

**MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO.LTD.**

**MUMBAI**

**SCHEDULE 'A'**

**TECHNICAL SPECIFICATION**

**FOR**

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

**FOR**

**DISTRIBUTION NETWORK IN MAHARASHTRA**

**(SPECIFICATION NO.MM/1/HTLT WEDGE TYPE CONNECTORS/2007)**

**( Dt. 13-02-2007).**

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**I N D E X**

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**SCHEDULE ' A '**  
**TECHNICAL SPECIFICATION FOR**  
**H.T./L.T. WEDGE TYPE LINE CONNECTORS**

**(SPECIFICATION NO.MM/I/HTLT WEDGE TYPE CONNECTORS/2007)**

1. SCOPE:

The specification covers design, manufacture, shop testing, packing and delivery of HT & LT Wedge Type overhead line connectors for **Jumpers, cut-points , T-connections and service connections** by road/rail to the designated Store Centers in the State of Maharashtra..

2. SERVICE CONDITIONS:

Equipment 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)	0.3 g.
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. 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) ANSI C 119.4
- 2) I.S.5561/1970.

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

#### 4.1 WEDGE CONNECTORS :

The connector shall conform to ANSI C 119.4. It consists of a spring ' C ' member and a Wedge, both made from a special tin plated copper alloy in a configuration that creates spring action. The ' C ' member and a Wedge shall be factory coated with a conductive inhibitor containing abrasive particles to help in cleaning the contact surface during installation.

The connector shall be useful for the conductor size of ANT, GNAT, WEASEL and service connection cables of sizes 2.5 , 4.0 and 10 sq.mm.

The connector shall be of Universal Distribution Connector (UDC) type. They shall connect conductors of Aluminium, Copper, Steel and their alloys regardless of the combination ( i.e. Al to Al , Al to Cu , Cu to Cu ). These connectors shall provide a non-corrosive action that is protected against temperature variation and overloading. Also, connector shall provide a reliable electrical as well as mechanical connection for solid, Stranded or compressed conductor combinations including AAC, AAAC and ACSR. A good connection shall be easily verified by visual inspection.

All the connectors shall be removed without damaging the conductor and the conductor as well as connector can be used again.

#### 4.2 " C " MEMBER:

The C member shall be formed from a special Copper alloy so that the grain (extrusion direction) runs perpendicular to the conductor (e.g. from C-groove end to C-groove end). This orientation of grain direction provides for lower rates of stress relaxation in the metal and will maintain the level of contact pressure at or near the value at initial installation for the life of connection. Susceptibility to stress corrosion cracking will also improve.

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

#### 4.3 WEDGE:

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

#### 4.4 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. GENERAL TECHNICAL REQUIREMENTS FOR HT WEDGE CONNECTORS ( AMPACT TYPE ):-**

#### 5.1 WEDGE CONNECTORS

The connector shall conform to ANSI C 119.4. It consist of a spring ' C ' member and a Wedge, both made from a special Aluminium alloy of high ductility and electrical conductivity. The ' C ' member and a Wedge shall be factory coated with a conductive inhibitor containing abrasive particles to help in cleaning the contact surface during installation.

The connector shall be useful for the conductor size of diameter more than 10.05 mm such as RACCON, DOG, PANTHER AND above.

AMPACT Wedge type connectors shall use a power-activated cartridge for installation with proper conductor combinations. During the assembly, the wedge shall be inserted at a speed of about 40 m/s (130 ft/s) using the specified tool. 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.

When connected, this tap shall provide a reliable electrical and mechanical connection for solid, stranded or compressed conductor combinations including AAC, AAAC and ACSR.

During Dis-assembly, A system of take-off clips is designed for use with the specified tool. Upon dis-assembly, the conductor as well as connector can be reused.

## 5.2 " C " MEMBER:

The C member shall be formed from extruded aluminium so that the grain (extrusion direction) runs perpendicular to the conductor (e.g. from C-groove end to C-groove end). This orientation of grain direction provides for lower rates of stress relaxation in the metal and will maintain the level of contact pressure at or near the value at initial installation for the life of connection. Susceptibility to stress corrosion cracking will also improve.

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.

## 5.3 WEDGE:

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

## 5.4 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.

## 5.5 The connector shall be cartridge fired 'C' wedge type conforming to ANSI-C119.4 (AA): Extra Heavy Duty Class tested. The connectors shall have maximum contact surface with conductor and, extremely low and stable contact resistance and minimum power loss. These shall maintain constant force within the connection for the life of the connector/clamp while compensating for thermal expansion or creep and increased life span.

The mechanical stresses generated during the wedge insertion shall cause plastic deformation of the C-clamp and shall increase the geometrical confirmation of the clamp to the conductor.

## 5.6 TOOL :-

The tool is having 4 moving parts: the ram, the power unit, the breech cap and the gas release knob. The gas produced by the cartridge during the installation is captive inside the power unit. This allows the tool to remain self-supporting on the lines during installations until the gas release knob is turned counterclockwise. This allows the gas produced by the cartridge to be released and the tool to be removed. Tool is to be used on conductors above Rabbit only.

## 5.7 CARTRIDGE: -

Power charge repeatability (PCR) is critical to the supply of a reliable product, which can be applied safely and consistently every time. These cartridges are designed with the primer cap enclosed to ensure that it can only be used with the specified tool and to ensure that there is no accidental firing. Cartridges are to be used on conductors above Rabbit only.

## 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 itself are minimized. They shall be designed, manufactured, and finished so as to avoid sharp radius of curvature, ridges and excrescences, which might lead to, localised pressure on or damage to the conductor in service.
- 6.3 Bimetallic connectors shall be used to connect conductors of two dissimilar metals.
- 6.4 Sufficient contact pressure should be maintained at the joint by the provision of the required number of bolts or other fixing arrangements. But the contact pressure should not be so great as to cause relaxation of the joint by cold flow. The joint should be such that the pressure is maintained within this range under all conditions of service.

## 7. TESTS:

### 7.1 TYPE TESTS: -

The following Type Tests shall be carried out on three samples as per I.S. 5561/1970.

- 1) Tensile Test.
- 2) Resistance Test
- 3) Temperature Rise Test.
- 4) Short Time Current Test.

(32 kA for three seconds. Applicable for HT connectors only.)

- 5) Dimensional Check.

## 7.2 TEST CERTIFICATE:

The tenderer shall furnish detailed type test reports of the offered Wedge Type Connector for the tests as per clause 7.1 of this specification. All the above Type Tests shall be carried out as per the relevant standards at laboratories which are accredited by the National Accreditation Board of Testing and Calibration Laboratories (NABL) of Government of India to prove that the Wedge Type Connector offered meet the requirements of the specification. These type tests should have been carried out within five years prior to the date of opening of this tender. However, the tenderer who have supplied the Wedge Type Connector to this Company against order from Central Purchase Agency of M.S.E.D.C.L. shall be exempted from submission of type test reports against this tender provided.....

- (i) their offered Wedge Type Connector are already fully type tested at Laboratories accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) within five years prior to the date of opening of the tender
- (ii) there is no change in the design of type tested Wedge Type Connector and those offered against this tender
- (iii) such tenderer complying (i) and (ii) above shall furnish an undertaking in the format scheduled 'F' enclosed herewith.

The detailed type test reports alongwith the relevant certified drawings etc. or undertaking seeking exemption from their submission in the format schedule 'F', are to be submitted in sealed cover on or before 14.00 hours on the same date of the month one month after the date of tender opening (e.g. if the tender is opened on 3<sup>rd</sup> June, the submission of type test reports shall be on or before 3<sup>rd</sup> July ) or the next working day in case the same date is a holiday duly superscribed on it following details :

" Type Test Reports of Wedge Type Connector against Tender No. -----  
- opened on ----- "

The sealed covers shall be opened at 15.00 hours on the same day in presence of the tenderers who choose to be present.

The purchaser reserves the right to demand repetition of some or all the Type Tests in presence of purchaser's representative at purchaser's cost. For this purpose, the tenderer shall quote unit rates for carrying out each Type Test. However, such unit rates will not be considered for evaluation of the offer. In case the unit fails in the type tests, the complete supply shall be rejected.



The successful tenderer shall take approval / waiver of type tests from C.E.(Dist.), M.S.E.D.C.L., Prakashgad, Bandra , Mumbai prior to commencement of supply.

#### 7.3 ACCEPTANCE TESTS :

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

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

#### 7.4 ROUTINE TESTS :

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

#### 7.5 TESTING FACILITIES AND DETAILS OF EQUIPMENTS :

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: Dist./MM/63.813
- ii) Drawing No: Dist./MM/63.814
- iii) Drawing No: Dist./MM/63.815
- iv) Drawing No: Dist./MM/63.816

#### 9.0 MARKING:

- 9.1 Each C- member and wedge is 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. The installer can make a quick visual check before installing.
- 9.2 On each wedge the distinct identification code is located on the side of the largest radius groove to ensure consistent and error-free installation.

10.0 PACKING:

For packing, Wooden cases / Boxes / Double Gunny bags 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 should be properly protected against damage. The gross weight of the packing shall not normally exceed 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. All Nuts shall be hand-tightened over the bolts and screwed up to the farther point. The tenderer should be approved the packing list before dispatching the material.

11.0 SCHEDULES:

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

Schedule `C' - Schedule of Tenderer's Experience.

Schedule ' F ' - Proforma of undertaking

11.2 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 'C') to enable the purchaser to evaluate the tender.

## **SCHEDULE - C**

### 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 ' F '**

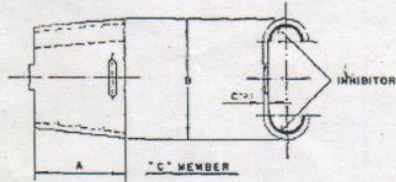
PROFORMA OF UNDERTAKING

We hereby confirm that Wedge Type Connectors offered by us against this tender are of the same design and type as have been supplied to M.S.E.D.C.L. against earlier order No. \_\_\_\_\_ dated \_\_\_\_\_ and all the type test reports thereof were approved by C.E. (Dist.) vide letter No. \_\_\_\_\_ dated \_\_\_\_\_

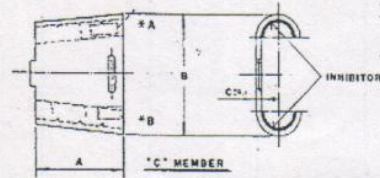
(Copy enclosed).

We further confirm that the said type tests have been carried out at the laboratories accredited by NABL within five years prior to the date of opening of the present tender.

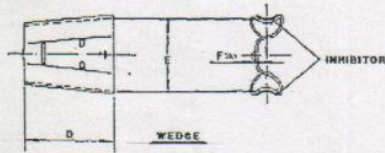
SEAL & SIGNATURE OF THE TENDERER



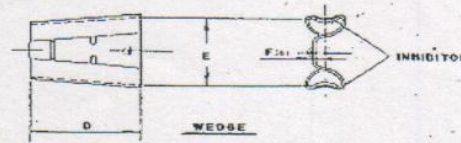
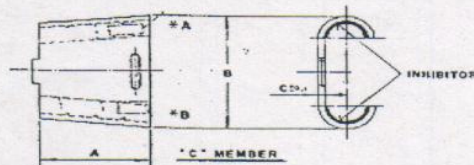
For GNAT to GNAT Connection.



For ANT to ANT Connection.



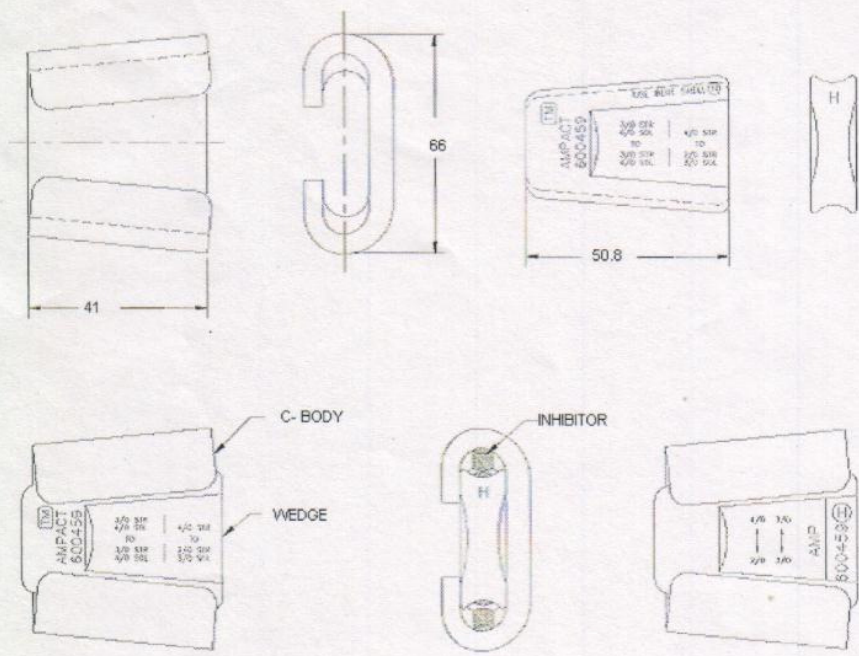
For WEASEL to WEASEL Connection.



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

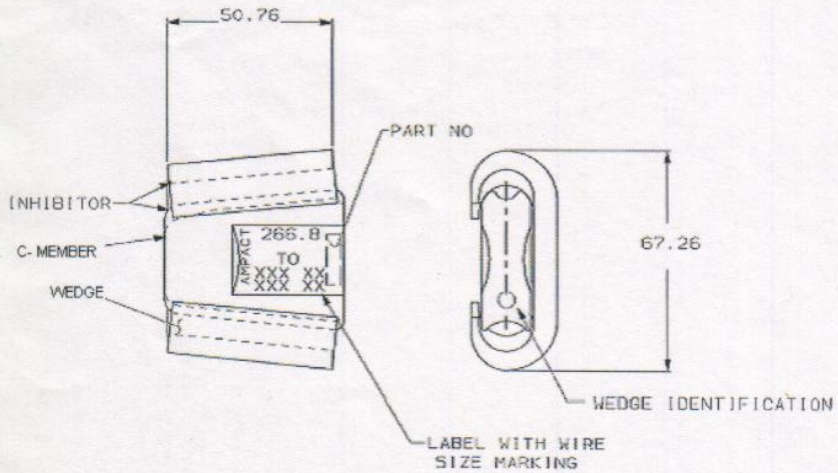
- Note:- 1) All dimensions are in mm.  
 2) Drawing is not to the scale.  
 3) Material shall be Copper Alloy.

Name of the Drawing.	LT WEDGE TYPE CONNECTORS.	
DRAWN BY J.E. (MM-1)	<i>J.E.</i> 15.2.07	M.S.E. D.C.L.
CHK. BY EE (MM-1)	<i>EE</i> 15.2.07	DISTRIBUTION SECTION
RECOMM. BY SE (MM)	<i>SE</i> 15.2.07	DRG. NO.: DIST./MM/63. 813
APPROVED BY CE (DIST.)	<i>CE</i> 15.2.07	



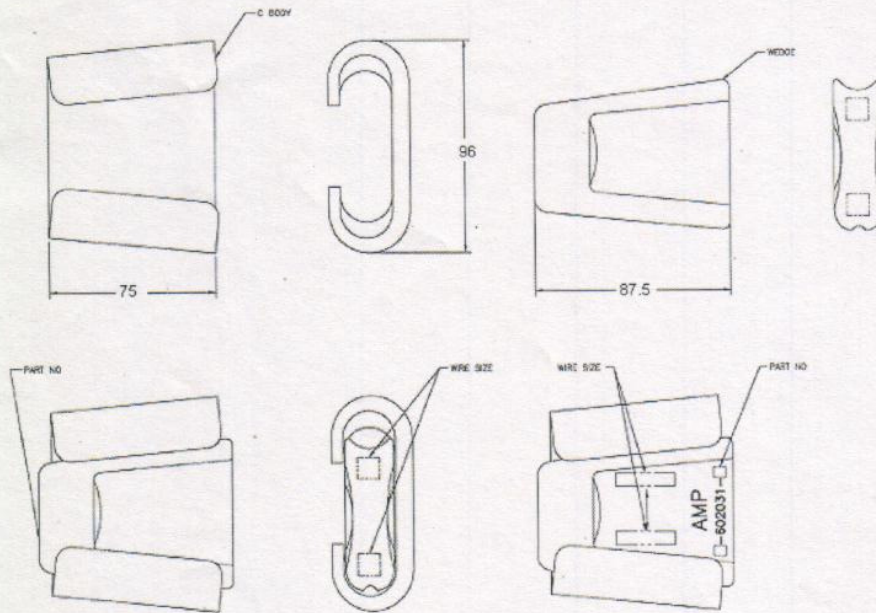
Note:- 1) All dimensions are in mm.  
 2) Drawing is not to the scale.  
 3) Material shall be Aluminium Alloy.

<b>Name of the Drawing.</b>	AMPACT TYPE HT CONNECTORS FOR RACCON CONDUCTOR	
DRAWN BY J.E. (MM-I)	<i>Amal 15/2/07</i>	M.S.E. D.C.L.
CHK. BY EE (MM-I)	<i>EE 15.2.07</i>	DISTRIBUTION SECTION
RECOMM. BY SE (MM)	<i>Per M. 15/2/07</i>	DRG. NO.:
APPROVED BY CE (DIST.)	<i>M. Patel 15/2/07</i>	DIST./MM/63. 814



- Note:-
- 1) All dimensions are in mm.
  - 2) Drawing is not to the scale.
  - 3) Material shall be Aluminium Alloy.

Name of the Drawing.	AMPACT TYPE HT CONNECTORS FOR DOG CONDUCTOR.	
DRAWN BY J.E. (MM-I)	<i>J.E.</i> 15.2.07	M.S.E. D.C.L.
CHK. BY EE (MM-I)	<i>EE</i> 15.2.07	DISTRIBUTION SECTION
RECOMM. BY SE (MM)	<i>SE</i> 15/2/07	DRG. NO.:
APPROVED BY CE (DIST.)	<i>CE</i> 15/2/07	DIST./MM/63. 815



- Note:- 1) All dimensions are in mm.  
 2) Drawing is not to the scale.  
 3) Material shall be Aluminium Alloy.

Name of the Drawing.	AMPACT TYPE HT CONNECTORS FOR PANTHER CONDUCTOR	
DRAWN BY J.E. (MM-1)	<i>J.E.</i> 15-2-07	M.S.E. D.C.L.
CHK. BY EE (MM-1)	<i>EE</i> 15-2-07	DISTRIBUTION SECTION
RECOMM. BY SE (MM)	<i>SE</i> 15/2/07	DRG. NO.:
APPROVED BY CE (DIST.)	<i>CE</i> 15/2/07	DIST./MM/63. 816