

Page 1 of 97

Specification No. CLW/ES/3/0124

ALT. P



भारत सरकार
रेल मंत्रालय

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

SPECIFICATION FOR
SET OF CONNECTORS
FOR THREE PHASE LOCOMOTIVES

Specification No : CLW/ES/3/0124
Issued on: 29.09.1999

विद्युत लोको डिजाइन कार्यालय
चितरंजन रेलइंजन कारखाना
चितरंजन - 713301

ELECTRIC LOCO DESIGN OFFICE
CHITTARANJAN LOCOMOTIVE WORKS
CHITTARANJAN - 713331

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 2 of 97

Specification No. CLW/ES/3/0124

ALT. P

ALTERATION RECORD SHEET

Amendme nt No.	Date of Amendment	Page No	Alt	REASON	Authority
1.	20-03-99	-	A	Table of contents added	Sd/-
2.	20-03-99		A	Scope of Supply is updated	
3.	20-03-99		A	Approval of Samples. Tests have been included	
4.	5-07-99		B	ABB Ident. No: for SI. No. 8 to 13 changed as per Adtranz MR, No. 433 Rev.A dt. 25.1.99	
5.	9-07-99		C	Scope of Supply is updated	
6.	29-7-99		D	Scope of Supply is updated due to inclusion of SB1&2 connectors	
7.	22/05/2002		E	Gimota part number of sl no.7 has been added (Cable clamp & reduction ring)	
8.	08/03/03		F	Fire retardant /self-extinguishing clause included as note	
9.	12/11/03		G	Gimota Part no. corrected/added in SI. no. 2, 3, 5,6,7, 11, 21, 22 and 32 in the Scope of supply. ABB ID no. corrected in sl. No.7 Qty./Loco changed in sl. No. 10 and 91 in the Scope of supply. Description of the item has been changed in sl. no. 82 in the Scope of supply. Item sl. no. 86 in the Scope of supply has been deleted	Sd/-
10.	25-8-05		H	Qty./Loco corrected as per shop requirement vide L/no. ELE/T/16 dt. 28.8.05 & SSE/A/19/Connection dt. 10.6.05 and comparative demand chart of SSE/Panel & SSE/Cable harnessing section. Qty./Loco of WAG-9 & WAP-5 separately incorporated.	
11.	11-09-06		I	Qty./Loco Corrected as per SEE/EL's letter no. ELE/T/21 dt 25.08.06 & shop requirement for item no. 1 & 47 of the scope of Supply.	Sd/-
12.	19.11.07		J	ABB No. of item socket 22P/36 PIN'N' (SI. no. 21) is corrected from HBTB 315161R0001 to HBTB315161R0011	Sd/-
13.	15.5.08		K	PLUG, 9P D-SUB, S1 PINS against SL. NO.48 & CONTACT SOCKET SIZE 8/6 MM ² have been re-introduced for shop requirement-Vide letter No.SE/3P/ST-III/ELS-19/07/22 dated 08.05.08	Sd/-

Prepared By

Digitally signed by
BHUPENDRA
KUMAR SINGH

Date: 2025.07.21
18:54:46+05'30'

JE/ Drg. (ELECT.)

Checked By

ARUN
PAN

Digitally signed by
ARUN PAN
Date: 2025.07.22
00:03:54+05'30'

SEE/ D-I

Issued By

RAVI
YADAV

Digitally signed by RAVI
YADAV
Date: 2025.07.22
09:53:44+05'30'

Dy.CEE/D-I

Page 3 of 97		Specification No. CLW/ES/3/0124		ALT. P
14.	01.10.09	L	Quantity/Loco column & OEM/Gimota Part No. column is deleted from the table in the scope of supply" (Clause 4). Qty. / Loco will be as per category book.	Sd/-
15.	11.11.09	M	Description changes and ABB Identification deleted for item no. 4 in the scope of supply. ABB identification no. of the sl. no 18 and 20 has been changed for the inclusion of non metallic Cable Clamp and reduction ring if requires with the connector as per shop requirement vide letter of AEE/ELC dated 13.10.09. and description changed.	Sd/-
16.	17.08.2010	N	Cl.No.4 of Scope of supply item Sl. No.92 of page no. 9 is re-introduced & one new item of scope of supply sl. no.97 of p-9 is included as per shop requirement, vide Lt. of Dy.CEE/EL Lt No.ELE/T/21. dtd. 22-07-2010.	Sd/-
17.	13.06.16	O	New Clause No. 6.5 added as separate packing for "Set of Connectors for Panel" and a "Set of connectors for Loco, except Panel" as per latest category provision will be provided by the firm.	Sd/-
18.	18.07.2025	P	Specification has been completely revised incorporating with re-traced drawings, detailed test schedule, sampling plan for inspection and all alterations issued time to time in Specification No. CLW/ES/3/0124 issued on 29.09.1999.	

Specification has been digitized and all alteration have been incorporated.

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 4 of 97	Specification No. CLW/ES/3/0124	ALT. P
--------------	---------------------------------	--------

TABLE OF CONTENTS

S. No.	Description	Page No.
1.	SCOPE	5
2.	SERVICE CONDITIONS	5
3.	STANDARDS	5
4.	DRAWING	6
5.	SCOPE OF SUPPLY	6-9
6.	TESTS	9-25
7.	TECHNICAL DOCUMENTS TO BE SUPPLIED BY THE SUPPLIER	25
8.	IDENTIFICATION	25
9.	QUANTITY/LOCO	26
10.	PACKING	26
11.	QUALITY ASSURANCE	26
12.	REFERENCE	26
13.	CLW Drg. No. CLW/ES/3/SK-1/0124 to CLW/ES/3/SK-96/0124	27-97

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 5 of 97

Specification No. CLW/ES/3/0124

ALT. P

Specification for Set of Connectors

1. SCOPE

This specification covers the manufacture, testing and supply of Set of Connectors for 3-Phase Electric Locomotives.

2. SERVICE CONDITIONS

2.1 Climatic & Environmental condition:-

Maximum atmospheric temperature	70°C (In Sun) ,50°C (In shade)
Ambient Temperature(Operating)	-20.....+70°C
Ambient Temperature (Storage)	-30...+80 °C
Normal Humidity	60%.
Maximum Humidity	100% saturation during rainy season
Altitude	1776 meter above mean sea level
Rainfall	Very heavy in certain areas. The equipment should be designed in such a way as to withstand its running at 10 Km/hr. in flood water level of 200 mm above rail level.
Atmosphere during hot weather	Extremely dusty and desert terrain in certain areas
Coastal areas	Locomotive and equipment will be designed to work in coastal areas in humid and salty laden atmosphere.
Vibration	The equipment, sub-system and their mounting arrangement will be designed to withstand vibrations and shocks encountered in services as specified in correspondence unless otherwise prescribed.

3. STANDARDS

The standard should be as per IEC-60130, IEC-60320, IEC-60309, IEC 60529, IEC 60603-2(DIN 41612), IEC 61373, MIL C/5015/JSS 50815, JSS 50812, DIN-95234/VG-95234,DIN 95319-2,IEC-60571, DIN 51221(Sheet-3), IEC-60077, ML DTL 45204 D(latest), MIL-STD 1344A(METHOD 2003.1,METHOD 2014,METHOD 3001.1,METHOD 1001.1, TEST 1001.1), BSEN 50343 for circular connector and other latest relevant Indian/International standard as and when applicable.

Prepared By

Digitally signed by
BHUPENDRA
KUMAR SINGH
Date: 2025.07.21
18:54:46+05'30'

JE/ Drg. (ELECT.)

Checked By

ARUN
PAN
Digitally signed by
ARUN PAN
Date: 2025.07.22
00:03:54+05'30'

SEE/ D-I

Issued By

RAVI
YADAV
Digitally signed by RAVI
YADAV
Date: 2025.07.22
09:53:44+05'30'

Dy.CEE/D-I

Page 6 of 97

Specification No. CLW/ES/3/0124

ALT. P

The Tenderer should quote separately for circular connectors, SUB-D connectors, contact pins, contact sockets. Railways shall have the right to exercise the opinion to place orders for circular connectors and SUB-D connectors. The tenderer should quote and supply the relevant accessories to each type of Connector also.

4. DRAWINGS:

CLW Drg. No. CLW/ES/3/SK-1/0124 to CLW/ES/3/SK-96/0124 indicates the constructional and general arrangement in brief of Set of Connectors is enclosed. For reference purpose, ABB drawings shall be referred as mentioned in CLW drawings.

5. SCOPE OF SUPPLY

S. No.	Description	ABB identification	CLW ASS DRG No.
CIRCULAR CONNECTORS			
1.	PLUG, INSULATED 0.5X2.8	3EHN424077P0001	CLW/ES/3/SK-1/0124
2.	PLUG, SIZE 22/19POLE LITTON	3EHP431611R0001	CLW/ES/3/SK-2/0124
3.	PLUG, SIZE 28/37POLE LITTON	3EHP431611R0002	CLW/ES/3/SK-3/0124
4.	PLUG SIZE 32/31 POLES (With nonmetallic Cable Clamp)	3EHP330325R0001+ HBTB416397P0012	CLW/ES/3/SK-4/0124
5.	PLUG, SIZE 22/19POLE/ LITTON	3EHP431609R0001	CLW/ES/3/SK-5/0124
6.	PLUG, SIZE 28/37POLE/ LITTON	3EHP431609R0002	CLW/ES/3/SK-6/0124
7.	SOCKET 4P/24 PIN "N"	3EHW470071R0001	CLW/ES/3/SK-7/0124
8.	PLUG 4 P BU "N" IR CA / CONNECTOR	3EHW470084R0001	CLW/ES/3/SK-8/0124
9.	SET OF COMPLETE SOCKET / SOCKET 5P / S18 PIN 'N'	HBT315075R0011	CLW/ES/3/SK-9/0124
10.	SET OF COMPLETE SOCKET / SOCKET 5P / S18 PIN 'N' STR	HBT315075R0031	CLW/ES/3/SK-10/0124
11.	SET OF COMPLETE PLUG / PLUG ASSEMBLY (KIT.)	HBT315076R0011	CLW/ES/3/SK-11/0124
12.	L-PLUG 31P/S32 BUSH "N" B	HBT315088R0031	CLW/ES/3/SK-12/0124
13.	SET OF COMPLETE PLUG / PLUG P7/24 SOCKET 'N' INDOOR	HBTB315110R0011	CLW/ES/3/SK-13/0124
14.	SET OF COMPLETE PLUG / PLUG 13P/32 SKT 'N' INDOOR/with cable damp	HBTB315111R0011	CLW/ES/3/SK-14/0124
15.	SET OF COMPLETE PLUG / PLUG 22P /36 SKT 'N' INDOOR	HBTB315112R0011	CLW/ES/3/SK-15/0124
16.	ST. 35P/40 BU "N" IR KABELH. / PLUG 35P/40 SKT 'N' INDOOR	HBTB315113R0011	CLW/ES/3/SK-16/0124
17.	ST. 61P/40 BU "N" IR KABELH. / PLUG 61P/40 SKT 'N' INDOOR	HBTB315157R0011	CLW/ES/3/SK-17/0124
18.	SOCKET 7P/24 PIN "N" (With Cable Clamp and Reduction Ring)	HBTB315158R0011	CLW/ES/3/SK-18/0124
19.	SET OF COMPLETE SOCKET / SOCKET 13P/32 PIN 'N' INDOOR	HBTB315159R0011	CLW/ES/3/SK-19/0124

Prepared By

Checked By

Issued By

Digitally signed by
BHUPENDRA KUMAR SINGH
Date: 2025.07.21
18:54:46+05'30'

JE/ Drg. (ELECT.)

ARUN
PAN

Digitally signed by
ARUN PAN
Date: 2025.07.22
00:03:54+05'30'

SEE/ D-I

RAVI
YADAV

Digitally signed by RAVI
YADAV
Date: 2025.07.22
09:53:44+05'30'

Dy.CEE/D-I

Page 7 of 97	Specification No. CLW/ES/3/0124	ALT. P
--------------	---------------------------------	--------

20.	SET OF COMPLETE SOCKET / SOCKET 31P/31 PIN 'N' (With Cable Clamp)	HBTB315160R0011	CLW/ES/3/SK-20/0124
21.	SOCKET 22P / 36 PIN 'N'	HBTB315161R0011	CLW/ES/3/SK-21/0124
22.	SOCKET 35P/40 PIN 'N' IND.	HBTB315162R0011	CLW/ES/3/SK-22/0124
23.	SET OF COMPLETE SOCKET / SOCKET 61P/40 PIN 'N' INDOOR	HBTB315163R0011	CLW/ES/3/SK-23/0124
24.	SET OF COMPLETE PLUG / PLUG 4P/40 SOCKET 'N' INDOOR	HBTB315176R0112	CLW/ES/3/SK-24/0124
25.	SET OF COMPLETE PLUG / PLUG 4P/40 SOCKET 'N' INDOOR	HBTB315176R0113	CLW/ES/3/SK-25/0124
26.	SET OF COMPLETE PLUG / PLUG 4P/40 SOCKET 'N' INDOOR	HBTB315176R0114	CLW/ES/3/SK-26/0124
27.	SET OF COMPLETE PLUG / L-PLUG 4P/40 SOCKET 'N' INDOOR	HBTB315176R0211	CLW/ES/3/SK-27/0124
28.	SET OF COMPLETE PLUG / L- PLUG 4P/40 SOCKET 'N' INDOOR	HBTB315176R0213	CLW/ES/3/SK-28/0124
29.	SOCKET 4P/40 PIN "N"	HBTB315177R0001	CLW/ES/3/SK-29/0124
30.	SOCKET 4P / 40 PIN 'N' IND	HBTB315177R0111	CLW/ES/3/SK-30/0124
31.	SOCKET 4P / 40 PIN 'N' IND	HBTB315177R0113	CLW/ES/3/SK-31/0124
32.	SET OF COMPLETE PLUG / L-PLUG 13P PIN 'N' OUTDOOR	HBTB315205R0111	CLW/ES/3/SK-32/0124
33.	SOCKET 13P PIN "N" OUTDOOR	HBTB315305R0111	CLW/ES/3/SK-33/0124
34.	SET OF COMPLETE SOCKET/ SOCKET 13P PIN "N" OUTDOOR	HBTB315305R0311	CLW/ES/3/SK-34/0124
35.	CABLE CONNECTION / HP-9P-SG-SG-17S-21-13.0 M	HBTB315385R0172	CLW/ES/3/SK-35/0124
36.	SOCKET / PLUG , 5 CRIMP SOCKET S16	HBTB415399P0012	CLW/ES/3/SK-36/0124
37.	PLUG 9 POLES SZ 13-13A/AMP/G-182645-1	HETT401293P0001	CLW/ES/3/SK-37-38/0124
38.	PROTECTIVE CAP / CABLE CLIP(Accessories to item no 40)	HETT401293P0032	
39.	ANDERSON CONTACTS 120A	X1319	CLW/ES/3/SK-39/0124
40.	ANDERSON PLUG PP 120A	X1321BLAU	CLW/ES/3/SK-40/0124
41.	ANDERSON PLUG PP 120A	X1321G3ROT	CLW/ES/3/SK-41/0124

SUB-D PLUGS/CONNECTORS

42.	SUB-D PLUG SET/CONNECTOR SPEEDOMETER CONNECTOR SUB-SET	3EHP590025R0519	CLW/ES/3/SK-42/0124
43.	CONNECTOR SPEEDOMETER	3EHP590025R0530	CLW/ES/3/SK-43/0124
44.	ST. 9P D-SUB GR1 / CONNECTOR	HBTB316240R0009	CLW/ES/3/SK-44/0124
45.	CONNECTOR / PLUG, 15P D-SUB,SIZE-2	HBTB316240R0015	CLW/ES/3/SK-45/0124
46.	CONNECTOR / PLUG, 17P D-SUB,SIZE-3	HBTB316240R0017	CLW/ES/3/SK-46/0124
47.	SUB D Plug 25P D-SUB	HBTB316240R0025	CLW/ES/3/SK-47/0124
48.	PLUG 9P D-SUB, S1 PINS	HBTB316240R0091	CLW/ES/3/SK-48/0124
49.	SOCKET 9P D-SUB SIZE 1	HBTB316241R0009	CLW/ES/3/SK-49/0124
50.	PLUG DO 5P/ 14	HBTB415399P0022	CLW/ES/3/SK-50/0124

CONTACT PINS

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:14:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 8 of 97	Specification No. CLW/ES/3/0124	ALT. P
--------------	---------------------------------	--------

51.	CONTACT PIN, SIZE 8/2.5 SQ.MM	3EHW470321P1025	CLW/ES/3/SK-51-53/0124
52.	CONTACT PIN, SIZE 8/6 SQ.MM	3EHW470321P1060	
53.	CONTACT PIN, SIZE 8/10 SQ. MM	3EHW470321P1100	
54.	CONTACT PIN 12/0.5	HBT415298P0001	CLW/ES/3/SK-54-59/0124
55.	CONTACT PIN 12/1.0	HBT415298P0003	
56.	CONTACT PIN 12/1.5	HBT415298P0005	
57.	CONTACT PIN 12/2.5	HBT415298P0007	
58.	CONTACT PIN 12/4.0	HBT415298P0009	
59.	CONTACT PIN 12/6.0	HBT415298P0011	
60.	CONTACT PIN GR 16* 0.5 MM2	HBT415299P0001	CLW/ES/3/SK-60-63/0124
61.	CONTACT PIN 16/1.0	HBT415299P0005	
62.	CONTACT PIN 16/1.5	HBT415299P0007	
63.	CONTACT PIN GR 16*2.0 MM2(AWG 14)	HBT415299P0009	
64.	CONTACT PIN MALE GR16 0.5-1.0 mm2	HBTB415399P0001	CLW/ES/3/SK-64/0124
65.	DUMMY CONTACT MALE GR16 BL/ DUMMY PLUG SIZE 16 BL	HBTB415399P0005	CLW/ES/3/SK-65/0124
66.	CONTACT PIN GR0/ 16 SQ.MM	HBTB416435P0001	CLW/ES/3/SK-66-69/0124
67.	CONTACT PIN GR0/25 SQ.MM	HBTB416435P0002	
68.	CONTACT PIN GR0/ 35 SQ.MM	HBTB416435P0003	
69.	CONTACT PIN GR0/50 SQ.MM	HBTB416435P0004	
70.	CONTACT PIN AWG 24-20 Sub-D	HESG455639P1200	CLW/ES/3/SK-70/0124
71.	CONT. PIN 0.24-D.62/24-20	X1.8076.005/01	CLW/ES/3/SK-71/0124
CONTACT SOCKETS			
72.	CONTACT SOCKET	HBT415299P0010	CLW/ES/3/SK-72/0124
73.	CONTACT SOCKET SIZE 8 / 2.5 MM2	3EHW470321P2025	CLW/ES/3/SK-73-75/0124
74.	CONTACT SOCKET SIZE 8 / 6 MM2	3EHW470321P2060	
75.	CONTACT SOCKET SIZE 8 / 10 MM2	3EHW470321P2100	
76.	CONTACT SOCKET	HBT415176P0003	CLW/ES/3/SK-76-77/0124
77.	CONTACT SOCKET	HBT415176P0004	
78.	CONTACT SOCKET 12/1.0	HBT415298P0004	CLW/ES/3/SK-78-81/0124
79.	CONTACT SOCKET 12/1.5	HBT415298P0006	
80.	CONTACT SOCKET 12/2.5	HBT415298P0008	
81.	CONTACT SOCKET 12/6.0	HBT415298P0012	
82.	CONTACT SOCKET 16/0.5	HBT415299P0002	CLW/ES/3/SK-82-85/0124
83.	CONTACT SOCKET 16/1.0	HBT415299P0006	
84.	CONTACT SOCKET 16/1.5	HBT415299P0008	
85.	CONTACT SOCKET 16/2/AWG14	HBT415299P0010	
86.	CONTACT FEMALE GR16 / CONTACT SOCKET SIZE 16	HBTB415399P0002	CLW/ES/3/SK-86/0124

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 9 of 97		Specification No. CLW/ES/3/0124	ALT. P
87.	Contact socket 5.0/35 mm ²	HBTB416434P0003	CLW/ES/3/SK-87-88/0124
88.	Contact socket 5.0/50 mm ²	HBTB416434P0004	
89.	CONTACT SOCKET 2-3 MM ²	HESG455509P0021	CLW/ES/3/SK-89/0124
90.	CONTACT SOCKET AWG24-20	HESG455638P0120	CLW/ES/3/SK-90-91/0124
91.	CONTACT SOCKET SUB-4)	HESG455638P1200	
92.	CONNECTOR SKT 0.23, 0.5	SE408197P0013	CLW/ES/3/SK-92/0124
ACCESSORIES			
93.	SOCKET BODY PA	3EHV470001P0001	CLW/ES/3/SK-93/0124
94.	ADAPTOR STR. SIZE 18	HBT415278P0001	CLW/ES/3/SK-94/0124
95.	ADAPTOR NW17/SIZE 32	HBTB415393P0437	CLW/ES/3/SK-95/0124
96.	PROTECTION BOOT	HBTB416397P0012	CLW/ES/3/SK-96/0124

6. Tests:

6.1 Type Tests, Routine Tests and Acceptance Tests:

Type Tests, Routine Tests and Acceptance Tests to be conducted on a series of circular connector complete and the contacts, series of data connector complete. For the purpose of selection of test sample, user may decide any one shell size and contact size from the series.

A. TYPE TEST: Type test to be carried out on prototype samples of Set of Connectors. Complete type tests shall be organized and conducted by the manufacturer in presence of the authorized representative of vendor controlling authority. The type test once approved by vendor controlling agency may be repeated whenever required by vendor controlling agency. Supplier shall submit internal test report along with following details prior to offering the Set of Connectors for type testing:

- The Bill of material indicating Specification drawing no, material, sub Supplier etc.
- Complete technical details of Circular Connectors, Data Connectors, Contacts, Rubber inserts etc.
- If TOT with the firm outside India is involved, then the supply experience of collaborator shall be furnished.
- The supplier shall make available at least two prototypes of the equipment proposed to be supplied by him for inspection and test at his works and advice the Dy. Chief Electrical Engineer (Design) and Controller of Stores as and when he is ready with the prototype and necessary testing and measuring apparatus and facilities for carrying out the tests.
- After the above tests if it is considered necessary by the Dy. CEE/Design's, authorized representative to carry out any further tests or trials of the prototype, the Supplier will arrange for the same by the quickest means.

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 10 of 97

Specification No. CLW/ES/3/0124

ALT. P

- (vi) The supplier shall not offer equipment's of series production to the inspector authorized under the contract until the prototype has been finally approved. The Supplier shall provide all facilities to the inspecting officer at his works, to inspect and test the equipment.
- B. ROUTINE TEST: To be carried out by the manufacturer on each lot. The manufacturer shall maintain record of test results to be produced as and when required by the authorized inspecting agency.
- C. ACCEPTANCE TEST: Acceptance test will be done by the inspection agency as per terms and condition mentioned in the placed purchase orders. Sampling plan will be followed as tabulated below:

Sl. No.	Lot or Batch Size	Sample Size	Acceptance Verdict	
			Accept Lot if Non Conformity is Equal or Less than Mentioned No.	Reject Lot if Non Conformity is equal or greater than Mentioned No.
1.	2-8	2	0	0
2.	9-15	3	0	0
3.	16-25	5	0	1
4.	26-50	8	0	1
5.	51-90	13	0	1
6.	91-150	20	1	2
7.	151-280	32	2	3
8.	281-500	50	3	4
9.	501-1200	80	5	6
10.	1201-3200	125	7	8
11.	3201-10000	200	10	11

Note:

- (a) If the sample pieces are found as per specification, then "OK" remarks will be given in firm's Inspection report or in clearance report of CLW.
- (b) Otherwise, non- conformity needs to be generated, and the lot is to be treated as above sampling inspection plan.

In addition to above, the purchaser shall have right to carry out stage inspection also at firm's premises particularly with reference to manufacturing process, quality control and compliance with various clauses of the specification.

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 11 of 97

Specification No. CLW/ES/3/0124

ALT. P

D. TESTS ON RAW MATERIALS/ BOUGHT OUT ITEMS

- The manufacturers shall maintain Quality Assurance Plan of all raw materials/bought out items used in the manufacturing of Set of Connectors to ensure the quality and compliance to prescribed standards.
- Type tests: To be carried out on prototype samples of raw materials. For bought out items firm to submit certificate of compliance/test certificate of OEM.
- Acceptance tests: To be carried out on each batch of supply. For bought out items firm to submit certificate of compliance/test certificate of OEM. The manufacturer shall maintain record of test results to be produced as and when required by the authorized inspecting agency.

6.1.1 Circular connectors product details

a) Sizes & categories

Shells	From 18 up to 40
Contacts	Size 0 to 16

b) Materials used

Shells	Aluminum Alloy
Contacts	Brass with Gold or with Silver plating (Gold plating: Min 0.5 μ m Au over min 2.5 μ m Ni, Silver plating: min 3.5 μ m Ag) Material grade: Brass: BS: 2874, IS: 319
Inserts	Ethylene acrylate, Silicon or equivalent Flame Retardant Halogen free low smoke non toxicity self-extinguishing elastomer-certified EN45545-2 HL-2. (Excluding EPDM)
Cable clamps	Al alloy, Nylon GR black Note: The non-metallic part of Connector (Protection boot etc.) must be of in flammability class FH 2-5mm as defined in the IS: 11731 (Part- 1): 1986- Horizontal specimen method of test for solid insulating materials and class FVO as per IS:11731(Part-2): 1986-Vertical test method.
Screws	Stainless steel

Prepared By

Digitally signed by
BHUPENDRA
KUMAR SINGH
Date: 2025.07.21
18:54:46+05'30'

JE/ Drg. (ELECT.)

Checked By

ARUN
PAN
Digitally signed by
ARUN PAN
Date: 2025.07.22
00:03:54+05'30'

SEE/ D-I

Issued By

RAVI
YADAV
Digitally signed by RAVI
YADAV
Date: 2025.07.22
09:53:44+05'30'

Dy.CEE/D-I

Page 12 of 97	Specification No. CLW/ES/3/0124	ALT. P
---------------	---------------------------------	--------

c) Surface treatment

Plating	Zinc Cobalt
Color	Olive green or black (Mismatching of colour shade permissible)

Note: Marking on inserts shall be done in white for better visualization and for identification.

6.1.2 Table of summary of applicable type tests, routine tests & acceptance test on Circular connectors:

Sl. No.	Test Description	Connector Complete			Contacts			Reference Clause No.
		Type Test	Routine Test	Acceptance Test	Type Test	Routine Test	Acceptance Test	
1.	Visual check	✓	✓	✓	✓	✓	✓	6.1.2.1
2.	Dimensional check	✓	✓	✓	✓	✓	✓	6.1.2.2
3.	Contact engagement & separation force test							6.1.2.3
	Mating force test				✓	✓	✓	6.1.2.3.1
	Separation force test				✓	✓	✓	6.1.2.3.2
4.	Crimp test				✓	✓	✓ * * *	6.1.2.4
5.	Di-electric voltage test	✓	✓	✓				6.1.2.5
6.	Insulation resistance test	✓	✓	✓				6.1.2.6
7.	Contact resistance test	✓	✓	✓				6.1.2.7
8.	Coupling torque test	✓	✓	✓ ****				6.1.2.8
9.	Mechanical endurance test	✓						6.1.2.9
10.	Thermal test	✓						6.1.2.10
11.	Corrosion resistance test	✓						6.1.2.11
12.	Vibration & shock tests	✓						6.1.2.12

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 13 of 97	Specification No. CLW/ES/3/0124	ALT. P
---------------	---------------------------------	--------

13.	Water tightness test	✓					6.1.2.13
14.	Voltage Induced Test	✓	✓	✓			6.1.2.14
15.	Interchangeability	✓	✓	✓			6.1.2.15
16.	Flammability test	✓	✓ *	✓ *			6.1.2.16
17.	Determination and thickness of plating	✓	✓	✓	✓	✓ **	6.1.2.17
18.	Moisture Resistance test	✓		✓			6.1.2.18

Note : '**' Flammability test may be carried out on raw material sample of nonmetallic components offered by firm from which firm has manufactured offered lot during inspection. Documentary evidence for traceability of raw materials to be shown by firm whenever asked by inspecting agency.

: '***' 05 random samples of contacts of each type shall be verified during inspection for determination and verification of thickness of plating as per specification.

: '****' 01 random sample of each size of pin and sockets shall be tested during inspection.

: '*****' 01 no.Connector for each Sample size of connector.

6.1.2.1. Visual check

The connector must not have any damages, at the shell, contacts, on the surface and on the rubber parts.

6.1.2.2. Dimensional check

The dimensions of all parts of the connector must conform to the specification drawings and the applicable standards.

6.1.2.3 Contact engagement & separation force tests

(a) Purpose

The purpose of this test is to determine the forces required to engage and separate standard test pins with individual contacts. The force recorded during the engagement and separation cycle is indicative of the normal force pressure exerted on a mating unit by the socket contact spring member.

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 14 of 97

Specification No. CLW/ES/3/0124

ALT. P

(b) Test equipment

Force gauge with contact holding fixture as per Exhibit-1.



Exhibit-1

(c) Test procedure

Insert a qualified test probe and measure the engagement force. As the qualified test probe is withdrawn, measure the separation force. The measured forces according to contact size must have the values given in the table.

6.1.2.3.1 Mating force

Tolerance on Probe dia (in mm)	+0/- 0.0025			
Contact size	16	12	8/8H	0
Probe dia (mm)	1.613	2.413	3.632	9.093
Force (gm)	≤350	≤550	≤1600	≤4000

6.1.2.3.2 Separating force

Tolerance on Probe dia (in mm)	+0.0025 /-0			
Contact size	16	12	8/8H	0
Probe dia (mm)	1.562	2.362	3.581	9.042
Force (gm)	≥160	≥220	≥400	≥1000

6.1.2.4 Crimp test**(a) Purpose**

The purpose of this test is to determine the mechanical strength of the crimped joint of contact and conductor. The values obtained give an indication of relative strength of the joint.

(b) Test equipment

- (i) Clamps, jaws or other means to hold the contact and conductor.
- (ii) Mechanism to separate the holding devices at a constant rate of speed of $1\pm 1/4$ inch/min.
- (iii) Gauge to register the amount of tension being exerted between the contact and conductor.

(c) Test procedure

- (i) Place crimped sample of crimped contact and wire into test fixture of tensile tester.

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 15 of 97

Specification No. CLW/ES/3/0124

ALT. P

(ii) Activate tensile equipment so that an axial force is exerted at a speed of $1\pm 1/4$ inch/ min, separating contact and conductor

(iii) Record tensile data and examine sample.

The measured loads must have the values as given in the table

Contact Size	Wire section (mm ²)	Load(N)	Contact Size	Wire section (mm ²)	Load(N)
16	0.5	≥ 70	8/8H	1.0	≥130
	1.0	≥ 130		1.5	≥195
	1.5	≥ 195		2.5	≥325
12	0.5	≥ 70		4.0	≥520
	0.75	≥100		6.0	≥780
	1.0	≥130		10.0	≥1000
	1.5	≥195			
	2.5	≥325			
	4.0	≥520			
	6.0	≥780	0	16.0	≥1600
				25.0	≥2000
				35.0	≥2800
				50.0	≥3000

During the test the wire must not slip out of the contact. The crimping area must not have deformations or fractures. Broken wires outside of the crimping area do not constitute a test failure.

6.1.2.5 Di-electric voltage test

Purpose of the test is to ensure proper di-electric strength of the connector. Depending upon the nominal operating voltages of the connector, test voltages are decided in accordance to the table given below.

Service	Working Voltage		Test voltage (VAC 50Hz)	Flashover voltage min.(V)
	DC (V)	AC (V)		
Instrument	250	200	1000	1400
A	700	500	2000	2800
D	1250	900	2800	3600
E	1750	1250	3500	4500
B	2450	1750	4500	5700
C	4200	3000	7000	8500
S	According to Customers Specification			

Prepared By

Digitally signed by
BHUPENDRA
KUMAR SINGH
Date: 2025.07.21
18:54:46+05'30'

JE/ Drg. (ELECT.)

Checked By

ARUN
PAN

Digitally signed by
ARUN PAN
Date: 2025.07.22
00:03:54+05'30'

SEE/ D-I

Issued By

RAVI
YADAV

Digitally signed by RAVI
YADAV
Date: 2025.07.22
09:53:44+05'30'

Dy.CEE/D-I

Page 16 of 97

Specification No. CLW/ES/3/0124

ALT. P

The test voltage according to table must be applied between contacts close to each other and between a contact closest to shell and the shell. Connectors must withstand the test voltage during one minute:

- Without any flashovers.
- Without surface discharges
- Without any damage.

Note : Di-electric test in acceptance may be carried on 80% as per relevant standard

6.1.2.6 Insulation resistance test

Insulation resistance shall be checked between the adjacent contacts of connector and between all contacts shorted together and the shell.

A voltage of 500±50V DC must be applied between contacts close to each other and between all contacts connected together and the Shell.

The value of insulation resistance measured shall be more than 100 MΩ.

6.1.2.7 Contact resistance test

Contact resistance shall be measured through measurement of DC voltage drop across the contact, using appropriate equipment, corresponding to the nominal direct current through the contact as per table.

Contact size	16	12	8/8H	0
Nominal (A)	13	23	46	150
Maximum (A)	22	41	73	245
Measured values of voltage drops must not exceed the values given in the table				
Contact size	16	12	8/8H	0
Voltage drop (mV)	≤74	≤63	≤85	≤53

6.1.2.8 Coupling torque test

Testing of connector is to be done with connector being coupled and uncoupled as per Exhibit - 2.

Prepared By

Digitally signed by
BHUPENDRA
KUMAR SINGH
Date: 2025.07.21
18:54:46+05'30'

JE/ Drg. (ELECT.)

Checked By

ARUN
PAN
Digitally signed by
ARUN PAN
Date: 2025.07.22
00:03:54+05'30'

SEE/ D-I

Issued By

RAVI
YADAV
Digitally signed by RAVI
YADAV
Date: 2025.07.22
09:53:44+05'30'

Dy.CEE/D-I

Page 17 of 97

Specification No. CLW/ES/3/0124

ALT. P

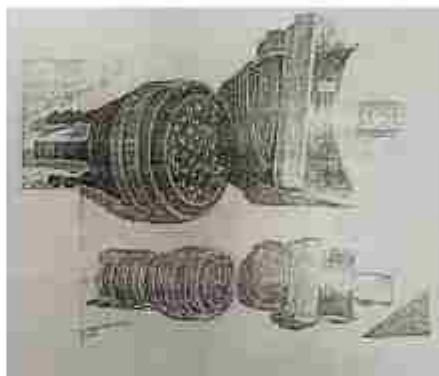


Exhibit - 2.

The measured coupling and uncoupling torques shall have the values given in the table.

Shell size	Coupling (N.cm)	Uncoupling (N.cm)
18	≤ 400	≥ 100
20	≤ 500	≥ 150
22	≤ 600	≥ 150
24	≤ 650	≥ 200
28	≤ 700	≥ 270
32	≤ 800	≥ 360
36	≤ 900	≥ 450
40	≤ 1000	≥ 590

6.1.2.9 Mechanical endurance test

The connector complete with contacts must go 500 cycles of coupling & uncoupling. A mechanical device may be used to perform coupling & uncoupling of the connector or may be done so manually.

After the test the connector must have,

- No cracks.
- No fractures.

It must also be verified that the bayonet ramps still respect the dimensions according to the relative drawing and specifications.

After the endurance cycle carry out the following tests:

- Di-electric voltage test
- Insulation resistance test

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 18 of 97

Specification No. CLW/ES/3/0124

ALT. P

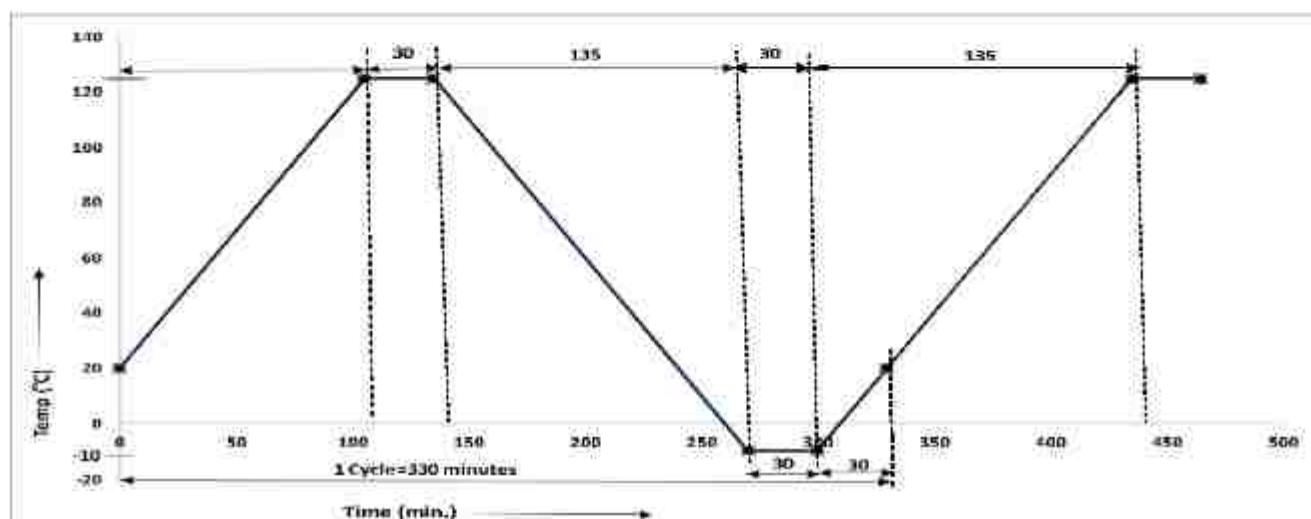
- Contact resistance test
- Coupling torques test

6.1.2.10 Thermal test

This test is to be carried out with full bundled connectors. Connector shall be placed inside the environmental chamber with following cycle programmed:

(a) Test condition

30 min. at + 125 °C, 30 min. at -10°C; dwelt time ≥ 1 deg ° C / min ; 5 cycle total.



After this test following tests are to be repeated :

- Di-electric voltage test
- Insulation resistance test

The connector must have:

- No breakage
- To deterioration
- No surface damages

6.1.2.11 Corrosion resistance test**(a) Purpose**

The purpose of the test is to determine the effects of a controlled salt laden atmosphere corresponding to JIS-Z2371 or equivalent on electrical and mechanical properties of the connector.

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:14:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 19 of 97

Specification No. CLW/ES/3/0124

ALT. P

(b) Test condition**Test conditions depending on surface treatment**

Zinc-Cobalt	48 hours at 35±2°C
Electroless Nickel	48 hours (Special Al alloy) at 35±2°C
Epoxy-Polyurethane	48 hours at 35±2°C

After carrying out the salt spray test following tests to be repeated

- Visual check
- Di-electric voltage test
- Insulation resistance test
- Contact resistance test

The connector must not have corrosion damages.

6.1.2.12 Vibration and Shock tests

Test shall be conducted as applicable to Rail Road products. During vibration test all conductors of the connectors to be connected in series & energised for lighting a lamp with suitable voltage, current through the circuit being not less than 100mA.

(i) Functional random test and simulated long life test is to be done as per IEC 61373.

At the end of the test, verify that the connector must have

- No resonance during the test.
- No damages after the test.
- No released threads after the test.
- No interruption in illumination of test lamp.

Note: After this test the di-electric voltage test is to be repeated.

(i) **Shock Test:** Shock test is to be done as per IEC 61373

At the end of the test, verify that the connector must have:

- No damages after the test

Note: After this test the di-electric voltage test is to be repeated.

6.1.2.13 Water Tightness test

This test is to be carried out with full bundled connectors. Free cable ends must be closed to avoid any infiltration of water.

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 20 of 97

Specification No. CLW/ES/3/0124

ALT. P

The prepared connector shall be immersed in water for one hour at a pressure of 0.13 bar (1.5m head of water) at ambient temperature.

At the end of the test, inspect the connector to confirm that no water ingress has taken place.

After this test following tests to be repeated

- Di-electric voltage test
- Insulation resistance test

6.1.2.14 Voltage Induced Test

(a) Purpose

The purpose of the test is to confirm that "No any voltage should be induced in adjacent contacts"

(b) Method of testing

Apply 110 V DC on two contacts. With the help of multi meter, one probe should be fix with supply (Positive or Negative), Move another probe on adjacent contacts and observe induce voltage.

6.1.2.15 Interchangeability Test

(a) The purpose of the test is to ensure "interchangeability with different vendors make set of Connectors".

(b) Method of testing

Matting with Gimota make Connectors and observe for proper matting and no any Contacts push back.

6.1.2.16 Flammability test

The nonmetallic part of connector (protection boot etc.) must be of inflammability class FH2-5 mm as defined in the IS:11731(part-1) : 1986- Horizontal specimen method of Test for solid Insulating materials and class FVO as per IS: 11731(part-2):1986-Vertical test method.

6.1.2.17 Determination and thickness of plating

The plating thickness measurement to be taken at 3 different points along the length of each of the sample contacts and the average value should be higher than the minimum specified thickness.

6.1.2.18 Moisture Resistance Test: The test to be conducted as per EIA 512, IEC-60512, MILL-1344.

6.1.3 Test report

Upon completion of all or part of the tests and functional checks, comprehensive report to be prepared by test engineer / test house. The report shall describe the execution of the tests and their effect on the connectors together with:

(a) The summary, which shall identify changes which have occurred during the tests. Part

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 21 of 97

Specification No. CLW/ES/3/0124

ALT. P

identification number shall be quoted.

- (b) Details of the instrumentation and procedures used for the tests. These may be included in the report but this is not mandatory.
- (c) Methods of mounting for each test.
- (d) Method and order of testing used. The report shall also include figures showing the location of all control and measuring positions.
- (e) Function test carried out and values obtained pre-test and post-test.
- (f) Results of tests from control and reference positions, together with observations against the set objectives and acceptance criteria.

The report shall contain all the control point graphs. If necessary the graphs shall contain also the tolerance bands in order to demonstrate that the test remained within the tolerance limits.

6.2 Test on Data Connectors

6.2.1 Data Connectors product details:

a) Sizes & categories

Cases	From 3 up to 25 poles
Contacts	Size HD20 and 8

b) Materials used:

Cases	Zinc Alloy(ZMAC)
Contacts	Bronze with gold plating
	Galvanic coating of Socket contact HD20 & 8: $\geq 1.3 \mu\text{m Au over } 1.3 \mu\text{m Ni}$
Inserts	Nylon GR, black
Cable clamps	Brass, tin plated
Screws	Stainless steel

c) Surface treatment: No surface treatment

Prepared By

Digitally signed by
BHUPENDRA
KUMAR SINGH
Date: 2025.07.21
18:54:46+05'30'

JE/ Drg. (ELECT.)

Checked By

**ARUN
PAN**

Digitally signed by
ARUN PAN
Date: 2025.07.22
00:03:54+05'30'

SEE/ D-I

Issued By

**RAVI
YADAV**

Digitally signed by RAVI
YADAV
Date: 2025.07.22
09:53:44+05'30'

Dy.CEE/D-I

Page 22 of 97	Specification No. CLW/ES/3/0124	ALT. P
---------------	---------------------------------	--------

6.2.2 Table of summary of applicable type tests, routine tests & acceptance tests on Data connectors:

S. No.	Test Description	Connector Complete			Contact			Reference Clause No.
		Type Test	Routine Test	Acceptance tests	Type Test	Routine Test	Acceptance tests	
1.	Visual check	✓	✓	✓	✓	✓	✓	6.2.2.1
2.	Dimensional check	✓	✓	✓	✓	✓	✓	6.2.2.2
3.	Di-electric voltage withstand test	✓	✓	✓				6.2.2.3
4.	Insulation resistance test	✓	✓	✓				6.2.2.4
5.	Cable retention test	✓						6.2.2.5
6.	Vibration & shock tests	✓						6.2.2.6
7.	Thermal test	✓						6.2.2.7
8.	Flammability test	✓	✓ *	✓ *				6.2.2.8
9.	Determination and thickness of plating				✓	✓ **	✓ **	6.2.2.9

Note : * Flammability test may be carried out on raw material sample of nonmetallic components offered by firm from which firm has manufactured offered lot during inspection. Documentary evidence for traceability of raw materials to be shown by firm whenever asked by inspecting agency. For bought out items, firm to submit certificate of compliance/test certificate of OEM.

** 05 random samples of contacts of each type shall be verified during inspection for determination and verification of thickness of plating as per specification. For bought out items, firm to submit certificate of compliance/test certificate of OEM.

6.2.2.1 Visual check

The connector must not have any damages, at the case, contacts and on the contact insert.

6.2.2.2 Dimensional check

The dimensions of case parts of the connectors must conform to the specification drawings and the applicable standards.

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 23 of 97

Specification No. CLW/ES/3/0124

ALT. P

6.2.2.3 Di-electric Voltage withstand test

Test voltage shall be applied between all contacts of the connectors shorted together and casing by gradually increasing the voltage amplitude to the test voltage and maintained at the specified level for 1 minute.

Working voltage (AC)	Working voltage (DC)	Test voltage (VAC at 50Hz)
50V AC	72V DC	500V
Above 50V AC & Up to 90V AC	Above 72V DC & Up to 125V DC	1000V
Above 160V AC & Up to 225V AC	Above 125V DC & Up to 315V DC	1500V

Data connectors must withstand the test voltage during one minute:

- Without any flashovers.
- Without surface discharges.
- Without any damage.

6.2.2.4 Insulation resistance test

Insulation resistance between the current carrying parts and casing is performed using 500V meggar.

A voltage of 500 \pm 50V must be applied between a contact pin closest to case and the case. The value measured must not be less than 5M Ω .

6.2.2.5 Cable retention test**(a) Procedure**

The force is to be applied on the cable which is secured with clamp.

The force is increased at a rate of 100N/min from 0 to 150N, at which it is finally held for 5 minutes.

It is to be observed that the cable must not move in the cable clamp.

After this test di-electric voltage test is to be repeated.

6.2.2.6 Vibration and Shock tests

Test shall be conducted as applicable to Rail Road products. During vibration test all conductors of the connectors to be connected in series & energised for lighting a lamp with suitable voltage, current through the circuit being not less than 100mA.

- (i) Functional random test and simulated long life test is to be done as per IEC 61373.

At the end of the test, verify that the connector must have

- No resonance during the test.

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 24 of 97

Specification No. CLW/ES/3/0124

ALT. P

- No damages after the test.
- No interruption in illumination of test lamp

Note: After this test the di-electric voltage test is to be repeated.

(ii) **Shocks Test:** Shock testing is to be done as per IEC 61373

At the end of the test, verify that the connector must have:

- No damages after the test.

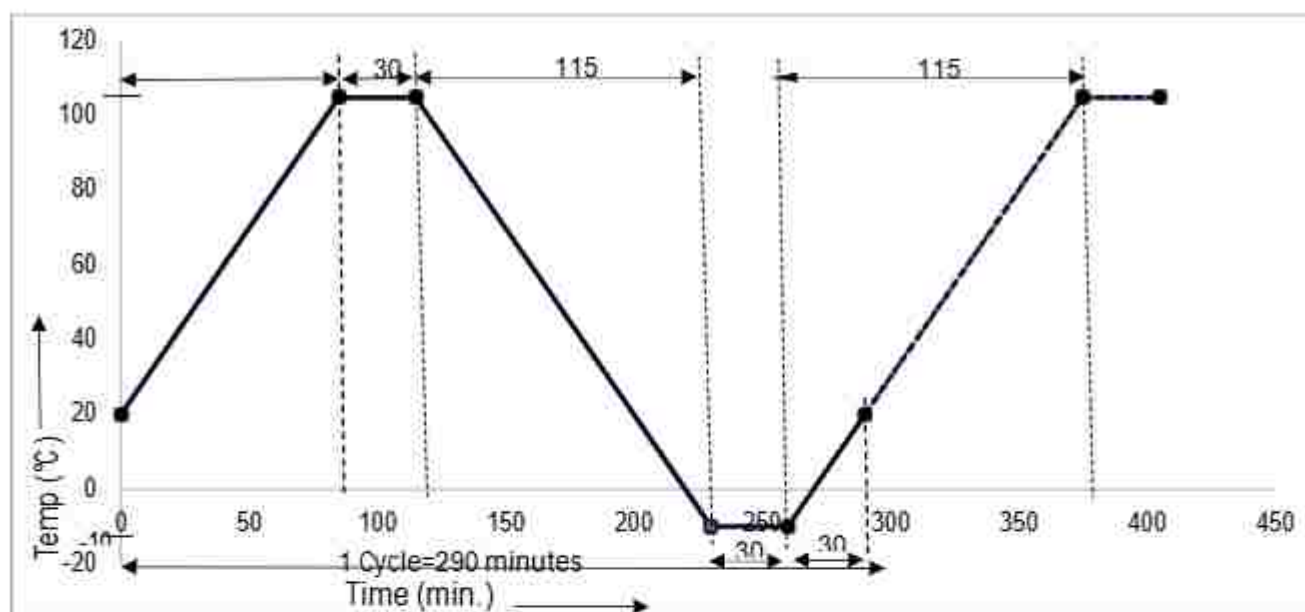
Note: After this test the di-electric voltage test is to be repeated.

6.2.2.7 Thermal test

This test is to be carried out with full bundled connectors.

(a) Test conditions

10 cycles total, each cycle consisting of 30 min, at 105°C, 90% humidity, 30 min, at -10°C contacts energised at working DC voltage.



After this test following tests are to be repeated:

- Di-electric voltage withstand test
- Insulation resistance test

6.2.2.8 Flammability test

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:14:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 25 of 97	Specification No. CLW/ES/3/0124	ALT. P
---------------	---------------------------------	--------

The nonmetallic part of connectors must be of inflammability class FH2-5 mm as defined in the IS:11731(part-1) : 1986- Horizontal specimen method of Test for solid Insulating materials and class FVO as per IS: 1173(part-2):1986-Vertical test method.

6.2.2.9 Determination and thickness of plating

For determination and verification of thickness of plating, firm has to submit NABL/ Govt approved lab tests reports of sealed random samples by authorised official of Dy.Design/Inspecting agency. In case of bought-out item relevant supplier COC/data sheet showing plating thickness to be provided.

6.2.3 Test report

Upon completion of all or part of the tests and functional checks, comprehensive report to be prepared by test engineer/test house. The report shall describe the execution of the tests and their effect on the connectors together with:

- The summary which shall identify changes which have occurred during the tests. Part identification number shall be quoted.
- Details of the instrumentation and procedures used during testing. These may be included in the report but this is not mandatory.
- Methods of mounting for each test.
- Method and order of testing used. The report shall also include figures showing the location of all control and measuring positions.
- Function test carried out and values obtained pre-test and post-test.
- Results of tests from control and reference positions, together with observations, against the set objectives and acceptance criteria

The report shall contain all the control point graphs. If necessary the graphs shall contain also the tolerance bands in order to demonstrate that the test remained within the tolerance limits.

7. Technical Documents to be supplied by the supplier :-

- Type test reports : In soft & Hard copy (One set)
- Routine test reports along with each set : In soft copy + hard copy(One set)
- Instruction/Maintenance Manual : In Soft copy
- Detailed Drawing : Soft copy (CAD /NX (Unigraphics)) + 1 hard copy in readable size

8. IDENTIFICATION:

The tenderer shall provide following details on the equipment

- Manufacturer's name & monogram/Brand
- Maximum Rated Voltage.
- Month & year of Manufacture.
- SL No. of equipment.

Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I

Page 26 of 97	Specification No. CLW/ES/3/0124	ALT. P
----------------------	--	---------------

9. QUANTITY/LOCO:

Quantity/Loco : As per latest category provision(one set means one loco set)

10. PACKING:

10.1 The Supplier should ensure that the Connectors are packed quantity per loco during delivery with the relevant ABB Identification Number labels on each item.

10.2 Separate packing for "Set of connectors for panel" and "Set of connectors for Loco except panel" as per latest category provision will be provided by the firm.

11. Quality Assurance: As per ISO 9001.

12. REFERENCE:

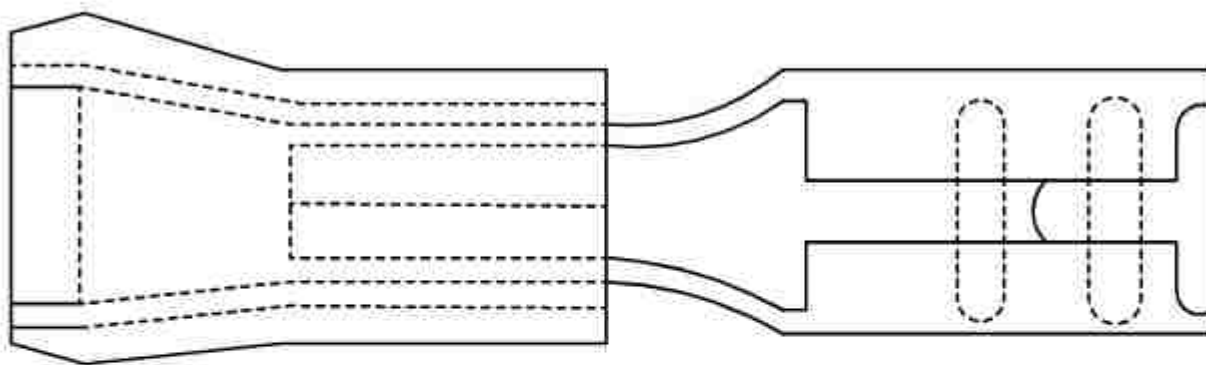
This specification has the reference to the original manufacturer as follows:

M/s GIMOTA AG

CH-8954, GEROLDSWIL ZURICH Ph: 004117493010, FAX:004117493015

The tenderer shall confirm that the equipments are as either used in 3 phase AC. Locomotive manufactured by ABB for Indian Railways or similar.

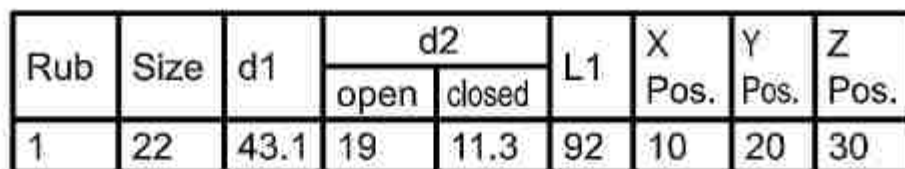
Prepared By	Checked By	Issued By
Digitally signed by BHUPENDRA KUMAR SINGH Date: 2025.07.21 18:54:46+05'30' JE/ Drg. (ELECT.)	Digitally signed by ARUN PAN Date: 2025.07.22 00:03:54+05'30' SEE/ D-I	Digitally signed by RAVI YADAV Date: 2025.07.22 09:53:44+05'30' Dy.CEE/D-I



PLUG,INSULATED 0.5 X 2.8

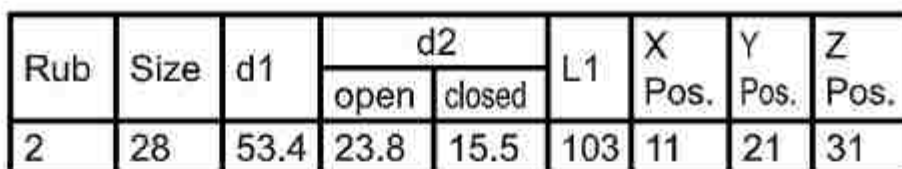
												अधिकृत OGN		प्रमुख ADRA KUMAR 371254		 चितारंजन रेल इंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA							
												जौन बख्श (H/O SEE)		Tanus hree Roy		पदार्थ MATL		व्रति भाग कि. ग्र. WT EACH IN GR.					
परिवर्तन संख्या ALT NO.		प्रमाणिकार AUTHY		वर्णन DESCRIPTION				दिखाई बख्त DATED INITIAL		परिष्ठा सदिश. / सदिश REVIEWED AGE / SEE		ARUN PAN		विधि SPECN									
संख्या - कलस, का साने ना. सं. 30773 / अ. ना. सं. 1302 SERIAL NUMBER 30773 TO 3079 / 13023		अनिर्दिष्ट रूप - सौम्य ना. ना. : 2102 / अ. ना. सं. : 2708 UNSPECIFIED TO SQUARE TO IS : 2702 / IS : 2708 वायु-विलयन चिह्न ना. ना. : 813 / अ. ना. सं. : 2003 WELDING SYMBOLS TO IS 813 / IS 2003				70L C.L.S.		अनुमोदित अनुमति APPROVED DYCEE		RAVI YADA V		वर्णन DESCRIPTION PLUG INSULATED 0.5 X 2.8											
ग्राहक GRADE NO.		सं 1 N1	सं 2 N2	सं 3 N3	सं 4 N4	सं 5 N5	सं 6 N6	सं 7 N7	सं 8 N8	सं 9 N9	सं 10 N10	सं 11 N11	सं 12 N12	रेखित अनुपात SCALE		NTS							
R2		8.8-8	8.5-8.7	8.8-13	15-20	25-18	18-4	10-12	18-25	18-43	18-43	25-38	38-53	आरेखण संख्या DRAWING NO.		CLWES/3/SK-1/0124							
Rd 44H		8.025	8.05	8.1	8.2	8.4	8.8	10	12	15	17.5	20	25	परिवर्तन संख्या ALTERATION NO.		P							
चिह्न SYMBOL														संदर्भ : REF 3EHN424077P0001 (AET-				पत्र SHEET		1 OF 1		A4	

This document remains the property of IBM. IBM is not responsible for any loss or damage to your information that may result from the use of this document. IBM is not responsible for any loss or damage to your information that may result from the use of this document.



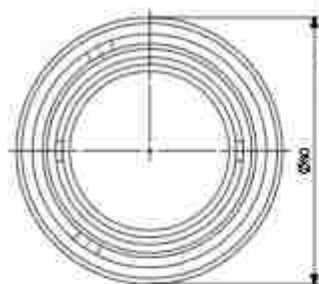
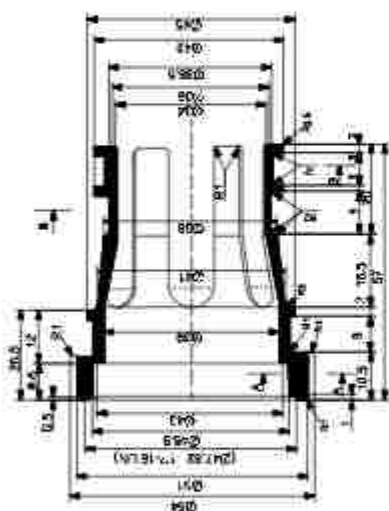
3EHP431611R0001 PLUG,SIZE 22/19POLE LITTON

[illegible]



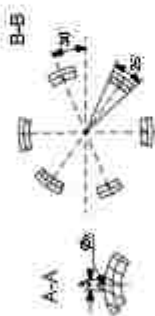
3EHP431611R0002
PLUG,SIZE 28/37POLE LITTON

[illegible]

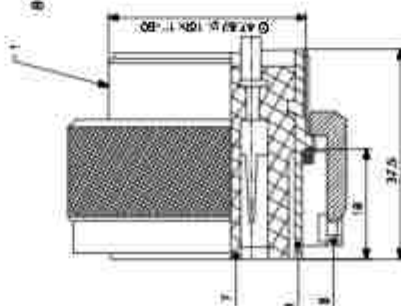
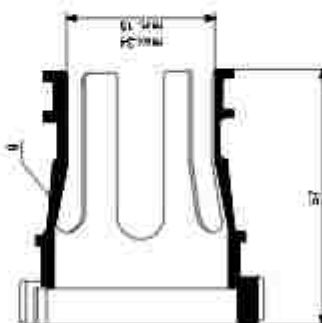
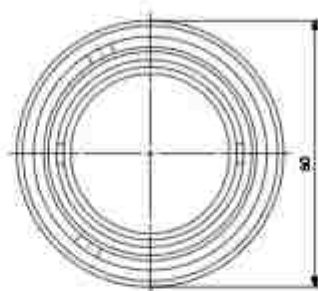


PATING		
PLUS	SIZE	CROSS SECTION
	8	11mm
	70A	10.0mm ²
	12	41A
		0.1-0.0mm ²
31	15	32A
		0.3-1.5mm ²

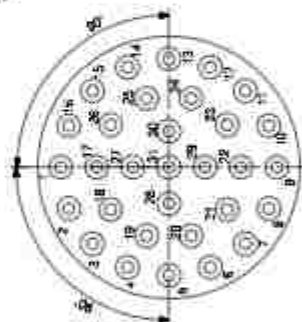
TEST VOLTAGE: 2000V
 INSULATION RESISTANCE: MIN. 2000MΩ



Ref-9 H3TB416397P0012



Ruf-12 HBT415281P0003.



Methyl-GIBBOTA PART NO. C1650-22-11 5N-EAC (For reference only)

PINS FOR ILLUSTRATION ONLY

9	HBTA1639P0012
12	HBTA1126P0003
11	HBTA15280P0003
10	HBTA51916P1001
1	DEHP30325P0001

[illegible]

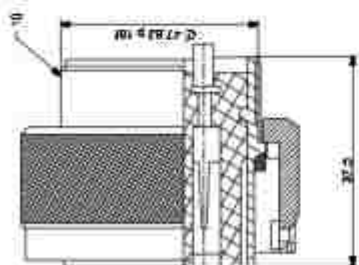
ALL DUBLICATIONS ARE IN ENGLISH

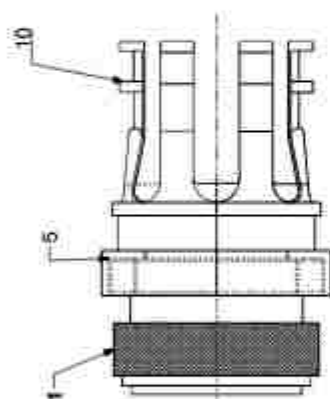
Date	Time		Location		Remarks
	Start	End	Area	Depth	
10/10/1971	0800	0900	100	10	100
10/10/1971	0900	1000	100	10	100
10/10/1971	1000	1100	100	10	100
10/10/1971	1100	1200	100	10	100
10/10/1971	1200	1300	100	10	100
10/10/1971	1300	1400	100	10	100
10/10/1971	1400	1500	100	10	100
10/10/1971	1500	1600	100	10	100
10/10/1971	1600	1700	100	10	100
10/10/1971	1700	1800	100	10	100
10/10/1971	1800	1900	100	10	100
10/10/1971	1900	2000	100	10	100
10/10/1971	2000	2100	100	10	100
10/10/1971	2100	2200	100	10	100
10/10/1971	2200	2300	100	10	100
10/10/1971	2300	2400	100	10	100
10/10/1971	2400	2500	100	10	100
10/10/1971	2500	2600	100	10	100
10/10/1971	2600	2700	100	10	100
10/10/1971	2700	2800	100	10	100
10/10/1971	2800	2900	100	10	100
10/10/1971	2900	3000	100	10	100
10/10/1971	3000	3100	100	10	100
10/10/1971	3100	3200	100	10	100
10/10/1971	3200	3300	100	10	100
10/10/1971	3300	3400	100	10	100
10/10/1971	3400	3500	100	10	100
10/10/1971	3500	3600	100	10	100
10/10/1971	3600	3700	100	10	100
10/10/1971	3700	3800	100	10	100
10/10/1971	3800	3900	100	10	100
10/10/1971	3900	4000	100	10	100
10/10/1971	4000	4100	100	10	100
10/10/1971	4100	4200	100	10	100
10/10/1971	4200	4300	100	10	100
10/10/1971	4300	4400	100	10	100
10/10/1971	4400	4500	100	10	100
10/10/1971	4500	4600	100	10	100
10/10/1971	4600	4700	100	10	100
10/10/1971	4700	4800	100	10	100
10/10/1971	4800	4900	100	10	100
10/10/1971	4900	5000	100	10	100
10/10/1971	5000	5100	100	10	100
10/10/1971	5100	5200	100	10	100
10/10/1971	5200	5300	100	10	100
10/10/1971	5300	5400	100	10	100
10/10/1971	5400	5500	100	10	100
10/10/1971	5500	5600	100	10	100
10/10/1971	5600	5700	100	10	100
10/10/1971	5700	5800	100	10	100
10/10/1971	5800	5900	100	10	100
10/10/1971	5900	6000	100	10	100
10/10/1971	6000	6100	100	10	100
10/10/1971	6100	6200	100	10	100
10/10/1971	6200	6300	100	10	100
10/10/1971	6300	6400	100	10	100
10/10/1971	6400	6500	100	10	100
10/10/1971	6500	6600	100	10	100

ORG SITE 3321 POLS (W/ non-metals Cells Chang)
EMPT 00075800 +14794189720019

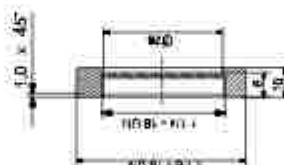
TECHNICAL DATA			
CONV. UNIT	SIZE	MAX. CONTINUOUS CROSS SECTION	
-	8	7/32"	10.0 mm ²
-	12	1/4"	0.6 - 8.0 mm ²
31	18	2/32"	0.5 - 1.5 mm ²
TEST VOLTAGE 1000V			
INSULATION RESISTANCE		MIN. 1000MΩ	

1. ASSEMBLY (3EHPJ30325R0001)

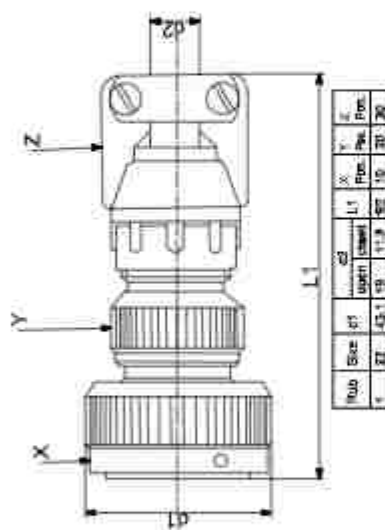




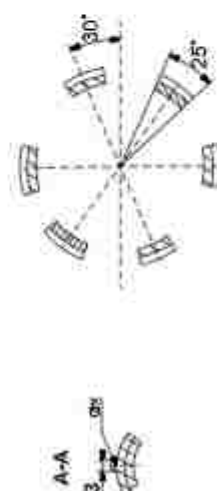
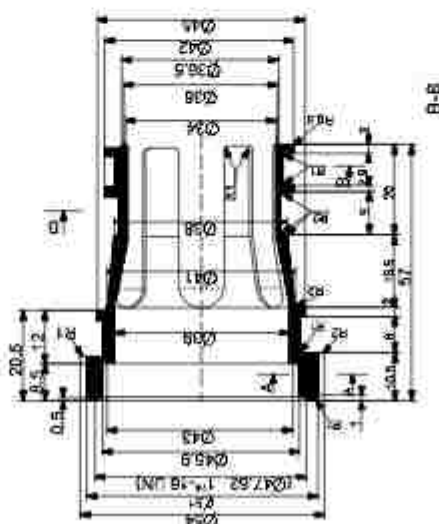
REF-A ASSEMBLY (3EHP431609R001)



REF-5 (3EHP431527P0001)

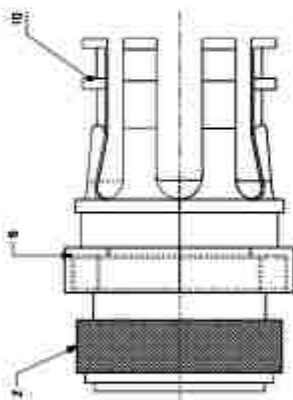


REF-1 (3EHP431611R0001)

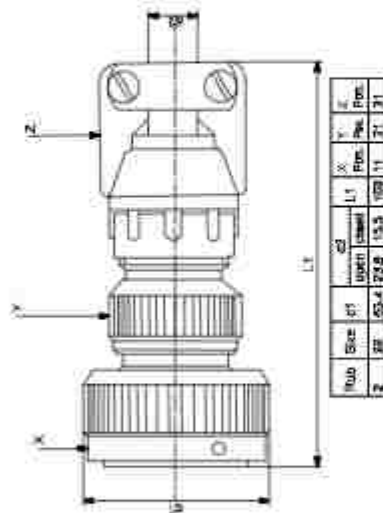


REF-10(HBTB416397P0012)

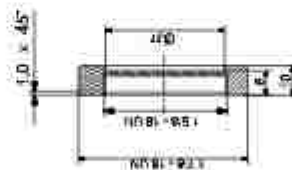
[illegible]



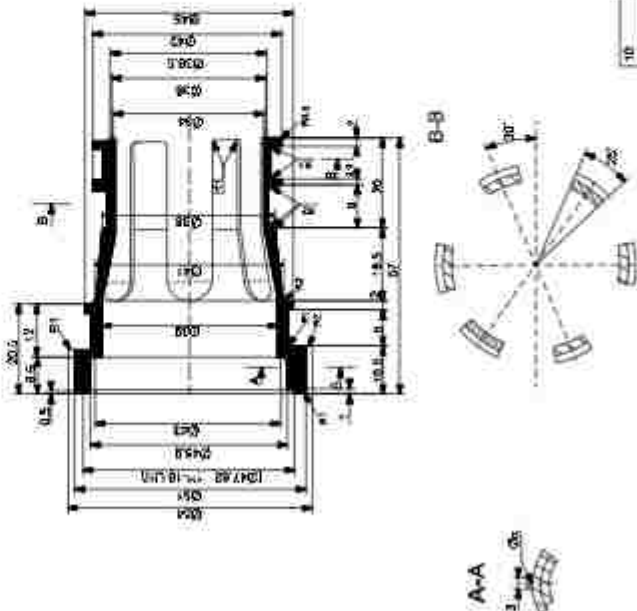
REF A ASSEMBLY (3EHP431609R0002)



REF-2 (3EHP431611R0002)

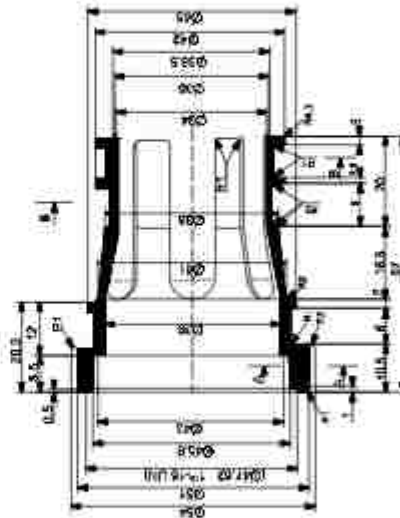
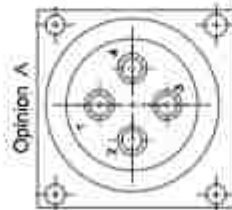


REF-6 (3EHP431527P0002)



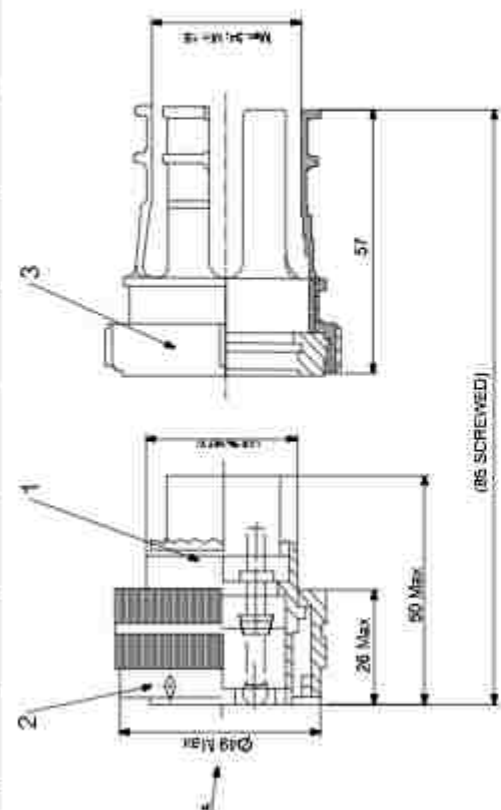
REF-10 (HBTB416397P0012)

10	HBTB416397P0012	CUB 6 SLEEVES 2/25-32 RDA
5	3EHP431527P0002	ADAPTOR SIZE 3228
3	3EHP431611R0002	PLUG SIZE 1837
A	3EHP431609R0002	PO. FLITTON
REF. NO.	ASB. ID.	ITEM DESCRIPTION
REF-10 (HBTB416397P0012) REF-2 (3EHP431611R0002) REF-6 (3EHP431527P0002) REF A ASSEMBLY (3EHP431609R0002)		
REF-10 (HBTB416397P0012) REF-2 (3EHP431611R0002) REF-6 (3EHP431527P0002) REF A ASSEMBLY (3EHP431609R0002)		
REF-10 (HBTB416397P0012) REF-2 (3EHP431611R0002) REF-6 (3EHP431527P0002) REF A ASSEMBLY (3EHP431609R0002)		



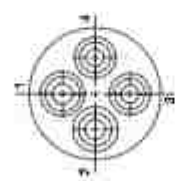
PIN FOR ILLUSTRATION ONLY

[illegible]

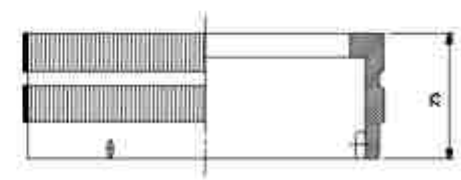


NOMINAL VOLTAGE 1000V

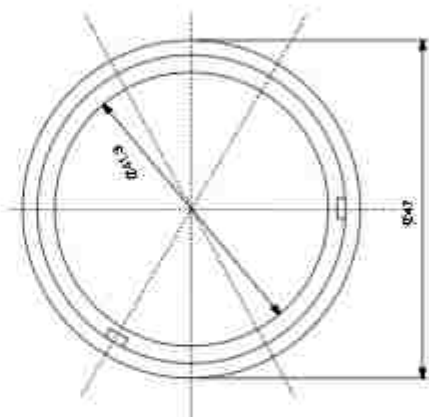
OPTION A



REF-A
ASSEMBLY (3EHW470084R0001)



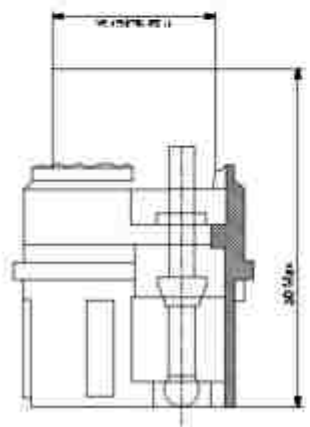
REF-2 (HBT415275P0002)



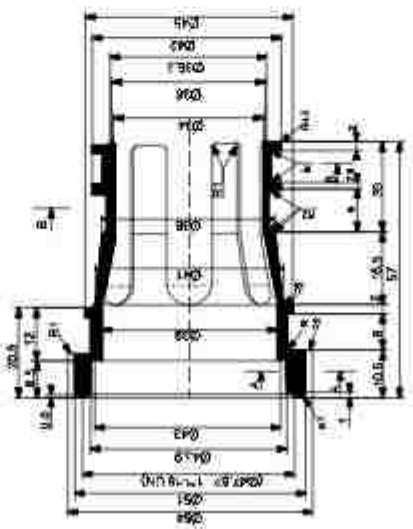
PLUG 4 P BU "N" IR CA / CONNECTOR

3EHW470004R0001

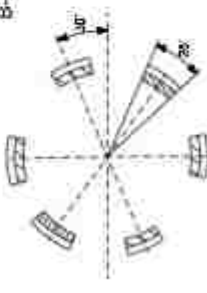
ALL DIMENSION ARE IN mm



REF-1 3EHW470083R0001

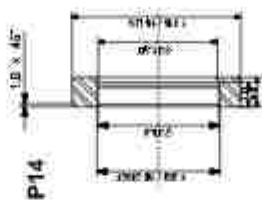


B-B



HBTB416397P0012

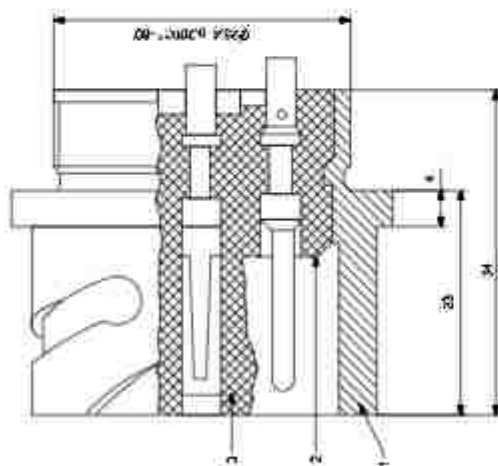
REF-3 (HBTB416397R0004)



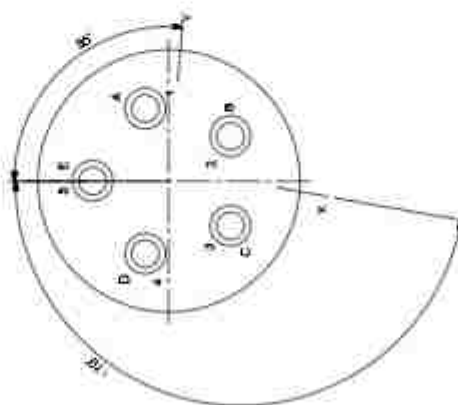
HBTB416397P0014

1	HBTB416397R0004	CA ELV INDOOR SUB (N2M)
2	HBT410275P0002	BUCKET SIZE 84
3	SEW470003P0001	PLUG 4P BU SKITTY
4	SEW470004R0001	ASSEMBLY
REF. NO	ASS ID	ITEM DESCRIPTION

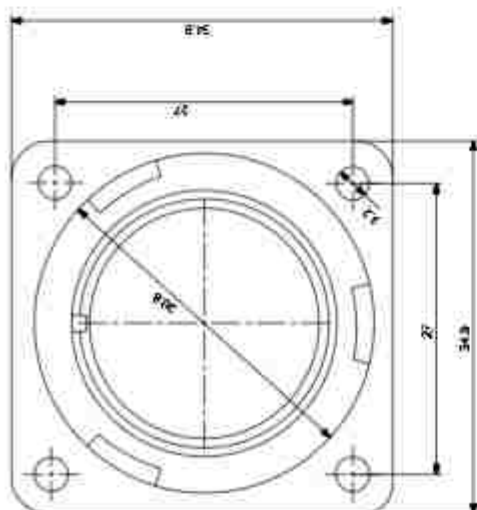
Revision history	
Rev	Description
1	Initial release
2	Update drawing
3	Update drawing
4	Update drawing
5	Update drawing
6	Update drawing
7	Update drawing
8	Update drawing
9	Update drawing
10	Update drawing
11	Update drawing
12	Update drawing
13	Update drawing
14	Update drawing
15	Update drawing
16	Update drawing
17	Update drawing
18	Update drawing
19	Update drawing
20	Update drawing
21	Update drawing
22	Update drawing
23	Update drawing
24	Update drawing
25	Update drawing
26	Update drawing
27	Update drawing
28	Update drawing
29	Update drawing
30	Update drawing
31	Update drawing
32	Update drawing
33	Update drawing
34	Update drawing
35	Update drawing
36	Update drawing
37	Update drawing
38	Update drawing
39	Update drawing
40	Update drawing
41	Update drawing
42	Update drawing
43	Update drawing
44	Update drawing
45	Update drawing
46	Update drawing
47	Update drawing
48	Update drawing
49	Update drawing
50	Update drawing
51	Update drawing
52	Update drawing
53	Update drawing
54	Update drawing
55	Update drawing
56	Update drawing
57	Update drawing
58	Update drawing
59	Update drawing
60	Update drawing
61	Update drawing
62	Update drawing
63	Update drawing
64	Update drawing
65	Update drawing
66	Update drawing
67	Update drawing
68	Update drawing
69	Update drawing
70	Update drawing
71	Update drawing
72	Update drawing
73	Update drawing
74	Update drawing
75	Update drawing
76	Update drawing
77	Update drawing
78	Update drawing
79	Update drawing
80	Update drawing
81	Update drawing
82	Update drawing
83	Update drawing
84	Update drawing
85	Update drawing
86	Update drawing
87	Update drawing
88	Update drawing
89	Update drawing
90	Update drawing
91	Update drawing
92	Update drawing
93	Update drawing
94	Update drawing
95	Update drawing
96	Update drawing
97	Update drawing
98	Update drawing
99	Update drawing
100	Update drawing



A. ASSEMBLY DRAWING(HBT315075R0011)



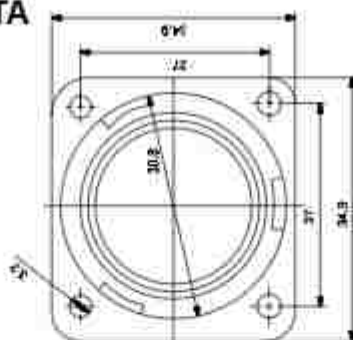
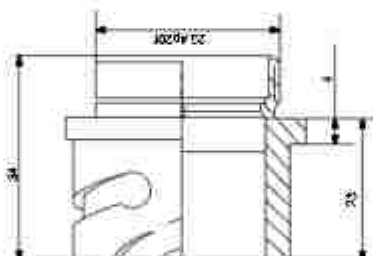
Ref-2
HBT415284P0001



TECHNICAL DATA		
CONTACT	SIZE	MAX. CAPACITATION CROSS SECTION
1	73A	10 mm ²
2	41A	0.5 - 6.0 mm ²
3	20A	0.5 - 3 mm ²

OPERATING VOLTAGE 230V

TEST VOLTAGE 500V	
INSULATION RESISTANCE	MIN. 500MΩ



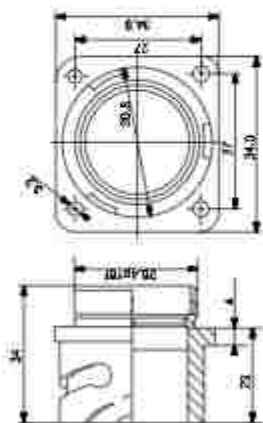
Ref:1 HBT415270P0001

QTY	PART # (S&M PART #)	THIS TIME DATE S&S
1	HB14162700001	SOCKET BODY, SIZE 18" B"
1	HB14150150001	ASSEMBLY
SEE NO.	ITEM ID	ITEM DESCRIPTION

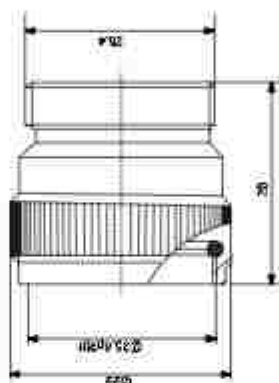
[illegible]

127 OF COMPLETE SOCKET/ROCKET SPACES IN MAX. IMP. STN.
1953: 50758-50759

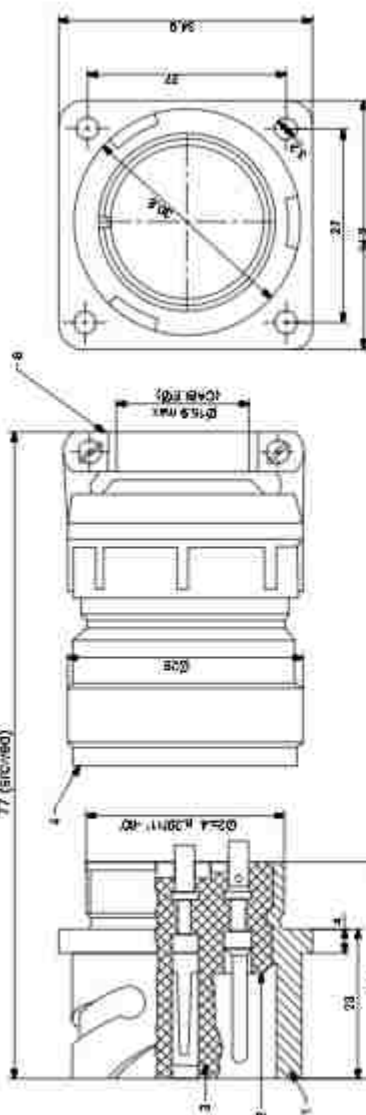
ALL CITIZENSHIPS ARE IN THE



Ref-1 HBT415270P0001

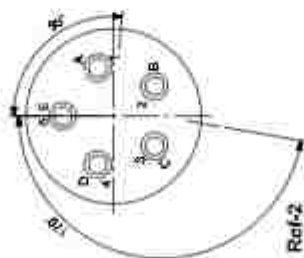


Ref: HBT415278P0001

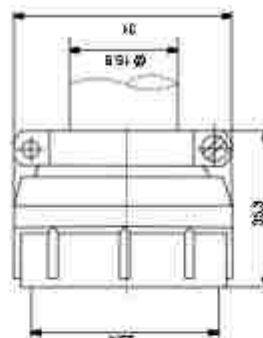


A. ASSEMBLY DRAWING(HBT315075R0031)

TECHNICAL DATA		
CONTACT	SIZE	CONDUCTOR CROSS SECTION
- B	73A	10.0 mm ²
- B	72	6.5 - 8.0 mm ²
- B	72A	6.5 - 8.5 mm ²
- OPERATING VOLTAGE: 330V		
- TEST VOLTAGE: 2000V		
- INSULATION RESISTANCE: MIN. 5000MΩ		



HBT415284P0001



Ref-6 HBT415281P0001

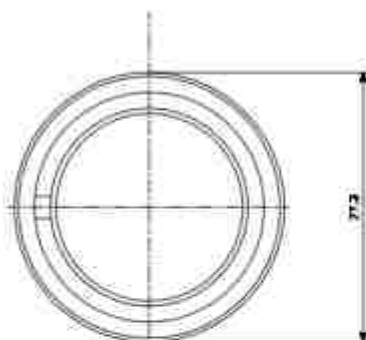
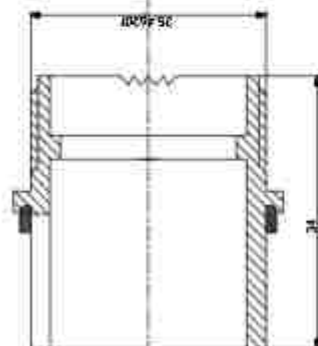
SET OF COMPLETE SOCIETY/ROCKET AND 18 PIN, IN 6TH HB7119/PS1021

CONTACT PINS FOR ILLUSTRATION ONLY.

0	HB14-1281-0001	METAL CLIP/SIZE 1A
1	HB14-1378-0001	ADAPTOR STRAIGHT SIZE 1B
2	HB14-1504-0001	PLUG 1/16" I.D. 3/16" O.D.
3	HB14-1379-0001	SOCKET BODY, SIZE 1/8"
4	HB13-507-0001	ASSEMBLY
A	HB13-507-0001	ITEM USED SUPPLY
	HB13-507-0001	

ALL DIMENSIONS ARE IN mm

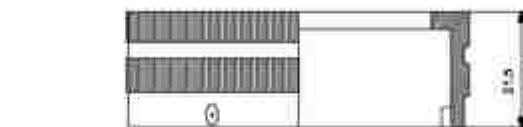
[illegible]



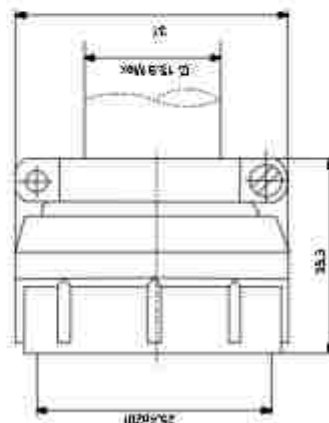
TECHNICAL DATA		
CONTACT	SIZE	COMPUTER CROSS SECTION
- B	73A	10.0 mm ²
- B	72	4.5 mm ²
- B	73A	0.5-0.0 mm ²
- B	73A	0.5-0.5 mm ²

- OPERATING VOLTAGE: 330V
 - TEST VOLTAGE: 2000V
 - INSULATION RESISTANCE: MIN. 5000MΩ

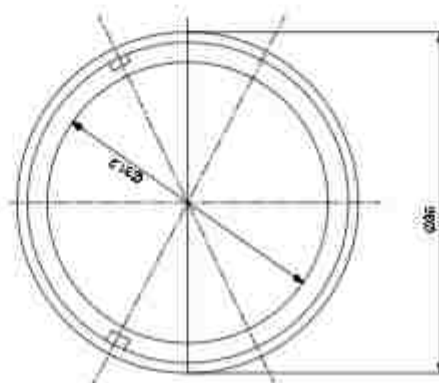
A. ASSEMBLY DRAWING(HBT315076R0011)



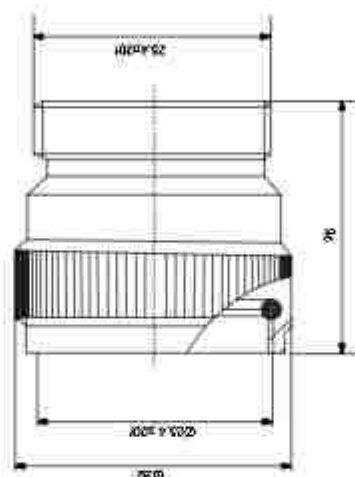
Ref-2 HBT415284P0002



Ref-7 HBT415281P0001



Ref-4 HBT415275P0001



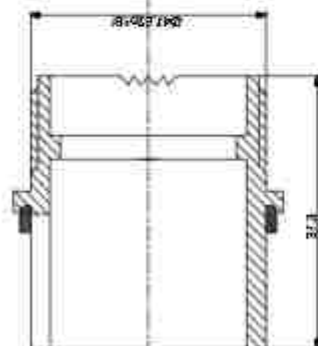
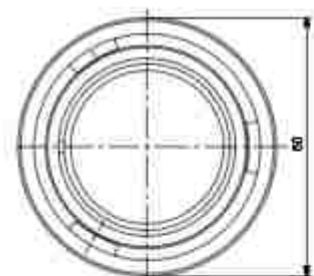
Ref-5HBT415278P0001

CONTACT PINS FOR ILLUSTRATION ONLY

7	HT14.520R0001	METAL CLIP SIZE 1A
8	HT14.527R0001	ADAPTOR STRAP- SIZE 1B
9	HT14.527R0001	BAG-ONLY SIZE 1A
2	HT14.528R0002	BUCKLES TWP. A & B SIZE 5
1	HT14.529R0001	PLUG ADON- SIZE 1B
6	HT13.507R0011	ASSEMBLY
5	HT13.507R0011	HT13 RESERV. PARTS
3	HT13.507R0011	HT13 RESERV. PARTS

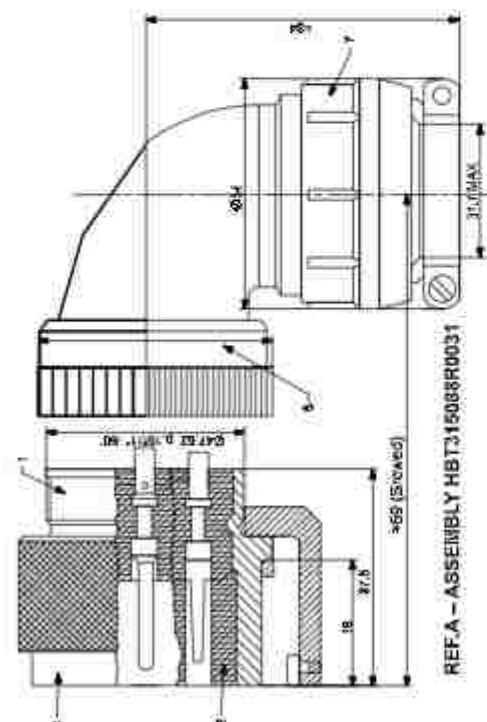
SET OF COMPLETE PLUG PLUG ASSEMBLY (NUT)
HBT71307ER0011

ALL DIMENSIONS ARE IN mm

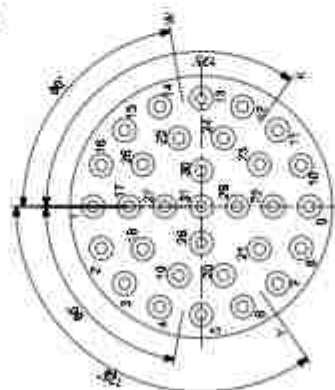


TECHNICAL DATA			
CONTACT	SIZE	1 MAX	CONDUCTOR CROSS SECTION
1	1/2	41A	10.0 mm ²
2	1/2	41A	6.0 - 8.0 mm ²
3	1/2	22A	8.5 - 15.3 mm ²
OPERATING VOLTAGE: 200V			
TEST VOLTAGE: 1000V			
ISOLATION RESISTANCE: MIN. 5000MΩ			

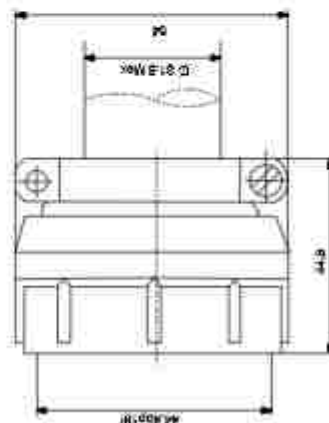
Ref-1 HBT415273P0003



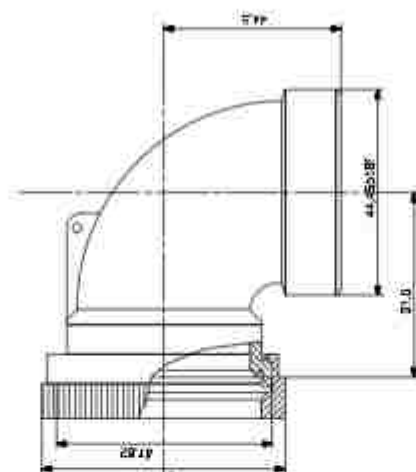
REF-A - ASSEMBLY HBT315088R00031



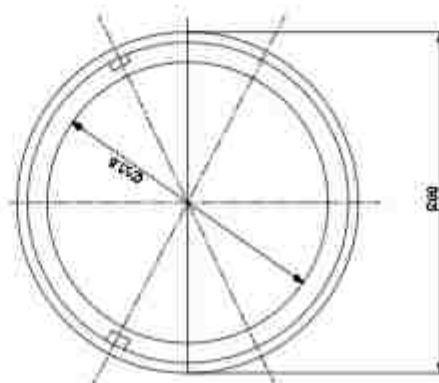
Ref-2 HBT415288P0002



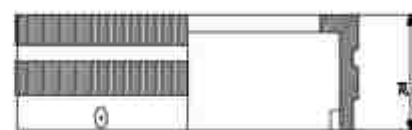
Ref-7 HBT415281P0003



Ref-6 HBT415280P0003



Ref-4 HBT415275P0001



REF. NO.	ITEM DESCRIPTION
1	HBT415281P0003
2	HBT415288P0002
3	HBT415273P0003
4	HBT415275P0001
5	HBT415280P0003
6	HBT415288R00031
7	ASSEMBLY

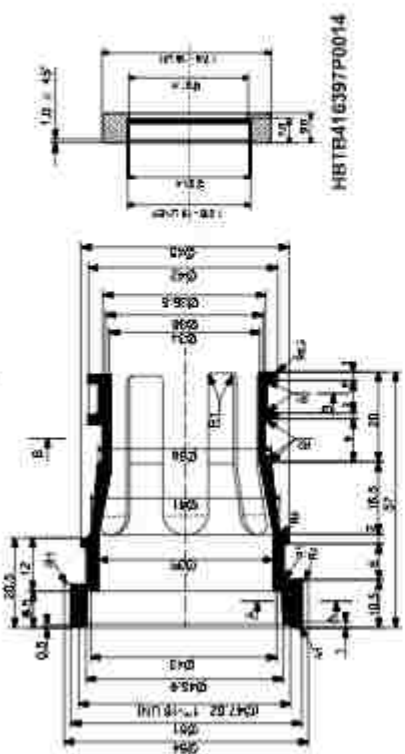
ITEM NO.	ITEM DESCRIPTION
1	CABLE HOLDER GR03
2	IN BETWEEN ANOCLAR GR 32
3	RING GR 32 BAJ
4	WAX BUSHINGS 3P/32
5	PLUG - HOLDING GR03
6	ASSEMBLY

1-PLUG 3-PIN 32 BUSH "N" B
HBT415288R00031

ALL DIMENSIONS ARE IN mm

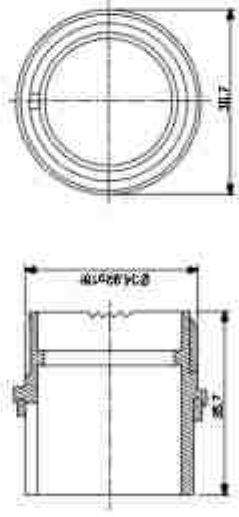
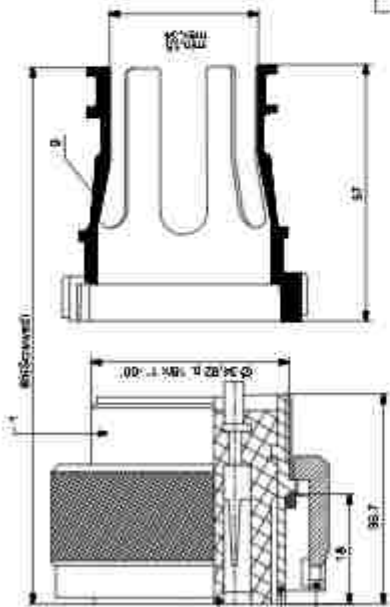
ITEM NO.	ITEM DESCRIPTION	QTY	UNIT
1	CABLE HOLDER GR03	1	PC
2	IN BETWEEN ANOCLAR GR 32	1	PC
3	RING GR 32 BAJ	1	PC
4	WAX BUSHINGS 3P/32	1	PC
5	PLUG - HOLDING GR03	1	PC
6	ASSEMBLY	1	PC

REF-8(HBTB416397R0004)

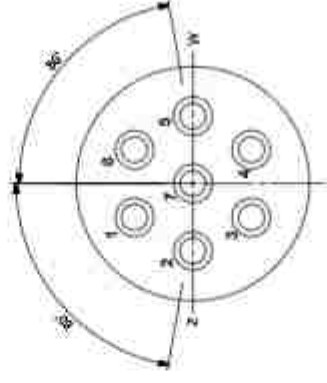


TECHNICAL DATA		
CON.	SIZE	MAX. CONDUCTOR CROSS SECTION
1	8	7.34
2	13	4.11
3	16	2.94
4	13	4.11
5	8	7.34
6	13	4.11
7	16	2.94
8	13	4.11
9	8	7.34
10	13	4.11
11	16	2.94
12	13	4.11
13	8	7.34
14	13	4.11
15	16	2.94
16	13	4.11
17	8	7.34
18	13	4.11
19	16	2.94
20	13	4.11
21	8	7.34
22	13	4.11
23	16	2.94
24	13	4.11
25	8	7.34
26	13	4.11
27	16	2.94
28	13	4.11
29	8	7.34
30	13	4.11
31	16	2.94
32	13	4.11
33	8	7.34
34	13	4.11
35	16	2.94
36	13	4.11
37	8	7.34
38	13	4.11
39	16	2.94
40	13	4.11
41	8	7.34
42	13	4.11
43	16	2.94
44	13	4.11
45	8	7.34
46	13	4.11
47	16	2.94
48	13	4.11
49	8	7.34
50	13	4.11
51	16	2.94
52	13	4.11
53	8	7.34
54	13	4.11
55	16	2.94
56	13	4.11
57	8	7.34
58	13	4.11
59	16	2.94
60	13	4.11
61	8	7.34
62	13	4.11
63	16	2.94
64	13	4.11
65	8	7.34
66	13	4.11
67	16	2.94
68	13	4.11
69	8	7.34
70	13	4.11
71	16	2.94
72	13	4.11
73	8	7.34
74	13	4.11
75	16	2.94
76	13	4.11
77	8	7.34
78	13	4.11
79	16	2.94
80	13	4.11
81	8	7.34
82	13	4.11
83	16	2.94
84	13	4.11
85	8	7.34
86	13	4.11
87	16	2.94
88	13	4.11
89	8	7.34
90	13	4.11
91	16	2.94
92	13	4.11
93	8	7.34
94	13	4.11
95	16	2.94
96	13	4.11
97	8	7.34
98	13	4.11
99	16	2.94
100	13	4.11

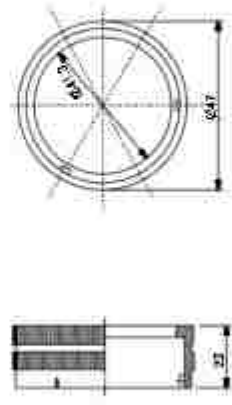
REF-1
ASSEMBLY DRAWING(HBTB315110R0001)



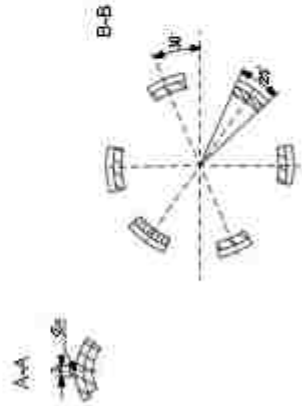
REF-6(HBT415273P0002)



REF-7(HBT415286P0002)



REF-8(HBT415278P0002)

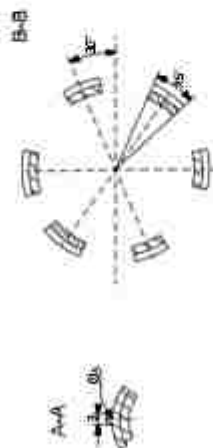
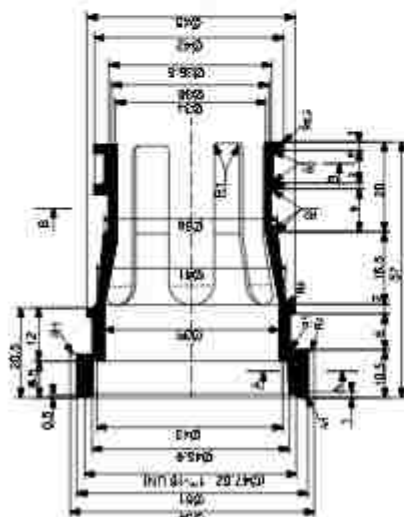


HBTB416397P0012

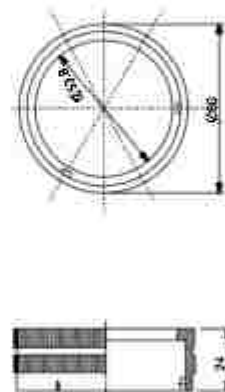
SET OF COMPLETE PLUG/PLUG PTH SOCKET/ BUD/OOR
HBTB 315110R0011

ITEM NO.	ITEM DESCRIPTION	REVISION	DATE	BY	CHKD	APP'D
1	HBTB 315110R0011					
2	HBTB 315110R0011					
3	HBTB 315110R0011					
4	HBTB 315110R0011					
5	HBTB 315110R0011					
6	HBTB 315110R0011					
7	HBTB 315110R0011					
8	HBTB 315110R0011					
9	HBTB 315110R0011					
10	HBTB 315110R0011					
11	HBTB 315110R0011					
12	HBTB 315110R0011					
13	HBTB 315110R0011					
14	HBTB 315110R0011					
15	HBTB 315110R0011					
16	HBTB 315110R0011					
17	HBTB 315110R0011					
18	HBTB 315110R0011					
19	HBTB 315110R0011					
20	HBTB 315110R0011					
21	HBTB 315110R0011					
22	HBTB 315110R0011					
23	HBTB 315110R0011					
24	HBTB 315110R0011					
25	HBTB 315110R0011					
26	HBTB 315110R0011					
27	HBTB 315110R0011					
28	HBTB 315110R0011					
29	HBTB 315110R0011					
30	HBTB 315110R0011					
31	HBTB 315110R0011					
32	HBTB 315110R0011					
33	HBTB 315110R0011					
34	HBTB 315110R0011					
35	HBTB 315110R0011					
36	HBTB 315110R0011					
37	HBTB 315110R0011					
38	HBTB 315110R0011					
39	HBTB 315110R0011					
40	HBTB 315110R0011					
41	HBTB 315110R0011					
42	HBTB 315110R0011					
43	HBTB 315110R0011					
44	HBTB 315110R0011					
45	HBTB 315110R0011					
46	HBTB 315110R0011					
47	HBTB 315110R0011					
48	HBTB 315110R0011					
49	HBTB 315110R0011					
50	HBTB 315110R0011					
51	HBTB 315110R0011					
52	HBTB 315110R0011					
53	HBTB 315110R0011					
54	HBTB 315110R0011					
55	HBTB 315110R0011					
56	HBTB 315110R0011					
57	HBTB 315110R0011					
58	HBTB 315110R0011					
59	HBTB 315110R0011					
60	HBTB 315110R0011					
61	HBTB 315110R0011					
62	HBTB 315110R0011					
63	HBTB 315110R0011					
64	HBTB 315110R0011					
65	HBTB 315110R0011					
66	HBTB 315110R0011					
67	HBTB 315110R0011					
68	HBTB 315110R0011					
69	HBTB 315110R0011					
70	HBTB 315110R0011					
71	HBTB 315110R0011					
72	HBTB 315110R0011					
73	HBTB 315110R0011					
74	HBTB 315110R0011					
75	HBTB 315110R0011					
76	HBTB 315110R0011					
77	HBTB 315110R0011					
78	HBTB 315110R0011					
79	HBTB 315110R0011					
80	HBTB 315110R0011					
81	HBTB 315110R0011					
82	HBTB 315110R0011					
83	HBTB 315110R0011					
84	HBTB 315110R0011					
85	HBTB 315110R0011					
86	HBTB 315110R0011					
87	HBTB 315110R0011					
88	HBTB 315110R0011					
89	HBTB 315110R0011					
90	HBTB 315110R0011					
91	HBTB 315110R0011					
92	HBTB 315110R0011					
93	HBTB 315110R0011					
94	HBTB 315110R0011					
95	HBTB 315110R0011					
96	HBTB 315110R0011					
97	HBTB 315110R0011					
98	HBTB 315110R0011					
99	HBTB 315110R0011					
100	HBTB 315110R0011					

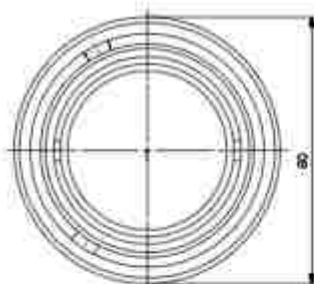
ALL DIMENSIONS ARE IN MM



REF-2(HB TB416397P0012)



REF-8(HBT415275P0003)

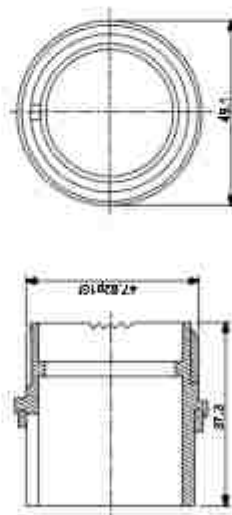


TECHNICAL DATA			
COND.	SIZE	MAX. CONDUCT. (DIAGONAL SECTION)	
-	4	7MA	10.0 mm ²
-	13	47A	0.5 - 3.0 mm ²
-	16	22A	0.5 - 1.5 mm ²

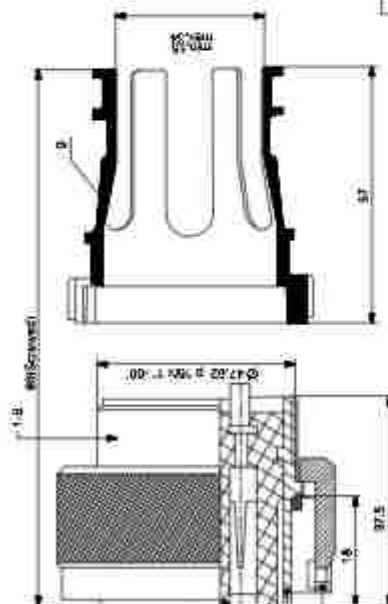
TEST VOLTAGE 250V
 INSULATION RESISTANCE MIN. 5000/M²



REF-7(HBT415287P0002)



REF-61HBT415273P00031



REF. 1

ASSEMBLY DRAWING(HBTB315111R0001)

CONTACTS FOR ILLUSTRATION ONLY

SET OF COMPLETE PLUG-PLUG 13P32 SOCKET™ (INGOOS) WITH CABLE CLAMP
 13P32 3151110021

Q	HTB4 1230 FRUIT ¹	CABLE BELIEVE SIZE 1/8 INCH
6	HNT 4152/70W003	BAYONET "SIZE 70"
7	HBT 4152/67P003	BUSHES TEMPLATE, 533X1/2"
8	HMT 4153/29-00003	PILLO BODY, SUEZ X 3/4"
9		ASSEMBLY
1	HB131511 P0021	
REF NO	ABD QD	ITEM DESCRIPTION

ALL DIMENSIONS ARE IN mm