

GOVERNMENT OF INDIA, MINISTRY OF RAILWAYS



सत्यमेव जयते

**IRS: TC: 42/2020**

SPECIFICATION FOR  
SIX PIN EMERGENCY PLUG AND SOCKET

ISSUED BY  
SIGNAL & TELECOM DIRECTORATE  
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<b>Document Title:</b> Specification for Six Pin Emergency Plug & Socket			

### I. Amendment History:

S.N.	Amendment Date	Version	Reason for Amendment
1.	1987	-	First Issue
2.	01.05.2000	Amd.1	Amendment Slip No. 1 to the specification issued.
3.	14.06.2013	Amd.2	Amendment No.2 to the specification issued.
4.	22.11.2016	Amd.3	Amendment No.3 to the specification issued.
5.	24.05.2021	1.0	Specification Revised. Revision No. 1.0 issued.
6.	12.03.2024	1.1	Correction of minor Typographical errors. Clauses are re-arranged as per the first issue. Approved by PED/S&T at Note#58 of subject e-file.

### II. Document Control Sheet

Designation	Organization	Function	Level
JRE/Tele	RDSO	Member	Assist/Prepare
ADE/Tele	RDSO	Member	Assist/Prepare, Check
Dir./Tele-II	RDSO	Member Secretary	Prepare, Review, Issue
PED/S&T	RDSO	Approving Authority	Approve

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## 0.0 FOREWORD

- 0.1 This Specification is issued under the fixed serial No. IRS: TC-42/2020. The final number indicates the year of original adoption as standard or in the event of revision, the year of last revision.
- 0.2 This specification requires reference to the following Indian Railways Standard (IRS), Indian Standard (IS) and British Standard (BS) Specifications.

IRS:S-23	Electrical Signalling and Interlocking Equipment.
IS: 319	Free Cutting Brass bars, rods and section specification
IS: 1079	Hot Rolled Carbon Steel Sheet, Plate and Strip — Specification
IS: 1300	Phenolic Moulding Materials-Specification
IS: 1366	Slotted Cheese Head Screws- Product Grade A
IS: 2016	Specification for Plain washers
IS: 9000	Basic Environmental Testing Procedures For Electronic and Electrical Items.
BS:2870 or equivalent	Copper and copper alloys. Sheet and strip for building purposes

- 0.3 Whenever a reference to any specification appears in this specification, without mentioning the year of issue. It shall be taken as reference to the latest issue of the specification.
- 0.4 The specification is intended chiefly to cover the technical provision relating to the supply of material and does not include all the necessary provisions of a contract.

## 1.0 SCOPE

- 1.1 This specification covers the requirements and provision of tests and inspection of six pin plug and sockets used for communication on 4 wire basis on emergency control circuits from the points provided for this purpose along the side of the track in A.C. electrified areas.
- 1.2 This specification covers the constructional features, electrical characteristics and technical requirements of six pin plug and socket.

## 2.0 TERMINOLOGY

- 2.1 For the purpose of the specification, terminology given in IRS: S-23 shall apply.
- 2.2 The term referred to in this specification but not covered in IRS:S-23 is defined below:-
- 2.2.1 **Lot:** A lot is constituted by the Six Pin Plug and Socket, of the same type manufactured in the same factory during the same period using the same process and materials.

## 3.0 GENERAL REQUIREMENTS

- 3.1 The transmitter, receiver and press to call switch of 4-Wire Emergency Portable Telephone shall

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be connected to the 6 Pin Plug by means of 6 way cord provided in the 4W Emergency Portable Telephone.

- 3.2 Socket shall be fixed in the socket box provided at different points along electrified track. The socket shall be connected to the trans receive and phantom of the emergency control circuit, derived from the main cable through transformer joint.
- 3.3 Since this is the only source of communication during emergency along the railway track and source of supply may not be the same, the interchangeability of the plug and socket is vital.
- 3.4 Six pin plug and socket shall be manufactured in a thoroughly workman like manner in accordance with best engineering practice.
- 3.5 Unless otherwise specified all exposed metal parts shall be plated, painted or otherwise protected against corrosion.
- 3.6 Six Pin Plug and Socket shall conform to the drawing approved by the purchaser.

#### 4.0 COMPONENTS/MATERIALS

- 4.1 Six Pin Plug and Socket shall consist of the following components:-
  - a. 6 pin plug shall consist of plug top cover, plug base and plug pin
  - b. 6 pin sockets shall consist of socket base, socket fixing clamps- contact spring, rivet and buffer pin.
- 4.2 Six numbers of plug pins shall be embodied in the plug base. The external wires shall be connected on the screw terminals of the plug base. The plug top cover shall be fixed on the plug base after connecting the external wires.
- 4.3 Contact spring, guard spring rivet and buffer pin shall be fixed on the socket base. Socket base shall be fixed in the socket fixing clamps rigidly by means of nuts and screws. The external wires shall be connected on the screw terminals of the socket.
- 4.4 Plug top cover, plug base and socket base, shall be made of phenolic moulding Grade 7, conforming to IS 1300/Poly carbonate LEXAN 143R.
- 4.5 Plug pin shall be made of brass conforming to IS-319.
- 4.6 Contact spring, guard spring, rivet and buffer pin, shall be made of phosphor bronze (EH) grade PB-102 conforming to BS: 2870 or equivalent.
- 4.7 Socket fixing clamp shall be made of AISI 301 grade of Austenitic stainless steel.
- 4.8 Screws and washers used shall be made of AISI 301 grade of Austenitic stainless steel.

#### 5.0 INSPECTION AND TESTS

##### 5.1 Visual Examination

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5.1.1 This test shall be carried out as per relevant sub-clauses of clause 14.2 of IRS-23 to the extent applicable.

## 5.2 Dimensions

5.2.1 The outline dimensions shall be checked for compliance with approved drawing.

5.2.2 The detailed dimensions of all parts of six pin plug and socket shall be checked with approved drawing.

## 5.3 Uniformity of die casting

5.3.1 Minimum of 10 samples out of each lot of 100, or a part shall be weighed. Their weights shall not differ more than  $\pm 2\%$  so as to ensure uniformity of die-casting.

## 5.4 Test for Interchangeability

5.4.1 Plug and Sockets outlets shall be tested for interchangeability and correctness of spacing of pins and socket outlets.

## 5.5 Contact Pressure

5.5.1 The contact pressure when measured with a pressure gauge applied on the contact spring front of the socket shall not be less than 500 gms.

## 5.6 High Voltage Test

5.6.1 Plugs and socket outlets shall satisfactorily withstand a voltage of 2KV RMS for one minute without breakdown when applied between

- i) All terminals looped and body
- ii) between terminals

5.6.2 The test voltage shall be sinusoidal of frequency between 40 to 50 Hz. The voltage shall be applied gradually. The initial voltage shall not exceed 30% of the test voltage and applied voltage shall be increased uniformly to the test voltage within 30 seconds. The full test voltage shall be maintained for 1 minute after which the test voltage shall be diminished rapidly to 30% of its test voltage before switching it off.

## 5.7 Insulation Resistance

5.7.1 Insulation resistance when measured at a voltage of 500 V D.C. after 1 minute of electrification between all terminals looped together and the body and in between terminals shall not be less than 100 Mega ohm.

5.7.2 This test may be carried out at the prevalent atmospheric condition.

## 5.8 Contact Resistance

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5.8.1 The contact resistance of each pin shall be measured directly using Kelvin-Bridge or by any other suitable means which shall not exceed 20 milli-ohms.

### 5.9 Drop Test

5.9.1 The Six pin plug and socket shall be dropped six times at random from a height of six feet. The plug and socket shall be visually examined. There shall be no physical damage and component shall not get loose.

5.9.2 After drop test, contact pressure and contact resistance shall be tested as per clause No. 5.5 and 5.8 of this specification. The value shall not vary by 5% of the initial value.

### 5.10 Corrosive Atmosphere Industrial Test

5.10.1 Unmated contacts shall be placed on a non-corrosive rack in a closed plastic or glass chamber, which contains 10% solution of potassium sulphide in distilled water. Contacts shall not be immersed in the solution but shall be exposed to the sulphide vapour for 100 hrs. There shall be no evidence of damage on any components of six pin plug and socket.

5.10.2 After corrosive atmospheric industrial test, the six pin plug and socket shall be subjected to the contact pressure and contact resistance test as per clause 5.5 and 5.8 of this specification. The value shall not vary by 5% of the initial value.

**5.11 Climatic Severity Test:** The climatic severity test shall be done in accordance with IS: 9000 as per sequence and severity indicated below:-

Sl. No.	Climatic cycle	Severity	Duration	Test to be conducted	Required Routine
1.	Dry Heat	70°C ± 2°C	16 hrs	i) Applied High Voltage ii) Insulation Resistance	i) Shall withstand ii) Shall be greater than 100 M ohms
2.	First Damp Heat	55°C ± 2°C RH 90 to 95%	16 hrs	Insulation Resistance	Shall be greater than 10 M ohms
3.	Cold	-10°C	2hrs	Insulation Resistance	Shall be greater than 10 M ohms
4.	Five Cycle of Damp Heat	55°C ± 2°C RH 90 to 95%	16 hrs + 2hrs	Insulation Resistance	Shall be greater than 1 M ohm. After 24 hrs recovery greater than 10M ohms

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**Note:** - The contact pressure and contact resistance shall be tested after completion of climatic tests as per clause 5.5 and 5.8 of this specification which shall not vary more than 5% of the original value.

## 5.12 Type Test

5.12.1 The following shall constitute type tests

- i) Visual inspection (as per sub clause No. 5.1)
- ii) Checking of dimensions (as per sub-clause No. 5.2)
- iii) Uniformity of die casting (as per sub-clause No. 5.3)
- iv) Test for interchangeability (as per sub-clause No. 5.4)
- v) Contact pressure (as per sub-clause No. 5.5)
- vi) High Voltage Test (as per sub-clause No. 5.6)
- vii) Insulation resistance test (as per sub-clause No. 5.7)
- viii) Contact resistance test (as per sub-clause No. 5.8)
- ix) Drop test (as per sub-clause No. 5.9)
- x) Corrosive atmosphere industrial Test (as per sub-clause No. 5.10)
- xi) Climatic severity test (as per sub-clause No. 5.11)

5.12.2 The manufacturer shall submit to the purchaser or his nominee six samples of six pin plug and sockets and supply labour and appliances for their testing, if required, free of cost for type approval.

5.12.3 A type approval certificate may be issued to the manufacturer if samples do pass all the prescribed tests. Type approval certificate shall normally be valid for three years from the date of issue. The type approval certificate once issued shall not be valid if a change in the design, construction, material used or manufacturing process is made subsequently unless this change has the approval of the purchase or his nominee.

5.12.4 If agreed to by the purchaser, the manufacturer can furnish the test certificate from an approved test laboratory, giving the results of the chemical analysis etc. of the material used in the manufacturing of components of six pin plug and socket to prove their conformity to the requirements of this specification.

## 5.13 Routine Test

5.13.1 The following shall constitute the routine tests.

- i) Visual inspection (as per clause No. 5.1)
- ii) Checking of dimensions (as per clause No. 5.2)
- iii) Uniformity of die casting (as per clause No. 5.3)
- iv) Test for interchangeability (as per clause No. 5.4)
- v) Contact pressure (as per clause No. 5.5)
- vi) High Voltage Test (as per clause No. 5.6)
- vii) Insulation resistance test (as per clause No. 5.7)
- viii) Contact resistance test (as per clause No. 5.8)



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5.13.2 Any other tests required by the manufacturer to ensure that six pin Plug and socket is in conformity with the requirements of this specification.

#### 5.14 Acceptance Test

5.14.1 The following shall constitute the Acceptance tests

- i) Visual inspection ( as per clause No. . 5.1)
- ii) Checking of dimensions (as per clause No. . 5.2)
- iii) Uniformity of die casting (as per clause No. 5.3)
- iv) Test for interchangeability ( as per clause No. 5.4)
- v) Contact pressure (as per clause No. 5.5)
- vi) High Voltage Test ( as per clause No. 5.6)
- vii) Insulation resistance test ( as per clause No. 5.7)
- viii) Contact resistance test ( as per clause No. 5.8)

5.14.2 Any other tests as required by the inspecting authority to ensure that six pin plug and socket is in conformity with the requirements of this specification.

#### 6.0 Sampling

6.1 Unless otherwise agreed to by the purchaser and the supplier, the double sampling plan given below shall be adopted.

1	2	3	4	5	6
Lot consisting of six pin plug and socket	1st Sample size (N1)	2nd sample size (N2)	Combined sample size (N1+N2)	Acceptance Number (C1)	Rejection Number (C2)
Under 25	3	6	9	0	2
25 to 50	7	14	21	0	3
51 to 100	10	20	30	0	3
101 to 200	13	26	39	0	5
201 to 300	20	40	60	1	5
301 to 500	25	50	75	1	6

6.2 The number of six pin plug and socket (N1) as given in col. 2 shall first be selected and subjected to the acceptance tests. If in the first sample, the number of defective six pin plug and socket that is those failing in one or more acceptance tests, is less than or equal to the corresponding number (C1) given in col. 5, the lot shall be considered as conforming to the requirements of the acceptance tests. If the number of defective six pin plug and socket in the first sample is greater than or equal to the rejection number given col.6, the lot shall be considered as not conforming to the requirements of the acceptance tests. If the number of

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defective six pin plug and socket in the first sample lies between (C1) and (C2) a second sample of size (N2) as given in col. 3 shall be selected and subjected to acceptance tests. If in the combined sample, the number of defective six pin plug and socket is less than (C2) the lot shall be considered as conforming to the requirements of acceptance tests.

- 6.3** The sample shall be selected at random from at least 10% of the packages. For random selection of packages, all the packages in the lot shall be arranged in a serial order and every 'r' package shall be selected until the requisite number of package is obtained.

'r' being the integral part of - 
$$\frac{\text{Total Number of packages in the lot}}{\text{Total number of packages to be selected}}$$

## **7.0 Inspection**

- 7.1** The inspection and tests shall be carried out to the satisfaction of the purchaser or his nominee.
- 7.2** The purchaser or his nominee shall have the right to be Present during all stages of manufacture and shall be accorded all reasonable/complete facilities to satisfy himself that the six pin plug and socket are being manufactured in accordance with the terms and conditions of the specification. The purchaser or his nominee shall have the right to reject any material that fails to conform to the specification.
- 7.3** When inspection is carried out during the manufacture, the manufacturer shall supply the material and sample required for testing free of charge and shall at his own cost prepare and furnish the necessary test pieces and appliances for such testing as may be carried out at his own premises in accordance with the specification. Failing facilities at his own works for conducting the prescribed tests, the manufacturer shall bear the cost of carrying out the tests at an approved test laboratory.
- 7.4** Test certificate incorporating the results of the routine tests and other manufacturing tests must be furnished in quadruplicate prior to the Inspection for the use of purchaser or his nominee.

## **8.0 Rejection**

- 8.1** Any of the materials which do not comply with the requirements of this specification may be rejected.

## **9.0 Packing**

- 9.1** Six pin plug and socket shall have to undergo arduous transportation before reaching the destination and will have to be stored and handled in tropical climatic conditions (including monsoons) before they are put to actual use. It is therefore, imperative that the packing is decided by taking into consideration inter-alia, the above two vital factors, to eliminate damage deterioration of the items in transit/transportation/ handling or during storage.

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