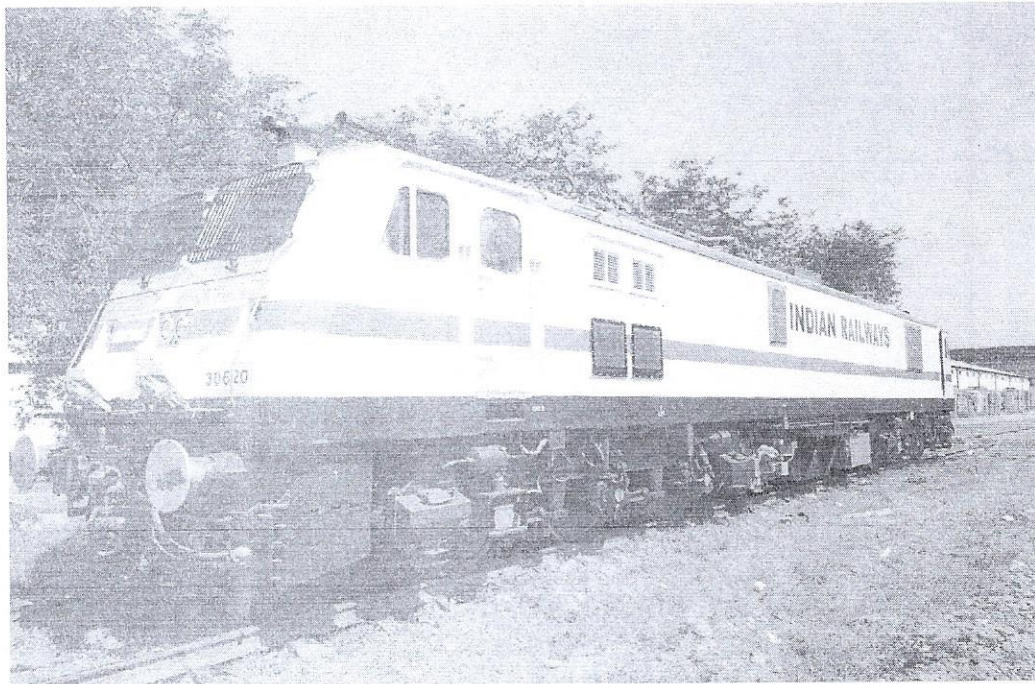




भारतीय रेल
INDIAN RAILWAYS

डीजल रेलइंजिन आधुनिकीकरण कारखाना, पटियाला
DIESEL LOCO MODERNISATION WORKS, PATIALA



LOCO HISTORY & TESTING RECORD OF IGBT
BASED 3-PHASE ELECTRIC LOCOMOTIVES

LOCO NO. -	39127
TYPE:	WAP-7
RAILWAY/SHED:	ECR/GMO
PROPULSION SYSTEM:	BT
HOTEL LOAD:	SIEMENS

लोको निर्माण रिकार्ड



डीजल रेलइंजिन आधुनिकीकरण कारखाना, पटियाला
DIESEL LOCO MODERNISATION WORKS, PATIALA

LOCO NO. – 39127

RAILWAY/SHED: ECR/GMO

DOD: JANUARY 2020

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1.0 Continuity Test of the cables**1.1 Continuity Test of Traction Circuit Cables**

As per cable list given in Para 1.3 of document no. 3 EHX 410 124, check the continuity with continuity tester and megger each cable to be connected between following equipment with 500V megger.

From	To	Continuity (OK/Not OK)	Prescribed Megger Value (min)	Measured Megger Value
Filter Cubicle	Transformer	OK	100 MΩ	1000
Filter Cubicle	Terminal Box of Harmonic Filter Resistor (Roof)	OK	100 MΩ	1000
Filter Cubicle	Earthing Choke	OK	100 MΩ	1000
Earthing Choke	Earth Return Brushes	OK	100 MΩ	1000
Transformer	Power Converter 1	OK	100 MΩ	2000
Transformer	Power Converter 2	OK	100 MΩ	2000
Power Converter 1	TM1, TM2, TM3	OK	100 MΩ	1500
Power Converter 2	TM4, TM5, TM6	OK	100 MΩ	1500
Earth	Power Converter 1	OK	100 MΩ	1000
Earth	Power Converter 2	OK	100 MΩ	1000

1.2 Continuity Test of Auxiliary Circuit Cables

As per cable list given in Para 1.4 of document no. 3 EHX 410 124, check the continuity with continuity meter and megger each cable to be connected between following equipment with the help of 500V megger.


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From	To	Continuity(OK/ Not OK)	Prescribed Megger Value (min)	Measured Megger Value
Transformer	BUR1	OK	100 MΩ	1500 M.2
Transformer	BUR2	OK	100 MΩ	1500
Transformer	BUR3	OK	100 MΩ	1500
Earth	BUR1	OK	100 MΩ	1000
Earth	BUR2	OK	100 MΩ	1000
Earth	BUR3	OK	100 MΩ	1000
BUR1	HB1	OK	100 MΩ	1500
BUR2	HB2	OK	100 MΩ	1500
HB1	HB2	OK	100 MΩ	1600
HB1	TM Blower 1	OK	100 MΩ	200
HB1	TM Scavenge Blower 1	OK	100 MΩ	150
HB1	Oil Cooling Unit 1	OK	100 MΩ	150
HB1	Compressor 1	OK	100 MΩ	200
HB1	TFP Oil Pump 1	OK	100 MΩ	150
HB1	Converter Coolant Pump 1	OK	100 MΩ	150
HB1	MR Blower 1	OK	100 MΩ	200
HB1	MR Scavenge Blower 1	OK	100 MΩ	150
HB1	Cab1	OK	100 MΩ	200
Cab1	Cab Heater 1	OK	100 MΩ	150
HB2	TM Blower 2	OK	100 MΩ	200
HB2	TM Scavenge Blower 2	OK	100 MΩ	150
HB2	Oil Cooling Unit 2	OK	100 MΩ	200
HB2	Compressor 2	OK	100 MΩ	200
HB2	TFP Oil Pump 2	OK	100 MΩ	150
HB2	Converter Coolant Pump 2	OK	100 MΩ	200
HB2	MR Blower 2	OK	100 MΩ	200
HB2	MR Scavenge Blower 2	OK	100 MΩ	150
HB2	Cab2	OK	100 MΩ	200
Cab2	Cab Heater 2	OK	100 MΩ	150


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1.3 Continuity Test of Battery Circuit Cables

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Check continuity of following cables as per Para 2.3 of document no. 3 EHX 610 299

From	To	Condition	Continuity (OK/Not OK)
Battery (wire no 2093)	Circuit breakers 110-2, 112.1-1, 310.4-1	By opening and closing MCB 112	OK
MCB 110	Connector 50.X7-1	By opening and closing MCB 110	OK
Battery (Wire no. 2052)	Connector 50.X7-2	----	OK
SB2 (Wire no 2050)	Connector 50.X7-3	----	OK

Close the MCB 112, 110, 112.1, and 310.4 and measure the resistance of battery wires 2093, 2052, 2050 with respect to the loco earth.	Prescribed value > 0.5 MΩ	Measured Value <u>1.5</u> MΩ
Measure the resistance between 2093 & 2052, 2093 & 2050, 2052 & 2050	Prescribed value: > 50 MΩ	Measured Value <u>100</u> MΩ

Commission the indoor lighting of the locomotive as per Sheet No 7A & 7B.

1.4 Continuity Test of Screened Control Circuit Cables

Check the continuity and isolation of the screen cable of the following circuits with the help of sheet no. mentioned against each as per document no. 3 EHX 610 299.

Screened control circuit cables for	Corresponding Sheet Nos.	Continuity & Isolation (OK/Not OK)
Battery voltage measurement	04B	OK
Memotel circuit of cab1 & 2	10A	OK
Memotel speed sensor	10A	OK
Primary voltage detection	01A, 12A	OK
Brake controller cab-1 & 2	06F, 06G	OK

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Master controller cab-1 &2	08C, 08D	OK
TE/BE meter bogie-1 & 2	08E, 08F	OK
Terminal fault indication cab-1 & 2	09F	OK
Brake pipe pressure actual BE electric	06H	OK
Primary current sensors	12B, 12F	OK
Harmonic filter current sensors	12B, 12F	OK
Auxiliary current sensors	12B, 12F	OK
Oil circuit transformer bogie 1	12E, 12I	OK
Magnetization current	12C, 12G	OK
Traction motor speed sensors (2 nos.) and temperature sensors (1 no.) of TM-1	12D	OK
Traction motor speed sensors (2nos) and temperature sensors (1 no.) of TM-2	12D	OK
Traction motor speed sensors (2nos) and temperature sensors (1 no.) of TM-3	12D	OK
Traction motor speed sensors (2 nos.) and temperature sensors (1 no.) of TM-4	12H	OK
Traction motor speed sensors (2nos) and temperature sensors (1 no.) of TM-5	12H	OK
Traction motor speed sensors (2nos) and temperature sensors (1 no.) of TM-6	12H	OK
Train Bus cab 1 & 2 (Wire U13A& U13B to earthing resistance= 10K Ω \pm 10%)	13A	OK
UIC line	13B	OK
Connection FLG1-Box TB	13A	OK


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2.0 Low Tension test

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2.1 Measurement of resistor in OHMS (Ω)

Measure the resistances of the load resistors for primary voltage transformer, load resistors for primary current transformer and Resistor harmonic filter as per Para 3.2 of the document no. 3 EHX 610 279.

Name of the resistor	Prescribed value	Measured value
Load resistor for primary voltage transformer (Pos. 74.2).	$3.9\text{K}\Omega \pm 10\%$	3.9 kΩ
Resistor to maximum current relay.	$1\Omega \pm 10\%$	1 Ω
Load resistor for primary current transformer (Pos. 6.11).	$3.3\Omega \pm 10\%$	3.3 Ω
Resistance harmonic filter (Pos 8.3). Variation allowed $\pm 10\%$	WAP7	WAP7
Between wire 5 & 6	0.2Ω	0.2 Ω
Between wire 6 & 7	0.2Ω	0.2 Ω
Between wire 5 & 7	0.4Ω	0.4 Ω
For train bus, line U13A to earthing.	$10\text{ k}\Omega \pm 10\%$	10.1 kΩ
For train bus, line U13B to earthing.	$10\text{ k}\Omega \pm 10\%$	10.2 kΩ
Insulation resistance of High Voltage Cable from the top of the roof to the earth (by 1000 V megger).	$200\text{ M}\Omega$	500 MΩ
Resistance measurement earth return brushes Pos. 10/1.	$\leq 0.3\Omega$	} OK
Resistance measurement earth return brushes Pos. 10/2.	$\leq 0.3\Omega$	
Resistance measurement earth return brushes Pos. 10/3.	$\leq 0.3\Omega$	
Resistance measurement earth return brushes Pos. 10/4.	$\leq 0.3\Omega$	
Earthing resistance (earth fault detection) Harmonic Filter -I; Pos. 8.61.	$2.2\text{ k}\Omega \pm 10\%$	2.2 kΩ
Earthing resistance (earth fault detection) Harmonic Filter -II; Pos 8.62.	$2.7\text{ k}\Omega \pm 10\%$	2.69 kΩ
Earthing resistance (earth fault detection) Aux. Converter; Pos. 90.3.	$3.9\text{ k}\Omega \pm 10\%$	3.91 kΩ
Earthing resistance (earth fault detection) 415/110V; Pos. 90.41.	$1.8\text{ k}\Omega \pm 10\%$	1.8 kΩ
Earthing resistance (earth fault detection) control circuit; Pos. 90.7.	$390\Omega \pm 10\%$	393 Ω
Earthing resistance (earth fault detection) Hotel load; Pos. 37.1(in case of WAP5).	$3.3\text{ k}\Omega \pm 10\%$	3.35 kΩ
Resistance for headlight dimmer; Pos. 332.3.	$10\Omega \pm 10\%$	10 Ω

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Make sure that the earthing brush device don't make direct contact with the axle housing, earth connection must go by brushes.

2.2 Check Points

Items to be checked	Remarks
Check whether all the earthing connection in roof and machine room as mentioned in sheet no. 22A is done properly or not. These earthing connections must be flexible and should be marked yellow & green	OK
Check whether all the earthing connection between loco body and bogie is done properly or not. These cables must be flexible having correct length and cross section	OK

2.3 Low Tension Test Battery Circuits (without control electronics)

These tests are done with the help of the special type test loop boxes as per procedure given in Para 3.6 of the document no. 3 EHX 610 279

Name of the test	Schematic used.	Remarks
Test 24V supply	Sheet 04F and other linked sheets	OK
Test 48V supply	Sheet 04F & sheets of group 09	Fan supply to be checked. OK
Test traction control	Sheets of Group 08.	OK
Test power supply bus stations.	Sheets of Group 09.	Fan supply to be checked. OK
Test control main apparatus	Sheets of Group 05.	OK
Test earth fault detection battery circuit by making artificial earth fault to test the earth fault detection	Sheet 04C	OK
Test control Pneumatic devices	Sheets of Group 06	OK
Test lighting control	Sheets of Group 07	OK
Pretest speedometer	Sheets of Group 10	OK
Pretest vigilance control and fire system	Sheets of Group 11	OK
Power supply train bus	Sheets of Group 13	OK



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3.1 Check Points.

	Yes/No
Check that all the cards are physically present in the bus stations and all the plugs are connected.	Yes
Check that all the fibre optic cables are correctly connected to the bus stations.	Yes
Make sure that control electronics off relay is not energized i.e. disconnect Sub-D 411.LG and loco is set up in simulation mode.	Yes
Check that battery power is on and all the MCBs (Pos. 127.*) in SB1 &SB2 are on	Yes

3.2 Download Software

The software of Traction converter, Auxiliary converter and VCU should be done by commissioning engineer of the firm in presence of supervisor. Correct software version of the propulsion equipment to be ensured and noted:

Traction converter-1 software version:	1.0.3.2
Traction converter-2 software version:	1.0.3.2
Auxiliary converter-1 software version:	1.8.1.2
Auxiliary converter-2 software version:	2.8.1.2
Auxiliary converter-3 software version:	3.8.1.2
Vehicle control unit -1 software version:	1.6.7.14
Vehicle control unit -2 software version:	1.6.7.14

3.3 Analogue Signal Checking

Check for the following analogue signals with the help of diagnostic tool connected with loco.

Description	Signal name	Prescribed value	Measured Value
Brake pipe pressure	FLG2;01--_01XPrAutoBkLn	100% (= 5 Kg/cm2)	100%
Actual BE electric	FLG2; AMSB_0201- Wpn BEdem	100% (= 10V)	10V
TE/BE at 'o' position from both cab	FLG1; AMSB_0101- Xang Trans FLG2; AMSB_0101- Xang Trans	Between 9% and 11 %	11 %
TE/BE at 'TE maximal' position from both cab	FLG1; AMSB_0101- Xang Trans FLG2; AMSB_0101- Xang Trans	Between 99 % and 101 %	100 %
TE/BE at 'TE minimal' position from both cab	FLG1; AMSB_0101- Xang Trans FLG2; AMSB_0101- Xang Trans	Between 20 % and 25 %	24 %


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TE/BE at 'BE maximal' position from both cab	FLG1; AMSB_0101-XangTrans FLG2; AMSB_0101-XangTrans	Between 99% and 101%	100%
TE/BE at 'BE Minimal' position from both cab	FLG1; AMSB_0101-XangTrans FLG2; AMSB_0101-XangTrans	Between 20% and 25%	24%
TE/BE at '1/3' position in TE and BE mode in both cab.	HBB1; AMS_0101-LT/BDEM>1/3 HBB2; AMS_0101-LT/BDEM>1/3	Between 42 and 44%	44%
TE/BE at '2/3' position in TE and BE mode in both cab.	HBB1; AMS_0101-LT/BDEM>2/3 HBB2; AMS_0101-LT/BDEM>2/3	Between 72 and 74%	74%
Both temperature sensor of TM1	SLG1; AMSB_0106-Xatmp1Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	OK
Both temperature sensor of TM2	SLG1; AMSB_0106-Xatmp2Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	OK
Both temperature sensor of TM3	SLG1; AMSB_0106-Xatmp3Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	OK
Both temperature sensor of TM4	SLG2; AMSB_0106-Xatmp1Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	OK
Both temperature sensor of TM5	SLG2; AMSB_0106-Xatmp2Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	OK
Both temperature sensor of TM6	SLG2; AMSB_0106-Xatmp3Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	OK


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3.4 Functional test in simulation mode

Conduct the following functional tests in simulation mode as per Para 5.5 of document no.3EHX 610 281. through the Diagnostic tool/laptop :

Test Function	Result desired in sequence	Result obtained
Emergency shutdown through emergency stop switch 244	VCB must open. Panto must lower.	OK
Shut Down through cab activation switch to OFF position	VCB must open. Panto must lower.	OK
Converter and filter contactor operation with both Power Converters during Start Up.	FB contactor 8.41 is closed. By moving reverser handle: <ul style="list-style-type: none"> • Converter pre-charging contactor 12.3 must close after few seconds. • Converter contactor 12.4 must close. • Converter re-charging contactor 12.3 must opens. By increasing TE/BE throttle: <ul style="list-style-type: none"> • FB contactor 8.41 must open. • FB contactor 8.2 must close. • FB contactor 8.1 must close. 	OK
Converter and filter contactor operation with both Power Converters during Shut Down.	Bring TE/BE to O . Bring the cab activation key to "O" <ul style="list-style-type: none"> • VCB must open. • Panto must lower. • Converter contactor 12.4 must open. • FB contactor 8.1 must open. • FB contactors 8.41 must close. • FB contactor 8.2 must remain closed. 	OK


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Contactor filter adaptation by isolating any bogie	<p>Isolate any one bogie through bogie cut out switch. Wait for self-test of the loco.</p> <ul style="list-style-type: none"> • Check that FB contactor 8.1 is open. • Check that FB contactor 8.2 is open. <p>After raising panto, closing VCB, and setting TE/BE</p> <ul style="list-style-type: none"> • FB contactor 8.1 closes. • FB contactor 8.2 remains open. 	ok
Test earth fault detection battery circuit positive & negative	<p>By connecting wire 2050 to earth, create earth fault negative potential.</p> <ul style="list-style-type: none"> • message for earth fault <p>By connecting wire 2095 to earth, create earth fault positive potential.</p> <ul style="list-style-type: none"> • message for earth fault 	ok
Test fire system. Create a smoke in the machine room near the FDU. Watch for activation of alarm.	<p>When smoke sensor-1 gets activated then</p> <ul style="list-style-type: none"> • Alarm triggers and fault message priority 2 appears on screen. <p>When both smoke sensor 1+2 gets activated then</p> <ul style="list-style-type: none"> • A fault message priority 1 appears on screen and lamp LSF1 glow. • Start/Running interlock occurs and TE/BE becomes to 0. 	ok
Time, date & loco number	Ensure correct date time and Loco number	ok


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4.0 Sensor Test and Converter Test

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4.1 Test wiring main Transformer Circuits

Apply $198V_p/140V_{RMS}$ to the primary winding of the transformer (at 1u; wire no. 2 at surge arrestor and at 1v; wire no. 100 at earthing choke). Measure the output voltage and compare the phase of the following of the transformers.

Output Winding nos.	Description of winding.	Prescribed Output Voltage & Polarity with input supply.	Measured output	Measured polarity
$2U_1$ & $2V_1$	For line converter bogie 1 between cable 801A-804A	$10.05V_p$ and same polarity	10.03V	Same
$2U_4$ & $2V_4$	For line converter bogie 1 between cable 811A-814A	$10.05V_p$ and same polarity	10.05V	✓
$2U_2$ & $2V_2$	For line converter bogie 2 between cable 801B-804B	$10.05V_p$ and same polarity	10.05V	✓
$2U_3$ & $2V_3$	For line converter bogie 2 between cable 811B-814B	$10.05V_p$ and same polarity	10.04V	✓
$2U_B$ & $2V_B$	For aux. converter 1 between cable 1103-1117 (in HB1) For Aux converter 2 between cable 1103-1117 (in HB2)	$7.9V_p$, $5.6V_{RMS}$ and same polarity.	7.8V	✓
$2U_F$ & $2V_F$	For harmonic filter between cable 4-12 (in FB)	$9.12V_p$, $6.45V_{RMS}$ and same polarity.	9.1V	✓

4.2 Test wiring auxiliary transformer 1000V/415V-110V (pos. 67)

Apply $141V_p / 100V_{RMS}$ to input of the auxiliary transformer at cable no 1203 – 1117 and measure the output at

Description of wire no.	Prescribed Output Voltage & Polarity with input supply.	Measured output	Measured polarity
Cable no. 1218 - 1200	$58.7V_p$, $41.5V_{RMS}$ and opposite polarity.	58.4V	Same
Cable no. 1218 – 6500	$15.5V_p$, $11.0V_{RMS}$ and opposite polarity.	15.2V	Same


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4.3 Primary Voltage Transformer

Apply $250V_{eff}/350V_p$ by variac to roof wire 1 and any wire 0 and measure the magnitude and polarity of the output of the primary voltage transformer for both bogies as per the procedure specified and suggested by the traction converter manufacturer. Primary voltage measurement converters (Pos. 224.1/*) & catenary voltmeter (Pos. 74/*)

This test is to be done for each converter.

Activate cab in driving mode and supply $200V_{RMS}$ through variac to wire no 1501 and 1502. Monitor the following parameters through Diagnostic tool and in catenary voltmeter.

Signal name	Prescribed value in catenary voltmeter	Prescribed value in Micview	Monitored value in catenary voltmeter	Monitored value in SR diagnostic tool
SLG1_G 87-XUPrim	25kV	250%	25 KV	250 %
SLG2_G 87-XUPrim	25 kV	250%	25 KV	250 %

Decrease the supply voltage below $140 V_{RMS}$. VCB must open at this voltage. In this case the readings in Diagnostic Tool and catenary voltmeter will be as follows.

Signal name	Prescribed value in catenary voltmeter	Prescribed value in Micview	Monitored value in catenary voltmeter	Monitored value in SR diagnostic tool
SLG1_G 87-XUPrim	17kV	170%	17 KV	170 %
SLG2_G 87-XUPrim	17 kV	170%	17 KV	170 %

Reactivate VCB to on by increasing this voltage to 175% (17.5 kV).

Increase the supply to $240 V_{RMS}$ through variac. VCB must open at this voltage, In this case the readings in **diagnostic tool** and catenary voltmeter will be as follows:

Signal name	Prescribed value in catenary voltmeter	Prescribed value in Micview	Monitored value in catenary voltmeter	Monitored value in SR diagnostic tool
SLG1_G 87-XUPrim	30kV	300%	30 KV	300 %
SLG2_G 87-XUPrim	30 kV	300%	30 KV	300 %

Reactivate VCB to on by decreasing this voltage to 290% (29 kV).


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4.4 Minimum voltage relay (Pos. 86)

Functionality test:

Minimum voltage relay (Pos. 86) must be adjusted to approx 68%	
Activate loco in cooling mode. Check Power supply of 48V to minimum voltage relay. Disconnect primary voltage transformer (wire no. 1511 and 1512) from load resistor (Pos. 74.2) and connect variac to wire no. 1501 and 1502. Supply 200V _{RMS} through variac. In this case; Minimum voltage relay (Pos. 86) picks up	(Yes/No) ✓
Try to activate the cab in driving mode: Contactor 218 do not close; the control electronics is not be working.	(Yes/No) ✓
Turn off the variac: Contactor 218 closes; the control electronics is be working	(Yes/No) ✓
Test Under Voltage Protection;	
Activate the cab in cooling mode; Raise panto; Supply 200V _{RMS} through variac to wire no. 1501 & 1502; Close the VCB; Interrupt the supply voltage The VCB goes off after 2 second time delay.	(Yes/No) ✓
Again supply 200V _{RMS} through variac to wire no. 1501 & 1502; Decrease the supply voltage below 140V _{RMS} ± 4V; Fine tune the minimum voltage relay so that VCB opens.	(Yes/No) ✓

4.5 Maximum current relay (Pos. 78)

Disconnect wire 1521 & 1522 of primary current transformer; Connect variac to wire 1521 & 1522 (including the resistor at Pos. 6.11); Put loco in simulation for driving mode; Open R ₃ – R ₄ on contact 136.3; Close VCB; supply 3.6A _{RMS} at the open wire 1521; Tune the drum of the maximum current relay Pos. 78 for correct over current value;	
VCB opens with Priority 1 fault message on display.	(Yes/No) ✓
Keep contact R ₃ – R ₄ of 136.3 closed; Close VCB; Tune the resistor 78.1 for the current of 7.0A _{RMS} / 9.9A _p at the open wire 1521;	
VCB opens with Priority 1 fault message on display.	(Yes/No) ✓

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4.6 Test current sensors

Name of the sensor	Description of the test	Prescribed value	Set/Measured value
Primary return current sensor (Test-1, Pos.6.2/1 & 6.2/2)	Activate cab in driving mode supply 10A. Measure the current through diagnostic tool or measuring print.	(Variation allowed is $\pm 10\%$)	—
Primary return current sensor (Test-2, Pos.6.2/1 & 6.2/2)	Supply 90mA _{DC} to the test winding of sensor through connector 415.AA/1or 2 pin no. 7(+) & 8(-)		0.35A
	Supply 297mA _{DC} to the test winding of sensor through connector 415.AA/1or 2 pin no. 7(+) & 8(-)		—
Auxiliary winding current sensor (Pos. 42.3/1 & 42.3/2)	Supply 90mA _{DC} to the test winding of sensor through connector 415.AC/1or 2 pin no. 7(+) & 8(-) Supply 333mA _{DC} to the test winding of sensor through connector 415.AC/1 or 2 pin no. 7(+) & 8(-)		0.34A
Harmonic filter current sensors (Pos.8.5/1 & 8.5/2)	Supply 90mA _{DC} to the test winding of sensor through connector 415.AE/1or 2 pin no. 7(+) & 8(-)		—
	Supply 342mA _{DC} to the test winding of sensor through connector 415.AE/1or 2 pin no. 7(+) & 8(-)		0.36A
Hotel load current sensors (Pos. 33/1 & 33/2)	Switch on hotel load. Supply 90mA _{DC} to the test winding of sensor through connector 415.AG/1or 2 pin no. 7(+) & 8(-)		—
	Supply 1242mA _{DC} to the test winding of sensor through connector 415.AG/1or 2 pin no. 7(+) & 8(-)		0.63A


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4.7 Test DC Link Voltage Sensors (Pos 15.6/*)

This test is to be done by the commissioning engineer of the firm if required.

4.8 Verification of Converter Protection Circuits (Hardware limits) -

This test is to be done as per para 6.17 of the document no. 3EHX 610 282 for both the converters.

Protection circuits	Limit on which shutdown should take place	Measured limit
Current sensors (Pos 18.2/1, 18.2/2, 18.2/3, 18.4/4, 18.5/1, 18.5/2, 18.5/3) for Power Converter 1	Increase the current quickly in the test winding of the current sensors, VCB will off at 2.52A with priority 1 fault for each sensor.	For 18.2/1= For 18.2/2= For 18.2/3= For 18.4/4= For 18.5/1= For 18.5/2= For 18.5/3=
Current sensors (Pos 18.2/1, 18.2/2, 18.2/3, 18.4/4, 18.5/1, 18.5/2, 18.5/3) for Power Converter 2	Increase the current quickly in the test winding of the current sensors, VCB will off at 2.52A with priority 1 fault for each sensor.	For 18.2/1= For 18.2/2= For 18.2/3= For 18.4/4= For 18.5/1= For 18.5/2= For 18.5/3=
Fibre optic failure In Power Converter1	Remove one of the orange fibre optic plugs on traction converter. VCB should trip	OK
Fibre optic failure In Power Converter2	Remove one of the orange fibre optic plugs on traction converter. VCB should trip	OK

4.9 Sequence of BUR contactors

The sequence of operation of BUR contactors for 'ALL BUR OK' BUR 1 out BUR 2 out and BUR 3 out condition has to be verified by putting the Loco in driving mode (VCB should not be closed) and isolating the BURs one by one. In these condition following will be the contactor sequence.

Status	52/1	52/3	52/3	52/4	52/5	52.4/1	52.4/2	52.5/1	52.5/2
AI BUR OK	Close	Open	Close	Open	Close	Open	Close	Close	Open
BUR1 off	Close	Open	Close	Close	Open	Close	Open	Open	Close
BUR2 off	Open	Open	Close	Close	Close	Close	Open	Open	Close
BUR3 off	Open	Close	Open	Close	Close	Close	Open	Open	Close


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Monitored contactor sequence

Status	52/1	52/3	52/3	52/4	52/5	52.4/1	52.4/2	52.5/1	52.5/2
AI BUR OK	C	0	C	0	C	0	C	C	0
BUR1 off	C	0	C	C	0	C	0	0	C
BUR2 off	0	0	C	C	C	C	0	0	C
BUR3 off	0	C	0	C	C	C	0	0	C

5.0 Commissioning with High Voltage**5.1 Check List**

Items to be checked	Yes/No
Fibre optic cables connected correctly.	Yes
No rubbish in machine room, on the roof, under the loco.	✓
All the electronic Sub-D and connectors connected	✓
All the MCBs of the HB1 & HB2 open.	✓
All the three fuses 40/* of the auxiliary converters	✓
The fuse of the 415/110V auxiliary circuit (in HB1) open.	✓
Roof to roof earthing and roof to cab earthing done	✓
Fixing, connection and earthing in the surge arrestor done correctly.	✓
Connection in all the traction motors done correctly.	✓
All the bogie body connection and earthing connection done correctly.	✓
Pulse generator (Pos. 94.1) connection done correctly.	✓
All the oil cocks of the gate valve of the transformer in open condition.	✓
All covers on Aux & Power converters, Filter block, HB1, HB2 fitted	✓
KABA key interlocking system.	✓

5.2 Safety test main circuit breaker

Prepare to switch off the catenary supply during the first charging of the locomotive in case of any unexpected behavior of the electrical component of the loco. Charge the loco for the first time by closing BLDJ switch. The VCB will trip after certain time as no oil/coolant pumps are running yet.

Perform the following safety test of main circuit breaker through both the cabs of the locomotive.


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Name of the test	Description of the test	Expected result	Monitored result
Emergency stop in cooling mode	Raise panto in cooling mode. Put the brake controller into RUN position. Close the VCB. Push emergency stop button 244.	VCB must open. Panto must lower. Emergency brake will be applied.	OK
Emergency stop in driving mode	Raise panto in driving mode in. Put the brake controller into RUN position. Close the VCB. Push emergency stop button 244.	VCB must open. Panto must lower. Emergency brake will be applied.	OK
Under voltage protection in cooling mode	Raise panto in cooling mode. Close the VCB. Switch off the supply of catenary by isolator	VCB must open.	OK
Under voltage protection in driving mode	Raise panto in driving mode. Close the VCB. Switch off the supply of catenary by isolator	VCB must open with diagnostic message that catenary voltage out of limits	OK
Shut down in cooling mode.	Raise panto in cooling mode. Close the VCB. Bring the BL-key in O position.	VCB must open. Panto must lower.	OK
Shutdown in driving mode	Raise panto in driving mode. Close the VCB. Bring the BL-key in O position.	VCB must open. Panto must lower.	OK
Interlocking pantograph-VCB in cooling mode	Raise panto in cooling mode. Close the VCB. Lower the pantograph by ZPT	VCB must open.	OK
Interlocking pantograph-VCB in driving mode	Raise panto in driving mode. Close the VCB. Lower the pantograph by ZPT	VCB must open.	OK


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5.3 Auxiliary Converter Commissioning

Switch on the high voltage supply and set up the loco in driving mode. Raise the panto. Close the VCB. Check that there is no earth fault in the auxiliary circuit, Switch off the VCB. Lower the panto. Create the earth fault in auxiliary circuit by making connection between wire no 1117(in HB2 cubicle) and earth. After 3 minutes a diagnostic message will come that "Earth fault auxiliary circuit."

5.3.1 Running test of 3 ph. auxiliary equipments

Switch on the 3 ph. auxiliary equipment one by one. Check the direction of rotation of each auxiliary machine and measure the continuous current and starting current drawn by them.

Name of the auxiliary machine	Typical phase current	Measured continuous phase current	Measured starting phase current
Oil pump transformer 1	9.8 amps	8 A	
Oil pump transformer 2	9.8 amps	10 A	
Coolant pump converter 1	19.6 amps	4 A	
Coolant pump converter 2	19.6 amps	3.9 A	
Oil cooling blower unit 1	40.0 amps	39.5 A	
Oil cooling blower unit 2	40.0 amps	39.7 A	
Traction motor blower 1	34.0 amps	32.5 A	
Traction motor blower 2	34.0 amps	33.8 A	
Sc. Blower to Traction motor blower 1	6.0 amps	4 A	
Sc. Blower to Traction motor blower 1	6.0 amps	4.5 A	
Compressor 1	25 amps at 0 kg/cm ² 40 amps at 10 kg/cm ²	23 A	
Compressor 2	25 amps at 0 kg/cm ² 40 amps at 10 kg/cm ²	25 A	


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5.3.2 Performance of Auxiliary Converters

Measure the performance of the auxiliary converters through software and record it.

BUR1 (Condition: Switch off all the load of BUR 1)- to be filled by commissioning engineer of the firm.

Signal name	Description of the signal	Prescribed value	Monitored value	Value under Limit (Yes/No)
BUR1 7303 XUUN	Input voltage to BUR1	75% (10%=125V)	1010V	Yes
BUR1 7303 XUUZ1	DC link voltage of BUR1	60% (10%=100V)	708V	✓
BUR1 7303 XUIZ1	DC link current of BUR1	0% (10%=50A)	—	—

BUR2 (Condition: Switch off all the load of BUR 2, Battery Charger on) to be filled by commissioning engineer of the firm.

Signal name	Description of the signal	Prescribed value by the firm	Monitored value	Value under Limit (Yes/No)
BUR2 7303-XUUN	Input voltage to BUR2	75% (10%=125V)	1012V	Yes
BUR2 7303-XUUZ1	DC link voltage of BUR2	60% (10%=100V)	705V	✓
BUR2 7303-XUIZ1	DC link current of BUR2	1% (10%=50A)*	82A	✓
BUR2 7303-XUILG	Current battery charger of BUR2	3% (10%=100A)*	55A	✓
BUR2 7303-XUIB1	Current battery of BUR2	1.5%(10%=100A)*	—	—
BUR2 7303 -XUUB	Voltage battery of BUR2	110%(10%=10V)	110V	Yes

* Readings are dependent upon charging condition of the battery.

BUR3 (Condition: Switch off all the load of BUR 3, Battery Charger on) to be filled by commissioning engineer of the firm.

Signal name	Description of the signal	Prescribed set value by the firm	Monitored value	Value under limit (Yes/No)
BUR3 7303-XUUN	Input voltage to BUR3	—	1010V	Yes
BUR3 7303-XUUZ1	DC link voltage of BUR3	—	708V	✓
BUR3 7303-XUIZ1	DC link current of BUR3	Input Current	18A	✓
BUR3 7303-XUILG	Current battery charger of BUR2	—	54A	✓
BUR3 7303-XUIB1	Current battery of BUR2	—	—	—
BUR3 7303-XUUB	Voltage battery of BUR2	—	110V	Yes

* Readings are dependent upon charging condition of the battery.

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5.3.3 Performance of BURs when one BUR goes out

When any one BUR goes out then rest of the two BURs should take the load of all the auxiliaries at ventilation level 3 of the locomotive.

Condition of BURs	Loads on BUR1	Loads in BUR2	Loads in BUR3
All BURs OK	Oil Cooling unit 1&2	TM blower1&2, TFP oil pump 1&2, SR coolant pump 1&2.	Compressor 1&2, Battery charger and TM Scavenger blower 1&2
BUR 1 out	-----	Oil Cooling unit 1&2, TM blower1&2, TM Scavenger blower 1&2	Compressor 1&2, TFP oil pump 1&2, SR coolant pump 1&2 and Battery charger.
BUR 2 out	Oil Cooling unit 1&2, TM blower 1&2, TM Scavenger blower 1&2	-----	Compressor 1&2, TFP oil pump 1&2, SR coolant pump 1&2 and Battery charger.
BUR 3 out	Oil Cooling unit 1&2, TM blower1&2, TM Scavenger blower 1&2	Compressor 1&2, TFP oil pump 1&2, SR coolant pump 1&2 and Battery charger.	-----

OK

5.4 Auxiliary circuit 415/110

For checking earth fault detection, make a connection between wire no. 1218 and vehicle body. On switching on VCB, Earth fault relay 89.5 must pick up and after 3 minutes a message will come in the Diagnostic display that Earth Fault 415/110V Circuit Switch on the 1 ph. auxiliary equipment one by one. Check the direction of rotation of each auxiliary machine and measure the continuous current and starting current drawn by them.

Name of the auxiliary machine	Typical phase current	Measured phase current	Measured starting current
Machine room blower 1	15.0 amps*	6.3 A	
Machine room blower 2	15.0 amps*	6 A	
Sc. Blower to MR blower 1	1.3 amps	0.9 A	
Sc. Blower to MR blower 2	1.3 amps	0.9 A	
Ventilator cab heater 1	1.1 amps	0.9 A	
Ventilator cab heater 2	1.1 amps	0.8 A	
Cab heater 1	4.8 amps	4.6 A	
Cab heater 2	4.8 amps	4 A	

* For indigenous MR blowers.

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5.5 Hotel load circuit

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For WAP-7 locomotive with Hotel load converter refer to Annexure-HLC

5.6 Traction Converter Commissioning**This test is carried out in association with Firm.**

Traction converter commissioning is being done one at a time. For testing Converter 1, switch off the traction converter 2 by switch bogie cut out switch 154. For testing Converter 2, switch off the traction converter 2 by switch bogie cut out switch 154. Isolate the harmonic filter also by switch 160. Start up the loco by one converter. Follow the functionality tests.

For Converter 1

Test Function	Results desired	Result obtained
Measurement of charging and pre-charging and charging of DC Link of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK
Measurement of discharging of DC Link of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK
Earth fault detection on positive potential of DC Link of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK
Earth fault detection on negative potential of DC Link of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK
Earth fault detection on AC part of the traction circuit of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK
Pulsing of line converter of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK
Pulsing of drive converter of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK

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For Converter 2

Test Function	Results desired in sequence	Result obtained
Measurement of charging and pre-charging and charging of DC Link of Converter 2	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK
Measurement of discharging of DC Link of Converter 2	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK
Earth fault detection on positive potential of DC Link of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK
Earth fault detection on negative potential of DC Link of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the supervisor/v	OK
Earth fault detection on AC part of the traction circuit of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK
Pulsing of line converter of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK
Pulsing of drive converter of Converter 2	Traction converter manufacturer to declare the successful operation and demonstrate the same to the DMW supervisor.	OK


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Page : 23 of 27**5.7 Test protective shutdown SR**

Test Function	Results desired in sequence	Result obtained
Measurement of protective shutdown by Converter 1 electronics.	Start up the loco with both the converter. Raise panto. Close VCB. Move Reverser handle to forward or reverse. Remove one of the orange fibre optic feedback cable from converter 1. Check that converter 1 electronics produces a protective shutdown. <ul style="list-style-type: none"> • VCB goes off • Priority 1 fault mesg. on DDU appears Disturbance in Converter 1	OK
Measurement of protective shutdown by Converter 2 electronics.	Start up the loco with both the converter. Raise panto. Close VCB. Move Reverser handle to forward or reverse. Remove one of the orange fibre optic feedback cable from converter 2. Check that converter 2 electronics produces a protective shutdown. <ul style="list-style-type: none"> • VCB goes off • Priority 1 fault mesg. on diagnostic display appears Disturbance in Converter 2	OK

5.8 Test Harmonic Filter

Switch on the filter by switch 160

Test Function	Results desired in sequence	Result obtained
Measurement of filter currents	Start up the loco with both the converter. Raise panto. Close VCB. Move Reverser handle to forward or reverse. Apply a small value of TE/BE by moving the throttle. <ul style="list-style-type: none"> • FB contactor 8.41 must open. 	182 Amp Monitored Value


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	<ul style="list-style-type: none"> • FB contactor 8.2 must close. • FB contactor 8.1 must close • Check the filter current in diagnostic laptop Bring the TE/BE throttle to O Switch off the VCB • FB contactor 8.1 must open. • FB discharging contactor 8.41 must close • Check the filter current in diagnostic laptop 	} OK
Test earth fault detection harmonic filter circuit.	Make a connection between wire no. 12 and vehicle body. Start up the loco. Close VCB. <ul style="list-style-type: none"> • Earth fault relay 89.6 must pick up. • Diagnostic message comes that - Earth fault in harmonic filter circuit 	} OK
Test traction motor speed sensors for both bogie in both cabs	Traction converter manufacturer to declare the successful operation and demonstrate the same to the supervisor/ DMW	OK

5.9 Test important components of the locomotive

Items to be tested	Description of the test	Monitored value/remarks
Speedometer	VCU converter manufacturer to declare the successful operation and demonstrate the same to the supervisor/ DMW	OK
Time delay module of MR blower	The time after which the starting capacitor for MR blower should go off the circuit should be set to 10-12 seconds	OK (10 sec)
Ni-Cd battery voltage	At full charge, the battery voltage should be 110V DC.	110 V
Flasher light	From both cab flasher light should blink at least 65 times in one minute.	OK
Head light	Head light should glow from both cabs by operating ZLPRD. Dimmer operation of headlight should also occur by operating the switch ZLPRD.	OK


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Marker light	Both front and tail marker light should glow from both the cabs	OK
Cab Light	Cab light should glow in both the cabs by operating the switch ZLC	OK
Spot lights	Both Drivers and Asst. Drivers Spot light should glow in both cabs by operating ZLDD	OK
Instrument lights	Instrument light should glow from both cab by operating the switch ZLI	OK
Illuminated Push button	All illuminated push buttons should glow during the operation	OK
Contact pressure of the high rating contactors	The contact pressure of FB contactors (8.1, 8.2) is to be measured Criteria: The minimum contact pressure is 54 to 66 Newton.	For contactor 8.1: For contactor 8.2: OK
Crew Fan	All crew fans should work properly when VCB of the loco is switched on. The airflow from each cab fan is to be measured. Criteria: The minimum flow of air of cab fan should be $25 \text{ m}^3/\text{minute}$	Cab 1 LHS: Cab 1 RHS: Cab 2 LHS: Cab 2 RHS: } OK

6.0 Running Trial of the locomotive

SN	Description of the items to be seen during trail run	Action which should take place	Remarks
1	Cab activation in driving mode	No fault message should appear on the diagnostic panel of the loco.	OK
	Loco charging	Loco to be charged and all auxiliaries should run. No fault message to appear on the diagnostic panel of the loco. Raise MR pressure to 10 Kg/cm^2 , BP to 5 Kg/cm^2 , FP to 6 Kg/cm^2 .	OK
3.	Check function of Emergency push stop.	This switch is active only in activated cab. By pushing this switch VCB should open & pantograph should be lowered.	OK
4.	Check function of BPCS.	<ul style="list-style-type: none"> Beyond 5 kmph, press BPCS, the speed of loco should be constant. BPCS action should be cancelled by moving TE/BE throttle, by dropping BP below 4.75 Kg/cm^2, by pressing BPCS again. 	OK
5.	Check train parting operation of the Locomotive.	Operate the emergency cock to drop the BP Pressure LSAF should glow.	OK

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6.	Check vigilance operation of the locomotive	<p>Set the speed more than 1.5 kmph and ensure that brakes are released i.e. $BC < 1 \text{ Kg/cm}^2$.</p> <p>For 60 seconds do not press vigilance foot switch or sanding foot switch or TE/BE throttle or BPVG switch then</p> <ul style="list-style-type: none"> • Buzzer should start buzzing. • LSVW should glow continuously. <p>Do not acknowledge the alarm through BPVG or vigilance foot switch further for 8 seconds then:-</p> <ul style="list-style-type: none"> • Emergency brake should be applied automatically. • VCB should be switched off. <p>Resetting of this penalty brake is possible only after 180 seconds by bringing TE/BE throttle to 0 and acknowledge BPVR and press & release vigilance foot switch.</p>	OK
7.	Check start/run interlock	<ul style="list-style-type: none"> • At low pressure of MR ($< 5.6 \text{ Kg/cm}^2$). • With park brake in applied condition. • With direct loco brake applied ($BP < 4.75 \text{ Kg/cm}^2$). • With automatic train brake applied ($BP < 4.75 \text{ Kg/cm}^2$). • With emergency cock ($BP < 4.75 \text{ Kg/cm}^2$). 	OK
8.	Check traction interlock	Switch of the brake electronics. The Tractive /Braking effort should ramp down, VCB should open and BP reduces rapidly.	OK
9.	Check regenerative braking.	Bring the TE/BE throttle to BE side. Loco speed should start reducing.	OK
10.	Check for BUR redundancy test at ventilation level 1 & 3 of loco operation	<p>In the event of failure of one BUR, rest of the two BURs can take the load of all the auxiliaries. For this switch off one BUR.</p> <p>Auxiliaries should be catered by rest of two BURs. Switch off the 2 BURs; loco should trip in this case.</p>	OK
11.	Check the power converter isolation test	Create disturbance in power converter by switching off the electronics. VCB should open and converter should get isolated and traction is possible with another power converter.	OK

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7.0 Final check list to be verified at the time of Loco dispatch

Condition /Operations of the following items are to be checked:

SN	Item	Cab-1	Cab-2	Remarks
1	Head lights	OK	OK	
2	Marker Red	OK	OK	
3	Marker White	OK	OK	
4	Cab Lights	OK	OK	
5	Dr Spot Light	OK	OK	
6	Asst Dr Spot Light	OK	OK	
7	Flasher Light	OK	OK	
8	Instrument Lights	OK	OK	
9	Corridor Light	OK	OK	
10	Cab Fans	OK	OK	
11	Cab Heater/Blowers	OK	OK	
12	All Cab Signal Lamps Panel 'A'	OK	OK	


 Signature of the JE/SSE/Loco Testing

DIESEL LOCO MODERNISATION WORKS, PATIALA

Testing & Commissioning Format for 2x500KVA IGBT based Hotel Load Converter for 3-phase Electric Locomotives

Locomotive No.: 39127

Page: 1 of 6

Type of Locomotive: WAP-7

Make of Hotel Load Converter: SIEMENS

Details of Equipment: -

Equipment	Sl. No	Equipment	Sl. No
HLC1	ST520528 HLC1	IV Coupler CAB1 ALP	—
HLC2	ST020656 HLC2	IV Coupler CAB1 LP	—
Converter-1	ST020657 HLC1	IV Coupler CAB2 ALP	—
Converter-2	ST020659 HLC2	IV Coupler CAB2 LP	—
UIC Coupler for Hotel Load Converter (353.3/2 CAB2)	—	UIC Coupler for Hotel Load Converter (353.3/3 CAB1)	—

1. Polarity test of Hotel Load Winding:

Apply 198 /140 to the primary winding of the transformer (at 1U; wire no. 2 at surge arrestor and at 1V; wire no. 100 at earthing choke). Measure the output voltage and compare the phase of the following of the transformer.

Output Winding Nos.	Description of winding	Prescribed Output Voltage & Polarity with input supply	Measured Output	Measured Polarity
2UH1 & 2VH1	For Hotel load between cable 91- 94	5.9 ,4.2 and same polarity	5.7	same Polarity
2UH2 & 2VH2	For Hotel load between cable 91A- 94A	5.9 ,4.2 and same polarity	5.6	same Polarity

Signature of the JE/SSE/Loco Testing

2. Visual Inspection:

Fitment of Units and Earthing to Sub-assemblies

Verify the following Equipments Fitment and grounding cables are connected to Locomotive body.

Sl. No.	Equipment Name	Unit Fitment (Yes/No)	Provision of Earthing (Yes/No)
1	HLC1	Yes	Yes
2	HLC2	✓	✓
3	Output Contactor unit1 HLC1	✓	✓
4	Output Contactor unit2 HLC2	✓	✓
5	IV Coupler CAB1 ALP	✓	✓
6	IV Coupler CAB1 LP	✓	✓
7	IV Coupler CAB2 ALP	✓	✓
8	IV Coupler CAB2 LP	✓	✓
9	UIC Coupler for Hotel Load Converter (353.3/3 CAB1)	✓	✓
10	UIC Coupler for Hotel Load Converter (353.3/2 CAB2)	✓	✓
11	CT (LEM sensor) under HLC1	✓	✓
12	CT(LEM sensor) under HLC2	✓	✓

Signature of the JE/SSE/Loco Testing

3. Cable Routing and Laying

3.1 Control cable routing and layout

Verify the connections, tightness and cable routing of the following Control cable.

Sl. No.	Cables Details	Performed (Yes/No)
1	From Wago SB1 to HLC1 are connected as per wiring format	Yes
2	From SB1 to UIC Coupler Hotel Load Converter (353.3/3 CAB2) through Bayonet connector XK22HL:01(22pin)is connected as per wiring format	✓
3	From SB1 wago(XF22S:01/53) to IV coupler CAB1 ALP are connected as per wiring format	✓
4	From SB1 wago(XF22S:01/54) to IV coupler CAB1 LP are connected as per wiring format	✓
5	From Wago SB2 to HLC2 are connected as per wiring format	✓
6	From SB2 to UIC Coupler Hotel Load Converter (353.3/2 CAB2) through Bayonet connector XK77HL:02 (22 pin) is connected as per wiring format	✓
7	From SB2 wago (XF77S:01/53) to IV coupler CAB2 ALP are connected as per wiring format	✓
8	From SB2 wago (XF77S:01/54) to IV coupler CAB2 LP are connected as per wiring format	✓
9	From HLC1 to Contactor unit 1 through 4 Core Cable are connected as per wiring format	✓
10	From HLC2 to Contactor unit 2 through 4 Core Cable are connected as per wiring format	✓
11	From SB to VCU are connected as per wiring format	✓
12	From CT (HLC1 LEM sensor) to SR1 are connected as per wiring format	✓
13	From CT (HLC2 LEM sensor) to SR2 are connected as per wiring format	✓

Signature of the JE/SSE/Loco Testing

3.2 Power cable routing and layout

Verify the connections, tightness and cable routing of the following Power cable.

Sl. No.	Cables Details	Performed Yes/No)
1	From Transformer to HLC1(2UH1 & 2VH1) are connected as per wiring format	yes
2	From Transformer to HLC2(2UH2 & 2VH2) are connected as per wiring format	"
3	From HLC1 to Output Contactor unit1 are connected as per wiring format	"
4	From HLC 2 to Output Contactor unit 2 are connected as per wiring format	"
5	From Output Contactor unit 1 to IV Coupler CAB1 ALP and IV Coupler CAB2ALP through Junction box are connected as per wiring format	"
6	From Output Contactor unit 2 to IV Coupler CAB2 LP and IV Coupler CAB1 LP through Junction box are connected as per wiring format	"

4. Continuity test:

Check the continuity test for the External connections made to Equipments.

Note: This continuity test should be done before power ON the Locomotive Battery.

4.1 Control cable continuity

Sl. No.	Cables Details	Performed (Yes/No)
1	From Wago SB1 to HLC1 are connected as per wiring format	yes
2	From SB1 to UIC Coupler Hotel Load Converter (353.3/3 CAB2) through Bayonet connector XK22HL:01(22pin)is connected as per wiring format	"
3	From SB1 wago(XF22S:01/53) to IV coupler CAB1 ALP are connected as per wiring format	"
4	From SB1 wago(XF22S:01/54) to IV coupler CAB1 LP are connected as per wiring format	"
5	From Wago SB2 to HLC2 are connected as per wiring format	"
6	From SB2 to UIC Coupler Hotel Load Converter (353.3/2 CAB2) through Bayonet connector XK77HL:02(22pin) is connected as per wiring format	"
7	From SB2 wago (XF77S:01/53) to IV coupler CAB2 ALP are connected as per wiring format	"
8	From SB2 wago(XF77S:01/54) to IV coupler CAB2 LP are connected as per wiring format	"
9	From HLC1 to Contactor unit 1 through 4 Core Cable are connected as per wiring format	"
10	From HLC2 to Contactor unit 2 through 4 Core Cable are connected as per wiring format	"
11	From SB to VCU are connected as per wiring format	"
12	From HLC1 LEM sensor to SR1 are connected as per wiring format	"
13	From HLC2 LEM sensor to SR2 are connected as per wiring format	"

4.2 Power cable continuity

These cables continuity should be checked before mounting of converter in the locomotive.

Sl. No.	Cables Details	Performed (Yes/No)
1	From Transformer to HLC1(2UH1 & 2VH1) are connected as per wiring format	Yes
2	From Transformer to HLC2(2UH2 & 2VH2) are connected as per wiring format	"
3	From HLC1 to Output Contactor unit1 are connected as per wiring format	"
4	From HLC 2 to Output Contactor unit 2 are connected as per wiring format	"
5	From Output Contactor unit 1 to IV Coupler CAB1 ALP and IV Coupler CAB2ALP through Junction box are connected as per wiring format	"
6	From Output Contactor unit 2 to IV Coupler CAB1 LP and IV Coupler CAB2 LP through Junction box are connected as per wiring format	"

5. Battery power ON

Tests Supply Voltages

Remove all Control cable connectors (Analog and Digital Input/output connectors) from HLC1, HLC2. While Switch ON Battery supply observe is there any MCBs tripping. Wait for one or two minutes after switching ON Circuit breaker(MCB1) and observe for any overheating symptoms like smell, smoke, temperature etc. from the wire bunches. If any such symptoms are noticed, there might be a short circuit in the wire bunch. Check up once again continuity wherever suspected. After that check the Voltage levels at all equipments connectors as mentioned below.

Test Details	Acceptance	Observations
Voltage Level at HLC1 : I. Between wago terminal XF22S:03/54 and XF22S:03/58 II. Between wago terminal XF22S:03/53 and XF22S:03/58	~110VDC	110 VDC
Voltage Level at HLC2 : I. Between wago terminal XF77S:03/52 and XF77S:03/56 II. Between wago terminal XF77S:03/51 and XF77S:03/56	~110VDC	110 VDC

Note: After Above tests switch off the Power and restore all removed connectors and once again switch ON the 110 V Supply and ensure that no MCB tripping due to abnormality.

Signature of the JE/SSE/Loco Testing

6. Converter operation (ON/OFF) test

Power supply is directly available to the Hotel Load Converter via Hotel Load Converter winding (2UH1-2VH1) and (2UH2-2VH2). As soon as BLDJ is closed power will be available to the Hotel Load Converter. Connect the test jig of Hotel Load Converter to the UIC and IV Coupler. Charge the locomotive and switch on the BLHO, LSHO indication should glow. Hotel Load Converter screen will show message "waiting for ON command". One by one Hotel Load Converter can be switched on by test jig. Finally both the Hotel Load Converter should be turned out simultaneously. Observe the flow of air from the air duct, this will ensure that Hotel Load Converter is ON. Both the Hotel Load Converters are ON, then voltage and frequency should be measured as per the table below:-

Converters should run without any irregularities.

Hotel Load Converter 1			
Output Voltage			Output Frequency (Hz)
U-V	V-W	U-W	
—	—	—	—

Hotel Load Converter 2			
Output Voltage			Output Frequency (Hz)
U-V	V-W	U-W	
—	—	—	—

7. Earth Fault Test

7.1 Input Earth Fault:-Ground the input terminal of the Hotel Load Converter using a proper resistance and then turn on the Hotel Load Converter. The converter should trip with the message "Input earth fault".

7.2 Output Earth Fault:-Ground the output terminal of the Hotel Load Converter using a proper resistance and then turn on the Hotel Load Converter. The converter should trip with the message "Output earth fault".

Note: These to be done for the both the converters (HLC1 and HLC2) separately.

Signature of the JE/SSE/Loco Testing

DMW / PA-TIALA

Loco No.: 39127

PNEUMATIC TEST PARAMETERS OF 3-PHASE ELECTRIC LOCOMOTIVES

(As per DG/RDSO/LKO's Letter No.-EL/3.2.19/3phase, dated-29.03.2012)

SN	Parameters	Reference	Value	Result
1.0	Auxiliary Air Supply System (Pantograph & VCB)			
1.1	Ensure, Air is completely vented from Pantograph Reservoir (Ensure Panto Pressure Gauge reading is zero)		0	0
1.2	Turn On BL Key. Now MCPA starts. Record Pressure Build up time (8.5 Kg/cm ²)		60 Sec. (Max.)	57 sec
1.3	Auxiliary compressor Safety Valve 23F setting	Faively Doc. No. DMTS-014-1, 8 CLW's check sheet no. F60.812 Version 2	8.5±0.25Kg/cm ²	8.6 kg/cm ²
1.4	Check VCB Pressure Switch setting	CLW's check sheet no. F60.812 Version 2	Opens 4.5±0.15 Kg/cm ² Closes 5.5±0.15 Kg/cm ²	4.6 kg/cm ² 5.5 kg/cm ²
1.5	Set pantograph Selector switch is In Auto, Open Pan-1&2 Isolating Cocks & KABA Cock by Key (KABA Key).		Observed Pan-2 Rises.	ok
1.6	Set Cab-1 Pan UP in Panel A.		Panto-2 Falls Down Panto-2 Rises	ok
1.7	Close Pan-2 Isolating Cock Open Pan-2 Isolating Cock		06 to 10 seconds	9.5 sec
1.8	Record Pantograph Rise time		06 to 10 seconds	10 sec
1.9	Record Pantograph Lowering Time		0.7Kg/cm ² in 5 Min.	0.3 kg/cm ²
1.10	Panto line air leakage			
2.0	Main Air Supply System			
2.1	Ensure air is completely vented from locomotive. Drain out all the reservoirs by opening the drain cocks and then closed drain cocks. MR air pressure build up time by each compressor from 0 to 10 kg/cm ² . i) with 1750 LPM Compressor ii) with 1450 LPM Compressor	Theoretical calculation and test performed by Railways.	i) 7 Mts. Max. ii) 8.5 Mts. Max.	6 mts 50 sec
2.2	Drain air below MR 8 Kg/cm ² to start both the compressors		Check Starting of both Compressors	
2.3	Drain air from main Reservoir up to 7 Kg/cm ² . Start compressors; Check pressure build time of individual compressor from 8 Kg/cm ² to 9Kg/cm ² .		30 Sec. (Max)	CP1- 28 sec CP2- 29 sec
2.4	Check Low MR Pressure Switch setting (37)	D&M test spec. MM3882 & MM3946	Closes at 6.40±0.15 Kg/cm ² Opens at 5.60±0.15 Kg/cm ²	6.5 kg/cm ² 5.7 kg/cm ²
2.5	Check Compressor Pressure Switch RGCP setting (35)	D&M test spec. MM3882 & MM3946	Closes at 10±0.20 Kg/cm ² Opens at 8.0±0.20 Kg/cm ²	10.0 kg/cm ² 8.0 kg/cm ²
2.6	Run both the compressors Record Pressure build up time	Trial results	3.5 Minutes Max.	

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2.7	Check unloader valve operation time		Approx. 12 Sec.	10 Sec
2.8	Check Auto Drain Valve functioning (124 & 87)		Operates when Compressor starts	OK
2.9	Check CP-1 delivery safety valve setting (10/1). Run CP Direct by BLCF.	D&M test spec. MM3882 & MM3946	11.50±0.35 Kg/cm ²	11.6 kg/cm ²
2.10	Check CP-2 delivery safety valve setting (10/2). Run CP Direct by BLCF.	D&M test spec. MM3882 & 3946	11.50±0.35 Kg/cm ²	11.6 kg/cm ²
2.11	Switch 'OFF' the compressors and ensure that the safety valve to reset at pressure 12 Kg/cm ² less than opening pressure.	D&M test spec. MM3882 & 3946		OK
2.12	BP Pressure : Switch 'OFF' Compressor. Drain MR pressure by drain cock of 1" Main Reservoir. Start Compressor, check setting pressure of Duplex Check Valve 92F.	CLW's check sheet no. F60.812 Version 2	5.0±0.10 Kg/cm ²	5.0 kg/cm ²
2.13	FP pressure : Fit Test Gauge in Test Point 107F FPTP. Open isolate cock 136F. Check pressure in Gauge.	CLW's check sheet no. F60.812 Version 2	6.0±0.20 Kg/cm ²	6.0 kg/cm ²
3.0.	Air Dryer Operation			
3.1	Open Drain Cock 90 of 2nd MR to start Compressor, leave open for Test Check Air Dryer Towers to change.		Tower to change 1) Every minute (FTIL & SIL) ii) Every two minute (KBIL)	OK
3.2	Check Purge Air Stops from Air Dryer at Compressor Stops			
3.3	Check condition of humidity indicator		Blue	Blue
4.0.	Main Reservoir Leakage Test			
4.1	Put Auto Brake (A-9) in full service, Check MR Pressure air leakage from both cabs.	D&M test spec. MM 3882 & MM3946	Should be less than 1Kg/cm ² in 15 minutes.	0.40 kg/cm ²
4.2	Check BP Air leakage (Isolate BP charging cock-70)	D&M test spec. MM 3882 & MM3946	0.15Kg/cm ² in 5 minutes	0.22 kg/cm ²
5.0.	Brake Test (Automatic Brake Operation)			
5.1	Record Brake Pipe & Brake Cylinder pressure at Each Step			
	Check Proportionality of Auto Brake System	CLW Check Sheet No.- F60.812 Version2		
	Auto Controller Position	BC (WAG-9 & WAP-7) Kg/cm ²	BC (WAP-5) Kg/cm ²	
		Value	Result	Value
Run	BP Pressure Kg/cm ² 5±0.1 5.0 kg/cm ²	0.00	0.00	0.00
Initial	4.60±0.1 4.6 kg/cm ²	0.40±0.1	0.40	0.75±0.15
Full Service	3.35±0.2 3.5 kg/cm ²	2.50±0.1	2.50	5.15±0.30
Emergency	Less than 0.3 0.2 kg/cm ²	2.50±0.1	2.50	5.15±0.30

5.2	Record time to BP Pressure drop to 3.5 Kg/cm ² Ensure Automatic Brake Controller handle is Full Service from Run	D&M test spec. MM 3882 & MM3946	8±2 Sec.	8 sec
5.3	Operate Asst. Driver Emergency Cock,	D&M test spec. MM 3882 & MM3946	BP Pressure falls rapidly to Below 25 Kg/cm ²	OK
5.4	Check Brake Pipe Pressure Switch 69F Operates	CLW's check sheet no F60.812 Version 2	Closes at BP 4.05-4.35 Kg/cm ² Opens at BP 2.85-3.15 Kg/cm ²	4.2 kg/cm ² 2.9 kg/cm ²
5.5	Move Auto Brake Controller handle from Running to Emergency BC filling time from 0.4 Kg/cm ² i.e. 95% of Max. BC developed WAP5 - BC 5.15 ± 0.3 Kg/cm ² apply-time WAP7 - BC 2.50 ± 0.1 Kg/cm ² WAG9 - BC 2.50 ± 0.1 Kg/cm ²	D&M test spec. MM 3882 & MM3946	4±1 Sec 7.5±1.5 Sec 21±3 Sec.	7 sec
5.6	Move Auto Brake Controller handle to full service and allow BP pressure 3.5 Kg/cm ² . Move Brake controller to Running Position BC Release time to fall BC Pressure up to 0.4 Kg/cm ² i.e. 95% of Max. BC developed BC Release time WAP5 WAG9 / WAP7	D&M test spec. MM 3882 & MM3946	17.5±25 Sec. 52.5±7.5 Sec.	17 sec
5.7	Move Auto Brake controller Handle to Release, Check BP Pressure Steady at 5.5-6.2 Kg/cm ² time.	CLW's Check sheet no F60.812 Version 2	60 to 80 Sec.	70 sec
5.8	Auto brake capacity test : The capacity of the A9 valve in released condition must conform to certain limit in order to ensure compensation for air leakage in the train without interfering with the automatic functioning of brake. * Allow the MR pressure to build up to maximum stipulated limit. * Close brake pipe angle cock and charge brake pipe to 5 Kg/cm ² by A (Automatic brake controlling) at run position. * Couple 7.5 dia leak hole to the brake hose pipe of locomotive. Open the angle cock for brake pipe. The test shall be carried out with all the compressors in working condition.	RDSO Motive Power Directorate report no. MP Guide No. 11 July, 1999 Rev.1	BP Pressure should not fall below 4.0Kg/cm ² with in 60 Sec.	4.6 kg/cm ²
5.9	Keep Auto Brake Controller (A-9) in Full Service. Press Driver End Paddle Switch (PVEF).		BC comes to '0'	0
5.0	Direct Brake (SA-9)			
5.1	Apply Direct Brake in Full Check BC Pressure WAG9/WAP7 WAP5	CLW's check sheet no. F60.812 Version 2	3.5±0.20 Kg/cm ² 5.15±0.3Kg/cm ²	3.5 kg/cm ²
5.2	Apply Direct Brake, Record Brake Cylinder charging time	D&M test spec. MM 3882 & MM3946	8 Sec., (Max.)	7 sec.

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6.3	Check Direct Brake pressure switch setting 59 (F)	D&M test spec. MM 3882 & MM3946	0.2±0.1 Kg/cm ²	0.2 kg/cm ²
7	Release direct brake & BC Release time to fall BC Pressure up to 0.4 Kg/cm ²		10-15 Sec.	13 sec
	Dynamic Brake (Brake Blending)			
7.1	This test is to be done by forcing signal by laptop 06H Actual BE E1 = 100%	D&M test spec. MM 3882 & MM3946	WAP7 & WAG9 - 2.5 Kg/cm ² . WAP5-5.15Kg/cm ² .	-
7.2	This test is to be done by forcing signal by laptop 06H Actual BE E1 = 50%	D&M test spec. MM 3882 & MM3946	WAP7 & WAG9 1.25 Kg/cm ² . WAP5- 2.55Kg/cm ²	-
	Parking Brake			
8.1	Press BPPB to Release Parking brake	D&M test spec. MM 3882 & MM3946	PB released Lamp Off in Panel Pressure In Parking Brake gauge 60Kg/cm ²	-
8.2	Press BPPB to apply parking brake		PB applied, Lamp On In Panel Pressure In Parking Brake gauge 0.0 Kg/cm ²	-
8.3	Manually release and apply Parking Brake by pressing solenoid valve 30F		Verify release and application of Parking Brake.	-
	Check Pressure in PB Gauge		6.0±0.15 Kg/cm ²	-
8.4	Check Brake Block Clearance	D&M test spec. MM 3882 & MM3946	10 mm in TBU 3 mm in Disc. Brake (WAP5)	-
9.0	Sanding Equipment			
9.1	Check Isolating Cock-134F is in open position. Press sander paddle Switch. (To confirm EP Valves Operates)		Sand on Rail	OK
9.2	Test Vigilance Equipment : As per D&M test Specification			OK

[Signature]

Signature of Loco Testing Staff

[Signature]

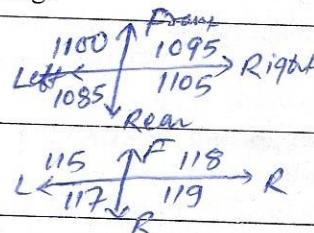
Issue No. : 02
Effective Date: Oct.2019

DOC NO: F/LRM/Electric Loco CHECK SHEET
(Ref: WI/LRM/Elect/01, 02, 03 & 04 & QPL/LRM/ Elec.Loco)
Page 1 of 1

डीजल रेडइंजन आधुनिकीकरण कारखाना पटियाला।
DIESEL LOCO MODERNISATION WORKS, PATIALA
ELECTRIC LOCO CHECK SHEET

LOCO NO: 39127 Rly: ECR Shed: GMD D.O.D. 28/01/2020

S.No	ITEM TO BE CHECKED	Specified Value	Observed Value
1.1	Check Hotel Load Converter & hotel load contactor for marking of its drilling hole.	OK	OK
1.2	Check MR Blower 1 & 2, MR Scavenging Blower 1 & 2, TM Blower 1 & 2, TM scavenging blower 1 & 2 & Oil Cooling unit.	OK	OK
1.3	Check the oil cooling unit & radiator using M10 bolt & mesh washer (10 nos.)	OK	OK
1.4	Check HB 1 & 2 and its respected lower part on its position	OK	OK
1.5	Check FB panel on its position	OK	OK
1.6	Check Assemble SB1 & SB2 with VCU1 & VCU2 respectively and place its position.	OK	OK
1.7	Check Auxiliary converter 1 & 2, 3 on its position with the help of overhead crane.	OK	OK
1.8	Check Traction converter 1 & 2 on its position	OK	OK
1.9	Check fitment of Main Transformer	OK	OK
1.10	Check torquing transformer bolt	OK	OK
1.11	Locking of Main Transformer bolts	OK	OK
1.12	Check the compressor both side with the compressor safety wire rope	OK	OK
1.13	Proper setting of the dampers as required.	OK	OK
1.14	Check the no. of spring liner on bogie as per marking on the spring respectively.	OK	OK
1.15	Cow catcher for proper fitment	OK	OK
1.16	Check both battery box	OK	OK
1.17	Check Push Pull rod its bolt torquing and safety slings	OK	OK
1.18	Buffer height: Range (1030 mm to 1105 mm)	1030-1105 mm	OK
1.19	Height of Rail Guard. (114 mm \pm 5 mm)	114 mm \pm 5 mm	OK



DECISION: ACCEPTED / NOT ACCEPTED

(Signature of SSE/Elect. Loco)

NAME BHUPINDER SINGH

DATE 28/01/2020

(Signature of JE/Elect Loco)

NAME SATISH KUMAR

DATE 28/01/2020

Under frame component

S.N.	Description of component	PL No.	Make	Mfg. date & Serial no.	Warranty covered upto
1	Shell	29171064	BHILAI IRON & STEEL PROCESSING CO(P) LTD	10/19 & 41	As per IRS/PO condition
2	Main Transformer	29731057	BHEL	12-19, 2049494	
3	Conservator Tank BREATHER		YOGYA ENTERPRISES	19-3805, 19-3832	
4	Comprssor both side	29511008	ELGI EQUIPMENT LTD	08/19 & ESES923412	
5	Battery Box both side	29680013	BHARTIA BRIGHT & SEAMLESS STEEL LTD	08/19 & 18219/29, 18219/22	
6	Traction Bar Cab-1	29100069		07-19-1402	
7	Traction Bar Cab-2			07-19-5264	
8	Oil Cooling Pump both Side	29530027	Flow Tech Pump & Motors Bangalore	05/18 & 19060573, 19060557	

Machine room Component cab 1

1	Hotel Load Contactor	29741087	SIEMENS	05/19 & ST5L0528HLCD	As per IRS/PO condition
2	Hotel Load Converter	29741087	SIEMENS	10/19 & STOL0657HLCD	
3	TM-Blower	29440075	AIR CONTROL & CHEMICAL ENGG. LTD & CGL	11/19 & AC-38917, BBLL1906603	
4	TM- Scavenging Blower Motor	29440117	G.T.R. CO. (P) LTD	BST-07-19-339	
5	Filter Cubical (HB-1)	29171180	AUTOMETERS ALLIANCE LTD	06/19 & CCBHB11906059	
6	Fiter Cubical (FB-1)	29480140	KAYSONS ELECTRICALS PVT. LTD.	07/19 & CSFL/FB/084	
7	SB-1		HIND RECTIFIERS LTD	08/18 & SB-1/2018/M/0059/149	
8	Vehicle Control Unit (VCU)	29741075	BTIL	BTIL/01/2020/01/PROPULSION-A/0673	
9	Aux. Converter (BUR) 1	29741075	BTIL	12/19 & 2019L/1755/42A/410	
10	Oil Cooling Unit (OCU)	29470043	AIR CONTROL & CHEMICAL ENGG. LTD & CGL	12/19 & AC-40144, LHP/000908204	
11	OCU RADIATOR	29470031	TESIO COOLING SYSTEM	07-19-2106	
12	M/C Room Blower	29440105	AIR CONTROL & CHEMICAL ENGG. LTD & CGL	12/19 & AC-40452, CGLSTAM-11420	
13	M/C Room Scavenging Blower	29440129	AIR CONTROL & CHEMICAL ENGG. LTD & CGL	10/19 & AC-35496, CGLSTBM-17162	
14	Traction Convertor	29741075	BTIL	BTIL/01/2020/02/PROPULSION-A/0675	

MACHINE ROOM COMPONENT Cab-2

1	Hotel Load Contactor	29741087	SIEMENS	10/19 & STOL0656HLCD	As per IRS/PO condition
2	Hotel Load Converter	29741087	SIEMENS	10/19 & STOL0659HLCD	
3	M-Blower	29440075	AIR CONTROL & CHEMICAL ENGG. LTD & CGL	11/19 & AC-38907, BBLL1905241	
4	TM-SCV Blower Motor	29440117	G.T.R. CO. (P) LTD	BST-19-11-748	
5	HB-2	29171192	AUTOMETERS ALLIANCE LTD	11/19 & AALN/11/2019/08/HB-2/P-7/165	
6	SB-2	29171210	TROLEX INDIA PVT LTD	03/19 & 19354	
7	Vehicle Control Unit (VCU)	29741075	BTIL	BTIL/07/2020/01/PROPULSION-A/0674	
8	Aux. Converter (BUR) 2&3		BTIL	12/19 & 2019L/1755/43/411	
9	Oil Cooling Unit (OCU)	29470043	AIR CONTROL & CHEMICAL ENGG. LTD & CGL	12/19 & AC-40146, LHP/000908547	
10	OCU RADIATOR	29470031			
11	M/C Room blower	29440105	AIR CONTROL & CHEMICAL ENGG. LTD & CGL	12/19 & AC-40469, CGLSKAM-12965	
12	M/C Room Scav. blower	29440129	AIR CONTROL & CHEMICAL ENGG. LTD & CGL	10/19 & AC-35508, CGLSIBM-17618	
13	Traction Convertor	29741075	BTIL	BTIL/01/2020/01/PROPULSION-A/0673	

Driver Cabin

1	Air Conditioner	29811028	SIDWAL REFRIGERATION INDUSTRIES(P) LTD.		As per IRS/P.O. condition
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SIGN.....

NAME.....

SIGN.....

NAME.....

DMW/PTA

ELECTRIC LOCO HISTORY SHEET (TRS)

ELECTRIC LOCO NO: 39127 RLY: ECR

SHED.: GMO

PROPULSION SYSTEM: BT

HOTEL LOAD CONVERTER : SIEMENS

LIST OF ITEMS FITTED BY TRS

SN	DESCRIPTION OF ITEM	ITEM PL NO.	ITEM SR. NO.		MAKE/SUPPLIER	QPL	WARRANTY COVERED
			CAB-1	CAB-2			
1	HEAD LIGHT LAMP	29610023	6/19	6/19	M/s. PATRA & CHANDA	04 Nos.	AS PER IRS / P.O CONDITIONS
2	LED BASED FL LIGHT	25984962	1909E16494	1909E16432	M/s ALTOS ELECTRONIC	02 Set	
3	LED MARKER LIGHT	25984860	135095,135096	135107,135176	M/s MATSUSHI POWER	04 Set	
4	DRIVER CAB LIGHT	29610461	1908112,1908143	1908146,1908022	M/s. SHRI GURU	04 Nos.	
5	CAB HEATER	29170011	532	534	M/s K.K. IRON	02 Set	
6	CREW FAN	29470080	19051886,19051923	19051936,19051918	M/s. VENTWELL	04 Nos.	
7	MASTER CONTROLLER	29860015	AALN/10/2019 038/MC/038	AALN/10/2019 002/MC/002	M/s. AUTOMETER	02 Nos.	
8	COMPLETE PANEL A,C,D	29178204	KEPCO/A1/785	KEPCO/A1/572	M/s. KEPCO/BSB	02 Set	
9	COMPLETE CUBICLE- F PANEL	29178162	1909001	1909005	M/s TROLEX	02 Nos.	
10	HEATER ROTERY SWITCH	29700012	PCE/1483/02/19	PCE/1506/2/19	M/s. PATRA & CHANDA	02 Nos.	
11	DIFFRENCIAL AMPLIFIRE	29500059	4151	4150	M/s. BAUMER	02 Nos.	
12	SPEED IND.& REC. SYSTEM	29200040	2484	3296	M/s MEDHA	01 Set	
13	BATTERY (Ni- Cd)	29680025	Battery Set No.-129 (Along with Battery maintenance kit)		AMCO	01 Set	
14	HARNESSED CABLE COMPLETE	29600418	CONTACT CHENNAI		CONTACT CHENNAI	01 Set	

SSE/TRS

J E/TRS

LOCO 39127

ROOF COMPONENT CAB 1 & 2

ROOF COMPONENT CAB 1 & 2					As per IRS/PO conditions
S.No.	Description	QPL /Nos.	Supplier	Sr. no.	
1	Pantograph	2	Contransys Private Ltd. Kolkata	B7522& B7540	
2	Servo motor	2	Contransys Private Ltd. Kolkata	Mfg.. 09/19	
3	Air Intake filter Assly	2	Parker	B6190& B5908	
4	Insulator Panto Mtg.	8	BHEL 01/19	Mfg. 03/19,01/19	
BHEL 01/19					
MIDDLE ROOF COMPONENT					
5	High Voltage Bushing	1	ABB	ABB286-2019	
6	Voltage Transformer	1	RITZ	2019/51373605	
7	Vacuum Circuit Breaker VCB	1	Autometer Alliance Ltd.	VCBA1906044	
8	Insulator Roof line	9	BHEL	03/19	
9	Harmonic Filter	1	Resitech Electricals Pvt. Ltd.	09/19/192039/04	
10	Earth Switch	1	PCE	PCE 71/ 04/19	
11	Surge Arrester	2	ABB	ABB	
Air Brake Components					
12	Air Compressor	2	Elgi	FSES 923416 & ESES 923417	
13	Air Dryer	1	Trident	LD2-05-4312-19	
14	Air Brake Panel	1	Faiveley	SEP2019-39WAP7-593	
15	Auxillary Compressor	1	CEC	R19F 3381	
16	Contoller	2	Faiveley	H19-024&H 19-014	
17	Wiper Motor	4	Elgi		
18	Breakup Valve	2	Faiveley	H19-066A&H19-059B	

D. K. S.
SSE/ABS

DIESEL LOCO MODERNISATION WORKS

Loco No. 39127 **Rly:** ECR **Shed:** GMO **Month:** Jan.20

1. BOGIE FRAME:

BOGIE	FRAME NO	Make	PL No.	PO No. & dt.	Warranty Period
FRONT	SL-469	ECBT	29105146	771901	As per PO/IRS conditions
REAR	SL-463	ECBT		771901	

2. Hydraulic Dampers (Axle, Vertical, Yaw and Horizontal) Make: Koni**3. AXLES:**

LOCATION	1	2	3	4	5	6
MAKE/ S.NO	DMW 19819	DMW 19756	DMW 19616	DMW 19690	DMW 19872	DMW 19850
Ultrasonic Testing	OK	OK	OK	OK	OK	OK

4. WHEEL DISCS NO. AND TYPE

LOCATION	1	2	3	4	5	6
GEAR END	L-39	L-92	19/1885	L-102	19/1884	L-48
Ultrasonic Testing	OK	OK	OK	OK	OK	OK
FREE END	L-37	L-98	19/1880	19/1856	19/1874	19/1739
Ultrasonic Testing	OK	OK	OK	OK	OK	OK

5. AXLE ROLLER BEARING (CRU) (PL No. 29010020, Warranty: As per PO/IRS conditions)

LOCATION		1	2	3	4	5	6
Gear End	MAKE	SKF	SKF	SKF	SKF	SKF	SKF
	PO NO. & dt	771678	771678	771678	771678	771678	771678
Free End	MAKE	SKF	SKF	SKF	SKF	SKF	SKF
	PO NO. & dt	771678	771678	771678	771678	771678	771678

6. WHEEL DISC PRESSING (PRESSURE IN TONNES): SPECIFIED 80-105 T

AXLE NO	1	2	3	4	5	6
BULL GEAR END	98	89	88	83	85	96
FREE END	100	95	90	82	100	95

Loco No. 39127 **Rly:** ECR **Shed:** GMO **Month:** Jan.20

7. DIAMETER AFTER PROFILE TURNING: SPECIFIED 1092 + 5 mm – 0 mm

AXLE NO.	1	2	3	4	5	6
DIA IN mm GE	1094	1094	1094	1094	1094	1093
DIA IN mm FE	1094	1094	1094	1094	1094	1093
WHEEL PROFILE GAUGE (1596±0.5mm)	OK	OK	OK	OK	OK	OK

8. SUSPENSION TUBE & ITS TAPER ROLLER BEARING:

AXLE NO.		1	2	3	4	5	6
S.T.	MAKE	Simplex	KPE	KPE	KPE	KPE	Simplex
G.E. BEARING	MAKE	FAG	FAG	FAG	FAG	FAG	FAG
F.E. BEARING	MAKE	FAG	FAG	FAG	FAG	FAG	FAG

9. GEAR CASE & BACKLASH:

AXLE NO.	1	2	3	4	5	6
MAKE	KP	KP	KP	KP	KP	KP
BACKLASH (0.254 – 0.458mm)	0.310	0.330	0.310	0.310	0.290	0.300

10 A/BOX TO BOGIE FRAME LATERAL CLEARANCES (SPECIFIED 15.0 to 19.0mm):

AXLE NO.	1	2	3	4	5	6
RIGHT SIDE	16.60	19.00	18.70	18.75	17.40	18.80
LEFT SIDE	17.73	18.85	18.90	16.11	15.50	15.31

11. TRACTION MOTOR : (PL No. 29942007, Warranty: As per PO/IRS conditions)

LOCATION	MAKE	PO No. & date	S. NO.
1	BHEL	566585 dt. 03.01.19	4637939
2	BHEL	566585 dt. 03.01.19	4637933
3	BHEL	566585 dt. 03.01.19	4637942
4	BHEL	566585 dt. 03.01.19	4637941
5	BHEL	566585 dt. 03.01.19	4637935
6	BHEL	566585 dt. 03.01.19	4637938