ENCLOSURES :

DRG NO:- i) CLW/ES/3/SK-1/0193/A
ii) CLW/ES/3/SK-2/0193/B
iii) 1209-15-143-004 Alt. 12
iv) RDSO MS 0366 Page 1
v) RDSO MS 0366 Page 2
vi) Inspection Window

TECHNICAL SPECIFICATION FOR

FILTER CUBICLE

FOR 3-PHASE ELECTRIC LOCOMOTIVES.

Specification No : CLW/ES/3/0193 ALT.~~G~~ H

ISSUE DATE: 05.03.1998

ISSUED BY :

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ALTERATION RECORD SHEET

SL. NO.	DATE OF AMENDMENT	PAGE NO.	ALT. NO.	REASON	INITIAL
1.	16.01.2001	14 & 15	A	6 no Capacitors and its accessories are deleted as per modification release no.MO.14. Modification order no.F361250 dated.07.09.99	Sd/-
2.	10.02.2004	CLW/ES/3/ SK-2/0193	B	As per SEE/EL's letter no. ELE/T/5/ dated.03.02.2004, the thickness of bus bar of item no.96 has been changed from 03 mm to 09 mm and shorting link of size (203x25x9) and φ11 mm hole in the middle of shorting link which is coming with Contactor Filter ON/OFF and Contactor Filter Adaption.	Sd/-
3.		15 to 18	C	i) Sheet No.15 to 18 has been added. ii) Note 2 is added in drg. no. CLW/ES/3/SK-1/0193/C	Sd/-
4.	21.06.2010	18	D	Modification sheet no. RDSO/2008/EL/MS/0366 (Rev.0) dated.29.08.2008 has been added. Clause no.10.1 of sheet no.12 has been added.	Sd/-
5.	20.02.2017	14	E	Specn.no. for Bare Panel has been corrected and sources are modified at sheet.14.	Sd/-
6.	25.05.2018	14	F	OEM/ Part-I source is replaced by CLW Approved Sources (the term only)	Sd/-
7.	24.03.2021	18	G	(i) MS-413, paralleling of Interlock of Aux Contactor of 3 Phase Locomotive. (ii) Provision of Auxiliary Interlock for monitoring of A2-B2 system of Harmonic Filter on 8.1/Adaption (8.2) Contactor in BT/IGBT based type locos. vide RDSO/ 2017/ EL/ MS/ 0464 Rev.0 dated.25.09.2017.	Sd/-
8.		15, 16	H	Cable Gland deleted from list of Sub-components. Cconnection XS-37B-3 & XS-37B-2 deleted. Remark added for Crimping test marked as *. The references are for guidance only. Final Cable cutting chart enclosed as Annexure-II.	

Note:- Specifications have been digitized and all alterations have been incorporated.

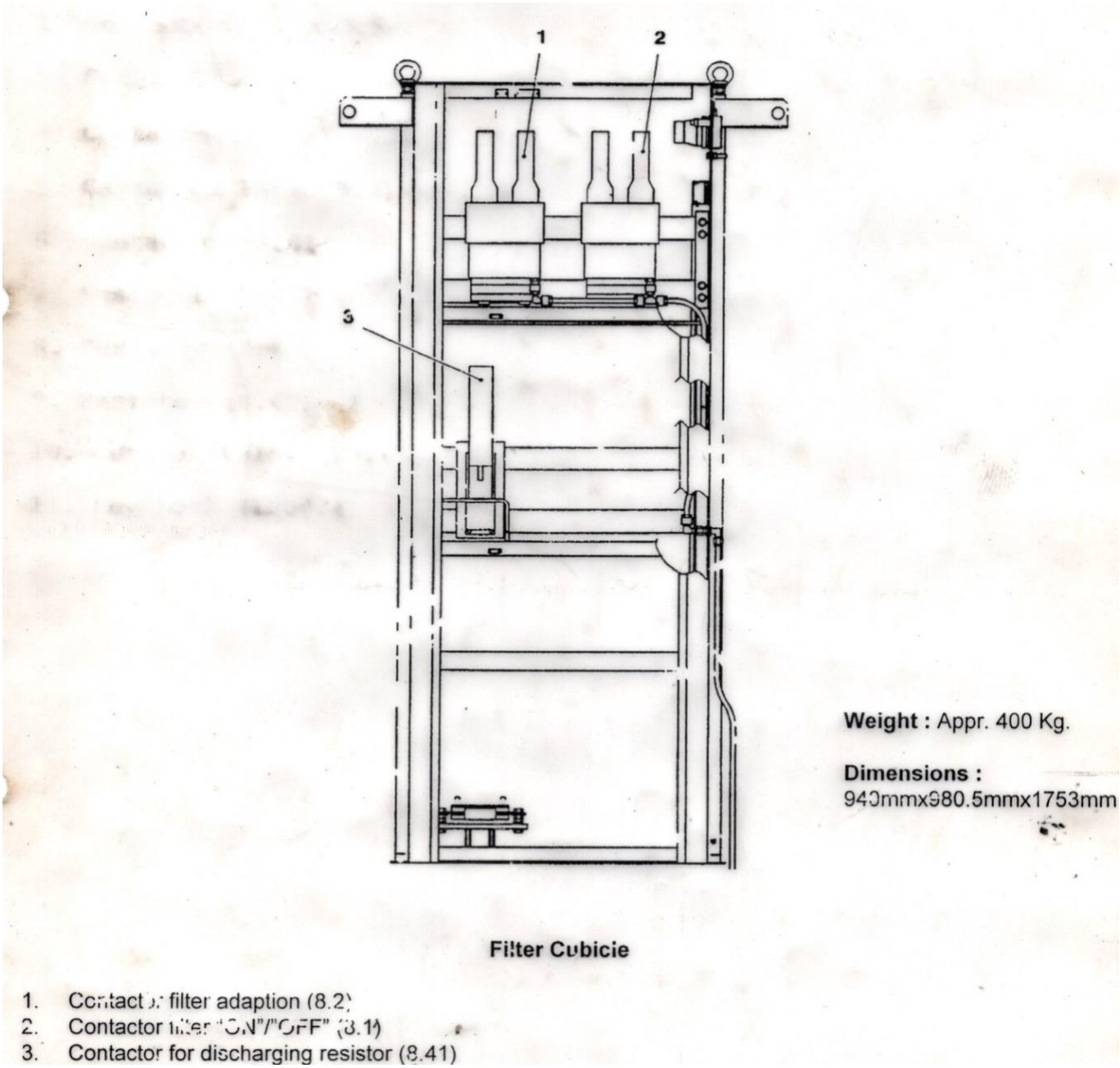
Prepared By	Checked By	Approved By
SSE/Design	AEE/Design	Dy.CEE/D-II

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1. INTRODUCTION

Filter cubicle i.e. FB is a panel of contactors, switches, harmonic filter etc. and controls filtering High Frequency Harmonics induced from the primary of the main transformer.



SCOPE OF SUPPLY

THE TENDERER'S SCOPE OF SUPPLY INCLUDES THE TOTAL PANEL ALONG WITH FOLLOWING ITEMS:

1. Current sensor (6.2, 8.5)
2. Connector (6.2A, 8.5A)
3. Surge Arrestor (6.21)
4. Contactor with Transzorb (8.1, 8.2)
5. Capacitor Bank (8.4)
6. Contactor (8.41)
7. Resistor (8.42)
8. Resistor (8.61)
9. Resistor (8.62)
10. Current Relay (89.6)
11. Key Lock (1004.4)

2. CLIMATIC AND ENVIROMENTALCONDITIONS OF LOCO

Maximum atmospheric temperature	Under Sun : + 70°C In Shade : + 50°C
Humidity	100% saturation during rainy season.
Reference site conditions	i) Ambient Temp. Max. 55°C. min 0°C. ii) The Contractor will indicate the expected temperature rise in the machine room under reference site conditions. iii) Humidity : 60 % iv) Altitude : 160 m above sea level
Rainfall	Very heavy in certain areas. The locomotive should be designed to permit its running at 10 km/ hr, in flood water level of 102 mm above rail level.
Atmosphere during hot weather	Extremely dusty and desert terrain in certain areas.
Coastal area	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 60077unless otherwise prescribed.

3. LIST OF ELECTRICAL COMPONENTS

The following electrical components which are mounted in the cubicle shall be supplied by the panel supplier. Only the OEM is indicated as manufacturer.

Current Sensor

Scheme Position : 6.2, 8.5
Required Number : 4
Identification : HIET428008P0002

Details :

Manufacturer : LEM
Type : LEM-LT 1000-SI/ SP59

Nominal Data : 1:5000-1000 A-40 OHM

Connector

Scheme Position : 6.2A, 8.5A
Required Number : 4
Identification : HETT401293P0001

Details :

Manufacturer : AMP
Type : AMP-182645-1
Nominal Data : 9-POLES GR 13-13A

Surge Arrestor

Scheme Position : 6.21
Required Number : 1
Identification : HAMM312079R0001

Details :

Manufacturer : ABB
Type : ABB-MVR0.44
Nominal Data : 0.44 KV-5 KA-30 KA

Contactor with Transzorb

Scheme Position : 8.1, 8.2
Required Number : 2
Identification : HS3A433699R1364

Details :

Manufacturer : SECHERON
Type : SSA-BPS30.06S
Nominal Data : 3000V-600A

Capacitor Bank

Scheme Position : 8.4
Required Number : 1
Identification : 3EHP610205R0001

Details :

Manufacturer : SIEMENS
Type : B25838-W7666-J004

Nominal Data : 0.8 MF-2500-80A

Contactor

Scheme Position : 8.41
Required Number : 1
Identification : 3EHP585762R6183

Details :

Manufacturer : SECHERON
Type : SSA-HSM
Nominal Data : 3000 V-50 A-2NO, 2NC

Resistor

Scheme Position : 8.42
Required Number : 1
Identification : 3EHP590470R0004

Details :

Manufacturer : ESTEC
Type : ESTE DT 45992
Nominal Data : 1400 V-50 A-784WS

Resistor

Scheme Position : 8.61
Required Number : 2
Identification : NBT300210P0081

Details :

Manufacturer : DANOTHERM
Type : GRF-30/265-401284
Nominal Data : 2.2 KOHM +/- 10%, 250 W

Resistor

Scheme Position : 8.62
Required Number : 2
Identification : NBT300210P0083

Details :

Manufacturer : DANOTHERM
Type : GRF-30/265-401284
Nominal Data : 2.7 KOHM +/- 10%, 250 W

Current Relay

Scheme Position : 89.6
Required Number : 1
Identification : HBVW400011R0001

Details :

Manufacturer : B+Z
Type : ABB-BVW 2800/110 V
Nominal Data : 150 MA- 43 OHM

Key Lock

Scheme Position : 1004.4
Required Number : 1
Identification : HSBA331645R0002

Details :

Manufacturer : SECHERON
Type : SSA-1500CB
Nominal Data : "C"- GREEN

Keepers of Key Lock

Scheme Position : 1004.4
Required Number : 1
Identification : HSBA331645R0005

Details :

Manufacturer : SECHERON
Type : SSA-1500CB

4. STANDARDS

- IEC 60077 : Electrical Traction 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

- 3EHN600385 : Min. insulation distance for basis insulation within air

5. WIRING AND CABLING

1. The cables for wiring in the locomotive and equipments will use high grade electrolytic copper stranded conductors tinned as used in the WAG-9 locomotive.

2. The cables will be of approved quality and grade of insulation and sheath. They will be fire retarding type. In locations where high temperature are likely to be met, special cables may be employed. For cabling of FB Panel, Electron Beam Irradiated Cable only be used.

3. All connections will be terminated on terminal bars of approved design, provided for the purpose. The terminals and wire cable ends will be marked to facilitate correct connections.

4. Plugs and sockets and connectors will be used to connect pre-assembled units and to facilitate maintenance and ensure a better layout. The details of which will be passed on subsequently to the successful tenderers.

5. No cable having a conductor size of less than 2.5 sq.mm will ordinarily be used.

6. Smaller size cables for internal wiring panels, control cubicles, signal wiring, consistent with the mechanical and electrical equipments may be adopted.

7. The layout of cables will be such that contamination by oils is avoided.

8. Loading of power cables will not be more than 75% of its capacity.

9. Cables for terminal connections will have only crimped joints.

10. The documents related to cabling of the panel would be passed on subsequently to the successful tenderers. All wiring and cabling should be as per CLW's specification.

6. SHEET METAL STRUCTURE

The cubicle is of detachable type and shall comply with the dimensions and tolerances specified in relevant part drawings .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. The dimensions and weight of the complete cubicle shall not be exceeded.

7. ENVIRONMENTAL AND OPERATIONAL CONDITIONS

The FB Cubicle shall be used under the following conditions :

7.1 Environmental Conditions

Environmental Condition within machine room :

Air Circulation	: Weak forced cooling
Operational temperature	: 0…..+65 ºC
Environmental air	: salty, dusty
Air humidity	: Condensation possible

7.2 Operational conditions

Operational Time :

Daily approx	: 16 hours (approx 330 days per year)
Yearly approx	: 5,280 hours
Within 30 years approx.	: 158,400 hours

Environmental conditions:

Rated values for environmental temperature and air humidity according to 7.1 “Condition within machine room”.

Reliability

Operational Condition	: according to 7.2
Availability Rate	: 98 %
Lifetime of the Loco	: min. 30 years (Maintenance, spare parts, life time)

8. TEST CONDITIONS

8.1 TYPE TESTING

a) Material certificate for raw used 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 supplier.

c) Welding to be checked properly as per an approved test plan, which has to be submitted to Dy.CEE/Design.

d) Panel should be electrically tested after wiring and assembly as per relevant standards. The components will be tested as per CLW’s stipulations to be passed on to the successful tenderer.

e) All components/equipments procured shall be inspected/tested at manufacturers premises prior to dispatch as per specn at assembly stages.Test certificate shall be produced for OEM components. Any change will have to be taken prior approval of Dy.CEE/Design and it will involve complete type test.

f) During inspection, inspection/ test certificates of all the components shall be procured.

8.2 ROUTINE TESTING

The Cubicle will be tested for the following routine tests :

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 for checking the dimensions of the complete assembled panels.

4. Certificate for raw materials and fasteners to be provided.

5. Complete cubicle and electrical items will be tested as per relevant IS.

9. STANDARDS / UNITS

Only IEC-Standards wiil be accepted. Internally used BBC/ABB/Adtranz-Standards may only be mentioned together with corresponding IEC- Standard. Only the SI unit will be accepted.

10. SCOPE OF SUPPLY

One Filter Block fully assembled as per CLW specifications and duly tested as per clause 8 of this document.

10.1 All individual components of the panel should be procured as per Annexure-I.

11. INSPECTION

1. The Routine inspection will be carried out by authorized representative of Dy.CEE/Design.

2. The complete testing to be carried out as per chapter 8 of this document.

12. SUPPLY OF DOCUMENTS (In addition to those indicated in bid documents of CLW)

i) Technical details composition and characteristics of the material including fastened to be used for manufacture of cubicle.
ii) Source(s) of raw materials and hardware.
iii) Manufacturing process.
iv) Type test plan including checks for vibration and welding.
v) Routine test plan.
vi) Details for similar items supplied for locomotives, if any.
vii) Source of the components being offered including cables.

13. SUBMISSION OF TENDER QUOTATION

13.1 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.

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

14. TECHNICAL DOCUMENTS TO BE SUPPLIED BY THE SUPPLIER

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

15. Stage Inspection

15.1 Purchaser reserve the right to carry out stage inspection during assembly of Filter Cubicles or at the premises of the sub-vendors during inspection of components of Filter Cubicle.

15.2 Details of Type and Routine Tests are given of clause 17.

Annexure – 1 (Filter Cubicle)

16. Details of Sub-components

Sl. no.	Description	Sch. Pos.	Specn. No.	ABB Identification No.	Qty /Panel	CLW Approved Source
a)	Bare Panel of Filter Cubicle		Drg.no.1209.15. 143.004 Alt.12 Specn.no. CLW/MS/3/046/11	3EHP130280	01 no.	
b)	Current Sensor	6.2 8.5	CLW/ES/3/0084/A or latest	HIET428008P0002	04 nos.	
c)	Connector Sub Set	6.2A 8.5a	CLW/ES/3/0124/O or latest	HIETT401293P0001	04 nos.	
d)	Surge Arrestor for Current Transformer	6.21	CLW/ES/3/0085/A or latest	HAMM312079R0001	01 nos	
e)	Contactor with Tranzorb	8.1 8.2	CLW/ES/3/0086/B or latest	HSBA433699R1384	02 nos.	
f)	Capacitor Bank (66.6 µF)	8.4	CLW/ES/3/0087/D or latest	3EHP510205R0001	06 nos.	
g)	Contactor with Tranzorb	8.41	CLW/ES/3/0088/A or latest	3EHP585762R6183	01 no.	
h)	Resistor	8.42	CLW/ES/3/0089 or latest	3EHP590470R0004	01 no.	
i)	Earthing Resistor Harmonic Filter-I	8.61	CLW/ES/3/0014/H or latest	NBT300210P0081	02 nos.	
j)	Earthing Resistor Harmonic Filter-II	8.62	CLW/ES/3/0014/H or latest	NBT300210P0083	02 nos.	

k)	Earth Fault Relay	89.6	CLW/ES/3/0090/C or latest	HBVW400011R0001	01 no.	
l)	Key Lock	1004.4	CLW/ES/3/0049/F or latest	HSBA331645R0002	01 no.	
m)	Keeper Key Lock	1004.4	CLW/ES/3/0049/F or latest	HSBA331645R0005	01 no.	
n)	Cable		CLW/ES/3/0458/E or latest & CLW/ES/3/0459/C or latest			
o)	Terminal Strip		CLW/ES/3/0645/F or latest		in set	
p)	Insulation Element A & Insulation Element B		CLW/ES/3/0144/C or latest		in set	
q)	Bus bar		CLW/ES/3/0118/M or latest		in set	
f)	Fittings		CLW/ES/3/125/D or latest		in set	
s)	Cable Conduit		CLW/ES/3/127/I or latest			
t)	Cable Lug		CLW/ES/3/130/N or latest			
u)	Cable Tie		CLW/ES/3/0131/D or latest			
v)	~~Cable Gland~~		~~CLW/ES/3/0129/D or latest~~	Deleted		

17. Tests

Sl No.	Description	Type Test	Routine Test
(i)	Dimensional Checking	Yes	Yes
(ii)	Verification of Electrical & Mechanical equipments and its test reports	Yes	Yes
(iii)	Complete Continuity test as per cable cutting chart	Yes	Yes
(iv)	Functional test (a) Pneumatic test, applied 8 Kg/ cm^2 Pressure to the Contactor 8.1 & 8.2 (b) To operate the Contactors 8.1, 8.2, & 8.4 by passing 110V DC.	Yes	Yes
(v)	Applied 3.8 KV for one minute between Earth/ body to XI-37A-2, XI-37A-3, ~~XS-37B-3, XS-37B-2~~, deleted XS37A1/2.	Yes	Yes
(vi)	Voltage test between terminals of capacitor & terminal to casing of Capacitor	Yes	No
(vii)	Measurement of Capacitance and Measurement of resistance of Resistors & Discharging resistor	Yes	Yes
(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 crimped cable	Yes *	~~No~~ (~~5% sampling~~) Yes *
(x)	Vibration Test (Optional)	Yes	No

* Sample cable crimped by each tool of each size are to be sealed in front of the inspector which shall be tested as per EN 50343 for crimping quality. The issued certificate shall be valid for inspection crimping during 3 Months and same process is to be repeated again for next 3 Months.

18. REFERENCES :

i) cable cutting chart-3EHP431324
ii) Document of cable list of Filter Cubicle -3EHP431449.
iii) Identification no. of Pre-assembly of Filter Cubicle 3EHP130280R0001
iv) Cable Looms no.3EHP130280R0100**.**

Note: The above mentioned references are for guidance only.

19. IMPORTANT INFORMATION

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

19.2 The Cable for wiring of FB Panel will be with Electron beam irradiated cable only. The cable size and cabling have to be according to the CLW document which will be passed on subsequently to the successful tenders. Cable Looms no.3EHP130280R0100**.**

19.3 The Cable and terminal connections will have only proper crimping joints.

20. Supplier will implement any modification arising out of the experience of Indian Railways applicable to Filter Cubicle assembly, free of cost.

21. Modification Sheet No. RDSO/ 2008/ EL/ MS/ 0366 (Rev.0) Dated.29.08.2008 has been added.

22. (i) MS-413, paralleling of interlock of Aux. Contactor of 3 Ph. Locomotives.
(ii) Provision of Auxiliary Interlock for monitoring of A2-B2 system of Harmonic Filter on 8.1/ Adaption (8.2) Contactor in BT/ IGBT based type locos. vide RDSO/ 2017/ EL/ MS/ 0464 Rev.0 dated.25.09.2017.

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