RAIL COACH FACTORY, KAPURTHALA

Specification for Double Inlet Centrifugal Blower, 190V AC, 3-Phase, 50Hz for Exhaust from Lavatories for LHB Non-AC coaches

S.N0.	Date of Revision/amendment	Revision/ Amendment	Page no.	Reasons for Revision
1	--	-	8	First issue 08.12.2021

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1.0 SCOPE:

1.1 This Specification covers the Technical requirement for Design, Manufacture, Testing and Supply of Centrifugal Blower Fans for LHB non AC coaches suitable for working on 3Ø, 190VAC, 50 Hz Supply. The Centrifugal blower fan shall be mounted on the coach end wall with the help of suitable mounting brackets and shall connect the Inlet/Outlet ducts from Lavatories area for exhausting the foul air.

2.0 SERVICE CONDITION:

2.1 The equipment shall be sturdy and suitable for the following service conditions normally encountered on the Railway rolling stock, under climatic conditions existing throughout India.

-Ambient Temperature	: - 4° C to 55° C
-Average Ambient Temperature	: 35° C
-Maximum Relative Humidity	: Up to 95%
-Altitiude	: 1200 mt.
-Atmosphere	: Extremely dusty and dust weather and desert terrain in certain areas. The dust contents in air may reach as high values as 1.6 mg/Cu-m Very dusty atmosphere with fog, cast iron dust of brake block shoe, flying ballast etc.
-Coastal Area	: The system shall be designed to work in coastal area in humidity, salt laden and corrosive atmosphere.

The maximum value of the condition in coastal area will be as under:

-Maximum Ph value	: 8.5
-Sulphate	: 7 mg/ltrs
-Max. Concentration of chlorine	: 6 mg/ltrs
-Maximum conductivity	: 130 micro semen/CM
-Annual rain fall	: Ranging between 1750 to 6250mm with thunder storm

WORKING CONDITIONS:

-Train Speed	: 200 Kmph
-Vibration and Shocks:	
a) Maximum vertical acceleration	: 3.0g

b) Maximum lateral acceleration : 3.0g

c) Maximum longitudinal acceleration : 3.0g

-Frequency and amplitude:

Sinusoidal form of vibration, the frequency 'f' lies between 1Hz and 50Hz and their amplitude 'a' express in mm is given as function of 'f' by the equation.

a = 25/f for values of 'f' between 1 Hz to 10Hz

$a = 250/f^2$ for values of 'f' between 10 Hz to 50Hz

3.0 GOVERENING STANDARDS/ SPECIFICATION:

3.1 Following standards/specifications will be referred unless stated otherwise:

IS:2312	Specification for propeller type ac ventilating fans.
IS:1271	Thermal evaluation and classification of electrical insulation.
IS:648	Non-oriented electrical steel sheets and strips for magnetic circuits.
ELRS/SPEC/ELC/0019, (latest revision)	Thin walled flexible elastomeric cables with copper conductors for working voltages upto 750V and above 750V upto 1.8/3.0KV.
IS:11353-1985	Guide for uniform system of marking and identification of conductors and apparatus terminals.
IS:513:1994	Cold rolled low carbon steel sheets and strips (fourth revision) (Amendments-I).
IS/IEC:60947 : (Part-1) : 2007	Low voltage Switchgear and Control gear: Part-1 (General rules)
IS/IEC: 60947 : (Part-3) : 2012	Low voltage Switchgear and Control gear: Part-3 (Switches, Disconnectors, Switch disconnectros and fuse combination unit).
IS:1364-1992	Hexagon head bolts, screws and nuts of Part-I, II, III and IV. Product grades A & B.
IS: 8623-1993 (Part-1)	Low voltage switchgear & control gear assemblies: Requirements for type tested and partially type tested assemblies.
IS: 10118-1982	Code of Practice for selection, installation and maintenance of Switchgear and control gear.
IS: 4905-68	Method for random sampling.

RDSO Spec./E-16/1 Reliability assurance specification for electronic components for using in rolling stock.

4.0 GENERAL REQUIREMENTS:

4.1 The Double Inlet Centrifugal Blower shall be supplied complete with mounting brackets suitable for **190V AC ± 5%, 50 Hz ± 3% PWM supply** conforming to drawing no. **CC75406, Alt-'Nil'** (for guidance only) respectively. The Centrifugal fan shall be generally conforming to **IS:2312** (latest) with additional data as under:

4.2 The equipment shall be suitable for indoor mounting in LHB Non-AC coaches which are expected to work in service conditions given in clause 2.0.

4.3 All components provided shall be adequately rated to render satisfactory service without any undue heating or arcing and shall meet the requirements of 'IS' specified. All protective devices shall be positive in action.

4.4 The complete unit shall consist of Scroll housing with high inertia mass external rotor motor i.e rotor rotating externally around the stator equipped with stainless steel shaft of suitable diameter.

4.5 The scroll housing shall be of galvanised Steel sheet unit a rectangular flange as indicated in the drawing.

4.6 The 3-phase 190VAC drive motor shall have compact construction with constant speed, high starting torque and efficiency.

4.7 Fan unit shall be supplied complete units connecting cable alongwith male to female type cage clamp terminals to cat no. 721-603 / 000-042 and 721-103 / 026-000 of M/s Wago or equivalent approve make for termination coach wiring.

4.8 **Scroll housing** : The material shall be of Galvanised Steel Sheet/CRCA sheet with powder coating.

4.9 **Impeller :-**The unit shall be of galvanised sheet steel forward curved impellers press fitted onto the rotor, dynamically balanced in two planes.

4.10 Motor shall be mounted by means of bracket on one side of Scroll housing . An external rotor motor with standing shaft can also be used.

4.11 **Direction of rotation:-** Anticlockwise as seen from Inlet opposite the cable exit.

4.12 **Protection :-**
It shall conform to IP-44 as per IEC: 60529.

4.13 **Insulation class:-** Class-H

4.14 The complete fan unit i.e Rotor motor and Impeller shall be such to required minimum space. Both motor and impeller shall be in direct stream for efficient cooling of motor to have minimum thermal and mechanical stress.

4.15 All components provided shall be adequately rated to render satisfactory service without any undue heating or arcing and shall meet the requirements of 'IS' specified. All protective devices shall be positive in action.

4.16 All fasteners including washers etc. used shall be of Stainless Steel. The fasteners shall generally conform to IS: 1364-1992.

4.17 All steel items excluding hardware shall be given requisite surface treatment for Anti-Rust & Anti-Corrosion before finishing with powder coating of thickness not less than 100-125 micron to Siemens grey shade no. 6102/08038 of M/s Nerolac Paints or 877 of Berger Paints.

4.18 All the components / equipment / materials including paint shall be fire retardant. Blower manufacturer shall certify this requirement.

5 TECHNICAL REQUIREMENTS:

5.1 The Double Inlet Centrifugal Blower shall meet following technical requirements as per Table-2 below.

Table-2

Sr. No.	Technical Parameters	Requirement
1	Voltage	190V AC, 3-Phase
2	Frequency	50 Hz
3	Air volume	625 CMH *
4	Speed	1500 RPM #
5	Power input	200 Watt or less
6	Current	0.61A or less
7	Noise level (dB)	**< 60 dBA**
8	Approximate weight including mounting brackets	7.2 Kg (Max) or less

* The exhaust fan shall be mounted on the end wall of the coach and exhaust air shall be drawn through duct arrangement from each lavatory as per drawing no. LW64236, Alt.'b'. In view of the above the exhaust fan shall be designed to give minimum exhaust air volume of 450 ±5% CMH at back pressure of 15mm of water gauge collectively from both lavatories at actual site conditions. Special test apparatus/equipments to check compliance of the above shall be arrange by the firm.

\# The speed of the exhaust fan shall be kept as 1500 rpm however to obtain the desired result may vary subject to the condition that noise level shall not exceed 60dB.

*# Prior approval in this regard shall be taken from CEDE/RCF.

6.0 TESTS AND INSPECTION:

6.1 Type Test:-

All the type tests mentioned in table given in clause 7.4 shall be carried out on a prototype unit.

6.2 Routine Test:-

Routine test mentioned in table given in clause 7.4 shall be carried out on each unit by manufacturer at his works to ensure compliance with the specification and the drawings.

6.3 Acceptance Test:-

Acceptance test mentioned in table given in clause 7.4 are to be carried out by an inspection authority nominated by the purchaser at the works of the manufacturer, on the samples picked up by the Inspecting authority.

6.4 Following tests shall be conducted:

TABLE FOR TESTS

Sr. Nos.	Test	Para of IS:2312	Type Test	Acceptance Test	Routine Test
1	Starting	Clause 10.0	Yes	Yes	Yes
2	Air Delivery	Clause 14.2	Yes	Yes	No
3	Temperature Rise	Clause 14.3	Yes	Yes	No
4	Power Factor	Clause 14.6	Yes	No	No
5	High Voltage	Clause 14.8	Yes	No	No
6	Insulation Resistance	Clause 14.9	Yes	Yes	Yes
7	Electrical Input	Clause 14.11	Yes	Yes	Yes
8	Fan Speed	Clause 14.12	Yes	Yes	Yes
9	Flash Test	Clause 14.13	No	No	Yes

6.5 The accuracy of measuring instruments used for both type and routine tests shall be of class-I.

6.6 All the tests shall be carried out at firm's premises at the manufacturer's cost. Inspecting officer / official will witness the tests. A copy of the internal tests conducted by the firm shall be supplied to inspecting / purchasing authority. Inspecting official shall also verify all the invoices of the material / items used in the manufacture during the inspection to ensure use of genuine material by the firm as per the relevant specifications.

6.7 The inspecting agency / officer shall conduct necessary checks as regards to use of material in construction of the equipment to confirm that the sub-components, sub-assemblies and the raw material used in the manufacturing of the unit has been taken from approved sources and conform to the relevant standards. For any item sub-

components / sub-assembly etc. for which approved sources are not available the inspecting agency / officer shall check as regards to conformance to materials used in the approved prototype sample.

6.8 Compliance to clause 'Governing standards/specifications' will be checked & confirmed by the inspecting agency / officer.

6.9 Conformance to the provisions in 'general requirements' shall be checked and confirmed by the inspecting agency / officer.

6.1 **Sampling and Rejection:-**

The sampling and rejection shall be carried out as per IS:4905-68 unless otherwise specified.

7 MARKINGS :

7.1 Each fan shall be marked indelibly or punched with information as per clause 13 of IS:2312 (latest edition) or conforming to International Standards such as CE/VDE/Underwriters Laboratory USA/Canadian standards etc.

7.2 Manufacturer's name plate indicating name and addresss, Sr. No. of the blower, specification No., P.O. No., Month & year of manufacture and weight shall be fixed on the blower suitably.

8.0 IRIS CONDITIONS:

A. First Article / Prototype Inspection :-

1 First Article Inspection (FAI) will be done in case of first time manufacture and approved by CEDE/RCF before bulk supplies.

2 External Provider shall be carryout FAI at their premises as per ISO/TS 22163:2017 requirements and submits the report alongwith the documents to RCF, Kapurthala prior to FAI by the purchaser. The following documents shall be submitted:-

i) FAI report
ii) QAP (Quality Assurance Plan)
iii) Details of special processes and their complaince.

3 Special processes are as under:-

i) Fabrication

ii) Powder coating / Painting

ii) Welding

4 On completion of First Article Inspection in-house by the firm and submission of documents to RCF, the representative of the purchaser shall be nominated to carry out FAI along with the validation of the above two special processes at firm's premises.

5 Validation of outsourced special processes shall also be carried out as per requirements of the ISO/TS 22163:2017.

6 Audit Inspection shall be done during regular production in the firm for certify quality of Double Inlet Centrifugal Blowers.

7 Firm has to fulfill all the requirements as mentioned in the IRIS standard ISO/TS 22163:2017.

B. RAMS (Reliability, Availability, Maintainability and safety) :-

1 **Reliability Targets :-**

The achieved level of reliability shall ensure MDBF of 2,00,000 Kms or more after inital reliability growth period on one year. The following fleet average levels of MDBF shall be achieved after the mentioned period of time:

- MBDF > 80,000 Kms after 06 months.
- MBDF > 2,00,000 Kms after 12 months.

For this purpose, any equipment shall be counted as available for calculations only after a stabilization period of 6 months after putting the train into revenue service.

2 **Availability Requirements :-**

The availability of the coach calculated on quarterly baisis and considering unscheduled repairs for the equipment should not be less than 96%.

3 **Maintainability :-**

The maintenance program prepared by EPPPS shall have the following objectives:-

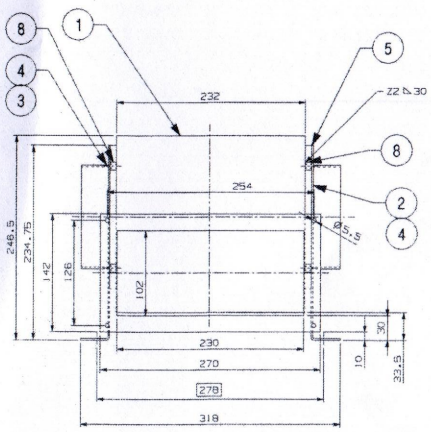
a) Enhancement of Rolling stock availablity.
b) Minimisation of maintenance costs.
c) Minimisation of coach downtime / MTTR (Mean Time To Retore Serviceability)

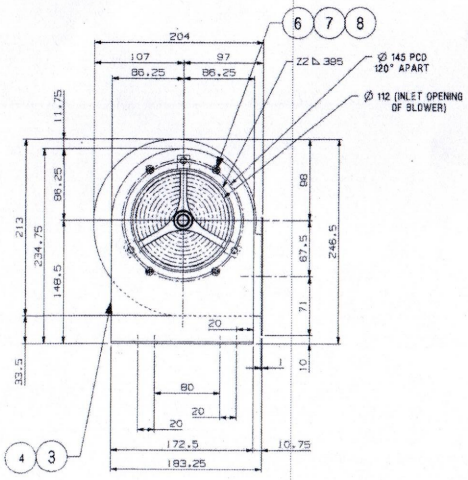
EPPPS shall submit the basic maintenance schedules for the equipment. The minimum interval between overhauls at workshop be as per the maintenance manual / schedule for LHB coaches issued by CAMTECH.

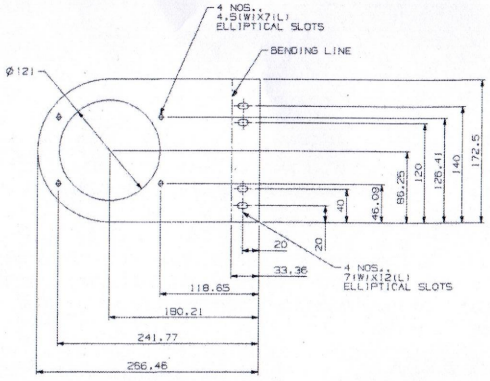
9.0 ENCLOSURE:

1 Drawing no. **CC75406, Alt.'Nil'**

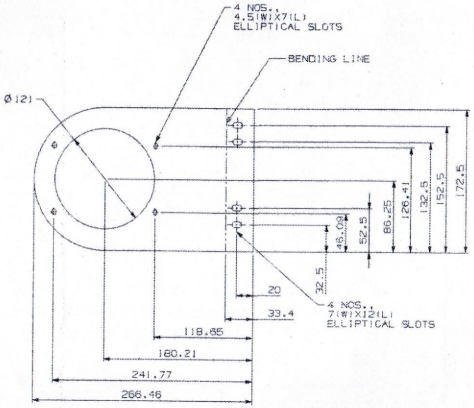
ALT.NO	ALT.DATE	ZONE	ALTERATIONS	AUTHORITY
NIL	NIL	NIL	NIL	NIL







DEVELOPED VIEW FOR ITEM-2



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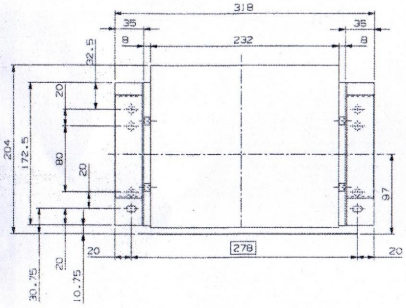
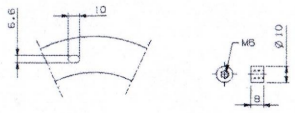
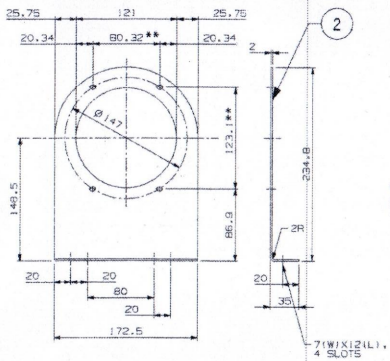
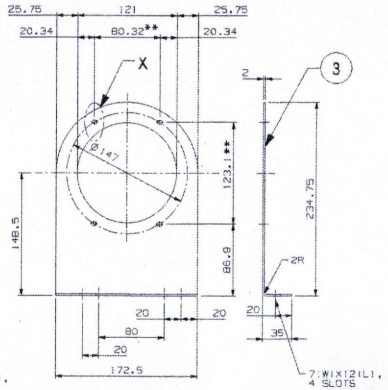
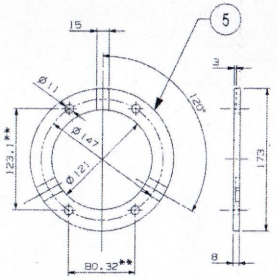


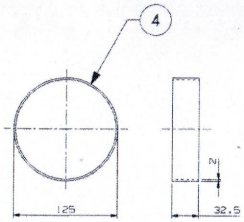


DETAIL AT-X









8	SCREWING BOSS DIA 10 (M6)	8	NIL	IS: 6911-92	NIL
7	PLAIN WASHER 6.6	8	IS: 2016-67, T-3, TY-B	IS: 1367-84, P-14, A2-70	NIL
6	CHEESE HEAD SCREW M6X20	8	IS: 1366 -2002, 4.6	IS: 1367-84, P-14, A2-70	NIL
5	RUBBER PACKING	2	NEOPRENE RUBBER	60X NEOPRENE 40X RUBBER	NIL
4	CUTER RING	2	NIL	IS: 6911-92	NIL
3	MOUNTING BRACKET - LEFT	1	NIL	IS: 6911-92	NIL
2	MOUNTING BRACKET - RIGHT	1	NIL	IS: 6911-92	NIL
1	DOUBLE INLET CENTRIFUGAL BLOWER	1	NIL	NIL	SEE NOTE-3
ITEM	DESCRIPTION & DIMENSIONS	QPASSLY	DETAIL DRG	MATL. & SPEC.	REMARKS

THIS DRAWING IS THE INTELLECTUAL PROPERTY OF RAIL COACH FACTORY, KAPURTHALA. THIS DRAWING SHOULD NOT BE REPRODUCED, ALTERED, USED FOR MANUFACTURING OF COMPONENTS, SOLD OR TRANSFERRED WITHOUT PERMISSION FROM CHIEF DESIGN ENGINEER, RAIL COACH FACTORY, KAPURTHALA.

NOTE:-

7. LENGTH OF CABLE CONNECTED TO BLOWER SHALL BE 300MM (MIN.)
**6. DIMENSIONS FOR REFERENCE ONLY & SUBJECTED TO VARIATION.
5. MOUNTING DIMENSION OF FLANGE ON BLOWER BODY MAY VARIES.
4. WELDING SHALL BE DONE AS PER DIN 6700, 1a WITH STAINLESS STEEL WELDING ELECTRODE TO DIN 17007,1.4370.
3. MANUFACTURER'S INSIGNIA, PURCHASE ORDER AND S.NO. IN THE FORM OF 'YYYYMMNNN' WHERE 'YYYY' STAND FOR YEAR 'MM' STAND FOR MONTH AND 'NNN' STAND FOR RUNNING SERIAL NO. SHALL BE SCREEN PRINTED ON THE MOUNTING BRACKET.
2. FRAMED MOUNTING DIMENSIONS ARE TO BE STRICTLY ADHERED TO BY JIG PUNCHING.
1. ALL DIMENSIONS IN MM.

WELD LENGTH	NIL M	GROUP	ELECTRICAL
WEIGHT	NIL KG	FILE	D:\\PCH156\MNSH\CC75406.prt
S.AREA	NIL M²		
~~LENGTH/DIA~~			
~~WIDTH/THICK~~	NIL M		
HEIGHT	NIL M		

SUPERSEDES: NIL

3-PHASE, 190V AC, DOUBLE INLET CENTRIFUGAL BLOWER ASSEMBLY (FOR LHB NON-AC COACHES)

RAIL COACH FACTORY, KAPURTHALA

SCALE | SSE/ED | CHD | DRN

REF.DRG.No. NIL

रेलकोच फैक्टरी कपूरथला | IRS

PL NO. NIL

DRG.NO. CC75406

ALT. NIL SIZE A1 SHEET 1/1

SEE/D&D | BY.CRE/D&D

ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID.

DETAIL DRGS STARTING WITH "LI" ARE INTERNAL REFERENCE LISTS ONLY AND ARE NOT FOR ISSUE.

FOR UNTOLERANCED DIMENSIONS REFER MDG0008

DATE OF FIRST ISSUE 08/12/2021

Corrigendum-1 to specification no. EDTS-432, Rev. 'Nil'

This corrigendum is being issued to specification no. EDTS-432, Rev. 'Nil' for "Double Inlet Centrifugal Blower, 190V AC, 3-Phase 50 Hz for Exhaust from Lavatories for LHB Non-AC coaches" to incorporate the following:

Clause no. 4.7 shall be read as under:

4.7 Fan unit shall be supplied complete with connecting cable along with male–female type cage clamp terminals with preceding ground terminal to cat no. **721-604/000-042 and 721-104/026-000** of M/s WAGO or equivalent approved make for termination of coach wiring.