

**SPECIFICATION FOR SET OF PANELS FOR LHB EOG NON-AC COACHES****1.0 SCOPE:**



- 1.1 This specification is for design, manufacture, testing and supply of Switch Board Cabinet consisting all the power/control switchgear related to coach lighting, pantry, pump control etc. for LHB EOG NON-AC Coaches suitable for 3 phase, 750 volts, 50 Hz train line system.
- 1.2 The quality, aesthetics, design and overall workmanship of Switchboard cabinet as a whole shall be to international standards and the quality of existing LHB equipment shall be considered prime basis.
- 1.3 Firm shall have adequate in-house infrastructure and experience of design, development and manufacturing of similar complex panels ( stainless steel ) on CNC machines and shall be capable of developing materials to the required quality and standards.
- 1.4 The firm shall maintain date-wise in-house quality control system and in-house quality control records etc. for in stage process inspection and testing and the same shall be made available to the inspecting official during type testing.
- 1.5 It will be the responsibility of the supplier to ensure and confirm that the equipment /part purchase from other vendors are as per relevant standard and original manufacturer last certificate are being obtained by the firm and are tested. Firm shall also keep record of in-house inspection.

**2.0 SERVICE CONDITIONS:****2.1 ENVIRONMENTAL CONDITIONS**

Ambient Temperature	: -5°C to 55°C
Maximum Relative Humidity	: up to 98% during the rainy season
Altitude	: Maximum 1000 Meters

**2.2 WORKING CONDITIONS**

Train Speed	: 160KMPH
Vibration and Shocks	
a) Maximum Vertical Acceleration	: 3.0g
b) Maximum lateral Acceleration	: 3.0g
c) Maximum longitudinal Acceleration	: 3.0g
d) Frequency and amplitude	: Sinusoidal form of vibration, the frequency 'f' lies between 1 Hz and 100 Hz and their amplitude 'a' expressed in mm is given as function of 'f' by equation $a = 25/f^2$ for values of 'f' between 1 and 10Hz

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$a=25f^2$  for values of  $f$  between  
10 and 100 Hz

### 3.0 GOVERNING SPECIFICATIONS:

3.1 Reference shall be made to following standard/specifications.


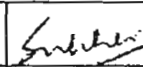
IS:13947(Pt-I)1983	Low voltage switchgear and control gear Part-I General rules
IS:13947(Pt-3)-1993	Part-3 - Switches, disconnectors and fuse combination unit
IS:8623-1993 Pt-1	Low voltage switchgear and control gear assemblies: Part-I Requirements for the type tested and partially type tested assemblies.
IS:10118-1982	Code of practice for selection, Installation and maintenance of the switchgear and the controlgear
IS:13703-1993	Low voltage fuses for voltages not exceeding 1000 volts or 1500 volts DC
IS:1248 Part-II-1983	Direct acting indicating analog electrical measuring instruments and their accessories (ammeter and voltmeters)
IS:8828-1996	Electrical accessories, circuit breakers for over current protection for household and similar installations.
IS:1573-1986	Electroplated coating of Zinc on Iron and Steel
IS:1364-1992	Hexagon head bolts, screws and nuts of product grades A and B
UIC550	Power supply installation for Passenger stock

### 4.0 CONSTRUCTIONAL REQUIREMENTS:

4.1 The set of panels comprises of the various cubicles consisting of power  
and control switchgear consisting of following

i	H V Cubicle	LS71103	2000(L)x550(D)x525(H)
ii	Battery Charger Box	LS71104	900(L)x750(D)x500(H)
iii	Low Voltage Panel including cable cover for top and bottom as indicated in the drawing	CC72081	500(W)x130(D)x1000(H) with mounting angle of 125mm on top and bottom

No positive tolerances are allowed. However, negative tolerances shall be  
governed by MDG0008

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- 4.2 The cubicles indicated at item i) and ii) above shall consist of welded stainless steel construction TIG welded to make complete frame with dimensions as indicated in the respective drawings.
- 4.2.1 The panel shall be made of stainless steel SS304 grade S2 to IS:6911( Latest Edition ). Welded zones may be given necessary treatment after fabrication and shall not be painted. Thickness of the sheet shall be 2mm and may be increased in some areas for strengthening against vibrations and shocks.
- 4.2.2 The stainless steel sheets shall be of approved makes.
- 4.2.3 Necessary equipment for cutting / welding shall be available with the firm for quality work.
- 4.3 The on-board cabinet shall conform to CRCA sheet of thickness 2 mm conforming to IS:513( Latest Edition ) as indicated in the drawing. The on board panel shall be powder coated to Siemens Grey shade no 6102/08038 of M/s Nerolac Paints or 877 of M/s Berger paints, after giving surface treatment.
- 4.4 The dimensions/mounting/general layout of the switch board cabinet shall be conforming to drawings as indicated in at clause 4.1 of this specification . The drawings annexed are for general guidance only. For change in layout for manufacturing/improving the aesthetics from maintenance point of view, the manufacturer shall take prior approval.
- 4.5 Most critical safety component in the panels is wide-band contactors. No deviation shall be given for these contactors. Inspecting agency shall specifically check this aspect that these contactors regarding make of these.
- 4.6 Suitable PVC alleys/duct with snap-in element of M/s. L&T/AKG shall be provided for cable traversing as indicated in the drawings. Whenever the cables shall cross the door/passage area, the cables shall be covered by self extinguishing and halogen free braiding/nylon jacket (polyamide 6.6) of approved make.
- 4.7 All the devices fitted in the switch board cabinet shall allow access for easy maintenance of all the equipments from the front of the panel.
- 4.8 The location and size of hinges shall be as per the respective drawing for the cubicles.
- 4.9 The internal wiring shall be done with Halogen free electron beam irradiated cables conforming to RDSO specification no. ELRS/SPEC/ELC/0019 Rev-2. The size/type of cables shall be as indicated in drawing no. LS70117, alt. 'a' (5 sheets). All cables/wiring/Sleeves shall be of color coded according to phases for identification. Control wiring and power cables shall be segregated according to the voltages and adequately secured with cable ties.
- 4.10 All components provided inside the panel shall be identified by screen/photo printed or computer generated designation labels/legend marking plates. These should be mounted near the concerned component duly ensuring visibility. Circuits and components shall also be provided with the name plates indicating the operation/function of the switches/circuits. Contactors and circuit codification diagram (with glass

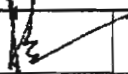
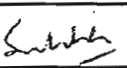
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fuses details) shall be identified by aluminum anodized legend plates by adhesive of approved make on back side of left hand front doors. Balance indicating/measuring switchgear/devices installed on front door shall be identified by aluminum anodized legend plates by adhesive of approved make on the front doors itself. No riveting is allowed on front door.

- 4.11 a) The outgoing/incoming terminal connections shall be brought out to a adequately rated cage clamp type terminal block/MCB.  
 b) The terminal blocks shall be ocated for easy access as indicated in the drawing.  
 c) Separators/intermediate plates shall be provided between adjacent terminal blocks, wherever required.  
 d) All cables leading to a terminal block shall be properly secured/ clamped before termination.  
 e) It shall be ensured that not more than two wires are terminated at one point.  
 f) The power panel shall be complete with all necessary crimping sockets and ferrules for ready connections. Rings type copper crimping sockets shall be used for cable sizes up to 1.5sqmm otherwise tubular crimping sockets shall be used with suitable palm size to prevent loose connections during vibrations. Only copper crimping sockets of approved make and conforming to the requirements of RCF specification no. EDTS200 and EDTS201 shall be used. Crimping sockets of size smaller than 16sqmm shall be with metal reinforcement.  
 g) Marking ferrules shall be of computer generated type for easy identification of the cables with the help of shrinking sleeves (self extinguishing) of suitable size horizontally printed or with the help of mintmark carrier/label of M/s. Tyco/Penduit/Pheonix only.  
 h) All cut-outs wherein cables enter/exit the switch board cabinet shall be provided with V-grooved fire retardant rubber grommets/edge protection sleeves of reputed make from protection against sharp edges.
- 4.12 Two earthing terminals shall be provided on top and bottom of the panel on diagonally opposite ends. For earthing two braided copper cable of 70sqmm and 300mm in length each duly crimped shall be supplied with the panel. Earthing of the metal parts/sub-assemblies inside the panel shall also be done as indicated with suitable wire size as determined vide clause 7.4.3.1.7 (a) or IS:8623(Pt-I)-1993.
- 4.13 Manufacturer's name plate indicating name and address, Sr. No. of the panel, Specification no. month and year of manufacturer and weight shall be fixed on the front door of the panel.
- 4.14 Danger Notice plate shall be screen printed or sticker shall be provided on front of the lower panel door conforming to IS: 2551-82 for 750V.
- 4.15 The Power/Control connections of the switch board cabinet shall be as per wiring diagram to drawing LS70117, alt. 'a'.
- 4.16 Care shall be taken to achieve a neat and symmetrical layout.

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- 4.17 Only makes mentioned in the bill of material as per Annexure-A shall be used. For any deviation prior approval from CEE shall be taken.
- 4.18 All the equipment fitted in the panel shall be easily accessible for replacement/checking.
- 4.19 All rotary switches shall conform to IS:13947 (Pt-III)-93 and shall be suitable for universal mounting.
- 4.20 All fasteners used shall be zinc plated and passivated according to IS: 1573-86 and conforming to IS: 1364-92.
- 4.21 All the components/ equipments/ materials including paint shall be fire retardant. Panel manufacturer shall certify this requirement.
- 4.22 General and safety requirements shall be governed by IS: 13947 (Pt-I)-93 and IS: 8623-1993.
- 4.23 The general construction of the switch board cabinet shall be such as to keep the various voltage levels separated against each other as far as possible.
- 4.24 **High Voltage Cubicle:**
- 4.24.1 A disconnecting and earthing device alongwith high voltage fuses shall be located as indicated in the drawing. The main function of this device is to separate the two feeders ( input supply) and simultaneously earthing 750 volts ac network of the coach. The connections to this device shall be made by removing the top cover on the front of the device
- 4.24.2 Suitable mounting plate shall be provided on the back of the panel to house the switchgear for main contactors, measuring and monitoring relays, contactors for pump control, MPCB, mounting for pump controller and cage clamp terminals.
- 4.24.3 The voltmeters and necessary rotary switches as indicated in the drawing shall be mounted on a plate welded or screwed to the top frame as indicated in the drawing.
- 4.24.4 Wheel slip protection is not in the scope of supply of the panel manufacturer, however suitable angles with terminals for mounting shall be provided in the panel.
- 4.25 **Regulated Battery Charger Cubicle :**
- 4.25.1 The cubicle shall house the regulated battery charger alongwith the connectors as indicated in the drawing.
- 4.25.2 The interconnecting cables for the charger shall be supplied alongwith the cubicle.
- 4.26 **On Board Rotary Switch Panel**
- 4.26.1 The on-board panel shall house the rotary switch panel as used in conventional coaches for distribution of light and fan as per the schematic and wiring diagram
- 4.26.2 The rotary switch for the feeder selection shall be provided on the panel to select the feeders as provided in the underslung HV cubicle. It may be noted that the control for the feeders selection contactors shall be on 110 volts dc only.
- 4.26.3 The connectors for the mobile charging socket shall be provided in the panel as indicated in the drawing.

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4.26.4 Suitable hat section trays shall be supplied alongwith the panel for covering the conduits/cables coming in/out of the cubicle.

## 5.0 TESTS:

### 5.1. TYPE TEST:

5.1.1 All the type tests mentioned in Clause 5.4 shall be carried out on a prototype unit. The firm manufacturing for the first time shall get the prototype approved from CEE/RCF.

### 5.2 ROUTINE TEST:

5.2.1 Routine tests mentioned in clause 5.5 shall be carried out on each unit by the manufacturer at his works to ensure compliance with the specification and the drawings.


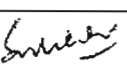
### 5.3 ACCEPTANCE TEST:

5.3.1 Acceptance test mentioned in clause 5.4 are to be carried out by an inspecting authority nominated by the purchase at the works of the manufacturer, on the samples picked up by the inspecting authority.

5.3.2 All the acceptance tests shall be carried out at firm's premises at the manufacturer's cost. Inspecting officer will witness the tests. A copy of the internal tests conducted by the firm shall be supplied to inspection/purchasing authority.

5.4 Tests as mentioned I table below shall be carried out as per respective clause of IS: 8623(Pt-I)-93.

Sr. No.	Clauses of IS:8623	Tests	Type Test	Routine Test	Accept Test
1	8.3.1	Visual inspection, including inspection of wiring and electrical operational test	YES	YES	YES
2	8.2.1	Temperature rise test	YES	NO	NO
3	8.2.6	Mechanical operation and sequence test	YES	YES	YES
4	8.2.5	Test for verification of clearance and creepage distances	YES	NO	NO
5	8.2.2	Test for verification of dielectric properties	YES	YES	YES
6	8.3.4	Test for verification of insulation resistance	YES	YES	YES
7	8.3.3	Checking of electrical continuity	YES	YES	YES
8	8.2.4	Verification for effectiveness of protective circuits	YES	YES	YES
9	--	Check for satisfactory operation of rotary switches by rotating 10 times clockwise and 10 times anti-clockwise. (WTC of rotary switches of OEM shall be checked by inspecting authority)	YES	YES	YES
10		Check for BOM and proof of material as per spec. with proof of invoices	YES	YES	YES

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- 5.4 The accuracy of measuring instruments used for both type and routine tests shall be of class-1.5.
- 5.5 For the commissioning of first panel, panel manufacturer shall depute his staff at RCF for interface with respect to items falling in RCF scope of supply.

#### 6.0 APPROVALS:

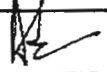
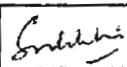
- 6.1 The firm manufacturing for the first time will arrange in stage inspection by the representative of the CEE/RCF at the following stages and get prototype approval for it.
- Manufacture/fabrication of the enclosure of the panel.
  - Structural/dimensional drawing of the switchboard cabinet
  - Mounting/fixing of equipment and layout of the switchgears
  - Power/control wiring
  - Final inspection/testing
- 6.2 The supplier may also be required to attend joint reviews regarding the development of prototype unit and submit the detailed clause by clause comments, bill of material, in-house test results before asking for prototype inspection by CEE office.
- 6.3 The tenderer may seek technical clarifications, if any, in writing 30 days before opening the tenders.

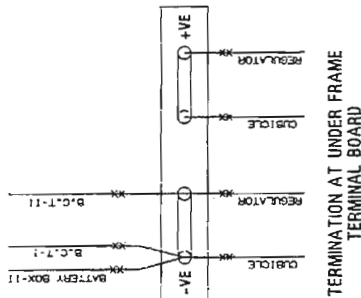
#### 7.0 COMMISSIONING:

- 7.1 The panel manufacturer shall associate with RCF during fitment and commissioning of the panels at RCF.

#### 8.0 ENCLOSURES:

Sr. No.	Drawing/ Document No.	Description
1.	LS71103	H V Cubide
2.	LS71104	Regulated Battery Charger Cubicle
3.	LS71105	Terminal codification for Battery charger cubicle
4.	CC72081	Low voltage on-board Rotary switch Panel
5.	CC72082, alt. 'a'	Fuse and Terminal panel
6.	LS70117, alt. 'a' (5 sheets)	Schematic wiring diagram for Switch Board Cabinet for LHB EOG Non-AC coaches
7.	Annexure-A	Bill of material
8.	Annexure-B	Terminals for HV cubide
9.	EDTS-200, Rev. 'NIL', Am-1	Specification for Tubular Crimping Sockets' for E-beam cables
10.	EDTS-201, Rev. 'A', Am-1	Specification for 'Ring Tongue type' crimping sockets for E-beam cables

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INVENTORY NO.	NO. OF HARNESS	FROM	TO	DATE SIZE	COLOR	WIRE SIZE (APPROXIMATE)	WIRE HARNESS	DOWN
1	1	A-TERMINATOR	CABLE BOX (A-TERMINATOR)	18, 50, 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000, 1050, 1100, 1150, 1200, 1250, 1300, 1350, 1400, 1450, 1500, 1550, 1600, 1650, 1700, 1750, 1800, 1850, 1900, 1950, 2000, 2050, 2100, 2150, 2200, 2250, 2300, 2350, 2400, 2450, 2500, 2550, 2600, 2650, 2700, 2750, 2800, 2850, 2900, 2950, 3000, 3050, 3100, 3150, 3200, 3250, 3300, 3350, 3400, 3450, 3500, 3550, 3600, 3650, 3700, 3750, 3800, 3850, 3900, 3950, 4000, 4050, 4100, 4150, 4200, 4250, 4300, 4350, 4400, 4450, 4500, 4550, 4600, 4650, 4700, 4750, 4800, 4850, 4900, 4950, 5000, 5050, 5100, 5150, 5200, 5250, 5300, 5350, 5400, 5450, 5500, 5550, 5600, 5650, 5700, 5750, 5800, 5850, 5900, 5950, 6000, 6050, 6100, 6150, 6200, 6250, 6300, 6350, 6400, 6450, 6500, 6550, 6600, 6650, 6700, 6750, 6800, 6850, 6900, 6950, 7000, 7050, 7100, 7150, 7200, 7250, 7300, 7350, 7400, 7450, 7500, 7550, 7600, 7650, 7700, 7750, 7800, 7850, 7900, 7950, 8000, 8050, 8100, 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87050, 87100, 87150, 87200, 87250, 87300, 87350, 87400, 87450, 87500, 87550, 87600, 87650, 87700, 87750, 87800, 87850, 87900, 87950, 88000, 88050, 88100, 88150, 88200, 88250, 88300, 88350, 88400, 88450, 88500, 88550, 88600, 88650, 88700, 88750, 88800, 88850, 88900, 88950, 89000, 89050, 89100, 89150, 892				

CABLE SIZE	SYMBOL	SPECIFICATION
6-50 MW. ELECTRON BEAM IRRADIATED COPPER CABLE	—/—	316139 RES. 1/4" AN. 1011A SHEET-2
10-60 MW. ELECTRON BEAM IRRADIATED COPPER CABLE	—//—	
25-50 MW. ELECTRON BEAM IRRADIATED COPPER CABLE	—X—	

2. NUMBERS INDICATED IN CIRCLE ARE HARNESS NUMBERS.
1. CABLE LENGTHS GIVEN AGAINST EACH HARNESS ARE ONLY APPROXIMATE AND CORRECT LENGTH SHALL BE ADVISED BY SHOPS TO DESIGN OFFICE AFTER FIRING FIRST COACH.

DATE OF FIRST ISSUE	FOR UNTOLERANCED DIMENSIONS REFER MDG0000

[illegible]

INDIAN RAILWAYS STANDARD



TABLE-1

S.NO	SIZE	DISCUSSION	QPC
1	4 SO.MM	CAT.NO.RPS-1K-16-10/2.0-4 OF M/S TYCO ELECTRONICS OR EQUIVALENT APPROVED MAKE	10
2	6-16 SO.MM	CAT.NO.RPS-1K-8-4/2.0-4 OF M/S TYCO ELECTRONICS OR EQUIVALENT APPROVED MAKE	40

TABLE-2

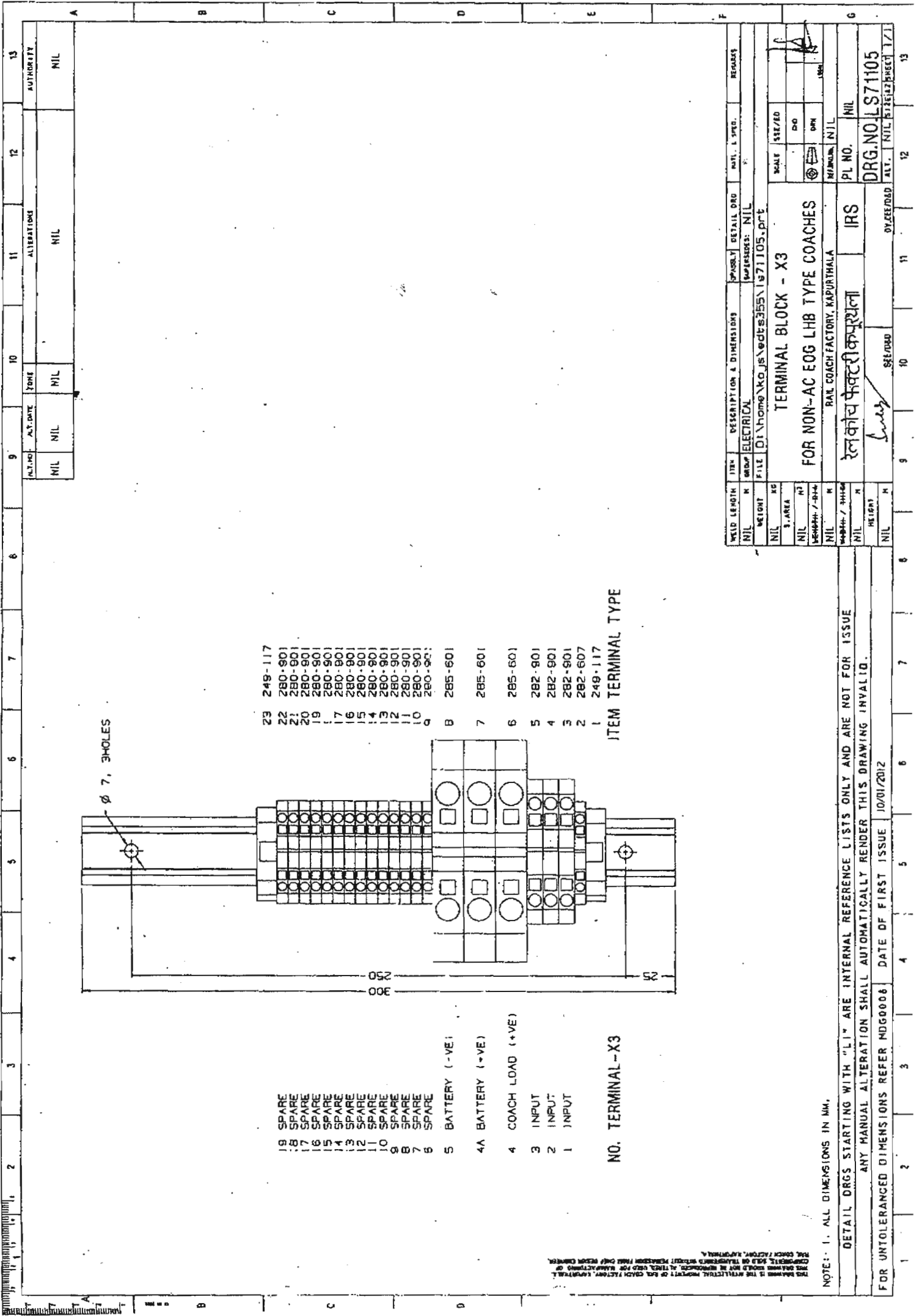
S.NO	SIZE	DISCUSSION	QPC
1	1.5-2.5 SO.MM	CAT.NO.RPS-1K-22-1B/2.0-4 OF M/S TYCO ELECTRONICS OR EQUIVALENT APPROVED MAKE	700
2	4 SO.MM	CAT.NO.RPS-1K-16-10/2.0-4 OF M/S TYCO ELECTRONICS OR EQUIVALENT APPROVED MAKE	250

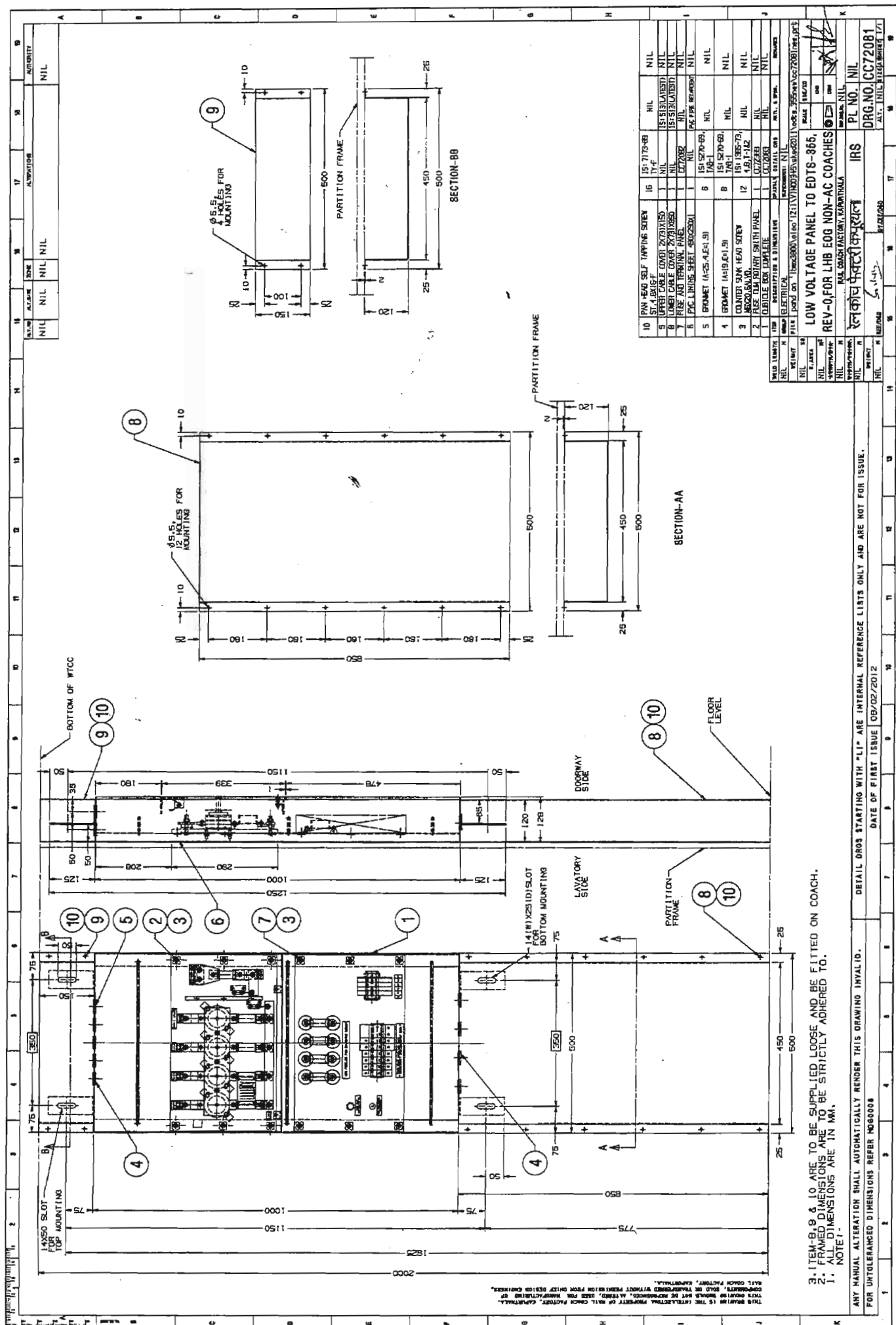
1. REFER TABLE-1 FOR ITEM-1 AND TABLE-2 FOR ITEM-2

NOTE:-

DETAIL DRGS STARTING WITH "LI" ARE INTERNAL REFERENCE LISTS ONLY AND ARE NOT FOR ISSUE.  
THIS IS A COMPUTER GENERATED DRAWING. ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER IT INVALID.  
FOR UNTOLERANCED DIMENSIONS REFER MDG0008 DATE OF FIRST ISSUE 01/10/2009

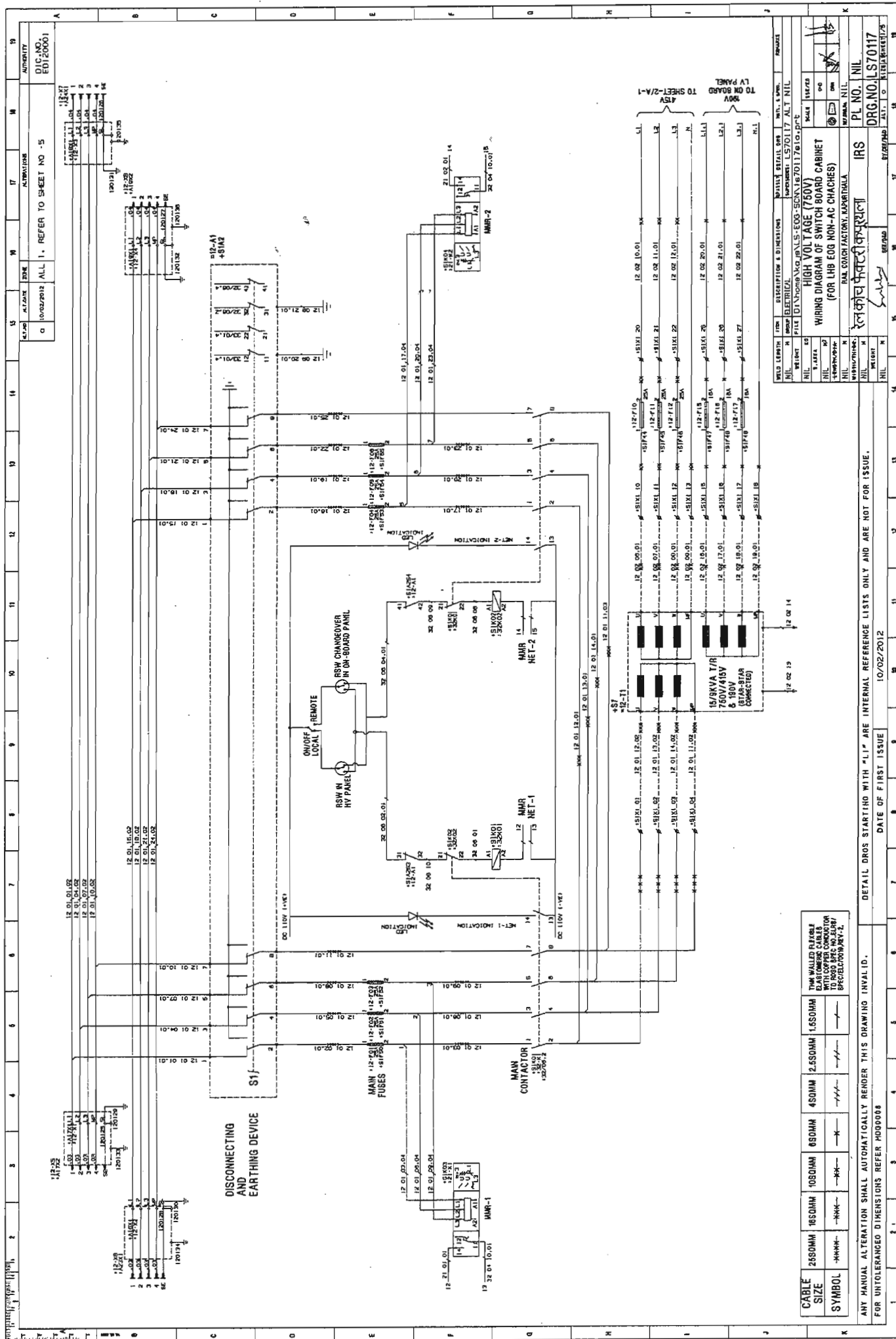
2		CABLE MARKER DATA CHART		1	NIL	NIL	SEE NOTE-1
1		CABLE MARKER DATA CHART		1	NIL	NIL	SEE NOTE-1
ITEM		DESCRIPTION & DIMENSIONS		QUANTITY	DETAIL DRG	MATL. & QTY.	REMARKS
WELD LENGTH		ELECTRICAL		NIL			
WELD H		ELECTRICAL		NIL			
WELD W		ELECTRICAL		NIL			
WELD D		ELECTRICAL		NIL			
WELD R		ELECTRICAL		NIL			
WELD T		ELECTRICAL		NIL			
WELD B		ELECTRICAL		NIL			
WELD L		ELECTRICAL		NIL			
WELD S		ELECTRICAL		NIL			
WELD E		ELECTRICAL		NIL			
WELD O		ELECTRICAL		NIL			
WELD U		ELECTRICAL		NIL			
WELD I		ELECTRICAL		NIL			
WELD J		ELECTRICAL		NIL			
WELD K		ELECTRICAL		NIL			
WELD L		ELECTRICAL		NIL			
WELD M		ELECTRICAL		NIL			
WELD N		ELECTRICAL		NIL			
WELD O		ELECTRICAL		NIL			
WELD P		ELECTRICAL		NIL			
WELD Q		ELECTRICAL		NIL			
WELD R		ELECTRICAL		NIL			
WELD S		ELECTRICAL		NIL			
WELD T		ELECTRICAL		NIL			
WELD U		ELECTRICAL		NIL			
WELD V		ELECTRICAL		NIL			
WELD W		ELECTRICAL		NIL			
WELD X		ELECTRICAL		NIL			
WELD Y		ELECTRICAL		NIL			
WELD Z		ELECTRICAL		NIL			
WELD AA		ELECTRICAL		NIL			
WELD AB		ELECTRICAL		NIL			
WELD AC		ELECTRICAL		NIL			
WELD AD		ELECTRICAL		NIL			
WELD AE		ELECTRICAL		NIL			
WELD AF		ELECTRICAL		NIL			
WELD AG		ELECTRICAL		NIL			
WELD AH		ELECTRICAL		NIL			
WELD AI		ELECTRICAL		NIL			
WELD AJ		ELECTRICAL		NIL			
WELD AK		ELECTRICAL		NIL			
WELD AL		ELECTRICAL		NIL			
WELD AM		ELECTRICAL		NIL			
WELD AN		ELECTRICAL		NIL			
WELD AO		ELECTRICAL		NIL			
WELD AP		ELECTRICAL		NIL			
WELD AQ		ELECTRICAL		NIL			
WELD AR		ELECTRICAL		NIL			
WELD AS		ELECTRICAL		NIL			
WELD AT		ELECTRICAL		NIL			
WELD AU		ELECTRICAL		NIL			
WELD AV		ELECTRICAL		NIL			
WELD AW		ELECTRICAL		NIL			
WELD AX		ELECTRICAL		NIL			
WELD AY		ELECTRICAL		NIL			
WELD AZ		ELECTRICAL		NIL			
WELD BA		ELECTRICAL		NIL			
WELD BB		ELECTRICAL		NIL			
WELD BC		ELECTRICAL		NIL			
WELD BD		ELECTRICAL		NIL			
WELD BE		ELECTRICAL		NIL			
WELD BF		ELECTRICAL		NIL			
WELD BG		ELECTRICAL		NIL			
WELD BH		ELECTRICAL		NIL			
WELD BI		ELECTRICAL		NIL			
WELD BJ		ELECTRICAL		NIL			
WELD BK		ELECTRICAL		NIL			
WELD BL		ELECTRICAL		NIL			
WELD BM		ELECTRICAL		NIL			
WELD BN		ELECTRICAL		NIL			
WELD BO		ELECTRICAL		NIL			
WELD BP		ELECTRICAL		NIL			
WELD BQ		ELECTRICAL		NIL			
WELD BR		ELECTRICAL		NIL			
WELD BS		ELECTRICAL		NIL			
WELD BT		ELECTRICAL		NIL			
WELD BU		ELECTRICAL		NIL			
WELD BV		ELECTRICAL		NIL			
WELD BW		ELECTRICAL		NIL			
WELD BX		ELECTRICAL		NIL			
WELD BY		ELECTRICAL		NIL			
WELD BZ		ELECTRICAL		NIL			
WELD CA		ELECTRICAL		NIL			
WELD CB		ELECTRICAL		NIL			
WELD CC		ELECTRICAL		NIL			
WELD CD		ELECTRICAL		NIL			
WELD CE		ELECTRICAL		NIL			
WELD CF		ELECTRICAL		NIL			
WELD CG		ELECTRICAL		NIL			
WELD CH		ELECTRICAL		NIL			
WELD CI		ELECTRICAL		NIL			
WELD CJ		ELECTRICAL		NIL			
WELD CK		ELECTRICAL		NIL			
WELD CL		ELECTRICAL		NIL			
WELD CM		ELECTRICAL		NIL			
WELD CN		ELECTRICAL		NIL			
WELD CO		ELECTRICAL		NIL			
WELD CP		ELECTRICAL		NIL			
WELD CQ		ELECTRICAL		NIL			
WELD CR		ELECTRICAL		NIL			
WELD CS		ELECTRICAL		NIL			
WELD CT		ELECTRICAL		NIL			
WELD CU		ELECTRICAL		NIL			
WELD CV		ELECTRICAL		NIL			
WELD CW		ELECTRICAL		NIL			
WELD CX		ELECTRICAL		NIL			
WELD CY		ELECTRICAL		NIL			
WELD CZ		ELECTRICAL		NIL			
WELD DA		ELECTRICAL		NIL			
WELD DB		ELECTRICAL		NIL			
WELD DC		ELECTRICAL		NIL			
WELD DD		ELECTRICAL		NIL			
WELD DE		ELECTRICAL		NIL			
WELD DF		ELECTRICAL		NIL			
WELD DG		ELECTRICAL		NIL			
WELD DH		ELECTRICAL		NIL			
WELD DI		ELECTRICAL		NIL			
WELD DJ		ELECTRICAL		NIL			
WELD DK		ELECTRICAL		NIL			
WELD DL		ELECTRICAL		NIL			
WELD DM		ELECTRICAL		NIL			
WELD DN		ELECTRICAL		NIL			
WELD DO		ELECTRICAL		NIL			
WELD DP		ELECTRICAL		NIL			
WELD DQ		ELECTRICAL		NIL			
WELD DR		ELECTRICAL		NIL			
WELD DS		ELECTRICAL		NIL			
WELD DT		ELECTRICAL		NIL			
WELD DU		ELECTRICAL		NIL			
WELD DV		ELECTRICAL		NIL			
WELD DW		ELECTRICAL		NIL			
WELD DX		ELECTRICAL		NIL			
WELD DY		ELECTRICAL		NIL			
WELD DZ		ELECTRICAL		NIL			
WELD EA		ELECTRICAL		NIL			
WELD EB		ELECTRICAL		NIL			
WELD EC		ELECTRICAL		NIL			
WELD ED		ELECTRICAL		NIL			
WELD EE		ELECTRICAL		NIL			
WELD EF		ELECTRICAL		NIL			
WELD EG		ELECTRICAL		NIL			
WELD EH		ELECTRICAL		NIL			
WELD EI		ELECTRICAL		NIL			
WELD EJ		ELECTRICAL		NIL			
WELD EK		ELECTRICAL		NIL			
WELD EL		ELECTRICAL		NIL			
WELD EM		ELECTRICAL		NIL			
WELD EN		ELECTRICAL		NIL			
WELD EO		ELECTRICAL		NIL			
WELD EP		ELECTRICAL		NIL			
WELD EQ		ELECTRICAL		NIL			
WELD ER		ELECTRICAL		NIL			
WELD ES		ELECTRICAL		NIL			
WELD ET		ELECTRICAL		NIL			
WELD EU		ELECTRICAL		NIL			
WELD EV		ELECTRICAL		NIL			
WELD EW		ELECTRICAL		NIL			
WELD EX		ELECTRICAL		NIL			
WELD EY		ELECTRICAL		NIL			
WELD EZ		ELECTRICAL		NIL			
WELD FA		ELECTRICAL		NIL			
WELD FB		ELECTRICAL		NIL			
WELD FC		ELECTRICAL		NIL			
WELD FD		ELECTRICAL		NIL			
WELD FE		ELECTRICAL		NIL			
WELD FF		ELECTRICAL		NIL			
WELD FG		ELECTRICAL		NIL			
WELD FH		ELECTRICAL		NIL			
WELD FI		ELECTRICAL		NIL			
WELD FJ		ELECTRICAL		NIL			
WELD FK		ELECTRICAL		NIL			
WELD FL		ELECTRICAL		NIL			
WELD FM		ELECTRICAL		NIL			
WELD FN		ELECTRICAL		NIL			
WELD FO		ELECTRICAL		NIL			
WELD FP		ELECTRICAL		NIL			
WELD FQ		ELECTRICAL		NIL			
WELD FR		ELECTRICAL		NIL			
WELD FS		ELECTRICAL		NIL			
WELD FT		ELECTRICAL		NIL			
WELD FU		ELECTRICAL		NIL			
WELD FV		ELECTRICAL		NIL			
WELD FW		ELECTRICAL		NIL			
WELD FX		ELECTRICAL		NIL			
WELD FY		ELECTRICAL		NIL			
WELD FZ		ELECTRICAL		NIL			
WELD GA		ELECTRICAL		NIL			
WELD GB		ELECTRICAL		NIL			
WELD GC		ELECTRICAL		NIL			
WELD GD		ELECTRICAL		NIL			
WELD GE		ELECTRICAL		NIL			
WELD GF		ELECTRICAL		NIL			
WELD GG		ELECTRICAL		NIL			
WELD GH		ELECTRICAL		NIL			
WELD GI		ELECTRICAL		NIL			
WELD GJ		ELECTRICAL		NIL			
WELD GK		ELECTRICAL		NIL			
WELD GL		ELECTRICAL		NIL			
WELD GM		ELECTRICAL		NIL			
WELD GN		ELECTRICAL		NIL			
WELD GO		ELECTRICAL		NIL			
WELD GP		ELECTRICAL		NIL			
WELD GQ		ELECTRICAL		NIL			
WELD GR		ELECTRICAL		NIL			
WELD GS		ELECTRICAL		NIL			
WELD GT		ELECTRICAL		NIL			
WELD GU		ELECTRICAL		NIL			
WELD GV		ELECTRICAL		NIL			
WELD GW		ELECTRICAL		NIL			
WELD GX		ELECTRICAL		NIL			
WELD GY		ELECTRICAL		NIL			
WELD GZ		ELECTRICAL		NIL			
WELD HA		ELECTRICAL		NIL			
WELD HB		ELECTRICAL		NIL			
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WELD HD		ELECTRICAL		NIL			
WELD HE		ELECTRICAL		NIL			
WELD HF		ELECTRICAL		NIL			
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WELD HH		ELECTRICAL		NIL			
WELD HI		ELECTRICAL		NIL			
WELD HJ		ELECTRICAL		NIL			
WELD HK		ELECTRICAL		NIL			
WELD HL		ELECTRICAL		NIL			
WELD HM		ELECTRICAL		NIL			
WELD HN		ELECTRICAL		NIL			
WELD HO		ELECTRICAL		NIL			
WELD HP		ELECTRICAL		NIL			
WELD HQ		ELECTRICAL		NIL			
WELD HR		ELECTRICAL		NIL			
WELD HS		ELECTRICAL		NIL			
WELD HT		ELECTRICAL		NIL			
WELD HU		ELECTRICAL		NIL			
WELD HV		ELECTRICAL		NIL			
WELD HW		ELECTRICAL		NIL			
WELD HX		ELECTRICAL		NIL			
WELD HY		ELECTRICAL		NIL			
WELD HZ		ELECTRICAL		NIL			
WELD IA		ELECTRICAL		NIL			
WELD IB		ELECTRICAL		NIL			
WELD IC		ELECTRICAL		NIL			
WELD ID		ELECTRICAL		NIL			
WELD IE		ELECTRICAL		NIL			
WELD IF		ELECTRICAL		NIL			
WELD IG		ELECTRICAL		NIL			
WELD IH		ELECTRICAL		NIL			
WELD II		ELECTRICAL		NIL			
WELD IJ		ELECTRICAL		NIL			
WELD IK		ELECTRICAL		NIL			
WELD IL		ELECTRICAL		NIL			
WELD IM		ELECTRICAL		NIL			
WELD IN		ELECTRICAL		NIL			
WELD IO		ELECTRICAL		NIL			
WELD IP		ELECTRICAL		NIL			
WELD IQ		ELECTRICAL		NIL			
WELD IR		ELECTRICAL		NIL			
WELD IS		ELECTRICAL		NIL			
WELD IT		ELECTRICAL		NIL			
WELD IU		ELECTRICAL		NIL			
WELD IV		ELECTRICAL		NIL			
WELD IW		ELECTRICAL		NIL			
WELD IX		ELECTRICAL		NIL			
WELD IY		ELECTRICAL		NIL			
WELD IZ		ELECTRICAL		NIL			
WELD JA		ELECTRICAL		NIL			
WELD JB		ELECTRICAL		NIL			
WELD JC		ELECTRICAL		NIL			
WELD JD		ELECTRICAL		NIL			
WELD JE		ELECTRICAL		NIL			
WELD JF		ELECTRICAL		NIL			
WELD JG		ELECTRICAL		NIL			
WELD JH		ELECTRICAL		NIL			
WELD JI		ELECTRICAL					

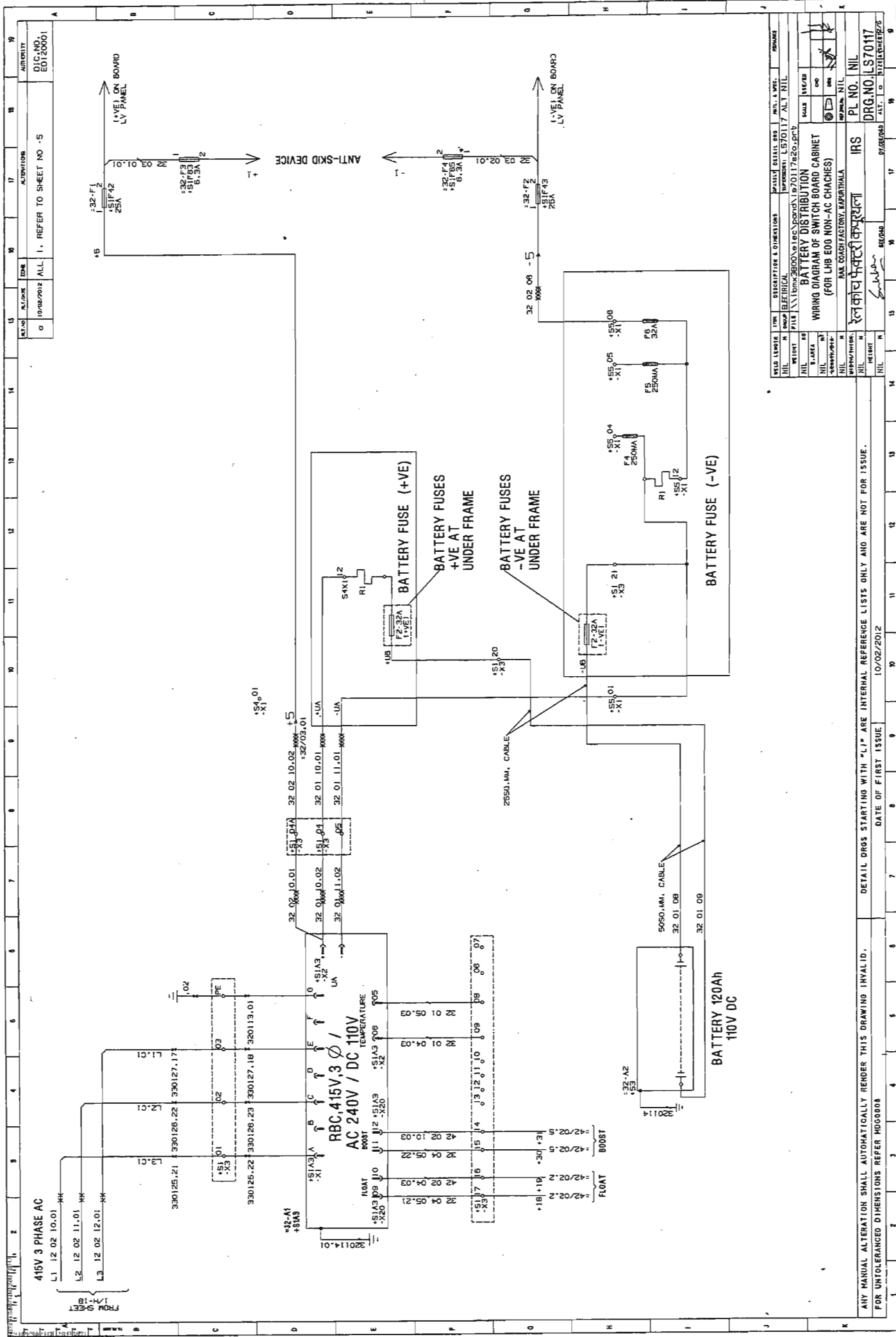




10	PIV-HEAD SELF TAPPING SCREW	16	15-7172-B	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
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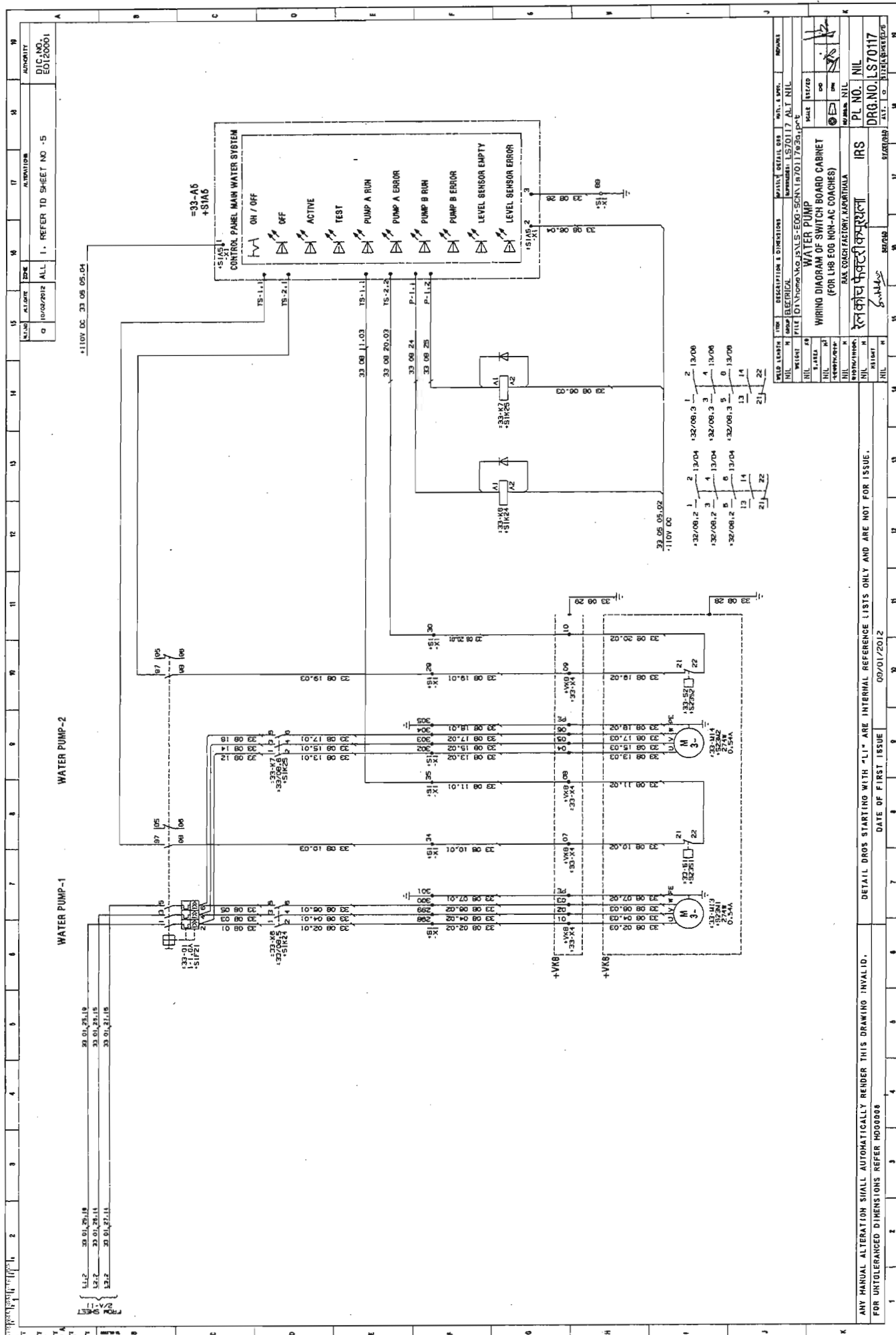


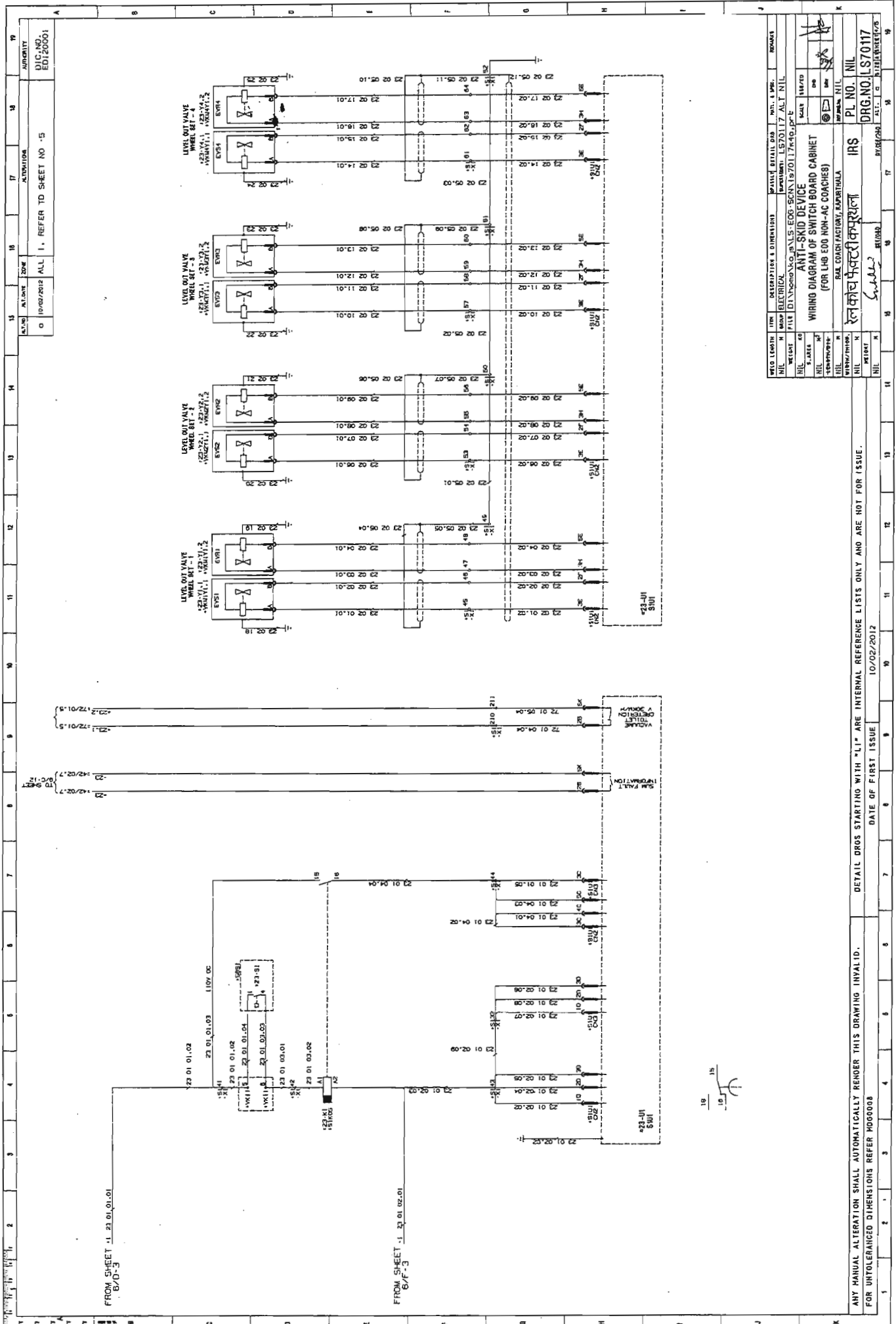


REV.	DATE	DESCRIPTION	BY	CHKD.	APPD.	DATE	REV.	DATE	DESCRIPTION	BY	CHKD.	APPD.	DATE
1	10/02/2012	ISSUED FOR FABRICATION	...	...	...	...	1	10/02/2012	ISSUED FOR FABRICATION	...	...	...	...
2	10/02/2012	REVISION	...	...	...	...	2	10/02/2012	REVISION	...	...	...	...
3	10/02/2012	REVISION	...	...	...	...	3	10/02/2012	REVISION	...	...	...	...
4	10/02/2012	REVISION	...	...	...	...	4	10/02/2012	REVISION	...	...	...	...
5	10/02/2012	REVISION	...	...	...	...	5	10/02/2012	REVISION	...	...	...	...
6	10/02/2012	REVISION	...	...	...	...	6	10/02/2012	REVISION	...	...	...	...
7	10/02/2012	REVISION	...	...	...	...	7	10/02/2012	REVISION	...	...	...	...
8	10/02/2012	REVISION	...	...	...	...	8	10/02/2012	REVISION	...	...	...	...
9	10/02/2012	REVISION	...	...	...	...	9	10/02/2012	REVISION	...	...	...	...
10	10/02/2012	REVISION	...	...	...	...	10	10/02/2012	REVISION	...	...	...	...
11	10/02/2012	REVISION	...	...	...	...	11	10/02/2012	REVISION	...	...	...	...
12	10/02/2012	REVISION	...	...	...	...	12	10/02/2012	REVISION	...	...	...	...
13	10/02/2012	REVISION	...	...	...	...	13	10/02/2012	REVISION	...	...	...	...
14	10/02/2012	REVISION	...	...	...	...	14	10/02/2012	REVISION	...	...	...	...
15	10/02/2012	REVISION	...	...	...	...	15	10/02/2012	REVISION	...	...	...	...
16	10/02/2012	REVISION	...	...	...	...	16	10/02/2012	REVISION	...	...	...	...
17	10/02/2012	REVISION	...	...	...	...	17	10/02/2012	REVISION	...	...	...	...
18	10/02/2012	REVISION	...	...	...	...	18	10/02/2012	REVISION	...	...	...	...
19	10/02/2012	REVISION	...	...	...	...	19	10/02/2012	REVISION	...	...	...	...
20	10/02/2012	REVISION	...	...	...	...	20	10/02/2012	REVISION	...	...	...	...

ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. DETAIL DRGS STARTING WITH "LJ" ARE INTERNAL REFERENCE LISTS ONLY AND ARE NOT FOR ISSUE.

FOR UNTOLERANCED DIMENSIONS REFER H000008









Sr. No.	Item	Term function Technical data	Drawing No	Manufacture supplier	Place of install- ation
		<b>HIGH VOLTAGE CUBICLE</b>			
1	12 F01	High voltage fuse (with holder) net1 Gr.00C 1000V/25A AC; qB	2038603 2138601	Siba/EFEN/ Ferraz/ETI/ Siemens/Bussmann/ Schneider/GE/L&T	S1F50
2	12 F02	High voltage fuse (with holder) net1 Gr.00C 1000V/25A AC; qB	2038603 2138601	Siba/EFEN/ Ferraz/ETI/ Siemens/Bussmann/ Schneider/GE/L&T	S1F51
3	12 F03	High voltage fuse (with holder) net1 Gr.00C 1000V/25A AC; qB	2038603 2138601	Siba/EFEN/ Ferraz/ETI/ Siemens/Bussmann/ Schneider/GE/L&T	S1F52
4	12 F04	High voltage fuse (with holder) net2 Gr.00C 1000V/25A AC; qB	2038603 2138601	Siba/EFEN/ Ferraz/ETI/ Siemens/Bussmann/ Schneider/GE/L&T	S1F53
5	12 F05	High voltage fuse (with holder) net2 Gr.00C 1000V/25A AC; qB	2038603 2138601	Siba/EFEN/ Ferraz/ETI/ Siemens/Bussmann/ Schneider/GE/L&T	S1F54
6	12 F06	High voltage fuse (with holder) net2 Gr.00C 1000V/25A AC; qB	2038603 2138601	Siba/EFEN/ Ferraz/ETI/ Siemens/Bussmann/ Schneider/GE/L&T	S1F55
7	12 F10	Low voltage fuse (with holder) transformer (sec.) Gr.00 500V/25A GL/GG	03912,03760 of M/s Wohner	Siba/EFEN/ Ferraz/ETI/ Siemens/Bussmann/ Schneider/GE/L&T	S1F44
8	12 F11	Low voltage fuse (with holder) transformer (sec.) Gr.00 500V/25A GL/GG	03912,03760 of M/s Wohner	Siba/EFEN/ Ferraz/ETI/ Siemens/Bussmann/ Schneider/GE/L&T	S1F45
9	12 F12	Low voltage fuse (with holder) transformer (sec.) Gr.00 500V/25A GL/GG	03912,03760 of M/s Wohner	Siba/EFEN/ Ferraz/ETI/ Siemens/Bussmann/ Schneider/GE/L&T	S1F46
10	12 F13	Fuse 5 x 20mm (fuse clamp) net-1 control 1 amps	282-122(clamp)	Wago/Wickmann/ RS/ Ferraz/Phoenix /Weidmuller	-
11	12 F14	Fuse 5 x 20mm (fuse clamp) net-1 control 1 amps	282-122(clamp)	Wago/Wickmann/ RS/ Ferraz/Phoenix /Weidmuller	-
12	12 F15	Low voltage fuse (with holder) transformer (sec.) Gr.00 500V/16A GL/GG	03909,03760 of M/s Wohner	Siemens/ WOHNER- ITALWEBER/ Ferraz/Bussmann/ Schneider/GE/L&T	S1F47
13	12 F16	Low voltage fuse (with holder) transformer (sec.) Gr.00 500V/16A GL/GG	03909,03760 of M/s Wohner	Siemens/ WOHNER- ITALWEBER/ Ferraz/Bussmann/ Schneider/GE/L&T	S1F48
14	12 F17	Low voltage fuse (with holder) transformer (sec.) Gr.00 500V/16A GL/GG	03909,03760 of M/s Wohner	Siemens/ WOHNER- ITALWEBER/ Ferraz/Bussmann/ Schneider/GE/L&T	S1F49
15	12 A1	Disconnecting and earthing device, 8 pole, 2 way, no-OFF on load, 63A 750V AC (1000V insulation), 2NO+2NC with heavy handle and pad locking arngt. In earth position, mounted in a stainless steel enclosure suitable for AC23 duty conforming to IS:13947/IEC947	M137.0827407 of M/s Schaltbau or cat. No. 73342SLB321 06B of M/s L&T	Schaltbau L&T	S1A2
16	21 F01	Fuse fuse for voltage control 1A; 1.2kV	70 034 049/1 71 034 01	Siba/Wohner/ Ferraz/GE/Schneider/ Bussmann/L&T	S1F90

17	21 F02	Fuse fuse for voltage control 1A; 1.2kV	71 034 049/1 71 034 01	Siba/Wohner/ Ferraz/GE/Schneider/ Bussmann/L&T	S1F91
18	21 F03	Fuse fuse for voltage control 1A; 1.2kV	72 034 049/1 71 034 01	Siba/Wohner/ Ferraz/GE/Schneider/ Bussmann/L&T	S1F93
19	21 F04	Fuse fuse for voltage control 1A; 1.2kV	73 034 049/1 71 034 01	Siba/Wohner/ Ferraz/GE/Schneider/ Bussmann/L&T	S1F94
20	21 F05	Fuse fuse for voltage control 1A; 1.2kV	74 034 049/1 71 034 01	Siba/Wohner/ Ferraz/GE/Schneider/ Bussmann/L&T	S1F95
21	21 F06	Fuse fuse for voltage control 1A; 1.2kV	75 034 049/1 71 034 01	Siba/Wohner/ Ferraz/GE/Schneider/ Bussmann/L&T	S1F96
22	21 K01	Voltage phase control net1 3AC,750V, aux. Voltage 24-60V AC/DC	8D 9080	Dold/ Gavazzi/ABB	S1K03
23	21 K02	Voltage phase control net1 3AC,750V, aux. Voltage 24-60V AC/DC	8D 9080	Dold/ Gavazzi/ABB	S1K04
24	21 P01	Item deleted	-	-	S1P2
25	21 P02	Item deleted	-	-	S1P3
26	21 S01	Item deleted	-	-	S1S13 (RSW-V1)
27	21 S02	Item deleted	-	-	S1S143 (RSW-V2)
28	28 K01	Drop out delay time relay ARS time tron, UC 24...240V anti skid	2430 120 01	GE/ABB/SchiElcher	S1K5
29	29 F01	Low voltage fuse (with holder) switch cabinet Gr.00 25A	03912,03760 of M/s Wohner	Siemens/ WOHNER- ITALWEBER/ Ferraz/Bussmann/ Schneider/GE/L&T	S1F42
30	30 F02	Low voltage fuse (with holder) switch cabinet Gr.00 25A	03912,03760 of M/s Wohner	Siemens/ WOHNER- ITALWEBER/ Ferraz/Bussmann/ Schneider/GE/L&T	S1F43
31	31 F03	Fuse 5 x 20mm (fuse clamp at the X1.2) anti skid device T6, 3A	282-128/281-418(clamp)	Wago/Wickmann/ RS/ Ferraz/Phoenix /Weidmuller	S1F63
32	32 F04	Fuse 5 x 20mm (fuse clamp at the X1.2) anti skid device T6, 3A	282-128/281-418(clamp)	Wago/Wickmann/ RS/ Ferraz/Phoenix /Weidmuller	S1F65
33	32 K01	Contactor LS 45K4.00 DC 110V net1,aux.contact HS8K11(2nos.) aux.contact HS7K10(1nos.) AC3; 750V RC Unit	- AF 50-40-00 DC 110V RCS CA5-22E	AEG or equivalent of Siemens  ABB or equivalent of Siemens/L&T/ Schneider	S1K01
34	32 K02	Contactor LS 45K4.00 DC 110V net1,aux.contact HS8K11(2nos.) aux.contact HS7K10(1nos.) AC3; 750V RC Unit	- AF 50-40-00 DC 110V RCS CA5-22E	AEG or equivalent of Siemens  ABB or equivalent of Siemens/L&T/ Schneider	S1K02

35	32 S01	Rotary switch with marking "I-O-II" net1-off-net2 (change over switch with 0-position 3- pole)	3SB3 000-0DA11 3SB3 901-0AW 3SB3 400-0A	Siemens L&T (SALZER) TEKNIC/ GE/KAYCEE	S1S02 (RSW-1)
36	33 Q1	Motor protective relay water pump MBS 25, 1-1.6 A with aux.. Contact HS9.11 and terminal block db	910-201-205 910-292-130 910-293-209  3RV1021 1AA10 +3RV 1901 1E	AEG  L&T/Group schneider/ABB  SIEMENS	S1F21
37	32 S07	Toggle switch 0-1 power supply on-off with socket and 2 NC	3SB3 000-2KA11 3SB3 901-0AC 3SB3 400-0D, 61006-S6-B19-400-FH-BB-OFF-ON	Siemens L&T (SALZER) TEKNIC SALZER	S1S01
38	32 S08	Rotary switch 3-pole, 2-way with OFF		Siemens SALZER Kaycee	
39	93 A1	Item deleted	-	-	S1A6
40	93 F01	Fuse 5 x 20mm (fuse clamp at the X1.2) Insulation control T2A	282-128/281-418(clamp)	Wago/Wickmann/ RS/Ferraz/Phoenix/ Weidmuller	S1F58
41	93 F02	Fuse 5 x 20mm (fuse clamp at the X1.2) Insulation control T2A	282-128/281-413(clamp)	Wago/Wickmann/ RS/Ferraz/Phoenix/ Weidmuller	S1F59
42	X1	Terminal block for High voltage Box			S1X1.1
43	33 K06	Auxiliary contactor SH5.31, DC110V with diode water pump 110V DC	SH5.31,DC110V TKC631-Z,110VDC	AEG ABB	S1K24
44	33 K07	Auxiliary contactor SH5.31, DC110V with diode water pump 110V DC	SH5.31,DC110V TKC631-Z,110VDC	AEG ABB	S1K25
			GJH1213061R6312 3RH1131-BF40 3RT1916-1DG00	Siemens/L&T/ Schneider	
		<b>REGULATED BATTERY CHARGER CUBICLE</b>			
45	X3	Terminal block X3	Drawing no. LS70105	Wago/Phoenix/ Weidmuller	S1X3
		<b>ON-BOARD LV CUBICLE</b>			
46		RCBO suitable for 10 amps , 30 mAmps		Siemens MDS/Legrand	
47		Rotary switch panel for Non-AC cables	CC72399	RDSO/RCF approved sources	
48		Rotary Switch for Mobile charging socket		Siemens SALZER Kaycee	
49		Rotary Switch for feeder changeover 16 Amps 6 way with off		Siemens SALZER Kaycee	
		<b>MISCELLANEOUS</b>			
50		PVC alleys	L&T/AKG		
51		Halogen free electron beam Irradiated cables of various sizes	RDSO specification no. ELRS/SPEC/ELC/0019, Rev-2	RDSO/RCF approved sources	
52		Multiple accessories like locks, hinges, handles etc.	Dirac/Hafele/equivalent Imported make		
53		Computer Generated Ferrules	Tyco/Phoenix/Pendult		
54		Cable Jackets	PMA Jack,Fedral Mogul, Werner Mahm	PMA/ Fedral Mogul/ , Werner Mahm	
		Note: 1. Inspecting agency will check all the components above and maintain record for future reference. No deviation in above will be acceptable. 2. Calibration certificate of measuring instruments i.e voltmeter, ammeter to be submitted during inspection. 3. Coloured heat shrinkable sleeves shall be provided as per phase for easy identification.			

## TERMINAL BLOCK IN HV PANEL

S1X1	1	283-901	TRANSFORMER INPUT
	2	283-901	
	3	283-901	
	4	283-901	
	5		
	6		
	7		
	8		
	9		
	10	284-681	TRANSFORMER OUTPUT 415V
	11	284-681	TRANSFORMER OUTPUT 415V
	12	284-681	TRANSFORMER OUTPUT 415V
	13	284-681	TRANSFORMER OUTPUT 415V
	14	284-681	
	15	284-681	TRANSFORMER OUTPUT 190 V
	16	284-681	TRANSFORMER OUTPUT 190 V
	17	284-681	TRANSFORMER OUTPUT 190 V
	18	284-681	TRANSFORMER OUTPUT 190 V
	19	284-681	
	20	284-681	BATTERY CHARGER INPUT
	21	284-681	BATTERY CHARGER INPUT
	22	284-681	BATTERY CHARGER INPUT
	23	284-681	
	24	284-681	
	25	284-681	MOBILE CHARGING
	26	284-681	MOBILE CHARGING
	27	284-681	MOBILE CHARGING
	30	280-833	DC +VE
	31	280-833	DC +VE
	32	280-833	DC -VE
	33	280-833	DC -VE
	34	280-833	pump control
	35	280-833	pump control
	41	280-833	anti skid
	42	280-833	anti skid
	43	280-833	anti skid
	44	280-833	anti skid
	45	280-833	anti skid
	46	280-833	anti skid
	47	280-833	anti skid
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	57	280-833	anti skid
	58	280-833	anti skid
	59	280-833	anti skid
	60	280-833	anti skid
	61	280-833	anti skid

62	280-833	anti skic
63	280-833	anti skic
298	280-833	PUMP
299	280-833	PUMP
300	280-833	PUMP
301	PE	PUMP
302	280-833	PUMP
303	280-833	PUMP
304	280-833	PUMP
305	PE	PUMP

*Handwritten mark resembling a stylized 'K' or '13' with a diagonal line.*

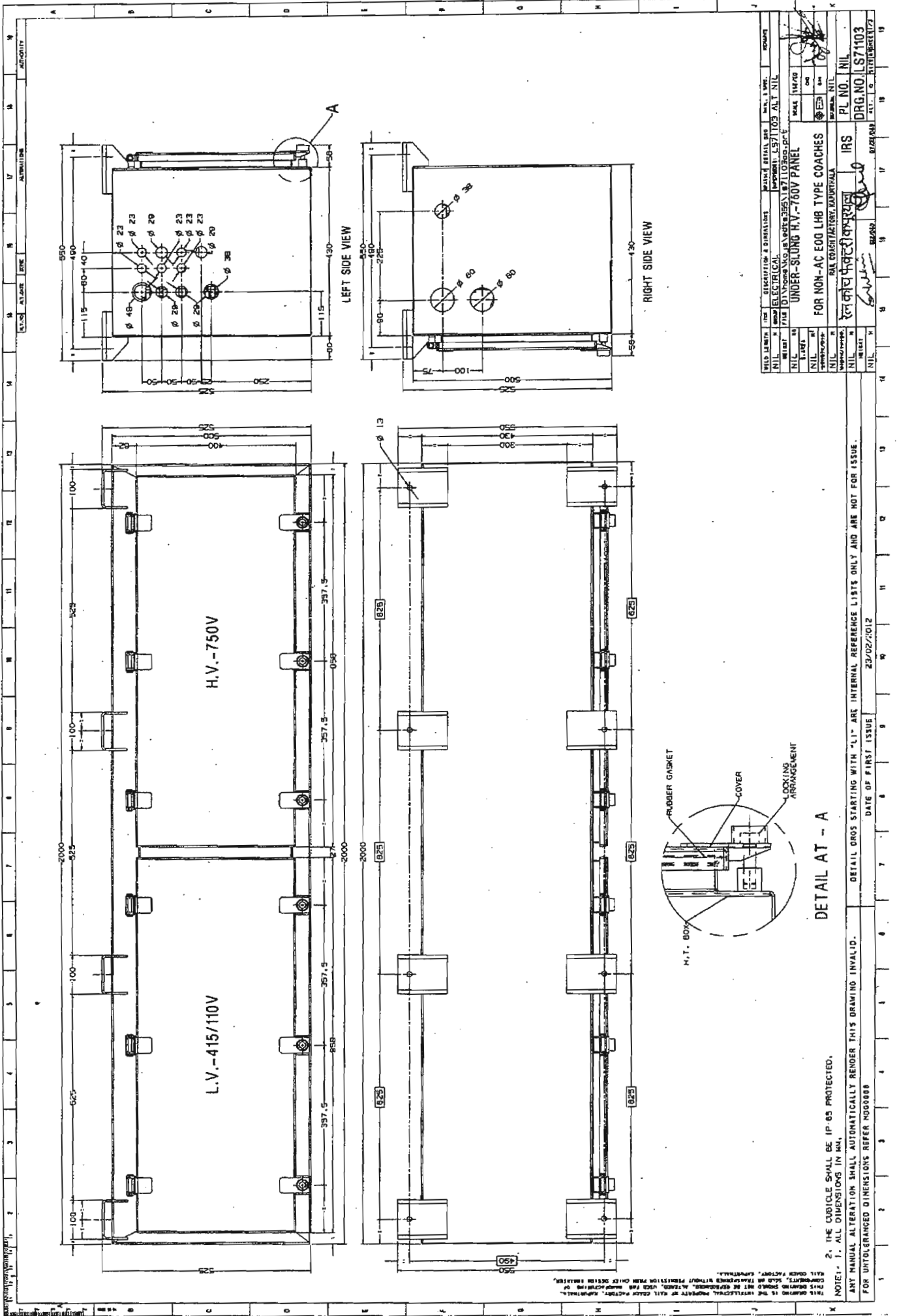
*Handwritten signature or mark.*

## Amendment-1 to specification no. EDTS-355, Rev-01 for Set of Panels for LHB EOG Non-AC coaches

Sr. No.	Clause No.	Existing	Revised
1	4.24.3	The voltmeter and necessary rotary switches as indicated in the drawing shall be mounted on a plate welded or screwed to the top frame as indicated in the drawing	Rotary switches as indicated in the drawing shall be mounted on a plate welded or screwed to the top frame as indicated in the drawing
2	4.27 (new clause added)	---	Regulated Battery Charger (excluding top openings) and HV Panel shall be IP65 protected as per IS:13947 (latest edition). Suitable gaskets shall be provided on the lower openings.
3	5.4 (Sr.No.11) (test added)	---	Test for verification of degree of protection as per IS:13947 (latest edition) (Applicable for type test only)
4	8.0 (Sr.No.1)	LS71103 (HV Cubicle)	LS71103 Alt. 'a' (3 sheets) (HV Cubicle)
5	8.0 (Sr.No.2)	LS71104 (Regulated battery Charger Cubicle)	LS71104 Alt. 'a' (3 sheets) (Regulated battery Charger Cubicle)
6	Annexure-A (BOM) Sr.No.48	Rotary Switch for Mobile charging Socket	Rotary Switch for Mobile charging Socket 10A, 4 Pole ON/OFF
7	Annexure-A (BOM) Sr.No.49	Rotary Switch for Feeder Changeover 16A, 6 way with OFF	Rotary Switch for Feeder Changeover 16A, 2 way with OFF

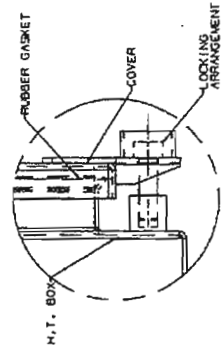
- RCBO shall be shifted to the HV Panel and wiring shall be modified accordingly. ON/OFF Rotary Switch for Mobile charging Socket shall be mounted in the space released by RCBO (Ref. drawing no. CC72082 Alt. 'a').

EDTS-355	01	1	23.2.12				1 of 1
Spec. No.	Rev	Am	Date	SSE/CAD	SEE/D&D	Dy.CEE/D&D	Page



2. THE CUBICLE SHALL BE IP 65 PROTECTED.  
NOTE:- 1. ALL DIMENSIONS IN MM.  
ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID.  
FOR UNTOUCHED DIMENSIONS REFER NO.00000

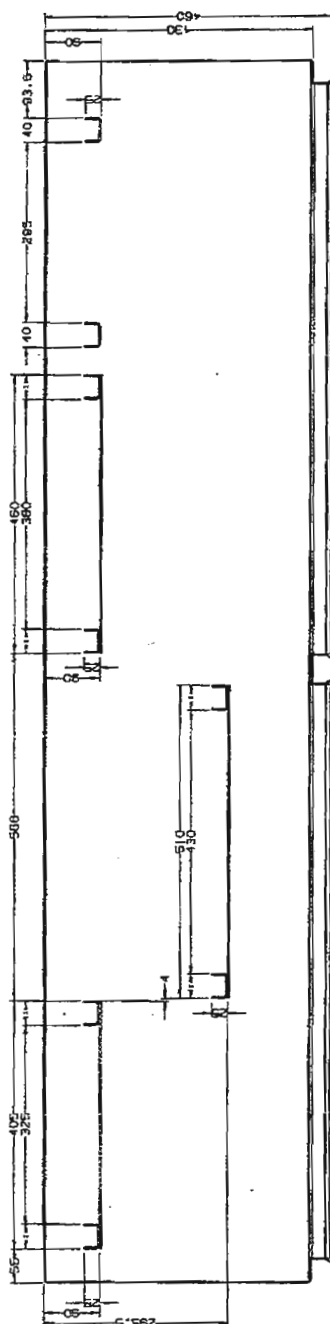
DETAIL AT - A



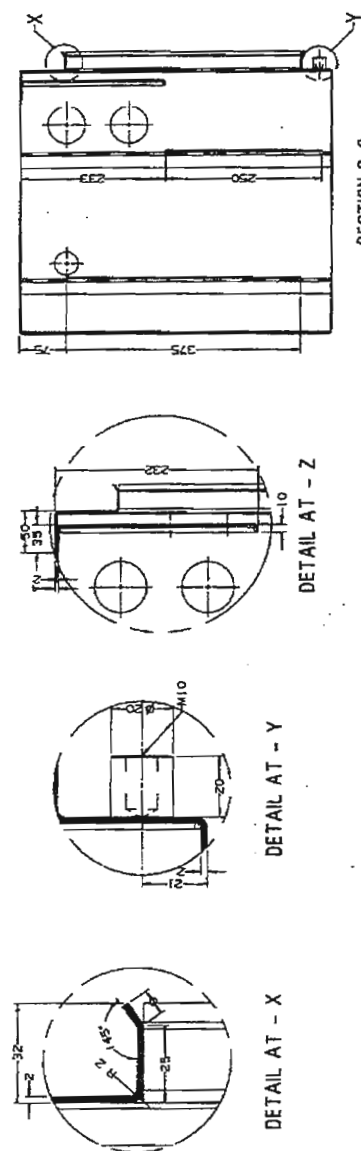
THIS DRAWING IS THE PROPERTY OF RAIL COACH FACTORY, KANPUR.  
IT IS TO BE KEPT IN THE OFFICE OF THE DESIGNER AND NOT TO BE REPRODUCED OR USED FOR ANY OTHER PURPOSE WITHOUT PERMISSION FROM CHIEF DESIGNER, KANPUR.  
FOR UNTOUCHED DIMENSIONS REFER NO.00000







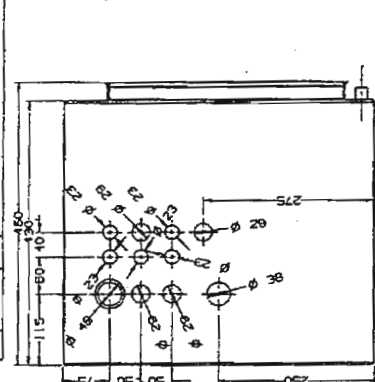
SECTION A-A



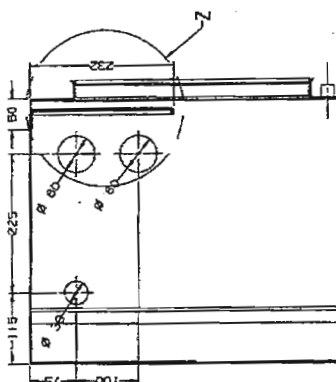
SECTION C-C

Y

TENTATIVE



**SECTION B-B**

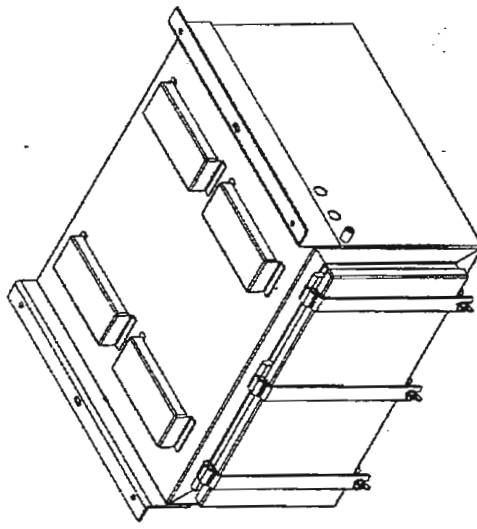
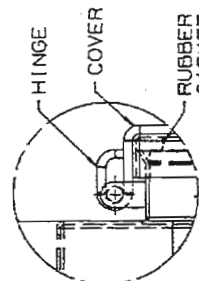
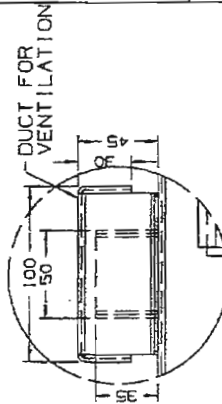
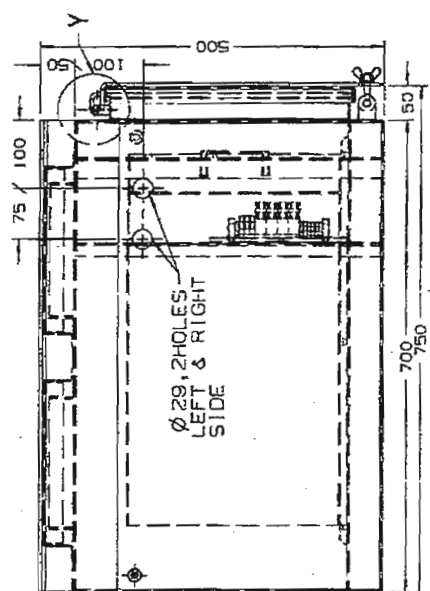
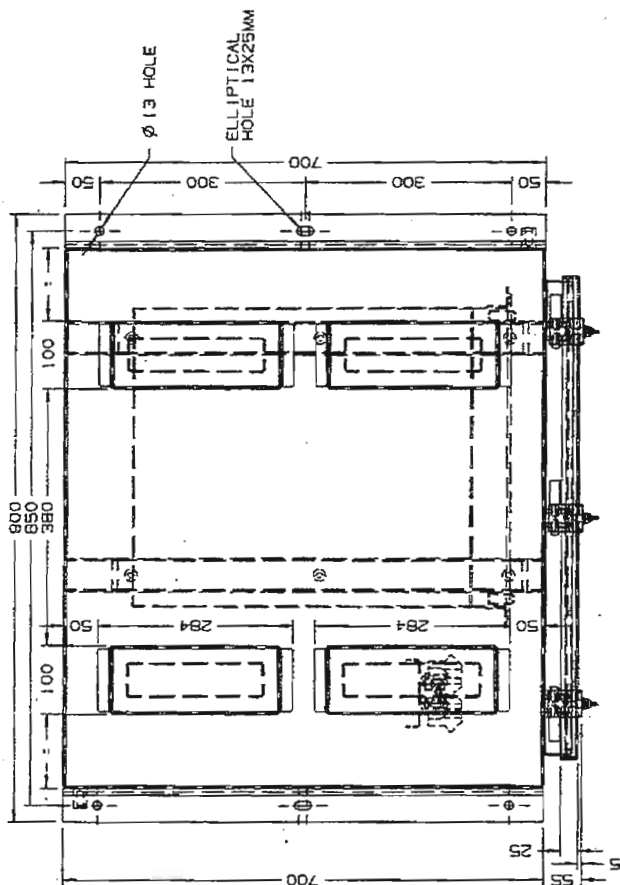
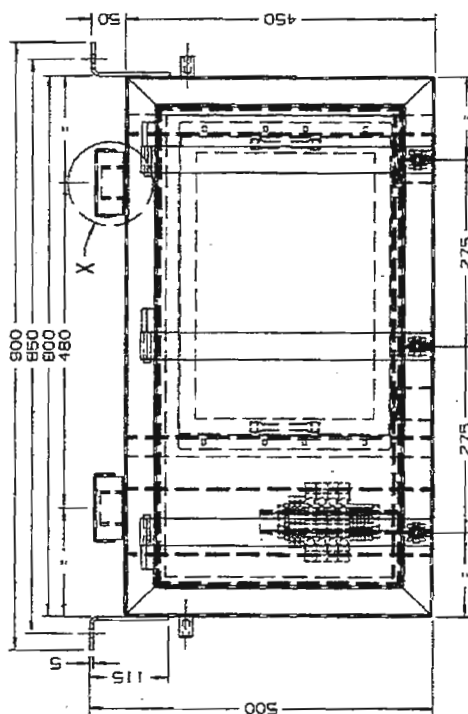


ITEM	DESCRIPTIONS & DIMENSIONS	QUANTITY	UNIT	REMARKS
1. NIL	1.000 ELECTRICAL	1	NO.	1.000
2. NIL	2.000 ELECTRICAL	2	NO.	2.000
3. NIL	3.000 ELECTRICAL	3	NO.	3.000
4. NIL	4.000 ELECTRICAL	4	NO.	4.000
5. NIL	5.000 ELECTRICAL	5	NO.	5.000
6. NIL	6.000 ELECTRICAL	6	NO.	6.000
7. NIL	7.000 ELECTRICAL	7	NO.	7.000
8. NIL	8.000 ELECTRICAL	8	NO.	8.000
9. NIL	9.000 ELECTRICAL	9	NO.	9.000
10. NIL	10.000 ELECTRICAL	10	NO.	10.000
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68. NIL	68.000 ELECTRICAL	68	NO.	68.000
69. NIL	69.000 ELECTRICAL	69	NO.	69.000

2. THE CUBICLE SHALL BE IP-85 PROTECTED.

ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID.

FOR UNTOLERANCED DIMENSIONS REFER MD000000

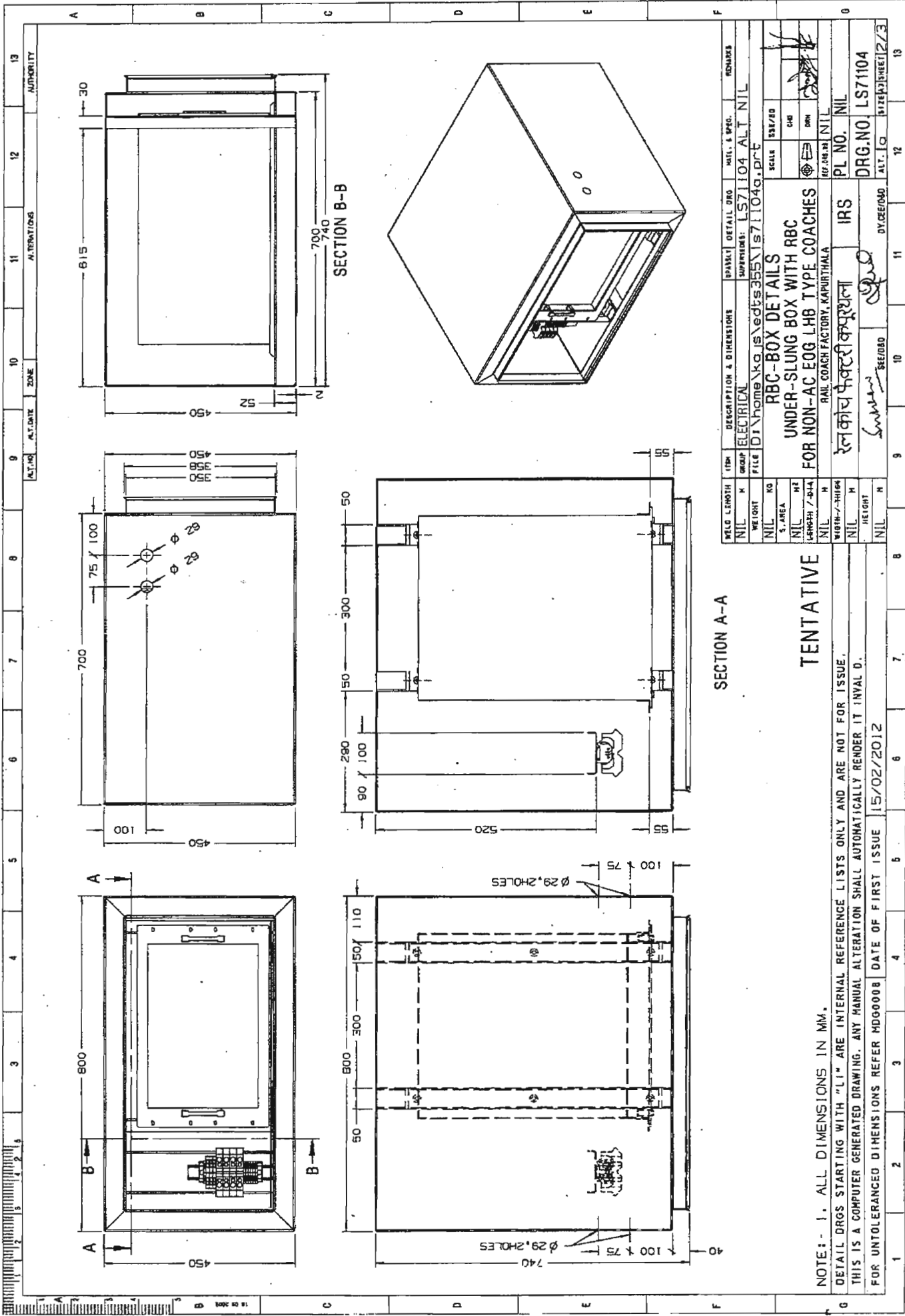
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TENTATIVE

NOTE:- 1. ALL DIMENSIONS IN MM.

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FOR UNTOLERANCED DIMENSIONS	REFER MDG0008	DATE OF FIRST ISSUE	15/02/2012
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NOTE:- 1. ALL DIMENSIONS IN MM.

DETAIL DRGS STARTING WITH "L1" ARE INTERNAL REFERENCE LISTS ONLY AND ARE NOT FOR ISSUE.  
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FOR UNTOLERANCED DIMENSIONS REFER MDG0008 DATE OF FIRST ISSUE 15/02/2012

SECTION A-A

TENTATIVE

WELD LENGTH	ITEM	DESCRIPTION & DIMENSIONS	DRAWING	DETAIL DRG	MAT. & QTY.	REMARKS
NIL	GROUP	ELECTRICAL				
NIL	N					
WEIGHT	FILE	DI\hame\kaj\edts355\LS71104a.drt	SUPERVISOR:	LS71104	ALT. NIL	
NIL	KO	RBC-BOX DETAILS				
S. AREA	NIL	UNDER-SLUNG BOX WITH RBC				
LENGTH / DIA	NIL	FOR NON-AC EGG LHB TYPE COACHES				
NIL	NIL	RAIL COACH FACTORY, KAPURTHALA				
LENGTH / THICK	NIL					
NIL	N	रेल कोच फावरी कारखाना	IRS			
HEIGHT	NIL					
NIL	N					



## Amendment No. 2

This Amendment is issued to Spec NO.- EDTS 355 Rev. 1, Am-I for specification for set of panels for 110V FOG Non AC Coaches to change the control supply of feeder contactors S1K01 and S1K02 from 110V DC to 110V AC as per Drg. No. L570117 Alt. 'C'

The following modifications shall be carried out:-

### 1. HV Panel

2 nos. 100 VA, 750/110 V transformers (H class insulation, suitable for rolling stock application) with 1 A fuse in primary side as well as in secondary side shall be provided in the under slung HV Panel on HV-750 V side of the cubicle (Drg. No. L571103 Alt. 'A'). The Switch Gear provided i.e. HV fuses, feeder contactors and MVR's may be suitably relocated to accommodate these step down transformers.

### 2. LV on board Rotary Switch Panel

As per Drg. No. L570117 Alt. 'C' one additional ON-OFF Rotary Switch shall be provided in the on board LV Panel and shall be housed in fuse and terminal panel to Drg. No. CC72082 Alt. 'a'.

### 3. Additional Material Required:

S.N	Item Description	Specification	Manufacturer/Supplier	Qty
1.0	Step down 100 VA, 750/110V transformers	H class insulation suitable for rolling stock application	M/s. Bhasin Packard, Chandigarh M/s. Vimal Transformers, Moradabad M/s. Pantronics, Mumbai M/s. NACEI, Ambala M/s. Raniya Electro Gear Private Limited, Chennai	2
2.0	HV fuses with fuse base. 1 A, 1.2 KV AC	70034049/1 7103401 of M/s. Siba or equivalent	M/s. Siba/ Wohner/ Ferraz / GE/ Schneider / Bussmann / L&I	4
3.0	LV fuses with fuse base. 1A, 250 V AC			4
4.0	Cam Operated ON OFF Rotary Switch Toggle switch, 0.1 power supply ON OFF, 2 pole	CAT No. 61198 SG of M/s. Salzer or equivalent	SALZER, Siemens, TKNIC	1

**Note:** Firms shall get layout/Drawing approved for location of the additional items before supply of the set of panels.

EDTS-355	01	2	10.06.2014	SSE/CAD	AEE/D	DY.CEE/D&D	1 of 1
Spec. No.	Rev.	Am.	Date				Page

**APPROVED**

Ref No. EL/7.1408/SBC Date 15.10.2014

For Director General 15/10/14

8050 226011

R.C.F.

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भारत सरकार रेल मंत्रालय  
अनुसंधान अभिकल्प और मानक संगठन

लखनऊ - २२६०११

Government of India

Ministry of Railways

Research, Designs & Standards Organization,

LUCKNOW - 226011

140328/

08-11-14

15<sup>th</sup> October 2014

No. EL/7.1.108/SBC

1. मेसर्स एस0एस0कं0 इंजीनियरिंग कं0 लिमिटेड, फैक्टरी एरिया, पी.ओ. बॉक्स-8, कपूरथला-144 601
2. मेसर्स इन्स्ट्रुमेंटेशन लि0, आलाबाद रोड, कोटा-324 005 (राजस्थान)
3. मेसर्स इन्टरनेशनल स्वीचरीयर्स प्रा0 लि0 925-ए, इ0 एरिया, फेस. II, चंडीगढ़ -160 002
4. मेसर्स एबरोल इंजीनियरिंग कं0, प्रा0 लि0 पी.ओ. बॉक्स-2, एबरोल हाउस, इ0 एरिया, कपूरथला-144 601, पंजाब
5. मेसर्स अमित इंजीनियर्स, विलज जंटी कालन, जिला सालन, तह नालागढ़, बदली, हिमाचल प्रदेश-173205
6. मेसर्स ट्रिनीट्रान कन्ट्रोल सिस्टम्स प्रा0 लि0 82 83 84, द्रनाग सिटी, इकोटेक III, ग्रेटर नोएडा, गौतम बुद्ध नगर, यू.पी.-201 308
7. मेसर्स एन.ई.सी. रिवचिंगियर्स एंड कंट्रोलर्स, ई 254, इन्डस्ट्रियल एरिया, फेस 7, बी, मोहाली - 160 071

Sub: Amendment No.2 to RDSO specification No. EDTS-355, Rev.1 of set of panels of non AC LHB coaches.

Ref : RCF's letter no. ED-2009/RDSO dtd. 29.09.2014.

Amendment No.2 of specification No. EDTS-355, Rev.1 of set of panels of non AC LHB coaches has been issued by RDSO. The salient features of amendment no.2 are as follows:-

1. Introduction of 2 nos. 100VA, 750/110 V step down transformers with fuses of 1 Amp. in primary & secondary.
2. Cam operated ON/OFF rotary switch toggle switch.

Copy of the amendment along with revised drawings are enclosed for reference. All vendors are advised to implement the same & submit the compliance to the RDSO at the earliest.

This is for your information & record.

DA : As above

Copy to:-

1. Chief Electrical Engineer,  
Integral Coach Factory,  
Perumbur, Chennai- 600 038

For kind information please.

- ✓ 2. Chief Electrical Engineer,  
Rail Coach Factory,  
Hussainpur, Kapurthala- 144 602

For kind information please.

3. Chief Electrical Engineer,  
Rail Coach Factory,  
Lalganj, Raibareilly

For kind information please.

4. सायब विंगुल रेलवे बोर्ड, रेल मंत्रालय, रेल भवन, नयी दिल्ली - 110 001

Kind attn.: Sri Vinayak Garg (DEE/G)

For kind information please.

Secretary (Electrical)/G, Railway Board, Rail Bhawan, New Delhi-110001

(R.A. Jamali)

DSE(TL-AC System Design)  
For Director General/PS&EMU

*Handwritten notes:*  
8/11/14  
for  
Bansal  
put up in  
manual  
for

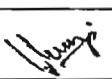
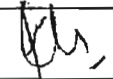
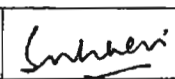
- B. RDSO vide letter no. EL/7.10.1/LHB/1 dated 12.10.2017 has issued specification no. RDSO/PE/SPEC/AC/0183-2015 (Rev-'0') for 4.5 KW underslung type constant voltage regulated battery charger for LHB coaches. The design of the battery charger is without the requirement of additional battery charger box, therefore the existing battery charger box to drawing no. LS71104 shall not be required. In view of above, the following amendment is issued:

Clause 4.1 of the specification amended as follows:

- 4.1 The set of panels comprises of the various cubicles consisting of power and control switchgears consisting of following:

i	H V Cubicle	LS71103	2000(L)x550(D)x525(H)
ii	Low Voltage Panel including cable cover for top and bottom as indicated in the drawing	CC72081	500(W)x130(D)x1000(H) with mounting angle of 125 mm on top and bottom.

No positive tolerances are allowed. However, negative tolerances shall be governed by MDG0008

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**Amendment No-3 to specification for set of panels for LHB EOG Non-AC Coaches no. - EDTS-355,  
Rev-1, Am-2**

- A. This Amendment is issued to specification for set of panels for LHB EOG Non-AC Coaches to specification no. EDTS-355, Rev-1, Am-2, to incorporate the modifications required as per RDSO letter No. EL/7.1.108/SBC/Policy, dt.21/08/2017. for provision of RC filters in secondary windings of 9/15 KVA transformers to comply with HOG system requirements according to amendment -1 to Modification sheet RDSO/PE/MS/AC/0051-2011 (Rev-2) issued by RDSO in march2017.

As per the modification issued by RDSO , 2 nos. of RC filters shall be provided in High Voltage (HV) Panel i.e one RC filter will be provided between phase and neutral and other RC filter will be provided between phase and earth of each of the secondary windings i.e 415V and 190V windings of 9/15 KVA transformers, to improve voltage waveform.

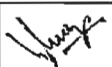

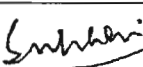
RDSO drawing no. RDSO/PE/SK/AC/0197-2016(Rev-0) for General Schematic diagram of Power and Control circuit of Non AC LHB EOG coaches with two numbers of RC Filters to make them HOG compliant enclosed as Annexure-E in the Am-1 of modification sheet Rev-2 shall be followed.

The following material shall be required for implementation of this amendment:

**1. Material Required:-**

S. No.	Item Description	Specification	Qty.	Remarks
1	RC filter	Each RC filter consists of 1ohm , 6/10W resistance connected in series with parallel connected 1.5 MFD 850/1000V range capacitors (EPCOS /VISHAY or equivalent make capacitor with prior approval of RDSO ) in each arm of star connected to be provided between phase and neutral and phase and earth of each secondary winding of 9/15 KVA transformer. The RC filter shall be of M/s Siemens / M/s Medha or any equivalent make. The mounting arrangement of RC filter shall be as per sheet 2 of 2 of RDSO drg. No. RDSO/PE/SK/AC/0188 2015 Rev.0.and RDSO drg. No. RDSO/PE/SK/AC/0197-2016,Rev-0.	4 nos.  (2 nos. 415V side and 2nos.190V side windings)	Item-12 of Cl. 5.1 of modification sheet no. RDSO/PE/MS/AC/0051-2011(Rev-2)



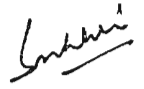
**Note:-Firms shall get drawings approved for location of the additional item before supply of the set of panels.**

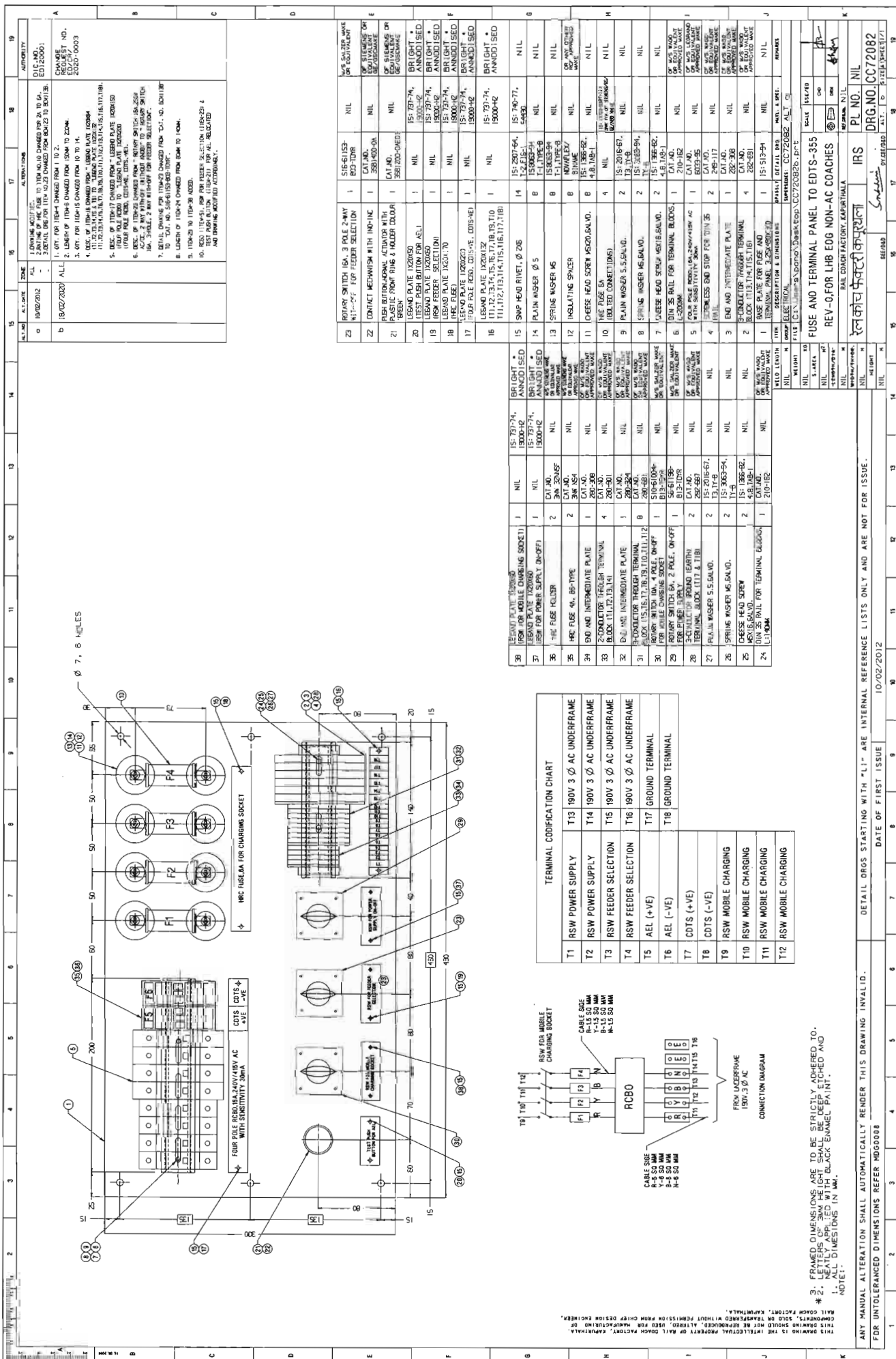
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## Amendment No. - 4

### Amendment No. - 4 to Specification No. EDTS-355, Rev. 01, Amendment - 1, 2 & 3

This amendment is issued to specification no. EDTS-355, Rev.01, Amendment-1, 2 & 3 for Set of Panels for LHB EOG Non-AC coaches to shift RCBO from underslung HV Panel to Onboard LV Panel for ease of trouble shooting by users railway during the coach run accordingly "Fuse and Terminal Panel" to drawing no. CC72082, alt.'a' revised to CC72082, alt.'b'.

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3. FRAMED DIMENSIONS ARE TO BE STRICTLY ADHERED TO.  
2. LETTERS OF 3MM HEIGHT SHALL BE DEEP ETCHED AND  
NEATLY APPLIED WITH BLACK ENAMEL PAINT.  
ALL DIMENSIONS IN MM.

**Amendment No.-5 to specification for "Set of panels for LHB EOG Non-AC Coaches without LV panel for LVPH coaches only": EDTS-355, Rev-1, Am-1, 2, 3 & 4**

This Amendment is issued to specification for set of panels for LHB EOG Non-AC Coaches to specification no. EDTS-355, Rev-1, AM-1, 2, 3 & 4 to incorporate the requirements/modifications required for LVPH coaches only. Coach Light control is being done through Rotary switches provided at End-wall and as a result LV panel become redundant, hence, LV panel is not used in LVPH coaches.

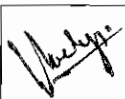
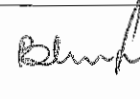
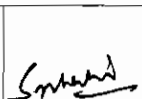
Further, for weight reduction of the coach and keeping in view, the Electrical load of LVPH coaches, specification of Electrical equipments has been updated. 9kVA transformer has been replaced with 3kVA transformer and 4.5kW Regulated Battery Charger cum Emergency Battery Charger has been replaced with 2.5kW underslung Battery charger for LVPH coaches.

As a result, Fuse rating of output side of 3kVA transformer shall be modified in line with actual load. Further, LVPH coaches are not equipped with Monoblock pump assembly, therefore, Pump controller with other associated accessories i.e. MPCBs, Contactors and Electrical Wiring shall also be removed from existing HV panel.

The following changes shall be incorporated in Bill of Material of specification:

**Existing:**

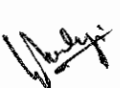
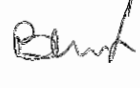

Sr. No.	Item	Term Function Technical Data	Drawing No.	Manufacturer supplier	Place of Installation
1	12 F01	High Voltage fuse (with holder) net1 Gr.00C 1000V/25A AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann /Schneider/GE/L&T	S1F50
2	12 F02	High Voltage fuse (with holder) net1 Gr.00C 1000V/25A AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F51
3	12 F03	High Voltage fuse (with holder) net1 Gr.00C 1000V/25A AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F52
4	12 F04	High Voltage fuse (with holder) net2 Gr.00C 1000V/25A AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F53
5	12 F05	High Voltage fuse (with holder) net2 Gr.00C 1000V/25A AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F54
6	12 F06	High Voltage fuse (with holder) net2 Gr.00C 1000V/25A AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F55
7	12 F10	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/25A GL/GG	03912, 03760 of M/s Wohner	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F44

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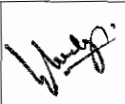
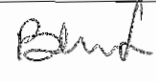

**Amendment No. - 5**

8	12 F11	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/25A GL/GG	03912, 03760 of M/s Wohner	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F45
9	12 F12	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/25A GL/GG	03912, 03760 of M/s Wohner	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F46
12	12 F15	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/16A GL/GG	03909, 03760 of M/s Wohner	Siemens/WOHNER ITALWEBER/ Ferraz/Bussmann/ Schneider/GE/L&T	S1F47
13	12 F16	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/16A GL/GG	03909, 03760 of M/s Wohner	Siemens/WOHNER ITALWEBER/ Ferraz/Bussmann/ Schneider/GE/L&T	S1F48
14	12 F17	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/16A GL/GG	03909, 03760 of M/s Wohner	Siemens/WOHNER ITALWEBER/ Ferraz/Bussmann/ Schneider/GE/L&T	S1F49
36	33 Q1	Motor protective relay water pump MBS 25, 1-1.6 A with aux. Contact HS9.11 and terminal block db	910-201-205 910-292-130 910-293-209	AEG	S1F21
				L&T/Group Schneider/ ABB	
			3RV1021 1AA10 +3RV 1901 1E	SIEMENS	
43	33 K06	Auxiliary contactor SH5.31, DC110V with diode water pump 110VDC	SH5.31 DC110V	AEG	S1K24
			TKC631- Z, 110VDC	GJH12130 61R6312 ABB	
				3RH1131- BF40 Siemens/L&T/ Schneider	
				3RT1916- 1DG00	
44	33 K07	Auxiliary contactor SH5.31, DC110V with diode water pump 110VDC	SH5.31 DC110V	AEG	S1K25
			TKC631- Z, 110VDC	GJH12130 61R6312 ABB	
				3RH1131- BF40 Siemens/L&T/ Schneider	
				3RT1916- 1DG00	

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**Revised:**


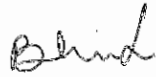
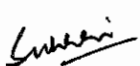
Sr. No.	Item	Term Function Technical Data	Drawing No.	Manufacturer supplier	Place of Installation
1	12 F01	High Voltage fuse (with holder) net1 Gr.00C 1000V/ <b>16A</b> AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann /Schneider/GE/L&T	S1F50
2	12 F02	High Voltage fuse (with holder) net1 Gr.00C 1000V/ <b>16A</b> AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F51
3	12 F03	High Voltage fuse (with holder) net1 Gr.00C 1000V/ <b>16A</b> AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F52
4	12 F04	High Voltage fuse (with holder) net2 Gr.00C 1000V/ <b>16A</b> AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F53
5	12 F05	High Voltage fuse (with holder) net2 Gr.00C 1000V/ <b>16A</b> AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F54
6	12 F06	High Voltage fuse (with holder) net2 Gr.00C 1000V/ <b>16A</b> AC:gB	2038603 2138601	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F55
7	12 F10	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/ <b>10A</b> GL/GG	03909, 03760 of M/s Wohner	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F44
8	12 F11	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/ <b>10A</b> GL/GG	03909, 03760 of M/s Wohner	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F45
9	12 F12	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/ <b>10A</b> GL/GG	03909, 03760 of M/s Wohner	Siba/EFEN/Ferraz/ETI /Siemens/Bussmann / Schneider/GE/L&T	S1F46
- Due to change in Transformer to 3kVA, 750/415 V, 3-Ø, instead of 9kVA, 750/415/190 V, 3-Ø, as such 3-Ø, 190 V circuit is not required, Item no. S1F47 to S1F49 (along with associated drawings) is not required in LVPH coaches.					
12	12 F15	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/ <b>16A</b> GL/GG	<b>---DELETED---</b>		S1F47
13	12 F16	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/ <b>16A</b> GL/GG	<b>---DELETED---</b>		S1F48
14	12 F17	Low Voltage fuse (with holder) transformer (sec.) Gr.00 500V/ <b>16A</b> GL/GG	<b>---DELETED---</b>		S1F49

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**Amendment No. - 5**

- Pump Equipment is not provided in LVPH coaches. Hence, Pump Circuit switchgears i.e. MPCB, Auxiliary Contactors are not required in Panel for LVPH coaches.				
36	33 Q1	Motor protective relay water pump MBS 25, 1-1.6 A with aux. Contact HS9.11 and terminal block db	---DELETED---	S1F21
43	33 K06	Auxiliary contactor SH5.31, DC110V with diode water pump 110VDC	---DELETED---	S1K24
44	33 K07	Auxiliary contactor SH5.31, DC110V with diode water pump 110VDC	---DELETED---	S1K25

**Note:** The associated wiring of Water Pump Controller circuit shall not be done in HV panel due to deletion of above mentioned switchgears of same circuit.

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Amendment No. - 6 to specification for "Set of panels for LHB EOG Non-AC Coaches"EDTS-355, Rev-1, Am-1, 2, 3 & 4

This Amendment is issued to specification for set of panels for LHB EOG Non-AC Coaches to specification no. EDTS-355, Rev-1, AM-1, 2, 3 & 4 (AM-5 is applicable for LVPH coaches only) to incorporate the requirements/modifications required for provision of 3-Ø, 190V double inlet centrifugal blower assembly in place of 3-Ø, 110V blower assembly in LHB Non-AC coaches and provision of Fire Protection measures in Switch board cabinets. Further, Material of Low Voltage Panel including cable cover for top and bottom is revised to SS304 grade S2 from existing CRCA sheet.

Changes are as under:

1. Following drawing nos. are revised:

- i. CC72081, alt 'nil'. shall be read as CC72081, alt 'a'
- ii. CC72082, alt 'b'. shall be read as CC72082, alt 'c'
- iii. CC72083, alt 'nil'. shall be read as CC72083, alt 'a'
- iv. CC72084, alt 'nil'. shall be read as CC72084, alt 'a'

2. **Clause no. 4.3** has been revised as under:

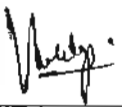


Existing:

The on-board cabinet shall conform to CRCA sheet of thickness 2 mm conforming to IS:513 (Latest Edition) as indicated in the drawing. The on board panel shall be powder coated to Siemens Grey shade no. 6102/08038 of M/s Nerolac Paints or 877 of M/s Berger paints, after giving surface treatment.

Revised:

The on-board cabinet shall be made of stainless steel SS304 grade S2 to IS:6911 (Latest Edition). Welded zones may be given necessary treatment after fabrication and shall not be painted.

3. Provision of MPCB with Auxiliary Contact 1NO+1NC, Thermal Release Range: 0.63-1A, Voltage Rating: 415VAC, Breaking Capacity: 50kA to Cat. No. MS116-1.0, HK1-11 of M/s ABB, Schneider, Siemens, Eaton, L&T or Approved make, for 3-Ø double inlet blower assembly (QPC: 02 nos.) has been made in "Fuse and Terminal Panel". Accordingly, drawing for Fuse and Terminal Panel is revised from CC72082, alt 'b' to CC72082, alt 'c'.

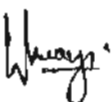

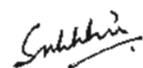
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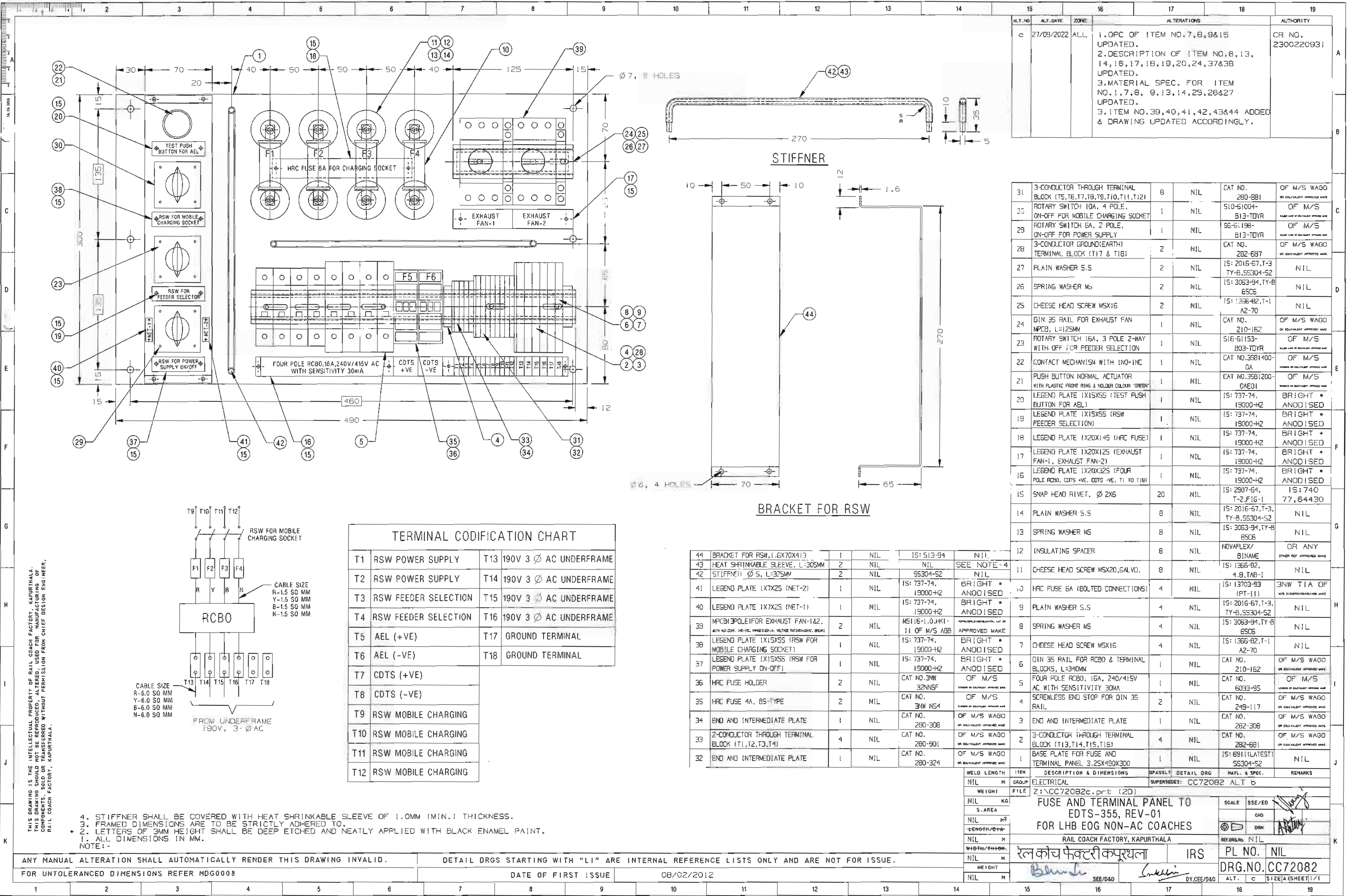


**Amendment No. - 6**

4. Provision of Fire Protection measures in Set of Panels for LHB EOG Non-AC Coaches as per RDSO letter no. EL/7.1.108/SBC/Main dated 07.01.2022. (Ref.: B, S.No-3)

Type Of Switch Board Cabinet	Provision of Aerosol based Fire Suppression System
Set of Panels for LHB EOG Non-AC Coaches	<p>1 no. 8/10 gm may be provided in onboard panel and 1 no. 100 gm in underslung panel in line with technical parameters and approved makes as per RDSO spec. RDSO/PE/SPEC/AC/0184-2015 (Rev.1) and RDSO letter no. EL/7.1.108/MSSBC dated 17.09.2021.</p> <p>Drawing no. CC72081 &amp; LS71103 may be referred for demarcating fitment of Aerosol based Fire Suppression System.</p>

EDTS-355, Rev-1, AM-1, 2, 3 & 4	6	27/09/2022				2 of 2
Spec. No.	Amdt.	Date	SSE/CAD	SEE/D&D	DY.CEE/D&D	Page



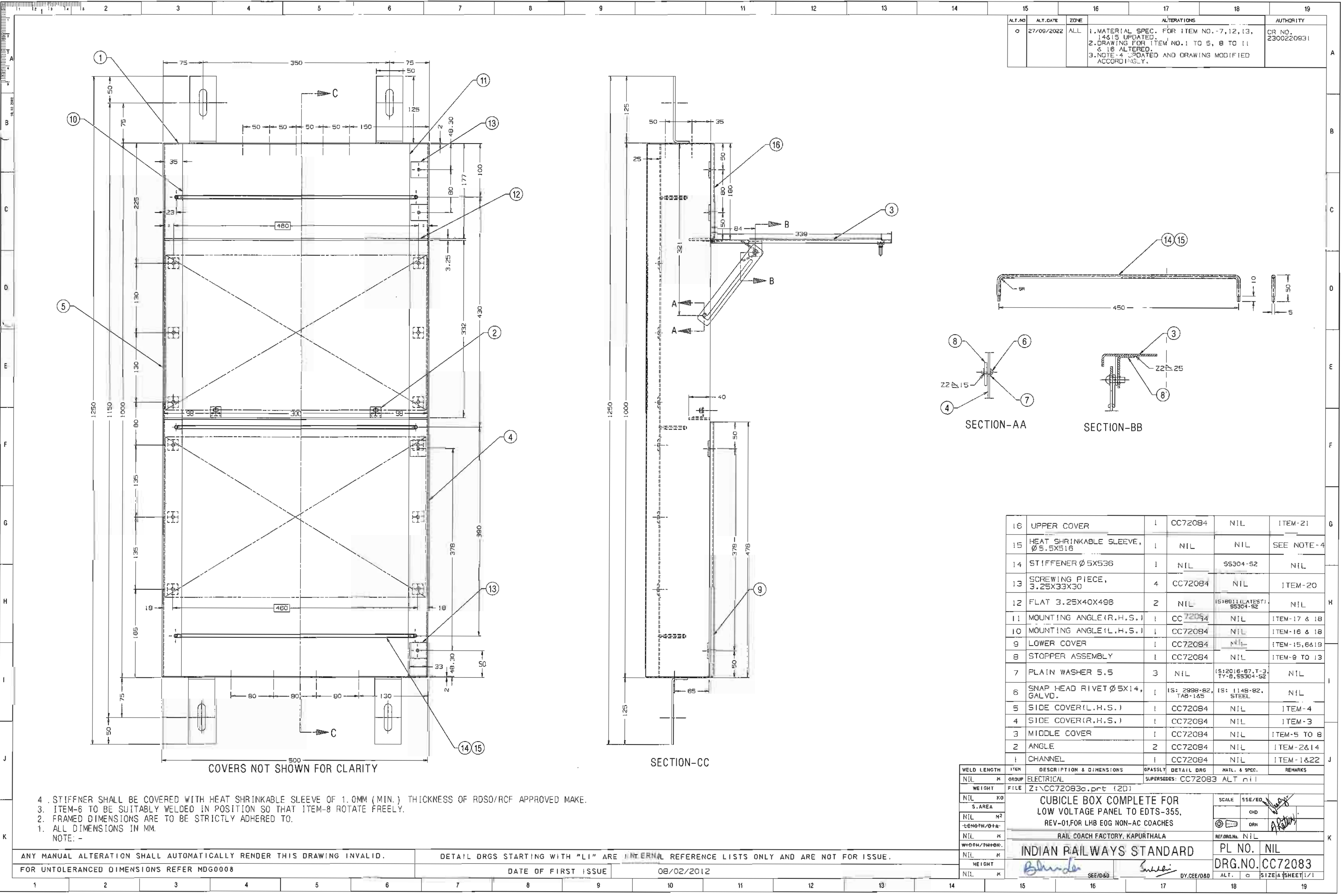
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4. STIFFNER SHALL BE COVERED WITH HEAT SHRINKABLE SLEEVE OF 1.0MM (MIN.) THICKNESS.  
3. FRAMED DIMENSIONS ARE TO BE STRICTLY ADHERED TO.  
2. LETTERS OF 3MM HEIGHT SHALL BE DEEP ETCHED AND NEATLY APPLIED WITH BLACK ENAMEL PAINT.  
1. ALL DIMENSIONS IN MM.

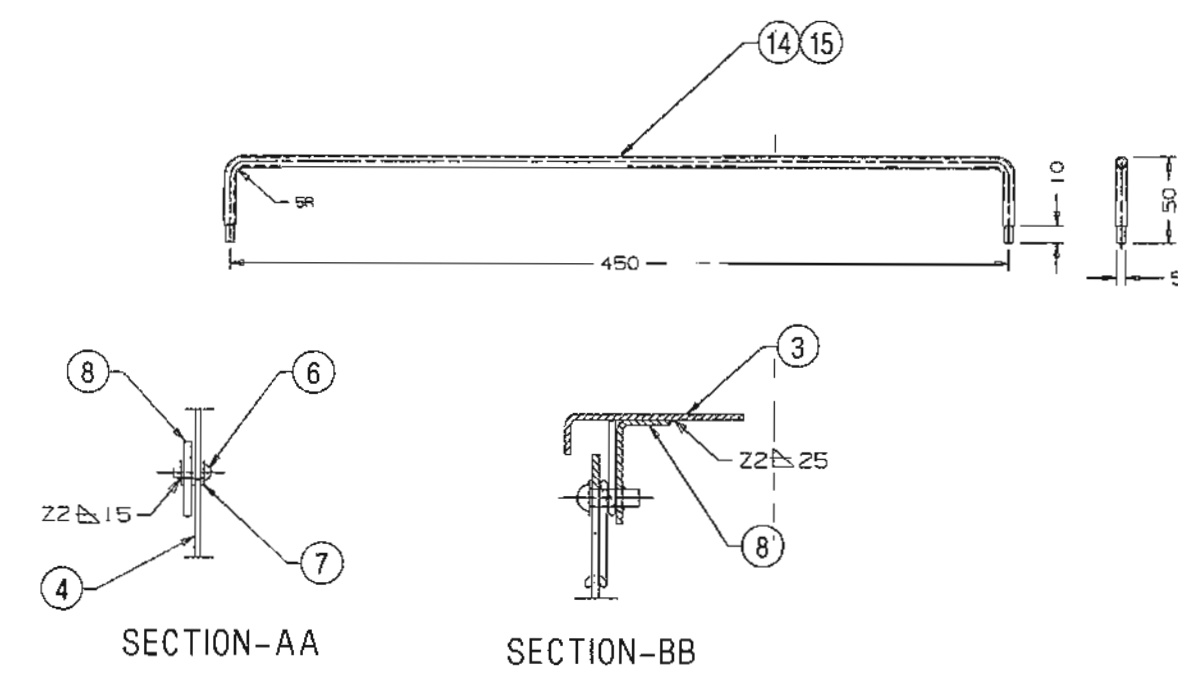








ALT. NO.	ALT. DATE	ZONE	ALTERATIONS	AUTHORITY
0	27/09/2022	ALL	1. MATERIAL SPEC. FOR ITEM NO.-7, 12, 13, 14 & 15 UPDATED. 2. DRAWING FOR ITEM NO. 1 TO 5, 8 TO 11 & 16 ALTERED. 3. NOTE-4 UPDATED AND DRAWING MODIFIED ACCORDINGLY.	CR NO. 2300220831



16	UPPER COVER	1	CC72084	NIL	ITEM-21
15	HEAT SHRINKABLE SLEEVE, Ø 5.5X516	1	NIL	NIL	SEE NOTE-4
14	STIFFENER Ø 5X536	1	NIL	SS304-S2	NIL
13	SCREWING PIECE, 3.25X33X30	4	CC72084	NIL	ITEM-20
12	FLAT 3.25X40X496	2	NIL	IS: 18611 (LATEST) SS304-S2	NIL
11	MOUNTING ANGLE (R.H.S.)	1	CC72084	NIL	ITEM-17 & 18
10	MOUNTING ANGLE (L.H.S.)	1	CC72084	NIL	ITEM-16 & 18
9	LOWER COVER	1	CC72084	NIL	ITEM-15, 6 & 19
8	STOPPER ASSEMBLY	1	CC72084	NIL	ITEM-9 TO 13
7	PLAIN WASHER 5.5	3	NIL	IS: 2016-87, T-3, 17-B, SS304-S2	NIL
6	SNAP HEAD RIVET Ø 5X14, GALVD.	1	IS: 2998-82, TAB-165	IS: 1148-82, STEEL	NIL
5	SIDE COVER (L.H.S.)	1	CC72084	NIL	ITEM-4
4	SIDE COVER (R.H.S.)	1	CC72084	NIL	ITEM-3
3	MIDDLE COVER	1	CC72084	NIL	ITEM-5 TO 8
2	ANGLE	2	CC72084	NIL	ITEM-2 & 14
1	CHANNEL	1	CC72084	NIL	ITEM-1 & 22

WELD LENGTH	ITEM	DESCRIPTION & DIMENSIONS	QTY	DETAIL DRG	MATL. & SPEC.	REMARKS
NIL	M	GROUP ELECTRICAL		SUPERSEDES: CC72083	ALT nil	
WEIGHT	FILE	Z:\CC72083a.prt (20)				
NIL	KG					
S. AREA	M <sup>2</sup>					
LENGTH/DIA	M					
NIL	M					
WIDTH/THICK.	M					
NIL	M					
HEIGHT	M					
NIL	M					

CUBICLE BOX COMPLETE FOR LOW VOLTAGE PANEL TO EDTS-355, REV-01 FOR LHB EOG NON-AC COACHES

RAIL COACH FACTORY, KAPURTHALA

INDIAN RAILWAYS STANDARD

PL NO. NIL

DRG. NO. CC72083

SCALE: 1:1

DATE: 08/02/2012

BY: CEE/080

ALT. 0

SIZE: A

SHEET: 1/1

