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

TENDER SPECIFICATION
NO. CLW/MS/3/0670 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

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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			2	Specification has been thoroughly revised. Flickering of LED indication lamp included, Type test and routine test elaborated. Flash mounted type switch introduce, one green push button switch in place of two green push button switch applied. Some other modification also incorporate.	

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

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 ~~WAG-9/WAP-7/WAP5~~ 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 :	• 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	• 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

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, 61000- 4-3, 61000-4-4 and 61000-4-6.

5.0 Scope of Supply :

5.1 T wo Lamp Unit fitted with LEDs with unbreakable transparent cover for each cab.
5.2 Two control unit fitted with all accessaries 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: Ebeam 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 - 05mtrs)
5.4 Wago Type terminal shall be supplied for connections as per design of manufacturers.
5.5 Hardware.

6.0 GENERAL FEATURES:

6.1 At present both loco pilots 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 ~~Light for Loco Pilot and Assistant Loco Pilot are installed at outside of sidewall of each cab.~~

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

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 ~~1mtr~~ 1.5 mtr.	Lux perpendicular axis to the train at ~~1mtr~~ 1.5mtr.
RED	>~~33~~ 40	>17
GREEN	>~~75~~ 60	>38

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 surge protection device shall be provided to protect the signal exchange light any high voltage surges as well as normal spikes. A high voltage surge above ~~210 ± 10 Volt~~ 1.8 times±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 ~~70-80~~ 220-270 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 Diode) 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.

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 500V meggar 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	Y	X
7.2.14	Rain Test (The artificial rain falling at 45^0 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 IEC 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

Note: The Type test Certificate approved by **RDSO/CLW /BLW** shall be valid for a period of five years.

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

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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.

9.0 Label and Marking :

9.1 Lebeling: 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

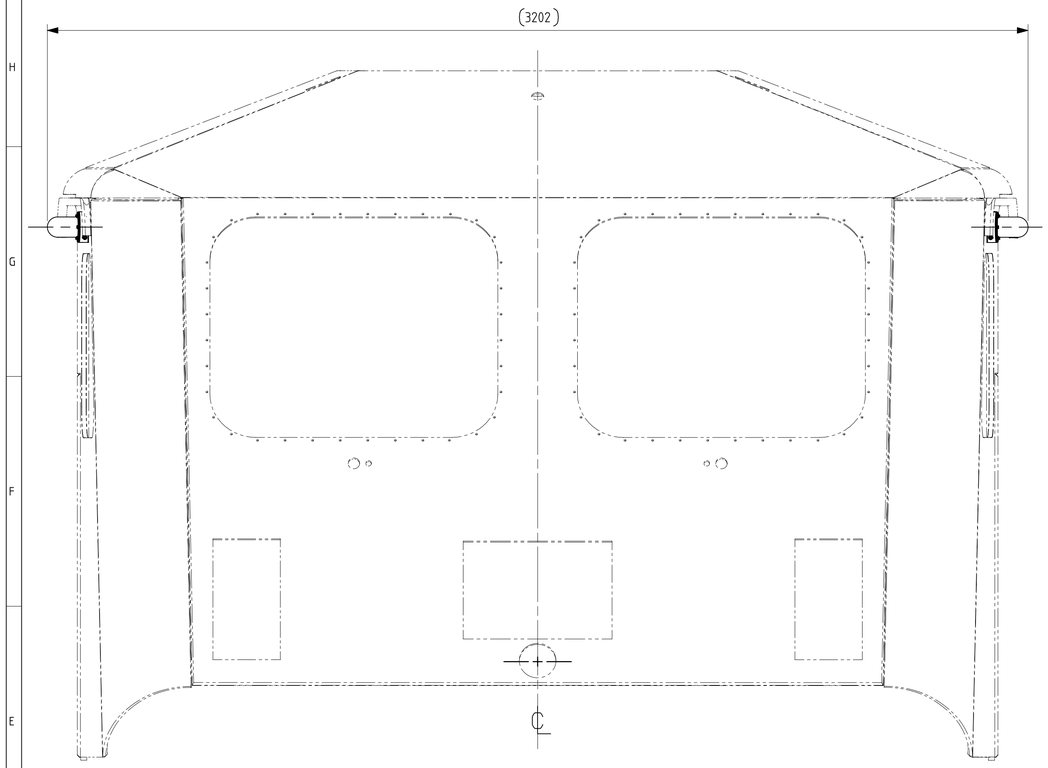
9.2 Marking: Various adjustment controls shall be marked accordingly for user. A user manual explaining various connections and adjustment shall be provided with each box of Electrical Signal exchange system.

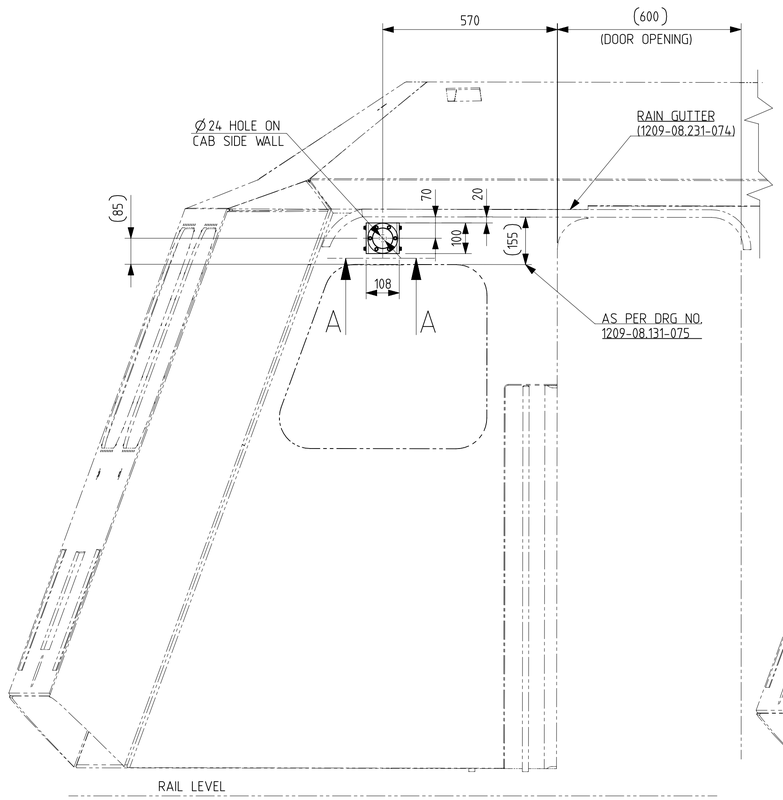
10.0 Quality assurance:

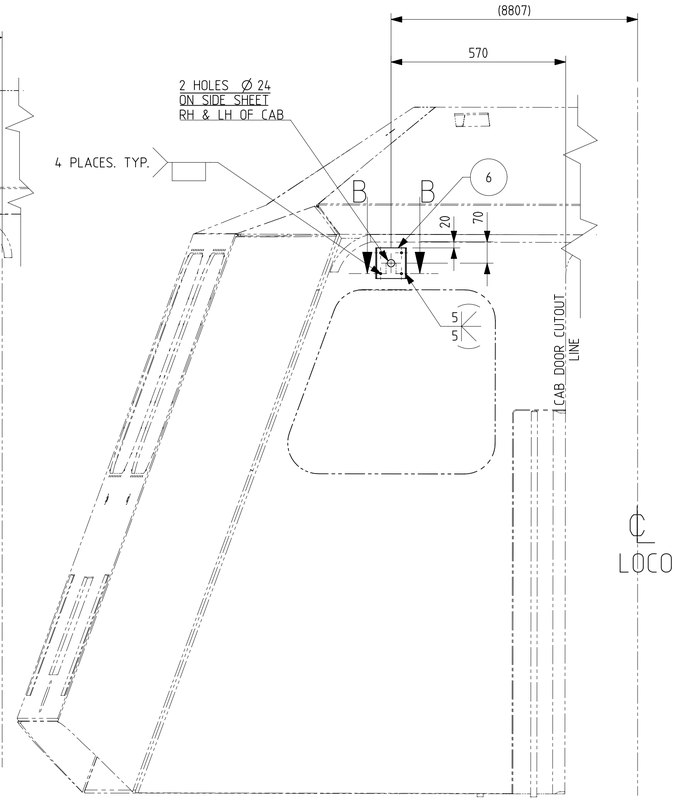
10.1 System Certification: Firm to have obtained system certification against ISO:9001:2015 (or latest version)
10.2 Any other certification obtained by the firm may also be submitted during the tender.
10.3 Firm should submit Quality Assurance Plan (QAP) for approval before Prototype inspection.

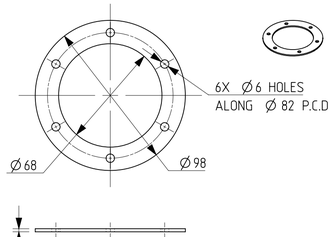
11.0 Packing:

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

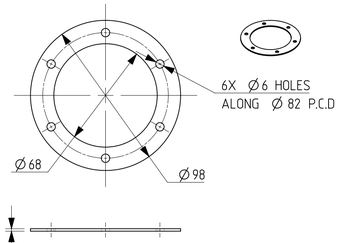




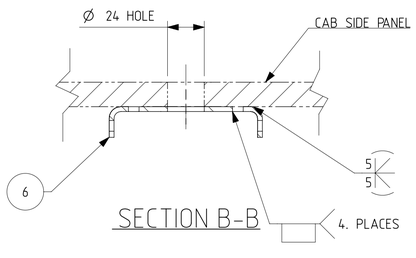




REF. NO. 4
SPONGE GASKET FOR GLASS MOUNTING

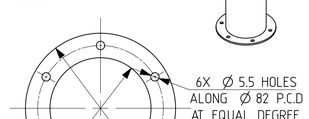


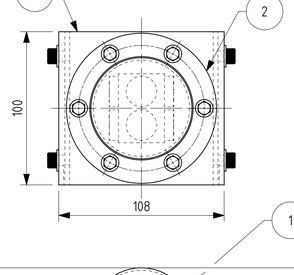
REF. NO. 2
ROUND PLATE 1.6mm THK.



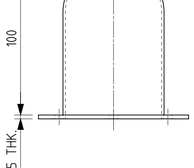
SECTION B-B

NOTE:
1. ONLY Ø 24 HOLE TO BE DRILLED ON BOTH SIDE SHEETS OF CAB STRUCTURE 1209-08.130-001(IB081-00313) BY CAB/SHELL MANUFACTURER FOR WIRE ENTRY. & SHOULD BE CONCENTRIC WITH HOLE Ø 24 OF ITEM REF. 6.
2. QTY/LOCO- 4 NOS.
3. DRAWINGS/SPECIFICATIONS OF ITEMS UNDER REFERENCE 1-14 ARE INDICATIVE ONLY & THE SAME ARE UNDER SUPPLIER'S SCOPE.

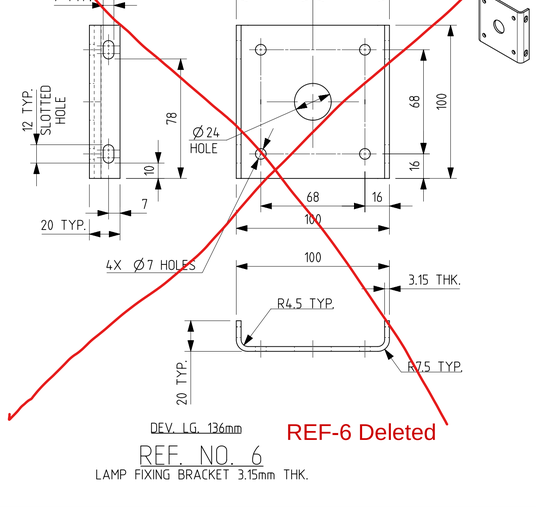




SECTION A-A



REF. NO. 1
GLASS POLYCARBONATE



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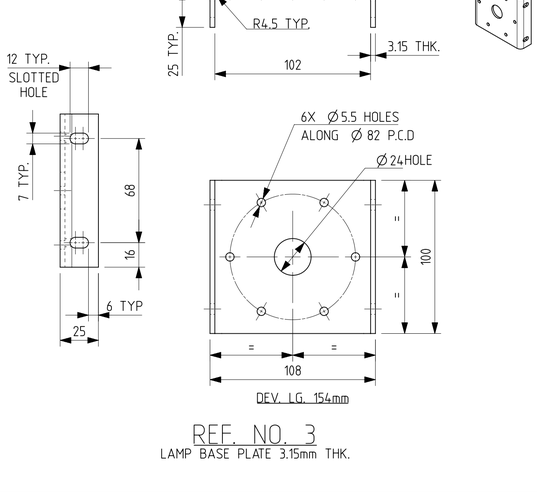
REF. NO. 6
LAMP FIXING BRACKET 3.15mm THK.



REF. NO. 3
LAMP BASE PLATE 3.15mm THK.

REF. NO.	C&D NO.	PART DRG. NO.	DESCRIPTION	QTY.	MATL	SPECN	WT. EACH IN K.G.
14	/		ALLEN BOLT M6, 20Lg	4	STEEL	IS:2269:2006	
13	/		NUT HEX M6x1 PHOSPHATED	4	STEEL	IS:1364,PT-3,CLASS-10	
12	/		WASHER ROUND FLAT M6	4	STEEL	IS:2016	
11	/		WASHER HELICAL SPRING LOCK M6 Zn Pl (PASS.)	4	STEEL	IS:3063	
10	/		BOLT HEX M5X0.8, 20Lg	6	STEEL	IS:1364, PT-2	
9	/		WASHER HELICAL SPRING LOCK M5 Zn Pl (PASS.)	6	STEEL	IS:3063	
8	/		NUT HEX M5x0.8 PHOSPHATED	6	STEEL	IS:1364 PT-3,CLASS-8	
7	/		WASHER ROUND FLAT M5	6	STEEL	IS:2016	
~~6~~	/		~~LAMP FIXING BRACKET 3.15mm THK.~~	~~1~~	~~MS~~	~~IRS:M-41 Gr.-I~~	
5	/	NOT AVAILABLE	LED SIGNAL LIGHT	1			
4	/		SPONGE GASKET FOR GLASS MOUNTING	1	NEOPRENE	IS:11149-1984 TYPE- 1, CLASS- C	
3	/		LAMP BASE PLATE 3.15mm THK.	1	MS	IRS:M-41 Gr.-I	
2	/		ROUND PLATE 1.6 MM THK.	1	MS	IRS:M-41 Gr.-I	
1	/		GLASS POLYCARBONATE	1	POLYCARBONATE		

निर्देश संख्या REF. NO.	लागत एवं विपत्र संख्या C&D NO.	अंग आरेखण संख्या PART DRG. NO.	वर्णन DESCRIPTION	मात्रा QTY.	पदार्थ MATL	विशिष्टि SPECN	प्रति गाड़ी कि. ग्रा. WT. EACH IN K.G.

अभिकल्पित DSN	
जाँचा व.अ.अ. CHD SSE	
पुनरीक्षित व.डि.अ. / व.डि.अ. REVIEWED AEE / SEE	
अनुमोदित प.अनु.डि.अ. APPROVED DYCEE	
दिनांक DATE	
वैधिक अनुपात SCALE	1:2
संदर्भ / REF.	ALT:-

चित्तरंजन रेलइंजन कारखाना
CHITTARANJAN LOCOMOTIVE WORKS, INDIA

पदार्थ MATL	प्रति गाड़ी कि. ग्रा. WT. EACH IN KG
विशिष्टि SPECN	
वर्णन DESCRIPTION	MOUNTING ARRANGEMENT OF LED BASED SIGNAL EXCHANGE LIGHT
आरेखण संख्या DRAWING NO.	SKETCH- 001 (25-03-2022)
परिवर्तन संख्या ALTERATION NO.	0
पृष्ठ SHEET	1 OF 1
	A1

REDRAWN BY TCS

धातु–वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सहा – छीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												TOL. CLS.	
	ग्रेडांक GRADE NO.	ग्रे1 N1	ग्रे2 N2	ग्रे3 N3	ग्रे4 N4	ग्रे5 N5	ग्रे6 N6	ग्रे7 N7	ग्रे8 N8	ग्रे9 N9	ग्रे10 N10	ग्रे11 N11	ग्रे12 N12	
भारत – रवशा का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	Rz:	0.16-0.3	0.3-0.7	0.9-1.1	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	0
	Ra µm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50	परिवर्तन संख्या ALT. NO.
	चिन्ह SYMBOL													प्राधिकार AUTHY

वर्णन DESCRIPTION	दिनांकित आधार DATED INITIAL

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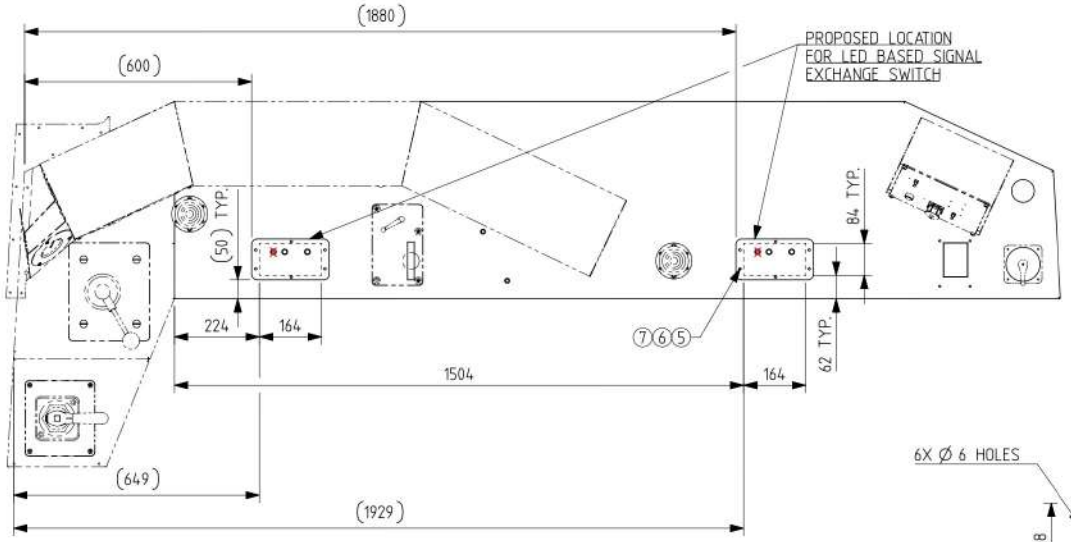
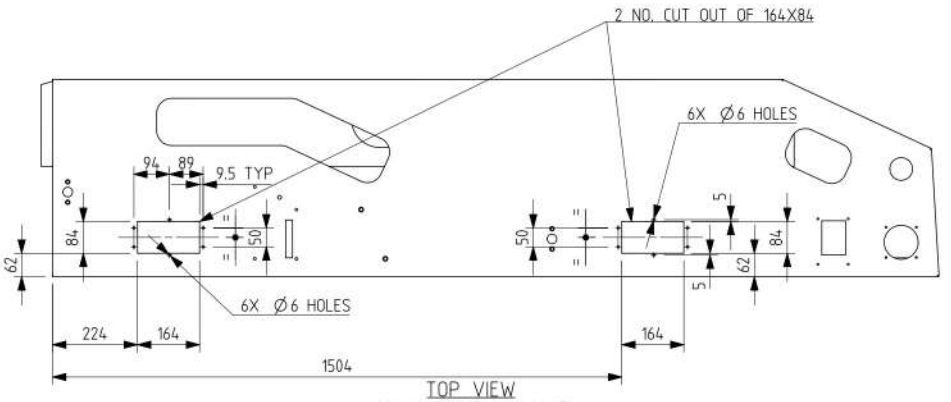
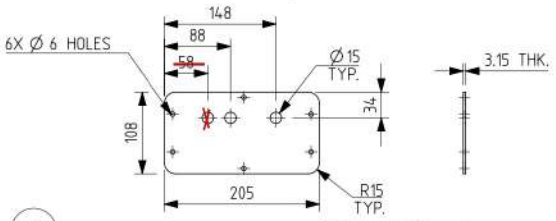


TOP VIEW
1209-08.030-441(IB081-00346)
COMPLETE CONSOLE ASSY



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



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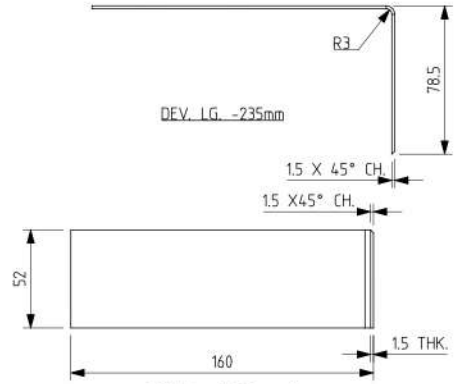

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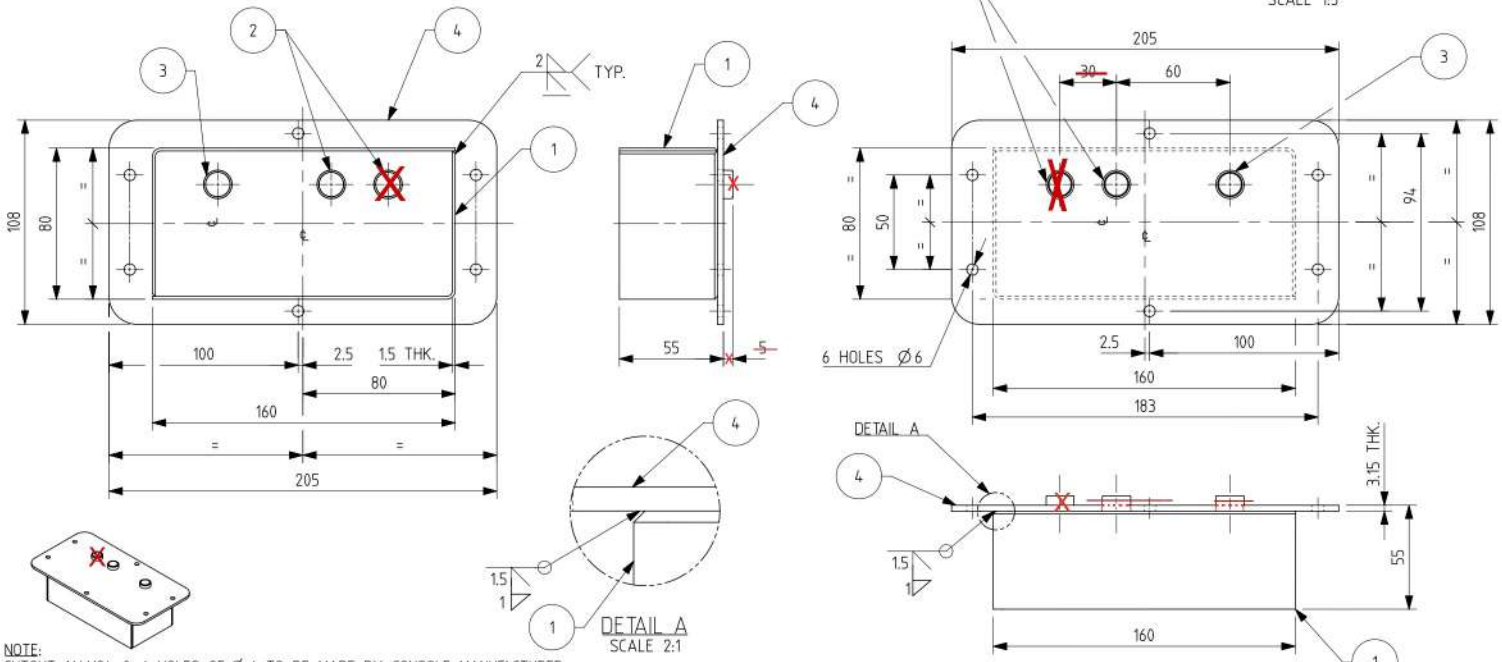

7		HEX NUT M5X0.8P	12	ST.ST-A 270	DIN934/ISO4032	
6		SPRING WASHER CHROME PLATED	12	SPG. STEEL	IS 3063	
5		PHILIPS HEAD SCREW DOME TYPE-M5X0.8PX10LG	12	ST.ST	AISI-304	
4		BOX COVER (3.15mm THK.)	1	MS	IRS:M-41 Gr.-1	
3	NOT AVAILABLE	PUSH ON SWITCH RED	1	METAL-PLASTIC (FIRE RETARDANT)	IS:11731 (PART-1 & 2)	
2	NOT AVAILABLE	PUSH ON SWITCH GREEN	2	METAL-PLASTIC (FIRE RETARDANT)	IS:11731 (PART-1 & 2)	
1		ANGLE (1.5mm THK.)	2	MS	IRS:M-41 Gr.-1	
निर्देश संख्या REF. NO.	अंग आरेखण संख्या PART DRG. NO.	वर्णन DESCRIPTION	मात्रा QTY.	पदार्थ MATL	विशिष्ट SPECN	प्रति भार कि. ग्रा. WT. EACH IN K.G.

NOTE:
1. CUTOUT 164X84 & 6 HOLES OF Ø 6 TO BE MADE BY CONSOLE MANUFACTURER AT 2 PLACES AS SHOWN IN VIEW.
2. DRAWINGS/SPECIFICATIONS OF ITEMS UNDER REF NO. 1 - 7 ARE INDICATIVE ONLY & UNDER THE SUPPLIER'S SCOPE.
3. QTY./LOCO- 4
4. 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.

धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सत्रु – सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												TOL. CLS.	
सतह – खुदाा का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	पदार्थ GRADE NO.	परि 1 H1	परि 2 H2	परि 3 H3	परि 4 H4	परि 5 H5	परि 6 H6	परि 7 H7	परि 8 H8	परि 9 H9	परि 10 H10	परि 11 H11	परि 12 H12	
	Ra µm	0.8-1.6	1.6-3.2	3.2-6.3	6.3-12.5	12.5-25	25-50	50-100	100-200	200-400	400-800	800-1600	1600-3200	
	Rz µm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50	
	चिन्ह SYMBOL													

परिवर्तन संख्या ALT. NO.	प्राधिकार AUTHY	वर्णन DESCRIPTION	दिनांकित आरेखण DATED INITIAL

अभिकल्पित DSN	
चीफ एस.एस.ई. CHG SSE	
समीक्षित एस.ई./ वर्कि.अ. REVIEWED ASE / SEE	
अनुमोदित ए.डी.एम. APPROVED DYCEE	
दिनांक DATE	
रैखिक अनुपात SCALE	1:2
संदर्भ / REF.	ALT.-

चित्तरंजन रेलइंजन कारखाना
CHITTARANJAN LOCOMOTIVE WORKS, INDIA

पदार्थ MATL	प्रति भार कि. ग्रा. WT. EACH IN KG
विशिष्ट SPECN	
वर्णन DESCRIPTION	MOUNTING ARRENGEMENT OF LED BASED SIGNAL EXCHANGE SWITCH
आरेखण संख्या DRAWING NO.	SKETCH- 002 (25-03-2022)
परिवर्तन संख्या ALTERATION NO.	0
पृष्ठ SHEET	1 OF 1
	A2

REDRAWN BY TCS