

**6.0 MARKING:**

- 6.1 The IV coupler assembly shall be marked with the following information at suitable location.

Make/rating  
Serial No.  
Month and year of manufacture  
Specification No.

**7.0 TESTS****7.1 Type test:**

- 7.1.1 Only after the detail drawings & the design of coupler and its accessories have been approved and the clearance given to this effect, the manufacturer shall take up the manufacture of the prototype. It is to be clearly understood that any changes, required to be done in the prototype or any additional tests other than specified herein are required to be conducted on the prototype unit or its components, they shall be done expeditiously. During the process of manufacture of the equipment, if the purchaser so desires, he may conduct/repeat any of the routine or additional tests to satisfy himself that the quality of the module being manufactured is of the required standards.
- 7.1.2 The test protocol indicating relevant clause of the test, condition of the test, specified value and observed value of the parameter for IV coupler shall be submitted by the firm before offering the sample for testing.
- 7.1.3 The type tests shall be carried out by RDSO representative on prototype unit either totally or in part under the following conditions without any additional cost:
- A manufacturer undertakes to manufacture for the first time as per this specification
  - An important change in the design of equipment has been introduced.
  - Specification is modified necessitating re-designing of equipment.
  - Unsatisfactory performance reported by user Railways.
  - Resumption of production after an interruption of more than two years.
- 7.1.4 RDSO may conduct surprise checks on manufacturing process and quality control along with any of the tests to ensure quality of product and its conformance to RDSO's specification.
- 7.1.5 The suitability of the IV coupler unit shall be ascertained by inspection & bench test at the firm's premises, that in stationary coach/locos and service trial of the coach/locos.
- 7.1.6 The tests shall be carried out at the works of the manufacturer or a reputed testing laboratory in presence of Indian Railway representative on the prototype unit of the IV coupler unit as per the relevant governing specifications. Manufacturer shall have all possible necessary arrangement for testing of IV coupler.

**7.2 Routine test:**

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7.2.1 Routine tests are to be carried out on each unit to verify that properties & design of the product are in the line to those measured during type test. Proper documentation of routine tests results shall be made available by the firm and will be produced before the inspecting official on demand.

### 7.3 Acceptance test:

7.3.1 Every unit of Inter Vehicle coupler shall be subjected to acceptance tests as given in clause no. 7.4 or sample picked up by inspecting official at manufacturer's works nominated by purchaser/RDSO.

7.3.2 Manufacturer, on demand by inspecting official shall produce the internal/routine test report carried out by manufacturer.

7.3.3 All the tests shall be carried out at firms premises and manufacturer's cost. Inspecting official shall witness the test on each unit. A copy of these internal tests conducted by the firm shall be supplied to the inspecting/purchasing authority. Notwithstanding above RDSO reserves the right to have these equipments also tested as per the specification and mentioned standards at any reputed house in India at firm's cost.

### 7.4 Test description

S.N.	Description of test	CI No.	Type test	Routine test	Acceptance test
1.	Dimensional and visual inspection	7.4.1	Yes	Yes	Yes
2.	Milivolt test (Voltage drop test)	7.4.2	Yes	Yes	Yes
3.	Temperature rise test	7.4.3	Yes	Yes	--
4.	Insulation resistance test	7.4.4	Yes	Yes	Yes
5.	High voltage test	7.4.5	Yes	Yes	Yes
6.	Cable pull out	7.4.6	Yes	-	---
7.	Test on spring	7 and 7.1 of IS:7906(I) &(II)	Yes	-	Yes
8.	Contact pressure test for individual fixed/mobile contacts	7.4.7	Yes	-	-
9.	Mating cycle test	7.4.8	Yes	-	-
10.	Salt fog test	7.4.9	Yes	-	-
11.	Clearance & creepage distance test	7.4.10	Yes	-	-
12.	Degree of protection test	7.4.11	Yes	-	Yes*
13.	Endurance test	7.4.12	Yes	-	-
14.	Test for withstanding shock & vibration	7.4.13	Yes	-	-

\* Tests to be done on annually basis from NABL accredited lab.

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**NOTE:**

1. Testing/measuring instruments shall be duly calibrated from any NABL recognized laboratory and shall be furnished during type test.
2. Acceptance tests to be conducted on 5% unit of the lot offered, subject to minimum 2 sets.

**7.4.1 Dimensional and visual inspection**

The coupler assembly and its components shall be inspected visually and the dimensions shall be measured and recorded as per the relevant drawings approved by RDSO. The castings shall be free from cracks, blow holes and shall have smooth finish. Firm shall also submit the detailed chemical report of the chemical analysis of the material confirming to the specification from reputed govt /NABL accredited lab.

**7.4.2 Milivolt drop test**

The Milivolt drop shall be measured across the terminals by passing the rated current when the steady state condition is achieved. The steady state condition is reached when last 3 consecutive readings are approximately constant. The Milivolt drop between two contacts should not be more than 45 Milivolt.

**7.4.3 Temperature rise test**

This test shall be conducted with all the cable connected to their respective terminals and lug inserted in socket tube and alternating current of the value shown in the table shall be passed through phase, neutral, earth & control pins for a period of three hours at an ambient temperature of 50°C. Firm shall create the facility to maintain the ambient of 50 °C. The temperature rise of the terminals shall not exceed 50°C, when measured with thermocouple or any other means (such as laser thermometer etc).

S.N	Nomenclature of contact	Test current(Amp)
1	Phase	650
2	Neutral	520
3	Earth	340
4	Control	32

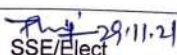
**7.4.4 Insulation Resistance (IR) test**

The insulation resistance shall be measured by 1500 V,DC megger. The insulation resistance shall be measured in the following combinations:

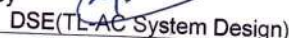
- Between all live poles connected together and earth & housing.
- Between each live pole ( inclusive of earth & neutral) and housing.
- Between live pole as R-Y, Y-B, R-B, R-E, R-N etc.

In each case, the IR shall not be less than 100 M  $\Omega$  before HV and after HV test.

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#### 7.4.5 High voltage (HV) test

High voltage test shall be conducted by applying test voltage and the combination between different poles as mentioned below in table.

S.N	Description	Test voltage	Duration
1.	Phase to phase	4.5 KV	One minute
2.	Phase to neutral	4.5 KV	One minute
3.	Phase to earth	4.5 KV	One minute
4.	Phase to control	2.5 KV	One minute
5.	Control to earth	2.5 KV	One minute
6.	Control to control	2.5 KV	One minute

The IR value recorded after the test shall not be less than 100 MΩ.

#### 7.4.6 Cable pull – out test

Cable pull out test shall be conducted as per EIA 364E-2008/IEC 60352-2 to determine the axial tensile load.

#### 7.4.7 Contact pressure test for individual fixed/mobile contacts

The contact pressure test shall be conducted on the pins by applying a force on the pins longitudinally and measuring the deflection of compression in the springs. The pressure exerted and deflection thus resulted shall not be more than the values indicated below:-

S.N	Pressure/load/weight on the pin	Maximum deflection
1.	12kg	5.0 mm
2.	18 kg	7.0 mm

#### 7.4.8 Mating cycle test

A) for Coach & Power car

In this test, 500 cycles of surface mating shall be carried out by connecting and disconnecting the plug and socket of IV coupler. After completing 500 cycles, the coupler shall be subjected to IR test, HV test, contact engagement & separation force test and Millivolt test as per relevant Para's of this specification.



B) For Locomotives

In this test, 1000 cycles of surface mating shall be carried out by connecting and disconnecting the plug and socket of IV coupler at 50°C. After completing 1000 cycles, the coupler shall be subjected to IR test, HV test, contact engagement & separation force test and Millivolt test as per relevant Para's of this specification.

#### 7.4.9 Salt fog test

The complete unit is subjected to pass 96 hours salt fog test as per ASTM 117 B/IEC 60512-11-6.

#### 7.4.10 Clearance & creepage distance test

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The Clearance & creepage distance shall be measured between various parts as mentioned in annexure – A. The creepage distance shall be as per pollution degree 4, material group II (Table XV), whereas the clearance shall be as per class A, pollution degree 4 (Table XIII) specified in IEC 60947 -1.

#### 7.4.11 Degree of protection test

Degree of protection for the complete unit shall be got tested by the firm from any NABL recognized laboratory as per IEC 60529 conforming to IP-65. The test results shall be submitted at the time of prototype testing. This test shall be conducted after vibration withstanding test and test to simulate the effect of shunting shock, specified in clauses 7.4.13 & 7.4.14.

#### 7.4.12 Endurance test

The endurance test shall be conducted on the complete unit when the plug and socket are connected together and an alternating current of 500 Amps, having sine wave form of 50 Hz, shall be applied for a period of minimum 10 hrs (for Coaches & Power Cars) and 24 hours for locomotives only at an ambient temperature of 50°C. After completion of the test, the contact tips shall be checked visually for any sign of pitted contact tip and contact resistance.

#### 7.4.13 Test for withstanding shock and vibration

Test for withstanding vibration for the complete unit shall be got tested by the firm either in-house or from any Govt. /NABL accredited laboratory as per IEC 61373 location 'O' cat. 1, class 'A' as mentioned in Annexure –C of IEC 61373. The test results shall be submitted at the time of prototype testing. The 18 shocks (three positive and three negative in each of the three orthogonal planes) shall be applied to the equipment as per clause No.10.6 of IEC 61373.

### 8.0 TECHNICAL DATA

- 8.1 The technical information as per Annexure A "Questionnaire on offer of IV Coupler" complete in all respect should be furnished before prototype test.
- 8.2 The firm shall indicate its compliance or otherwise against each clause and sub-clause of the technical specification and submit before prototype test.
- 8.3 The manufacturer shall also supply the following drawings in CAD software:
- a) Dimensional drawings of complete plug and socket assembly along with ratchet assembly.
  - b) Component drawings in line with RCF drawings enclosed with specifications along with the material and specification.
  - c) One set of the following documents will be supplied with every 50 units:-
    - i) Operating and trouble-shooting manual.
    - ii) Parts illustrated catalogue-indicating sources.

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## 9.0 Manufacturer's responsibility

The manufacturer's responsibility will extend to the following:

- 9.1 The supplier shall supply the detailed instructions for proper installation of the equipment on Rolling stock. For this purpose, the supplier shall depute his engineers/supervisors to purchaser's site during installation of the equipment.
- 9.2 The supplier shall be responsible for commissioning, testing and field trials of the equipment in service and depute team of engineers/supervisors for this purpose during developmental stage.
- 9.3 The supplier shall be responsible for carrying out improvements and modifications at his own expense on all the equipments supplied, provided such modifications/improvements are decided to be necessary for meeting the requirements of reliability, performance and safety etc., jointly by manufacturer and purchaser.
- 9.4 For the purpose of technical decisions on improvements/ modifications etc. on equipment, the final authority from the purchaser's side will be RDSO.

## 10.0 Warranty period and liability

The supplier/manufacturer shall be responsible for any damage to the products due to defective design, materials and workmanship for a period as per Indian Railway stores (IRS) condition of contract.

## 11.0 Infringement of patent right

Indian Railways shall not be responsible for infringement of patent rights arising due to similarity in design manufacturing process, use of similar components in the design & development of this item and any other factor not mentioned herein which may cause such a dispute. The entire responsibility to settle any such disputes/matters lies with the manufacturer/ supplier.

Details / design/documents given by them are not infringing any IPR and they are responsible in absolute and full measure instead of railways for any such violations. Data, specifications and other IP as generated out of interaction with railways shall not be unilaterally used without the consent of RDSO and right of Railways / RDSO on such IP is acceptable to them.

## 12.0 Schedule of Technical Requirement (STR)

- 12.1 Firm intended to manufacture and supply of IV coupler to Indian railway should have all the manufacturing & testing facilities as per RDSO's STR No. RDSO/PE/AC/STR/0033-2011(Rev-0) or latest.

## 13.0 Maintenance Manual

- 13.1 Firm will submit the general maintenance recommendations on maintenance requirement of the unit, which should contain periodicity, work content and justification

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



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for each maintenance requirement. Firm will also submit the catalogue indicating sources during prototype test.

#### 14.0 Enclosures

- a) Annexure A: Questionnaire on offer for IV coupler.
- b) Drawing of jumper plug assembly LW 71301 Alt "a"
- c) Drawing of Coupling socket assembly LW 71300 Alt "nil"
- d) Drawing of blind socket assembly LW 71302 Alt "nil"
- e) Drawing of jumper plug housing LW 71380 Alt "nil".
- f) Drawing of insulating base for jumper plug LW71304 Alt "c".
- g) Drawing of socket housing assembly LW71306 Alt "b"
- h) Drawing of hinged cover for socket assembly LW71309 Alt "a"
- i) Drawing of blind socket housing no. LW71341 Alt "b".
- j) Drawing of socket housing for locomotives RDSO/PE/SK/AC/0226-2021 (Rev-0).
- k) Drawing of hinged cover for socket assembly for locomotives RDSO/PE/SK/AC/0227-2021 (Rev-0).
- l) Drawing of complete ratchet assembly for locomotives RDSO/PE/SK/AC/0228-2021 (Rev-0).
- m) Drawing of sealing ring gasket for locomotives RDSO/PE/SK/AC/0235-2021 (Rev-0).

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**ANNEXURE – A**

**QUESTIONNAIRE ON OFFER FOR IV COUPLER FOR LHB EOG TYPE AC COACHES**

(To be furnished by the firm at the time of prototype testing)

S.No.	Description	To be furnished by the firm
1.	Manufacturer's name & Address	
2.	Model/Type	
3.	Rating <ul style="list-style-type: none"> <li>a) Voltage</li> <li>b) Current</li> <li>c) Power factor</li> </ul>	
4.	Temperature rise at rated current	
5.	Cable pull out	
6.	Material and parameters of the spring	
7.	Mating cycle	
8.	Weight <ul style="list-style-type: none"> <li>a) Plug assembly</li> <li>b) Socket assembly</li> <li>c) Blind Socket assembly</li> <li>d) Total wt.of Plug, socket &amp; blind socket with cables</li> <li>e) Socket assembly for locomotives</li> </ul>	
9.	Materials along with relevant specification & drawing <ul style="list-style-type: none"> <li>a) Plug assembly</li> <li>b) Socket assembly</li> <li>c) Ratchet assembly</li> <li>d) Blind Socket assembly</li> <li>e) Fixed contact pin</li> <li>f) socket Tube</li> <li>g) Control pin</li> <li>h) Socket assembly for locomotives</li> <li>i) Ratchet assembly for locomotives</li> </ul>	
10.	Degree of protection for complete coupler unit	

Note: All the columns shall be filled in along with the relevant documents, drawings, specifications and other details.

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**DISTRIBUTION****CHIEF ELECTRICAL LOCO/ SERVICE/ DESIGN ENGINEER:**

1	Northern Railway, Baroda House, New Delhi – 110 001.
2	Central Railway, II Floor, Parcel office, CST Mumbai –500 001.
3	Eastern Railway, Fairlie Place, Kolkata – 700 001.
4	South Eastern Railway, Garden Reach, Kolkata – 700 043
5	Southern Railway, Park Town, Chennai – 600 003.
6	Western Railway, Churchgate, Mumbai – 500 020.
7	South Central Railway, Rail Nilayam, Secunderabad – 500 371.
8	East Central Railway, DighiDistt- Vaishali, Hajipur Bihar- 844 101.
9	North Central Railway, Subedarganj, Allahabad- 211 001.
10	South Western Railway, 1 <sup>st</sup> Floor, DRM Office, Hubli 580 020
11	South East Central Railway, Bilaspur.495004
12	North East Frontier Railway, Maligaon, Guwahati – 781001
13	North Eastern Railway, Gorakhpur – 273001
14	North Western Railway, Jaipur – 302006
15	West Central Railway, Jabalpur – 482001
16	East Coast Railway, Bhuvneshwar, Orrisa – 751016
17	Konkan Railway, BelapurBhavan, Sector-11, Belapur, Mumbai –500614
18	Metro Railway, 33 /1 J.L. Nehru road, Kolkata- 700071
19	Integral coach factory, Perambur, Chennai – 600038
20	Rail Coach Factory, Kapurthala (Punjab) – 144 602
21	Rail Coach Factory, Lalgaon, Bareilly (U.P) – 144 602

**CHIEF WORKS MANAGER:**

1	Matunga Workshop, Central Railway, Mumbai 500 019.
2	Liluah Workshop, Eastern Railway, Howrah
3	C&W Workshop , Northern Railway, Alambagh, Lucknow-226 05
4	C & W Workshop,N. Rly., Jagdhari – 135 002
5	Mechanical Workshop, NER, Gorakhpur – 273 012
6	Carraige Workshop, Southern Railway, Perambur, Ayanavaram, Chennai–600023.
7	SCR, Lallagudda Workshop, Lallaguda, Secunderabad - 500017
8	Carriage Workshop, Western Railway, Lower Parel, Mumbai-500013
9	CRWS, W. C. Railway, Nishatpura, Bhopal-462010
10	Carriage Workshop, NW Rly., Ajmer - 305001
11	Carriage Repair Workshop, Gadag Road, SWR, Hubli – 580 020
12	Carriage Workshop, S.W. Railway, Mysore Vishwanath.
13	Carriage Workshop, SE Rly., Kharagpur - 721301
14	New Bongaigaon , Railway Workshop, Danttal, Distt. Bongaigaon, Assam-783380
15	Carriage and Wagon Workshop, N. C. Rly., Jhansi – 248003
16	Carriage and Wagon Workshop, WC Rly., Kota - 325002
17	Carriage and Wagon Workshop, Eeastern Rly., Liluha - 711204
18	Carriage and Wagon Workshop, W. Rly., Pratap Nagar, Vadodara - 390004
19	Carriage and Wagon Workshop, N Rly., Amritsar - 143001
20	Central Workshop, Goldenrock, S. Rly., Trichi - 620004

**OTHERS:**

1	Director, IRIEEN, Nasik Road (Maharashtra). - 422101
2	Senior Professor (Elect.), Railway Staff College, Lalbaug, Vadodara. - 390004
3	Director, IRCAMTECH, Maharajpur, Gwalior – 474 020.

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