



CORRIGENDUM-II

- i) **BID IDENTIFICATION NO:** AEGCL/MD/TECH-1155/Bus Aug/Kahilipara/SOPD 2024-25/BID
- ii) **TENDER DETAILS/NAME OF WORK:** Augmentation of the existing 132 kV Bus (ACSR Zebra Conductor) by HTLS Conductor at 132/33 KV Kahilipara GSS, AEGCL
- iii) Corrigendum-I issued on 04.02.2025

With reference to the above, the following in **Volume-2 of Bid Document** is amended as below:

1. **Clause 37.2.2.1**, Detailed Survey/Check Survey, (D) ROW of Section-2 (Scope and General Technical Condition for Transmission Lines) is amended to be read as below:
D. RIGHT OF WAY (ROW)
As per bid (Not required for 132kV bus augmentation works at Kahilipara GSS).

2. **Clause 14.5.4**, Section-14 (Specification for HTLS) is amended to be read as below:
14.5.4 Core
There shall be no joint of any kind in the finished core entering into the manufacture of the strand. There shall also be no joints or splices in any length of the completed stranded core.

CEA Guidelines shall be referred.

3. **Clause 14.5.5**, Section-14 (Specification for HTLS) is amended to be read as below:
14.5.5 Tolerances
Manufacturing tolerances on the dimensions to the extent of one percent ($\pm 1\%$) shall be permitted for individual strands and the complete conductor.

CEA Guidelines shall be referred.

4. **Clause 14.9.1**, 2nd Para, Section-14 (Specification for HTLS) is amended to be read as below:
14.9.1 Type Tests
Type tests specified under clause no. 14.9.1 shall not be required to be carried out if a valid test certificate is available for the offered design, i.e., tests conducted earlier (not more than 7 years old at the time of bid opening) should have been conducted in accredited laboratory (accredited based on ISO/IEC guide 25/17025 or EN 45001 by the National Accreditation body of the country where laboratory is located) or witnessed by the representative (s) of CTU or State Transmission Utility.

5. **Clause 14.9.1, (ii, a)**, Section-14 (Specification for HTLS) is amended to be read as below:

(ii)	On Conductor Strand/core	
a)	Heat resistance test on Aluminium Alloy strands or core	: As per Annexure-A CEA Guidelines shall be referred.

6. **Clause 14.9.4, (c)**, Section-14 (Specification for HTLS) is amended to be read as below:

c)	Chemical analysis of core strands/composite core	: As per Annexure-A CEA Guidelines shall be referred.
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7. **Clause 1.34 (SCHEDULE—1 (A), Annexure-A)**, Section-14 (Specification for HTLS) is amended to be read as below:

1.34 Chemical Analysis of Aluminium/ Aluminium Alloy and Composite core/ INVAR Core Wires

Samples taken from the Aluminium /Aluminium Alloy and core coils/ strands shall be chemically/spectrographically analyzed. The same shall be in conformity to the particulars guaranteed by the bidder so as to meet the requirements stated in this Specification.

CEA Guidelines shall be referred.

8. **Clause 14.18, Sl. No. 19**, Section-14 (Specification for HTLS) is amended to be read as below:

Sl. No.	Indian Standard	Title	International Standard
19.		Standard Specification for Carbon Fiber Thermoset Polymer Matrix Composite Core (CFC) for use in Overhead Electrical Conductors	ASTM B987

9. **Clause 1.5 (SCHEDULE—1 (A), Annexure-A)**, Section-14 (Specification for HTLS) is amended to be read as below:

1.5 Stress-strain test at elevated temperature

Stress-strain test as per IEC-1089 shall be conducted keeping conductor temperature at designed maximum temperature.

CEA Guidelines shall be referred.

10. **Clause 1.6 (SCHEDULE—1 (A), Annexure-A)**, Section-14 (Specification for HTLS) is amended to be read as below:

1.6 High Temperature endurance & creep test

Two conductor samples of length equal to at least $100 \times d + 2 \times a$ (where, d is the conductor diameter and a is the distance between the end fitting and the gauge length) shall be strung at tension equal to 25 % of conductor UTS. The distance, a, shall be at least 25 % of the gauge length or 2 m whichever is the smaller. The conductor samples shall be subjected to tests as indicated below:

On one of the conductor samples, the conductor temperature shall be maintained at 20 deg C for 1000 hours. The elongation/creep strain of the conductor during this period shall be measured and recorded at end of 1 hour, 10- hour, 100 hour and subsequently every 100-hour upto 1000 hours' time period. (On other conductor sample, the conductor temperature shall be increased to design maximum temperature in steps of 20 deg. C and thermal elongation of the conductor sample shall

be measured & recorded at each step. The temperature shall be held at each step for sufficient duration for stabilization of temperature. Further, the temperature of the conductor shall be maintained at maximum continuous operating temperature (+10 Deg. C) for 1000 hours. The elongation/creep strain of the conductor during this period shall be measured and recorded at end of 1 hour, 10 hour, 100 hour and subsequently every 100-hour upto 1000 hours' time period. After completion of the above, the core of the conductor sample shall be subjected to UTS test as mentioned above at clause 1.1 of Annexure-A. The conductor core shall withstand a load equivalent to 95 % of UTS. In case of polymer composite core conductor, the flexural strength & glass transition temperature of the core shall also be evaluated and the same shall not be degraded by more than 10 % over the initial value. The supplier shall plot the thermal elongation with temperature.

The supplier shall furnish details of creep characteristic in respect of the conducted based on laboratory test and other laboratory investigations/ experimental conducted on similar type of conductor and shall indicate creep strain values corresponding to 1 month, 6 month, 1 year, 10 year & 20 year creep at everyday tension & continuous designed temperature as well as room temperature.

CEA Guidelines shall be referred.

11. **Clause 1.7 (SCHEDULE—1 (A), Annexure-A)**, Section-14 (Specification for HTLS) is amended to be read as below:

1.7 Sheaves Test

The conductor sample of minimum length of 35 meter shall be tensioned at 22 % of the UTS and shall be passed through pulleys having diameter of 32 times that of the conductor with angle of 20 deg. between the pulleys. The conductor shall be passed over the pulleys 36 times a speed of 2 m/sec. After this test UTS test on the conductor shall be carried out. The core shall be inspected for any sign of damage or cracking through dye penetration test as per ASTM D5117.

CEA Guidelines shall be referred.

12. **Clause 1.10 (SCHEDULE—1 (A), Annexure-A)**, Section-14 (Specification for HTLS) is amended to be read as below:

1.10 Torsional Ductility Test

The conductor sample of 10-15 m shall be loaded to 25% of UTS and then rotated in increasing steps of +/-180 deg. In case of composite core conductors, after 4 rotations or after separation of aluminium strands, the aluminium wires shall be cut and removed from the conductor and the exposed core shall be twisted and shall withstand upto 16 rotations.

CEA Guidelines shall be referred.

13. **Clause 1.12 (SCHEDULE—1 (A), Annexure-A)**, Section-14 (Specification for HTLS) is amended to be read as below:

1.12 Temperature Cycle Test

The purpose of this test is verification of degradation characteristics of metallic and non-metallic material when subjected to thermal cycling temperature cycling can create large internal stresses due to thermal expansion mismatch between constituents. Test Methods: -

- Mechanical tension, 20 % RBS, marks on the conductor at the edge of the conductor.
- 100 cycles from room temperature up to maximum temperature. Hold at design maximum temperature ± 2.5 deg. C for 5 minutes.
- After the above mentioned 100 cycles, the mechanical tension shall be increased up to 70 % RBS at room temperature and kept at this tension for 24 H. Thereafter release to 20 % RBS.
- This cycling test shall be repeated 5 times.
- During the test, temperature of connectors, conductor and resistance are recorded according to ANSI C 119.
- A breaking load test is applied at the end of the test. Conductor strength has to be higher than 95% RBS.

In case of polymer composites, the flexural strength should not degrade by more than 10 % and the Glass Transition temperature shall not degrade by more than 10 % after thermal cycling. Flexural strength shall be obtained on the basis of test procedure indicated at 1.32 below.

CEA Guidelines shall be referred.

- 14. Clause 1.13 (SCHEDULE—1 (A), Annexure-A), Section-14 (Specification for HTLS) is amended to be read as below:**

1.13 Heat Resistance test on Aluminium Alloy wire

Breaking load test as per clause 1.12 above shall be carried out before and after heating the sample in uniform heat furnace at following temperature for one hour. The breaking strength of the wire after heating shall not be less than the 90% of the breaking strength before heating: -

Maximum continuous operating temperature of the conductor	Test Temperature
Upto 150 deg. C	230 degC (+5/-3 degC)
More than 150 deg. C & upto 210 deg. C	280 degC (+5/-3 degC)
More than 210 deg. C & upto 230 deg. C	400 degC (+5/-3 degC)

CEA Guidelines shall be referred.

- 15. Clause 1.24 (SCHEDULE—1 (A), Annexure-A), Section-14 (Specification for HTLS) is amended to be read as below:**

1.24 Torsion and Elongation Tests on Composite Core

In case of composite core HTLS conductor, the following procedure shall be applicable: -

Elongation Test: - The elongation of the composite core sample at shall be determined using extensometer. The load along the core shall be gradually increased. The elongation achieved on reaching the tensile strength of the core shall not be less than the value guaranteed in the GTP.

Torsion Test: The purpose of the test is to determine the resilience of the composite core

to twisting and to show that after the composite core has experienced the prescribed twisting, it will not crack or have a loss in tensile strength due to the twisting. A sample length that is 170 times the diameter of the composite core being tested is mounted in the gripping fixtures. One grip shall then be fixed so that it does not twist and the other end shall be twisted a full 360 degrees and then fixed in this position for 2 minutes. Once the twist time is completed, the core is untwisted and inspected for any crazing or other damage. If no damage is observed, the composite core is then tensile tested to failure and the final load recorded. For the test to be accepted, the composite core must withstand at least 100% of its rated tensile strength. Two samples need to be completed in order to satisfy the testing requirement.

CEA Guidelines shall be referred.

- 16. Clause 1.25 (SCHEDULE—1 (A), Annexure-A), Section-14 (Specification for HTLS) is amended to be read as below:**

1.25 Breaking load test on Aluminium/ Aluminium Alloy & Composite core and D.C Resistance test on Aluminium/ Aluminium Alloy wire

The above tests shall be carried out as per IEC: 888/889 and the results shall meet the requirements of the specification.

CEA Guidelines shall be referred.

- 17. Clause 1.31 (SCHEDULE—1 (A), Annexure-A), Section-14 (Specification for HTLS) is amended to be read as below:**

1.31 Glass Transition Temperature Test (for polymer composite core only)

Test method shall be as per ASTM D7028, A Standard Test Method for Glass Transition Temperature of Polymer Matrix Composites by Dynamic Mechanical Analysis. The glass transition temperature shall be greater than the maximum continuous operating temperature of the offered Composite Carbon Core HTLS Conductor+ 35 deg C.

CEA Guidelines shall be referred.

- 18. Clause 1.33 (SCHEDULE—1 (A), Annexure-A), Section-14 (Specification for HTLS) is amended to be read as below:**

1.33 Bending Test on Composite Core:

A composite core sample shall be wrapped 180 degree around a cylindrical mandrel, and the specimen brought to 15 % of the rated tensile strength of the composite core and held for 1 min. The mandrel diameter shall be not more than 50 times the dia of composite core. After completion of the test, the core shall withstand UTStest and dye penetration test.

CEA Guidelines shall be referred.

- 19. Clause 1.10 (Section-3A, Annexure-B1), Section-14 (Specification for HTLS) is amended to be read as below:**

1.10 Heating Cycle Test

Heating cycle test shall be performed in accordance with IS 2486 (Part-I) with following modifications: -

- i. Temperature of conductor during each cycle: 40 deg. C above designed maximum operating temperature of the conductor.
- ii. Number of cycles: 100
- iii. Slip strength test shall also be carried out after heating cycle test

CEA Guidelines shall be referred.

20. Clause 2.1, b (Section-3A, Annexure-B1), Section-14 (Specification for HTLS) is amended to be read as below:

b. Heating Cycle Test

Heating cycle test shall be performed in accordance with IS 2121 (Part-II-1981) with following modifications: -

- i. Temperature of conductor during each cycle: 40 deg. C above designed maximum operating temperature of the conductor.
- ii. Number of cycles: 100
- iii. Slip strength test shall also be carried out after heating cycle test.

CEA Guidelines shall be referred.

All other terms and conditions of the bid document shall remain same.

Sd/-
Chief General Manager (PP&D)
Assam Electricity Grid Corporation Limited

Memo No: AEGCL/MD/TECH-1155/Bus Aug/Kahilipara/SOPD 2024-25/18(a) Date: 11.02.2025

Copy to:

1. IT Cell, O/o the MD, AEGCL, for publication of the corrigendum in AEGCL's Website

Sd/-
Chief General Manager (PP&D)
Assam Electricity Grid Corporation Limited