resistance of conductor at 20 °C	Ω/ km	Specify	
	d) a.c. resistance of conductor at 90°C	Ω/ km	Specify	
	e) a.c. resistance of sheath with conductor at 90 °C	Ω/ km	Specify	
	f) reactance per phase	Ω/ km	Specify	
	g) capacitance per phase	nF/km	Specify	
	h) zero sequence impedance	Ω/ km	Specify	
	i) zero sequence capacitance	nF/km	Specify	
3	Cable supporting structures, Cleats and Clamps			

3.1	Details of cable support structures		Drawing(s)/ document reference	
3.2	Details of cleats		Drawing(s)/ document reference	
3.3	Details of intermittent clamps		Drawing(s)/ document reference	
4	Terminations			
4.1	Details of the GIS/GIS cable terminations		Drawing(s) reference	
4.2	Details of the Outdoor cable terminations		Drawing(s) reference	
4.3	Details of cable termination/ end support structure		Drawing(s) reference	
4.4	Pollution Severity		Very heavy	XXXXXXXXXX
4.5	Insulator material type		Silicone composite	
4.6	Required minimum specific creepage distance	mm/kV	31	
4.7	Measured creepage distance	mm	Provide	
5	ECC/Bonding Leads			
5.1	Type of ECC/bonding lead		Single core	
5.2	ECC/Bonding lead conductor material (Cu/Al)		Specify	
5.3	ECC/Bonding lead conductor cross-sectional area	mm ²	Specify	
5.4	Thickness of ECC/bonding lead insulation	mm	Specify	
5.5	Dimensional details of ECC/bonding lead		Drawing(s) reference	
5.6	Estimated length of ECC/bonding leads	m	330	
6	Other Accessories			
6.1	Details of Link disconnecting box		Drawing(s) reference	
6.2	Details of SVL link box		Drawing(s) reference	
6.3	Details of SVL		Drawing(s)/document reference	
6.4	Fibre optic cable duct installed		Yes	

Annex J – Schedules A and B for the 132kV Coupling transformer 1: Purchaser's specific requirements

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered - to be completed by tenderer

Item	Description		Schedule A	Schedule B
1	Ambient and installation parameters			
1.1	a) altitude	m	1000	xxxxxxxx
	b) ambient air temperature	°C	-5 °C to 35 °C	xxxxxxxx
	c) soil temperature	°C	-10 °C to 25 °C	xxxxxxxx
	d) soil thermal resistivity	K·m/W	1.2	xxxxxxxx
	e) depth of burial	m	1.2	xxxxxxxx
	f) configuration		Specify	
	g) special bonding applied		single end point bonded	
	h) lightning ground flash density		severe (14 flashes/km ² /yr)	xxxxxxxx
	i) solar radiation	W/m ²	1 100	xxxxxxxx
	j) ultraviolet radiation		High	xxxxxxxx
	k) relative humidity		10 % to 95 %;	xxxxxxxx
	l) wind pressure and seismic		+/-700 Pa (34 m/s) and 3g	xxxxxxxx
	m) pollution severity defined by IEC 60815:		Very heavy	xxxxxxxx
	n) specific creepage distance required for external insulation	mm/kV	31	
	o) maximum conductor operating temperature	°C	90°C (@ 250 MVA)	
1.2	Load current (rating)	A	1094 (250 MVA)	
1.3	Max Rated voltage cable and accessories (U _{max} as per IEC 60840)	kV	145	
1.4	Estimated required cable length	m	190	
2	Cable specifications			
2.1	Conductor cross-sectional area	mm ²	Specify	
2.2	Conductor material	Cu/Al	Specify	
2.3	Ampacity (at 90°C)		Specify	
	a) 100 % load factor	A	Specify	
	b) 110% for 4 hours	A	Specify	
	c) 120% for 2 hours	A	Specify	

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	d) 130% for 1 hour	A	Specify	
	e) 105°C rating	A	Specify	
2.4	a) Symmetrical short-circuit fault level	kA	40	
	b) Fault level duration	s	1	
2.5	Nominal thickness of XLPE insulation	mm	Xxxxxxx	
2.6	Conductor screen radial stress at U_0	kV/mm	Specify	
2.7	Core screen radial stress at U_0	kV/mm	Specify	
2.8	Type of Metallic sheath		Specify	
2.9	a) Earth fault level	kA	40	
	b) Fault level duration	s	1	
2.10	Detail of nominal thickness of Al or Cu sheath and/or nominal thickness of copper wire strands and number of copper wire strands		Provide drawing reference /description	
2.11	Details of water barriers/blocking applied		Provide drawing reference/description	
2.12	Type of outer sheath (PVC/PE/HDPE etc.)		Specify	
2.13	Outer sheath has flame retardance and low halogen		Yes	
2.14	Conductive coating applied		Graphite or alternative	
2.15	Other Cable parameters			
	a) mass of cable	kg/m	Specify	
	b) minimum installation bending radius	mm	Specify	
	c) d.c. resistance of conductor at 20 °C	Ω / km	Specify	
	d) a.c. resistance of conductor at 90°C	Ω / km	Specify	
	e) a.c. resistance of sheath with conductor at 90 °C	Ω / km	Specify	
	f) reactance per phase	Ω / km	Specify	
	g) capacitance per phase	nF/km	Specify	
	h) zero sequence impedance	Ω / km	Specify	
	i) zero sequence capacitance	nF/km	Specify	
3	Cable supporting structures, Cleats and Clamps			

3.1	Details of cable support structures		Drawing(s)/ document reference	
3.2	Details of cleats		Drawing(s)/ document reference	
3.3	Details of intermittent clamps		Drawing(s)/ document reference	
4	Terminations			
4.1	Details of the GIS/GIS cable terminations		Drawing(s) reference	
4.2	Details of the Outdoor cable terminations		Drawing(s) reference	
4.3	Details of cable termination/ end support structure		Drawing(s) reference	
4.4	Pollution Severity		Very heavy	XXXXXXXXXX
4.5	Insulator material type		Silicone composite	
4.6	Required minimum specific creepage distance	mm/kV	31	
4.7	Measured creepage distance	mm	Provide	
5	ECC/Bonding Leads			
5.1	Type of ECC/bonding lead		Single core	
5.2	ECC/Bonding lead conductor material (Cu/Al)		Specify	
5.3	ECC/Bonding lead conductor cross-sectional area	mm ²	Specify	
5.4	Thickness of ECC/bonding lead insulation	mm	Specify	
5.5	Dimensional details of ECC/bonding lead		Drawing(s) reference	
5.6	Estimated length of ECC/bonding leads	m	190	
6	Other Accessories			
6.1	Details of Link disconnecting box		Drawing(s) reference	
6.2	Details of SVL link box		Drawing(s) reference	
6.3	Details of SVL		Drawing(s)/document reference	
6.4	Fibre optic cable duct installed		Yes	

Annex K – Schedules A and B for the 132kV Coupling transformer 2: Purchaser's specific requirements

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered - to be completed by tenderer




Item	Description		Schedule A	Schedule B
1	Ambient and installation parameters			
1.1	a) altitude	m	1000	xxxxxxxx
	b) ambient air temperature	°C	-5 °C to 35 °C	xxxxxxxx
	c) soil temperature	°C	-10 °C to 25 °C	xxxxxxxx
	d) soil thermal resistivity	K·m/W	1.2	xxxxxxxx
	e) depth of burial	m	1.2	xxxxxxxx
	f) configuration		Specify	
	g) special bonding applied		single end point bonded	
	h) lightning ground flash density		severe (14 flashes/km ² /yr)	xxxxxxxx
	i) solar radiation	W/m ²	1 100	xxxxxxxx
	j) ultraviolet radiation		High	xxxxxxxx
	k) relative humidity		10 % to 95 %;	xxxxxxxx
	l) wind pressure and seismic		+/-700 Pa (34 m/s) and 3g	xxxxxxxx
	m) pollution severity defined by IEC 60815:		Very heavy	xxxxxxxx
	n) specific creepage distance required for external insulation	mm/kV	31	
	o) maximum conductor operating temperature	°C	90°C (@ 250 MVA)	
1.2	Load current (rating)	A	1094 (250 MVA)	
1.3	Max Rated voltage cable and accessories (U _{max} as per IEC 60840)	kV	145	
1.4	Estimated required cable length	m	190	
2	Cable specifications			
2.1	Conductor cross-sectional area	mm ²	Specify	
2.2	Conductor material	Cu/Al	Specify	
2.3	Ampacity (at 90°C)		Specify	
	a) 100 % load factor	A	Specify	
	b) 110% for 4 hours	A	Specify	
	c) 120% for 2 hours	A	Specify	

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	d) 130% for 1 hour	A	Specify	
	e) 105°C rating	A	Specify	
2.4	a) Symmetrical short-circuit fault level	kA	40	
	b) Fault level duration	s	1	
2.5	Nominal thickness of XLPE insulation	mm	Xxxxxxx	
2.6	Conductor screen radial stress at U_0	kV/mm	Specify	
2.7	Core screen radial stress at U_0	kV/mm	Specify	
2.8	Type of Metallic sheath		Specify	
2.9	a) Earth fault level	kA	40	
	b) Fault level duration	s	1	
2.10	Detail of nominal thickness of Al or Cu sheath and/or nominal thickness of copper wire strands and number of copper wire strands		Provide drawing reference /description	
2.11	Details of water barriers/blocking applied		Provide drawing reference/description	
2.12	Type of outer sheath (PVC/PE/HDPE etc.)		Specify	
2.13	Outer sheath has flame retardance and low halogen		Yes	
2.14	Conductive coating applied		Graphite or alternative	
2.15	Other Cable parameters			
	a) mass of cable	kg/m	Specify	
	b) minimum installation bending radius	mm	Specify	
	c) d.c. resistance of conductor at 20 °C	Ω/ km	Specify	
	d) a.c. resistance of conductor at 90°C	Ω/ km	Specify	
	e) a.c. resistance of sheath with conductor at 90 °C	Ω/ km	Specify	
	f) reactance per phase	Ω/ km	Specify	
	g) capacitance per phase	nF/km	Specify	
	h) zero sequence impedance	Ω/ km	Specify	
	i) zero sequence capacitance	nF/km	Specify	
3	Cable supporting structures, Cleats and Clamps			

3.1	Details of cable support structures		Drawing(s)/ document reference	
3.2	Details of cleats		Drawing(s)/ document reference	
3.3	Details of intermittent clamps		Drawing(s)/ document reference	
4	Terminations			
4.1	Details of the GIS/GIS cable terminations		Drawing(s) reference	
4.2	Details of the Outdoor cable terminations		Drawing(s) reference	
4.3	Details of cable termination/ end support structure		Drawing(s) reference	
4.4	Pollution Severity		Very heavy	XXXXXXXXXX
4.5	Insulator material type		Silicone composite	
4.6	Required minimum specific creepage distance	mm/kV	31	
4.7	Measured creepage distance	mm	Provide	
5	ECC/Bonding Leads			
5.1	Type of ECC/bonding lead		Single core	
5.2	ECC/Bonding lead conductor material (Cu/Al)		Specify	
5.3	ECC/Bonding lead conductor cross-sectional area	mm ²	Specify	
5.4	Thickness of ECC/bonding lead insulation	mm	Specify	
5.5	Dimensional details of ECC/bonding lead		Drawing(s) reference	
5.6	Estimated length of ECC/bonding leads	m	190	
6	Other Accessories			
6.1	Details of Link disconnecting box		Drawing(s) reference	
6.2	Details of SVL link box		Drawing(s) reference	
6.3	Details of SVL		Drawing(s)/document reference	
6.4	Fibre optic cable duct installed		Yes	

Annex L – Additional Information requirements after contract award

Item	Description
1	Additional cable drum and installation information required:
	a) Cable drum design and material
	b) Method of wood treatment (if applicable)
	c) Details of haulage/pulling equipment
	d) Maximum permissible pulling tensions (in kN)
2	Miscellaneous requirements
	a) SVL MCOV characteristic curves
	b) Installation instruction for outdoor and GIS terminations offered
	c) Specialized tools required for jointing and terminating
	d) Quality inspection test plans for all components (Outdoor terminations, GIS terminations, cable supports, cleats and clamps, other accessories, link disconnecting boxes) and installation processes