

MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.

TECHNICAL SPECIFICATION

FOR

H.T./L.T. WEDGE TYPE LINE CONNECTORS

FOR

DISTRIBUTION NETWORK IN MAHARASHTRA

MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.

TECHNICAL SPECIFICATION FOR H.T./L.T WEDGE TYPE LINE CONNECTORS

Tech Spec NO.CE/Testing/MSC-1/HTLT WEDGE TYPE CONNECTORS/2021

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TECHNICAL SPECIFICATION FOR H.T./L.T. WEDGE TYPE LINE CONNECTORS

(Tech Spec NO.MSC-1/HTLT WEDGE TYPE CONNECTORS/2021)

1.0 SCOPE:

The specification covers design, manufacture, shop testing, packing, supply and delivery of HT & LT Wedge Type overhead line connectors for Jumpers, cut-points, T-connections as equipment connectors to the equipment like Isolators, Circuit Breakers, CT's & PT's & Busbar and Service Connection etc..

2.0 SERVICE CONDITIONS:

Device/Equipments to be supplied against this specification shall be suitable for Satisfactory continuous operation under the following tropical conditions.

| | | |
|------|--|-----------|
| 2.1 | Maximum ambient temperature (deg C) | 50 |
| 2.2 | Maximum temperature in shade (deg C) | 45 |
| 2.3 | Minimum temperature in air (deg C) in shade | 3.5 |
| 2.4 | Relative Humidity (%) | 10 to 100 |
| 2.5 | Maximum annual Rainfall (mm) | 1450 |
| 2.6 | Maximum Wind Pressure (kg/Sqmm) | 150 |
| 2.7 | Maximum altitude above mean sea level (Meters) | 1000 |
| 2.8 | Isoceraunic level (days/year) | 50 |
| 2.9 | Seismic level (Horizontal acceleration) | 0.3g |
| 2.10 | Ground temperature (deg. C) | 30 |
| 2.11 | Thermal Resistivity of soil (deg. C cm / watt) | 150 |
| 2.12 | Moderately hot and humid tropical climate, conducive to rust and fungus growth | |

3. APPLICABLE STANDARDS:

Unless otherwise specified elsewhere in this specification, the rating as well as performance and testing of the HT & LT overhead line connectors shall conform to the latest revisions available at the time of placement of order of all the relevant standards as listed below:-

- 1) I.S.5561/1970-1996 (reaffirmed 2002)
- 2) ANSI C 119.4-2004
- 3) IS 6009 (1970 updated) (Reaffirmed Year : 2016)
- 4) ASTM-D-117 updated

4. GENERAL TECHNICAL REQUIREMENTS FOR LT / HT WEDGE CONNECTORS (UNIVERSAL DISTRIBUTION CONNECTORS TYPE) :-

4.1 WEDGE CONNECTORS :

The connector shall conform to Indian Standard IS 5561 for all type tests & electrically to extra heavy duty, class AA and mechanically to class 3 as per ANSI C 119.4-2004.

4.2 It consists of a spring ' C ' member and a Wedge, both made from a special aluminum alloy of high ductility and electrical conductivity. The ' C ' member and a Wedge shall be coated with a conductive inhibitor containing abrasive particles to help in cleaning the contact surface during installation. This coating shall be done at factory itself.

4.3 The connector shall be useful for the conductor size of diameter more than 10mm such as ANT, GNAT, WEASEL, RACOON, DOG, PANTHER and above. For LT wedge connector locking parallel jaw plier is to be used, for H.T wedge connector special tool is to be used for proper & ensured locking.

4.4 During the assembly, the wedge shall be inserted at a speed of about 35-40 m/s using the specified tool. This is also needed to eliminate operator dependency. High- speed insertion with the specified inhibitor shall be very effective in abrading all sliding surfaces and in disrupting surface oxide film to generate large

number of contact spot in the electrical surfaces provided. During disassembly of connector, the same specified tool shall be used. Upon disassembly, the conductor & connector shall be reused at least once.

- 4.5 At the end of Wedge Notch type locking facility shall be provided. This will ensure once the wedge is fixed it will not loosen and come back.
- 4.6 When connected, this tap shall provide a reliable electrical and mechanical connection for solid, stranded or compressed conductor combinations including AAC, AAAC and ACSR. These shall maintain constant force within the connection for the life of connector while compensating for thermal expansion or Creep.
- 4.7 The connectors shall have maximum contact surface with conductor and extremely low & stable contact resistance. This shall be with proven track record for Connector Performance.

5.00 CONNECTOR COMPONENTS

5.1 "C" MEMBER:

The C member shall be formed from extruded Aluminium alloy so that the grain (extrusion direction) runs perpendicular to the conductor (e.g. from C-groove end to C-groove end).

The material used shall be specially designed with tighter tolerances on the chemical composition to ensure consistency of the C-member production regarding dimensions and mechanical properties.

5.2 WEDGE:

The dimensions for wedges shall be manufactured to close tolerances to ensure repeatability and reliability of the connection.

5.3 INHIBITOR:

An oxidation inhibitor shall be applied to the surface there by elimination of oxidation of metallic surface. The chemical composition of the inhibitor shall be synthetic and compatible with the rubber gloves used by the utilities. This inhibitor shall contain special Aluminium abrasive particles, optimized in size and quantity, to ensure repeatability and reliability of the electrical contact made in every connection

5.4 INSTALLATION TOOL

The special tool is to be used for wedge Connectors installations, due to which operator dependency & human errors in connector installations shall be eliminated. This tool shall ensure speed of wedge insertion at approx.. 35-40 m/s which is important requirement for connector performance.

6.0 FREEDOM FROM DEFECTS

- 6.1** The wedge type connectors shall be smooth and free from cavities, blowholes, and such other defects, which would likely cause them to be unsatisfactory in service.
- 6.2** The wedge type connectors shall be so designed and proportioned that they are capable of safely withstanding stresses to which they may be subjected (including those due to short circuit and climatic conditions) and that the effects of vibration both on conductor and connector are minimized. They shall be designed, manufactured, and finished so as to avoid sharp radius of curvature, ridges and excrescences, which might lead to, localized pressure on or damage to the conductor in service.

7.0 TESTS

7.1 Type Tests

The following Type Tests shall be carried out as specified in respective standard as per IS 5561-1970 reaffirmed 2002, IS 6009 (1970) reaffirmed 2016, ASTM-D-117 (Annexure-A) updated & ANSI C -119.4 wherever necessary

- 1) Tensile Test.
- 2) Resistance Test
- 3) Temperature Rise Test.
- 4) Short Time Current Test.
 - For Raccoon and Dog conductors: 25 kA for 3 secs
 - For higher sizes: as per electrical fault system requirements
- 5) Current Cycle Test (ANSI-C 119.4 updated) as per the connector class
- 6) Corrosion Test / Salt spray test (IS-6009 (1970 updated) (Reaffirmed Year : 2016) / ASTM-D-117 (Annexure-A updated)

7.2 Testing Certificates

The tenderer shall furnish detailed type test reports of the offered Wedge Type Connector for the tests as per this specification. All above Type Tests shall be carried out as per the relevant standards at laboratories accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) such as CPRI/ERDA in accordance with relevant standard as amended up to date and this technical specifications, within the last 5 (five) years prior to the date of offer. These type tests should have been carried out as per respective standards of IS 5561/1970-1996 reaffirmed 2002, IS 6009 (1970 updated) (Reaffirmed Year: 2016), ASTM-D-117 (updated) & ANSI C 119.4-2004. Testing for family of connectors shall be as per standard, if applicable.

7.3 Acceptance Tests

- a) Tensile Test
- b) Resistance Test
- c) Dimensional check

The acceptance tests are to be carried out in presence of MSEDCL representative. The supplier shall, therefore, give sufficient advance notice to MSEDCL for arranging witnessing of the tests.

7.4 Routine Tests

- a) Visual inspection.
- b) Dimensional Checks.

7.5 Testing Equipment's /Facilities

The supplier / tenderer shall clearly state as to what testing facilities are available in the works of manufacturer and whether the facilities are adequate to carry out type, routine and acceptance tests as per specification. The bidder shall provide the facilities to purchaser's representative for witnessing the tests in the manufacturer's works. If any test cannot be carried out at manufacturer's works reason should be clearly stated in the tender.

8.0 DRAWING

The bidders shall supply the material as per following enclosed drawings:-

- i) Drawing No: CE/T/MSC/LTW/01
- ii) Drawing No: CE/T/MSC/HTWCR/02
- iii) Drawing No: CE/T/MSC/HTWCD/03
- iv) Drawing No: CE/T/MSC/HTWCP/04

9.0 GUARANTEED TECHNICAL PARTICULARS (GTP)

GTP of HV/LV Wedge Connectors shall be as per Specification. Any deviation w.r.to this specifications shall be clearly mentioned

10.0 MARKING

Each C-member and wedge shall be marked with distinct identification code. This identification code is also marked on the packaging to ensure that the correct parts are used for the application. Thereby installer can make a quick visual check before installing.

11.0 PACKING

For packing, suitable materials shall be used. The packing shall be fit to withstand rough handling during transit and storage at destination. The heads and threaded portion of fasteners fitting if any should be properly protected against damage. The gross weight of the packing shall not be exceeded 50 kg per box or case. All different fitting components shall be packed in different cases and shall be completed with minor accessories fitted in places. The tenderer should be approved the packing list before dispatching the material.

12.00 SCHEDULES:

12.1 The tenderer shall fill in the following schedules, which are part & parcel of the tender specification and offer. If the schedules A1,A2 and B are not submitted duly filled in with the offer, the offer shall be liable for rejection.

Schedule `A-1` - Guranteed Technical Particulars HT wedge connector

Schedule `A-2` - Guranteed Technical Particulars HT wedge connector

Schedule `B` - Tenderer's Experience.

12.2 The tenderer shall submit the list of orders for similar type of equipment, executed or under execution during the last three years, with full details in the schedule of Tenderer's experience (Schedule 'B') to enable the purchaser to evaluate the tender.

13.00 PERFORMANCE OF WEDGE CONNECTORS/MANUFACTURER

13.1 Bidder shall submit performance certificates / Purchase orders to prove satisfactory performance of connectors for minimum 5 years or before.

- 13.2 Approximately more than 1Lac connectors should have been distributed throughout Indian electrical utilities.
- 14.00 The material supplied shall be guaranteed for 5 years from the date of installation of the connectors or 5 ½ years from the date of supply to the stores / date of receipt of material to the consignee.

SCHEDULE - B

SCHEDULE OF TENDERER'S EXPERIENCE

Tenderer shall furnish here a list of similar orders executed/under execution by him to whom a reference may be made by purchaser in case he considers such a reference necessary.

| Sr. No. | Name of client and description | Value of order | Period of supply and commissioning | Name and address to whom reference may be made |
|---------|--------------------------------|----------------|------------------------------------|--|
| 1 | 2 | 3 | 4 | 5 |

NAME OF FIRM

NAME & SIGNATURE OF TENDERER

DESIGNATION

DATE

Schedule – A1

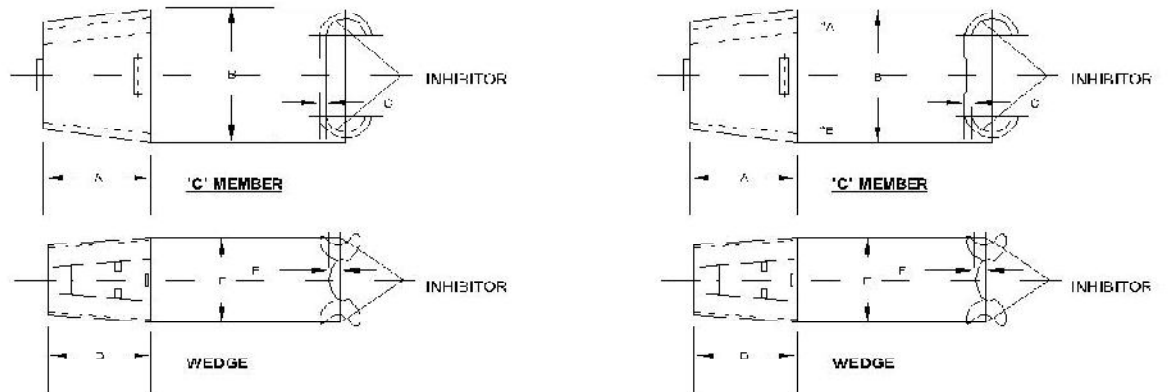
Guaranteed Technical Particular (GTP) for HT Wedge Connector

| S N | Particulars | MSEDCL Requirement | Bidder Offer. |
|-----|---|--|---------------|
| 1 | Manufacturer' Name & Address | | |
| 2 | Brand Name & Country of Origin | | |
| 3 | Wedge connector with tool | As per Specification | |
| 4 | Standard Applicable | IS:556, IS 6009 (1970 updated), ASTM-D-117 (updated) &ANSI C 119.4 | |
| 5 | Material of Wedge Connector a)'C' Member b)Wedge Member c) Inhibitor | Tin plated Aluminium alloy for both "C" member & wedge | |
| 6 | Connector suitable for | Racoon/Dog/Panther | |
| 7a | Tooling for connector installation | As per spec clause no. 5.4 | |
| 7b | Speed of wedge during installation in (m/s) | 35 to 40 | |
| 8 | Notch at the end of wedge after installation (wedge locking provision) | yes | |
| 09 | Type test reports | 1) As per IS-5561 2)ANSI C 119.4 3) IS 6009 (1970 updated) 4) ASTM-D-117 (updated) | |
| 10 | Dimensions | As per Drawing | |

Schedule –A2

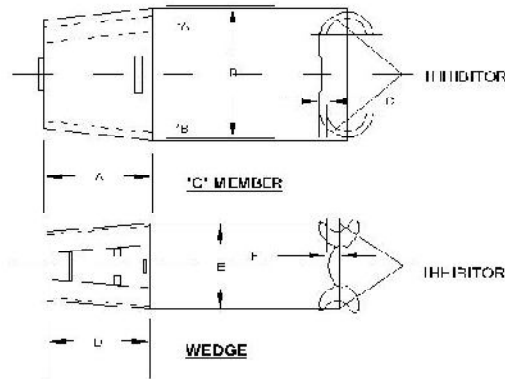
Guaranteed Technical Particular(GTP) for LT Wedge Connector

| Sr. No. | Particulars | MSEDCL Requirement | Bidder Offer. |
|---------|---|--|---------------|
| 1 | Manufacturer' Name& Address | | |
| 2 | Brand Name &Country of Origin | | |
| 3 | Wedge connector with tool | As per Specification | |
| 4 | Standard Applicable | IS:556, IS 6009 (1970 updated), ASTM-D-117 (updated) &ANSI C 119.4 | |
| 5 | Material of Wedge Connector a) C Member b) Wedge Member c) Inhibitor | Tin plated Aluminium alloy for both "C" member & wedge | |
| 6 | Connector suitable for | Ant, Weasel, Gnat | |
| 7 | Tooling for connector installation | Parellel Jaw plier | |
| 8 | Notch at the end of wedge after installation (wedge locking provision) | yes | |
| 09 | Type test reports | 1) As per IS-5561 2)ANSI C 119.4 3) IS 6009 (1970 updated) 4) ASTM-D-117 (updated) | |
| 10 | Dimensions ² | As per Drawing | |



For GNAT to GNAT Connection

For ANT to ANT Connection



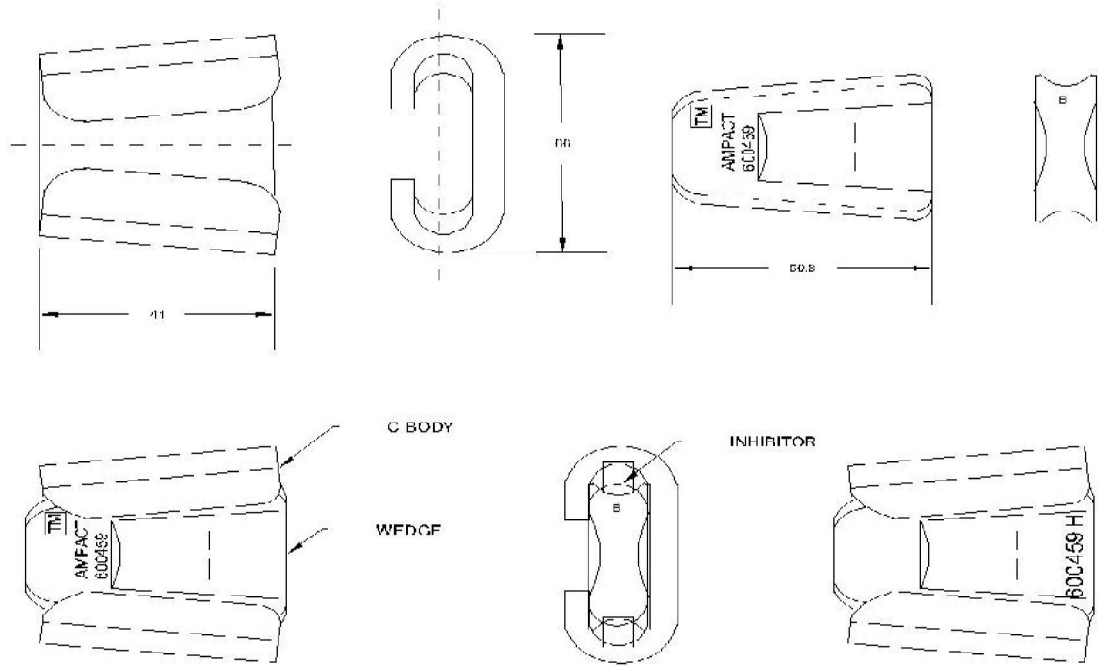
For WEASEL to WEASEL Connection

| Type of the Conductor Joints | A | B | C (Thickness of C-Member) (Tol. ±0.1) | D | E | F (Thickness of wedge) (Tol. ±0.1) |
|------------------------------|------|------|---------------------------------------|------|------|------------------------------------|
| GNAT TO GNAT | 31.7 | 34.4 | 2.1 | 31.7 | 20.2 | 1.0 |
| ANT TO ANT | 31.7 | 40.2 | 2.1 | 31.7 | 20.2 | 1.0 |
| WEASEL TO WEASEL | 31.7 | 40.2 | 2.1 | 31.7 | 20.2 | 1.0 |

- NOTE: 1) ALL DIMENSIONS ARE IN MM.
 2) DRAWING IS NOT TO BE SCALE.
 3) MATERIAL SHALL BE ALUMINIUM ALLOY

| | |
|-------------------------|---------------------------|
| NAME OF THE DRAWING. | LT WEDGE TYPE CONNECTORS. |
| MSEDCL | |
| TESTING SECTION | |
| DRG NO: CE/T/MSC/LTW/01 | |

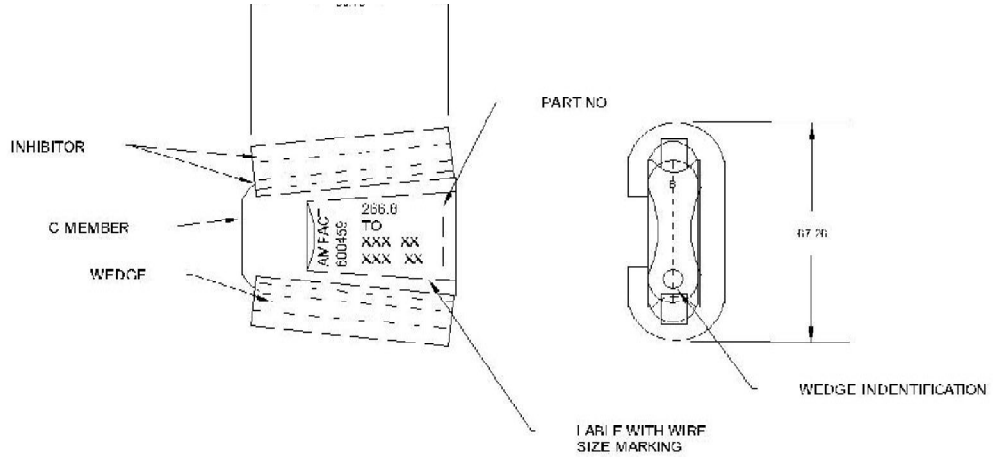
TECHNICAL SPEC OF ...HT / LT WEDGE TYPE LINE CONNECTORS



- NOTE:** 1) ALL DIMENSIONS ARE IN MM.
 2) DRAWING IS NOT TO BE SCALE.
 3) MATERIAL SHALL BE ALUMINIUM ALLOY

| | |
|----------------------------------|---|
| NAME OF THE DRAWING. | AMPACT TYPE HT CONNECTOR FOR RACON CONDUCTOR |
| MSEDCL | |
| TESTING SECTION | |
| DRG NO: CE/T/MSD/HTWCR/02 | |

TECHNICAL SPEC OF ...HT / LT WEDGE TYPE LINE CONNECTORS



- NOTE:** 1) ALL DIMENSIONS ARE IN MM.
2) DRAWING IS NOT TO BE SCALE.
3) MATERIAL SHALL BE ALUMINIUM ALLOY

| | |
|----------------------------------|---|
| NAME OF THE DRAWING. | AMPACT TYPE HT CONNECTORS FOR DOG CONDUCTOR. |
| MSEDCL | |
| TESTING SECTION | |
| DRG NO: CE/T/MSC/HTWCD/03 | |

