

**ANNEXURE III B**

**ADDITIONAL MACHINERY & PLANT (M & P), TOOLS & PLANTS(T&P) AND  
TRAINING , TESTING AND REPAIR FACILITIES FOR ELECTRONIC  
EQUIPMENT SPECIALLY REQUIRED FOR HOMING 100/200 3-  
PHASE LOCOMOTIVES IN SHEDS**

<b>LIST- 1 MACHINE TOOLS (GENERAL PURPOSE MACHINES)</b>		<b>Shed Holding</b>	
		<b>For 100 locos</b>	<b>For 200 locos</b>
1	Diagnostic Tool (Mark-BT)	8	16
2	Valve set Trolley Drg. No. TRS/GMO/WAG9/003 & TRS/GMO/WAG9/002	6	12
3	Test loops boxes (sets)	3	6
4	Converter lifting tackle (sets)	3	4
5	LCR Meter (Make: Philips fluke)	3	6
6	GTO Fire Box (Make: BT)	2	3
7	Oscilloscope with probe (Model: DL 1740) (Make: Gould / England)	2	3
8	Gate Unit Transmitter and Receiver	2	3
9	Fibre optic test equipment (Make: BT)	4	8
10	MIG Welding Plant (Aluminium Welding Plant)	3	6
11	Converter Oil Filtration Unit	2	2
12	Oil filling plant with flow control for transformer	2	4
13	Oil filling plant with flow control for Power converter	3	6
14	Hydraulic Lifting Platform / trolley for TFP	2	2
15	High pressure steam cleaners including cleaning grill	3	6
16	Traction rod bush assly. Fixture (RRH3010 mof Enerpac	2	2
17	Rubber bush extracting plant for spheriblock (Make: Enerpac)	2	2
18	Hydraulic Press with Accessories	2	2
19	Test Rigs for E70 brake equipment	2	2
20	Pinion extraction tool (Hipress)	3	4

21	Gantry Crane (SWIL-3T)	3	4
22	PCB Handling facility	As per Requirement	As per Requirement
23	Battery Charger (250 A, 150V)	3	4
24	Universal Programmer	2	2
25	Inverter	3	4
26	UPS	4	8
27	Hurth Coupling removal pump (Make: Enerpac)	2	2
28	Towing Equipment as per RDSO Drawing No. SKVL-215, 216, 217 & 218 for WAG9 locomotive.	1 set	2 sets
29	Supply of SAB WABCO make special tool kit for BFC/F TBU of WAG9.	1	2
30	Variable voltage, Variable frequency converter power system 3 phase, 380 volts, 45 kw alongwith suitable control panel.	1	1
31	EPROM Programme Kit & 03 set card handling boxes.	1	1
32	Light load run test facilities for traction motor of WAG9 loco as per specification attached.	1	1
33	Testing unit for Angle Transmitter (Master controller) for WAG9 loco as details given below:-  (1) Supply: 230V AC,50 Hz (2) Input:- (a) Analog resistance input signal from angle transmitter (b) Digital contact.	1	1
34	Electronic card handling/storage room.	1	1
35	Mounting & Dis-mounting arrangement for axle box bearing	1	2
36	Traction rod bush assly. fixture (RRH 3010 of Enerpac)	2	4
37	Knorr make special tool kit for BFC/F TBU	1	2

38	Pinion extraction hydraulic machine	1	1
39	LEM System Unit	1	2
40	Transient recorder	1	1
41	Power Quality analyser	--	1
42	Integrated charge discharge regenerative type unit	--	1

**LIST 2- ADDITIONAL TOOL & PLANT (T & P) ITEM SPECIFICALLY REQUIRED FOR HOMING 100/200 3-PHASE LOCOMOTIVES IN SHEDS**

S. No.	Description	Shed Holding	
		100 locos	200 locos
1	Vertical balancing machine	1	1
2*	Industrial vacuum cleaner	6	8
3*	½” Sq. Drive industrial socket set (Taparia)	30	60
4*	¾” Sq. Drive industrial socket set (Taparia)	30	60
5*	Torque wrench (72-340 NM) (Make: Trip Torque)	6	12
6*	Torque wrench (475-1015 NM) (Make: Trip Torque)	6	12
7*	Torque wrench (1015-1900 NM) (Make: Trip Torque)	6	12
8*	Hydraulic Pellet Trolley (2.5T)	3	6
9	Pinion pushing jack Enerpack (20T) with oil pump	3	6
10	Hydraulic jack (2.5T)	3	6
11	i) Disc Micrometer (75-100mm, 0.01mm)	2	4
	ii) Disc Micrometer (250-275mm, 0.01mm) Make: Mitotoyo / Japan	2	
12*	Digital clamp meter Metra clip - 5110	4	8
13	VARIAC (0-220 V, 50 Hz)	2	3
14*	Milliohm Meter	6	12
15*	Multi Meter	4	8

16	Contactless (Infrared) Thermometer	2	4
17	Sensor checking unit	2	4
18	Pressure Calibrator	2	2
19	10.5 V 10 amp. Ac source with voltage and current indicator	2	4
20	Grease gun with air dryer	3	6
21	Centre pivot housing pushing and pulling double acting jack cap.- 30t and pump 700 bar with all accessories	2	4
22	LCR meter (range-1 MH/F/ohm to 100 MH/F/ohm)	1	1
23	SR rack power supply load test jig	1	1
24	BUR rack power supply load test jig	1	1
25	Reed relay test jig for UFB 5 1 2 D 1 5 & URB 1 7 7 DIS card	1	1
26	DB loss test jig for UFB660 A01 and AFB 635 B08 LWL card	1	1
27	WRE gate drive card test jig	1	1
28	SR gate unit test jig	1	1
29	GG module pulse transformer test jig	1	1
30	SAP card test jig	1	1
31	FDU testing jig	1	1
32	Card testing jig for testing of PCBs at compo. level	1	1
33	GTO stacking arrangement	1	1
34	Continuous pulse testing of gate unit	1	1
35	Multi channel oscillograph (portable)	1	1
36	Function generator	1	1
37	Tools for Knorr compressor	1 set	1 set
38	Current signature analyzer for TM & Aux. motors	1	1
39	Surge comparison tester for condition monitoring of TM & Aux. motor	1	1
40	Damper testing machine	1	1

Note: \* marked items are common to conventional and 3 phase electric locomotives. Therefore, their actual requirement in a shed should be worked out depending on the types and numbers of locomotives available in the shed.

**LIST 3- Requirement for testing, maintenance and repair facilities of electronic cards/modules used in 3-phase locomotives**

A. Requirement for Electronic Testing Lab (As per CLW specification No. ES/3/534):

1. Functional Tests of the cards to determine Whether the card is faulty and identification of suspect component list
2. In circuit diagnostic test of the PCB cards up to Component level
3. Through Hole and Surface Mounted Device (SMD)PCB Remote stations
4. Conformal coating Removal Equipment
5. Video Microscope Based PCB Remote Inspection System
6. ESD Work Tables
7. Software Requirement for 1 and 2 above -
8. Power Supply Requirement 230 V, 1 phase, with Max count of 64A
9. ESD Flooring

B. Test set ups for testing of locos with GTO based convertors

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|-------------------|--|
| 1. RDSO's SMI 252 | Testing of speed sensors                                 |
| 2. RDSO's SMI 256 | Testing of WRE gate units                                |
| 3. RDSO's SMI 260 | Testing set up for signal conditioning cards and sensors |
| 4. RDSO's SMI 261 | Repairing of WRE Gate unit                               |
| 5. RDSO's SMI 265 | Repairing of Valve set                                   |

C. Other Requirements

1. Reed Relay test jig for URB 512 D15 & URB 177D15 card
2. GG Module pulse transformer jig
3. FDU Testing jig
4. Multi channel oscillograph (Portable)
5. Function Generator

D. Training facilities required in shed

- 1) 02 Class rooms equipped with Benches for 40 trainees
- 2) Working Model for WAG-7 locomotive in Hall

- 3) Cut models of Compressor, Pneumatic valves of WAG-7 locomotive.
- 4) Details of various bearings used in Locomotives
- 5) Trouble shooting Circuit model for WAG-7 locomotive
- 6) Working model of Bogie of WAG-7 locomotive.
- 7) Model for various equipments of WAG-9 locomotive
- 8) Digital still camera – 01 No.
- 9) Audio Video set for display of various educational films on maintenance, safety, fire etc.
- 10) Overhead Projector – 01 No.
- 11) Video camera – 01 No.