


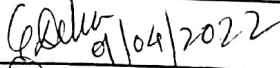
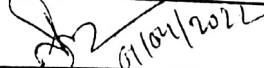

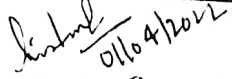
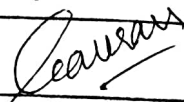
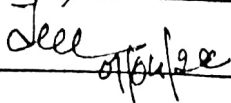
BSES

Technical Specification

For

11kV Covered Conductor & Accessories

Specification no – BSES-TS-04-11CCA-R0

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Technical Specification of 11kV Covered Conductor & Accessories**1.0 SCOPE**

This specification provides design, manufacturing, testing, inspection, packing and dispatch to BSES New Delhi store/ site of XLPE insulated AAAC AL59 water tight DOG & GOAT covered conductor along with accessories ([Cl.4.13](#)), specified herein for their satisfactory operation in various lines and substations of BSES Rajdhani Power Ltd, New Delhi.

These covered conductors are to be used as overhead distribution conductors on single circuit and / or double circuit for BSES distribution lines and / or sub-stations.

2.0 STANDARDS

The covered conductor shall conform to the following International/Indian Standards, which shall mean latest revisions, with amendments/changes adopted and published, unless specifically stated otherwise in the Specification.

S. No.	International/ Indian Standard	Title
1	SS 4240814	Aluminium alloy stranded Conductors for overhead lines Al59 specifications
2	SS 4240813	Aluminium alloy wire for stranded Conductors for overhead lines- Al 59 wires
3	SS EN 50397-1	Covered conductors for overhead lines and the related accessories- Covered Conductors
4	SS EN50397-2	Covered conductors for overhead lines and the related accessories- Accessories for covered conductors- tests and acceptance criteria

3.0 CLIMATIC CONDITIONS

a)	Average grade atmospheric condition	Heavily polluted, dry
b)	Maximum altitude above sea level	1000 M

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c)	Air temperature Ambient	i) Highest : 50°C ii) Average : 30°C iii) Minimum : 0°C
e)	Relative Humidity	100 % max
f)	Thermal Resistivity of Soil	150°C. cm / W (max.)
g)	Seismic Zone	4
h)	Rainfall	750 mm concentrated in four months

4.0 GENERAL TECHNICAL REQUIREMENT**CONDUCTOR CONSTRUCTION FEATURES**

The specification generally covers the technical parameters of AAAC circular, water tight AL-59 DOG and GOAT conductor wounded with conductor screen, Inner layer of TR-XLPE insulation and black coloured outer insulation of XLPE with UV resistant, non tracking and erosion resistant properties as per SS EN 50397-1. Conductor must be water tight with yarn/tape.

The conductor shall therefore be suitable for satisfactory operation under the climatic conditions listed in [clause 3.0](#).

Conductor Code as per EN 50397-1: 2006

Type Code	CC	
Covering Material	S X T	-for semi-conductive screen -for cross-linked Polyethylene -for thermoplastic polyethylene
Conductor material and cross section	According to EN 50182	AL59
Conductor design	W K	-for water tight -for compacted
Rated Voltage U in kV	kV	

Covered Conductor Code to be used by BSES-

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Sr. No.	Description	Conductor Material	Cable Code
1.	XLPE insulated DOG conductor	Al	CCSX ▲-AL59 WK <u>E</u> KV
2.	XLPE insulated GOAT conductor	Al	CCSX ▲-AL59 WK <u>E</u> KV

For which -

▲ = Nominal Conductor Cross Section in mm²;

E = Rated Voltage (in kV)

4.1 CONDUCTOR

The AAAC AL59 conductor should be as per SS 424 08 14 and its latest amendments. All the physical properties, design and dimension, strength of material, testing of material etc. shall be as per SS 424 08 14 and EN 50397-1.

The AL59 conductor shall have accurate chemical composition of Alloy so as to offer excellent corrosion resistance, better strength to weight ratio and improved conductivity. The solution treatment shall be done in a very sophisticated and advanced technology furnace with automatic quenching system.

The AL59 conductor wire shall meet the mechanical strength and resistance of the wire properties as mentioned in the GTP ([Annexure-A](#))/ SS 42408 14.

The bidder should specify the source of raw materials along with the proof of last purchases made. BSES may reject the tender of the Bidders whose raw material manufacturers are found to be supplying any poor quality or Non-standard materials to BSES.

4.2 FILLING

The stranded conductor longitudinally watertight by means of adequate measures as e.g. filling with an adequate mass. The filling mass or other materials for obtaining the longitudinal water-tightness, shall be compatible with the conductor material and the material of the covering

4.3 FREEDOM FROM DEFECTS

The wires shall be smooth and free from all imperfections such as spills, splits, slag inclusion, die marks, scratches, fittings, blow-holes, projections, looseness, overlapping of strands, chipping of Aluminium

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layers etc., and all such other defects which may hamper the mechanical & electrical properties of the conductor as also the installation of the conductor at the site etc. Special care shall be taken to keep away dirt, grit etc. during stranding.

4.4 WIRE SIZES

The Aluminium wires for the stranded conductor covered by this standard shall have diameters specified in the guaranteed technical particulars ([Annexure-A](#)) shall be as such to comply with the rated DC resistance while maintaining cross section as per the specification and shall be within the tolerances indicated therein.

4.5 JOINTS IN WIRES

4.5.1	Joints not allowed.
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4.6 STRANDING

4.6.1	The wires used in the construction of AL59 conductor before stranding and after stranding shall satisfy all the relevant requirements as per the standards indicated in the specification or any other relevant standards with due justification.
4.6.2	In all constructions, the successive layers shall have opposite directions of lay, the outermost layer being right-handed. The wires in each layer shall be evenly and closely stranded.
4.6.3	In conductors having multiple layers of Aluminium wires, the lay ratio of any Aluminium layer shall not be greater than the lay ratio of the Aluminium layer immediately beneath it.

4.7 STANDARD LENGTH

4.7.1	<p>The standard length of the conductor shall be 1000 meter per drum. A tolerance of $\pm 5\%$ on the standard length shall be permitted.</p> <p>Only one short length with drum length not less than 500 mtr. shall be accepted in last lot. All lengths outside this limit of tolerance shall be treated as rejected drum. Also, two short lengths shall not be allowed in one drum.</p>
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4.7.2	Bidder shall also indicate the maximum single length, above the standard length, he can manufacture in the guaranteed technical particulars. This is required for special stretches like river crossing, society crossing etc. BSES reserves the right to place orders for the above length as per the requirement.
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4.8 CONDUCTOR SCREEN

Extruded semi conducting material as per BSES approved make ([Annexure-B](#)).

Thickness shall be as per Guaranteed Technical Particulars of the specification ([Annexure-A](#)). (Tapes are not acceptable)

4.9 INNER INSULATION

4.9.1	Extruded TR-XLPE (Tree retardant Cross Linked Poly-Ethylene) insulation with water tree retardant property.
4.9.2	The required compound used shall be from BSES approved sub-vendors only (Annexure-B).
4.9.3	Uniform thickness of insulation shall be within the permissible values as per specification (Annexure-A). Eccentricity check shall be carried out to ensure this.
4.9.4	Insulation colour: Natural

4.10 INSULATION OUTER LAYER

4.10.1	Extruded XLPE (Cross Linked Poly-Ethylene) insulation, UV resistant, Non Tracking & Erosion Resistant Black coloured XLPE (SS EN 50397-1).
4.10.2	Make of compound shall as per BSES approved sub-vendors only (Annexure-B).
4.10.3	Uniform thickness of insulation shall be within the permissible values as per specification (Annexure-A). Eccentricity check shall be carried out to ensure this.

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4.10.4	Shape of the conductor over the outer layer shall be circular, when manufactured / completed. Ovality check shall be carried out at factory, to detect any abnormality. Manufacturing quality shall be such that cable will retain its circular shape, even after it is laid at site.
4.10.5	Outer layer colour: Black
4.10.6	<p>Covered conductors shall be provided with an identification of origin consisting of a continuous marking of the manufacturer's name or trademark on the surface of the covering. This marking shall be made by embossing. Embossing on outer insulation of conductor shall be as:</p> <ol style="list-style-type: none">Type of conductor (conductor name)<ul style="list-style-type: none">CCSX ▲-AL59 WK 11 kV (for DOG conductor)CCSX ▲-AL59 WK 33 kV (for GOAT conductor) <p>(for which ▲ = Nominal Cross section of conductor in mm²)</p> <ol style="list-style-type: none">Manufacturer's Name and Trade-markName of buyer / purchaser, BSESMonth and year of manufacturingBatch No. / Lot No.Purchase order No. and date <p>* Progressive (sequential) length of cable at every meter, starting from zero for every drum shall be printed with laser print.</p>
4.10.7	UV protection on outer layer shall be provided. The Carbon black content shall be as per EN 50397-1
4.10.8	Sample will be sealed during Acceptance test of each and every lot for testing of Chemical composition test of Aluminium and UV test of outer layer which shall be conducted from BIS and NABL (both) accredited third party lab.

4.11 XLPE PROCESS

- Dry Cure process only
- Triple head extrusion only

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Both the ends of the conductor shall be sealed with heat shrinkable PVC end cap before dispatching the final drum to BSES.

Drums without end sealing cap will not be accepted by BSES.

4.13 ACCESSORIES

- The Accessories shall abide SS EN 50483, SS EN 50397-1 and SS EN 50397-2 standards.
- All the accessories shall be type tested and the acceptance test shall be carried out as per standard SS EN 50397-2.
- BSES reserves the right to reject the bid if the type test report of accessories is not valid.
- The fittings shall be able to withstand the specific minimum failure load and shall not damage the covering (no damage shall occur which could affect the correct function of the covering) and shall be designed to prevent the ingress of moisture during service.

4.13.1	Anchoring (Dead end) Clamps	<ul style="list-style-type: none">• As per NFC 33 041 September 2013/ EN 50483 as per latest amendments• Min. Breaking load = ~30kN• For anchoring or tensioning covered conductor
4.13.2	Plastic insulator ties	For gripping/holding of covered conductors with pin or spool type insulators
4.13.3	Suspension clamps	<ul style="list-style-type: none">• Body made of insulating material with climatic resistance which provides an additional insulation between the pole and the cable• A stainless clip insert to avoid any abrasion due to vibrations• Locking and clamping of the bundle by a thermoplastic bolt with fusible wing nut. Shall have provision for removal and further installation.• The suspension clamps shall be so designed that the effect of vibration, both on the covered

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		<p>conductor and on the clamps themselves are minimized. The clamps shall be designed to avoid localized pressure or damage to the covered conductor.</p> <ul style="list-style-type: none"> • The wear resistance of the articulation shall be sufficient to prevent deterioration in service. • Breaking load = ~8kN
4.13.4	Insulating piercing connectors	<ul style="list-style-type: none"> • To connect a covered tap conductor to a covered main conductor without stripping. • Connector shall be adapted for installation in polluted areas. • Connector shall be resistant to tracking phenomenon.
4.13.5	Pre insulated junction sleeve for AAAC covered conductors	<ul style="list-style-type: none"> • Connection: water tightness shall be assured by a soft joint • The sleeve shall mention— <ul style="list-style-type: none"> ○ Number and order of compressions to be made ○ Length to be stripped on the conductor ○ The die to be used
4.13.6	Markings	<ul style="list-style-type: none"> • Manufacturer's trade mark or logo; • Product code or reference; • Traceability code / batch number; • The minimum and maximum cross section for which the unit is suitable; • Tightening torque or die reference, if applicable; • Recycling code, if any. <p>NOTE: Marking shall be provided as per SS EN 50397-2.</p>

Technical Specification of 11kV Covered Conductor & Accessories**5.0 TESTS****5.1 GENERAL**

The type test, acceptance test, routine test any other tests specifically demanded by BSES and tests during manufacturing shall be carried out by the manufacturer on the whole **covered conductor** and **accessories without any cost implication to BSES.**

5.1.1	<p>Type tests shall mean those tests, which are to be carried out from BSES approved testing laboratory (CPRI/ERDA) to prove the quality of product and general conformity of the material to this specification in the presence of BSES's representative.</p> <p>These tests shall be carried out on samples prior to commencement of commercial production against the order. The Manufacturer shall indicate his schedule for carrying out these tests in the activity schedule.</p> <p>BSES reserves the right to specify the name of the laboratory also, if so felt. All kind of expenses for type test shall be borne by manufacturer.</p>
5.1.2	<p>Acceptance Test means those tests which are to be carried out on samples of covered conductor taken from each lot offered for pre-dispatch inspection, for the purpose of acceptance of that lot.</p> <p>These tests shall be carried out at the manufacturer's works in presence of BSES's representative before the dispatch of the materials to the site/BSES store with in Delhi.</p>
5.1.3	<p>Routine Test means those tests which are to be carried out on each strand/spool/length of the covered conductor to check requirements, which are likely to vary during production. These tests shall be carried out by the manufacturer on each drum and shall have to furnish the reports to the BSES's representative during his visit for acceptance tests or/and on requirement of BSES.</p>
5.1.4	<p>Tests during manufacturing means those tests which are to be carried out during the process of manufacturing and end inspection by the manufacturer to ensure the desired quality of the end product to be supplied, including all quality control checks & raw material testing.</p>

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5.1.5	For all type and acceptance tests, the acceptance values shall be the values guaranteed by the Bidder in the "Guaranteed Technical Particulars ", of their proposal or the acceptance value specified in this specification, whichever is more stringent for that particular test.
5.1.6	BSES reserves the right to visit the plant and can review the manufacturing process as well as quality any time during manufacturing till delivery without any prior intimation to manufacturer.

5.2 TYPE TESTS

Bidder shall submit the Type test reports of AAAC AL-59 Dog and Goat conductor along with the type test reports of Accessories as mentioned in this specification during the submission of technical bid.

5.2.1	All the product including accessories must be of type tested quality from CPRI/ ERDA. Type test reports shall be submitted for the type, size and rating of all the products offers in the bid. BSES reserves the right to conduct type test from BSES PO for which the cost shall be borne by the bidder without any cost implication to BSES. Type tests shall be as per EN 50397-1: 2006 and its latest amendments.
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5.3 ACCEPTANCE TESTS

Covered Conductor		
5.3.1	Visual and dimensional check on drum	SS 4240814 and IS: 398(Part IV) 1994/Relevant with latest Amendment.
5.3.2	Visual check for joints, scratches etc. and lengths of conductor	SS 4240814 and IS: 398(Part IV) 1994/Relevant with latest Amendment.
5.3.3	Dimensional check on Aluminium strands	SS 4240814 and IS: 398(Part IV) 1994/Relevant with latest Amendment.
5.3.4	Conductor Resistance test at 20°C	EN 50397-1-2006
5.3.5	Volume Resistivity	EN 50397-1-2006
5.3.6	High Voltage test	EN 50397-1-2006

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5.3.7	Leakage current test	EN 50397-1-2006
5.3.8	Tracking Resistance test	EN 50397-1-2006
5.3.9	Test for thickness of insulation, semicon and outer layer	EN 50397-1-2006
5.3.10	Dimension for insulation and layer	EN 50397-1-2006
5.3.11	Tensile and elongation at break of Insulation and outer layer	EN 50397-1-2006
5.3.12	Hot set test for insulation and outer layer	EN 50397-1-2006
5.3.13	UV test of outer layer from NABL approved lab	EN 50397-1-2006
5.3.14	Water Penetration test	EN 50397-1-2006
5.3.15	Water absorption test	EN 50397-1-2006
5.3.16	Check for lay ratio of various layers.	EN 50397-1-2006
5.3.17	Breaking load test on aluminum strands.	EN 50397-1-2006
5.3.18	Wrap test on aluminum strands.	EN 50397-1-2006
5.3.19	UTS test on welded joint of aluminum strand	As per this specification
5.3.20	Stress Strain test surface condition test	EN 50397-1-2006
5.3.21	Chemical analysis of Aluminium	EN 50397-1-2006
5.3.22	Chemical analysis of Outer layer	EN 50397-1-2006

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5.3.23	Eccentricity check of insulation	IS 7098-2
5.3.24	Ageing in air oven of insulation and outer layer	SS 4240814 and IS: 398(Part IV) 1994/Relevant with latest Amendment.
5.3.25	Drum Rewinding	Factory Standard
5.3.26	Cable end sealing	Factory Standard
5.3.27	Drum Stenciling	Factory Standard
5.3.28	Carbon Black Content	EN 50397-1-2006
Accessories		
5.3.29	Visual Examination	EN 50397-2
5.3.30	Dimensional and material verification	EN 50397-2
5.3.31	Marking	EN 50397-2
5.3.32	Tensile test	EN 50397 -2

All above tests shall be carried out after stranding only.

5.4 ROUTINE TESTS

Physical Tests	
5.4.1	Check ensures that the joints are as per specifications.
5.4.2	Check that there are no cuts, fins etc. on the strands.
5.4.3	Check that drums are as per specification.

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Electrical Tests

5.4.4 High Voltage test

5.4.5 Conductor resistance test

Routine Tests on Accessories

5.4.6 Routine tests on accessories are intended to prove conformance of fittings to specific requirements and are made on every fitting. Routine tests on accessories shall be as per SS EN 50397-2.

Test results from the above tests must appear in the documents forwarded by the vendor for inspection call.

5.5 TESTS DURING MANUFACTURING

5.5.1	Chemical analysis of Aluminium used for making Aluminium strands	As per relevant standard
5.5.2	Anti tracking test on each drum length	As per EN 50397-1:2006

Test report of the same shall be submitted to BSES.

5.6 TESTING CHARGES

5.6.1	The testing charges for the type tests specified and as per relevant standard shall be borne by the bidder. All the manufacturers irrespective of quantity allotted to them, will have to carry out the Type Tests at their own cost and BSES will not have any bearing on this account. The type test reports shall not be older than 5 yrs and shall be valid till the validity of offer
5.6.2	In case of failure in any of the type tests, the manufacturer is required to modify the design of the material if required and repeat the particular type test and same shall pass within three times at his own expenses. The decision of the BSES in this regard shall be final. BSES at its own desecration may also cancel the order at the risk and cost of the manufacturer if the

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	material fails twice in the type test.
5.6.3	Type test shall be done from CPRI/ERDA. Ensure that the tests can be completed in these laboratories within the time schedule guaranteed by them in the appropriate schedule. BSES reserves the right to specify the name of the laboratory also, if so felt.
5.6.4	The entire cost of testing for the acceptance and routine tests and tests during manufacture specified herein shall be treated as included in the quoted unit price of conductor.

5.7 ADDITIONAL TESTS

BSES reserves the right of getting done any other test(s) of reasonable nature carried out at Manufacturer's premises, at site, or in any other place/ third party lab in addition to the aforesaid type, acceptance and / or routine tests to satisfy with the fact that the material comply with the specifications. In such case all the expenses will be to Manufacturer's account.

5.8 SAMPLE BATCH FOR TYPE TESTING

5.8.1	The Manufacturer shall offer at least three (3) drums for selection of samples required for conducting all the type tests. BSES reserves the right to choose drums.
5.8.2	The Manufacturer is required to carry out all the acceptance tests and anti tracking test successfully in the presence of BSES representative in their manufacturing facility before dispatch of the selected sample to the testing laboratory for type test.

5.9 TEST REPORTS

5.9.1	Soft copies of type test reports shall be furnished through mail only. BSES may ask original type test report to verify soft copy. BSES will not receive any hard copy for their office record. BSES will give final dispatch clearance after validating type test report.
5.9.2	Record of routine test reports shall be maintained by the Manufacturer at their works for periodic inspection by the BSES's representative and shall be reviewed during inspection.

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5.9.3	Test Certificates of tests done during manufacturing shall be maintained by the Bidder. These shall be produced for verification as and when desired by the BSES.
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6.0 INSPECTION

6.0.1	BSES representative shall at all times be entitled to have access to the works and all places of the manufacturer where covered conductor shall be manufactured and the representative shall have full facilities for unrestricted inspection of the Manufacturer's works, raw materials, store process and process of manufacture and conducting necessary tests as may be deemed fit, for certifying the quality of product.
6.0.2	The Manufacturer shall keep BSES informed in advance of the time of starting and of the progress of manufacturing of covered conductor in its various stages so that arrangements can be made for inspection.
6.0.3	No material shall be dispatched from its point of manufacture and works before it has been satisfactorily inspected, tested, and necessary dispatch instructions are issued in writing, except for the cases where waiver of Inspection is granted by BSES, and even in this case also, written dispatch instructions will be issued. Any dispatches before the issue of Dispatch Instructions in writing will be liable for rejection and non acceptance by the consignee.
6.0.4	The acceptance of any quantity of material shall in no way relieve the Manufacturer of any of his responsibilities for meeting all requirements of the specification, and shall not prevent subsequent rejection if such material is later found to be defective.
6.0.5	At least 10% of the total number of drums subject to minimum of two in any lot put up for inspection shall be selected at random to ascertain the length of conductor.
6.0.6	The sample cut from any numbers of drums for carrying out any type of tests will be to the manufacturers account.
6.0.7	Anti Tracking test on one sample of each offered lot shall be conducted from 3 rd party lab (accredited by both BIS and NABL), cost shall be borne by the manufacturer.

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6.0.8	Only soft copy of inspection report shall be furnished by manufacturer through mail. BSES shall not receive any hard copy of report for their office record.
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7.0 QUALITY ASSURANCE PLAN

7.1 The bidder shall invariably furnish following information along with his offer, failing which his offer shall be rejected.

7.1.1	Statement giving list of important raw materials names of sub manufacturers for the raw materials, list of standards according to which the raw materials are tested, list of tests normally carried out on raw materials in presence of manufacturer's representative and as routine and / or acceptance during production and on finished goods, copies of test certificates.
7.1.2	Information and copies of test certificates as in mentioned above in respect of bought out accessories.
7.1.3	List of manufacturing facilities available.
7.1.4	Level of automation achieved and list of areas where manual processing exists.
7.1.5	List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.
7.1.6	List of testing equipment available with the Manufacturer for final
7.1.7	Testing of Covered Conductor to be specified. In the case if the manufacturer does not possess all the Routine and Acceptance testing facilities, the bid / PO shall be rejected.
7.1.8	BSES reserves the right for factory inspection to verify the quoted offer. If any of the facts are found to be misleading or incorrect the offer of that Bidder will be out rightly rejected and he may be black listed.
7.1.9	Special features provided to make it maintenance free.

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7.2 The bidder shall also submit following information to the BSES along with the technical Bid.

7.2.1	List of raw materials as well as bought out accessories, and the name of manufacturers of raw materials as well as bought out accessories.
7.2.2	Type test certificates of the raw material and bought out accessories.
7.2.3	Quality assurance plan (QAP) with hold points for BSES's inspection.

7.3 The Manufacturer shall submit the routine test certificates (only soft copy through mail) of all the bought-out items, accessories etc.

NOTE: Final QAP shall be approved by BSES.

8.0 DOCUMENTATION

Submission of drawings, calculations, catalogues, manuals, test reports shall be as mentioned below:

8.0.1 DRAWING, DATA AND MANUALS

Cross-Sectional drawing shall show every feature of construction, including the thickness/ diameter over every layer. This drawing shall also state the text to be embossed over the outer insulation layer i.e. type/ size etc. of the conductor, drum no./ lot no., sequential length marking over every meter, font sizes to be used, additional text if any etc. Also drum detail markings to be made on both sides of the drum.

8.0.2 DOCUMENTS TO BE SUBMITTED ALONG WITH BID FOR TECHNICAL JUSTIFICATION

Document/Drawing submission shall be as per the matrix given below:

- a. All documents/drawings shall be provided in soft copy only in returnable Pen drives
- b. Language of the documents shall be English only.
- c. Incomplete submission shall be liable for rejection.
- d. Document check sheet compliance shall be the first sheet for each submission stage i.e. Technical bid, Drawing Approval, Pre Dispatch, Pre closure
- e. No submission is acceptable without check list compliance.

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- f. Deficient/ improper document/ drawing submission shall be liable for rejection.
- g. Order of documents shall be strictly as per the check list.
- h. Any document not included in the below table but necessary for detailed engineering shall be deemed to be included in bidder's scope

S.No.	Detail of Document	For Tender	For Approval/Review	Final Submission
1	Guaranteed Technical Particulars (GTP)	Required	Required	Required
2	Deviation Sheet, if any	Required	Required	Required
3	Detailed cross sectional drawing of cable and drum	Required	Required	Required
4	Installation Instructions		Required	Required
5	Manual/Catalogue	Required	Required	Required
6	Cable de-rating factors		Required	Required
7	Type test reports of offered type and rating of cable	Required	Required	Required
8	BIS certificate	Required		
9	Make of Raw Materials	Required	Required	Required
10	Inspection and test reports, carried out in manufacturer's works			Required
11	Routine Test Certificates			Required
12	Test certificates of all the raw materials			Required

- The manufacturing of the conductor shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the BSES. All manufacturing and fabrication work in connection with the conductor prior to the approval of the drawing shall be at manufacturer's risk.

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Approval of drawing etc. by the BSES shall not relieve the Manufacturer of his responsibility and liability for ensuring correctness and correct interpretation of the latest revision of applicable standards, rules and codes of practices. The conductor shall conform in all respects to high standards of engineering, design, workmanship and latest revisions of relevant standards at the time of ordering and BSES shall have the power to reject any work or material which in his judgment is not in full accordance therewith.

9.0 PACKING & FORWARDING

9.1	The conductor shall be supplied in non-returnable steel drums only	
9.2	The drums shall be suitable for wheel mounting and for jetting off the conductor under a minimum controlled tension of the order of 5 KN.	
9.3	The bidder should submit the proposed drum drawings along with the bid. However, the same shall be in line with the requirements as stated herein.	
9.4	Both the ends of the conductor shall be properly sealed to prevent any deterioration of the conductor, due to ingress of water, etc.	
9.5	Shipping Information	The seller shall give complete shipping information concerning the weight, size of each package
9.6	Transit damage	The seller shall be responsible for any transit damage due to improper packing
9.7	Cable Drum handling	The drums shall be with MS spindle plate (with nut-bolts) of adequate size to suit the spindle rods, normally required for handling the drums, according to expected weight of the cable drums.
9.8	Markings	<ul style="list-style-type: none">• Drum identification number• Conductor type• Conductor length (meter)

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		<ul style="list-style-type: none">• PO number and date• SAP item code• Total weight of cable and drum• Manufacturer's name• Buyer's name• Month and year of manufacturing• Direction of rotation of drum• Conductor length final end markings (i.e. reading at inner end reading at the outer end, just before packing shall be marked on the drum)
9.9	Delivery Schedule	<ul style="list-style-type: none">• Delivery period Start Date : From date of LOI / LOA• Delivery period End Date : As agreed with manufacturer• Material dispatch Clearance : After inspection by purchaser
9.10	Accessories	<ul style="list-style-type: none">• Accessories shall be packed separately item wise with proper protection to prevent damage and easy handling.• Marking• Material description• Type• Dimension• PO number and date• SAP item code• Total weight of• Manufacturer's name• Buyer's name• Month and year of manufacturing• Storage type



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10.0 DEVIATIONS

- a) Deviations from this specification shall be listed separately by bidder clause wise (format given below) along with optional offer and has to submit the list along with bid/quotation. BSES will review the deviations and if BSES is agreed with the deviation, seller has to take written confirmation from BSES on deviation during tender evaluation.
- b) In the absence of any separate list of deviations from the bidders with bid as well as written confirmation from BSES on deviations, it will be assumed by the Buyer that the Seller complies with the Specification fully.
- c) Any deviations mentioned in any other submitted bid documents (i.e.in filled GTP, Catalog, BSES old approval, buyer's/seller's standards etc) by seller without separate deviation sheets will not consider as a deviation from this tech spec at any stage of contract.

Deviation Sheet Format-

Sino	Document Name	Clause No.	Deviation	Reason	Merits to BSES

ANNEXURE-A GUARANTEED TECHNICAL PARAMETERS

Note:

- 1) Every data shall be mentioned.
- 2) Seller may submit separate GTP for the cable, as suitable.
- 3) GTP shall be read in line with purchaser's Project Site Specific Requirement.

S.No	Description	AL59 DOG	AL59 GOAT
1	Guarantee Period	60 months from date of commissioning / 66 months (from date of receipt at purchaser's store) whichever is earlier	

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S.No	Description	AL59 DOG		AL59 GOAT	
2	Standard according to which the conductor will be manufactured and tested	SS EN4240814 SS EN 4240813 SS EN 50397-1			
3	Quality of material & standard to which conform	SS EN 42 40814 & IS-9997			
4	Type of covered conductor	AAAC (AL-59) Covered Conductor			
5	Number of strands and wire diameter in mm	7/4.72 mm		37/3.71mm	
6	Number Of Strands – Nos.	7		37	
7	Diameter Of Strand – mm.				
	I) Strands	4.72		3.71	
	a) Nominal				
	b) Maximum	4.77		3.75	
	c) Minimum	4.67		3.67	
	II) Overall Of Conductor	14.16		25.97	
8	Nominal Cross Sectional Area (mm ²) Of-				
	a) Whole Conductor	122.5		400	
	b) Each Strand	17.50		10.81	
9	Laying Of Strands – Nos.	Max	Min	Max	Min
	a) Centre wire				
	b) First Layer	14	12	14	12
	c) Second Layer	-	-	13	11

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S.No	Description	AL59 DOG		AL59 GOAT	
	d) Third Layer	-	-	13	11
	e) Fourth Layer	-	-	-	-
10	Weight (Excl. Wt. Of Grease) – Kg/Km. a) Whole Conductor	As per Manufacturer			
	b) Strand (At Nominal Dia.)	As per Manufacturer			
11	Calculated D.C. resistance at 20°C (Ω/Km) (Max.) a) Whole Conductor	0.2400		0.07411	
	b) Strand	1.66		2.69	
12	Ultimate Tensile Stress – KN a) Whole Conductor	28.2		96	
	b) Strand i) Before Stranding	4.02		2.59	
	ii) After Stranding	3.82		2.46	
13	Modulus of Elasticity –MPA	As per Manufacturer			
14	Coefficient of linear expansion – per deg. C.	23.0x10 ⁻⁶		23.0x10 ⁻⁶	
15	Chemical Composition	The wire material shall be AL59 Aluminium alloy meeting the requirements on Resistivity, tensile strength, DC resistance etc.			
16	Resistivity – Ω mm ² / Mtr.				
17	a) Continuous minimum current rating of conductor in still air at ambient Temperature (40°C)	375 A		828 A	
	b) Temperature rise for the above 55°C	55		55	

Technical Specification of 11kV Covered Conductor & Accessories

S.No	Description	AL59 DOG	AL59 GOAT
18	Minimum continuous current rating of conductor at 95°C corresponding of ambient temperature of 50°C	375 A	828 A
19	Lay Ratios		
	a) First Layer	14	14
	i) Maximum	12	12
	ii) Minimum		
	b) Second Layer		13
	i) Maximum	NA	11
	ii) Minimum		
	c) Third Layer		13
i) Maximum	NA	11	
ii) Minimum			
d) Fourth Layer			
i) Maximum	NA	NA	
ii) Minimum			
20	Minimum tensile strength of the finished strand with joint if any made in base rod or semi finished wire a) Aluminium Alloy	Min. 90% of wire before stranding	Min. 90% of wire before stranding
21	Conductor Screen		
	Material	Extruded semi-conducting layer (As per Cl. 4.8)	
	Nominal thickness (mm)	0.3	0.3

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S.No	Description	AL59 DOG	AL59 GOAT
22	Insulation inner layer	(As per Cl. 4.9)	
	Material	TR-XLPE	TR-XLPE
	Nominal thickness (mm)	1.2	2.43
23	Insulation outer layer	(As per Cl. 4.10)	
	Material	UV stabilized, weather resistant and tracking resistant Black XLPE with UV RESISTANT, NON TRACKING & EROSION RESISTANT (EN 50397-1)	
	Nominal thickness (mm)	1.1	1.2
24	Approx. overall diameter (mm)	As per Manufacturer	
25	Approx. weight (kg/km)	As per Manufacturer	
26	Max. continuous operating conductor temperature (°C)	95	95
27	Embossing on Insulation outer layer	As per Clause 4.10.6	
28	Standard packing length	1000 ± 5%	1000 ± 5%

ANNEXURE-B MAKE LIST

S.No.	Raw Materials		Name of the Manufacturers
1.	TR-XLPE/XLPE Compound	1	Dow Chemicals , U.S.A.
		2	Borealis , Sweden

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		3	Hanwha , South Korea
2.	Semi-Conducting Compound	1	Dow Chemicals, U.S.A.
		2	Borealis , Sweden
		3	Hanwha , South Korea
3.	Aluminium Rod	1	Bharat Aluminium Co. Ltd. (BALCO)
		2	Hindustan Aluminium Co. Ltd. (HINDALCO)
		3	National Aluminium Co. Ltd. (NALCO)
		4	Vedanta (Sesa Sterlite)