

Document Title	Specification for 33 kV AB switch (400 A)	
Document No.	ENG-ELC-012	Issue Date: 01-05-2022
Revision No.	00	Page 1 of 16
Prepared by: Ranjan Kumar Sahoo	Reviewed By: Priya Kumar Sharma	Issued By: Mahendra Kumar Pandey

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1. SCOPE

This specification covers design, manufacturing, testing at manufacturer's works, inspection, packing & delivery of 33 KV Air Break Switch with accessories for out-door installation for use on transformer centers and tap line in Southern Odisha. Aforesaid item(s) shall include loading and unloading at anywhere in Odisha.

It is not the intent to specify completely herein all the details of design and construction of Air Break Switches. However, AB Switches will conform in all respects to high standards of engineering design and workmanship and shall be capable of performing in continuous Commercial operation up to the supplier's guarantee, in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specifications and shall have the power to reject any material, which in his judgment i.e. not in accordance with the specifications/drawings.

The A. B. Switches offered shall be complete with all components necessary for its effective and trouble-free operation along with associated equipment etc. such components shall be deemed to be within the scope of supplier's supply, irrespective of whether those are specifically brought out in the specification and/or in order or not. Also similar parts particularly removable ones shall be inter-changeable.

2. APPLICABLE STANDARDS

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, International Standards and shall conform to the regulations of the local authorities:

Ref. IS	Description
IS 9920 (part-I to V)	Specification for helically formed fittings for Overhead lines up to 33 kV
IS 2633 (Part 1)	Method for testing uniformity of coating on zinc coated
IS 2544	Porcelain post insulators for systems with nominal voltage greater than 1000 Volts [ETD 6: Electrical Insulators and Accessories]
IEC 61109	Insulators for overhead lines - Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1 000 V - Definitions, test methods and acceptance criteria

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IS 9530	Recommended practice for silver plating
IS 5925	Recommended practice for silver plating for general engineering purposes
BS 2816	Testing of silver plating thickness
IS 1239	GI pipe('B' class or Medium class)
IS: 5561	Electrical Power Connectors

3. CLIMATIC CONDITIONS OF THE INSTALLATION

1	Maximum ambient temperature	50 deg C
2	Max. Daily average ambient temp	35 deg C
3	Min Ambient Temperature	0 deg C
4	Maximum Humidity	95%
5	Average Annual Rainfall	1500 mm
6	Average No. of rainy days per annum	120
7	Altitude above MSL not exceeding	1000m
8	Wind Pressure	300 Km/hr
9	Earthquakes of an intensity in horizontal direction	equivalent to seismic acceleration of 0.3g
10	Earthquakes of an intensity in vertical direction	equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)

TPSODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed upto 300 Kmph. The atmosphere is generally laden with mild acid, dust in suspension during the dry months, and is subjected to fog in cold months.

4. GENERAL TECHNICAL REQUIREMENTS

SL. NO.	TECHNICAL PARTICULARS	DESIRED VALUE
1	Rating of AB Switch	400 Amps AB Switch
1.a	Reference standards (latest amend.)	IS 9920, IEC 129, IEC 61109,IS 1239
2	Installation	Outdoor

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SL. NO.	TECHNICAL PARTICULARS	DESIRED VALUE
3	Suitable for Mounting	Horizontal Rotating Type
4	Type	3 Pole
5	Service Voltage	33 kV
6	Rated Voltage	36 kV
7	Rated Frequency	50 Hz
8	Current Carrying Capacity	400 Amps
9	Rated short time current	16 kA for 1sec
10	Rated peak withstand current	40 kA
11	Rated Short circuit making capacity	25 KA RMS
12	Rated Cable Charging breaking capacity	40 A RMS
13	Rated line charging breaking capacity	5.3 A RMS
14	Rated Transformer off load breaking Capacity	16 A RMS
15	One-minute power frequency with stand voltage Dry	95 KV RMS
16	One-minute power frequency withstand voltage Wet	75 KV RMS
17	Power Frequency puncture withstand voltage	1.3 times of actual dry flashover voltage
A	Visible Discharge Voltage	27 KV RMS
B	Dry flashover Voltage	95 kV
18	Power Frequency withstand voltage between pole and earth	70 KV RMS
19	Power frequency withstand voltage across the isolation distance	80 KV RMS
20	Impulse with stand voltage for positive and negative polarity (1.2 / 50) micro second wave)	
A	Across Isolating distance	195 KV Peak
B	To earth and between poles	170 KV Peak
21	No. of Post Per Phase (Polymeric, IEC 61109)	02
22	Total No. of post	06
23	Minimum Creepage Distance	900 mm (one post)
24	Phase to Phase Clearance	1200 mm
25	Isolation Distance in switch open condition	640 mm
26	Vertical clearance from Top of Insulator cap to mounting channel	508 mm (Minimum)
27	Copper contacts Temp in Air should not exceed	65 Degree
28	Size of fixed contacts (Copper Type Electrolytic with silver plated)	80mmx50mmx8mm Jaw assemblies are to be bolted through stainless steel flat and spring washer (Min 6 nos. of phosphor bronze high pressure spring to be used on each post).

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SL. NO.	TECHNICAL PARTICULARS	DESIRED VALUE
29	Size of Moving contacts (Copper Type Electrolytic with silver plated)	250mmx50mmx8mm (a Min deposit of 10 micron of Silver on copper contact)
30	Moving Contact supporting Angle	50mmx50mmx6mm
31	Size of rods used for arcing horns	10 mm
32	Insulation for tinned Copper braid/rope	Polyolefin, (RSFR-H) type
33	Copper Flexible BRAIDED Tape - 420 mm Long, Tined plated with Brass Nut, bolt & Washers both end shall be crimped with copper socket through brass bolts and nuts	450gm /Mtr
34	Minimum size*Length of Coupling Hot Dip GI Solid Pipe for Phase coupling pipe, B Class (IS 1239)(Nominal Bore)	25mm Dia & 2500mm long
35	Operating Down Pipe, B Class (IS 1239)(Nominal Bore)	32mm Dia & 7 Mtr Long (one piece)
36	Temperature Rise Limit (w.r.t ambient temp) - Tinned Copper contacts - Terminals - Metal Parts	50°C 40°C 40°C
37	Arching Horns	10 mm dia GI rod
38	Locking Arrangement	Provision for pad locking at both 'ON' & 'OFF' position
39	Earth Terminal	M12 Bolts with nuts and flat washer shall be provided at base channel as earthing Terminal.
40	'T' Connection	The T connection provided on the channel having 'moving contact' shall be G.I Nut & bolt at the bottom end to facilitate replacement of this unit only during requirements & avoid entire change of arm.
41	'I' bolt	The I bolt shall be longer with 75 mm thread.
42	Supporting Channel	100x50x6 mm hot dip galvanized channel (C/C slotted 18x36 hole 250 mm) Min. 760 mm length
43	Connectors/sockets	Connectors shall be of hard drawn electrolytic copper or brass. The connector should be of 4 bolted type and suitable for 100 sqmm AAAC conductor. SOCKET: Two no. of bimetallic copper sockets shall be used at both ends suitable for 100 sqmm AAAC conductor.
44	Terminal Connectors/ Pads	The size of fixed connector shall be (80 x 50 x 8) and size of movable connector shall be (80 x50)x (80 x 50) x 8 mm of HDE copper with uniform machine finishing duly silver plated with 2 no. of 14 mm dia holes provided with suitable brass bolts

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SL. NO.	TECHNICAL PARTICULARS	DESIRED VALUE
45	Bearing	4 nos. self-lubricating bearing to be provided with grease nipple including 4 th bearing being a thrust bearing.
46	Marking/Engraving	TPSODL, Serial No., Manufacture's name or trademark, Month & Year of Manufacturing.

5. GENERAL CONSTRUCTIONS/REQUIREMENTS

- The Air break switch shall be outdoor type, rotating type gang operated and shall be suitable for horizontal installation having 2 no. of polymeric post insulators per phase.
- The Rotating type operating mechanism shall be suitable for manual operation from ground level and shall be designed in such way that all the three phases shall open and close simultaneously in smooth way.
- The air break switch shall be with the arcing horns, 10mm for 33 kV 400 A AB switch of GI rod.
- The current carrying connectors should be two-bolt type having nuts and bolts, with spring washer and plane washer.
- Each joint shall be provided with one plane and one spring of not less than 2mm thickness.
- Connectors shall be of H D electrolytic copper.
- Tinned Copper braid/rope shall be insulated by Polyolefin (RSFR-H) type to prevent animal electrocution. It shall be 420 mm long minimum and shall weigh 450 G/M. It shall be punched at both ends.
- All ferrous parts shall be hot dip galvanized with heavy coating after proper surface treatment as per standards. Coating thickness shall not be less than 86micron at any point.
- All Copper parts shall be silver plated as per relevant standards and coating thickness not less than 10 microns at any point.
- Equipment grounding shall be provided by bidder at two points with terminals. .
- All the nut bolt used must be Hot dip Galvanized and of size not less than M10 until and unless specified.
- A rigid base of galvanized steel channel of size approx.100x50x6 mm Length 760 mm min. (C/C slotted hole 18x 36 mm- 250mm shall be provided with clamps and bolts for Horizontal mounting firmly on steel structure.
- Each member of the switch shall be free from Rust, sharp edges, burr and any kind of deformation.
- The phase coupling rod, operation rod with intermediate guide braided with flexible electrolytic copper, tail piece of required current carrying capacity and operation mechanism with 'ON' & 'OFF' positions shall be provided.
- The operation rod shall be medium gage of 32mm diameter nominal bore G.I. pipe single length 7 meters. The phase coupling rod for gang operation shall be of medium gauge 25mm dia &2500 mm length nominal bore G.I. pipe.
- Spacing: The Minimum clearance between phase to switch shall be 1200 mm. The operating down rod shall be at a transverse distance of 300 mm from the outer limb of the switch. The center spacing between two post insulators of the same phase shall be 560 mm. in open position of the AB switches the moving blade shall rotate through an angle of 90 degree. This shall be exhibited in the drawing.

6. MARKING

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Below parameters should be embossed on SS sheet of thickness 1mm with black background.

It should be riveted on MS channel of AB switch:

1. Rated Voltage
2. Manufacturer's Name
3. Month/Year of Manufacture
4. Serial Number
5. PO no.
6. Rated normal current in Amps Amps
7. Rated one second short-time current in

7. TESTS

7.1 Type Test

The A.B. switches shall be subjected to the following type tests in accordance with clause No. 6 of IS-9920 (Part-1)/2002.

- (i) Tests to prove that the temperature rise of any parts does not exceed the values specified in IS 9920 /2002.
- (ii) Tests to prove the capability of the switch to carry the rated peak withstand current and the rated short time current.
- (iii) Measurement of the resistance of the main circuit.
- (iv) Tests to prove the ability of the switch to make and break the specified currents.
- (v) Tests to verify the insulation level including withstand tests at power frequency voltages on auxiliary equipment if any. Di-electric tests include impulse withstand tests, power frequency voltage withstand tests, and power frequency voltage withstand tests.
- (vi) Tests to prove satisfactory operation and Mechanical endurance..
- (vii) Tests to prove the integrity of the external insulation under conditions of the air pollution.

Note 1: The type test certificate should not be more than 5 years old as on due date of opening of tender.

Note 2: Type test certificate of polymeric post Insulator shall be submitted and shall be issued from CPRI/ERDA or Government lab only as per IEC 61109.

7.2 Acceptance Tests

The following acceptance test should be carried out as per IS: 9920 (P4/1985) on number of samples selected from the offered lot.

- i. Visual Inspection.
- ii. Checking of Dimensions (of all parts as per the approved drawing).
- iii. Power frequency voltage withstand test. (dry)
- iv. Measurement of the resistance of the main circuit.
- v. Test to prove satisfactory operation
- vi. Galvanizing test as per IS: 2633.
- vii. Temperature rise test.

7.3 Routine Tests:

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Supplier shall provide a control plan, which will be implemented on AB switches. Routine test reports should be submitted by the manufacturer with inspection call.

The following routine tests as outlined in clause No.4 of IS: 9920 (Part4/1985) shall be carried out by the manufacturer on each unit to check certain essential requirements.

- i) Power frequency voltage dry tests.
- ii) Measurement of the resistance of the main circuit.
- iii) Test to prove satisfactory operation.
- iv) Dimension check
- v) Galvanization test

The tenderer shall clearly indicate what testing facilities are available in the works of manufacturer & whether facilities are adequate to carry out all Acceptance & Routine Tests. These facilities should be available to TPSODL's representative if deputed or carry out or witness the tests in the manufacturer works.

8. TESTS

Along with the bid, the bidder must submit Type Test Reports on Ab switches as per this technical specification, carried out within last five years from the date of opening of techno-commercial bid of the tender from CPRI/ERDA/Government/Government undertaking labs only. Otherwise the tender may be rejected.

9. PRE DISPATCH INSPECTION

The Material shall be subject to inspection by a duly authorized representative of the TPDCOL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall always grant free access to the places of manufacture to TPSODL's representatives when the work is in progress. Inspection by the TPSODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPSODL. Following documents shall be sent along with material

- a. Test reports
- b. MDCC issued by TPSODL
- c. Invoice in duplicate
- d. Packing list
- e. Drawings & catalogue
- f. Guarantee / Warrantee card
- g. Delivery Challan
- h. Other Documents (as applicable).

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10. INSPECTION AFTER RECEIPT AT STORES

The material received at TPSODL store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Project Engineering department.

11. GUARANTEE

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract whichever is later, (the time scale of 12/24 months could be enhanced subject to mutual agreements). Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.

12. PACKING

Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.

Note: One use plastic not to be used for packing of the material.

13. TENDER SAMPLE

Bidder shall submit the sample of material with the offer (in case of first supply to TPSODL).

14. QUALITY CONTROL

The bidder shall submit with the offer Quality Assurance Plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections. The bidder shall ensure that the material supplied is as per the Guaranteed Technical Particulars

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as specified in the specifications.

15. MINIMUM TESTING FACILITIES

Bidder shall have adequate in-house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

16. MANUFACTURING ACTIVITIES

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

17. SPARES, ACCESSORIES AND TOOLS

Not applicable.

18. DRAWINGS AND DOCUMENTS

Following documents shall be prepared based on TPSODL specifications and statutory requirements with complete BOM and shall be submitted with the bid:

- a. Completely filled in Technical Particulars.
- b. General description of the equipment and all components including brochures.
- c. Type test Certificates
- d. Experience List.

After the approval of the contract, four (4) copies of the drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy of all the drawing, GTP, test certificates shall be submitted after the final approval of the same to the purchaser.

Following Drawings/Documents shall be submitted after the award of the contract.

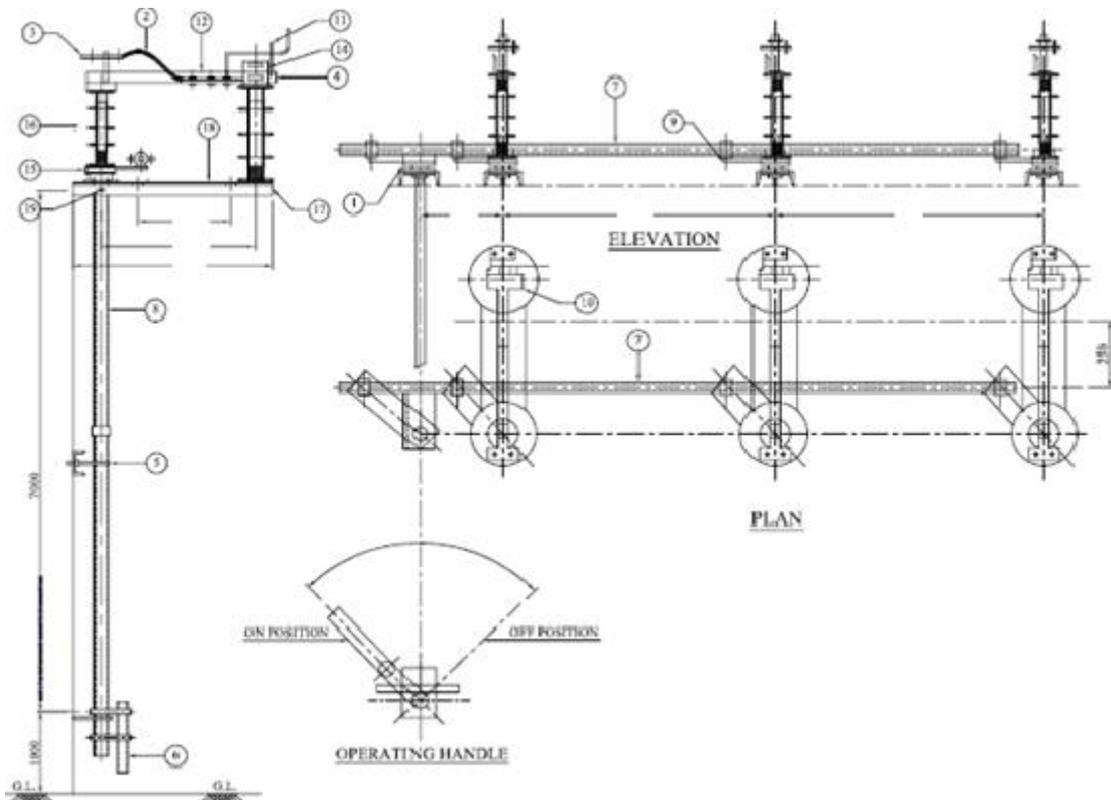
S. No	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	Manual/Catalogues/drawings for all components.		√	
3	Technical details and test certificates.		√	√
4	Installation Instructions		√	√
5	Transport/shipping dimension drawing		√	√

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S. No	Description	For Approval	For Review Information	Final Submission
6	QA & QC Plan	√	√	√
7	Routine, Acceptance and Type test Certificates	√	√	√

All the Documents and Drawings shall be in English Language.

Instruction Manuals: Bidder shall furnish two (2) soft copies (CD) and four (4) hard copies of nicely bound manual (in English Language) covering erection and maintenance instructions and all relevant information pertaining to the main equipment as well as auxiliary devices.



Indicative drawing of 33KV 400 A AB Switch

19. GUARANTEED TECHNICAL PARTICULARS

The GTP is to be furnished by the Bidder in following format.

SL. NO.	TECHNICAL PARTICULARS	OFFERED VALUE
1	Rating of AB Switch	
1.a	Reference standards (latest amend.)	
2	Installation	
3	Suitable for Mounting	
4	Type	

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SL. NO.	TECHNICAL PARTICULARS	OFFERED VALUE
5	Service Voltage	
6	Rated Voltage	
7	Rated Frequency	
8	Current Carrying Capacity	
9	Rated short time current	
10	Rated peak withstand current	
11	Rated Short circuit making capacity	
12	Rated Cable Charging breaking capacity	
13	Rated line charging breaking capacity	
14	Rated Transformer off load breaking Capacity	
15	One-minute power frequency with stand voltage Dry	
16	One-minute power frequency withstand voltage Wet	
17	Power Frequency puncture withstand voltage	
A	Visible Discharge Voltage	
B	Dry flashover Voltage	
18	Power Frequency withstand voltage between pole and earth	
19	Power frequency withstand voltage across the isolation distance	
20	Impulse with stand voltage for positive and negative polarity (1.2 / 50) micro second wave)	
A	Across Isolating distance	
B	To earth and between poles	
21	No. of Post Per Phase (Polymeric, IEC 61109)	
22	Total No. of post	
23	Minimum Creepage Distance	
24	Phase to Phase Clearance	
25	Isolation Distance in switch open condition	
26	Vertical clearance from Top of Insulator cap to mounting channel	
27	Copper contacts Temp in Air should not exceed	
28	Size of fixed contacts (Copper Type Electrolytic with silver plated)	
29	Size of Moving contacts (Copper Type Electrolytic with silver plated)	
30	Moving Contact supporting Angle	
31	Size of rods used for arcing horns	

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SL. NO.	TECHNICAL PARTICULARS	OFFERED VALUE
32	Insulation for tinned Copper braid/rope	
33	Copper Flexible BRAIDED Tape - 420 mm Long, Tined plated with Brass Nut, bolt & Washers both end shall be crimped with copper socket through brass bolts and nuts	
34	Minimum size*Length of Coupling Hot Dip GI Solid Pipe for Phase coupling pipe, B Class, IS 1239,(Nominal Bore)	
35	Operating Down Pipe, B Class (medium) (nominal bore) (IS 1239)	
36	Temperature Rise Limit (w.r.t ambient temp) - Tinned Copper contacts - Terminals - Metal Parts	
37	Arching Horns	
38	Locking Arrangement	
39	Earth Terminal	
40	'T' Connection	
41	'I' bolt	
42	Supporting Channel	
43	Connectors/sockets	
44	Terminal Connectors/ Pads	
45	Bearing	
46	Marking/Engraving	

20. SCHEDULE OF DEVIATIONS

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

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SL. No	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature

Designation