



International Year
of Cooperatives

Cooperatives Build
a Better World



International Year
of Cooperatives

Cooperatives Build
a Better World

भारत सरकार/GOVERNMENT OF INDIA

रेल मंत्रालय/MINISTRY OF RAILWAYS

रेलवे बोर्ड/RAILWAY BOARD

No. 2025/TT-IV/12/10

Date: 09.05.2025

The General Managers,
All Zonal Railways and
CMD/KRCL.

Sub: Instructions for exchange of signal between Loco Pilot/Assistant Loco Pilot, Train Manager and Station Staff – GR4.42 reg.

Ref: CLW's specification No. CLW/MS/3/0670ALT-2 dated 13.03.2025 for blinking signal exchange light.


In view of the rapid proliferation of Air conditioning in cab of locomotives, the method of acknowledgment of 'all right' signals by running staff (Loco Pilot, Assistant Loco Pilot and Train Manager) has been reviewed by Board. It has been observed that some of the Zonal Railways have issued instructions for exempting Train Manager from the acknowledgement of 'all right' signals by Station/Train passing staff, in air conditioned SLRs. Some Zonal Railways have also authorized the use of signal exchange lamp by loco pilot/ assistant loco pilot for Vande Bharat train sets. Board [M(T&RS) and M(O&BD)] have reviewed the above and approved the following for implementation by Zonal Railways:

"Signal exchange lights of approved design, wherever provided outside the locomotives/SLRs/brakevans/Vande Bharat train sets may be operated by Loco Pilot/Assistant Loco Pilot/ Train Manager for the purpose of exchanging signals with station staff/train passing staff/running staff of adjacent trains. In case the signal exchange light is defective, the extant practice of Zonal Railways should be followed. Further, signal exchange light does not absolve Loco Pilot/Assistant Loco Pilot/Train Manager from observance of the signal exchange given by station staff/train passing staff/running staff of adjacent trains."

2. Zonal Railways are advised to counsel the running/train passing staff for the above instructions and review the local instructions for necessary compliance.

This has the approval of M(O&BD) and M(T&RS).

DA: As above



(Tejendra Singh)
Joint Director Traffic Trans-III
Railway Board
Email Id: tejendra.singh@gov.in

Copy to:

1. PSO/M(O&BD) , Railway Board for kind information of M(O&BD).
2. PSO/M(T&RS) , Railway Board for kind information of M(T&RS).
3. AM/Traction, Railway Board.
4. PED/Safety, Railway Board.

Page 1 of 9	Specification No-CLW/MS/3/0670 (Electrical Signal Exchange System)	Alt-2
-------------	---	-------

SPECIFICATION FOR ELECTRICAL SIGNAL EXCHANGE SYSTEM FOR 3-PHASE ELECTRIC LOCOMOTIVE

SPECIFICATION No.:
CLW/MS/3/0670 ALT-2

Enclosure: Drawing No: i) Sketch-001/Alt-2
ii) Sketch-002/Alt-2

ISSUED BY:

DY.CHIEF ELECTRICAL ENGINEER/D/III.
CHITTARANJAN LOCOMOTIVE WORKS
P.O. CHITTARANJAN – 713331
DIST. BURDWAN (WEST), WEST BENGAL (INDIA)

Prepared By	Checked By	Issued By
SSE – Design	SEE -Design	Dy.CEE/D-III

Page 2 of 9	Specification No-CLW/MS/3/0670 (Electrical Signal Exchange System)	Alt-2
-------------	---	-------

INDEX

1. **GENERAL DESCRIPTION**
2. **SCOPE**
3. **CLIMATE AND ENVIRONMENTAL CONDITION**
4. **STANDARDS**
5. **SCOPE OF SUPPLY**
6. **GENERAL FEATURES & TECHNICAL REQUIREMENTS**
7. **TESTS**
8. **DOCUMENTATION**
9. **LABEL and MARKING**
10. **QUALITY ASSURANCE**
11. **PACKING**

Prepared By	Checked By	Issued By
SSE – Design	SEE -Design	Dy.CEE/D-III

Page 3 of 9	Specification No-CLW/MS/3/0670 (Electrical Signal Exchange System)	Alt-2
-------------	---	-------

ALTERATION RECORD SHEET

Amendment Number	Date of Amendment	Page number	Alteration	Descriptions	Authority
1	01/08/2022		1	DRAWING NO.SKETCH 001 (25.03.2022) AND SKETCH 002 (25.03.2022) INCLUDED WITH THE SPECIFICATION.	Sd/-
2	12-03-2025		2	Specification has been thoroughly revised. Flickering of LED indication lamp added, Flash mounted type switch introduce, one green push button switch in place of two green push button switch applied. Lux value modified. Type test and routine test elaborated. Some other modification also incorporate. Drawing no-Sketch-001 and Sketch-002 modified.	

Note: Specification has been digitized and all the alteration i.e addition , deletion, modification etc. has been incorporated in the digitized specification.

Prepared By	Checked By	Issued By
SSE – Design	SEE -Design	Dy.CEE/D-III

Page 4 of 9	Specification No-CLW/MS/3/0670 (Electrical Signal Exchange System)	Alt-2
-------------	---	-------

1.0 GENERAL DESCRIPTION

SPECIFICATION FOR ELECTRICAL SIGNAL EXCHANGE SYSTEM FOR 3-PHASE ELECTRIC LOCOMOTIVE.

2.0 SCOPE:

This specification covers the supply of ELECTRICAL SIGNAL EXCHANGE SYSTEM being used in 3-Phase Drive 25 KV Single Phase 50 HZ AC Electric Locomotive of Indian Railways.

3.0 CLIMATIC AND ENVIRONMENTAL CONDITION

SL.No	Description	Remarks
3.1	Maximum atmospheric temperatures :	<ul style="list-style-type: none"> • Metallic Surface temperature Under Sun: 75°C Max and in Shade : 55°C • Minimum Temperature -10 °C (Also. Snow Fall in certain areas during winter season).
3.2	Maximum Humidity	100% saturation during rainy season.
3.3	Reference site conditions	<ul style="list-style-type: none"> • Ambient Temperature : 50°C • Humidity : 100%. • Altitude : 1776m above mean sea level
3.4	Rainfall	Very heavy in certain areas. The locomotive shall be designed to permit it's running at 10 Km per hour in flood water level of 102 millimeter above Rail level.
3.5	Atmosphere during hot weather	Extremely dusty and desert terrain in certain areas. The dust concentration in air may reach a high value of 1.6 mg/m ³ . In many iron ore and coal mine areas, the dust concentration is very high affecting the filter and air ventilation system
3.6	Coastal areas	Locomotive and equipment shall be designed to work in coastal areas in humid and salt laden atmosphere with maximum pH value of 8.5. Sulphate of 7 mg per liter, max. concentration of Chlorine 6 mg per liter and maximum conductivity of 130 μ Siemens /cm.
3.7	Vibration	The equipment and subsystem and their mounting arrangement will be designed to withstand vibrations and shocks encountered in service as per IEC 61373 or latest unless otherwise prescribed.
3.8	Wind Speed	High Wind Speed in certain areas, with Wind Pressure reaching 150 Kg/m ²

Prepared By	Checked By	Issued By
SSE – Design	SEE -Design	Dy.CEE/D-III

Page 5 of 9	Specification No-CLW/MS/3/0670 (Electrical Signal Exchange System)	Alt-2
-------------	---	-------

4.0 **STANDARAD** :

IEC : 61373 or latest for shock and vibration.

IEC : 60571 or latest for Environmental condition

IEC : 60529 or latest for IP 65 Test

IEC : 61000-4-2, IEC 61000-4-3, IEC 61000-4-4 and IEC 61000-4-6 or latest for EMI/EMC.

5.0 **Scope of Supply :**

5.1 Two numbers of lamp Unit fitted with LEDs with unbreakable transparent cover for each cab.

5.2 Two numbers of control unit fitted with all accessories such as switch , PCBs, etc. for each cab

5.3 Connecting Cable covered with suitable size of Metallic hose for connection between Lamp Unit and Control Unit. (**Cable type**: E-beam 2x2x0.5 sq.mm SCR as per specification no: CLW/ES/3/0459 of latest alteration and Metallic hose: specification no: CLW/ES/3/0309 Alt D or latest. **Cable length** – 05 Meter for each unit.)

5.4 Wago or similar Type terminal shall be supplied for connections as per design of manufacturers.

5.5 Hardware and fasteners.

6.0 **GENERAL FEATURES:**

6.1 At present both loco pilot and assistant loco pilot need exchange of signals with station staff, crew of passing by trains etc. by means of flags and Torch. Due to this, they need to open the door/windows of cab frequently, which not only distracts them, but also hampers the working of Air Conditioners. To avoid the problem, necessary arrangement is being made by using LED based Electrical Signal exchange system, which will not necessitate frequent opening of door/windows for exchange of signals.

6.2 **TECHNICAL REQUIREMENTS :**

6.2.1 Electrical Signal Exchange Light for loco pilot and assistant loco pilot are to be installed in both side of each cab towards the outer side.

6.2.2 Control panel for each light unit to be fitted in drivers desk.

6.2.3 Self illuminated Push button switches with associated accessories are to be supplied and fitted in the control panel.

6.2.4 There shall be one push button switch for glowing Green signal and One Push button switch for glowing Red signal in the control panel.

6.2.5 Operating voltage:

Rated : 110 Volt DC

Minimum : 70 Volt DC

Maximum : 136 Volt DC

Prepared By	Checked By	Issued By
SSE –Design	SEE -Design	Dy.CEE/D-III

Page 6 of 9	Specification No-CLW/MS/3/0670 (Electrical Signal Exchange System)	Alt-2
-------------	---	-------

6.2.6 Power consumption (At Rated Voltage):-

Red : Not more than 9 Watt.

Green : Not more than 12 Watt.

6.2.7 Adequate no. of LEDs to be used for signal exchange light to provide minimum Lux as follows:-

TYPE of LED	Parallel lux train axis towards guard at 1.5 mtr.	Lux perpendicular axis to the train at 1.5mtr.
RED	> 40	>17
GREEN	> 60	>35

6.2.8 Capsule type moulded unbreakable transparent cover of polycarbonate material conforming to Fire retardant UL94-V0 grade should be used for lamp unit. Firm to submit OEM TC /GC

6.2.9 Visibility :- Light should be visible from >500 meters in clear day and >1Km in clear night.

6.2.10 Separate coloured self-illuminated push button switch to be given for Red and Green operation.

6.2.11 At a time only one light (Red/ Green) should glow. If pushed both (RED and GREEN) push button at a time only Red LED lights should glow.

6.2.12 Control panel used for selecting Red/Green light required in each cab separately wired.

6.2.13 Series parallel combination of LED used such that failure of one LED does not affect any other LED.

6.2.14 A self-restoring over voltage protection shall be provided to protect the signal exchange light any high voltage surges as well as normal spikes. High voltage above 1.8 times \pm 10volt of rated voltage will cause the supply to disconnect and self-restore as soon as the normal operating voltage is available.

6.2.15 Standard hardware/fasteners of CLW/ BLW/ RDSO approved source make only to be used.

6.2.16 During glowing of both RED and GREEN LED's must be flashing/flickering at a frequency of 80 \pm 10 per minute.

6.2.17 High Quality self-illuminated Push Button switches should be used as there are frequent operation shall be required.

6.2.18 The Lamp unit should be protected from water and dust entry as the lamp unit shall be fitted outside. Protection shall be IP: 65 grade.

6.2.19 High Intensity LED should be of SMD (Surface Mounted Device) or COB (Chip on Board) type only to be used.

6.2.20 The switches must be flush mounted type i.e the finish of switches lays in same surface of panel.

Prepared By	Checked By	Issued By
SSE –Design	SEE -Design	Dy.CEE/D-III

Page 7 of 9	Specification No-CLW/MS/3/0670 (Electrical Signal Exchange System)	Alt-2
-------------	---	-------

7.0 TEST

7.1 TYPE TESTS : Type Tests shall be carried out once in five years in presence of authorized representative of Railways / Production Units /RDSO. The Type Tests once conducted on the complete unit supplied by a particular manufacturer need not be repeated within a period of five years provided its performance is satisfactory during this period. Type tests may be repeated in between this period, if any change in the Manufacturing Process, Construction, Material, Design or any major change in specification as considered by approving agency.

7.2 Following Tests shall be carried out :

Clause No	Test Description	Type Test	Routine Test
7.2.1	Physical and Dimensional measurement as per drawing.	Y	Y
7.2.2	Insulation Resistance Test with 500V megger, insulation resistance should be more than 50 M Ohm for a period of not less than 60 sec.	Y	Y
7.2.3	Dielectric Test (High Voltage Test) 1000 V AC 50Hz for 60 sec.	Y	Y
7.2.4	Lux measurement Test as per clause no: 6.2.7	Y	Y
7.2.5	Measurement of Luminous intensity. (Technical data sheet of OEM's of LEDs to be compared)	y	X
7.2.6	Measurement of dominant wave length. (Technical data sheet of OEM's of LEDs to be compared)	Y	X
7.2.7	Functional Test : Voltage variation as per clause no: 6.2.5	Y	Y
7.2.8	Over voltage test to be carried out as per clause no-6.2.14	y	y
7.2.9	Endurance test for continuous operation of 08 hours. After the endurance test functional test as per clause no-7.2.7 to be carried out.	Y	X
7.2.10	Endurance Test for Switches for operation up to 100000 Cycles. After the endurance test functional test as per clause no-7.2.7 to be carried out.	Y	X
7.2.11	Surge Test: The test shall be carried out as per IEC: 60571 or latest. Surge pulse shall be 1.8 kV peak for 1.2/50 micro sec.	Y	X
7.2.12	Shock and Vibration test as per IEC: 61373 Category 1 body mounted.	Y	X
7.2.13	Ingress Protection test (IP: 65) as per IEC : 60529 for lamp unit only.	Y	X

Prepared By	Checked By	Issued By
SSE –Design	SEE -Design	Dy.CEE/D-III

Page 8 of 9	Specification No-CLW/MS/3/0670 (Electrical Signal Exchange System)	Alt-2
-------------	---	-------

7.2.14	Rain Test (The artificial rain falling at 45° at a rate of 60 mm per minute for a period of 30 minutes for Lamp unit only).	Y	X
7.2.15	Cooling Test as per IEC: 60571 Clause No: 10.2.3.	Y	X
7.2.16	Damp Heat Test as per IEC: 60571 Clause No: 10.2.5.	Y	X
7.2.17	Dry Heat Test as per IEC: 60571 Clause No : 10.2.4.	Y	X
7.2.18	Visibility Test as per clause no: 6.2.9	Y	X
7.2.19	Reverse Polarity Test: The equipment should have built in reverse polarity protection. The reverse polarity test shall be conducted at nominal voltage (110V DC) for 1 minutes. After the test the equipment should perform normal.	Y	Y
7.2.20	Power Consumption Test : To be carried out at rated voltage and should not exceed specified limits given in clause no-6.2.6.	Y	X
7.2.21	Flickering measurement test as per clause no: 6.2.16.	Y	Y
7.2.22	Short Circuit Test : The output terminal should be shorted and the unit switched "ON" with maximum voltage as specified in specification for 10 minutes. After the test, unit shall be tested as per clause no: 7.2.7	Y	X
7.2.23	EMI/EMC test as per 61000-4-2, IEC 61000-4-3, IEC 61000-4-4 and IEC 61000-4-6.	Y	X
7.2.24	Test for series parallel combination: To check the functional operation by bypassing one LED for both green and Red separately.	Y	X

8.0 Documentation: Following documents to be submitted during tendering:

- 8.1 Clause wise comments on specification
- 8.2 Technical data sheet of OEM of LED's
- 8.3 Detail Drawings
- 8.4 Quality Assurance Plan
- 8.5 Detail Test Procedure
- 8.6 Bill of Material (BOM)
- 8.7 Maintenance Manual
- 8.8 Operational Manual.
- 8.9 Details of Plant and machinery
- 8.10 Testing facilities
- 8.11 Successful tenderers shall submit list of items supplied, Bill of Material (BOM), certified copies of material and test certificates, technical datasheet and guarantee certificate along with the supply-
- 8.12 Past experience with supporting papers (if any).
- 8.13 Firm should submit GA drawing for approval before prototype inspection.

Prepared By	Checked By	Issued By
SSE – Design	SEE -Design	Dy.CEE/D-III

Page 9 of 9	Specification No-CLW/MS/3/0670 (Electrical Signal Exchange System)	Alt-2
-------------	---	-------

9.0 Label and Marking :

9.1 Labeling: Each assembly shall have clear readable marking as follows:

- i) Manufacturers name
- ii) Year of manufacture
- iii) Trade mark if any
- iv) Batch No. & Code
- v) Serial No of the product

9.2 Marking: Various adjustment controls shall be marked accordingly for user. A user manual explaining various connections and adjustment shall be provided with each box of Electrical Signal exchange system.

10.0 Quality assurance:

10.1 System Certification: Firm to have obtained system certification against ISO:9001:2015 (or latest version)

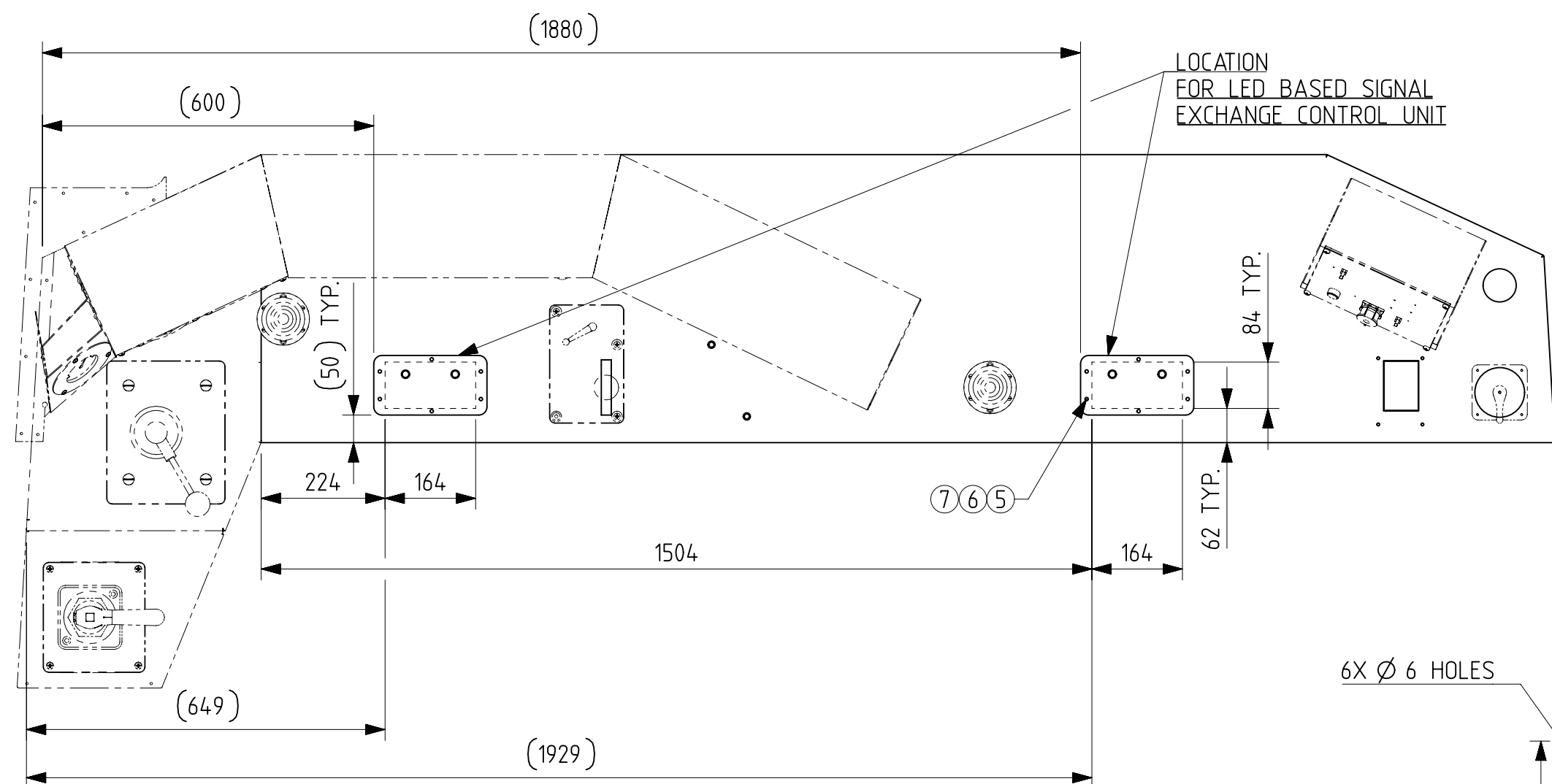
10.2 Any other certification obtained by the firm may also be submitted during the tender.

10.3 Firm should submit Quality Assurance Plan (QAP) for approval before Prototype inspection.

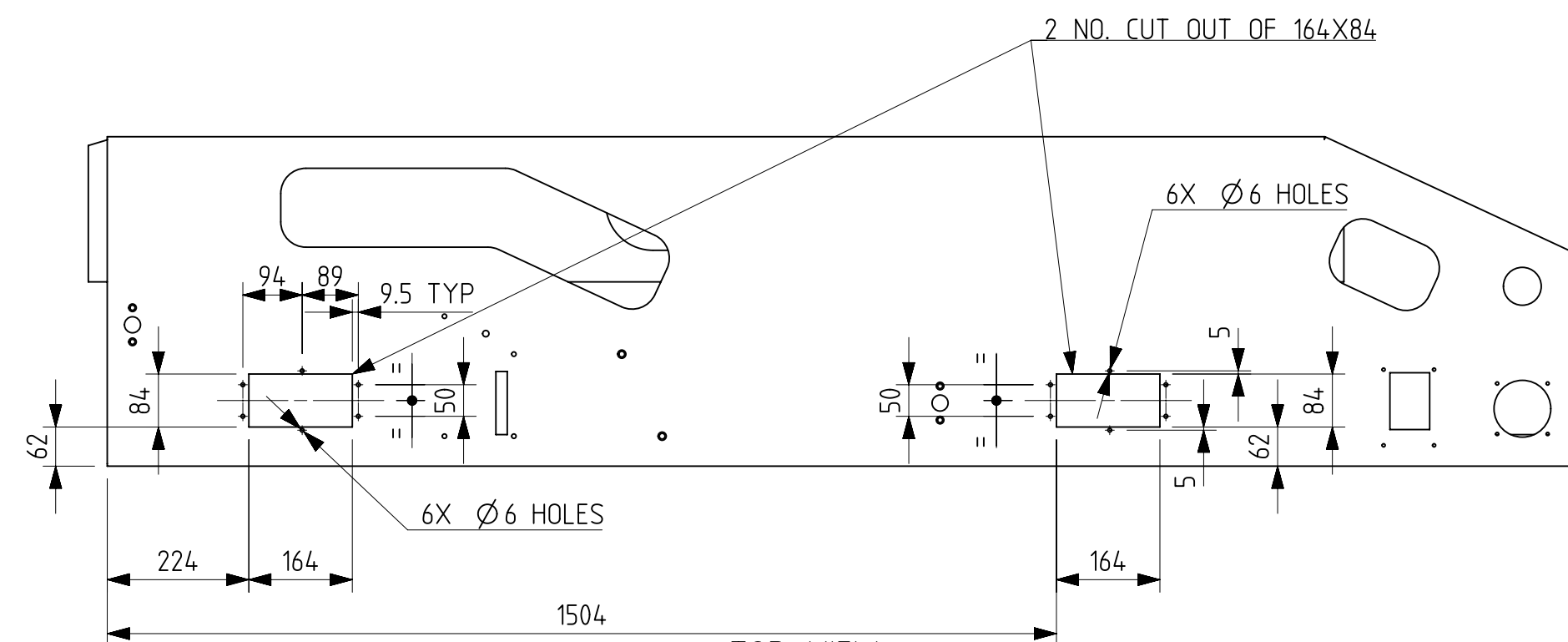
11.0 Packing:

All fittings shall be properly packed to avoid damage during transit and storage.

Prepared By	Checked By	Issued By
SSE –Design	SEE -Design	Dy.CEE/D-III



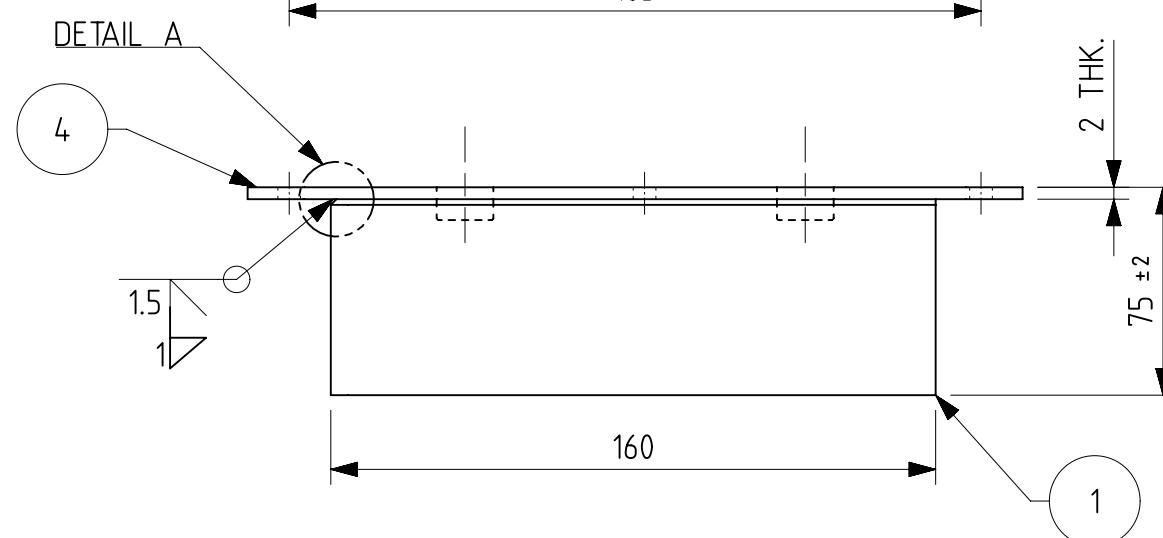
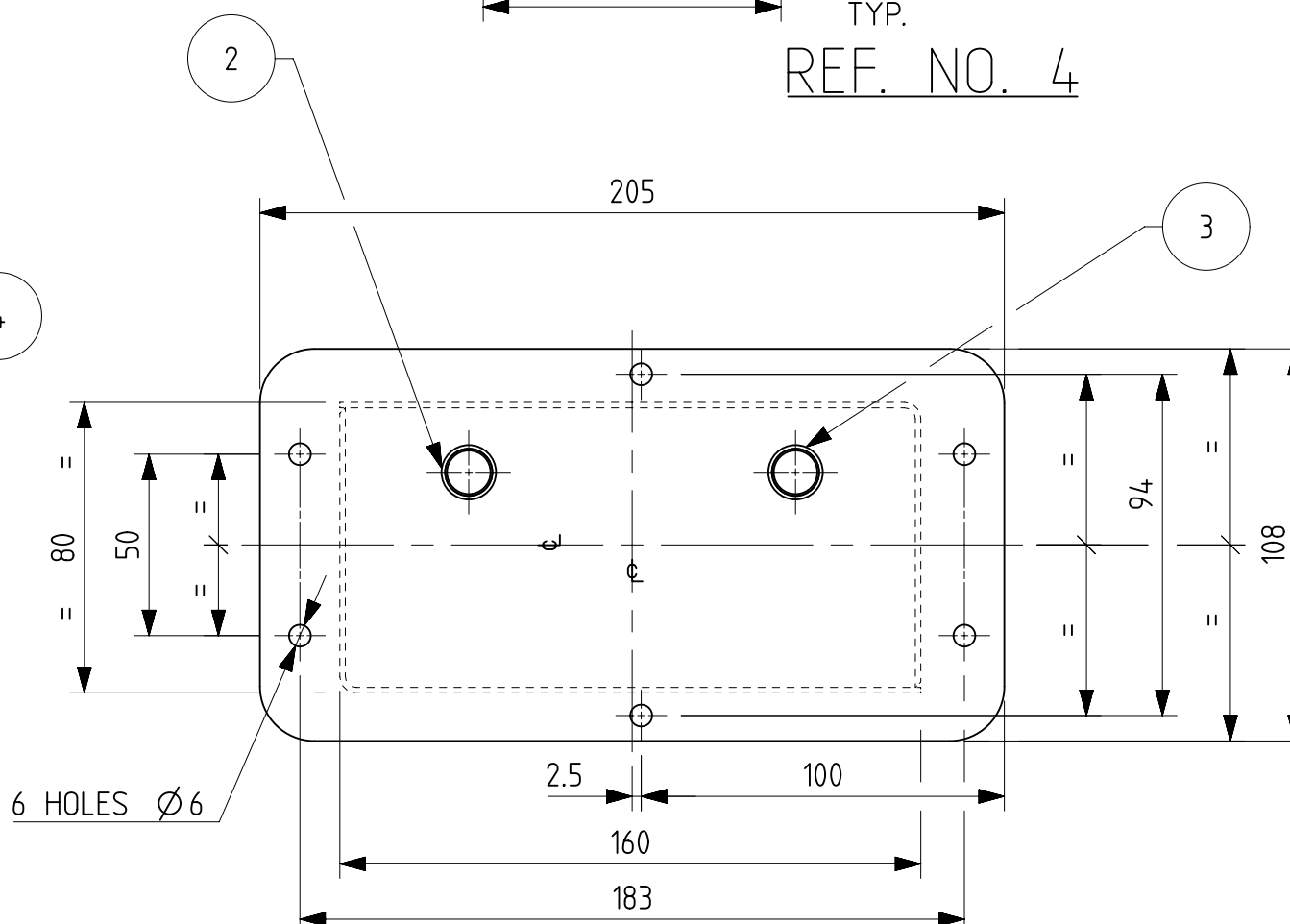
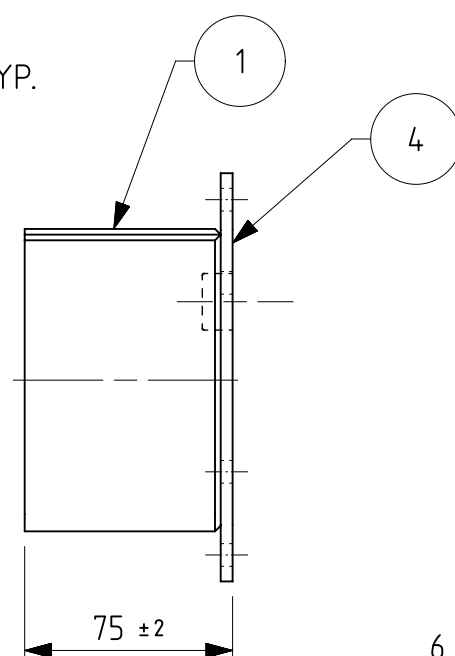
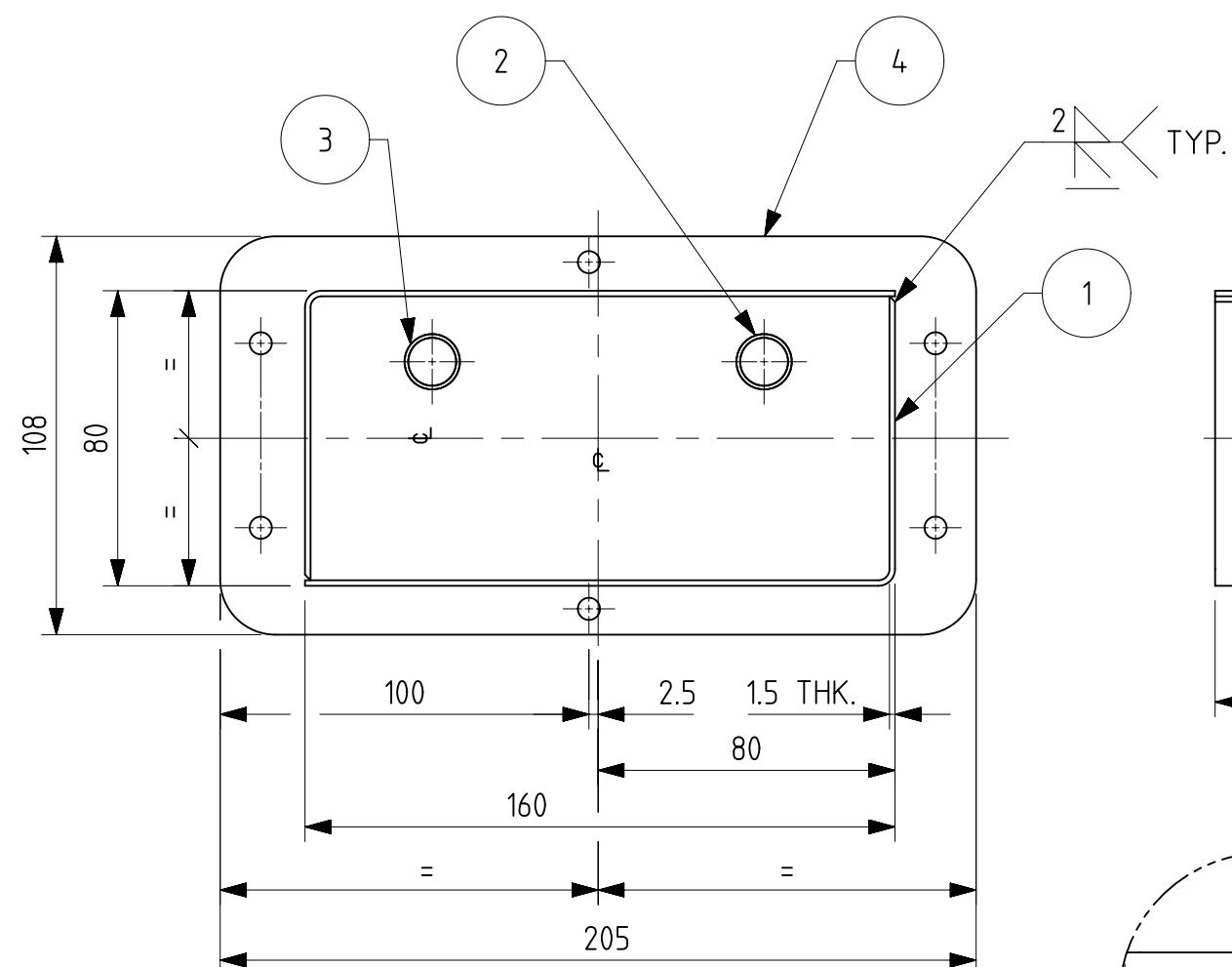
TOP VIEW
1209-08.030-441(IB081-00346)
COMPLETE CONSOLE ASSY



TOP VIEW
1209-08.130-225(IA081-00187)
MAIN DESK TOP PANEL- R.H.

NOTE:

1. ALL DIMENSIONS ARE IN mm.
2. CUTOUT 164X84 & 6 HOLES OF Ø 6 TO BE MADE BY CONSOLE MANUFACTURER AT 2 PLACES AS SHOWN IN VIEW.
3. DRAWINGS/SPECIFICATIONS OF ITEMS UNDER REF NO. 1 - 7 ARE INDICATIVE ONLY & UNDER THE SUPPLIER'S SCOPE.
4. QTY./LOCO- 4
5. ITEM REF. 1 & 4 SHOULD BE POWDER COTED IN SIEMENS GREY COLOUR & THICKNESS OF COATING SHOULD BE 80 MICRONS. TREATMENT TO BE DONE BEFORE COATING.
6. POSITION OF SWITCH INDICATIVE ONLY.



7	-	HEX NUT M5X0.8P	12	ST.ST-A 270	DIN934/ISO4032	
6	-	SPRING WASHER CHROME PLATED	12	SPG. STEEL	IS 3063	
5	-	PHILIPS HEAD SCREW DOME TYPE-M5X0.8PX10LG	12	ST.ST	AISI-304	
4	-	BOX COVER	1	MS	IRS:M-41 Gr.-1	
3	-	PUSH ON SWITCH RED	1	METAL-PLASTIC (FIRE RETARDANT)	IS:11731 (PART-1 & 2)	
2	-	PUSH ON SWITCH GREEN	1	METAL-PLASTIC (FIRE RETARDANT)	IS:11731 (PART-1 & 2)	
1	-	BOX	1	MS	IRS:M-41 Gr.-1	

निर्देश संख्या	अंग आरेखण संख्या	वर्णन	मात्रा	पदार्थ	विशिष्ट	प्रति थ. कि.
REF. NO.	PART DRG. NO.	DESCRIPTION	QTY.	MATL	SPECN	WT EACH IN.

अधिकारित DGN			चितरंजन रेलइंजन कारखाना
जॉचा व.अ.अ.			CHITTARANJAN LOCOMOTIVE WORKS, INDIA

CHD SSE		पदार्थ	प्रति भार कि. ग्रा.
समीक्षित स.वि.अ. / व.वि.अ.		MATL	WT. EACH IN KG
REVIEWED AEE / SEE		विशिष्ट	
आवधिकारिता व.वि.अ.		SPECN	

अनुमोदित उ.पु.न.अ. APPROVED DYCE	वर्णन MOUNTING ARRANGEMENT OF CONTROL UNIT FOR
दिनांक DATE	DESCRIPTION ELECTRICAL SIGNAL EXCHANGE SYSTEM

रेखिक अनुपात SCALE	NTS	आरेखण संख्या SKETCH- 002 Alt-2			
संदर्भ / REF. ALT-	DRAWING NO.				
		परिवर्तन संख्या ALTERATION NO.	0	पर्ण SHEET	1 OF 1
					A2

धातु-वेल्डिंग चिन्ह भा. मा. : 813 / अ. मा. सं. : 2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												TOL. CLS.
	पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12
सतह - रूक्षता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	Rz	0.1-0.43	0.5-0.7	0.8-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	140-250
	Ra μ m	0.075	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
	चिन्ह SYMBOL												
		Rz			Ra			Ry			Rpm		

0			
परिवर्तन संख्या	प्राधिकार	वर्णन	DESCRIPTION
ALT. NO.	AUTHY		
			दिनांक आद्य
			DATE
			INITIAL