TECHNICAL SPECIFICATION FOR
AUXILIARY CUBICLE HB-2
FOR 3-PHASE ELECTRIC LOCOMOTIVES
Specification No : CLW/ES/3/0192
ISSUE DATE: 15.02.1998

ENCLOSURE

1. **DRAWING No. CLW/ES/3/SK-1/0192**
2. **DRAWING No. CLW/ES/3/SK-2/0192**
3. **DRAWING No. CLW/ES/3/SK-3/0192**
4. **DRAWING No. 1209-15-143-002**

ISSUED BY :

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ALTERATION RECORD SHEET

Amend. No.	Date of Amend.	Page No.	Alt.	Reason	Authority
1.	03.01.2004		A	Implementation of modification Release no: 460, 434,429	Sd/-
2.	29.04.2010		B	Sheet no. 15 to 18 added and Drg. No. CLW/ES/3/SK-1/0192 is added at sheet no.19	Sd/-
3.	21.06.2010		C	Modification sheet no. RDSO/2008/EL/MS/0367/Rev. 0 dated 29.08.08 is included. Clause no. 10.1 of page no. 11 has been added.	Sd/-
4.	17.02.2017		D	Specn. no. of Bare Panel has been corrected and sources are modified at sheet no. 17.	Sd/-
5.	25.05.2018		E	OEM/ Part-I is replaced by CLW Approved Sources (the term only)	Sd/-
6.	12.03.2019		F	Schematic position and quantity has been modified & Circuit Breaker Oil Pump Converter has been deleted.	Sd/-
7.	24.03.2021		G	MS – 413, paralleling of interlock of Aux. Contactor of 3 phase locomotive.	Sd/-
8.	11.02.2022		H	Modification to drive MR Blower & SCMR by three phase, 20 A 1 Pole & 6 A 1 Pole CB have been replaced by 6 A 3 Pole AC. Capacitor start & Run (22 & 47 μF) and Time Relay MR Blower has been deleted vide letter no. C- D&D/T/42/(Pt) dt. 27.01.22	Sd/-
9.			I	Manufacturer name for list of electrical components should be as per CLW approved Vendor Directory on UVAM and type no. has been deleted. Sources for SS Hardware added in page no. 13. D.E. Test applied between Insulator & body. Remark added for Crimping test marked as *. Final Cable cutting chart enclosed as Annexure-II. The references are for guidance only.	Sd/-
10.	07.01.2025		J	• Deleted connection details has been removed from Cable Connection Chart. • Energy saving scheme for 3-phase freight electric locomotives as per RDSO MS 482 Rev.1 has been incorporated in the cable connection chart of HB-2. • Cable size (Cable 1121A/B, 1122A/B, 1123A/B) changed from 25 sq. mm to 35 sq.mm and 10 sq. mm cable to 16 sq.mm in Cable Connection Chart	Sd/-

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11.	--/04/2026	-	K	(i) As per Item No.2 of MSG 41, Rating of Contactor at schematic position 52.5/1 & 52.5/2 increased from 150A to 225A. (ii) As per MS 482, Rating of Circuit Breaker at schematic position 54.1/2 & 56.1/2 increased from 6A 3P to 10A 3P for WAG-9 Loco. (iii) Cable Connection Chart (Annexure -I) updated as per latest modifications. (iv) Vibration test specified as essential in type test in clause No.12. (v) Verification of Routing of cables & Crimp connections added in type test & routine test in clause No.12. (vi) Crimp test on 5% or minimum 2 Sets per lot in routine test in clause No.12. (vii) Existing Annexure-I under clause no.19 for sub components deleted and details of sub components with item ID & Specification No. added under clause. 5 for scope of supply. (viii) Scope added in Clause no. 2 and Identification mark added in Clause No.13	

The specification has been revised, digitized and all existing alteration have been incorporated.

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1. INTRODUCTION

Auxiliary Cubicle HB-2 consists of contactors, switches, circuit breakers etc. It contains the input to several auxiliary assemblies of the locomotive like machine room blower, compressors etc. The external interface is provided through circular Connectors for easy maintenance. This specification contains technical details of the cubicle structure, equipment mounted, wiring procedure, environmental specification & acceptance test criteria. HB-1 is assembled as per the drawing enclosed with this document. Drg no. 3EHP 130177.

2. SCOPE

The scope of this specification covers the manufacturing and supply of Complete Auxiliary Cubicle HB-2 for Three Phase Electric Locomotives.

3. CLIMATIC AND ENVIRONMENTAL CONDITION OF LOCO

Maximum atmospheric temperatures	Under Sun : + 70°C In shade : + 50°C
Humidity	100% saturation during rainy season.
Reference site conditions	1) Ambient Temp. max 55°C, min 0°C 2) The contractor will indicate the expected temperature rise in the machine room under reference site conditions. 3) Humidity: 60 % 4) Altitude: 1776 m above mean sea level against USRBL project condition.
Rainfall	Very heavy in certain areas. The locomotive will be designed to permit its running at running at 10 km /hr in flood water level of 200 mm above rail level.
Atmosphere during hot weather	Extremely dusty and desert terrain in certain areas.
Coastal areas	Locomotive and equipment will be designed to work in coastal areas in humid and salt laden atmosphere.
Vibration.	The equipment, sub system and their mounting arrangement will be designed to withstand vibrations and shocks encountered in service as specified in IEC:61373 (Latest) corresponding unless otherwise prescribed.

4. STANDARDS :

IEC 61373 : Shock and vibration testing of railway vehicle equipment
NF.F.16.101 : Rolling stock, Fire behavior, Materials Choosing
NF.F.16.102 : Rolling stock, Fire behavior, Effects on electrical equipment
3EHN600359 : Insulation Co-ordination
EHN600385 : Min. insulation distance for basis insulation within air

5. SCOPE OF SUPPLY

Auxiliary Cubicle HB-2 assembled as per the drawing no. 3EHP130177. Sub components of the panel should be procured from approved vendors only. Details of sub components are as following.

Sl. No.	Item Description	ABB Identification	UVAM Item ID	Specification No. (Latest alteration)	Qty/ Loco (Nos)	
					WAG-9	WAP-7/ WAP-5
1.	Current Sensor Auxiliary Circuit (42.3)	HIET428008P0002		CLW/ES/3/0084	02	02
2.	Contactor For Scavenge Blower (52.7/2)	HBTB585683R2927	2100407	CLW/ES/3/0095	01	01
3.	Snubber Circuit (52.7A/2)	3EHW470024R0005	2100058	CLW/ES/3/0067	01	01
4.	Contactor For Main Compressor (47.2/2)	HBTB585683R2927	2100407	CLW/ES/3/0095	01	01
5.	Snubber Circuit (47.2A/2)	3EHW470024R0005	2100058	CLW/ES/3/0067	01	01
6.	Auxiliary Contactor Type-6 (52.6/1)	HBTB585402R0821	2100100	CLW/ES/3/0034	01	01
7.	Auxiliary Contactor Type-6 (52.6/2)	HBTB585402R0821	2100100	CLW/ES/3/0034	01	01
8.	Earth Fault Relay (89.2)	HBVW400011R0001	2100061	CLW/ES/3/0090	01	01
9.	Circuit Breaker: Oil Pump Transformer (62.1/2)	HBTB585552R3033	2100535	CLW/ES/3/0096	01	01
10.	Circuit Breaker: Main Compressor (47.1/2)	3EH-113456R0001	2100535	CLW/ES/3/0096	01	01
11.	Circuit Breaker: Traction Motor Blower-1 (53.1/2)	HBTB585554R3083	2100535	CLW/ES/3/0096	01	01
12.	Circuit Breaker: Scavenge Blower (55.1/2)	HBTB585552R3013	2100535	CLW/ES/3/0096	01	01
13.	Circuit Breaker: OCU-1 (59.1/2)	HBTB585554R3083	2100535	CLW/ES/3/0096	01	01
14.	Circuit Breaker: MR Blower (54.1/2), 6A 3 P for WAP-7/WAP-5	HBTB585552R3013	2100535	CLW/ES/3/0096	-	01
15.	Circuit Breaker: Scavenge Blower (56.1/2) 6A 3 P for WAP-7/WAP-5	HBTB585552R3013	2100535	CLW/ES/3/0096	-	01
16.	Circuit Breaker: MR Blower (54.1/2) 10A 3 P for WAG-9 (MS: 482)	-	2100535	CLW/ES/3/0096	01	-
17.	Circuit Breaker: Scavenge Blower (56.1/2) 10A 3 P for WAG-9 (MS: 482)	-	2100535	CLW/ES/3/0096	01	-
18.	Circuit Breaker: AC	HBTB585552R3013	2100535	CLW/ES/3/0096	01	01

	System (64.1)					
19.	Aux. Contacts 2NO (For circuit breakers at Sch. Pos. 62.1/2, 47.1/2, 53.1/2, 55.1/2, 59.1/2 54.1/2,, 56.1/2,, 64.1)	HBTB585557R1200	2100535	CLW/ES/3/0096	08	08
20.	Contactor (52.4/1)	HBTB585683R2927	2100407	CLW/ES/3/0095	01	01
21.	Snubber Circuit (52.4A/1)	3EHW470024R0005	2100058	CLW/ES/3/0067	01	01
22.	Contactor (52.4/2)	HBTB585683R2927	2100407	CLW/ES/3/0095	01	01
23.	Snubber Circuit (52.4A/1)	3EHW470024R0005	2100058	CLW/ES/3/0067	01	01
24.	Contactor for Aux. Converter 225 Amps (52.5/1)	----	2100026	CLW/ES/3/0201	01	01
25.	Contactor for Aux. Converter 225 Amps (52.5/2)	----	2100026	CLW/ES/3/0201	01	01
26.	Snubber Circuit (52.5A/1) (Varistor)	3EHE428099P00001	2100056	CLW/ES/3/0202	01	01
27.	Snubber Circuit (52.5A/2) (Varistor)	3EHE428099P00001	2100056	CLW/ES/3/0202	01	01
28.	Aux. Contact block Type LADC or similar (For 52.5/1, 52.5/2)	3EHP585771R0006	2100060	CLW/ES/3/0066	02	02
29.	Resistance 3.9 K Ohm (90.3/1)	NBT300210P0087	2100065	CLW/ES/3/0014	01	01
30.	Resistance 3.9 K Ohm (90.3/2)	NBT300210P0087	2100065	CLW/ES/3/0014	01	01
31.	Capacitor (49.1)	HIES309976P0001			03	03
32.	Resistance 220 Ohm (49.2)	HIET402702P1029	2100065	CLW/ES/3/0014	04	04
33.	Choke Input Filter Aux. Converter (49.3)					
34.	Bare HB-2 Panel	----	2100237	CLW/MS/3/047	01	01
35.	Key Lock	HSBA331645R0002	2100022	CLW/ES/3/0049	01	01
36.	Hardware	----	2100233	CLW/MS/10/053 CLW/MS/3/040 CLW/ES/3/184	----	----
37.	Cables	----	3100272	CLW/ES/3/0458 CLW/ES/3/0459	----	----
38.	Bus bar	----	2100309	CLW/ES/3/0118	----	----
39.	Connectors	----	2100197	CLW/ES/3/0124	----	----
40.	Cable Lug	----	2100250	CLW/ES/3/0130	----	----

41.	Copper sleeves	----	2100320	CLW/ES/3/0205	----	----
42.	Faston Lug	----	2100259	CLW/ES/3/0643	----	----
43.	Screw type terminal block	----	2100410	CLW/ES/3/0645	----	----
44.	Cable tie	----	2100293	CLW/ES/3/0131	----	----
45.	Base for Cable Tie	----	2100133	CLW/ES/3/0131	----	----
46.	Exp. Insulated Tube	----	2100234	CLW/ES/3/0154	----	----
47.	Shrink down Sleeve	----	2100048	CLW/ES/3/0154	----	----
48.	Rating Plate	----	2100516	CLW/ES/3/0252	----	----
49.	Cable Conduit	----	2100167	CLW/ES/3/0127	----	----

Mechanical structure complete with following:

- Connectors
- Wiring and other accessories
- Terminal Block

6. LIST OF ELECTRICAL COMPONENTS

The following electrical components which are mounted in the cubicle shall be supplied by the panel supplier. Only the makes specified in CLW/BLW/RDSO approved UVAM vendor directory shall be accepted**.** The detailed CLW specification of each of these items would be passed on to the successful tenderers.

Current Sensor Auxiliary Circuit			
	Scheme Position	:	42.3
	Required Number		02
	Identification		HIET428008P0002
Details			
	Manufacturer		As per CLW approved Vendor Directory on UVAM
	Nominal Data		1:5000-1000 A- 40 ohm

Connector 9 Pole			
	Scheme Position	:	42.3A
	Required Number		02
	Identification		HETT401293P0001
Details			
	Manufacturer		As per CLW approved Vendor Directory on UVAM
	Nominal Data		9 Pole GR. 13 -13A, M. BUCHSE

Circuit breaker AC			
	Scheme Position	:	53.1/2, 59.1/2
	Required Number	:	02
	Identification	:	HBTB585554R3083

Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	63A-690 VAC- 3 Poles

Aux. Contacts			
	Scheme Position	:	For circuit breakers at Sch. Pos. 62.1/2, 47.1/2, 53.1/2, 55.1/2, 59.1/2 54.1/2,, 56.1/2,, 64.1
	Required Number	:	08
	Identification	:	HBTB585557R1200
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	AUX.CONTACT-2NO

Contactor			
	Scheme Position	:	52.7/2, 47.2/2, 52.4/1, 52.4/2
	Required Number	:	04
	Identification	:	HBTB585683R2927
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	80A/125A- 690 V-3 Poles

Circuit Breaker Type-16			
	Scheme Position	:	47.1/2
	Required Number	:	01
	Identification	:	3EH-113456R0001
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	40A, 690V, 3 Poles

Snubber Circuit			
	Scheme Position	:	52.7A/2, 47.2A/2, 52.4AA/1, 52.4/2
	Required Number	:	02
	Identification	:	3EHW470024R0005
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	110/120 VDC

Contactor			
	Scheme Position	:	52.5/1, 52.5/2
	Required Number	:	02
	Identification	:	-

Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	225 A/1000V- 3 Poles

Varistor AO VDR			
	Scheme Position	:	52.5A/1, 52.5A/2
	Required Number	:	02
	Identification	:	3EHE428099P00001
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	100 V AC/DC

Auxiliary contactor			
	Scheme Position	:	52.6/1, 52.6/2
	Required Number	:	02
	Identification	:	HBTB585402R0821
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	110 VDC-1345 Ohm-1NO

Circuit Breaker AC			
	Scheme Position	:	55.1/2, 54.1/2, 56.1/2, 64.1
	Required Number	:	03
	Identification	:	HBTB585552R3013
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	6 A-690 VAC- 3 Poles

Circuit Breaker AC			
	Scheme Position	:	54.1/2, 56.1/2 for WAG-9 (MS: 482)
	Required Number	:	02
	Identification	:	-
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	10 A-690 VAC- 3 Poles

Aux. Contact block			
	Scheme Position	:	For 52.5/1, 52.5/2
	Required Number	:	02
	Identification	:	
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM

	Nominal Data	:	Type LADC or similar
Circuit Breaker AC			
	Scheme Position	:	62.1/2
	Required Number	:	01
	Identification	:	HBTB585552R3033
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	16 A-690 VAC- 3 Poles

Earth Fault Relay Aux Converter			
	Scheme Position	:	89.2
	Required Number	:	01
	Identification	:	HBVW400011R0001
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	150 mA-43 Ohm

Earthing Resistor Earth fault Detection Aux. Converter			
	Scheme Position	:	90.3/1, 90.3/2
	Required Number	:	02
	Identification	:	NBT300210P0087
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	3.9 kOhm ±10%, 250W

Key Lock			
	Scheme Position	:	1004.4
	Required Number	:	01
	Identification	:	HSBA331645R0002
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	“C”- GREEN

Keeper of Key Lock			
	Scheme Position	:	1004.4
	Required Number	:	01
	Identification	:	HSBA331645R0005
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	-

Capacitor input Filter Aux. Converter

	Scheme Position	:	49.1
	Required Number	:	03
	Identification	:	HIES309976P0001
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	0.22 µF/ 2000 V

Resistor Input Filter Aux. Conv.			
	Scheme Position	:	49.2
	Required Number	:	04
	Identification	:	HIET402702P1029
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	220 ohm/ 80 W /LOW IND

Choke Input Filter Aux. Converter			
	Scheme Position	:	49.3
	Required Number	:	01
	Identification	:	-
Details			
	Manufacturer	:	As per CLW approved Vendor Directory on UVAM
	Nominal Data	:	100 µH

7. WIRING AND CABLING

1. The cables for wiring within the cubicle will be of Electron Beam irradiated cross linked Thin walled cables from RDSO approved vendors under UVAM Item ID: 3100272 **with strict compliance of governing** specification.
2. All connections will be connected on terminals of components provided for the purpose. The terminals and wire cable ends will be marked to facilitate correct connections.
3. Plugs and sockets and connectors will be used to connect pre-assembled units and to facilitate maintenance and ensure a better layout.
4. Cables for terminal connections will have only crimped joints with Cable Lugs/ Copper Sleeves/ Faston Lugs, whichever is applicable. These items should strictly be procured from approved vendors only as per governing specification.
5. Load on power cables will not be more than 75% of its capacity.
6. Cable length and routing should be done in such a way that stress at termination point should be eliminated.
7. Transparent sleeves should be provided over the printed sleeves to avoid erasing of cable identification mark.

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8. SHEET METAL STRUCTURE

The cubicle is of detachable type and shall comply with the dimensions and tolerances specified in relevant part drawings documents. The complete cubicle shall consist of a no. of panels secured to each other by Hex. Bolts/ screws, nuts, washers etc. made of stainless steel. The cubicle should be of sturdy construction so as not to vibrate loosely or excessively, when mounted in the machine room.

9. ENVIRONMENTAL AND OPERATIONAL CONDITIONS

The HB2 Cubicle shall be used under the following conditions :

9.1 Environmental conditions

Environmental condition within the machine room :

Air circulation	:	Weak forced cooling
Operational temperature	:	0…+65°C
Environmental air	:	Salty, dusty
Air humidity	:	Condensation possible

9.2 Operational conditions

Operation time :

Daily approx.	:	16 hours (approx. 330 days per year)
Yearly approx.	:	5.280 hours
Within 30 years approx	:	158, 400 hours

9.3 Reliability

Operation condition	:	according to 9.2
Availability rate	:	98%
Lifetime of the loco	:	min. 30 years (Maintenance, spare parts, lifetime)

10. TEST CONDITIONS

10.1 TYPE TESTING:

a. Type test certificate of material and equipments used in the cubicle must be provided from an approved test house /supplier has to be procured during inspection and along with supplies.
b. Certificate for fasteners used and their material to be produced and supplied along with supplies.
c. Welding to be checked properly as per an approved test plan, which will be given to successful tenderer.
d. Panel should be electrically tested after wiring as per relevant standards to be passed on to the successful tenderer.

e. All electrical equipment's procured shall be tested at assembly stages. Acceptance Test certificates shall be produced for OEM components. For use of any make/type of equipments/components other than that specified prior approval is required. Such approval will be given only after a thorough type test and field validation.

10.2 ROUTINE TESTING:

The cubicle will be tested for the following routine test:

1. Integrity and completeness.
2. Testing of inter-connections and functionality of different sub-assemblies within the panel.
3. Suitable checking fixtures are to be made by successful tenderers for checking the dimensions of the complete assembled panels. Certificate for raw materials and fasteners to be provided.
4. Complete cubicle and electrical items will be tested as per relevant standards.

10.3 Details of Type & Routine test are given clause no. 12.

11. INSPECTION

1. The Type inspection will be carried out by authorized representative of Design wing of CLW/ BLW and routine inspection by CLW/BLW/TPI.
2. The purchaser may carry out stage inspection during inspection of components, cabling or assembly stage of complete cubicle.

12. TESTS

Sl No.	Description	Type Test	Routine Test
I.	Dimensional Checking	Yes	Yes
II.	Verification of Routing of cables & Crimp connections	Yes	Yes
III.	Verification of Electrical & Mechanical equipments and its test reports	Yes	Yes
IV.	Complete Continuity test as per cable connection chart	Yes	Yes (100%)
V.	Measurement of resistance	Yes	Yes
VI.	D.E Test applied 2.27 KV for one minute *between Insulator & body*	Yes	No
VII.	Voltage test between terminals of Capacitor & terminal to casing	Yes	No
VIII.	Fire –retardant test of all insulating material	Yes	No
IX.	Crimping test: - To check whether proper crimping tool with required pressure is applied so that there is no void in the cross section of the cable crimped with Contact Pins, Cable Lugs, Copper Sleeves, Faston Lugs as per requirements of EN50343 (Latest)	*****Yes	*****Yes 5% or minimum 2 Sets per lot
X.	Vibration Test	Yes	No

***** *Sample cable of each size* crimped with Contact Pins/Cable Lugs/Copper Sleeves/ Faston Lugs *are to be prepared in front of the inspecting official which shall be tested as per EN 50343 (Latest) for crimping quality in house with calibrated testing equipment*

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13. DENTIFICATION MARK

Following details shall be provided on equipment:

- Name of the firm
- Equipment serial no.
- Month & year of manufacture

14. SUBMISSION OF TENDER QUOTATION

14.1 The tenderer shall give sufficient information to prove that his factory has adequate facilities and capacity to manufacture the complete panel to meet fully the technical requirement of the specification and quality of materials and workmanship.

14.2 Quotation shall not be considered complete unless all information is furnished and therefore liable to be rejected.

15. TECHNICAL DOCUMENTS TO BE SUPPLIED BY THE SUPPLIER:

i) Type Test Reports
ii) Routine test report along with each set
iii) Detailed drawing

.

16. IMPORTANT INFORMATIONS

16.1 All the insulating material should have Fire Retardant Property as per CLW individual specn.

16.2 The Cable and terminal connections will have only proper crimping joints with Cable Lugs/ Copper Sleeves/ Faston Lugs, whichever is applicable.

16.3 Firm should ensure that subject item being supplying with all latest modifications.

16.4 Firm should regular follow RDSO link https://rdso.indianrailways.gov.in/view_section.jsp?lang=0&id=0,4,6523,7086,7087,7092,7133,7140 for latest modifications.

16.5 All modification have to be incorporated by the firm in consultation with CLW at firms own cost and without any financial repercussion on Railways.

16.6 Final Cable cutting chart has been enclosed as Annexure-I. RDSO's Modification Sheet should be implemented by panel manufacturer time to time as required for.

17. Reference

a. ABB Document No. 3EHP130177, 3EHP431445.

Note: The above mentioned references are given for guidance only.

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ANNEXURE-I

Cable Connection chart of Auxiliary Cubicle HB2 for WAG9/ WAP7/WAP5

*** In order to Drive MR Blower and ScMR Blower by three phase supply from BUR2 the connections should be treated as deleted**

35 PIN /12 GRADE XK67S

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	2050	XK67S-1	47.2A/2-3
2.	1.5	2858	XK67S-2	89.2-B
3.	1.5	2801B	XK67S-3	62.1/2-23
4.	1.5	2850B	XK67S-4	53.1/2-24
5.	1.5	2851B	XK67S-5	55.1/2-24
6.	1.5	2852B	XK67S-6	56.1/2-24
7.	1.5	2853B	XK67S-7	54.1/2-24
8.	1.5	2855B	XK67S-8	59.1/2-24
9.	1.5	2856B	XK67S-9	62.1/2-24
10.	1.5	2857B	XK67S-10	63.1/2-24
11.	1.5	3037B	XK67S-11	47.2A/2-2+
12.	1.5	2840B	XK67S-26	47.1/2-14
13.	2.5	5094	XK67S-29	52.4/1-13
14.	2.5	5094	XK67S-30	52.4/2-13
15.	2.5	2877A	XK67S-31	52.6/1-A1
16.	2.5	2877B	XK67S-32	52.6/2-A1
17.	2.5	2880A	XK67S-33	52.5/2-54
18.	2.5	2880B	XK67S-34	52.5/1-54

7 PIN /12 GRADE XK67C:01

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1218	XK67C:01-1	XB67A-1
2.	2.5	1218	XK67C:01-1	XB67A (1)-1 (WAP-7)
3.	6	1218	XK67C:01-2	XB67A-1
4.	6	1218	XK67C:01-2	XB67A (1)-1 (WAP-7)
5.	2.5	6501	XK67C:01-3	XK67C:02-3
6.	2.5	6510	XK67C:01-4	XK67C:02-4
7.	2.5	6503	XK67C:01-6	XK67C:02-6

Prepared by	Checked by	Approved by
SSE/D/Elect.	**AEE/D-II**	**Dy.CEE/D-II**

7 PIN /12 GRADE XK67C:02

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	6	1218	XK67C:02-1	XB67A-1
2.	6	1218	XK67C:02-1	XB67A (1)-1 (WAP-7)
3.	2.5	6501	XK67C:02-3	XK67C:01-3
4.	2.5	6510	XK67C:02-4	XK67C:01-4
5.	2.5	6503	XK67C:02-6	XK67C:01-6

4 PIN XK67P:01

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	6	1157B	XK67P:01-1	62.1/2-2
2.	6	1158B	XK67P:01-2	62.1/2-4
3.	6	1159B	XK67P:01-3	62.1/2-6

4 PIN XK67A:05

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1201B	XK67A:05-1	54.1/2-2
2.	2.5	1218	XK67A:05-1	XB67A (1)-2 (WAP-7)
3.	2.5	1218	XK67A:05-1	XB67A-2
4.	2.5	1202B	XK67A:05-2	54.1/2-4
5.	2.5	1204B	XK67A:05-3	54.1/2-6
6.	2.5	1202B	XK67A:05-3	XB67A (1)-9 (WAP-7)

4 PIN XK67A:06

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1121B	XK67A:06-1	56.1/2-2
2.	2.5	1218	XK67A:06-1	XB67A-2
3.	2.5	1218	XK67A:06-1	XB67A (1)-2 (WAP-7)
4.	2.5	1122B	XK67A:06-2	56.1/2-4
5.	2.5	1123B	XK67A:06-3	56.1/2-6

4 PIN XK67AC:01 (CAB 1)

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1140A	XK67AC:01-1	DT SWITCH-2
2.	2.5	1141A	XK67AC:01-2	DT SWITCH-6
3.	2.5	1142A	XK67AC:01-3	DT SWITCH-10

4 PIN XK67AC:02 (CAB 2)

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1140B	XK67AC:02-1	DT SWITCH-4
2.	2.5	1141B	XK67AC:02-2	DT SWITCH-8
3.	2.5	1142B	XK67AC:02-3	DT SWITCH-12

4 PIN XK67A:02

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1137B	XK67A:02-1	55.1/2-2
2.	2.5	1138B	XK67A:02-2	55.1/2-4
3.	2.5	1139B	XK67A:02-3	55.1/2-6

4 PIN XK67D

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	25	1131	XK67D-1	XH67A (2)-4
2.	25	1132	XK67D-2	XH67A (2)-5
3.	25	1133	XK67D-3	XH67A (2)-6

4 PIN XK67B

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	35	1121B	XK67B-1	XH67A (2)-1
2.	35	1122B	XK67B-2	XH67A (2)-2
3.	35	1123B	XK67B-3	XH67A (2)-3

4 PIN XK67E:01

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	50	1121B	XK67E:01-1	XH67A (2)-1
2.	50	1122B	XK67E:01-2	XH67A (2)-2
3.	50	1123B	XK67E:01-3	XH67A (2)-3

4 PIN XK67E:02

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	50	1131	XK67E:02-1	XH67A (2)-4
2.	50	1132	XK67E:02-2	XH67A (2)-5
3.	50	1133	XK67E:02-3	XH67A (2)-6

52.7 CONTACTOR

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	2877B	52.7-A1	52.7A-2+
2.	2.5	2050	52.7-A2	52.7A-4-

3.	2.5	1137A	52.7-1	64.1/2-2
4.	2.5	1137B	52.7-2	DT SWITCH-1
5.	2.5	1138A	52.7-3	64.1/2-4
6.	2.5	1138B	52.7-4	DT SWITFH-5
7.	2.5	1139A	52.7-5	64.1/2-6
8.	2.5	1139B	52.7-6	DT SWITCH-9

52.7A SNUBBER CIRCUIT

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	2878B	52.7A-1+	52.6/2-2
2.	2.5	2877B	52.7A-2+	52.7-A1
3.	2.5	2050	52.7A-3-	47.2A/2-4
4.	2.5	2050	52.7A-4-	52.7-A2

47.2/2 CONTACTOR

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	3037B	47.2/2-A1	47.2A/2-1+
2.	1.5	2050	47.2/2-A2	47.2A/2-4
3.	10	1131	47.2/2-1	XH67A (2)-4
4.	10	1141B	47.2/2-2	47.1/2-1
5.	10	1132	47.2/2-3	XH67A (2)-5
6.	10	1142B	47.2/2-4	47.1/2-3
7.	10	1133	47.2/2-5	XH67A (2)-6
8.	10	1143B	47.2/2-6	47.1/2-5

47.2A/2 SNUBBER CIRCUIT

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	3037B	47.2A/2-1+	47.2/2-A1
2.	1.5	3037B	47.2A/2-2+	XK67S-11
3.	2.5	2050	47.2A/2-3	XK67S-1
4.	2.5	2050	47.2A/2-4	52.7A-3-
5.	1.5	2050	47.2A/2-4	47.2/2-A2

52.6/1 AUX. CONTACTOR 80A

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	2877A	52.6/1-A1	XK67S-31
2.	1.5	2050	52.6/1-A2	52.6/2-A2
3.	2.5	2050	52.6/1-A2	52.4/1-A2
4.	2.5	5094	52.6/1-1+	52.4/1-13
5.	2.5	2877A	52.6/1-2+	XB67A-3
6.	2.5	2877A	52.6/1-2	52.4/1-A1
7.	2.5	2878A	52.6/1-2-	XB67A-3

8.	2.5	2878A	52.6/1-2-	XB67A (1)-3 (WAP-7)

52.6/2 AUX. CONTACTOR 80A

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	2877B	52.6/2-A1	XK67S-32
2.	1.5	2050	52.6/2-A2	52.4/2-A2
3.	1.5	2050	52.6/2-A2	52.6/1-A2
4.	2.5	5094	52.6/2-1+	52.4/2-13
5.	1.5	2877B	52.6/2-2	XB67A-4
6.	2.5	2878B	52.6/2-2	52.7A-1+

89.2 EARTH FAULT RELAY

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	1105	89.2-U	90.3/1-Q2 (For WAG 9 & WAP-5 only)
2.	1.5	1105	89.2- U	XB67A (1)-10 (WAP-7)
3.	2.5	0	89.2-V	MASSE-M
4.	1.5	2801B	89.2-A	47.1/2-13
5.	1.5	2801B	89.2-A	56.1/2-23
6.	1.5	2858	89.2-B	XK67S-2

62.1/2 CIRCUIT BRERAKER 16A 3 POLE

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	10	1134	62.1/2-1	XH67A (2)-7
2.	6	1157B	62.1/2-2	XK67P:01-1
3.	10	1135	62.1/2-3	XH67A (2)-8
4.	6	1158B	62.1/2-4	XK67P:01-2
5.	10	1136	62.1/2-5	XH67A (2)-9
6.	6	1159B	62.1/2-6	XK67P:01-3
7.	1.5	2801B	62.1/2-23	XK67S-3
8.	1.5	2801B	62.1/2-23	63.1/2-23
9.	1.5	2856B	62.1/2-24	XK67S-9

47.1/2 CIRCUIT BREAKER 40A 3 POLE

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	10	1141B	47.1/2-1	47.2/2-2
2.	10	1187B	47.1/2-2	XH67A (1)-7
3.	10	1142B	47.1/2-3	47.2/2-4
4.	10	1188B	47.1/2-4	XH67A (1)-8
5.	10	1143B	47.1/2-5	47.2/2-6

6.	10	1189B	47.1/2-6	XH67A (1)-9
7.	1.5	2801B	47.1/2-13	89.2-A
8.	1.5	2840B	47.1/2-14	XK67S-26

53.1/2 CIRCUIT BREAKER 63A 3 POLE

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	16	1121B	53.1/2-1	XH67A (2)-1
2.	16	1127B	53.1/2-2	XH67A (1)-1
3.	16	1122B	53.1/2-3	XH67A (2)-2
4.	16	1128B	53.1/2-4	XH67A (1)-2
5.	16	1123B	53.1/2-5	XH67A (2)-3
6.	16	1129B	53.1/2-6	XH67A (1)-3
7.	1.5	2801B	53.1/2-23	55.1/2-23
8.	1.5	2801B	53.1/2-23	63.1/2-23
9.	1.5	2850B	53.1/2-24	XK67S-4

63.1/2 Circuit Breaker Oil Pump Converter

(MCB is deleted from scope of supply of Panel and to be provided by Propulsion manufacturer but cable connection with lug is to be provided by the panel supplier)

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1134	63.1/2-1	XH67A (2)-7
2.	2.5	1167B	63.1/2-2	XH67A (1)-19
3.	2.5	1135	63.1/2-3	XH67A (2)-8
4.	2.5	1168B	63.1/2-4	XH67A (1)-20
5.	2.5	1136	63.1/2-5	XH67A (2)-9
6.	2.5	1169B	63.1/2-6	XH67A (1)-21
7.	1.5	2801B	63.1/2-23	62.1/2-23
8.	1.5	2857B	63.1/2-24	XK67S-10

55.1/2 CIRCUIT BREAKER 6A 3 POLE

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	10	1124	55.1/2-1	XH67A (1)-13
2.	2.5	1137B	55.1/2-2	XK67A:02-1
3.	10	1125	55.1/2-3	XH67A (1)-14
4.	2.5	1138B	55.1/2-4	XK67A:02-2
5.	10	1126	55.1/2-5	XH67A (1)-15
6.	2.5	1139B	55.1/2-6	XK67A:02-3
7.	1.5	2801B	55.1/2-23	59.1/2-23
8.	1.5	2801B	55.1/2-23	53.1/2-23
9.	1.5	2851B	55.1/2-24	XK67S-5

59.1/2 CIRCUIT BREAKER 63A 3 POLE

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	16	1121A	59.1/2-1	XH67A (1)-10
2.	16	1147B	59.1/2-2	XH67A (1)-4
3.	16	1122A	59.1/2-3	XH67A (1)-11
4.	16	1148B	59.1/2-4	XH67A (1)-5
5.	16	1123A	59.1/2-5	XH67A (1)-12
6.	16	1149B	59.1/2-6	XH67A (1)-6
7.	1.5	2801B	59.1/2-23	54.1/2-23
8.	1.5	2801B	59.1/2-23	55.1/2-23
9.	1.5	2855B	59.1/2-24	XK67S-8

54.1/2 CIRCUIT BREAKER 10A 3 POLE for WAG-9 (MS: 482) & 6A 3 POLE for WAP-7/ WAP-5

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1131	54.1/2 – 1	XH67A (2)-10 (RDSO MS 482 Rev.1, Energy Saving)
2.	2.5	1201B	54.1/2 -2	XB67A-7
3.	2.5	1201B	54.1/2 -2	XB67A (1)-7 (WAP-7)
4.	2.5	1132	54.1/2 – 3	XH67A (2)-11 (RDSO MS 482 Rev.1, Energy Saving)
5.	2.5	1133	54.1/2 – 5	XH67A (2)-12 (RDSO MS 482 Rev.1, Energy Saving)
6.	2.5	1201B	54.1/2-2	XK67A:05-1
7.	2.5	1202B	54.1/2-4	XK67A:05-2
8.	2.5	1204B	54.1/2-6	XK67A:05-3
9.	1.5	2801B	54.1/2-23	59.1/2-23
10.	1.5	2801A	54.1/2-23	56.1/2-23
11.	1.5	2853B	54.1/2-24	XK67S-7

56.1/2 CIRCUIT BREAKER 10A 3 POLE for WAG-9 (MS: 482) & 6A 3 POLE for WAP-7/ WAP-5

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1131	56.1/2 – 1	XH67A (2)-10 (RDSO MS 482 Rev.1, Energy Saving)
2.	2.5	1132	56.1/2 – 3	XH67A (2)-11 (RDSO MS 482 Rev.1, Energy Saving)
3.	2.5	1133	56.1/2 – 5	XH67A (2)-12 (RDSO MS 482 Rev.1,

				Energy Saving)
4.	1.5	2801B	56.1/2-23	54.1/2-23
5.	1.5	2801A	56.1/2-23	54.1/2-23
6.	2.5	1121B	56.1/2-2	XK67A:06-1
7.	2.5	1122B	56.1/2-4	XK67A:06-2
8.	2.5	1123B	56.1/2-6	XK67A:06-3
9.	1.5	2852B	56.1/2-24	XK67S-6
10.	1.5	2801B	56.1/2-23	89.2-A

64.1 CIRCUIT BREAKER 6A 3 POLE

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1131	64.1 – 1	XH67A (2)-10 (RDSO MS 482 Rev.1, Energy Saving)
2.	2.5	1137A	64.1/2-2	52.7-1
3.	2.5	1132	64.1 – 3	XH67A (2)-11 (RDSO MS 482 Rev.1, Energy Saving)
4.	2.5	1138A	64.1/2-4	52.7-3
5.	2.5	1133	64.1 – 5	XH67A (2)-12 (RDSO MS 482 Rev.1, Energy Saving)
6.	2.5	1139A	64.1/2-6	52.7-5

LOOSE CONNECTION (DT SWITCH)

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1137B	DT SWITCH-1	52.7-2
2.	2.5	1140A	DT SWITCH-2	XK67AC:01-1
3.	2.5	1140B	DT SWITCH-4	XK67AC:02-1
4.	2.5	1138B	DT SWITCH-5	52.7-4
5.	2.5	1141A	DT SWITCH-6	XK67AC:01-2
6.	2.5	1141B	DT SWITCH-8	XK67AC:02-2
7.	2.5	1139B	DT SWITCH-9	52.7-6
8.	2.5	1142A	DT SWITCH-10	XK67AC:01-3
9.	2.5	1142B	DT SWITCH-12	XK67AC:02-3

52.4/1 CONTACTOR

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	2878A	52.4/1-A1	52.4A/1-1+
2.	1.5	2878A	52.4/1-A1	52.5/2-A1
3.	2.5	2878A	52.4/1-A1	52.4A/2-2
4.	2.5	2877A	52.4/1-A1	52.6/1-2
5.	1.5	2050	52.4/1-A2	52.4A/2-4

6.	2.5	2050	52.4/1-A2	52.6/1-A2
7.	2.5	2050	52.4/1-A2	52.4A/1-4
8.	10	1121A	52.4/1-1	XH67A (1)-10
9.	10	1124	52.4/1-2	XH67A (1)-13
10.	10	1122A	52.4/1-3	XH67A (1)-11
11.	10	1125	52.4/1-4	XH67A (1)-14
12.	10	1123A	52.4/1-5	XH67A (1)-12
13.	10	1126	52.4/1-6	XH67A (1)-15
14.	2.5	5094	52.4/1-13	XK67S-29
15.	2.5	5094	52.4/1-13	52.6/1-1+
16.	1.5	2879A	52.4/1-14	52.5/2-53

52.4A/1 SNUBBER CIRCUIT

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	2877A	52.4A/1-1+	52.4/1-A1
2.	2.5	2877A	52.4A/1-2+	XB67A-3
3.	2.5	2878A	52.4A/1-2+	XB67A (1)-3 (WAP-7)
4.	2.5	2050	52.4A/1-3-	XB67A-5
5.	2.5	2050	52.4A/1-3-	XB67A (1)-5 (WAP-7)
6.	2.5	2050	52.4A/1-4	52.4/1-A2
7.	1.5	2050	52.4A/1-4	52.4/2-A2

52.4/2 CONTACTOR

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	2877A	52.4/2-A1	52.4A/2-1+
2.	1.5	2878B	52.4/2-A1	52.4A/2-1+
3.	1.5	2050	52.4/2-A2	52.4A/1-4
4.	2.5	2050	52.4/2-A2	52.4A/2-4
5.	1.5	2050	52.4/2-A2	52.6/2-A2
6.	10	1121B (renamed RDSO MS 482 Rev.1)	52.4/2-1	52.5/1-1
7.	10	1124	52.4/2-2	XH67A (1)-13
8.	10	1122B (renamed RDSO MS482 Rev.1)	52.4/2-3	52.5/1-3
9.	10	1125	52.4/2-4	XH67A (1)-14
10.	10	1123B (renamed RDSO MS482 Rev.1)	52.4/2-5	52.5/1-5
11.	10	1126	52.4/2-6	XH67A (1)-15
12.	2.5	5094	52.4/2-13	XK67S-30
13.	2.5	5094	52.4/2-13	52.6/2-1+
14.	1.5	2879B	52.4/2-14	52.5/1-53

52.4A/2 SNUBBER

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	2878B	52.4A/2-1+	52.4/2-A1
2.	2.5	2878A	52.4A/2-2	52.4/1-A1
3.	2.5	2878B	52.4A/2-2+	XB67A-4
4.	2.5	2878B	52.4A/2-2+	XB67A (1)-4 (WAP-7)
5.	2.5	2050	52.4A/2-3-	XB67A-5
6.	2.5	2050	52.4A/2-3-	XB67A (1)-5 (WAP-7)
7.	2.5	2050	52.4A/2-4	52.4/2-A2
8.	1.5	2050	52.4A/2-4	52.4/1-A2

52.5/1 CONTACTOR 225 A

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	2877B	52.5/1-A1	XB67A-4
2.	1.5	2878B	52.5/1- A1	XB67A-4
3.	1.5	2878B	52.5/1- A1	XB67A (1)-4 (WAP-7)
4.				
5.	1.5	2878B	52.5/1-A1	52.5A/1-1
6.	1.5	2050	52.5/1-A2	52.5/2-A2
7.	0.0	2050	52.5/1-A2	52.5A/1-4-
8.	1.5	2050	52.5/1-A2	52.5/2-A2
9.	35	1121B	52.5/1-1	XH67A (2)-1
10.	10	1121B (renamed RDSO MS 482 Rev.1)	52.5/1-1	52.4/2-1
11.	25	1134	52.5/1-2	52.5/2-2
12.	25	1134	52.5/1-2	XH67A (2)-7
13.	35	1122B	52.5/1-3	XH67A (2)-2
14.	10	1122B (renamed RDSO MS482 Rev.1)	52.5/1-3	52.4/2-3
15.	25	1135	52.5/1-4	52.5/2-4
16.	25	1135	52.5/1-4	XH67A (2)-8
17.	35	1123B	52.5/1-5	XH67A (2)-3
18.	10	1123B (renamed RDSO MS482 Rev.1)	52.5/1-5	52.4/2-5
19.	25	1136	52.5/1-6	52.5/2-6
20.	25	1136	52.5/1-6	XH67A (2)-9
21.	1.5	2879B	52.5/1-53	52.4/2-14
22.	2.5	2879B	52.5/1-53	52.5/1-83
23.	2.5	2880B	52.5/1-54	XK67S-34

24.	2.5	2880B	52.5/1-54	52.5/1-84

52.5A/1 SNUBBER CIRCUIT (VARISTOR)

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	2878B	52.5A/1-1	52.5/1-A1
2.	0.0	2050	52.5A/1-4-	52.5/1-A2

52.5/2 CONTACTOR 225 A

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	2878A	52.5/2-A1	52.4/1-A1
2.	2.5	2877A	52.5/2- A1	XB67A-3
3.	0.0	2877A	52.5/2-A1	52.5A/2-1+
4.	1.5	2050	52.5/2-A2	52.5/1-A2
5.	0.0	2050	52.5/2-A2	52.5A/2-4-
6.	25	1131	52.5/2-1	XH67A (2)-4
7.	25	1134	52.5/2-2	52.5/1-2
8.	25	1132	52.5/2-3	XH67A (2)-5
9.	25	1135	52.5/2-4	52.5/1-4
10.	25	1133	52.5/2-5	XH67A (2)-6
11.	25	1136	52.5/2-6	52.5/1-6
12.	1.5	2879A	52.5/2-53	52.4/1-14
13.	2.5	2879A	52.5/2-53	52.5/2-83
14.	2.5	2880A	52.5/2-54	XK67S-33
15.	2.5	2880A	52.5/2-54	52.5/2-84

52.5A/2 SNUBBER CIRCUIT (VARISTOR)

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	0.0	2877A	52.5A/2-1+	52.5/2-A1
2.	0.0	2050	52.5A/2-4-	52.5/2-A2

90.3/1 RESISTOR

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	1103	90.3/1-Q1	S1103.1-Q1
2.	1.5	1105	90.3/1-Q2	89.2-U (For WAG 9 & WAP-5 only)
3.	1.5	1105	90.3/1- Q2	XB67A (2)-1 (WAP-7)
4.	1.5	1105	90.3/1-Q2	90.3/2-Q1

Prepared by	Checked by	Approved by
SSE/D/Elect.	**AEE/D-II**	**Dy.CEE/D-II**

90.3/2 RESISTOR

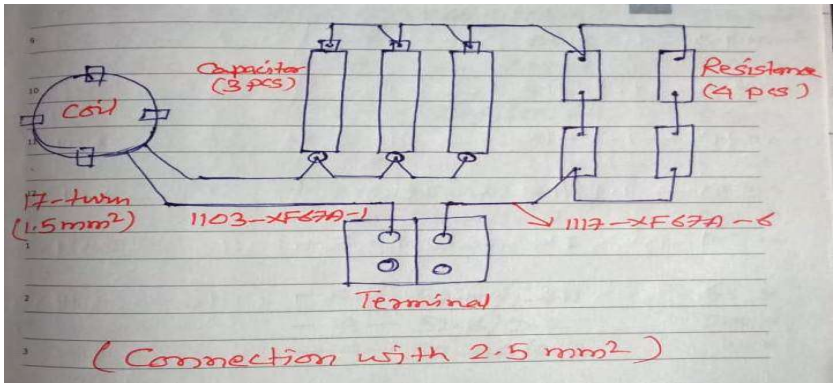
Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	1105	90.3/2-Q1	90.3/1-Q2
2.	1.5	1117	90.3/2-Q2	S1117.1-Q1

Bus Bar-1

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	0.0	1103	S1103.1-Q1	42.3/1-IN
2.	1.5	1103	S1103.1-Q1	90.3/1-Q1
3.	0.0	1103	S1103.1-Q2	42.3/1-OUT

Bus Bar-2

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	1117	S1117.1-Q1	90.3/2-Q2
2.	0.0	1117	S1117.1-Q2	42.3/2-OUT
3.	0.0	1117	S1117.1-Q1	42.3/2-IN



CONNECTION OF R-L-C CIRCUIT BUR INPUT SNUBBER IN HB2

SCREW CONNECTIONTB XH67A (1) - 21 TB

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	16	1127B	XH67A (1)-1	53.1/2-2
2.	16	1128B	XH67A (1)-2	53.1/2-4
3.	16	1129B	XH67A (1)-3	53.1/2-6
4.	16	1147B	XH67A (1)-4	59.1/2-2
5.	16	1148B	XH67A (1)-5	59.1/2-4
6.	16	1149B	XH67A (1)-6	59.1/2-6
7.	10	1187B	XH67A (1)-7	47.1/2-2

8.	10	1188B	XH67A (1)-8	47.1/2-4
9.	10	1189B	XH67A (1)-9	47.1/2-6
10.	10	1121A	XH67A (1)-10	52.4/1-1
11.	10	1122A	XH67A (1)-11	52.4/1-3
12.	10	1123A	XH67A (1)-12	52.4/1-5
13.	16	1121A	XH67A (1)-10	59.1/2-1
14.	16	1122A	XH67A (1)-11	59.1/2-3
15.	16	1123A	XH67A (1)-12	59.1/2-5
16.	10	1124	XH67A (1)-13	52.4/1-2
17.	10	1125	XH67A (1)-14	52.4/1-4
18.	10	1126	XH67A (1)-15	52.4/1-6
19.	10	1124	XH67A (1)-13	55.1/2-1
20.	10	1125	XH67A (1)-14	55.1/2-3
21.	10	1126	XH67A (1)-15	55.1/2-5
22.	10	1124	XH67A (1)-13	52.4/2-2
23.	10	1125	XH67A (1)-14	52.4/2-4
24.	10	1126	XH67A (1)-15	52.4/2-6
25.	10	1134	XH67A (1)-16	XH67A (2)-7
26.	10	1135	XH67A (1)-17	XH67A (2)-8
27.	10	1136	XH67A (1)-18	XH67A (2)-9
28.	2.5	1167B	XH67A (1)-19	63.1/2-2
29.	2.5	1168B	XH67A (1)-20	63.1/2-4
30.	2.5	1169B	XH67A (1)-21	63.1/2-6

SCREW CONNECTIONTB XH67A (2) - 12 TB

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	16	1121B	XH67A (2)-1	53.1/2-1
2.	35	1121B	XH67A (2)-1	XK67B-1
3.	50	1121B	XH67A (2)-1	XK67E:01-1
4.	35	1121B	XH67A (2)-1	52.5/1-1
5.	16	1122B	XH67A (2)-2	53.1/2-3
6.	35	1122B	XH67A (2)-2	XK67B-2
7.	50	1122B	XH67A (2)-2	XK67E:01-2
8.	35	1122B	XH67A (2)-2	52.5/1-3
9.	16	1123B	XH67A (2)-3	53.1/2-5
10.	35	1123B	XH67A (2)-3	52.5/1-5
11.	35	1123B	XH67A (2)-3	XK67B-3
12.	50	1123B	XH67A (2)-3	XK67E:01-3
13.	25	1131	XH67A (2)-4	52.5/2-1

14.	25	1131	XH67A (2)-4	XK67D-1
15.	50	1131	XH67A (2)-4	XK67E:02-1
16.	10	1131	XH67A (2)-4	47.2/2-1
17.	LINK	1131	XH67A (2)-10	XH67A (2)-4
18.	2.5	1131	XH67A (2)-10	64.1 – 1
19.	2.5	1131	XH67A (2)-10	54.1/2 – 1
20.	2.5	1131	XH67A (2)-10	56.1/2 – 1
21.	25	1132	XH67A (2)-5	52.5/2-3
22.	25	1132	XH67A (2)-5	XK67D-2
23.	50	1132	XH67A (2)-5	XK67E:02-2
24.	10	1132	XH67A (2)-5	47.2/2-3
25.	LINK	1132	XH67A (2)-11	XH67A (2)-5
26.	2.5	1132	XH67A (2)-11	64.1 – 3
27.	2.5	1132	XH67A (2)-11	54.1/2 – 3
28.	2.5	1132	XH67A (2)-11	56.1/2 – 3
29.	25	1133	XH67A (2)-6	52.5/2-5
30.	25	1133	XH67A (2)-6	XK67D-3
31.	50	1133	XH67A (2)-6	XK67E:02-3
32.	10	1133	XH67A (2)-6	47.2/2-5
33.	LINK	1133	XH67A (2)-12	XH67A (2)-6
34.	2.5	1133	XH67A (2)-12	64.1 – 5
35.	2.5	1133	XH67A (2)-12	54.1/2 – 5
36.	2.5	1133	XH67A (2)-12	56.1/2 – 5
37.	10	1134	XH67A (2)-7	62.1/2-1
38.	10	1134	XH67A (2)-7	XH67A (1)-16
39.	25	1134	XH67A (2)-7	52.5/1-2
40.	2.5	1134	XH67A (2)-7	63.1/2-1
41.	10	1135	XH67A (2)-8	62.1/2-3
42.	10	1135	XH67A (2)-8	XH67A (1)-17
43.	25	1135	XH67A (2)-8	52.5/1-4
44.	2.5	1135	XH67A (2)-8	63.1/2-3
45.	10	1136	XH67A (2)-9	62.1/2-5
46.	10	1136	XH67A (2)-9	XH67A (1)-18
47.	25	1136	XH67A (2)-9	52.5/1-6
48.	2.5	1136	XH67A (2)-9	63.1/2-5

SCREW CONNECTION UPPER PANEL TB XB67A (1) - 10 TB FOR WAP-7

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1218	XB67A (1)-1	XK67C:01-1

Prepared by	Checked by	Approved by
SSE/D/Elect.	AEE/D-II	Dy.CEE/D-II

2.	6	1218	XB67A (1)-1	XK67C:01-2
3.	6	1218	XB67A (1)-1	XK67C:02-1
4.	2.5	1218	XB67A (1)-2	XK67A:06-1
5.	2.5	1218	XB67A (1)-2	XK67A:05-1
6.	2.5	2878A	XB67A (1)-3	52.6/1-2-
7.	2.5	2878A	XB67A (1)-3	52.4A/1-2+
8.	2.5	2878B	XB67A (1)-4	52.4A/2-2+
9.	1.5	2878B	XB67A (1)-4	52.5/1- A1
10.	2.5	2050	XB67A (1)-5	52.4A/1-3-
11.	2.5	2050	XB67A (1)-5	52.4A/2-3-
12.	2.5	1201B	XB67A (1)-7	54.1/2 -2
13.	2.5	1201B	XB67A (1)-7	XB67A (2)- 3
14.	2.5	1204B	XB67A (1)-8	XB67A (2)- 4
15.	2.5	1202B	XB67A (1)-9	XK67A:05-3
16.	2.5	1202B	XB67A (1)-9	XB67A (2)- 2
17.	1.5	1105	XB67A (1)-10	89.2- U
18.	2.5	1105	XB67A (1)-10	XB67A (2)- 1

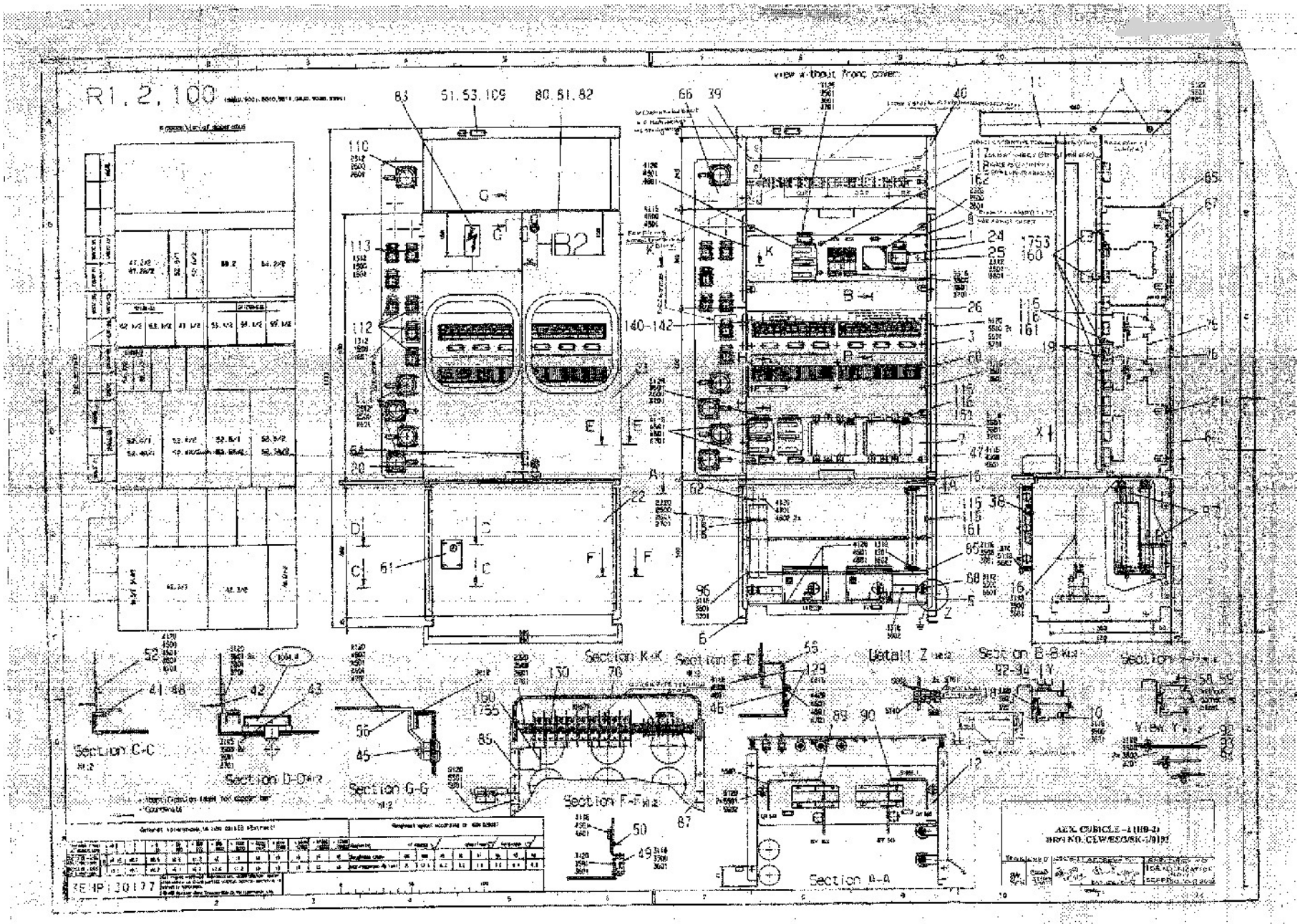
SCREW CONNECTION TB XB67A (2) - 4 TB FOR WAP-7

Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	1.5	1105	XB67A (2)-1	90.3/1- Q2
2.	1.5	1105	XB67A (2)-1	XB67A (1)- 10
3.	2.5	1202B	XB67A (2)-2	XB67A (1)- 9
4.	2.5	1201B	XB67A (2)-3	XB67A (1)- 7
5.	2.5	1204B	XB67A (2)-4	XB67A (1)- 8

SCREW CONNECTION TB XB67A - 8 TB FOR WAG-9

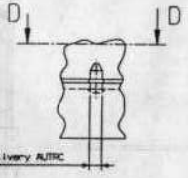
Sl. No.	Cable Size (mm^2)	Cable No.	Connection From	Connection To
1.	2.5	1218	XB67A-1	XK67C:01-1
2.	6	1218	XB67A-1	XK67C:01-2
3.	6	1218	XB67A-1	XK67C:02-1
4.	2.5	1218	XB67A-2	XK67A:06-1
5.	2.5	1218	XB67A-2	XK67A:05-1
6.	2.5	2878A	XB67A-3	52.6/1-2-
7.	2.5	2878A	XB67A-3	52.4A/1-2+
8.	2.5	2878B	XB67A-4	52.4A/2-2+
9.	1.5	2878B	XB67A-4	52.5/1- A1
10.	2.5	2050	XB67A-5	52.4A/1-3-
11.	2.5	2050	XB67A-5	52.4A/2-3-

12.	2.5	1201B	XB67A-7	54.1/2 -2
13.	1.5	2877B	XB67A-4	52.6/2-2
14.	2.5	2877A	XB67A-3	52.5/2- A1


R1, 2, 100
view without front cover
Section C-C
Section D-D
Section G-G
Section K-K
Section E-E
Detail Z
Section B-B
Section F-F
Section A-A
View Y
AEK CUBICLE-1 (HB-2)

R1, R2 (9080)

Detail C
1:2



Aux. cubicle 1

	XK32S
XK32F	
XK32C:01	XK32C:02
XK32P:01	XK32P:02
XK32A:05	XK32A:06
XK32A:03	XK32A:04
XK32A:01	XK32A:02
	XK32D
XK32B	
XK32E	

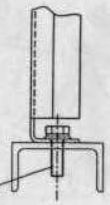
Aux. cubicle 2

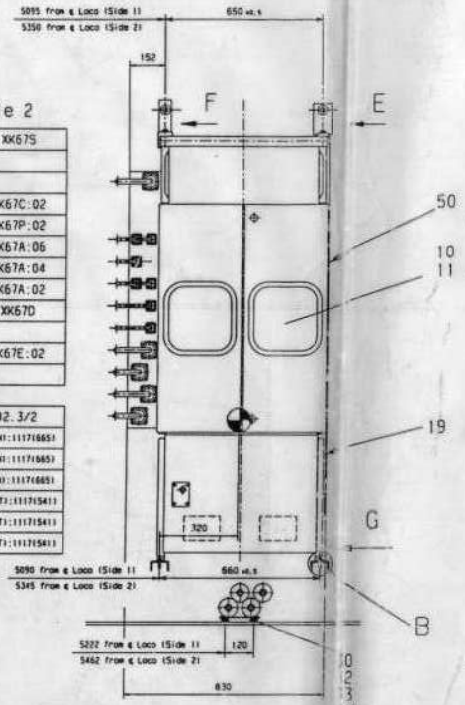
	XK67S
XK67C:01	XK67C:02
XK67P:01	XK67P:02
XK67A:05	XK67A:06
XK67A:03	XK67A:04
XK67A:01	XK67A:02
	XK67D
XK67B	
	XK67E:02
XK67E:01	

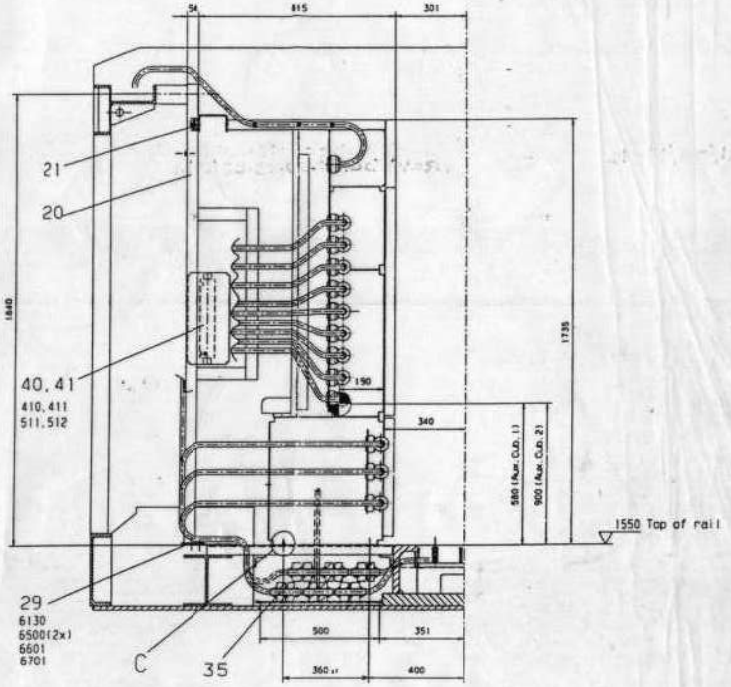
XK67:01		
XK67:02		
XK67:03		
		X132A

	42.3/1	42.3/2
	O1(IN):11031(541)	O1(IN):11171(665)
XK32:01	O1(IN):11031(541)	O1(IN):11171(665)
XK32:02	O1(IN):11031(541)	O1(IN):11171(665)
XK32:03	O2(OUT):11031(666)	O2(OUT):11171(541)
	O2(OUT):11031(666)	O2(OUT):11171(541)
	O2(OUT):11031(666)	O2(OUT):11171(541)

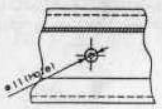
Detail B
1:2



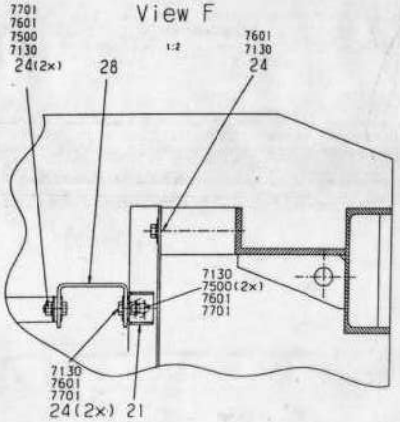




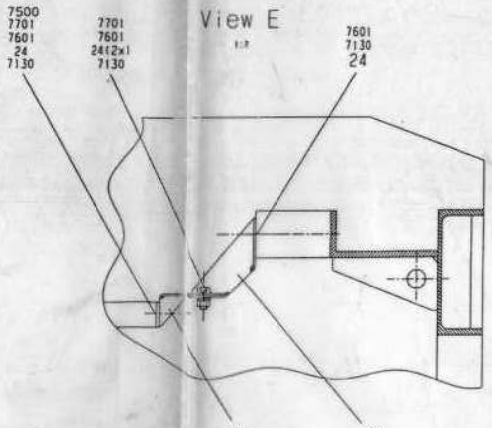
Section D-D
1:2



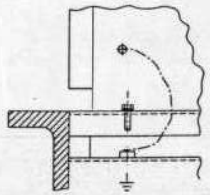
View F
1:2



View E
1:2



View G
1:2



-Center of gravity

Weight cubicle 1 : 220kg
Weight cubicle 2 : 105kg

Issued	95-05-10 Heusser	Checked	95-05-11 Bolliger	Rel. Date	----------	Rel. remark	95-05-11 Bolliger
Drawing No.	3EHP130235			Replaced		Replaced by	No separate parts list
Change	A 95-05-30 Heu						Sec. A same sr.
	B 96-01-09 TNg					Scale	Sec. A another sr.
	C 96-06-20 O.G.					1:10	ABB Transportation Systems Ltd
	D 98-11-19 AH					1:2	Bearer, office
	E 00-09-22 Sha						Office resp. (BFK1)

CLW/ES/2/192/SK-2
Alt. B

Title: Indian Railways
MOUNTING AUX. CUBICLE
Locomotive WAG9

Doc.-type	Format	Lang.	Sht. nr.	Nr. shts.
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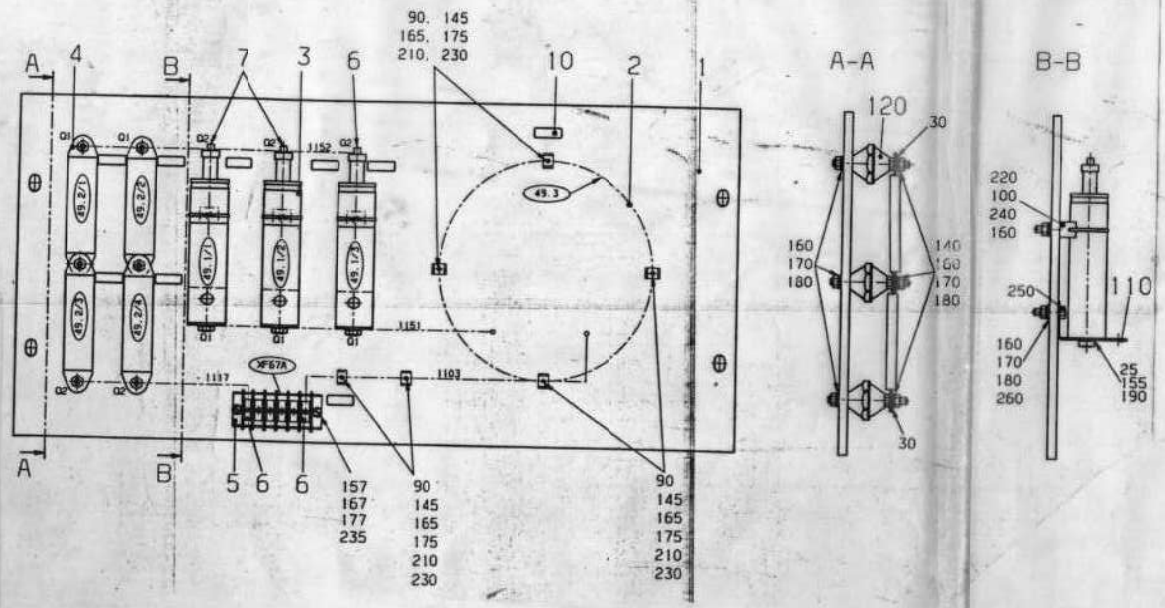
3EHP130270

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FORMAT NO.:- D&D/003

R1



निर्देश संख्या REF NO	नागल एवं डिमलग संख्या C&D NO	अन आरेखण संख्या PART DRG. NO.	वर्णन DESCRIPTION	संख्या/ रेलईजन NO./ LOCO	पदार्थ MATL	विशिष्टि SPECN	प्रति भार कि.ग्रा WT EACH IN K.G

अभिकल्पित DGN	
जाँचा CHD	
अधीक्षक SUPDT	
समीक्षित REVIEWED	
अनुमोदित APPROVED उ म वि अ DYCEE	
दिनांक DATE	
पैमाना अनुपात SCALE	
सदर्भ/REF	

आरेखण सदर्भ
REF DRG. NO : CLW/ES/3/191/SK-3
Alt. B.C.D.E.F.G.H

अभिकल्प एवं विकास केन्द्र
D & D CENTRE
चितरंजन रेलइंजन कारखाना/भारत
CHITTARANJAN LOCOMOTIVE WORKS INDIA

BUR INPUT SNUBBER

ABB. DRG. NO.: 3EH-106613

मेमदर क्र.
C A D NO.

प्रयोग में
USED FOR LOCOS

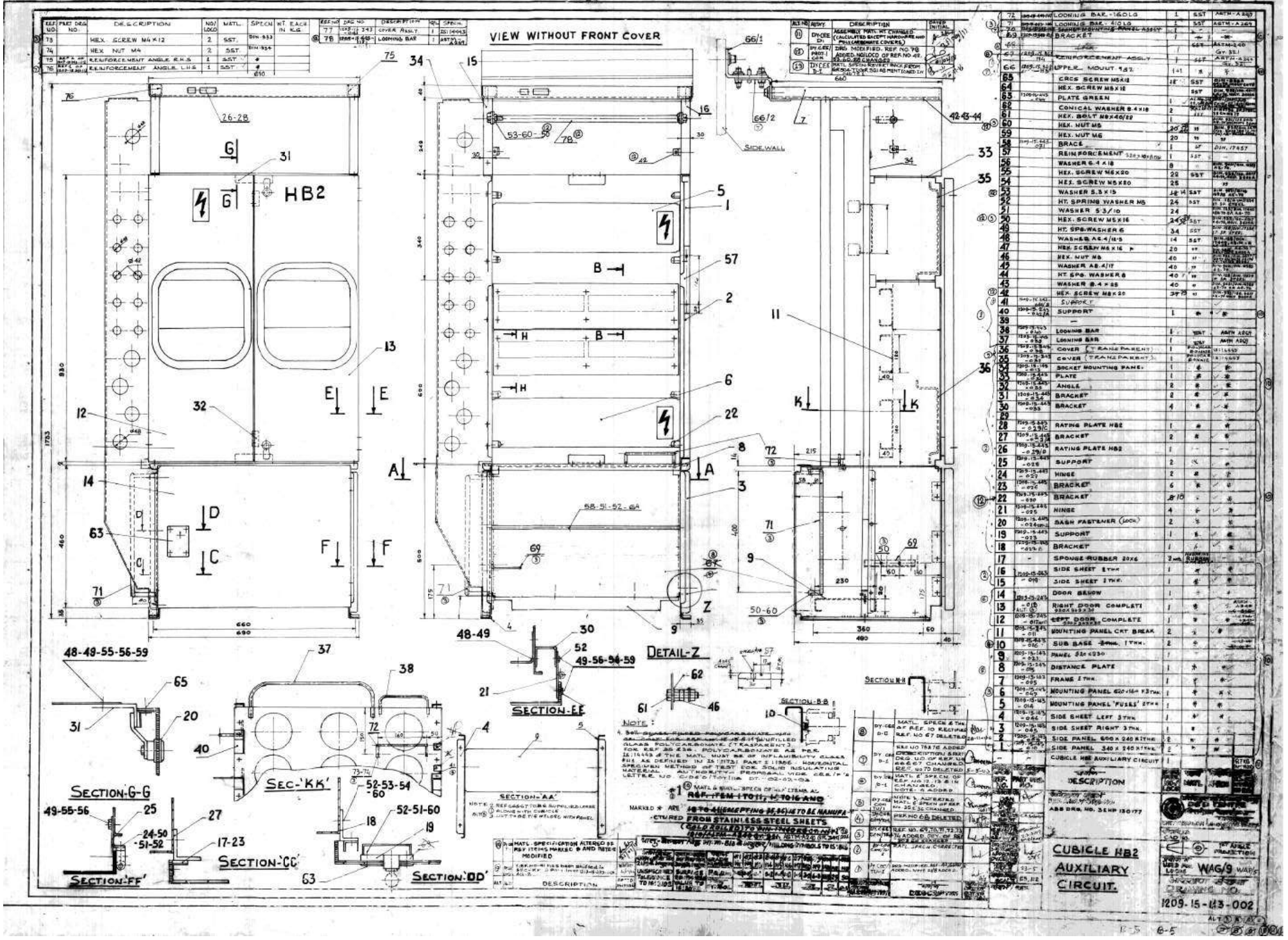
1ST. ANGLE PROJECTION

आरेखण संख्या/ DRAWING NO.

धातु-वेल्डन चिह्न भा. मा. : 813 के अनुसार / WELDING SYMBOLS TO IS : 813

अनिर्दिष्ट सहनसीमा भा.मा. 2102 के अनुसार UNSPECIFIED TOLEARANCE TO IS : 2102	खात-कक्षता का मान भा.मा. SURFACE ROUGHNESS VALUE TO IS 3073	ग्रेड GRADE NUMBER	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12
		Raum	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
		चिह्न SYMBOL												

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


VIEW WITHOUT FRONT COVER
HB2
SECTION-G-G
SEC-'KK'
SECTION-'AA'
SECTION-'CC'
SECTION-'DD'
SECTION-'EE'
SECTION-'FF'
DETAIL-Z
SECTION-B-B
SECTION-H-H
SIDE WALL
CUBICLE HB2 AUXILIARY CIRCUIT.
1209-15-143-002
WAG/9