

ALT	A	B	C	D	E	
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ENCLOSURES:

1. DRG. NO. CIM/ES/SK-2/H-1(4 SHEETS)

ALT	A	B	E	D	E
-----	---	---	---	---	---

2. DRG. NO.

ALT	A
-----	---

TOTAL NO. OF SHEETS IN THIS SPECN.

ALT	C	D	E
SHTS.	13	13	13

SPECIFICATION FOR  
CAB HEATERS  
FOR  
25 KV AC ELECTRIC LOCOMOTIVES  
CLASS:WAM-4, WAG-5A, WAG-5B,  
WCM-6, WCG-3

RE-TRACED

ISSUED BY  
DY. CHIEF ELECTRICAL ENGINEERS(D&D)  
CHITTARANJAN LOCOMOTIVE WORKS  
P.O. CHITTARANJAN-713331  
DIST: BURDWAN, WEST BENGAL, INDIA.

CAB HEATERS,

*[Signature]*  
श.गु वि. (वरि.)  
DY. CEE. (D)

নির্ভরযোগ্য ইলেক্ট্রিক্যাল ইঞ্জিনিয়ার  
শ্রীমান শ.গু. বি. (D)  
CHITTARANJAN LOCOMOTIVE WORKS  
WEST BENGAL, INDIA  
স্মারক/NO. CIM/ES/H-1/E  
তারিখ/DATE: 11-4-85

100%  
 AEE/D  
 CRKD  
 DRN  
 100%

DETAILS OF ALTERATIONS :

98  
2 Sheet

ALT	DATE	DESCRIPTION	SIGNATURE	REMARKS
A	10-8-81	Drg.No. CLM/ES/SK-1/N-1 is superseded by Drg.No. CLM/ES/SK-2/N-1 Sheet-4 deleted.	SD/-	
B	12-11-82	Note 11 added in Drg. Sheet No.3	SD/-	
C	9-11-84	Sheet 7 added.	SD/-	
D	26-3-93	The cab heaters shall be capable of working at a nominal voltage of 415 V, 50HZ, Single <sup>ph</sup> A.C. The voltage fluctuation will be $415 \pm 22\%$ .	SD/-	
E	23-2-95	Used in WDM/6 & WDM/3 Loco also.	SD/-	

1/1/84  
 AEE-D  
 CHRD  
 DRN

SPECIFICATION FOR CAB HEATERS.

*(Signature)*  
 डी. सी. वी. (अति.)  
 DY. CEE. (D)

चित्तारंजन रेल इंजन कारखाना  
 WEST BENGAL, INDIA  
 CHITTARANJAN LOCOMOTIVE WORKS  
 WEST BENGAL, INDIA  
 क्रमांक/NO. CLM/ES/SK-1/N-1  
 तिनांक/DATE : 11-6-86

# INDEX

Sheet  
3

- 1.0 Scope
- 2.0 Service conditions
- 3.0 Deviations
- 4.0 Submission of Tender Quotation
- 5.0 Approval of sample
- 6.0 Conditions of contract
- 7.0 Technical documents and drawings to be furnished by the supplier as part of the contract.
- 8.0 Guarantee
- 9.0 Technical specification
- 10.0 Standard
- 11.0 Tests
- 12.0 Schedule of Technical particulars-Annexure 'A'
- 13.0 Test Programme- Annexure 'B'

37/10/06  
AEE/D

37/10/06  
CHD

37/10/06  
DRN

CAB HEATERS

*[Signature]*  
उप-मू. नि.व. (नि.नि.)  
DY. CEE. (D)

चितरंजन लोकोमोटिव कारखाना  
वीथी नं. १०६, १३१०  
CHITTARANJAN LOCOMOTIVE WORKS  
WEST BENGAL, INDIA  
क्रमांक/NO. C.E.M./22/11-3/1  
दिनांक/DATE : 11-4-06

1.0 SCOPE

1.1 This specification covers the manufacture and supply of cab heater for installation on the 25 KV Single Phase, 50 C/s, A.C. Electric Locomotives of the Indian Railways.

2.0 SERVICE CONDITIONS

2.1 As the equipment covered by the specification are mounted on locomotives, they shall be subjected to considerable vibrational and buffing shocks during service.

2.0 DEVIATION

3.1 Any deviation from the standards laid down with a view to improve the performance, may be given due consideration provided, full particulars with justification, thereof, are furnished. It may, however, be noted, that due to limited availability of space in the locomotive and the necessity to ensure inter changeability with the existing equipment increased in the overall and mounting dimensions shall not be allowed normally.

4.0 SUBMISSION OF TENDER QUOTATION

4.1 All tender documents including the quotation shall be submitted in duplicate. The tenderer shall inter-alia furnish the following alongwith the quotation.

- i) Detailed dimensional drawings in six(6) copies.
- ii) Full technical particulars of the offer.

5.0 APPROVAL OF SAMPLES

5.1 The supplier shall make available at least two prototype of the equipment proposed to be supplied by him for inspection and tests at his works and advise the Dy. Chief Electrical Engineer (Design), Chittaranjan and Controller of Stores, Calcutta as and when he is ready with the prototype and necessary testing and measuring apparatus and facilities for carrying out the tests.

5.2 After the above tests, if it is considered necessary by the Dy. Chief Electrical Engineer (Design) or his authorised representative to carry out any further tests or trials of the prototype at Chittaranjan, the supplier will arrange for the same by the quickest means.

5.3 Any short comings or defects in the design and workmanship of the equipment, shall be pointed out after the tests, to enable the manufacturer to incorporate the necessary improvement before bulk manufacture is commenced, without affecting

COST.....

CAB HEATERS.

*Handwritten signature*

ए.ए. सि. व. (संवि.)  
DY. CEE. (D)

चितरंजन रेल इंजन कारखाना  
वी.ए. ए. ए. ए.  
CHITTARANJAN LOCOMOTIVE WORKS  
WEST BENGAL, INDIA  
क्रमांक/NO. CIM/ES/H-1/5  
दिनांक/DATE: 11-6-56

5.3 the guaranteed deliveries or guaranteed performance characteristics.

5.4 Any testing and approval by the purchaser of the design working drawing and prototype shall in no way absolve the supplier of his responsibilities under the terms of the contract for the equipment supplied.

5.5 The supplier shall not offer equipments of series production to the Inspector authorised 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.

6.0 CONDITIONS OF CONTRACT

6.1 The standard I.R.S. conditions of contract will be applicable for the supply of the equipment.

7.0 TECHNICAL DOCUMENTS AND DRAWING TO BE FURNISHED BY THE SUPPLIER AS PART OF THE CONTRACT.

7.1 The following <sup>drawing</sup> and documents shall be supplied by the supplier.

I. TYPE TEST REPORT OR CERTIFICATE

This shall be supplied in standard 'A4' size of sheets with punched holes for filing. It shall be suitably enclosed in a cover. Type test reports shall have to be signed both by the suppliers engineers and CLW's engineers or the Director of Inspection as the case may be. Six(6) copies of the report shall be supplied.

II. ROUTINE TEST CERTIFICATE

This shall be supplied in standard 'A4' size of sheets with punched holes for filing. Routine test certificates shall be submitted alongwith each individual equipment in 6 copies.

III DRAWINGS

The supplier shall submit atleast ten(10) copies of drawings of the equipment ordered on him within two weeks from the date of receipt of the purchase order to Dy. Chief Electrical Engineer (Des. & Dev.) for approval. Any discrepancy, correction considered necessary will be indicated on the drawings and supplier shall take due note of them and effect supplies accordingly.

8.0 GUARANTEE

cont....

CAB HEATER

*Chatterjee*  
 ३३-५ बि. व. (वि. वि.)  
 DY. CEE. (D)

वितरण रेल इंजन कारखाना  
 चित्तारंजन, बिहार  
 CHITTARANJAN LOCOMOTIVE WORKS  
 WEST BENGAL, INDIA  
 CLW / १३३/१-१/१०

क्रमांक/NO. C  
 दिनांक/DATE : 11-4-66

DRW/7  
 CHKD  
 AEE/D

9.1 The supplier shall give a guarantee of clear 24 months on the equipment from the date of despatch of the equipment. Any damage or defect noticed during the period due to defective material or workmanship will be replaced by the supplier free of cost.

#### 9.0 TECHNICAL SPECIFICATION

- 9.1 The heater covered by this specification is required for mounting in the 25 kv A.C. Electric Locomotives for heating the cab air to a comfortable temperature during the winter and shall be suitable to withstand the buffing shocks and vibrations encountered on the locomotives.
- 9.2 The heater shall be made of tubular element housed in sheet metal box generally in accordance with sketch No. CLW/ES/SK-1/H-1 attached to this specification. It shall be suitable for vertical mounting and designed to work on natural convection currents of the surrounding air. The surface loading of the tubular jacket of the heater shall preferably be NOT MORE THAN 2.5 watts/cm. The heater shall be of 500 watts capacity suitable for a nominal voltage of 415 V Alt-d, single phase 50 C.P.S. supply. Voltage fluctuation will be 415 V Alt-d  $\pm 2\frac{1}{2}\%$ . The loading at nominal voltage shall not vary by more than 3% of rated value.
- 9.3 Air inlet and outlet louvres shall be provided with close 3/8" wire mesh to avoid entry of varn/insects etc. The housing shall be provided with plain cable side entries with suitable rubber entry bushes with plastic plugs. Volt-d cadmium plated terminals of M5 shall be provided for electric connections. The housing shall be finished in black stove enamel with matt finish.
- 9.4 Terminal arrangement and provision of fused shall be generally in accordance to sketch No. CLW/ES/SK-1/H-1. The terminal board shall be made of synthetic resin bonded paper, but preference shall be given to 'Heat resistant low hygroscopic symianic sheet'. The fuses provided shall be of MRC Type.
- 9.5 Suitable inspection openings with cover shall be provided to attend to the fuses.
- 9.6 It may specifically be noted that sketch No. CLW/ES/SK-1/H-1 attached to this specification is purely for the purposes of guidance. The overall dimensions can be related upto 700 mm x 200 mm x 160 mm.
- 9.7 The tenders shall furnished technical particulars of the material offered by them in line with Annexure-A attached to this specification. No tender shall be considered complete without the receipt of the above schedule of technical particulars.

contd...

CAB HEATER

ज.सू. नि.ज. (नि.वि.)  
DY. CEE. (D)

चितरंजन लोकोमोटिव कारखाना  
पश्चिम बंगाल, भारत  
CHITTARANJAN LOCOMOTIVE WORKS  
WEST BENGAL INDIA  
आदेश/NO. CLW/ES/H-1/E.  
दिनांक/DATE: 11-4-66

9.8 MARKING : See sheet No. 8 below.

10.0 STANDARD

10.1 All the materials used in the manufacture of the cab radiator shall comply with the latest issues of the relevant I.S. Specifications. Where an I.S. specification is not available, B.S. or V.D.R. specification shall apply.

11.0 TESTS

11.1 The radiators/heaters shall be tested in accordance with test programme attached to this specification, Annexure-B.

SPECIAL CONDITION - Once a prototype is approved no contractor shall change his source of supply or sub-contractor for purchased components and sub-assemblies without CLW's approval.

3/11/58  
 ABE/1  
 CHRO  
 11/4/58

	<p style="text-align: center;"><i>Be</i></p> <p>उप.सू. वि.ज. (अनि.) DY. CEE. (D)</p>	<p style="text-align: center;">                 चित्तारंजन लोकोमोटिव कारखाना                  रॉयल बंगला, बरकतपुर                  CHITTARANJAN LOCOMOTIVE WORKS                  WEST BENGAL, INDIA             </p> <p>क्रमांक/NO. : 11-4-58              तिथि/DATE : 11-4-58</p>
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12.0 SCHEDULE OF TECHNICAL PARTICULARS

1. Diameter of resistance wire element.
2. Length of resistance element used.
3. Composition of resistance wire element.
4. Specific resistance in ohm/metre/mm<sup>2</sup>.
5. Resistance per metre of wire @ 20°C.
6. Temperature.
7. Surface loading of wire in Watts/cm<sup>2</sup>.
8. Diameter of the resistance element spiral and number of turns of wire.
9. Highest operating temperature of the resistance element while dissipating 500 watts at 415V. Au (D)
10. Particulars of filling power bedding in material used between the resistance element and the external tube.
11. Composition of the tube ~~and~~ jacket.
12. Diameter of the tube jacket.
13. Length of the tube jacket.
14. Surface loading of the tube jacket temperature.
15. Highest permissible tube jacket temperature.
16. Length of unheated tube ends allowed for in the design.
17. Particulars of the built in fuse used in the assembly.
18. Value of leakage current between tube jacket and element when operating under rated conditions.

9.8 Making :- Manufacturer shall provide a Name Plate in a conspicuous place on the metal cover.

- 1) Permanent Identification Mark.
- 2) Manufacturer's Name/Monogram of Brand if any.
- 3) Month and year of Manufacturer
- 4) Serial No.
- 5) Type
- 6) Reduced Voltage :- Wattage -  
Frequency -
- 7) Ref: I.S.S.No.

SPCIFICATION FOR  
CAB HEATERS

*De*  
স্ব.স্ব. বি.স. (বি.স.)  
DY. CEE. (D).

চিটারঞ্জন লোকোমোটিভ  
কর্পোরেশন  
CHITTARANJAN LOCOMOTIVE WORKS  
WEST BENGAL INDIA  
স্মারক/NO. CLM/PS/14-1/9  
তারিখ/DATE : 11-4-2006.

ANNEXURE-B

TEST PROGRAMME FOR CAB RADIATORS

Type Test

Routine Test

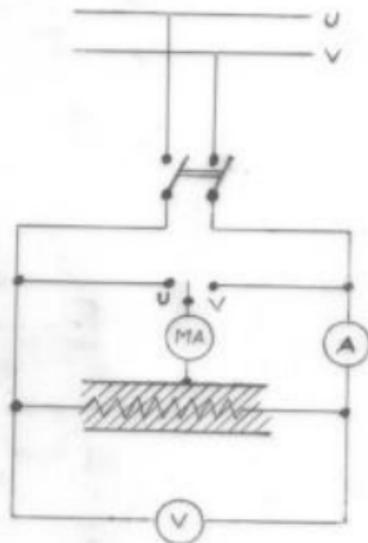
- |  |   |
|--|---|
| <p>1. Measurement of resistance of the element at ambient temperature (Specify ambient).</p>   | <p>Same as type test.</p>   |
| <p>2. Measurement of leakage current in accordance with Sketch No. CIA/WB/SK-1/M-1 (Sh.4)<br/>The leakage current shall not exceed the value stipulated in para-25 of the I.E. Rules 1956.</p>   | <p>Same as type test but on 10 percent of samples selected at random.</p>     |
| <p>3. Checking of the sealing of the connecting ends (Moisture test).</p>  | <p>Same as type test but on 10 percent of samples selected at random.</p>     |
| <p>4. Insulation Resistance test.<br/>Rated voltage shall be applied at the radiator terminals until all the parts of the radiator have attained a steady temperature. The supply shall then be cut off and the insulation resistance measured as under with a 1000V megger. The values of insulation resistance obtained shall be higher than those indicated in the following table :-</p> <p>i) Between the resistance element and tube jacket = 0.2 megohm.</p> <p>ii) Between resistance element and any insulating support = 100 megohm.</p> | <p>Same as type test.</p>   |
| <p>5. Dielectric test at 3 kV, 50 c/s. single phase, A.C. for 2 minutes when cold.</p>   | <p>Same as type test.</p>   |
| <p>6. Heat run test at 120% of rated voltage for 30 minutes, immediately followed by test No.5 above.</p>  | <p>Same as type test but on 10 percent of the samples selected at random.</p> |

27-6  
 AEE/D  
 15/10  
 CHKS  
 27-6  
 D/W

TEST PROGRAMME FOR  
CAB RADIATORS

सत्य सि.न. (सवि.)  
DY. CEE. (D)

चितरंजन लोकोमोटिव कारखाना  
 4533 एच. ४०१, ४०१  
 CHITTARANJAN LOCOMOTIVE WORKS  
 WEST BENGAL, INDIA  
 डा.नं./NO. CIA/WB/M-1/E  
 दिनांक/DATE : 11-4, 2006.

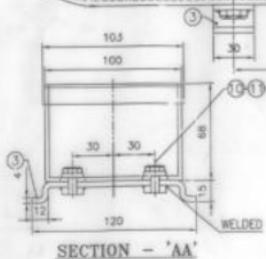
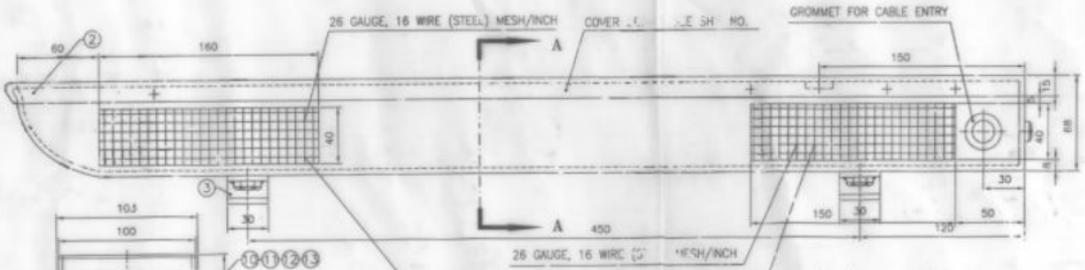
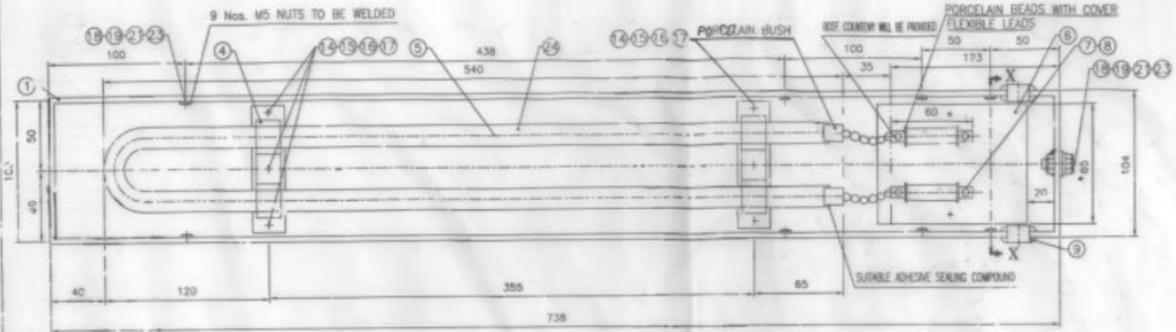


CIRCUIT DIAGRAM FOR  
MEASURING THE  
LEAKAGE CURRENT.

*AK*  
डा. सु. वि. व. (संवि.)  
DY. CEE. (D)

चितरंजन रेल इंजन कारखाना  
सीकरा नगर, ७४१०  
CHITTARANJAN LOCOMOTIVE WORKS  
WEST BENGAL, INDIA  
क्रमांक/NO. CLW/ES/SK-2/H-1  
दिनांक/DATE : 11-4-06

ALT. NO.	AUTHORITY	EFFECTIVE SHT. NO.	DESCRIPTION	INITIAL	DATE
				SEL/D	DY.C.E.E/D

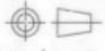


AIR INLET/OUTLET OPENING SHALL BE 1/2" ON BOTH SIDES OF HEATER. BLACK PAINTED OPENING SHALL BE WELDED WITH CLOSE WIRE MESH (STEEL) FROM INSIDE.

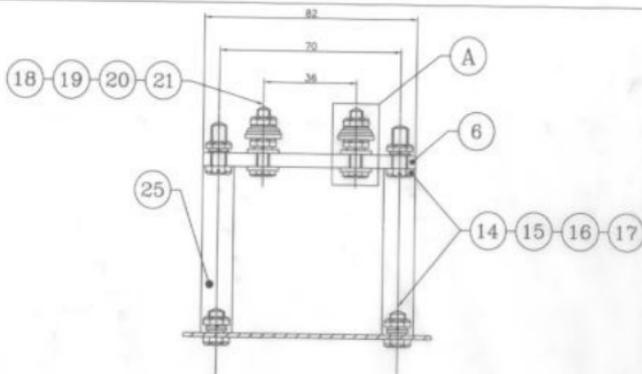
**WAG-7 & WAP-4  
ELECTRIC  
CAB  
HEATER**

CAP. NO.	REV.	PART. ENG. NO.	DESCRIPTION	QTY./LOT	MAT.	SPK.	REMARKS
	DATE	NAME					
		<i>H. B. Chatterjee</i>					
		<i>H. B. Chatterjee</i>					

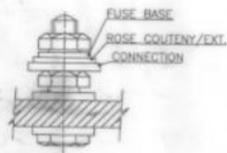
CHITTARANJAN  
LOCOMOTIVE WORKS  
WEST BENGAL, INDIA



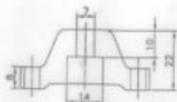
APPROVED- *[Signature]* /08-11-01  
No. CLW/ES/SK-2/H-1/B



SECTION - 'XX'



DETAILS OF - A



DETAILS OF REF. - 22

## NOTE:

1. WATTAGE:- 500 WATTS 3% AT 380 V.A.C.
2. THE TERMINALS LEADS COVERED BY PORCELAIN BEADS SHALL HAVE A MINIMUM CLEARANCE OF 10MM. FROM BODY.
3. WIRE GAUGE SIZE OF HEATING ELEMENT 31 SWG.
4. TOLERANCE OF JECKET TUBE WALL THICKNESS WILL BE 0.2 MM.
5. TERM. BOARD WILL BE TREATED WITH DR. BECK'S VARNISH SILICONITE E233 TO AVOID DI-ELECTRIC FAILURE.
6. JACKET TUBE WALL THICKNESS SHALL BE WITHIN 0.8 MM. TO 1. MM. AFTER COMPRESSION OF MGD.
7. GENERAL TOLERANCE:  $\pm 3$  MM.
8. ALL DIMENSIONS ARE IN MM.
9. THIS DRG. SUPERSEDES DRG.NO.CLW/ES/SK-1/H-1(IN 3 SHITS.)
10. 2 MM. THICK PARAMITE SHEET SHALL BE RIVETTED BY ALUMINIUM RIVET ON THE INSIDE OF THE BOTH FRONT COVER PLATES.
11. CLEARANCE BETWEEN THE TERMINALS COVER AND TERMINAL SHALL NOT BE LESS THAN 10 MM.

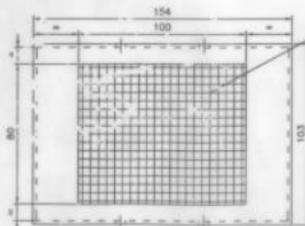
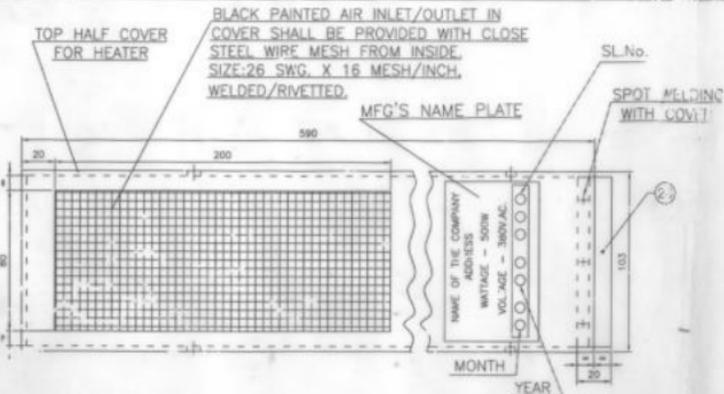
ALT. NO.	AUTHORITY	EFFECTIVE SHY. NO.	DESCRIPTION	INITIAL		DATE
				SEE/O-	DY.C.E.E./D	

26.	COVER PLATE	1	M.S.	IS:226	BLACK PAINTED
25.	PORCELAIN SUPPORT FOR U TUBE 62 X 30 X 28	2	PORCLAN	IS:2544	-
24.	JECKET TUBE 18 SWG. O/D 11.2	1	SHANKS STEEL	THICKNESS 1.219	-
23.	SLOTTED HEX. HD. SCREW M5 X 15	9	STEEL	IS:2016	-
22.	PORCELAIN SUPPORT FOR TERMINAL 50 X 22 X 21	2	PORCLAN	IS:2544	-
21.	HEX. NUT M5	17	STEEL	IS:1364	CAD PLATED
20.	SLOTTED HEX. HD. SCREW M5 X 25	4	STEEL	IS:1364	00 P/B
19.	PLAIN WASHER M5	21	STEEL	IS:2016	00 P/B
18.	SPG. WASHER M5	17	SPC.SL	IS:3063	00 P/B
17.	SPG. WASHER M6	12	SPC.SL	IS:3063	00 P/B
16.	PLAIN WASHER M6	12	STEEL	IS:2016	00 P/B
15.	HEX. NUT M6	12	STEEL	IS:2016	00 P/B
14.	SLOTTED HEX. HD. SCREW M5 X 25	12	STEEL	IS:1364	00 P/B
13.	SLOTTED HEX. HD. SCREW M5 X 15	4	STEEL	IS:1364	00 P/B
12.	SPG. WASHER M8	4	SPC.SL	IS:3063	00 P/B
11.	HEX. NUT M8	4	STEEL	IS:1364	00 P/B
10.	PLAIN WASHER M8	4	STEEL	IS:2016	00 P/B
9.	RUBBER GROMMET WITH PLUG OR BUNG	2	RUBBER	IS:5270	-
8.	ROSE COUTENY FOR M5 TERM.	2	BRASS	IS:1366	IN P/B
7.	H.R.C. FUSE-2 AMPS.	2	H.R.C.	M/E E.C.C. WARS TYPE 744	-
6.	FUSE TERM. BOARD 95 X 85 X 15	1	INDIAN	NATURAL GRADE.	-
5.	HEATING ELEMENT,380 V.A.C.500W	1	NI/CR	-	-
4.	ELEMENT CLAMP	4	M.S.	IS:226	00 P/B
3.	MOUNTING BRACKET 150 X 30 X 4	2	M.S.	IS:226	BLACK PAINTED
2.	HEATER BODY COVER IN TWO PARTS	1	M.S.	IS:226	BLACK PAINTED
1.	HEATER BODY SIZE 736 X 100 X 121	1	M.S.	IS:226	BLACK PAINTED

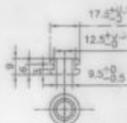
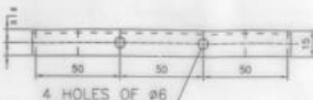
CAD NO.	REV.	PART DRG. NO.	DESCRIPTION	QTY./LOCAL	MAT. SPEC.	REMARKS
DATE	NAME		WAG-7 & WAP-4			
DRN	E-8-01/Amalendu		ELECTRIC CAB HEATER			
CHD	E-8-01-41		ELECTRIC CAB HEATER			
SIZE/D			ELECTRIC CAB HEATER			
SCALE:			ELECTRIC CAB HEATER			
REF.			ELECTRIC CAB HEATER			

 CHITTARANJAN  
 LOCOMOTIVE WORKS  
 WEST BENGAL, INDIA

 APPROVED-  
 No.CLW/ES/SK-2/H-1/B

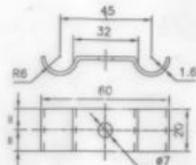


BLACK PAINTED AIR INLET/OUTLET IN COVER SHALL BE PROVIDED WITH CLOSE STEEL WIRE MESH FROM INSIDE. SIZE:26 SWG X 16 MESH/INCH. WELDED/RIVETTED.

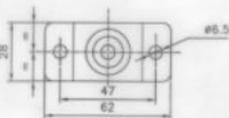
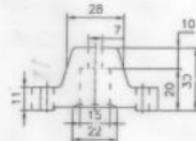


AS PER IS:5270,195

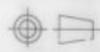
ALT. NO.	AUTHORITY	EFFECTIVE SH. NO.	DESCRIPTION	INITIAL		DATE
				DES/D-	BY/EE/D	



DETAIL OF REF.4



DETAIL OF REF.25

CAD NO.	REF.	DATE	DATE	NAME	DESCRIPTION	QTY / LOC.	MAT.	SPECN.	REMARKS
					WAG-7 & WAP-4				CHITTARANJAN GENOTIVE WORKS WEST BENGAL, INDIA
					<b>ELECTRIC CAB HEATER</b>				 APPROVED -  / 08-11-11 No. CLW/ES/SK-2/11-1/E
					SCALE: 				
					REF.				