



भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ - 226 011
EPBX (0522) 2451200
Fax : 0522 - 2452581

Government of India-Ministry of Railways
Research Designs & Standards Organisation
Lucknow - 226 011
DID (0522) 2450115
DID (0522) 2465310



No. EL/3.2.19/3-Phase

Dated: 06.10.2016

Chief Electrical Engineer,

- Central Railway, Mumbai CST – 400 001.
- Northern Railway, Baroda House, New Delhi 110 001.
- North Central Railway, Hastings Road, Allahabad- 211001
- Eastern Railway, Fairlie Place, Kolkata -700 001.
- East Central Railway, Hazipur-844101.
- East Coast Railway, Chandrashekharapur, Bhubaneswar-751016.
- Southern Railway, Park Town, Chennai-600 003.
- South Central Railway, Secunderabad-500 371.
- South Eastern Railway, Garden Reach, Kolkata -700 043.
- South East Central Railway, Bilaspur-495004
- Western Railway, Churchgate, Mumbai-400 020.
- West Central Railway, Jabalpur-482001.
- Chittaranjan Locomotive Works, Chittaranjan-713 331 (WB)

SPECIAL MAINTENANCE INSTRUCTION NO. RDSO/2016/EL/SMI/0298 (REV. '0')

1.0 Title:

Technical Scope of work for Annual Maintenance Contract (AMC) of brake system fitted in 3-phase electric locomotives.

2.0 Brief History:

- 2.1 At present there are two brake systems working on 3-phase electric locomotives viz. E-70 Brake system and Computer Controlled Brake System (CCB). E-70 Brake system is being supplied by M/s. Faiveley Transport Rail Technologies India Limited /Hosur whereas CCB Brake system is being supplied by M/s. Knorr-Bremse India Limited/ Palwal.
- 2.2 Zonal Railways are encountering various reliability and performance related issues in Brake System. The failure analysis has revealed that a large numbers of failures could be avoided if proper & timely actions are taken for, repair and replacement of faulty components. As per minutes of CEE's conference held on 4th June 2016 in Railway Board issued vide letter no. 2016/Elect. (TRS)/138/3 dated 15.06.2016, Board had advised Zonal Railways to process AMC of items requiring specialized maintenance with OEM's. Moreover, Member Traction also directed RDSO to issue technical scope of work for AMC of brake system (E-70/CCB) of three phase locomotives during Governing Council Meeting held at RDSO on 06.09.2016. In view of above, a technical scope of work for AMC for Brake system of Three phase locomotives WAG9, WAG9H, WAP5 and WAP7 is prepared to facilitate Zonal Railways for proper maintenance.

3.0 DEFINITIONS

Throughout this document, the terms:

- a) **'IR'** means Government of India, Ministry of Railways, Railway Board, New Delhi or its nominees.
- b) **'Tenderer'** means the firm/company submitting the offer for annual maintenance of brake system fitted on three phase Electric locomotives.
- c) **'Contract'** means the contract for annual maintenance of brake system fitted on three phase Electric locomotives between IR and the firm, against the tender.
- d) **'Contractor'** means the firm / company or its wholly owned subsidiary in India on whom the order for annual maintenance of brake system fitted on three phase Electric locomotives is to be placed.
- e) **'Sub-contractor'** means any person, firm or company from whom the contractor may obtain any services for maintenance of brake system.
- f) **'User Railway'** means the Zonal Railway or Divisional Railway which has placed the contract on firm in terms of this agreement.
- g) **'Designated Shed'** shall be the shed so designated by the user Railway, within the zone of that user Railway, where the locomotives shall be brought for maintenance including the maintenance of brake system.
- h) **'Nominated Officer'** means the person nominated by user Railway for the purpose of execution of contract.
- i) **'RDSO'** shall mean Research, Design and Standards Organization / Lucknow for the purpose of consultation regarding up gradation.
- j) **'GCC'** shall mean General Conditions of Contract (Works) contract, of the concerned zonal railway.
- k) **'Minor Schedule'** The inspection schedule IA, IB and IC & ICo.
- l) **'Major Schedule'** The schedule MOH, IOH and POH.
- m) **'OEM'** means Original Equipment Manufacturer.

4.0 Object:

To provide technical scope of work for Annual Maintenance Contract (AMC) of brake system for 3-Phase electric locomotives.

5.0 Scope of work of AMC:

- 5.1 This is a comprehensive Annual Maintenance Contract for 3-Phase Brake System where Original Equipment Manufacturer (OEM)/contractor shall at its own cost and expense attend, replace and install materials which get consumed, wear out due to ageing /use in the normal course of operation as well as attend failures/leakages/ breakdowns /out of course repairs of 3-Phase Brake System including components, assembly/ sub-assembly, electronic cards etc. for efficient and reliable operation of equipment under AMC. During the maintenance period OEM/contractor shall arrange transport of man and material at its own cost as and when required for maintenance of the equipment.

- 5.2** Railways will enter into AMC for 3-phase brake system with manufacturers of brake system for their own make of brake system .
- 5.3** Three-phase brake system under warranty shall not be included in scope of AMC. 3-phase brake system beyond manufacturer's warranty shall only be included in scope of AMC. However, Railways may enter in to AMC contract for 3-phase brake system covered under warranty, but in such cases, AMC for units still covered under warranty shall commence from the next day of completion of warranty period.
- 5.4** AMC will be carried out for 3-phase brake system in working condition.
- 5.5** The contract shall be comprehensive in nature wherein preventive as well as Breakdown Maintenance of 3-phase brake system shall be carried out by the contractor including the arrangement of spares, tools, consumables, technical expertise and man power. The released defective electronic cards, consumables, tools, items etc. will be contractor's property. Contractor shall remove the same from the shed's premises with due authority/procedures.
- 5.6** The maintenance and support by the contractor shall consist of periodical preventive checks as per the maintenance schedule of 3-phase brake system for trouble free operation of the equipment.
- 5.7** Contractor shall ensure that AMC maintenance schedule should match with the loco inspection schedules. i.e. IA, IB, IC, AOH/TOH, IOH, etc. The scope of maintenance by the contractor shall be largely as per preventive maintenance schedule of the equipment, but shall include out of course attentions including breakdown, if any required, to ensure trouble free operation of the locomotive.
- 5.8** AMC shall not cover the 3-phase brake system failures due to circumstances such as fire in locomotives, accident, earth quake, floods etc. However, in such circumstances payment for spares to be replaced by the tenderer will be made extra as per the price list of OEM submitted along with their offer.
- 5.9** All maintenance activities shall be carried out as per the schedule approved by Railways. In case of any abnormalities found during minor/major schedules, associated component/subassemblies shall be replaced/repared by the contractor. The activities to be covered under scope of work of AMC of 3-phase brake system are given below:
- 5.10** The scope of work is divided in two schedules:
- (i) Schedule of works for CCB of M/s KBIL–Schedule A.
 - (ii) Schedule of works for Brake System of E-70 of M/s FTRTIL –Schedule B
- 5.10.1 Schedule A**
The details of proposed maintenance activity to be checked in CCB of M/s KBIL are listed below:

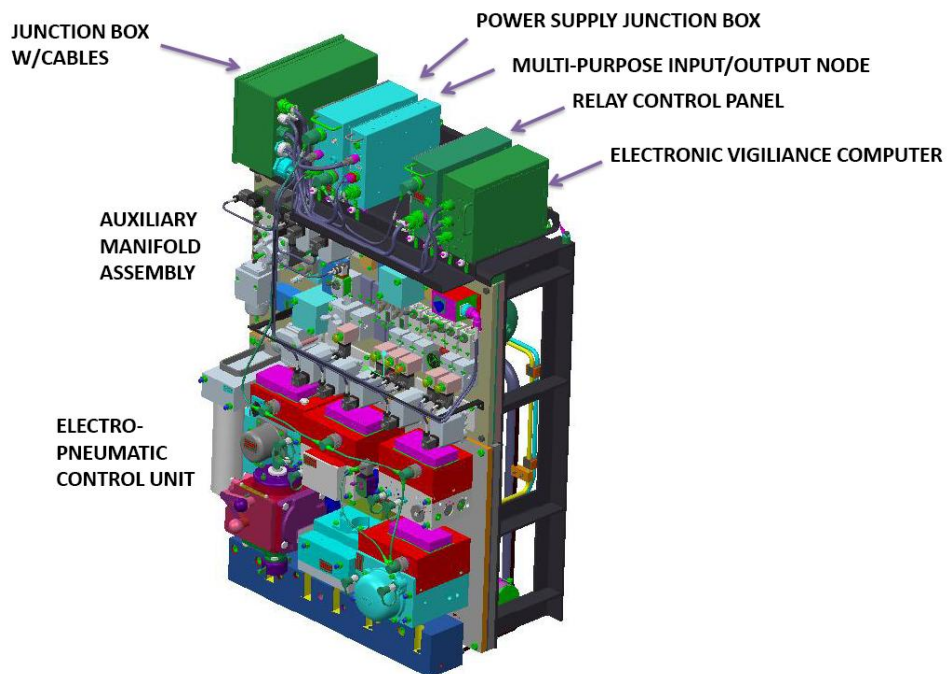


Fig: 1 Front view of CCB

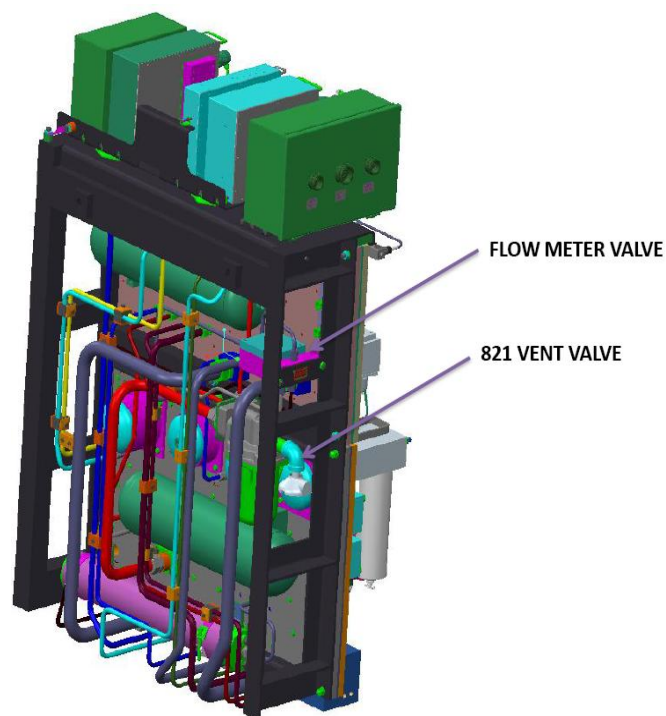


Fig: 2 Rear view of CCB

Schedule of works for CCB of M/s KBIL

S No.	Equipment	Activities	Maintenance Schedule					
			IA	IB	IC	MOH	IOH	POH
Electrical items								
1	Electrical junction box with cables	Check tightness of connectors to ensure proper locking.	√	√	√	√	√	√
2	Relay Control Portion (RCP)							
3	Multi-Purpose Input/output Node (MPIO)	Function test with complete system and repair/replace if any problem found in any individual unit.						
4	Power Supply Junction Box (PSJB)							
5	Electronic Vigilance Computer (EVC)							
Auxiliary manifold assembly								
6	Isolating Cocks (TC1, TC2, FC, UL, CB, PAN1,PAN2,SAND 1, SAND2,Feed Pipe cock, SIFA cock, Kaba Key)	1) Check for correct orientation of Isolating Cocks handles	√	√	√	√	√	√
		2) Overhaul of Isolating cocks & Functional / leakage test as per OEM guidelines	×	×	×	×	√	√
7	Pressure Reducing Valve	1) Ensure that PRV seals are not tempered	√	√	√	√	√	√
		2) Overhaul of valve & functional test as per OEM guidelines	×	×	×	×	√	√
8	Magnet Valves (UL, 21, PAN1, PAN2, SAND1 & SAND2)	1) Ensure that connectors of Magnet valve are fixed properly.	√	√	√	√	√	√
		2) Overhaul of Magnet valves & functional test as per OEM guidelines.	×	×	×	×	√	√

Schedule of works for CCB of M/s KBIL

S No.	Equipment	Activities	Maintenance Schedule					
			IA	IB	IC	MOH	IOH	POH
9	Feed Valve	1) Check the working and condition of valve. Repair/Replace, if any problem found.	√	√	√	√	√	√
		2) Overhaul of valve & functional test as per OEM guidelines	×	×	×	×	√	√
10	Over flow Valve	1) Check the working and condition of valve. Repair/Replace, if any problem found.	√	√	√	√	√	√
		2) Overhaul of valve & functional test as per OEM guidelines	×	×	×	×	√	√
11	Check Valve	1) Check the working and condition of valve. Repair/Replace, if any problem found.	√	√	√	√	√	√
		2) Overhaul of valve & functional test as per OEM guidelines	×	×	×	×	√	√
12	Impulse magnet valve Parking Brake	1) Check connector for proper tightness And functional test	√	√	√	√	√	√
		2) Overhaul of valve	×	×	×	×	√	√
		3) Functional test as per OEM guidelines						
13	Pressure Governors	1) Check the working and condition of Governors. Calibrate/Replace, if any problem found.	√	√	√	√	√	√
		Functional test and calibration	×	×	×	×	√	√

Schedule of works for CCB of M/s KBIL

S No.	Equipment	Activities	Maintenance Schedule					
			IA	IB	IC	MOH	IOH	POH
14	Safety Valves (AR-SV and AC-SV)	1) Check the working and condition of valve. Replace, if any problem found.	√	√	√	√	√	√
		2)Functional test as per OEM guidelines	×	×	×	×	√	√
15	Panto pressure gauge	1) Check the working and condition of gauge. Calibrate/Replace, if any problem found	√	√	√	√	√	√
		2)Functional test as per OEM guidelines						
16	Filter (AC-F and MREP-F)	1) Check the condition of filters	√	√	√	√	√	√
		2) Replacement of filter elements and rubber parts	×	×	×	√	√	√
17	Unloader Valve & Auto Drain Valve	1) Check the working and condition of valve. Repair/Replace, if any problem found.	√	√	√	√	√	√
		2) Overhaul of valve & functional test as per OEM guidelines	×	×	×	√	√	√
EPCU functions Items								
18	Control Portion (16-CP, 20-CP, ER-CP, BP-CP,BC-CP)	1) Ensure that connectors of LRU's are fixed properly.	√	√	√	√	√	√
		2) Overhaul of Valves & functional / leakage test	×	×	×	×	√	√

Schedule of works for CCB of M/s KBIL

S No.	Equipment	Activities	Maintenance Schedule					
			IA	IB	IC	MOH	IOH	POH
19	Distributive Valve	(1) Ensure DV/C3W Isolation handle in working position .	√	√	√	√	√	√
		2) Functional / leakage test as per OEM guidelines	×	×	×	×	√	√
		(3) Overhaul of Valves						
20	Pneumatic Equalizing Reservoir Actuator (PER COS)	1) Check the functioning of valve	√	√	√	√	√	√
		2) Overhaul of valve & Functional / leakage test	×	×	×	×	√	√
		3) Ensure that connector of Magnet valve are fixed properly.	√	√	√	√	√	√
21	MR Filter Assembly	1) Drain the CCB main Reservoir Filter assembly by opening manual drain valve located at the bottom of MR filter housing.	√	√	√	√	√	√
		2) Replacement of all Filter Elements & rubber parts of filters.	×	×	×	√	√	√
		3) Check leakage after replacement						
22	Filter Element Aux R, DBP, BP)	1) Replacement of all Filter Elements & rubber of filters.						
		2) Check leakage after replacement	×	×	×	√	√	√

Schedule of works for CCB of M/s KBIL

S No.	Equipment	Activities	Maintenance Schedule					
			IA	IB	IC	MOH	IOH	POH
Accessories Items								
23	Brake Controller Cab1 and Cab2	1) Check connector to ensure proper tightness at both ends (cab side & panel side)	√	√	√	√	√	√
		2) Overhaul of controllers & Functional test.	×	×	×	×	√	√
24	Emergency Valve NB11, PTDC, PRV, check valves, unloader valve, oil separator, Auto drain valves, Microphone horns, horn operating valves, sanding valve	1) Check the working and condition of valve. Repair/ Replace, if any problem found.	√	√	√	√	√	√
		2) Overhaul of Valves & functional test	×	×	×	×	√	√
25	Safety Valves (MR-SV and CP-SV)	Check the working and condition of valve. Replace, if any problem found.	√	√	√	√	√	√
26	Check Valve (CP-NRV)	1) Check the working and condition of valve. Repair/Replace, if any problem found.	√	√	√	√	√	√
		2) Overhaul of valve & functional test as per OEM guidelines	×	×	×	×	√	√
27	Pressure Governors	1) Check the working and condition of governors. Calibrate/Replace, if any problem found.	√	√	√	√	√	√
		2)Functional test and calibration	×	×	×	×	√	√

Schedule of works for CCB of M/s KBIL

S No.	Equipment	Activities	Maintenance Schedule					
			IA	IB	IC	MOH	IOH	POH
28	Isolating cock 1 1/4" vented (Air dryers, MR,BP,FP)	Check for correct orientation of Cocks handle, leakage, functioning. Replace if found damaged during inspection/shed visit.	√	√	√	√	√	√
29	Isolating cock w/vent 3/4" (for MREP & DBP and BC)	Check for correct orientation of Cocks handle, leakage, functioning. Replace if found damaged during inspection/shed visit.	√	√	√	√	√	√
30	Drain Cocks Reservoirs 1/2"	Check for functioning, leakage. Replace if found damaged during inspection/shed visit.	√	√	√	√	√	√
31	Isolating cock 3/8" horns & wipers	Check for correct orientation of Cocks handle, leakage, functioning. Replace if found damaged during inspection/shed visit.	√	√	√	√	√	√
32	Angle cocks	Check for correct orientation of Cocks handle, leakage, functioning. Replace if found damaged during inspection/shed visit.	√	√	√	√	√	√

Schedule of works for CCB of M/s KBIL

S No.	Equipment	Activities	Maintenance Schedule					
			IA	IB	IC	MOH	IOH	POH
33	Hose coupling 1"(MREP, DBP) , BP, FP1 1/4"),	Check the working and condition of coupling. Replace if found damaged during inspection/shed visit.	√	√	√	√	√	√
34	Flexible hose sanding, parking, Brake cylinders	Check the working and condition of hose. Replace if found damaged during inspection/shed visit.	√	√	√	√	√	√
35	Pressure gauges	Functional test Replace, if any problem found.	√	√	√	√	√	√
Reservoir								
36	Reservoir	Visually examine fastenings, leaks or other damages/Replace if required.	√	√	√	√	√	√

5.10.2 Schedule B

The details of proposed maintenance activity to be checked in E-70 of M/s FTIL are listed below:

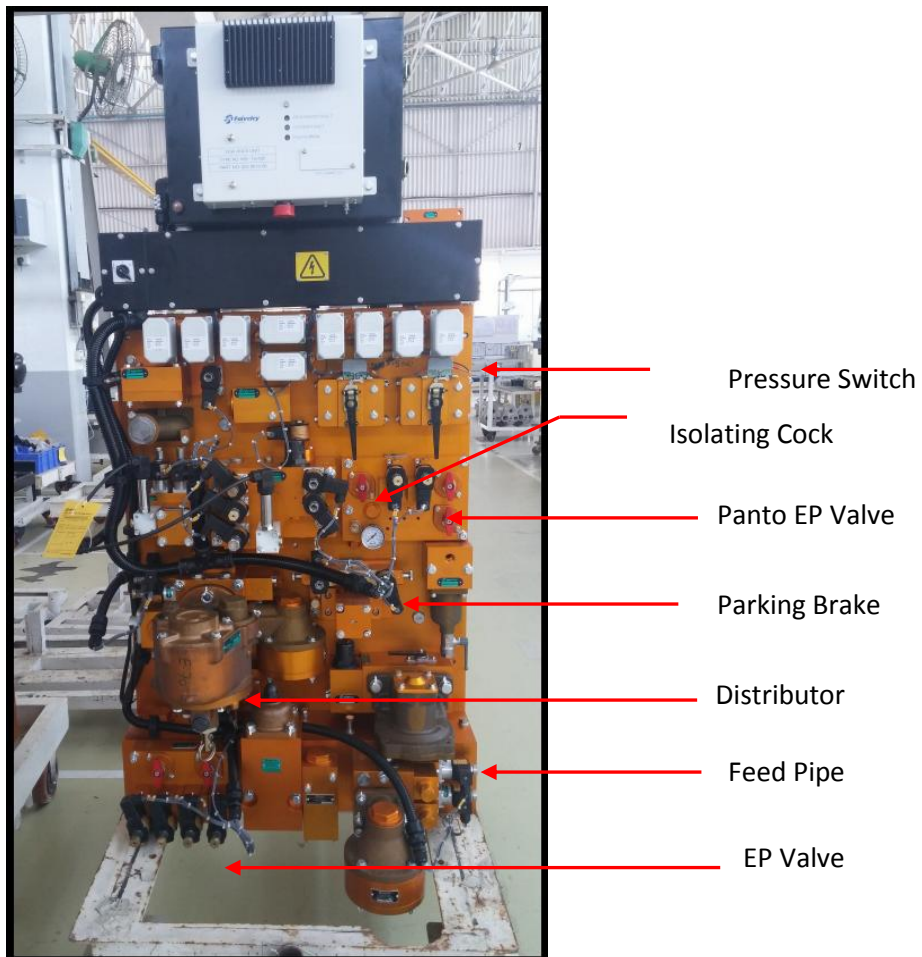


Fig :3 Front View of E-70 Brake System

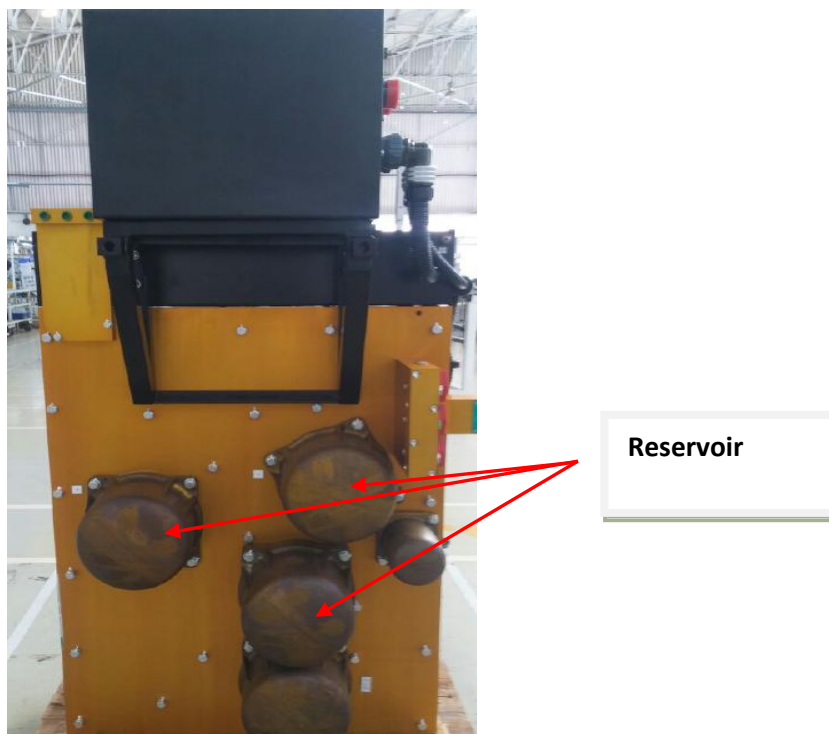


Fig:4 Rear View of E-70 Brake System

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
BRAKE MANIFOLD								
1	Tri-Plate & Equipment Manifold	1) Visually examine for loose fastenings, leaks or other damages	√	√	√	√	√	√
		2) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check part performance with the brake equipment module	×	×	×	×	√	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	×	√
2	Unloader Exhaust Valve	1) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of exhaust valve	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
3	Drip cup With Auto Drain Valve	1) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of drain valve	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
4	Driver Brake Controller	1) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Clean/ Operate and / or Check performance	×	×	×	√	√	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
5	Driver's Direct Air Brake Valve	1) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of brake valve	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM	×		×	×	√	√
6	E70 Brake Piping Interface Main	1) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of piping interface main	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM	×		×	×	√	√
7	Auto Drain Valve	1) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of drain valve	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM	×		×	×	√	√
8	Pressure Switch Assembly	1) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of pressure switch assembly	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	√	×
		4) Overhaul/ Renew material/ Replace as recommended by OEM	×	×	×	×	×	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
AIR HORN								
9	Pneuphonic Horn - Low Tone	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Overhaul the equipment as recommended by OEM	×	×	×	√	√	√
10	Pneuphonic Horn - High Tone	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	×	×	×	√
		2) Overhaul the equipment as recommended by OEM	×	×	√	√	√	×
11	Two Way Horn Valve Assembly Type 15	1) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	×	×	×	×
		2)Clean	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
ALL ISOLATING COCKS & DRAIN COCKS								
12	Isolating Cock Assembly	1) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2)Cleaning of cock	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM.	×	×	×	×	√	×
		4) Replace as recommended by OEM.	×	×	×	×	×	√
		5) Replace if found damaged during inspection/shed visit	√	√	√	√	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
13	Isolating Cock & Regulator Assembly	1) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of cock and assembly	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	√	×
		4) Renew material/Replace as recommended by OEM	×	×	×	×	×	√
		5) Replace if found damaged during inspection/shed visit	√	√	√	√	√	√
14	Isolating Cock Olp 1-1/4"	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Cleaning of cock	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM and replace if required	×	×	×	×	√	√
		4) Replace if found damaged during inspection/shed visit	√	√	√	√	√	√
15	Isolating Cock Clp1-1/4"	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Clean	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM and replace if required	×	×	×	√	√	×
		4) Replace if found damaged during inspection/shed visit	√	√	√	√	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
16	Isolating Cock 3/8" Vented	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Clean	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM and replace if required	×	×	×	×	√	√
17	Isolating Cock 1-1/4" Vented	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Clean	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM and replace if required	×	×	×	×	√	√
18	1/2" Isolating Cock W/O Vent (Olp)	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Cleaning of cock	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM and replace if required	×	×	×	×	√	√
19	Latched Isolating Cock 1-1/4" W/O V	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Cleaning of cock	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM and replace if required	×	×	×	×	√	√
20	Latched Isolating Cock With Vented	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Cleaning of cock	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
21	End Cock Rh	1) Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	√	×	×
		2) Overhaul the equipment as recommended by OEM/ Renew material/ Replace as recommended by OEM	×	×	×	×	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
22	End Cock Lh	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	√	×	×
		2) Overhaul the equipment as recommended by OEM/ Renew material/Replace as recommended by OEM	×	×	×	×	√	√
23	Cut-Out Cock- 3/4" With Drain	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Cleaning of cock	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM and replace if required	×	×	×	×	√	√
24	1.25 "Latched Isolating Cock	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Cleaning of cock	×	×	×	√	×	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
25	1-1/4"Cutoff Angle cock Bp W/V101	1) Visually examine for loose fastenings, leaks or other damages	√	√	√	√	√	√
		2)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
26	1-1/4"Cutoff Angle cock Fp W/V	1) Visually examine for loose fastenings, leaks or other damages	√	√	√	√	√	√
		2)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
HOSE & COUPLING								
27	1"Uic Hose M R E P	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	√	×	×
		2) Check performance with the brake equipment module/ Renew material/Replace as recommended by OEM	×	×	×	×	√	×
		3) Replace as recommended by OEM	×	×	×	×	×	√
		4) Replace if found damaged during inspection/shed visit	√	√	√	√	√	√
28	1"Uic Hose 905mm Long	1)Visually examine for loose fastenings, leaks or other damages/ Operate and Check performance with the brake equipment module	√	√	√	√	×	×
		2) Check performance with the brake equipment module/Replace as recommended by OEM	×	×	×	×	√	×
		3) Replace as recommended by OEM	×	×	×	×	×	√
		4) Replace if found damaged during inspection/shed visit	√	√	√	√	√	√
29	Air Brake Hose Coupling-BP	Visually examine for loose fastenings, leaks or other damages. Replace if any problem found. Replace if found damaged during inspection/shed visit.	√	√	√	√	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
30	Air Brake Hose Coupling-FP	Visually examine for loose fastenings, leaks or other damages. Replace if found damaged during inspection/shed visit	√	√	√	√	√	√
31	Flexible Hose 3/4"	Visually examine for loose fastenings, leaks or other damages. Replace if found damaged during inspection/shed visit	√	√	√	√	√	√
32	Flexible Hose 1/2"	Visually examine for loose fastenings, leaks or other damages. Replace if found damaged during inspection/shed visit	√	√	√	√	√	√
33	Flexible Hose 3/8"	Visually examine for loose fastenings, leaks or other damages. Replace if found damaged during inspection/shed visit	√	√	√	√	√	√

PRESSURE GAUGES

34	Panto Gauge	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	√	×	×
		2) Check performance/ Replace Part as recommended by OEM	×	×	×	×	√	×
		3) Replace Part as recommended by OEM	×	×	×	×	×	√
35	Pressure Gauge(FP-MR)	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check part performance with the brake equipment module.	√	√	√	√	×	×
		2) Check part performance/ Replace Part as recommended by OEM	×	×	×	×	√	×
		3) Replace Part as recommended by OEM	×	×	×	×	×	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
36	Duplex Pressure Gauge	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	√	×	×
		2) Check performance/ Replace as recommended by OEM	×	×	×	×	√	×
		3) Replace as recommended by OEM	×	×	×	×	×	√
37	Pressure Gauge BP	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	√	×	×
		2) Check performance/ Replace as recommended by OEM	×	×	×	×	√	×
		3) Replace as recommended by OEM	×	×	×	×	×	√
38	Spring Parking Brake Pressure	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	√	×	×
		2) Check performance/ Replace as recommended by OEM	×	×	×	×	√	×
		3) Replace as recommended by OEM	×	×	×	×	×	√
39	Air Flow Measuring Gauge W/Led	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	√	×	×
		2) Check performance/ Replace as recommended by OEM	×	×	×	×	√	×

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
PNEUMATIC VALVES (ON PANEL)								
40	Duplex Check Valve 1 1/4"	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	√	√	√
		2) Cleaning of valve	x	x	x	√	√	x
		3)Overhaul the equipment as recommended by OEM	x	x	x	x	x	√
41	Venturi Check Valve Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	x	x	x
		2) Cleaning of check valve	x	x	x	√	x	√
		3)Overhaul the equipment as recommended by OEM	x	x	x	x	√	√
42	1" Spring Loaded Check Valve	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	x	x	x
		2) Cleaning of valve	x	x	x	√	x	x
		3)Overhaul the equipment as recommended by OEM	x	x	x	x	√	√
43	Emergency Exhaust Valve	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	x	x	x	x	x
		2)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance	x	√	√	x	x	x
		3)Clean	x	x	x	√	x	x
		4)Overhaul the equipment as recommended by OEM	x	x	x	x	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
44	1/2" Double Check Valve	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
45	1/2" Strainer-Check Valve	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
46	Safety Valve 1/4"Bsp	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	×
		4) Replace as recommended by OEM	×	×	×	×	×	√
47	Check Valve Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of check valve assembly	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	×
		4) Replace Part as recommended by OEM	×	×	×	×	×	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
48	Compressor Check Valve/Pu Type Check Valve	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
49	Safety Valve 3/4" Bsp - Type 9	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of safety valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	×
		4)Overhaul the equipment as recommended by OEM/ Replace as recommended by OEM	×	×	×	×	×	√
50	Safety Valve 1/4" Bsp - Type 9	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of safety valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	×
		4)Overhaul the equipment as recommended by OEM/ Replace as recommended by OEM	×	×	×	×	×	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
51	Safety Valve 1/4" Bsp - Type 9	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of safety valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	×
		4)Overhaul the equipment as recommended by OEM/ Replace as recommended by OEM	×	×	×	×	×	√
52	Sander Nozzle Imported	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
53	Air Line Sieve 3/8"	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Visually examine for loose fastenings, leaks or other damages./ Replace as recommended by OEM	×	×	×	×	√	×
		3) Replace as recommended by OEM	×	×	×	×	×	√
54	C3 W DV	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
55	Double Check Valve Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
56	Emergency Exhaust Valve	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
57	Double Check Valve-3/8"	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
ELECTRO-PNEUMATIC VALVES								
58	Solenoid Valve 110v Dc Nc	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
59	Pressure Switch Manifold Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of assembly	×	×	×	√	√	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
60	Solenoid Valve Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve assembly	×	×	×	√	√	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
61	Latched Solenoid Valve Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve assembly	×	×	×	√	√	×
		3) Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
62	Transducer Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of assembly	×	×	×	√	×	×
		3) Operate and / or Check performance	×	×	×	×	√	×
		4) Replace as recommended by OEM	×	×	×	×	×	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
63	D2 Relay Valve	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
64	EP Relay Valve 110v Dc	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
65	Limiting Valve Assembly (6kg/8kg)	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
66	Limiting Valve Assembly (Auto Brake)	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve assembly	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
67	Limiting Valve Assembly (EBC/5 Blending)	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of limiting valve assembly	×	×	×	√	√	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
68	Solenoid Valve	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	√	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
69	Pilot Valve 110 V Dc	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
70	Venturi Valve Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve assembly	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
71	Brake In Two Protection Valve	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
		4) Replace as recommended by OEM	×	×	×	×	×	√
72	Pressure Control Valve	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of control valve	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
		4)Renew material/Replace as recommended by OEM	×	×	×	×	×	√
73	Transmission Valve Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Clean	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
		4)Renew material/Replace as recommended by OEM	×	×	×	×	×	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
74	D2 Relay Valve Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve assembly	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
75	Pressure Regulating Valve Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of valve assembly	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
		4) Replace as recommended by OEM	×	×	×	×	×	√
ELECTRONICS RACK/ MOTHER BOARD								
76	Electronic Rack/ Mother Board	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Clean/ Operate and / or Check performance	×	×	×	√	√	×
		3) Refurbish the equipment as recommended by OEM/ Replace, if required.	×	×	×	×	×	√
77	PSU CARD	1)Visually examine for loose fastenings, leaks or other damages/ Check performance with the brake equipment module	√	√	√	×	×	×
		2) Clean/ Operate and / or Check performance	×	×	×	√	√	×
		3) Refurbish the equipment as recommended by OEM/ Replace, if required.	×	×	×	×	×	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
78	LPO CARD	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Clean/ Operate and / or Check performance	×	×	×	√	√	×
		3) Refurbish the equipment as recommended by OEM/ Replace, if required.	×	×	×	×	×	√
79	Control Card	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Clean/ Operate and / or Check performance	×	×	×	√	√	×
		3) Refurbish the equipment as recommended by OEM/ Replace, if required.	×	×	×	×	×	√
80	Blender Card	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Clean/ Operate and / or Check performance	×	×	×	√	√	×
		3) Refurbish the equipment as recommended by OEM/ Replace, if required.	×	×	×	×	×	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
81	Vigilance Control Unit	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Clean/ Operate and / or Check performance	×	×	×	√	√	×
		3) Refurbish the equipment as recommended by OEM/ Replace, if required.	×	×	×	×	×	√
82	Conduit Assembly	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2)Clean/ Replace as recommended by OEM	×	×	×	×	√	×
		3) Replace as recommended by OEM	×	×	×	×	×	√
83	EBC/5 Blending Unit (3.5 Bar)	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of unit	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
84	SUPPRESSIO N BOX UNIT	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Clean/ Operate and / or Check performance	×	×	×	√	√	×
		3)Overhaul the equipment as recommended by OEM/ 1/Replace as recommended by OEM	×	×	×	×	×	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
MANIFOLD ASSEMBLY								
85	Pantograph Pipe Bracket Manifold	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
86	Pantograph Interface Manifold	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
87	DV Equipment Manifold(Freight)	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of manifold	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
88	Isolator Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of isolator assembly	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
89	Pantograph Equip Manifold Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of manifold	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
90	Manifold Mounting Regulator/High Flow Limiting Valve	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of unit	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
		4)Overhaul the equipment as recommended by OEM/Replace as recommended by OEM	×	×	×	×	×	√
91	Direct Brake Equ Manifold Assy	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of assembly	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
92	Sanding Equip Manifold Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of assembly	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
93	Venturi / EP Manifold Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of assembly	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. No	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
94	SPB Equip Manifold Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	x	x	x
		2) Cleaning of assembly	x	x	x	√	x	x
		3)Overhaul the equipment as recommended by OEM	x	x	x	x	√	√
95	¾" Manifold Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	x	x	x
		2) Cleaning of unit	x	x	x	√	x	x
		3)Overhaul the equipment as recommended by OEM	x	x	x	x	√	√
96	TRACTION CONTROL Assembly)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	x	x	x
		2) Cleaning of unit	x	x	x	√	x	x
		3)Overhaul the equipment as recommended by OEM	x	x	x	x	√	√

Schedule of works for Brake System of E-70 of M/s FTRTIL

Sl. no	Equipment	Activities	IA	IB	IC	MOH	IOH	POH
97	E-70 Brake Control Unit Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Clean	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
98	Centrifugal Air Strainer Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of unit	×	×	×	√	×	×
		3)Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
99	Coil Assembly	1)Visually examine for loose fastenings, leaks or other damages/ Operate and / or Check performance with the brake equipment module	√	√	√	×	×	×
		2) Cleaning of assembly	×	×	×	√	×	×
		3) Operate and / or Check performance	×	×	×	×	√	×
		4)Replace as recommended by OEM	×	×	×	×	×	√
RESERVOIR								
100	Main/Aux Reservoirs	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Hydrostatic test	×	×	×	×	√	√
101	RESERVIOR 5 L	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Overhaul the equipment as recommended by OEM	×	×	×	×	√	√
102	E70 Control Reservoir 1lt	1) Visually examine for loose fastenings, leaks or other damages.	√	√	√	√	√	√
		2) Overhaul the equipment as recommended by OEM	×	×	×	×	√	√

5.10.3 In addition to above, modifications/reliability improvement measures / instructions related to 3-phase brake system issued by Railway Board/RDSO from time to time shall be considered as part of scope of AMC. The cost of such modification (material portion) will be borne by Railways. However, labour portion including provision & testing is to be done at free of cost by the Contractor. Contractor will carry out the required modifications and inform Railways and RDSO.

5.10.4 Above schedule of works is for guideline. Railways may include any additional action/works deemed necessary to ensure proper maintenance.

5.11 Responsibilities of Railways:

5.11.1 The Railway authority shall permit the contractor to work on 3-phase brake system fitted in 3-phase electric locomotives under preventive maintenance or break down.

5.11.2 Railways shall nominate the Officer/ Supervisor for supervision of the work done by the contractor under the contract.

5.11.3 The necessary space, electricity, and water connection shall be provided by Railway free of cost as required for at the nearest possible point of the site. In addition, a suitable covered lockable space to store the tools and tackles shall be provided free of cost by the IR to the contractor. However, there shall be no separate exclusive security systems for the space/facility provided to the contractor by Railway.

5.11.4 Railway shall mention the details of the locomotives including the locomotive nos. covered under Annual Maintenance Contract for the reference of both the parties. In case the base maintenance designated shed of the locomotive is shifted to any other location, than those specified in the scope, the scope of AMC shall accordingly shifted to new site/base.

5.11.5 Railways shall inform in advance the contractor regarding locomotives planned for scheduled repairs (i.e. IA/IB/IC/MOH/IOH/POH) so that contractor can also plan and carry out the activities as per scope of work of AMC.

5.11.6 Railways shall also inform the contractor regarding any line failures/Leakages/breakdown of the locomotive and likely place (trip shed/ loco shed) and date where locomotive needs to be attended by the contractor.

5.11.7 The owning shed and the firm shall jointly arrive at the no. of locos that are under AMC at the start of every month and a record shall be kept for this purpose.

5.12 Responsibilities of Contractor

5.12.1 The contractor shall post adequate no. of qualified service engineers/backup engineers and arrange required materials exclusively for the execution of this contract at the designated shed/sheds with immediate effect.

5.12.2 Service Engineer shall carryout preventive maintenance on locos at all days and times including Sundays and Gazetted holidays depending upon availability of locomotive in the shed.

5.12.3 Normally Service engineer shall be available in the shed during normal working hours to attend breakdown calls/ preventive maintenance. A backup engineer shall be located at one of the contractor's office and shall be available at the designated shed if required to attend the complaints in case of absence of service engineer at the designated shed.

- 5.12.4 The service engineer nominated for the repair on the shed duty shall observe all safety and security rules prevailing at the place of work.
- 5.12.5 The contractor shall keep adequate number of spare cards/components etc. to ensure timely replacement of defective cards/components.
- 5.12.6 Firm shall make Joint Note along with shed staff for each and every line failure and shed detection cases duly indicating the root cause of failure and corrective measures to be taken in the format as prescribed by RDSO. Investigation report in each case along with remedial action taken/to be taken shall be submitted to Railways & RDSO.
- 5.12.7 In case of any electronic card found malfunctioning / behaving erratically showing fault intermittently not permanent it must be replaced by firm
- 5.12.8 In some cases, the actual problem is not established and in these cases, loco is required to be escorted by the maintenance personnel. Hence, in such cases escorting of loco by the contractor's service engineer for finding the trouble to be included.
- 5.12.9 Firm service engineer should maintain 3-phase brake system wise history of failure and other details and checks performed during the minor schedule in the form of check sheets which will be made as per RDSO guidelines and got approved from Railway Representative
- 5.12.10 Scheduled work and testing if required should be carried out during the schedule and testing hours as specified by Railways
- 5.12.11 After every attention to the 3-phase brake system, contractor will give a report to the Railways giving details of activities carried out including details of components/subassemblies replaced.
- 5.12.12 The contractor shall quote the rates for comprehensive AMC (as specified in paragraph 5.1) considering both the break down & preventive maintenance (including spare materials, components, assemblies, labour, manpower, service, transportation etc.

5.13 PLACE OF WORK

- 5.13.1 Minor schedule activities (IA/IB/IC) will be carried out at the home shed of the locomotive.
- 5.13.2 Major schedule activities (AOH/MOH/IOH) will be carried out at the home shed of the locomotive.
- 5.13.3 Breakdown maintenance will normally be carried out at the nearest trip shed/loco shed where loco is sent after failure. If the locomotive cannot be attended at out stations, locomotive may be called to home shed.

5.14 Penalty Clause for AMC:

- 5.14.1 As soon as failure of equipment under AMC takes place, the same shall be informed to Contractor by Shed/Railway authority. Contractor shall attend the defects as early as possible but not exceeding 24 hours after the placement of locomotive in shed/trip shed covered under contract mutually agreed between parties (Railways and contractors).

- 5.14.2 For smooth execution of AMC by contractor, Zonal Railways may include suitable penalty clause as special condition of contract for AMC. However sample penalty clauses are given as under for guidance of Zonal Railways.

5.14.3 Downtime penalty for fleet of locomotives

- a) Downtime on account of online failures of equipment under AMC shall be from the time the locomotive fails on line and reported to the contractor till the loco is given ready for service.
- b) The contractor shall ensure that during the billing period (three months), combined downtimes of all the locomotives covered under AMC, on account of out of course repair and online failures of equipment under AMC does not exceed 1.5% of total loco hours for the locomotives covered in the AMC. Penalty for Downtime for the fleet of the locomotive shall be as under:

Down time	Penalty
1.5 % or less	NIL
1.5% to 5%	2% of the total monthly proportional bill
5% to 10%	5% of the total monthly proportional bill
More than 10 %	10% of the total monthly proportional bill

5.14.4 Downtime penalty for individual locomotive

- a) Downtime on account of online failures of equipment under AMC shall be from the time the locomotive fails on line and reported to the contractor till the loco is given ready for service.
- b) The contractor shall ensure that during the billing period (three months), individual downtime of all the locomotives covered under AMC, on account of out of course repair and online failures of equipment under AMC does not exceed 5% of loco hours for the locomotive covered in the AMC. Penalty for Downtime of the individual locomotive shall be as under:

Individual Loco Down time	Penalty
5 % or less	NIL
> 5%	5% of the individual loco's monthly proportional bill

5.14.5 Overall liability in any case shall not exceed 10% of the contract value

6.0 Application to the Class of Locomotives:

WAP5, WAP7, WAG9 & WAG9H

- 6.1 Maintenance Schedule activities IA, IB, IC, MOH & IOH will be carried out at the home shed of the locomotive.
- 6.2 POH schedule activity to be carried out in the nominated locomotive workshop.

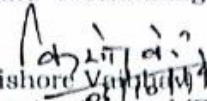
7.0 Agency of Implementation:

All Electric Loco Sheds & Electric Loco Workshops.

8.0 Periodicity of Implementation:

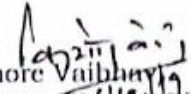
All the maintenance schedule inspections (IA/IB/IC) and overhauling schedules MOH, IOH & POH

Encl.: Nil


(Kishore Vaibhavi)
for Director General (Elect.)

Copy to: As per standard Mailing List No. EL-M-4.2.3-19 (latest revision).

Encl.: Nil


(Kishore Vaibhavi)
for Director General (Elect.)