भारतीय रेल Indian Railways

पटियाला रेलइंजन कारख़ाना, पटियाला

PATIALA LOCOMOTIVE WORKS, PATIALA



LOCO TESTING & DISPATCH REPORT OF IGBT BASED wAg9hc ELECTRIC LOCOMOTIVE

LOCO NO.: 42042

TYPE: WAG9HC

Rail way shed: Cr/BSLL

ProPulsion system: CGL

Date of Dispatch: 22.06.2025

लोको निर्माण रिकार्ड



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LOCO NO.: 42042

RAILWAY/SHED: CR/BSLL

DOD: June-2025

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Locomotive No.: 42042

Type of Locomotive: WAP-7/WAG-9HC

1.0 Continuity Test of the cables

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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 1000V megger.

From	То	Continuity (OK/Not OK)	Prescribed Megger Value (min)	Measured Megger Value
Filter Cubicle	Transformer	oK	100 ΜΩ	750002
Filter Cubicle	Terminal Box of Harmonic Filter Resistor (Roof)	ok	100 ΜΩ	800me
Filter Cubicle	Earthing Choke	OK	100 ΜΩ	800ms
Earthing Choke	Earth Return Brushes	ok	100 ΜΩ	750 ans
Transformer	Power Converter 1	OK	100 ΜΩ	800 ars
Transformer	Power Converter 2	ok	100 ΜΩ	700 MS
Power Converter 1	TM1, TM2, TM3	ok	100 ΜΩ	800 ml
Power Converter 2	TM4, TM5, TM6	OK	100 ΜΩ	900m2
Earth	Power Converter 1	ok	100 ΜΩ	85°ona
Earth	Power Converter 2	ok	100 ΜΩ	750ms

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 1000V megger.

Signature of the JE/SSE/Harness

Signature of the JE/SSE/Loco Cabling

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From	То	Continuity(OK/ Not OK)	Prescribed Megger Value (min)	Measured Megger Value
Transformer	BUR1	OK	100 ΜΩ	600m/L
Transformer	BUR2	Jok.	100 M Ω	JAMMAL.
Transformer	BUR3	ou	100 M Ω	KOD MS
Earth	BUR1	OK	100 ΜΩ	600M
Earth	BUR2	OK	100 M Ω	Soo mr
Earth	BUR3	ole	100 M Ω	600 M/L
BUR1	HB1	or	100 MΩ	100 mr
BUR2	HB2	OK.	100 ΜΩ	Looma
HB1	HB2	O'L	100 ΜΩ	600 011
HB1	TM Blower 1	or	100 ΜΩ	600 M
HB1	TM Scavenge Blower 1	OK.	100 ΜΩ	700 m/
HB1	Oil Cooling Unit 1	ok_	100 ΜΩ	800 m
HB1	Compressor 1	ML	100 ΜΩ	600 m
HB1	TFP Oil Pump 1	814	100 ΜΩ	700 mr
HB1	Converter Coolant Pump 1	OK	100 ΜΩ	600 mr
HB1	MR Blower 1	or	100 ΜΩ	600 M2
HB1	MR Scavenge Blower 1	ok	100 ΜΩ	Sooma
HB1	Cab1	ol-	100 ΜΩ	600 m2
Cab1	Cab Heater 1	OK	100 ΜΩ	Jooms
HB2	TM Blower 2	ok.	100 ΜΩ	600 m/2
HB2	TM Scavenge Blower 2	80K	100 ΜΩ	Commo
HB2	Oil Cooling Unit 2	ok	100 ΜΩ	
HB2	Compressor 2	014	100 ΜΩ	700 Ma
HB2	TFP Oil Pump 2	ole_	100 ΜΩ	600 M/
HB2	Converter Coolant Pump 2	- Ok	100 ΜΩ	700 m
HB2	MR Blower 2	gle_	100 ΜΩ	600 Mg/2
HB2	MR Scavenge Blower 2	ok	100 ΜΩ	600 ML
HB2	Cab2	- Bl	100 ΜΩ	STO MA
Cab2	Cab Heater 2	ok	100 MΩ ·	600 MA

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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	То	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	Prescribed value	Measured
measure the resistance of battery wires 2093, 2052, 2050 with respect to the loco earth.	> 0.5 MΩ	Value MΩ
Measure the resistance between 2093 & 2052, 2093 & 2050, 2052 &	Prescribed value:	Measured
2050	> 50 MΩ	Value <u>70</u> ΜΩ

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 OK
Primary voltage detection	01A, 12A	ø K
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	ØK
Terminal fault indication cab-1 & 2	09F	OK
Brake pipe pressure actual BE electric	06H	o K
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	_
Magnetization current	12C, 12G	<u> </u>
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 OK
Traction motor speed sensors (2nos) and temperature sensors (1 no.) of TM-3	12D	o K
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	øK
Traction motor speed sensors (2nos) and temperature sensors (1 no.) of TM-6	12H	ок
Train Bus cab 1 & 2 (Wire U13A& U13B to earthing resistance=	13A	OK
10KΩ±±10%)		
UIC line	13B	OK
Connection FLG1-Box TB	13A	øK.

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2.0 Low Tension test

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).	3.9K Ω ± 10%	3.9 KSL
Resister to maximum current relay.	1 Ω ± 10%	12
Load resistor for primary current transformer (Pos. 6.11).	3.3 Ω ± 10%	3.32
Resistance harmonic filter (Pos 8.3). Variation allowed \pm 10%	WAP7	WAP7
Between wire 5 & 6	0.2 Ω	0.20
Between wire 6 & 7	0.2 Ω	0.21
Between wire 5 & 7	0.4 Ω	0.42
For train bus, line U13A to earthing.	10 k Ω ± 10%	10.0K SL
For train bus, line U13B to earthing.	10 k Ω ± 10%	10.0KSZ
Insulation resistance of High Voltage Cable from the top of the roof to the earth (by1000 V megger).	200 ΜΩ	300 MJL
Resistance measurement earth return brushes Pos. 10/1.	≤0.3 Ω	0.2952
Resistance measurement earth return brushes Pos. 10/2.	≤0.3 Ω	0.2952
Resistance measurement earth return brushes Pos. 10/3.	≤0.3 Ω	0.2852
Resistance measurement earth return brushes Pos. 10/4.	≤0.3 Ω	0.30s2
Earthing resistance (earth fault detection) Harmonic Filter –I; Pos. 8.61.	2.2 kΩ ± 10%	2.2KD
Earthing resistance (earth fault detection) Harmonic Filter –II; Pos 8.62.	2.7 k Ω ± 10%	2.7 KD
Earthing resistance (earth fault detection) Aux. Converter; Pos. 90.3.	3.9 k Ω ± 10%	3.9 KD
Earthing resistance (earth fault detection) 415/110V; Pos. 90.41.	1.8 kΩ± 10%	1.8 KD
Earthing resistance (earth fault detection) control circuit; Pos. 90.7.	390 Ω ± 10%	39052
Earthing resistance (earth fault detection) Hotel load; Pos. 37.1(in case of WAP5).	3.3 k Ω ± 10%	NA
Resistance for headlight dimmer; Pos. 332.3.	10 Ω ± 10%	100

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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	CHECKED 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	CHECKED 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	CHEALED OK
Test 48V supply	Sheet 04F & sheets of group 09	Fan supply to be checked. $\mathcal{O} \mathcal{K}$
Test traction control	Sheets of Group 08.	øK.
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	σK
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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Locomotive No.: $42\sigma42$ 3.0 Downloading of Software

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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:	1.0.6.9
Traction converter-2 software version:	1.0.6.9
Auxiliary converter-1 software version:	1.0.1.0
Auxiliary converter-2 software version:	2.0.10
Auxiliary converter-3 software version:	3.0.1.0
Vehicle control unit -1 software version:	60.0.18
Vehicle control unit -2 software version:	6.0.0.18

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;0101XPrAutoBkLn	100% (= 5 Kg/cm2)	OK
Actual BE electric	FLG2; AMSB_0201- Wpn BEdem	100% (= 10V)	ОК
TE/BE at 'o' position from both cab	FLG1; AMSB_0101- Xang Trans FLG2; AMSB_0101- Xang Trans	Between 9% and 11%	10%
TE/BE at 'TE maximal' position from both cab	FLG1; 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 %	25 %

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TE/BE at 'BE maximal position from both cab	XangTrans FLG2; AMSB_0101- XangTrans	Between 99% and 101%	100%
TE/BE at 'BE Minimal position from both cab	XangTrans FLG2; AMSB_0101- XangTrans	Between 20% and 25%	25%
TE/BE at '1/3' position in TE and BE mode in both cab.	LT/BDEM>1/3 HBB2; AMS_0101- LT/BDEM>1/3	Between 42 and 44%	44%
TE/BE at '1/3'positior 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	21.0
Both temperature sensor of TM2	SLG1; AMSB_0106- Xatmp2Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	22%
Both temperature sensor of TM3	SLG1; AMSB_0106- Xatmp3Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	20°C
Both temperature sensor of TM4	SLG2; AMSB_0106- XAtmp1Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	20°C
Both temperature sensor of TM5	SLG2; AMSB_0106- Xatmp2Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	20.5°c
	Xatmp3Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	21°c

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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
	nesuit desired in sequence	obtained
Emergency shutdown through	VCB must open.	obtained
emergency stop switch 244	Panto must lower.	CHECKED OK
	T ditto mast lower.	Checkey OR
Shut Down through cab activation	VCB must open.	
switch to OFF position	Panto must lower.	CHECKED OK
Converter and filter contactor	FB contactor 8.41 is closed.	
operation with both Power	By moving reverser handle:	1)
Converters during Start Up.	 Converter pre-charging contactor 	V
	12.3 must close after few seconds.	
	• Converter contactor 12.4 must close. \	
	 Converter re-charging contactor 	CHECKED OK
	12.3 must opens.	
	By increasing TE/BE throttle:	
	• FB contactor 8.41 must open.	•
	• FB contactor 8.2 must close.	
	$ullet$ FB contactor 8.1 must close. \int	
Converter and filter contactor		
operation with both Power	The same detribution her to o	
Converters during Shut Down.	• VCB must open.	
	• Panto must lower.	
	 Converter contactor 12.4 must open. 	T CHECKED OK
·	 FB contactor 8.1 must open. 	,
	 FB contactors 8.41 must close. 	·
	 FB contactor 8.2 must remain closed. 	
	· /	
	/	

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		_
Contactor filter adaptation by isolating any bogie	Isolate any one bogie through bogie cut out switch. Wait for self-test of the loco.	
	 Check that FB contactor 8.1 is open. 	į
	 Check that FB contactor 8.2 is open. 	TCHECKED OK
	After raising panto, closing VCB, and	Checkey
	setting TE/BE	V
	• FB contactor 8.1 closes.	I
	• FB contactor 8.2 remains open.	1
Test earth fault detection battery	By connecting wire 2050 to	
circuit positive & negative	earth, create earth fault	
•	negative potential.	/
	message for earth fault	1
	By connecting wire 2095	CHECKED OK
	to earth, create earth	
•	fault positive potential.	Å
·	• message for earth fault	
	/	
Test fire system. Create a smoke in	When smoke sensor-1 gets	
the machine room near the FDU.	activated then	1
Watch for activation of alarm.	Alarm triggers and fault	1
•	message priority 2	
	appears on screen.	
	When both smoke sensor	CHECKED OK
	1+2 gets activated then	CILCACY OF
	A fault message priority	
	1 appears on screen and	
•	lamp LSF1 glow.	
• • •	• Start/Running interlock occurs and	
	TE/BE becomes to 0.	
ime, date & loco number	Ensure correct date time and Loco	
	number	OK
	1	l l

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4.0 Sensor Test and Converter Test

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	10-05 Up	OK
2U ₄ & 2V ₄	For line converter bogie 1 between cable 811A- 814A	10.05V _p and same polarity	16.04 Up	OK
2U ₂ & 2V ₂	For line converter bogie 2 between cable 801B- 804B	10.05V _p and same polarity	10.05 Vp	OK
2U ₃ & 2V ₃	For line converter bogie 2 between cable 811B- 814B	10.05V _p and same polarity	10.08Vp	οK
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.	7.9 U1 5.6 VRMS)	σĽ
2U _F & 2V _F	For harmonic filter between cable 4-12 (in FB)	9.12V _p , 6.45V _{RMS} and same polarity.	4.10 UP 644VRMS]	OK

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.	58.6 VP	201
C-1-1- 4040 CE05		41.5VRMS)	· OK
Cable no. 1218 – 6500	$15.5V_p$, $11.0V_{RMS}$ and opposite polarity.	15.5VP	OK

11.0 VRMSI

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4.3 Primary Voltage Transformer

Apply $250V_{\rm eff}/350V_{\rm p}$ 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%	25KV	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%	17KV	170 %
SLG2_G 87-XUPrim	17 kV	170%	17KV	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%	30KV	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 adju	sted 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; <i>Minimum voltage relay (Pos. 86) picks up</i>	(Yes/No)
Try to activate the cab in driving mode:	/// /or 1
Contactor 218 do not close; the control	(yes/No)
electronics is not be working.]
Turn off the variac :	
Contactor 218 closes; the control electronics is be	(Yes/No)
working	
Test Under Voltage Protection	<u>;</u>
Activate the cab in cooling mode; Raise panto;	15.7.7
Supply 200V _{RMS} through variac to wire no. 1501	(Yés/No)
& 1502; Close the VCB; Interrupt the supply	
voltage	[
The VCB goes off after 2 second time delay.	
Again supply 200V _{RMS} through variac to wire no.	(Yés/No)
1501 & 1502; Decrease the supply voltage below 140V _{RMS} ± 4V;	
Fine tune the minimum voltage relay so that VCB opens.	
Totale relay so that veb opens.	

4.5 Maximum current relay (Pos. 78)

Disconnect wire 1521 & 1522 of primary current tra &1522 (including the resistor at Pos. 6.11); Put loco in s on contact 136.3; Close VCB; supply 3.6A _{RMS} at the maximum current relay Pos. 78 for correct over current	imulation for driving mode; Open R ₃ – R ₄
VCB opens with Priority 1 fault message on display.	(Yes/No)
Keep contact R_3 – R_4 of 136.3 closed; Close VCB; Tune tf /9.9 A_p at the open wire 1521;	ne resistor 78.1 for the current of 7.0A _{RMS}
VCB opens with Priority 1 fault message on display.	(Yés/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 ± 10%)	
Primary return current	Supply 90mA _{DC} to the test winding of sensor through connector 415.AA/1or 2 pin no. 7(+) & 8(-)	_	
sensor (Test-2, Pos.6.2/1 & 6.2/2)	Supply 297mA _{DC} to the test winding of sensor through connector 415.AA/1or 2 pin no. 7(+) & 8(-)		299ma
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(-)		338mA
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(-)		346 ma
Hotel load current sensors (Pos. 33/1 &	Switch on hotel load. Supply 90mA _{DC} to the test winding of sensor through connector 415.AG/1or 2 pin no. 7(+) & 8(-)	NA	NA
33/2)	Supply 1242mA _{DC} to the test winding of sensor through connector 415.AG/1or 2 pin no. 7(+) & 8(-)	NA	NA

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

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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	Measured limit
	should take place	
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 8.2/2= 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	52/2	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	52/2	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	ciose	OPEN	Close	CLOSE	olen
BUR1 off	CLOSE	OPEN	CLOSE	CLOSE	OPEN	CLOSE	OPEN	OPEN	close
BUR2 off	ofen	OPEN	CLOSE	CLOSE	OPEN	close	OPEN	OPEN	close
BUR3 off	OPEN	CLUSE	OPEN	CLOSE	OPEN	close	OPEN	OPEN	CLOSE

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	YES
	YES
All the MCBs of the HB1 & HB2 open.	
All the three fuses 40/* of the auxiliary converters	YES
	YES
The fuse of the 415/110V auxiliary circuit (in HB1) open.	YES
Roof to roof earthing and roof to cab earthing done	1 1 1 2 3
Fixing connection and earthing in the average of the state of the stat	. YES
Fixing, connection and earthing in the surge arrestor done correctly.	Vec
Connection in all the traction motors done correctly.	YES_
All the bogie body connection and earthing connection done correctly.	YES
All the bogie body conflection and eartning connection done correctly.	
Pulse generator (Pos. 94.1) connection done correctly.	YES
<u> </u>	YES
All the oil cocks of the gate valve of the transformer in open condition.	YES
All covers on Aux & Power converters, Filter block, HB1, HB2 fitted	165
	YES
KABA key interlocking system.	YES

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.	CHECKED 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.	CHECKED 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.	CHECKED 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	CHECKED 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.	CHECKED 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.	CHECKED OK
Interlocking pantograph- VCB in cooling mode	Raise panto in cooling mode. Close the VCB. Lower the pantograph by ZPT	VCB must open.	Снесрео ок
Interlocking pantograph- VCB in driving mode	Raise panto in driving mode. Close the VCB. Lower the pantograph by ZPT	VCB must open.	CHECKED 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	8.7	4.3
Oil pump transformer 2	9.8 amps	9.0	9.6
Coolant pump converter 1	19.6 amps	5.4	7.0
Coolant pump converter 2	19.6 amps	5.5	80
Oil cooling blower unit 1	40.0 amps	36.0	. 1450
Oil cooling blower unit 2	40.0 amps	37.0	150.0
Traction motor blower 1	34.0 amps	28.0	132.0
Traction motor blower 2	34.0 amps	29.0	154.0
Sc. Blower to Traction motor blower 1	6.0 amps	3.0	7.5
Sc. Blower to Traction motor blower 1	6.0 amps	3.2	7.2
Compressor 1	25 amps at 0 kg/cm ² 40 amps at 10 kg/cm ²	24.0	55.0
Compressor 2	25 amps at 0 kg/cm ² 40 amps at 10 kg/cm ²	250	50.0

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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)
BURI 7303 XUUN	Input voltage to BUR1	75% (10%=125V)	949V	YES
	DC link voltage of BUR1	60% (10%=100V)	636V	YES
BURI 7303 XUIZI	DC link current of BUR1	0% (10%=50A)	I AMP	YES

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)	1003V	YES
BUR2 7303-XUUZ1	DC link voltage of BUR2	60% (10%=100V)	637V	YES.
BUR2 7303-XUIZ 1	DC link current of BUR2	1% (10%=50A)*	7 AMP	YES
BUR2 7303-XUILG	Current battery charger of BUR2	3% (10%=100A)*	22 AMP	Yes
BUR2 7303-XUIB1	Current battery of BUR2	1.5%(10%=100A)*	12 AMP	yes
BUR2 7303 -XUUB	Voltage battery of BUR2	110%(10%=10V)	1100	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	75% (10%=125V	1002V	YES
BUR3 7303- XUUZ1	DC link voltage of BUR3	60% (10%=100V)	637 V	7E3
BUR3 7303-XUIZ I	DC link current of BUR3	1% (10%=50A)*	7AMP	765 765
BUR3 7303-XUILG	Current battery charger of BUR 3	3% (10%=100A)*	22 AMP	YES
BUR3 7303-XUIB1	Current battery of BUR 3	1.5%(10%=100A)*	12 Ans	7ES
BUR3 7303-XUUB	Voltage battery of BUR 3	110%(10%=10V)	1104	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.	CHECKE OK
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.		

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*	4.3	13.0
Machine room blower 2	15.0 amps*	4.4	120
Sc. Blower to MR blower 1	1.3 amps	1.3	20
Sc. Blower to MR blower 2	1.3 amps	1-2	2.2
Ventilator cab heater 1	1.1 amps	1-1	1.1
Ventilator cab heater 2	1.1 amps	1.1	1.7
Cab heater 1	4.8 amps	4.6	4.7
* For indigenous MR blowers	4.8 amps	4.7	4.8

For indigenous MR blowers.

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5.5 Hotel load circuit (Not applicable for WAG-9HC)

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	Traction converter manufacturer to	
charging and pre- charging and charging of DC Link of Converter 1	declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
Measurement of discharging of DC Link of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	Снескер оК
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 PLW supervisor.	CHECKED 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 PLW supervisor.	CHECKED 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 PLW supervisor.	CHECKED OK
Pulsing of line converter of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
Pulsing of drive converter of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHELLED 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 PLW supervisor.	CHECKED OK
Measurement of discharging of DC Link of Converter 2	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
positive potential of DC Link of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
negative potential of DC Link of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the supervisor/v	CHECKED OK
AC part of the traction circuit of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
converter of Converter 2	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK

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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 1Check that converter 1 electronics produces a protective shut down. • VCB goes off • Priority 1 fault mesg. on DDU appears	> CHECKED OK
·	Disturbance in Converter 1	
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 shut down. • VCB goes off • Priority 1 fault mesg. on diagnostic display appears Disturbance in Converter 2	>CHECKED OK

5.8 Test Harmonic Filter

Switch on the filter by switch 160

Test Function	Results desired in sequence	Result obtained		
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. • FB contactor 8.41 must open.	CHECKED OK		

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Test earth fault	 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 8.1must open. FB discharging contactor 8.41 must close Check the filter current in diagnostic laptop Make a connection between wire 	CHECKED OK
detection harmonic filter circuit.	no. 12 and vehicle body. Start up the loco. Close VCB. • Earth fault relay 89.6 must pick up. • Diagnostic message comes that - Earth fault in harmonic filter circuit	CHECKED 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/ PLW	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/ PLW	CHECKED 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	CHECKED OK	
Ni-Cd battery voltage	At full charge, the battery voltage should be 110V DC.	CHECKED OK	
Flasher light	From both cab flasher light should blink at least 65 times in one minute.	CHECKED 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.	CHECKED OK	

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Marker light	Both front and tail marker light should glow from both the cabs	CHECKED OK
Cab Light	Cab light should glow in both the cabs by operating the switch ZLC	CHECKED OK
Spot lights	Both Drivers and Asst. Drivers Spot light should glow in both cabs by operating ZLDD	CHECKED OK
Instrument lights	Instrument light should glow from both cab by operating the switch ZLI	CHECKED OK
Illuminated Push button	All illuminated push buttons should glow during the operation	CHECKED 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:
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 m³/minute	Cab 1 LHS: Cab 1 RHS: Cab 2 LHS: Cab 2 RHS:

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.	CHECKED
	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 .	CHECKED 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.	CHECKED OK
4.	Check function of BPCS.	 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/cm², by pressing BPCS again. 	CHECKE P OK
5.	Check train parting operation of the Locomotive.	Operate the emergency cock to drop the BP Pressure LSAF should glow.	CHECKED

Signature of the JE/SSE/Loco Testing

OIL

PATIALA LOCOMOTI**VE VIO**RKS, PATIALA

Doc.No.F/ECS/01 (Ref: WI/ECS/10)

Testing & Commissioning Format For 3-Phase Locomotive fitted with IGBT based Traction Converter, Auxiliary Converter and TCN based VCU

Locomotive No.: 42042

Type of Locomotive: WAP-7/WAG-9HC

Page: 26 of 27

6.	Check vigilance	Sat the speed mare than 1 E lemph and ensure that
•	operation of the	Set the speed more than 1.5 kmph and ensure that
	locomotive	brakes are released i.e. BC < 1 Kg/cm ² .
	locomotive	For 60 seconds do not press vigilance foot switch or
		sanding foots switch or TE/BE throttle or BPVG
		switch then
		Buzzer should start buzzing.
		LSVW should glow continuously.
	·	Do not acknowledge the alarm through BPVG or
		vigilance foot switch further for 8 seconds then:-
		Emergency brake should be applied:
		automatically.
	•	VCB should be switched off.
		Resetting of this penalty brake is possible only after
	•	32 seconds by bringing TE/BE throttle to 0 and
		acknowledge BPVR and press & release vigilance
		foot switch.
7. 	Check start/run interlock	• At low pressure of MR (< 5.6 Kg/cm ²).
		With park brake in applied condition.
ļ		• With direct loco brake applied (BP< 4.75Kg/cm ²).
		• With automatic train brake applied (BP<4.75Kg/cm²).
	'	• With emergency cock (BP < 4.75 Kg/cm ²).
8.	Check traction interlock	Switch of the brake electronics. The
	•	Tractive / Braking effort should ramp down, VCB
		should open and BP reduces rapidly.
9.	Check regenerative	Bring the TE/BE throttle to BE side. Loco speed
	braking.	should start reducing.
10.	Check for BUR	In the event of failure of one BUR, rest of the two
	redundancy test at	BURs can take the load of all the auxiliaries. For this
	ventilation level 1 & 3 of	switch off one BUR.
	loco operation	Auxiliaries should be catered by rest of two BURs.
11		Switch off the 2 BURs; loco should trip in this case.
11.	Check the power	Create disturbance in power converter by switching
	converter	off the electronics. VCB should open and converter
	isolation test	should get isolated and traction is possible with
·]		another power converter.

Issue No.03

Effective Date: Feb 2022

M'7'd <u>Patiala locomotive</u> works, patiala

Doc.No.F/ECS/01 (Ref: WI/ECS/10)

<u>Testing & Commissioning Format For 3-Phase Locomotive fitted with IGBT based Traction Converter, Auxiliary Converter and TCN based VCU</u>

Locomotive No.: 42042

Type of Locomotive: WAP-7/WAG-9HC

Page: 27 of 27

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	οΚ	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	CHECKED WORKING OK
7	Flasher Light	οK	oK	CHECKED WORKING OK
8	Instrument Lights	OK	OK	
9	Corridor Light	OK	øK	
10	Cab Fans	OK	OK	
11	Cab Heater/Blowers	OK	σK	
12	All Cab Signal Lamps Panel 'A'	OK	ok)	

Status of RDSO modifications

LOCO NO: 42041

Sn	Modification No.	Description	Remarks
1.	RDSO/2008/EL/MS/0357	Modification in control circuit of Flasher Light and Head Light of	
	Rev.'0' Dt 20.02.08'	three phase electric locomotives.	Ok/Not Ok
2.	RDSO/2009/EL/MS/0377 Rev.'0' Dt 22.04.09	Modification to voltage sensing circuit in electric locomotives.	OK/Not Ok
3.	RDSO/2010/EL/MS/0390 Rev.'0' Dt 31.12.10	Paralleling of interlocks of EP contactors and Relays of three phase locomotives to improve reliability.	Øk/Not Ok
4.	RDSO/2011/EL/MS/0399 Rev.'0' Dt 08.08.11	Removal of interlocks of control circuit contactors no. 126 from MCPA circuit.	Ok/Not Ok
5.	RDSO/2011/EL/MS/0400 Rev.'0' Dt 10.08.11	Modification sheet for shifting the termination of \$GKW, 1.8 KV, 70 sq mm cables and 2x2.5 sq mm cables housed in lower portion of HB2 panel and provision of Synthetic resin bonded glass fiber sheet for three phase locomotives.	Ok/Not Ok
6.	RDSO/2011/EL/MS/0401 Rev.'0' Dt 10.08.11	Modification sheet for relaying of cables in HB-2 panel of three phase locomotives to avoid fire hazards.	Ok/Not Ok
7.	RDSO/2011/EL/MS/0403 Rev.'0' Dt 30.11.11	Auto switching of machine room/corridor lights to avoid draining of batteries in three phase electric locomotives.	Øk/Not Ok
8.	RDSO/2012/EL/MS/0408 Rev.'0'	assembly.	Ok/Not Ok
9.	RDSO/2012/EL/MS/0411 Rev.'1' dated 02.11.12	Modification sheet to avoid simultaneous switching ON of White and Red marker light in three phase electric locomotives.	OK/Not Ok
10	RDSO/2012/EL/MS/0413 Rev.'1' Dt 25.04.16	Paralleling of interlocks of EP contactors and auxiliary contactors of three phase locomotives to improve reliability.	OK/Not Ok
11	RDSO/2012/EL/MS/0419 Rev.'0' Dt 20.12.12	Modification sheet to provide rubber sealing gasket in Master Controller of three phase locomotives.	Øk/Not Ok
12	RDSO/2013/EL/MS/0420 Rev.'0' Dt 23.01.13	Modification sheet to provide mechanical locking arrangement in Primary Over Current Relay of three phase locomotives.	OK/Not Ok
13	RDSO/2013/EL/MS/0425 Rev.'0' Dt 22.05.13	Modification sheet for improving illumination of head light in dimmer mode in three phase electric locomotives.	Øk/Not Ok
14	RDSO/2013/EL/MS/0426 Rev.'0' Dt 18.07.13	Modification sheet of Bogie isolation rotary switch in three phase electric locomotives.	Ok/Not Ok
15	RDSO/2013/EL/MS/0427 Rev.'0' Dt 23.10.13	Modification sheet for MCP control in three phase electric locomotives.	Ok/Not Ok
16	RDSO/2013/EL/MS/0428 Rev.'0' Dt 10.12.13	Modification sheet for relocation of earth fault relays for harmonic filter and hotel load along with its resistors in three phase electric locomotives.	2 ΘK/Not Ok
17	RDSO/2014/EL/MS/0432 Rev.'0' Dt 12.03.14	Removal of shorting link provided at c-d terminal of over current relay of three phase electric locomotives.	Ok/Not Ok
18	RDSO/2017/EL/MS/0464 Rev.'0' Dt 25.09.17	Provision of Auxiliary interlock for monitoring of Harmonic filter ON (8.1)/adoption (8.2) Contactor in GTO/IGBT locomotives.	ØK/Not Ok
19	RDSO/2017/EL/MS/0467 Rev.'0' Dt 07.12.17	Modification in blocking diodes to improve reliability in three phase electric locomotives.	Ok/Not Ok
.20	RDSO/2018/EL/MS/0475 Rev.'0'	Modification in existing Control Electronics (CE) resetting scheme of 3 phase electric locomotives.	Øk/Not Ok
21	RDSO/2019/EL/MS/0477 Rev.'0' Dt 18.09.19	Implementation of push pull scheme.	Øk/Not Ok
22	RDSO/2024/EL/MS/0500 Rev '0' Dt. 13.09.2024	Recording of Flasher light operation either due to fault or manually by Loco Pilot in case of emergency with time stamping in VCU of 3-phase Electric Locomotives.	Øk/Not Ok
23	RDSO/2024/EL/MS/0502 Rev '0' Dt 10.10.2024	Unloader valve control circuit modification in three Phase Electric Locomotives.	Ok/Not Ok
24	RDSO/2024/EL/MS/0503 Rev '0' Dt 17.09.2024	Paralleling of interlocks of control circuit contactor to improve reliability of three phase electric locomotives	Ok/Not Ok
25	RDSO/2024/EL/MS/0504 Rev '0' Dt 21.11.2024	Isolation of Harmonic Filter from 3-phase locomotives fitted with M/s Alstom (BTIPL), CGPISL and Medha make IGBT based Propulsion Equipment	Cok/Not Ok

Signature of JE/SSE/ECS

Loco No.: 42042

PLW/PATIALA

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
	Brake Panel: M/s Faiveley			
1.0	Auxiliary Air supply system (Pantograph & VCB)			
1.1	Ensure, Air is completely vented from pantograph			0
	Reservoir (Ensure Panto gauge reading is Zero)			
1.2	Turn On BL Key. Now MCPA starts.		60 sec. (Max.)	58 sec
	Record pressure Build up time (8.0 kg/cm2)			
1.3	Auxiliary compressor safety Valve 23F setting	Faiveley Doc. No.	8.5±0.25kg/cm2	8.55 Kg/cm2
		DMTS-014-1, 8 CLW's	-	
		check sheet no.		
		F60.812 Version 2		
1.4	Check VCB Pressure Switch Setting	CLW's check sheet	Opens 4.5±0.15	4.55 Kg/cm2
		no. F60.812 Version 2	kg/cm2, closes	
			5.5±0.15 kg/cm2	5.55 Kg/cm2
1.5	Set pantograph Selector Switch is in Auto, Open pan-1&2 Is	solating Cocks & KABA co		
1.6	Set Cab-1 Pan UP in Panel A.		Observed Pan-2	ОК
			Rises.	
1.7	Close Pan-2 isolating Cock		Panto-2 Falls Down	ОК
	Open Pan -2 isolating Cock		Panto-2 Rises	
1.8	Record Pantograph Rise time		06 to 10 seconds	8 Sec
1.9	Record Pantograph Lowering Time		06 to 10 seconds	9 Sec
1.10	Panto line air leakage		0.7 kg/cm2 in 5	0.10 kg/cm2
1 11			Min.	in 5 Min.
2.0	High Reach Panto emergency test and reset.			ok
	Main Air Supply System			
2.1	Ensure, Air is completely vented from locomotive. Drain	Theoretical		
	out all the reservoirs by opening the drain cocks and then	calculation and		
	closed drain cocks. MR air pressure build up time by each	test performed by		
	compressor from 0 to 10 kg/cm2. i) with 1750 LPM compressor	Railways.	i) 7 mins Max.	6 min. & 45
	ii) with 1450 LPM compressor		ii) 8.5 mins Max.	sec.
	ii) with 1430 trivi compressor		ii) 6.5 iiiiis iviax.	360.
2.2	Drain air below MR 8 kg/cm2 to start both the		Check Starting of	ok
	compressors		both compressors	
2.3	Drain air from main reservoir up to 7 kg/cm2. Start		30 Sec. (Max)	CP1-29 Sec
	compressors, Check pressure build time of individual		(,	
	compressor from 8 kg/cm2 to 9 kg/cm2			CP2-28 Sec
2.4	Check Low MR Pressure Switch Setting (37)	D&M test spec.	Closes at 6.40±0.15	6.50 Kg/cm2
		MM3882 &	kg/cm2 Opens at	
		MM3946	5.60±0.15kg/cm2	5.65 Kg/cm2
2.5	Check compressor Pressure Switch RGCP setting (35)	D&M test spec.	Opens at 10±0.20	10 Kg/cm2
		MM3882 &	kg/cm2, Closes	
		MM3946	at 8±0.2kg/cm2	8 Kg/cm2
2.6	Run both the compressors Record Pressure build up time	Trial results	3.5 Minutes Max.	3.45 minute

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2.7	Check unloader val	ve operation				OK/Not OK	ОК
2.8	Check Auto Drain V		4 & 87)			Operates when	ОК
			,			Compressor	
						starts	
2.9	Check CP-I delivery	safety valve setting	(10/1). Run CP	D&M t	est spec.	11.50±0.35	11.5 Kg/cm2
	Direct by BLCP.			MM3882	& MM3946	kg/cm2	
2.10	Check CP-2 delivery	safety valve setting	g (10/2). Run CP		est spec.	11.50±0.35	11.5 Kg/cm2
	direct by BLCP			MM3882	& MM3946	kg/cm2	
2.11	Switch 'OFF' the co	•	•		est spec.		
	valve to reset at pre	essure 1.2 kg/cm2 le	ess than opening	MM3882	& MM3946		
	pressure.	/a!					
2.12	BP Pressure: Switch	•			ck sheet no.	5.0±0.10kg/cm2	5.0 Kg/cm2
	by drain cock of 1"			F60.812 Ve	ersion 2		
2.13	check setting press	ure of Duplex Check	valve 92F.	CLW/s show	ck sheet no.	6.0±0.20kg/sm2	6.00
2.13	FP pressure: Fit Test Gauge in Te	est point 107F EDTD	Open isolate cock	F60.812 Ve		6.0±0.20kg/cm2	Kg/cm2
	136F. Check pressu	•	Open isolate cock	100.812 V	131011 2		Kg/CIIIZ
3.0	Air Dryer Operati						
3.1	Open Drain Cock 90		Compressor, leave			Tower to change	ok
0.12	open for Test Check		-			every minute	J
3.2	Check Purge Air Sto			,			
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		D&M t	est spec.	Should be less	0.5 Kg/cm2	
	leakage from both cabs.			MM3882	& MM3946	than 1 kg/cm2 in	in 15
						15 minutes	minutes
4.2	Check BP Air leakag	ge (isolate BP chargi	ng cock-70)		est spec.	0.15 kg/cm2 in 5	0.05
				MM3882 & MM3946		minutes	Kg/cm2 in 5
							minutes
5.0	Brake Test (Autor	•					
5.1	Record Brake Pipe 8	& Brake Cylinder pre	essure at Each Step				
	Check proportionality of Auto Brake system		CLW's che	ck sheet no.			
		icy of ridico Draine by		F60.812 Version 2			
	Auto controller	BP Pressure kg/cn	ո2	BC (WAG-9	% WAP-7)	BC (WAP-5)	
	position			Kg/cm2		Kg/cm2	
		Value	Result	Value	Result	Value	Result
	Run	5±0.1	5.0 Kg/cm2	0.00	0.00 Kg/ cm2	0.00	-
	Intial	4.60±0.1	4.6 Kg/cm2	0.40±0.1	0.40Kg/ cm2	0.75±0.15	-
	Full service	3.35±0.2	3.4 Kg/cm2	2.50±0.1	2.5Kg/ cm2	5.15±0.30	-
	Emergency	Less than 0.3	0.2 Kg/cm2	2.50±0.1	2.5Kg/ cm2	5.15±0.30	-
		i contract of the contract of			1		i .

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Loco No.: 42042

5.2	Record time to BP pressure drop to 3.5 kg/cm2 Ensure Automatic Brake Controller handle is Full Service from Run	D&M test spec. MM3882 & MM3946	8±2 sec.	9 Sec
5.3	Operate Asst. Driver Emergency Cock,	D&M test spec. MM3882 & MM3946	BP pressure falls to Below 2.5 kg/cm2	ОК
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/cm2 Opens at BP 2.85- 3.15 kg/cm2	4.30 Kg/cm2 3.05 Kg/cm2
5.5	Move Auto Brake Controller handle from Running to Emergency BC filling time from 0.4 kg/cm2 i.e. 95% of Max. BC developed WAP5 – BC 5.15 ± 0.3 kg/cm2 apply time WAP7 - BC 2.50 ± 0.1 kg/cm2 WAG9 - BC 2.50 ± 0.1 kg/cm2	D&M test spec. MM3882 & MM3946	4±1 sec. 7.5±1.5 sec. 21±3 sec.	20 Sec.
5.6	Move Auto Brake Controller handle to full service and BP pressure 3.5 kg/cm2. Move Brake controller to Running position BC Release time to fall BC Pressure up to 0.4 kg/cm2 i.e. 95% of Max. BC developed BC release Time WAP7 WAG9	D&M test spec. MM3882 & MM3946	17.5±25 sec. 52±7.5 sec .	55 sec.
5.7	Move Auto Brake Controller handle to Release, Check BP Pressure Steady at 5.5± 0.2 kg/cm2 time.	CLW's check sheet no. F60.812 Version 2	60 to 80 Sec.	78 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/cm2 by A-9 (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 4.0 kg/cm2 with in 60 Sec.	4.5 Kg/cm2
5.9	Keep Auto Brake Controller (A-9) in Full Service. Press Driver End paddle Switch (PVEF)		BC comes to '0'	0
6.0	Direct Brake (SA-9)			
6.1	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/cm2 5.15±0.3 kg/cm2	3.6 Kg/cm2
6.2	Apply Direct Brake, Record Brake Cylinder charging time	D&M test spec. MM3882 & MM3946	8 sec. (Max.)	8 Sec

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Loco No.: 42042

6.3	Check Direct Brake Pressure switch 59 (F)	D&M test spec. MM3882 & MM3946	0.2.±0.1 kg/cm2	0.25 kg/cm2	
6.4	Release direct brake & BC Release time to fall BC pressure up to 0.4 kg/cm2		10 -15 Sec.	14 Sec	
7.0	Modified System Software (only for CCB)		-NA-	-NA-	
7.1	Bail-off de-activated during emergency by any means	-			
7.2	DPWCS and Non-DPWCS mode enabled		Multi Loco	Presently	
7.3	TCAS and Non-TCAS mode enabled		Not Yet Launched		
7.4	Penalty brake application deactivated for Fault code 113 (FC 113) and CCB health signal will not drop to avoid loco detention/failure. The Brake Electronics Failure "message will not generate on DDS.	RDSO letter no.	Pressure Setting Needed is12 kg/sqcm causing mismatching with standard Pr Setting	not happening in PLW	
7.5	CCB health signal logic revised (Now will remain high) for penalty condition occurring with FC 108 due to wrong operation/not affecting operation/ Not a CCB Fault (i.e Both controllers selected as LEAD etc) The Brake electronic failure message will not generate on DDS	EL/3.2.19/3-phase (CCB), dtd 30.01.2023	-NA-	-NA-	
7.6	CCB health signal logic for FC 102 (In case of BC request from VCU is more than 90 %-above 9V DC) is changed i.e CCB health signal will not drop for FC 102 which will avoid loco detention/failure. The brake electronic failure message will not generate on DDS.		Could not performed by M/s Knorr	Presently Not happening in PLW	
7.7	Booting time for CCB with TCAS/TPM/PTWS/DPWCS mode 15-20 sec. However, in case of absence of either one or both system booting time subsequently increased to 40-50 sec.		-NA-	-NA-	
8.0	Sanding Equipment				
8.1	Check Isolating Cock-134F is in open position. Press sander paddle Switch. (To confirm EP valves Operates)		Sand on Rail	Ok	
9.0	Test Vigilance equipment : As per D&M test specification			Ok	

Signature of SSE/Shop

	42042									
	Warranty									
S.No.	Description	PL NO.	QPL /Nos.	Supplier	Sr. no.					
1	Pantograph	29880014(HR), 29880026	2	FAIVELEY, CONTRANSYS	C25-1230/MAR-2025, 14868-07/24					
2	Servo motor	29880026	2	CONTRANSYS	14867-07/24					
3	Air Intake filter Assly	29480103	2	Vikrant	3595-03/2025, 3595-03/2025					
4	Insulator Panto Mtg.	29810127	8	MIL	03-2025, 04-2025					
5	High Voltage Bushing	29731021	1	ELECTRANEX	EIPL-5981-01-25					
6	Voltage Transformer	29695028	1	CG POWER & INDUSTRIAL	243359-2025	AS Per PO/IRS Conditions				
7	Vacuum Circuit Breaker	25712202	1	Autometers	AALN/04/2025/014/VCBA/014					
8	Insulator Roof line	29810139	9	MIL	02-2025, 02-2025					
9	Harmonic Filter	29650033	1	Sunshine Industries	1343-12/2024					
10	Earth Switch	29700073	1	Patra & Chanda	303-09/2024					
11	Surge Arrester	29750052	2	CG POWER & INDUSTRIAL	57367-2024, 57368-2024	1				
			-	•						
12	Air Compressor (A,B)	29511008	2	ELGI	EYLS 925136 A, EXGS 923588 B					
13	Air Dryer	29162051	1	TRIDENT	LD2-05-1880-25					
14	Babby compressor	25513000	1	CEC	RB 5026-02-25					
15	Air Brake Panel	29180016	1	FAIVELEY	MAR 25-07-WAG9 3993					
16	Contoller (A,B)	29180016	2	FAIVELEY	N 24-099 A, N 24-038 B					
17	Breakup Valve	29180016	2	FAIVELEY						
18	wiper motor	29162026	4	AUTO INDUSTRY						

भारतीय रेल Indian Railways

पटियाला रेलइंजन कारख़ाना, पटियाला

PATIALA LOCOMOTIVE WORKS, PATIALA



LOCO TESTING & DISPATCH REPORT OF IGBT BASED wAg9hc ELECTRIC LOCOMOTIVE

LOCO NO.: 42042

TYPE: WAG9HC

Rail way shed: Cr/BSLL

ProPulsion system: CGL

Date of Dispatch: 22.06.2025

लोको निर्माण रिकार्ड



पटियाला रेलइंजन कारख़ाना, पटियाला PATIALA LOCOMOTIVE WORKS, PATIALA

LOCO NO.: 42042

RAILWAY/SHED: CR/BSLL

DOD: June-2025

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1.0 Continuity Test of the cables

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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 1000V megger.

From	То	Continuity (OK/Not OK)	Prescribed Megger Value (min)	Measured Megger Value
Filter Cubicle	Transformer	oK	100 ΜΩ	750002
Filter Cubicle	Terminal Box of Harmonic Filter Resistor (Roof)	ok	100 ΜΩ	800me
Filter Cubicle	Earthing Choke	OK	100 ΜΩ	800ms
Earthing Choke	Earth Return Brushes	ok	100 ΜΩ	750 ans
Transformer	Power Converter 1	OK	100 ΜΩ	800 ars
Transformer	Power Converter 2	ok	100 ΜΩ	700 MS
Power Converter 1	TM1, TM2, TM3	ok	100 ΜΩ	800 ml
Power Converter 2	TM4, TM5, TM6	OK	100 ΜΩ	900m2
Earth	Power Converter 1	ok	100 ΜΩ	85°ona
Earth	Power Converter 2	ok	100 ΜΩ	750ms

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 1000V megger.

Signature of the JE/SSE/Harness

Signature of the JE/SSE/Loco Cabling

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From	То	Continuity(OK/ Not OK)	Prescribed Megger Value (min)	Measured Megger Value
Transformer	BUR1	OK	100 ΜΩ	600m/L
Transformer	BUR2	Jok.	100 M Ω	JAMMAL.
Transformer	BUR3	ou	100 M Ω	KOD MS
Earth	BUR1	OK	100 ΜΩ	600M
Earth	BUR2	OK	100 M Ω	500 m/
Earth	BUR3	ole	100 M Ω	600 M/L
BUR1	HB1	or	100 MΩ	100 mr
BUR2	HB2	OK.	100 MΩ	Looma
HB1	HB2	O'L	100 ΜΩ	600 011
HB1	TM Blower 1	or	100 ΜΩ	600 M
HB1	TM Scavenge Blower 1	OK.	100 ΜΩ	700 m/
HB1	Oil Cooling Unit 1	ok_	100 ΜΩ	800 m
HB1	Compressor 1	ML	100 ΜΩ	600 m
HB1	TFP Oil Pump 1	814	100 ΜΩ	700 mr
HB1	Converter Coolant Pump 1	OK	100 ΜΩ	600 mr
HB1	MR Blower 1	or	100 ΜΩ	600 M2
HB1	MR Scavenge Blower 1	ok	100 ΜΩ	Sooma
HB1	Cab1	ol-	100 ΜΩ	600 m2
Cab1	Cab Heater 1	OK	100 ΜΩ	Jooms
HB2	TM Blower 2	ok.	100 ΜΩ	600 m/2
HB2	TM Scavenge Blower 2	80K	100 ΜΩ	Commo
HB2	Oil Cooling Unit 2	ok	100 ΜΩ	
HB2	Compressor 2	014	100 ΜΩ	700 Ma
HB2	TFP Oil Pump 2	ole_	100 ΜΩ	600 M/
HB2	Converter Coolant Pump 2	- Ok	100 ΜΩ	700 m
HB2	MR Blower 2	gle_	100 ΜΩ	600 Mg/2
HB2	MR Scavenge Blower 2	ok	100 ΜΩ	600 ML
HB2	Cab2	- Bl	100 ΜΩ	STO MA
Cab2	Cab Heater 2	ok	100 MΩ ·	600 MA

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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	То	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	Prescribed value	Measured
measure the resistance of battery wires 2093, 2052, 2050 with respect to the loco earth.	> 0.5 MΩ	Value MΩ
Measure the resistance between 2093 & 2052, 2093 & 2050, 2052 &	Prescribed value:	Measured
2050	> 50 MΩ	Value <u>70</u> ΜΩ

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 OK
Primary voltage detection	01A, 12A	ø K
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	ØK
Terminal fault indication cab-1 & 2	09F	OK
Brake pipe pressure actual BE electric	06H	o K
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	_
Magnetization current	12C, 12G	<u> </u>
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 OK
Traction motor speed sensors (2nos) and temperature sensors (1 no.) of TM-3	12D	o K
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	øK
Traction motor speed sensors (2nos) and temperature sensors (1 no.) of TM-6	12H	ок
Train Bus cab 1 & 2 (Wire U13A& U13B to earthing resistance=	13A	OK
10KΩ±±10%)		
UIC line	13B	OK
Connection FLG1-Box TB	13A	øK.

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2.0 Low Tension test

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).	3.9K Ω ± 10%	3.9 KSL
Resister to maximum current relay.	1 Ω ± 10%	12
Load resistor for primary current transformer (Pos. 6.11).	3.3 Ω ± 10%	3.32
Resistance harmonic filter (Pos 8.3). Variation allowed \pm 10%	WAP7	WAP7
Between wire 5 & 6	0.2 Ω	0.20
Between wire 6 & 7	0.2 Ω	0.21
Between wire 5 & 7	0.4 Ω	0.42
For train bus, line U13A to earthing.	10 k Ω ± 10%	10.0K SL
For train bus, line U13B to earthing.	10 k Ω ± 10%	10.0KSZ
Insulation resistance of High Voltage Cable from the top of the roof to the earth (by1000 V megger).	200 ΜΩ	300 MJL
Resistance measurement earth return brushes Pos. 10/1.	≤0.3 Ω	0.2952
Resistance measurement earth return brushes Pos. 10/2.	≤0.3 Ω	0.2952
Resistance measurement earth return brushes Pos. 10/3.	≤0.3 Ω	0.2852
Resistance measurement earth return brushes Pos. 10/4.	≤0.3 Ω	0.30s2
Earthing resistance (earth fault detection) Harmonic Filter –I; Pos. 8.61.	2.2 kΩ ± 10%	2.2KD
Earthing resistance (earth fault detection) Harmonic Filter –II; Pos 8.62.	2.7 k Ω ± 10%	2.7 KD
Earthing resistance (earth fault detection) Aux. Converter; Pos. 90.3.	3.9 k Ω ± 10%	3.9 KD
Earthing resistance (earth fault detection) 415/110V; Pos. 90.41.	1.8 kΩ± 10%	1.8 KD
Earthing resistance (earth fault detection) control circuit; Pos. 90.7.	390 Ω ± 10%	39052
Earthing resistance (earth fault detection) Hotel load; Pos. 37.1(in case of WAP5).	3.3 k Ω ± 10%	NA
Resistance for headlight dimmer; Pos. 332.3.	10 Ω ± 10%	100

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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	CHECKED 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	CHECKED 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	CHEALED OK
Test 48V supply	Sheet 04F & sheets of group 09	Fan supply to be checked. $\mathcal{O} \mathcal{K}$
Test traction control	Sheets of Group 08.	øK.
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	σK
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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Locomotive No.: $42\sigma42$ 3.0 Downloading of Software

Type of Locomotive: WAP-7/WAG-9HC

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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:	1.0.6.9
Traction converter-2 software version:	1.0.6.9
Auxiliary converter-1 software version:	1.0.1.0
Auxiliary converter-2 software version:	2.0.10
Auxiliary converter-3 software version:	3.0.1.0
Vehicle control unit -1 software version:	60.0.18
Vehicle control unit -2 software version:	6.0.0.18

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;0101XPrAutoBkLn	100% (= 5 Kg/cm2)	OK
Actual BE electric	FLG2; AMSB_0201- Wpn BEdem	100% (= 10V)	ОК
TE/BE at 'o' position from both cab	FLG1; AMSB_0101- Xang Trans FLG2; AMSB_0101- Xang Trans	Between 9% and 11%	10%
TE/BE at 'TE maximal' position from both cab	FLG1; 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 %	25 %

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TE/BE at 'BE maximal position from both cab	XangTrans FLG2; AMSB_0101- XangTrans	Between 99% and 101%	100%
TE/BE at 'BE Minimal position from both cab	XangTrans FLG2; AMSB_0101- XangTrans	Between 20% and 25%	25%
TE/BE at '1/3' position in TE and BE mode in both cab.	LT/BDEM>1/3 HBB2; AMS_0101- LT/BDEM>1/3	Between 42 and 44%	44%
TE/BE at '1/3'positior 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	21.0
Both temperature sensor of TM2	SLG1; AMSB_0106- Xatmp2Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	22%
Both temperature sensor of TM3	SLG1; AMSB_0106- Xatmp3Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	20°C
Both temperature sensor of TM4	SLG2; AMSB_0106- XAtmp1Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	20°C
Both temperature sensor of TM5	SLG2; AMSB_0106- Xatmp2Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	20.5°c
	Xatmp3Mot	Between 10% to 11.7% depending upon ambient temperature 0°C to 40°C	21°c

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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
	nesuit desired in sequence	obtained
Emergency shutdown through	VCB must open.	obtained
emergency stop switch 244	Panto must lower.	CHECKED OK
	T ditto mast lower.	Checkey OR
Shut Down through cab activation	VCB must open.	
switch to OFF position	Panto must lower.	CHECKED OK
Converter and filter contactor	FB contactor 8.41 is closed.	
operation with both Power	By moving reverser handle:	1)
Converters during Start Up.	 Converter pre-charging contactor 	V
	12.3 must close after few seconds.	
	• Converter contactor 12.4 must close.	
	 Converter re-charging contactor 	CHECKED OK
	12.3 must opens.	
	By increasing TE/BE throttle:	
	• FB contactor 8.41 must open.	•
	• FB contactor 8.2 must close.	
	$ullet$ FB contactor 8.1 must close. \int	
Converter and filter contactor		
operation with both Power	The same detribution her to o	
Converters during Shut Down.	• VCB must open.	
	• Panto must lower.	
	 Converter contactor 12.4 must open. 	T CHECKED OK
·	 FB contactor 8.1 must open. 	,
	 FB contactors 8.41 must close. 	·
	 FB contactor 8.2 must remain closed. 	
	· /	
<u> </u>	/	

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		_
Contactor filter adaptation by isolating any bogie	Isolate any one bogie through bogie cut out switch. Wait for self-test of the loco.	
	 Check that FB contactor 8.1 is open. 	į
	 Check that FB contactor 8.2 is open. 	TCHECKED OK
	After raising panto, closing VCB, and	Checkey
	setting TE/BE	V
	• FB contactor 8.1 closes.	I
	• FB contactor 8.2 remains open.	1
Test earth fault detection battery	By connecting wire 2050 to	
circuit positive & negative	earth, create earth fault	
•	negative potential.	/
	message for earth fault	1
	By connecting wire 2095	CHECKED OK
	to earth, create earth	
•	fault positive potential.	Å
·	• message for earth fault	
	/	
Test fire system. Create a smoke in	When smoke sensor-1 gets	
the machine room near the FDU.	activated then	1
Watch for activation of alarm.	Alarm triggers and fault	1
•	message priority 2	
	appears on screen.	
	When both smoke sensor	CHECKED OK
	1+2 gets activated then	CILCACY OF
	A fault message priority	
	1 appears on screen and	
•	lamp LSF1 glow.	
• • •	• Start/Running interlock occurs and	
	TE/BE becomes to 0.	
ime, date & loco number	Ensure correct date time and Loco	
	number	OK
	1	l l

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4.0 Sensor Test and Converter Test

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	10-05 Up	OK
2U ₄ & 2V ₄	For line converter bogie 1 between cable 811A- 814A	10.05V _p and same polarity	16.04 vp	OK
2U ₂ & 2V ₂	For line converter bogie 2 between cable 801B- 804B	10.05V _p and same polarity	10.05 Vp	ОК
2U ₃ & 2V ₃	For line converter bogie 2 between cable 811B- 814B	10.05V _p and same polarity	10.08Vp	οK
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.	7.9 U1 5.6 VRMS)	σK
2U _F & 2V _F	For harmonic filter between cable 4-12 (in FB)	9.12V _p , 6.45V _{RMS} and same polarity.	4.10 UP 644VRMS]	oK

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.	58.6 VP	
		41-5VRMS)	. OK
Cable no. 1218 – 6500	$15.5V_p$, $11.0V_{RMS}$ and opposite polarity.	15.5VP	OK

11-0 VRMS1

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4.3 Primary Voltage Transformer

Apply $250V_{\rm eff}/350V_{\rm p}$ 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%	25KV	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%	17KV	170 %
SLG2_G 87-XUPrim	17 kV	170%	17KV	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%	30KV	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 adju	sted 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; <i>Minimum voltage relay (Pos. 86) picks up</i>	(Yes/No)
Try to activate the cab in driving mode:	/// /or 1
Contactor 218 do not close; the control	(yes/No)
electronics is not be working.]
Turn off the variac :	
Contactor 218 closes; the control electronics is be	(Yes/No)
working	
Test Under Voltage Protection	<u>;</u>
Activate the cab in cooling mode; Raise panto;	15.7.7
Supply 200V _{RMS} through variac to wire no. 1501	(Yés/No)
& 1502; Close the VCB; Interrupt the supply	
voltage	[
The VCB goes off after 2 second time delay.	
Again supply 200V _{RMS} through variac to wire no.	(Yés/No)
1501 & 1502; Decrease the supply voltage below 140V _{RMS} ± 4V;	
Fine tune the minimum voltage relay so that VCB opens.	
Totale relay so that veb opens.	

4.5 Maximum current relay (Pos. 78)

Disconnect wire 1521 & 1522 of primary current tra &1522 (including the resistor at Pos. 6.11); Put loco in s on contact 136.3; Close VCB; supply 3.6A _{RMS} at the maximum current relay Pos. 78 for correct over current	imulation for driving mode; Open R ₃ – R ₄
VCB opens with Priority 1 fault message on display.	(Yes/No)
Keep contact R_3 – R_4 of 136.3 closed; Close VCB; Tune tf /9.9 A_p at the open wire 1521;	ne resistor 78.1 for the current of 7.0A _{RMS}
VCB opens with Priority 1 fault message on display.	(Yés/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 ± 10%)	
Primary return current	Supply 90mA _{DC} to the test winding of sensor through connector 415.AA/1or 2 pin no. 7(+) & 8(-)	_	
sensor (Test-2, Pos.6.2/1 & 6.2/2)	Supply 297mA _{DC} to the test winding of sensor through connector 415.AA/1or 2 pin no. 7(+) & 8(-)		299ma
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(-)		338mA
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(-)		346 ma
Hotel load current sensors (Pos. 33/1 &	Switch on hotel load. Supply 90mA _{DC} to the test winding of sensor through connector 415.AG/1or 2 pin no. 7(+) & 8(-)	NA	NA
33/2)	Supply 1242mA _{DC} to the test winding of sensor through connector 415.AG/1or 2 pin no. 7(+) & 8(-)	NA	NA

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

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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	Measured limit
	should take place	
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 8.2/2= 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	52/2	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	52/2	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	ciose	OPEN	Close	CLOSE	olen
BUR1 off	CLOSE	OPEN	CLOSE	CLOSE	OPEN	CLOSE	OPEN	OPEN	close
BUR2 off	ofen	OPEN	CLOSE	CLOSE	OPEN	close	OPEN	OPEN	close
BUR3 off	OPEN	CLUSE	OPEN	CLOSE	OPEN	close	OPEN	OPEN	CLOSE

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	YES
	YES
All the MCBs of the HB1 & HB2 open.	
All the three fuses 40/* of the auxiliary converters	YES
	YES
The fuse of the 415/110V auxiliary circuit (in HB1) open.	YES
Roof to roof earthing and roof to cab earthing done	1 1 1 2 3
Fixing connection and earthing in the average of the state of the stat	. YES
Fixing, connection and earthing in the surge arrestor done correctly.	Vec
Connection in all the traction motors done correctly.	YES_
All the bogie body connection and earthing connection done correctly.	YES
All the bogie body conflection and eartning connection done correctly.	
Pulse generator (Pos. 94.1) connection done correctly.	YES
<u> </u>	YES
All the oil cocks of the gate valve of the transformer in open condition.	YES
All covers on Aux & Power converters, Filter block, HB1, HB2 fitted	165
	YES
KABA key interlocking system.	YES

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.	CHECKED 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.	CHECKED 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.	CHECKED 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	CHECKED 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.	CHECKED 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.	CHECKED OK
Interlocking pantograph- VCB in cooling mode	Raise panto in cooling mode. Close the VCB. Lower the pantograph by ZPT	VCB must open.	Снесрео ок
Interlocking pantograph- VCB in driving mode	Raise panto in driving mode. Close the VCB. Lower the pantograph by ZPT	VCB must open.	CHECKED 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	8.7	4.3
Oil pump transformer 2	9.8 amps	9.0	9.6
Coolant pump converter 1	19.6 amps	5.4	7.0
Coolant pump converter 2	19.6 amps	5.5	80
Oil cooling blower unit 1	40.0 amps	36.0	. 1450
Oil cooling blower unit 2	40.0 amps	37.0	150.0
Traction motor blower 1	34.0 amps	28.0	132.0
Traction motor blower 2	34.0 amps	29.0	154.0
Sc. Blower to Traction motor blower 1	6.0 amps	3.0	7.5
Sc. Blower to Traction motor blower 1	6.0 amps	3.2	7.2
Compressor 1	25 amps at 0 kg/cm ² 40 amps at 10 kg/cm ²	24.0	55.0
Compressor 2	25 amps at 0 kg/cm ² 40 amps at 10 kg/cm ²	250	50.0

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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)
BURI 7303 XUUN	Input voltage to BUR1	75% (10%=125V)	949V	YES
	DC link voltage of BUR1	60% (10%=100V)	636V	YES
BURI 7303 XUIZI	DC link current of BUR1	0% (10%=50A)	I AMP	YES

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)	1003V	YES
BUR2 7303-XUUZ1	DC link voltage of BUR2	60% (10%=100V)	637V	YES.
BUR2 7303-XUIZ 1	DC link current of BUR2	1% (10%=50A)*	7 AMP	YES
BUR2 7303-XUILG	Current battery charger of BUR2	3% (10%=100A)*	22 AMP	Yes
BUR2 7303-XUIB1	Current battery of BUR2	1.5%(10%=100A)*	12 AMP	yes
BUR2 7303 -XUUB	Voltage battery of BUR2	110%(10%=10V)	1100	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	75% (10%=125V	1002V	YES
BUR3 7303- XUUZ1	DC link voltage of BUR3	60% (10%=100V)	637 V	YES YES
BUR3 7303-XUIZ I	DC link current of BUR3	1% (10%=50A)*	7AMP	765 765
BUR3 7303-XUILG	Current battery charger of BUR 3	3% (10%=100A)*	22 AMP	YES
BUR3 7303-XUIB1	Current battery of BUR 3	1.5%(10%=100A)*	12 Ans	7ES
BUR3 7303-XUUB	Voltage battery of BUR 3	110%(10%=10V)	1104	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.	CHECKE OK
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.		

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*	4.3	13.0
Machine room blower 2	15.0 amps*	4.4	120
Sc. Blower to MR blower 1	1.3 amps	1.3	20
Sc. Blower to MR blower 2	1.3 amps	1-2	2.2
Ventilator cab heater 1	1.1 amps	1-1	1.1
Ventilator cab heater 2	1.1 amps	1.1	1.7
Cab heater 1	4.8 amps	4.6	4.7
* For indigenous MR blowers	4.8 amps	4.7	4.8

For indigenous MR blowers.

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5.5 Hotel load circuit (Not applicable for WAG-9HC)

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	Traction converter manufacturer to	
charging and pre- charging and charging of DC Link of Converter 1	declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
Measurement of discharging of DC Link of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	Снескер оК
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 PLW supervisor.	CHECKED 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 PLW supervisor.	CHECKED 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 PLW supervisor.	CHECKED OK
Pulsing of line converter of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
Pulsing of drive converter of Converter 1	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHELLED 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 PLW supervisor.	CHECKED OK
Measurement of discharging of DC Link of Converter 2	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
positive potential of DC Link of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
negative potential of DC Link of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the supervisor/v	CHECKED OK
AC part of the traction circuit of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
of Converter 2.	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK
converter of Converter 2	Traction converter manufacturer to declare the successful operation and demonstrate the same to the PLW supervisor.	CHECKED OK

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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 1Check that converter 1 electronics produces a protective shut down. • VCB goes off • Priority 1 fault mesg. on DDU appears	> CHECKED OK
·	Disturbance in Converter 1	
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 shut down. • VCB goes off • Priority 1 fault mesg. on diagnostic display appears Disturbance in Converter 2	>CHECKED OK

5.8 Test Harmonic Filter

Switch on the filter by switch 160

Test Function	Results desired in sequence	Result obtained		
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. • FB contactor 8.41 must open.	CHECKED OK		

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Test earth fault	 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 8.1must open. FB discharging contactor 8.41 must close Check the filter current in diagnostic laptop Make a connection between wire 	CHECKED OK
detection harmonic filter circuit.	no. 12 and vehicle body. Start up the loco. Close VCB. • Earth fault relay 89.6 must pick up. • Diagnostic message comes that - Earth fault in harmonic filter circuit	CHECKED 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/ PLW	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/ PLW	CHECKED 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	CHECKED OK
Ni-Cd battery voltage	At full charge, the battery voltage should be 110V DC.	CHECKED OK
Flasher light	From both cab flasher light should blink at least 65 times in one minute.	CHECKED 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.	CHECKED OK

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Marker light	Both front and tail marker light should glow from both the cabs	CHECKED OK
Cab Light	Cab light should glow in both the cabs by operating the switch ZLC	CHECKED OK
Spot lights	Both Drivers and Asst. Drivers Spot light should glow in both cabs by operating ZLDD	CHECKED OK
Instrument lights	Instrument light should glow from both cab by operating the switch ZLI	CHECKED OK
Illuminated Push button	All illuminated push buttons should glow during the operation	CHECKED 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:
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 m³/minute	Cab 1 LHS: Cab 1 RHS: Cab 2 LHS: Cab 2 RHS:

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.	CHECKED	
	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 .	CHECKED 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.	CHECKED OK	
4.	Check function of BPCS.	 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/cm², by pressing BPCS again. 	CHECKE P OK	
5.	Check train parting operation of the Locomotive.	Operate the emergency cock to drop the BP Pressure LSAF should glow.	CHECKED	

Signature of the JE/SSE/Loco Testing

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6.	Check vigilance	Sat the speed mare than 1 E lemph and ensure that
•	operation of the	Set the speed more than 1.5 kmph and ensure that
	locomotive	brakes are released i.e. BC < 1 Kg/cm ² .
	locomotive	For 60 seconds do not press vigilance foot switch or
		sanding foots switch or TE/BE throttle or BPVG
		switch then
		Buzzer should start buzzing.
		LSVW should glow continuously.
	·	Do not acknowledge the alarm through BPVG or
		vigilance foot switch further for 8 seconds then:-
		Emergency brake should be applied:
		automatically.
	•	VCB should be switched off.
		Resetting of this penalty brake is possible only after
	•	32 seconds by bringing TE/BE throttle to 0 and
		acknowledge BPVR and press & release vigilance
		foot switch.
7. 	Check start/run interlock	• At low pressure of MR (< 5.6 Kg/cm ²).
		With park brake in applied condition.
ļ		• With direct loco brake applied (BP< 4.75Kg/cm ²).
		• With automatic train brake applied (BP<4.75Kg/cm²).
	'	• With emergency cock (BP < 4.75 Kg/cm ²).
8.	Check traction interlock	Switch of the brake electronics. The
	•	Tractive / Braking effort should ramp down, VCB
		should open and BP reduces rapidly.
9.	Check regenerative	Bring the TE/BE throttle to BE side. Loco speed
	braking.	should start reducing.
10.	Check for BUR	In the event of failure of one BUR, rest of the two
	redundancy test at	BURs can take the load of all the auxiliaries. For this
	ventilation level 1 & 3 of	switch off one BUR.
	loco operation	Auxiliaries should be catered by rest of two BURs.
- 1.1		Switch off the 2 BURs; loco should trip in this case.
11.	Check the power	Create disturbance in power converter by switching
	converter	off the electronics. VCB should open and converter
	isolation test	should get isolated and traction is possible with
·]		another power converter.

Issue No.03

Effective Date: Feb 2022

M'7'd <u>Patiala locomotive</u> works, patiala

Doc.No.F/ECS/01 (Ref: WI/ECS/10)

<u>Testing & Commissioning Format For 3-Phase Locomotive fitted with IGBT based Traction Converter, Auxiliary Converter and TCN based VCU</u>

Locomotive No.: 42042

Type of Locomotive: WAP-7/WAG-9HC

Page: 27 of 27

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	οΚ	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	CHECKED WORKING OK
7	Flasher Light	οK	oK	CHECKED WORKING OK
8	Instrument Lights	OK	OK	
9	Corridor Light	OK	øK	
10	Cab Fans	OK	OK	
11	Cab Heater/Blowers	OK	σK	
12	All Cab Signal Lamps Panel 'A'	OK	ok)	

Status of RDSO modifications

LOCO NO: 42041

Sn	Modification No.	Description	Remarks
1.	RDSO/2008/EL/MS/0357	Modification in control circuit of Flasher Light and Head Light of	
	Rev.'0' Dt 20.02.08'	three phase electric locomotives.	Ok/Not Ok
2.	RDSO/2009/EL/MS/0377 Rev.'0' Dt 22.04.09	Modification to voltage sensing circuit in electric locomotives.	OK/Not Ok
3.	RDSO/2010/EL/MS/0390 Rev.'0' Dt 31.12.10	Paralleling of interlocks of EP contactors and Relays of three phase locomotives to improve reliability.	Øk/Not Ok
4.	RDSO/2011/EL/MS/0399 Rev.'0' Dt 08.08.11	Removal of interlocks of control circuit contactors no. 126 from MCPA circuit.	Ok/Not Ok
5.	RDSO/2011/EL/MS/0400 Rev.'0' Dt 10.08.11	Modification sheet for shifting the termination of \$GKW, 1.8 KV, 70 sq mm cables and 2x2.5 sq mm cables housed in lower portion of HB2 panel and provision of Synthetic resin bonded glass fiber sheet for three phase locomotives.	Ok/Not Ok
6.	RDSO/2011/EL/MS/0401 Rev.'0' Dt 10.08.11	Modification sheet for relaying of cables in HB-2 panel of three phase locomotives to avoid fire hazards.	Ok/Not Ok
7.	RDSO/2011/EL/MS/0403 Rev.'0' Dt 30.11.11	Auto switching of machine room/corridor lights to avoid draining of batteries in three phase electric locomotives.	Øk/Not Ok
8.	RDSO/2012/EL/MS/0408 Rev.'0'	assembly.	Ok/Not Ok
9.	RDSO/2012/EL/MS/0411 Rev.'1' dated 02.11.12	Modification sheet to avoid simultaneous switching ON of White and Red marker light in three phase electric locomotives.	OK/Not Ok
10	RDSO/2012/EL/MS/0413 Rev.'1' Dt 25.04.16	Paralleling of interlocks of EP contactors and auxiliary contactors of three phase locomotives to improve reliability.	OK/Not Ok
11	RDSO/2012/EL/MS/0419 Rev.'0' Dt 20.12.12	Modification sheet to provide rubber sealing gasket in Master Controller of three phase locomotives.	Øk/Not Ok
12	RDSO/2013/EL/MS/0420 Rev.'0' Dt 23.01.13	Modification sheet to provide mechanical locking arrangement in Primary Over Current Relay of three phase locomotives.	OK/Not Ok
13	RDSO/2013/EL/MS/0425 Rev.'0' Dt 22.05.13	Modification sheet for improving illumination of head light in dimmer mode in three phase electric locomotives.	Øk/Not Ok
14	RDSO/2013/EL/MS/0426 Rev.'0' Dt 18.07.13	Modification sheet of Bogie isolation rotary switch in three phase electric locomotives.	Ok/Not Ok
15	RDSO/2013/EL/MS/0427 Rev.'0' Dt 23.10.13	Modification sheet for MCP control in three phase electric locomotives.	Ok/Not Ok
16	RDSO/2013/EL/MS/0428 Rev.'0' Dt 10.12.13	Modification sheet for relocation of earth fault relays for harmonic filter and hotel load along with its resistors in three phase electric locomotives.	2 ΘK/Not Ok
17	RDSO/2014/EL/MS/0432 Rev.'0' Dt 12.03.14	Removal of shorting link provided at c-d terminal of over current relay of three phase electric locomotives.	Ok/Not Ok
18	RDSO/2017/EL/MS/0464 Rev.'0' Dt 25.09.17	Provision of Auxiliary interlock for monitoring of Harmonic filter ON (8.1)/adoption (8.2) Contactor in GTO/IGBT locomotives.	ØK/Not Ok
19	RDSO/2017/EL/MS/0467 Rev.'0' Dt 07.12.17	Modification in blocking diodes to improve reliability in three phase electric locomotives.	Ok/Not Ok
.20	RDSO/2018/EL/MS/0475 Rev.'0'	Modification in existing Control Electronics (CE) resetting scheme of 3 phase electric locomotives.	Øk/Not Ok
21	RDSO/2019/EL/MS/0477 Rev.'0' Dt 18.09.19	Implementation of push pull scheme.	Øk/Not Ok
22	RDSO/2024/EL/MS/0500 Rev '0' Dt. 13.09.2024	Recording of Flasher light operation either due to fault or manually by Loco Pilot in case of emergency with time stamping in VCU of 3-phase Electric Locomotives.	Øk/Not Ok
23	RDSO/2024/EL/MS/0502 Rev '0' Dt 10.10.2024	Unloader valve control circuit modification in three Phase Electric Locomotives.	Ok/Not Ok
24	RDSO/2024/EL/MS/0503 Rev '0' Dt 17.09.2024	Paralleling of interlocks of control circuit contactor to improve reliability of three phase electric locomotives	Ok/Not Ok
25	RDSO/2024/EL/MS/0504 Rev '0' Dt 21.11.2024	Isolation of Harmonic Filter from 3-phase locomotives fitted with M/s Alstom (BTIPL), CGPISL and Medha make IGBT based Propulsion Equipment	Cok/Not Ok

Signature of JE/SSE/ECS

-		TIVE WORKS, PATIA 12042/CR/BSLL / U			
Equipment	PL No.		nt Serial No.	Ma	ike
lete Shell Assembly with piping	29171027	08/17	1, 06/25	Chandra	Udyog
Buffer Assly Both Side Cab I		19, 11/24	329, 02/25	AEU	AEU
Buffer Assly Both Side Cab II	29130050	320, 02/25	433, 02/25	AEU	AEU
ab I & II	29130037	132, 11/24	123, 11/24	FASP	FASP •
Brake			12-5/25	Mechwe	I SSI I Init
Diake	29045034	100-	+2-3/23	+	
Secondry Helical Spring	29043034			Frontio	Y
ry Boxes (both side)	29680013	154, 03/25	174, 03/25	BHARTIA BRIGHT	BHARTIA BRIGHT
on Bar Bogie I		8926	5, 04/25	KI	M
on Bar Bogie II		8899), 04/25	KI	M
e Pivot Housing in Shell Bogie I side	29100057	461,	, 02/25	AN	IIL
e Pivot Housing in Shell Bogie II side	23100037	495,	, 02/25	AN	IIL
Ring in Front in Shell Bogie I side	29100010	05/26	6, 10/24	SS	PL
Ring in Front in Shell Bogie II side	29100010	05/07	7, 10/24	· SS	PL
Transformer	29731008 for WAG 9 29731057 for WAP-7	MIPL-65-03-	-25-0007, 2025	MAH	HATI
oling Radiator I .	20470004	03/25, p0	0325RC2823	fine AUTO	OMOTIVE
oling Radiator II	29470031	03/25, p0	0325RC2812	Fine AUT	OMOTIVE
Compressor I with Motor		EXGS 923	3598, 10/24	EL	Gi
Compressor II with Motor	29511008		5136, 03/25	. EL	
former Oil Cooling Pump I			4102, 2024		
	+		4110, 2024	FLOWOIL	
former Oil Cooling Pump II				FLOWOIL PD STEEL	
ooling Blower OCB I	29470043		28, LHP1001610299	PD STEEL	
oling Blower OCB II		01/25, PDS2501027, LHP1001610298			
ower I	29440075	02/25, 24P6794AF13 , 24P6794/13		SAINI .	
ower II		02/25, 24P6794	AF37, 24P6794/37	SA	INI
ine Room Blower I	29440105	03/25, D42-61	L75, MF42/D,6222	SAN	ИAL
ine Room Blower II	25440105	01/25, AC-6133	5, CGLXKCM11442	AC	CEL
ine Room Scavenging Blower I	29440129	03/25, AC-6184	9, CGLYBCM13936	AC	CEL
ine Room Scavenging Blower II	29440129	03/25, S	M-25.03.65	G ⁻	ΓR
cavenging Blower Motor I	29440117	05/25, 24P8000	ÄF23,24P8000/23	SA	INI
cavenging Blower Motor II	29440117				
on Convertor I		ATIL/12/2024/13	PROPULSION/4266		
on Convertor II		ATIL/12/2024/13	PROPULSION/4265		
le Control Unit I	29741075	ATIL/12/2024/13	/PROPULSION/4265	BI	TIL
le Control Unit II	257,12075		PROPULSION/4266		
Converter Box I (BUR 1)			/10257/31A/1286		
Converter Box 2 (BUR 2 + 3)			/10257/31B/1286		
ry Control Cubical HB-1	29171180	04/25, HB1,	/1016/04/2025		
ry Control Cubical HB-2	29171192	02/25 444402	2025 IOE ICD 140 I - 4	10	Λ1
	-			T D . A	4
Cubical (FB) (COMPLETE FILTER	29480140			HIND RE	CTIFIERS
	20171121	A/25 1F2	183 1/5 100	TADI	IDEED
				TARU	DELF
former oil steel pipes				1	27/4
ervator Tank Breather				YOU	GYA •
t Assembly (only for WAG-9)	29170163			-	
CLES) r Seats former cervator 1	oil steel pipes Tank Breather	trol Cubicle SB-2 29171210 (FB) (COMPLETE FILTER 29480140 29171131 bil steel pipes 29230044 Tank Breather 29731057	trol Cubicle SB-2 29171210 KPL/SB2 (FB) (COMPLETE FILTER 29480140 FB/2025/ 29171131 4/25- 153, bil steel pipes 29230044 Vikrai Fank Breather 29731057 24-1506	trol Cubicle SB-2 29171210 KPL/SB2/2502/103 (FB) (COMPLETE FILTER 29480140 FB/2025/D/0274/652 29171131 4/25- 153, 183, 145, 100 oil steel pipes 29230044 Vikrant PIPES Tank Breather 29731057 24-1506B,24-15069 bly (only for WAG-9) 29170163 11,73	trol Cubicle SB-2 29171210 KPL/SB2/2502/103 (FB) (COMPLETE FILTER 29480140 FB/2025/D/0274/652 HIND RE 29171131 4/25- 153, 183, 145, 100 TARU oil steel pipes 29230044 Vikrant PIPES Tank Breather 29731057 24-1506B,24-15069 YOU bly (only for WAG-9) 29170163 11,73

NAME Shuamm smam SSE/LAS

NAME ANKIT UPPAL
JE/LAS/UF

Issue No.: 05 Effective Date: July-2023

DOC NO: F/LAS/Electric Loco CHECK SHEET (Ref: WI/LAS/Elect/01, 02, 03 & 04 & QPL/LAS/Elect. Loco)

Page 1 of 1

पटियाला रेलइंजन कारखाना, पटियाला PATIALA LOCOMOTIVE WORKS, PATIALA **ELECTRIC LOCO CHECK SHEET**

LOCO NO: 42042

Shed: BSLL

S. No.	ITEM TO BE CHECKED	Specified Value	C	bserve	d Val	ue
1.1	Check proper Fitment of Hotel Load Converter & its output contactor.	OK		- N	1	_
1.2	Check proper Fitment of MR Blower 1 & 2, MR Scavenging Blower 1 & 2, TM Blower 1 & 2, TMB Scavenging Blower 1 & 2. TM scavenging blower 1 & 2 & Oil Cooling unit.	ОК			K	
1.3	Check proper of Fitment of oil cooling unit (OCU).	OK		(3/2	
1.4	Check proper Fitment of HB 1 & 2 and its respected lower part on its position.	OK		(OLL	
1.5	Check proper Fitment of FB panel on its position.	OK			5/2	
1.6	Check proper Fitment of assembled SB1 & SB2 panel.	OK			OLL	
1.7	Check proper Fitment of Auxiliary converter 1, 2 & 3-(BUR-1, 2 & 3).	OK		92		
1.8	Check proper Fitment of Traction converter 1 & 2 (SR-1 & 2).	OK			0/2	
1.9	Check proper fitment, torquing & Locking of Main Transformer bolt.	OK			0/	
1.10	Check proper fitment of Main compressor both side with the compressor safety wire rope.	OK		d/L		_
1.11	Check proper resting of Secondary Helical Springs between Bogie & Shell body.	OK			0/2	
1.12	Check proper fitment of Bogie Body Safety Chains.	OK		-04/10	01	
1.13	Check proper fitment of Cow catcher.	OK			VI	
1.14	Check coolant level in SR 1 & 2 Expansion Tank.	OK			0/4	
1.15	Check Transformer Oil Level in both conservators Tank (Breather Tank).	OK			01	C
1.16	Check proper fitment and maintain required gaps from Loco Shell Body of all metallic pipes to avoid any damage during online working of Locomotives.	OK		0/2		2
1.17	Check proper fitment of both battery box.	OK		ar		1
1.18	Check for any gap between Main Transformer mounting base & Loco Shell.	OK			d	1
1.19	Check proper fitment of Push Pull rod its bolt torquing and fitment of fixing cable. As per Drg No 1209-01-113-001	OK		0/2		
1.20	Secondary Vertical and Lateral Clearance on leveled track at the time of Loco Dispatch.	Vertical-Std :35-60 mm	CA	B-1		CAB-2
	ELRS/TC/ 0082 (Rev 1) dated 17.09.2015		LP	ALP	LP	ALP
			48	44	46	41
		Lateral Std-	55	43	52	1
1.21	Buffer height: Range (1090, +15,-5)	45-50 mm 1085-1105		T L/		R/S
1.21	Drg No IB031-02002.	mm				
	big No 15031-02002.		FRONT	100	14	1095
			REAR	100	93	1096
1.22	Buffer Length: Range (641 mm + 3 to 10 mm with buffer face)	641 mm		L	S	R/S
	Drg No-SK.DL-3430.		FRONT	65	in	647
			REAR	641		644
1.23	Height of Rail Guard. (114 mm + 5 mm,-12 mm).	114 mm + 5	TALATA	641 U		R/S
1.23	As per RDSO Pamphlet Important Bogie Clearances of Electric Locomotives.	mm,-12 mm	FRONT			
	7.0 por 1.200 . ampinet important bogie ordinanos er Electric Eccomotivos.	11111,- 12 HHIII	FRONT	110		119
,			REAR 113			110
1.24	CBC Height: Range (1090, +15,-5)	1090, +15				
	Drg No- IB031-02002.	-5 mm	REAR:	1101		

(Signature of SSE/Elect. Loco)

NAME SHUBBAN Sha Pope

DATE 22.06.2025

(Signature of /JE/Elect Loco)

NAME Paymorg Mem

DATE 22.06.2025

Aux 7 Uhral (Signature of JE/UF)

NAME ANKIT UPPAL

DATE 22.06.2025

Loco No. 42042

1. BOGIE FRAME:

BOGIE	FRAME NO	Make	PL No.	PO No. & dt.	Warranty Period
FRONT	SL-479	ECBT	29101104	102079	As per PO/IRS
REAR	SL-478	ECBT	29101104	102079	conditions

2. Hydraulic Dampers (PL No.29040012) Make: KNORR / KNORR

3. AXLES:

AXLE POSITION NO	1	2	3	4	5	6
MAKE/	PLW	PLW	PLW	PLW	PLW	PLW
S.NO	28653	28748	28649	28953	28754	28661
Ultrasonic Testing	OK	OK	OK	OK	OK	OK

4. WHEEL DISCS NO. AND TYPE & BULL GEAR

AXLE POSITION NO	1	2	3	4	5	6
GEAR END	EV56-086	EV70-052	EV43-011	EV64-079	EV36-064	EV91-056
Make	IMPORTED	IMPORTED	IMPORTED	IMPORTED	IMPORTED	IMPORTED
FREE END	EV62-024	EV36-030	EV24-093	EV64-082	EV37-107	EV39-041
Make	IMPORTED	IMPORTED	IMPORTED	IMPORTED	IMPORTED	IMPORTED
Bull Gear No.	25-B-16153	25-C-12125	25-C-15111	25-B-16152	25-B-15132	25-C-16166
Bull Gear Make	KPCL	KPCL	KPCL	KPCL	KPCL	KPCL

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

	AXLE POSITION NO	1	2	3	4	5	6
Gear	MAKE	NBC	FAG	FAG	FAG	FAG	FAG
End	PO NO. & dt	02311	02312	02312	02312	02312	02312
Free	MAKE	NBC	FAG	FAG	FAG	FAG	FAG
End	PO NO. & dt	02311	02312	02312	02312	02312	02312

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

AXLE POSITION NO	1	2	3	4	5	6
BULL GEAR END	87 T	841 KN	1003 KN	927 KN	811 KN	80 T
FREE END	103 T	915 KN	879 KN	854 KN	819 KN	88 T

Loco No. 42042

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

AXLE POSITION NO	1	2	3	4	5	6
DIA IN mm GE	1092.5	1092.5	1092.5	1092.4	1092.5	1092.5
DIA IN mm FE	1092.5	1092.5	1092.5	1092.4	1092.5	1092.5
WHEEL PROFILE GAUGE (1596±0.5mm)	OK	OK	OK	OK	OK	OK

8. SUSPENSION TUBE & ITS TAPER ROLLER BEARING:

AXLE POSITION	NO	1	2	3	4	5	6
S.T. PL 29100288	MAKE	IN	IN	IN	IN	IN	IN
GE Brg. PL 29030110	MAKE	FAG	FAG	FAG	FAG	FAG	FAG
FE Brg. PL 29030110	MAKE	FAG	FAG	FAG	FAG	FAG	FAG

9. GEAR CASE (PL No. 29030018) & BACKLASH:

AXLE POSITION NO	1	2	3	4	5	6
MAKE	KPE	KPE	PEPL	EEE	EEE	KPE
BACKLASH (0.254 – 0.458mm)	0.360	0.290	0.340	0.325	0.330	0.300

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

AXLE POSITION NO	1	2	3	4	5	6
RIGHT SIDE	16.72	17.40	15.65	15.49	17.36	15.55
LEFT SIDE	16.08	17.53	15.73	16.91	16.23	16.61

11. TRACTION MOTOR: (PL No.29940606, Warranty: As per PO/IRS conditions)

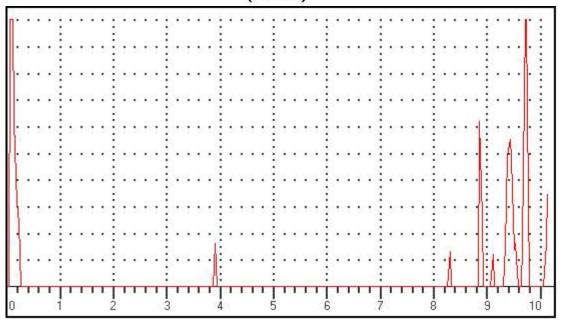
AXLE POSITION NO	MAKE	PO No. & Date	S. NO.
1	PIONEER	102028	318A24918
2	TMS		PLW-3437
3	PIONEER	102028	318A241001
4	PIONEER	102028	318A241000
5	HIND RECTIFIER	101655	237010154/049
6	PIONEER	102028	318A24994

JE/SSE/ Bogie Shop

ULTRASONIC TESTING REPORT

Date and TimeDt:27/5/2025 Tm:10:21	
UFD Model: <u>Arya 1(R)</u> Sr No: <u>AA0362-422</u> 0	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28653
Operator Name/Code : RAMVEER MEENA	
Defect Location GE	
Test Results (Pass/Fail/other):	
If other, then Remarks	
Frame No: ASC81 *	

(A-Scan)



Data Setup Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm

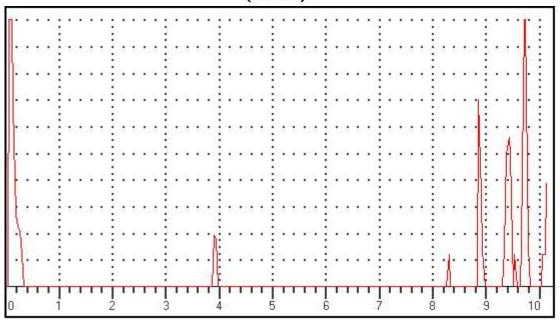
Gate 2(Depth): mm

Observation/Remarks (If Any):

ULTRASONIC TESTING REPORT

(A-Scan)

Frame No: ASC82 *



Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

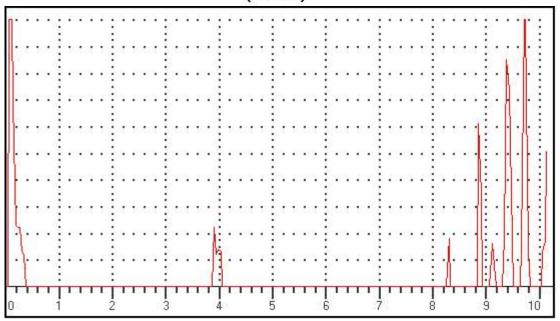
Observation/Remarks (If Any):

Data Setup

ULTRASONIC TESTING REPORT

Date and TimeDt:27/5/2025 Tm:10:21	
UFD Model: Arya 1(R) Sr No:AA0362-4220	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28653
Operator Name/Code : RAMVEER MEENA	
Defect Location GE	
Test Results (Pass/Fail/other):	
If other, then Remarks	
Frame No: ASC83 *	

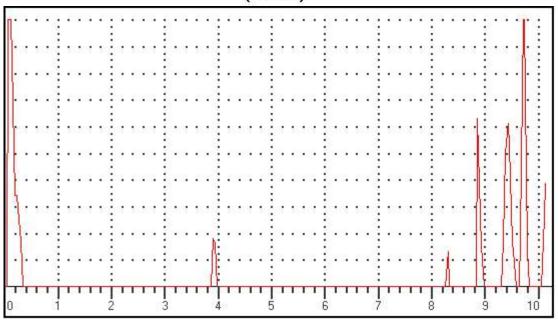
(A-Scan)



Data Setup Gain: 39.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm Gate 2(Depth): mm

Observation/Remarks (If Any):

(A-Scan)



Data Setup
Gain: 39.0 dB
RANGE: 2500.00mm
MTL VEL: 5920 M/S
REJECT: 12 %
DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 0.0DEG

THICK: 100.00mm

Gate 1 (Status): OFF Gate 2 (Status): OFF

Gate 1(Echo height): 0 % Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

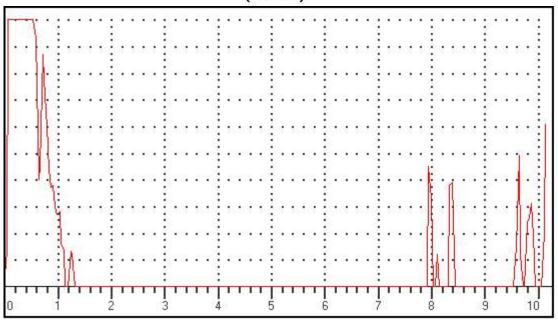
Date and Time......Dt:27/5/2025 Tm:10:22 UFD Model: Arya 1(R) Sr No:AA0362-4220 Railway/Workshop....: BS PLW Type of Axle/wheel....: WAG9 Axle/wheel No:28653 Operator Name/Code : RAMVEER MEENA

Defect Location GE Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC85 *

(A-Scan)



Data Setup

Gain: 49.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height):

PROBE ANGLE: 10.0DEG Gate 2(Beam Path): mm THICK: 100.00mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time.......:Dt:27/5/2025 Tm:10:22

UFD Model: Arya 1(R) Sr No:AA0362-4220

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28653

Operator Name/Code: RAMVEER MEENA

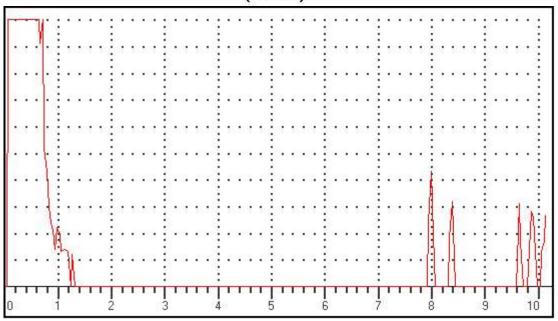
Defect Location: GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC86 *

(A-Scan)



Data Setup

Gain: 49.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 10.0DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time.......:Dt:27/5/2025 Tm:10:22

UFD Model: Arya 1(R) Sr No:AA0362-4220

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28653

Operator Name/Code: RAMVEER MEENA

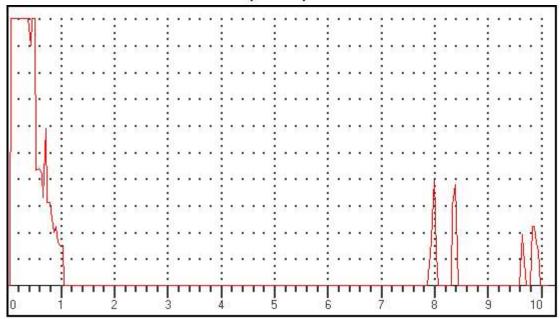
Defect Location: GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC87 *

(A-Scan)



Data Setup

Gain: 45.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 %
REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height):
PROBE ANGLE: 10.0DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

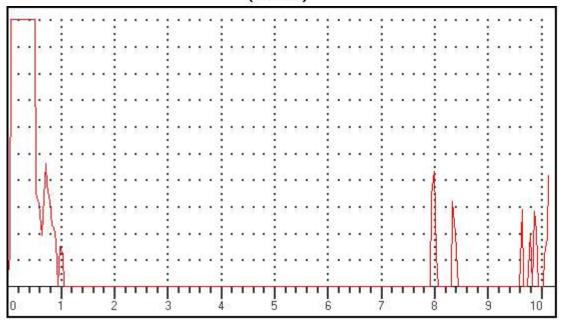
Date and Time......Dt:27/5/2025 Tm:10:22 UFD Model: Arya 1(R) Sr No:AA0362-4220 Railway/Workshop....: BS PLW Type of Axle/wheel....: WAG9 Axle/wheel No:28653 Operator Name/Code : RAMVEER MEENA

Defect Location GE Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC88 *

(A-Scan)



Data Setup

Gain: 45.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 10.0DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:10:23
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28653

Operator Name/Code : RAMVEER MEENA

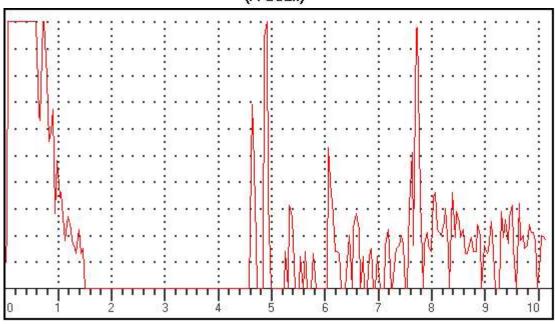
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC89 *

(A-Scan)



Data Setup

Gain: 53.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time.......Dt:27/5/2025 Tm:10:23
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28653

Operator Name/Code : RAMVEER MEENA

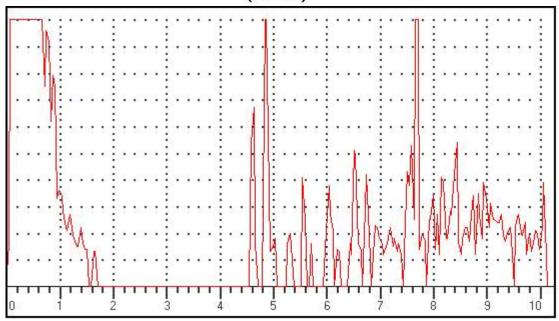
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC90 *

(A-Scan)



Data Setup

Gain: 53.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:10:23
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0
Railway/Workshop.....: <u>BS PLW</u>

Type of Axle/wheel....: WAG9 Axle/wheel No:28653

Operator Name/Code : RAMVEER MEENA

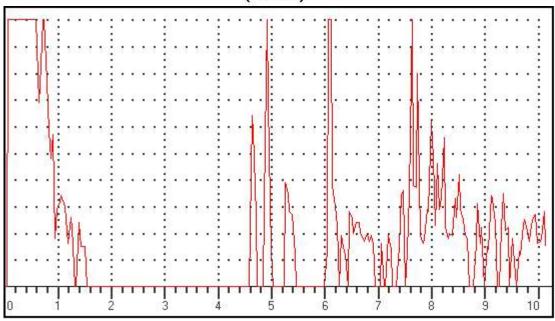
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC91 *

(A-Scan)



Data Setup

Gain: 53.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 %

REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height):

PROBE ANGLE: 17.5DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:10:23 UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28653

Operator Name/Code : RAMVEER MEENA

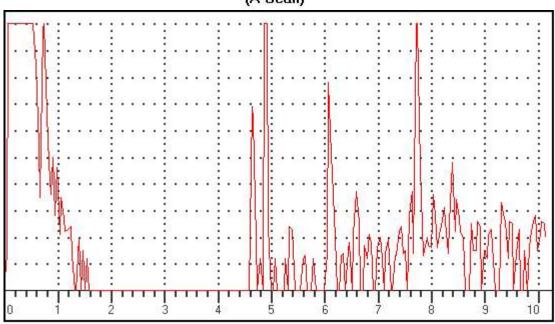
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC92 *

(A-Scan)



Data Setup

Gain: 53.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:10:27
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0
Railway/Workshop.....: <u>BS PLW</u>

Type of Axle/wheel: WAG9 Axle/wheel No:28653

Operator Name/Code : RAMVEER MEENA

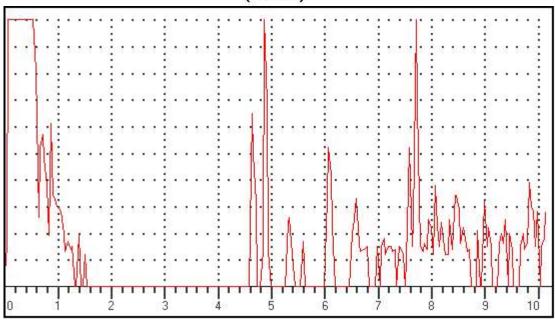
Defect Location FE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC93 *

(A-Scan)



Data Setup

Gain: 49.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:10:28 UFD Model: Arya 1(R) Sr No:AA0362-4220 Railway/Workshop.....: BS PLW Type of Axle/wheel....: WAG9 Axle/wheel No:28653

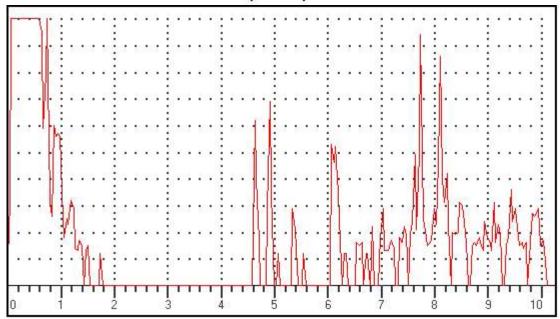
Operator Name/Code : RAMVEER MEENA

Defect Location FE

Test Results (Pass/Fail/other):

If other, then Remarks..... Frame No: ASC94 *

(A-Scan)



Data Setup

Gain: 53.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 %

Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 17.5DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:10:28
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0
Railway/Workshop.....: <u>BS PLW</u>

Type of Axle/wheel....: WAG9 Axle/wheel No:28653

Operator Name/Code : RAMVEER MEENA

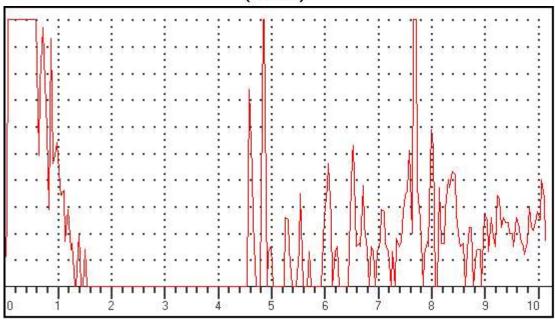
Defect Location FE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC95 *

(A-Scan)



Data Setup

Gain: 52.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:10:28
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0
Railway/Workshop.....: <u>BS PLW</u>

Type of Axle/wheel No:28653

Operator Name/Code : RAMVEER MEENA

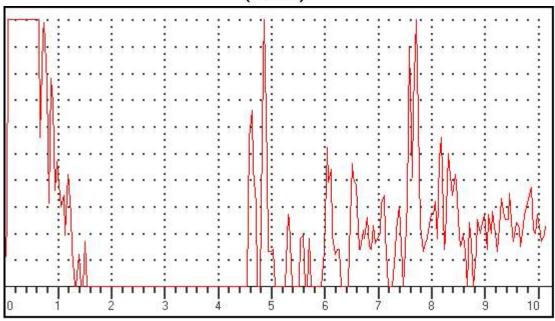
Defect Location FE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC96 *

(A-Scan)



Data Setup

Gain: 52.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 %

REJECT: 12 % Gate 1(Beam Path): 0.00mm

EJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height):

PROBE ANGLE: 17.5DEG Gate 2(Beam Path): mn

PROBE ANGLE: 17.5DEG Gate 2(Beam Path): mm

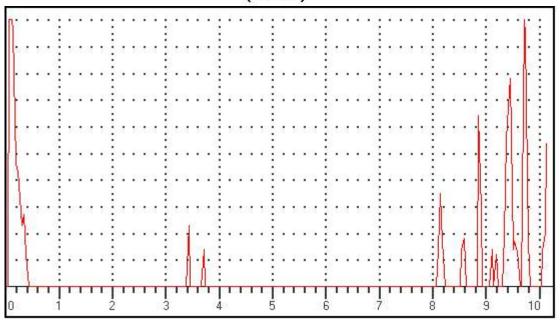
THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:10:29 UFD Model: Arya 1(R) Sr No:AA0362-4220 Railway/Workshop.....: BS PLW Type of Axle/wheel....: WAG9 Axle/wheel No:28653 Operator Name/Code : RAMVEER MEENA Defect Location FE Test Results (Pass/Fail/other): If other, then Remarks.....

(A-Scan)

Frame No: ASC97 *



Data Setup Gain: 42.0 dB RANGE: 2500.00mm MTL VEL: 5920 M/S REJECT: 12 % DELAY: 0.06mm PROBE ZERO: 8.78us MODE: SINGLE

PROBE ANGLE: 0.0DEG THICK: 100.00mm

Gate 1 (Status): OFF Gate 2 (Status): OFF

Gate 1(Echo height): 0 % Gate 1(Beam Path): 0.00mm

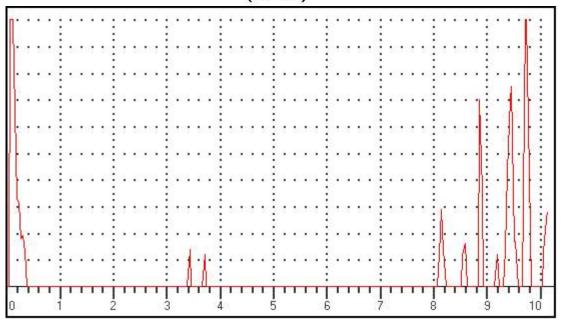
Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm Gate 2(Echo height): Gate 2(Beam Path): mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and TimeDt:27/5/2025 Tm:10:29	
UFD Model: <u>Arya 1(R)</u> Sr No: <u>AA0362-422</u> 0	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28653
Operator Name/Code : RAMVEER MEENA	
Defect Location FE	
Test Results (Pass/Fail/other):	
If other, then Remarks	

(A-Scan)



Data Setup Gain: 39.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm

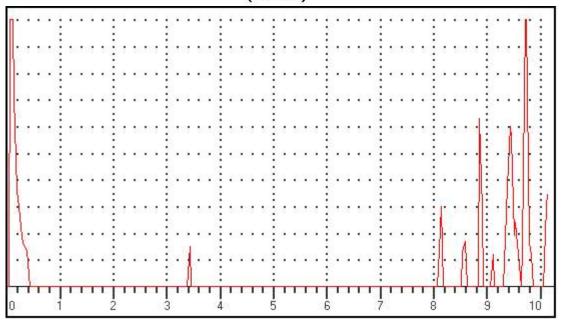
Gate 2(Depth): mm

Observation/Remarks (If Any):

Frame No: ASC98 *

Date and TimeDt:27/5/2025 Tm:10:29	
UFD Model: <u>Arya 1(R)</u> Sr No: <u>AA0362-422</u> 0	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28653
Operator Name/Code : RAMVEER MEENA	
Defect LocationFE	
Test Results (Pass/Fail/other):	
If other, then Remarks	
Frame No: ASC99 *	

(A-Scan)



Data Setup Gain: 39.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time.......:Dt:27/5/2025 Tm:10:29

UFD Model: Arya 1(R) Sr No:AA0362-4220

Railway/Workshop....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28653

Operator Name/Code: RAMVEER MEENA

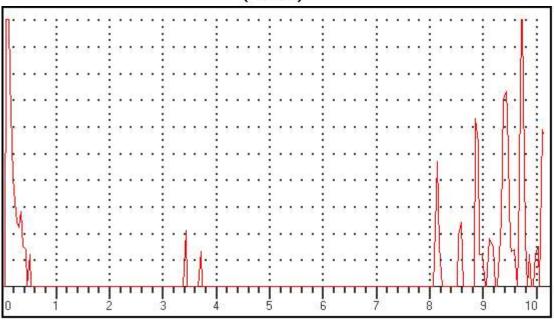
Defect Location: FE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC100 *

(A-Scan)



Data Setup Gain: 41.0 dB RANGE: 2500.00mm MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 0.0DEG

THICK: 100.00mm

Gate 1 (Status): OFF

Gate 2 (Status): OFF

Gate 1(Echo height): 0 % Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

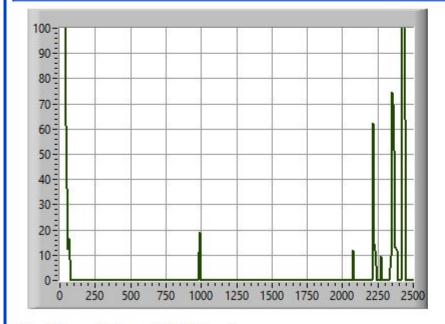
Gate 2(Depth): mm

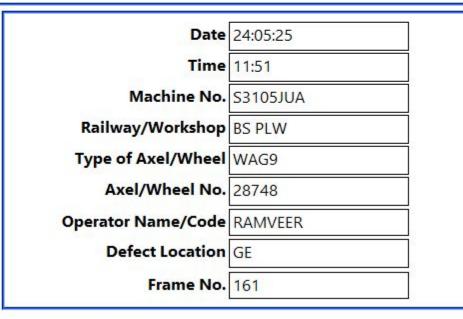


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 34.3 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





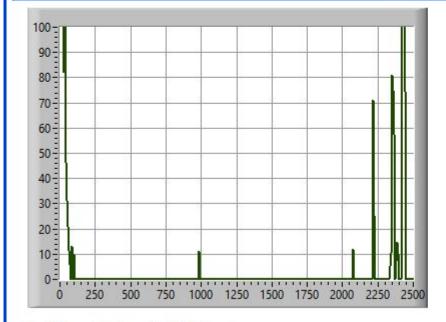
Test Result(Pass/Fail/Other) : If Other, then Remarks :

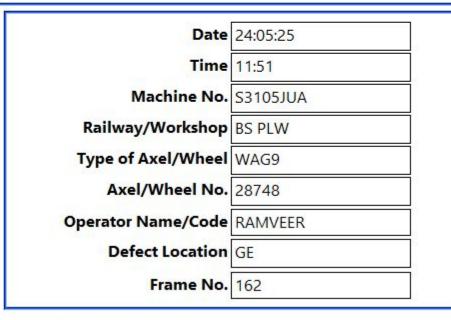


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters			ate Measure	
Gain	: 34.3 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm





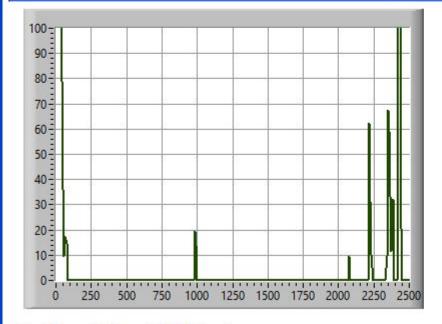
Test Result(Pass/Fail/Other) : If Other, then Remarks :

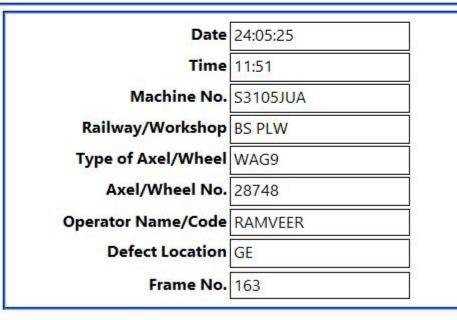


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters			ate Measure	
Gain	: 34.3 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm





Test Result(Pass/Fail/Other) : If Other, then Remarks :

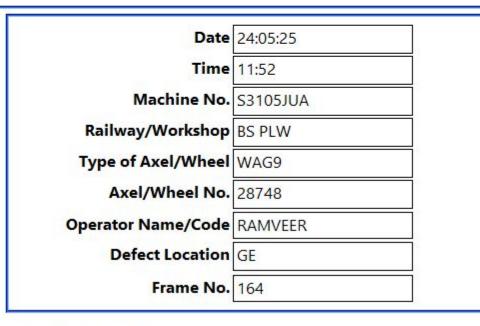


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 34.3 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status	: OFF	
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height)	: 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path)	: 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance)	: 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth)	: 0 mm	





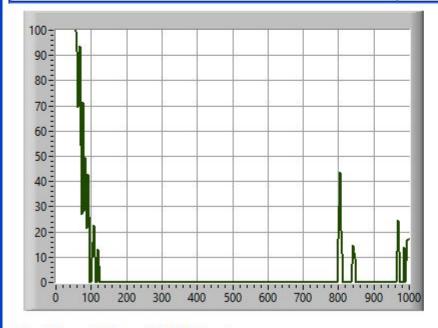
Test Result(Pass/Fail/Other) : If Other, then Remarks :

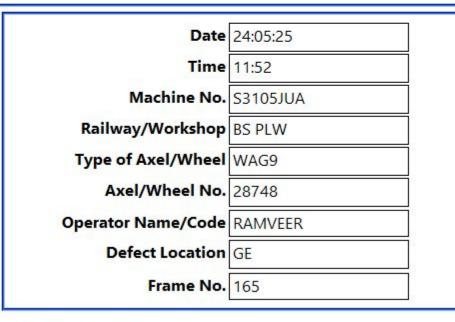


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





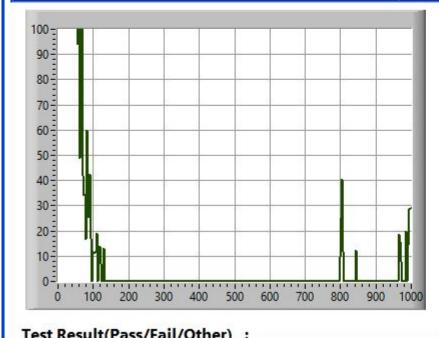
Test Result(Pass/Fail/Other) : If Other, then Remarks :

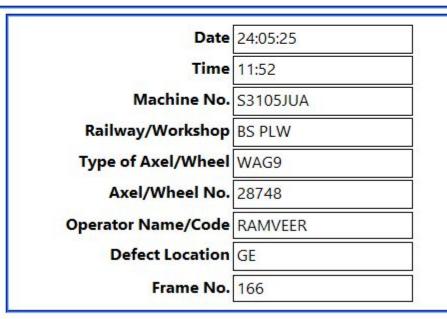


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status	: OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height)	: 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path)	: 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance)	: 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth)	: 0 mm	





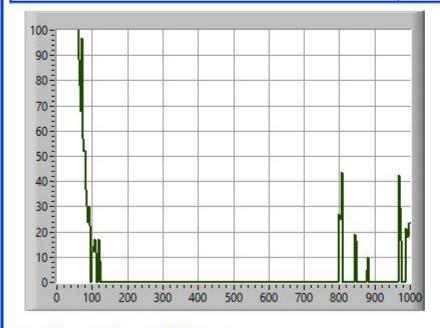
Test Result(Pass/Fail/Other) : If Other, then Remarks :

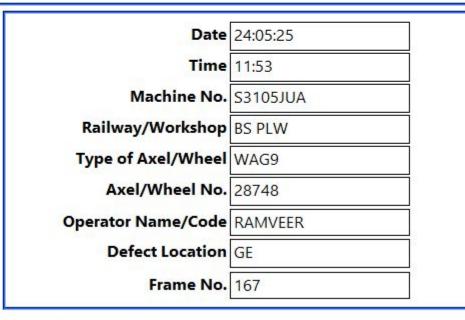


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters			ate Measure	
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm





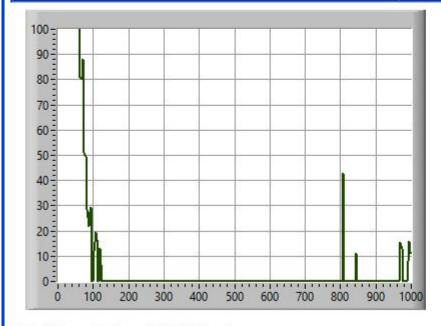
Test Result(Pass/Fail/Other) : If Other, then Remarks :

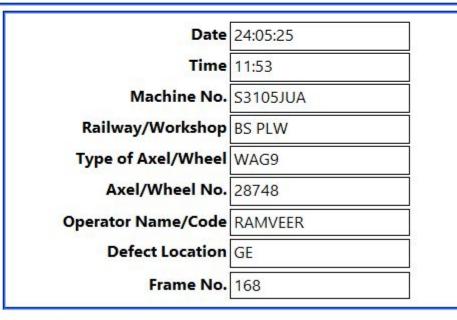


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters			ate Measure	
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm





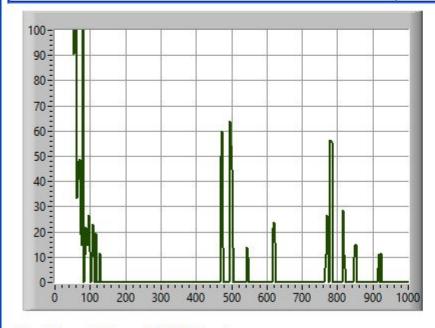
Test Result(Pass/Fail/Other) : If Other, then Remarks :

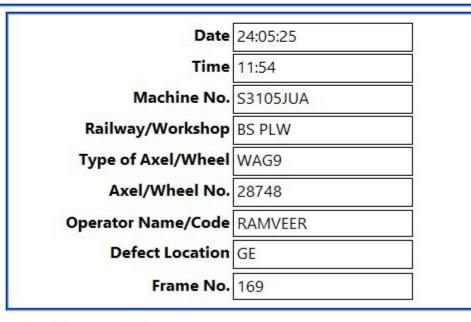


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 42.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





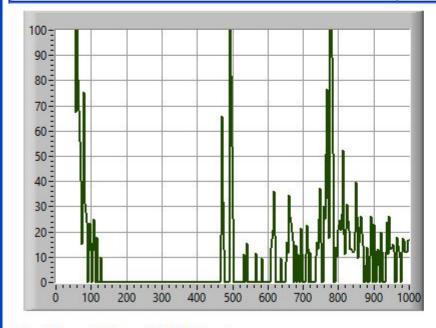
Test Result(Pass/Fail/Other) : If Other, then Remarks :

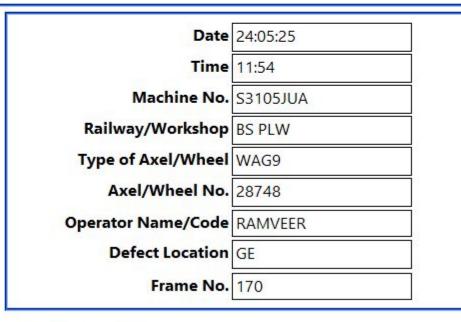


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 46.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance): 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





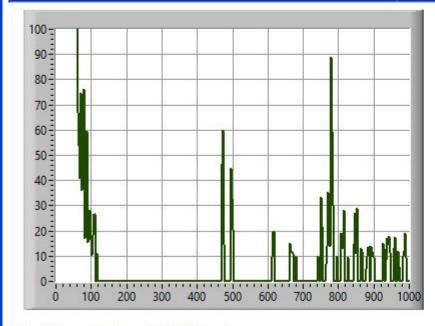
Test Result(Pass/Fail/Other) : If Other, then Remarks :

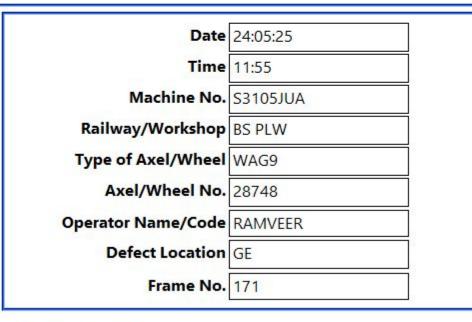


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure				
Gain	: 46.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





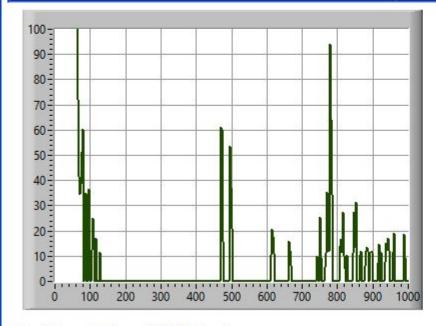
Test Result(Pass/Fail/Other) : If Other, then Remarks :

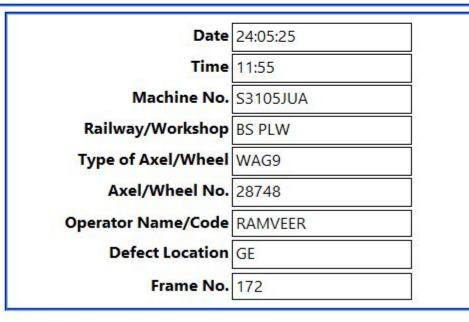


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure				
Gain	: 46.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





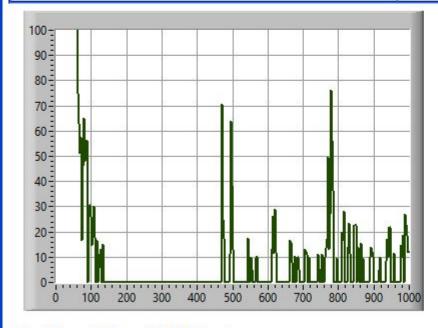
Test Result(Pass/Fail/Other) : If Other, then Remarks :

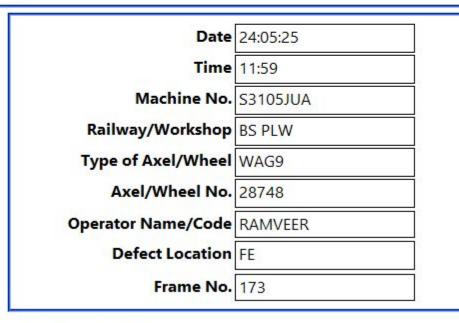


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure				
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status	: OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height)	: 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path)	: 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance)	: 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth)	: 0 mm	





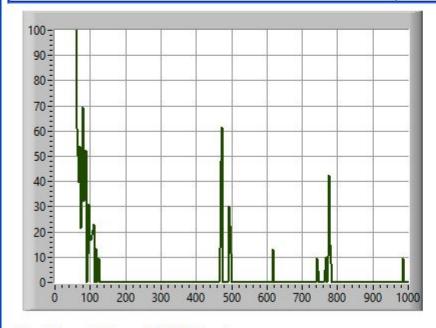
Test Result(Pass/Fail/Other) : If Other, then Remarks :

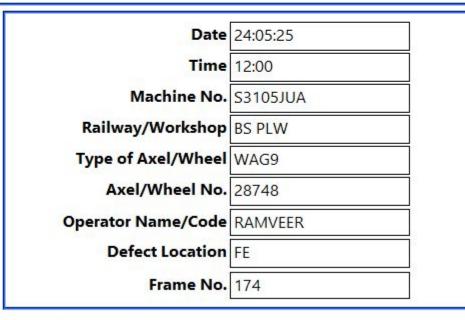


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 45.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm]		Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





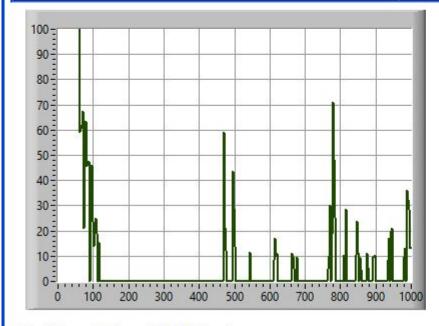
Test Result(Pass/Fail/Other) : If Other, then Remarks :

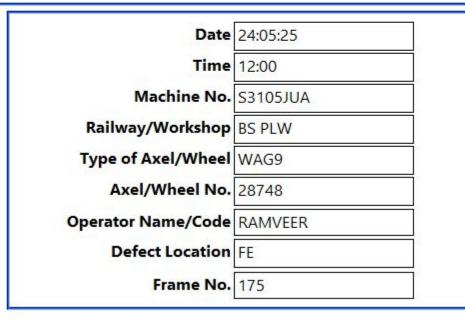


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.O.OO.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





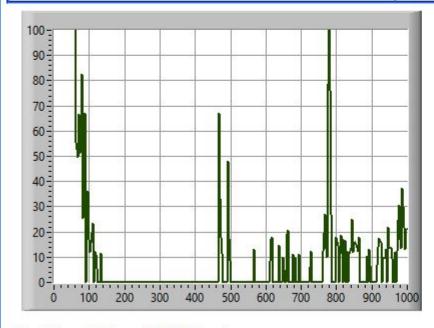
Test Result(Pass/Fail/Other) : If Other, then Remarks :

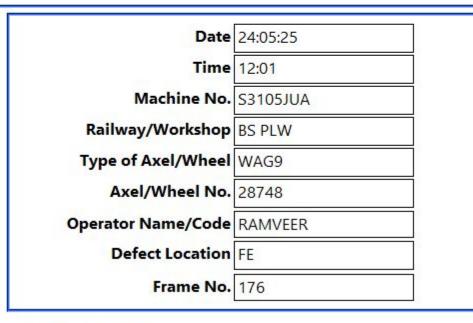


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.O.OO.AE.O4.06

Testing Parameters				Gate Measure				
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status	: OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height)	: 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path)	: 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance)	: 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth)	: 0 mm	





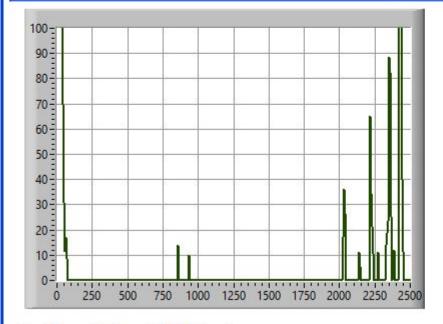
Test Result(Pass/Fail/Other) : If Other, then Remarks :

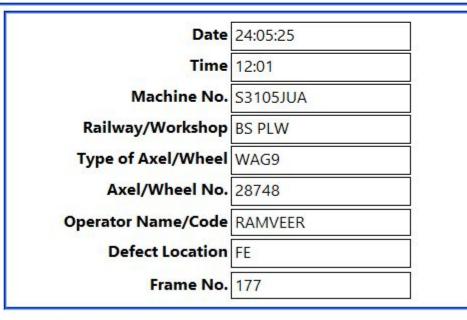


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure				
Gain	: 33.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 0 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





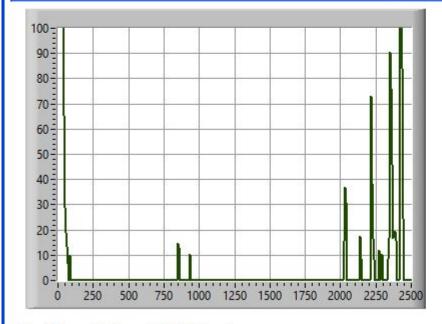
Test Result(Pass/Fail/Other) : If Other, then Remarks :

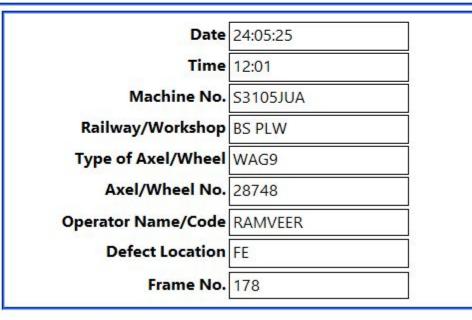


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure				
Gain	: 33.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 0 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





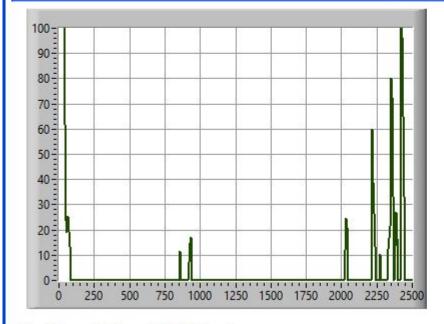
Test Result(Pass/Fail/Other) : If Other, then Remarks :

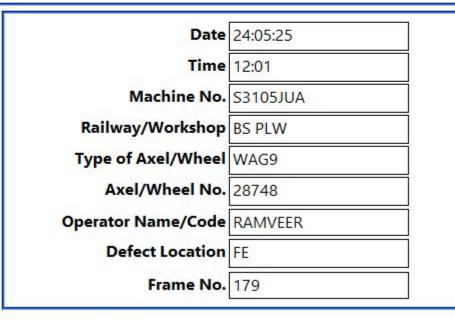


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure				
Gain	: 33.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 0 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





Test Result(Pass/Fail/Other) : If Other, then Remarks :

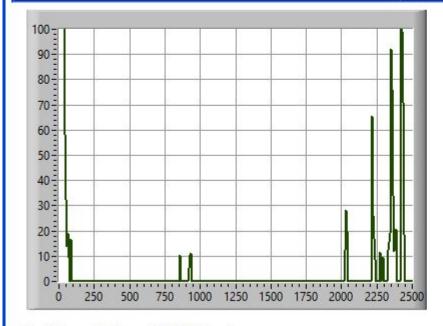


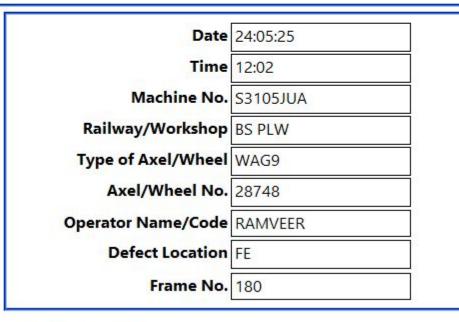
ULTRASONIC TEST REPORT DIGISCAN DS-333

DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters			Gate Measure			
Gain	: 33.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm





Test Result(Pass/Fail/Other) : If Other, then Remarks :

Date and Time..........Dt:27/5/2025 Tm:9:39

UFD Model: Arya 1(R) Sr No:AA0362-4220

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28649

Operator Name/Code: RAMVEER MEENA

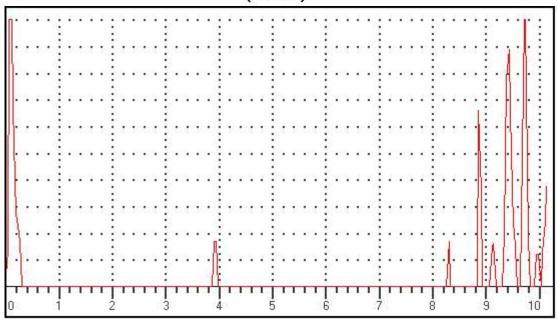
Defect Location: GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC01 *

(A-Scan)



Data Setup

Gain: 39.0 dB

RANGE: 2500.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 0.0DEG

I NODE ANGLE. U.UDEG

THICK: 100.00mm

Gate 1 (Status): OFF

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time.......:Dt:27/5/2025 Tm:9:39

UFD Model: Arya 1(R) Sr No:AA0362-4220

Railway/Workshop....: BS PLW

Type of Axle/wheel...: WAG9 Axle/wheel No:28649

Operator Name/Code: RAMVEER MEENA

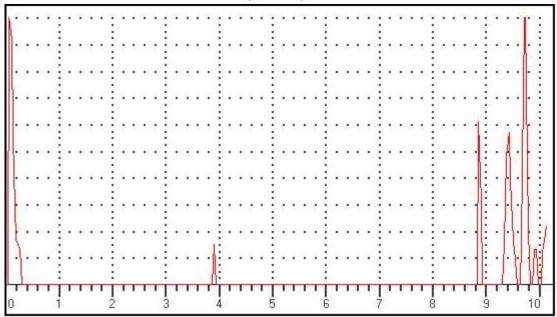
Defect Location: GE

Test Results (Pass/Fail/other):

If other, then Remarks......

Frame No: ASC02 *

(A-Scan)



Data Setup Gain: 36.0 dB

RANGE: 2500.00mm MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8,78us MODE: SINGLE

PROBE ANGLE: 0.0DEG

THICK: 100.00mm

Gate 1 (Status): OFF

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

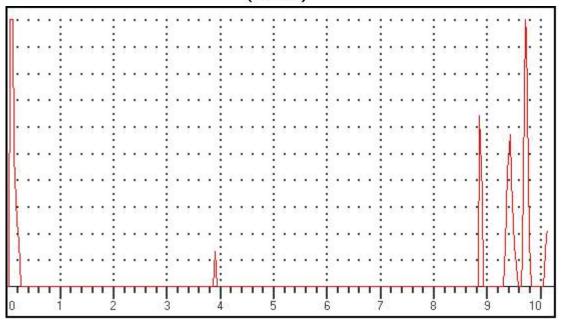
Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and TimeDt:27/5/2025 Tm:9:39	
UFD Model: <u>Arya 1(R)</u> Sr No: <u>AA0362-422</u> 0	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28649
Operator Name/Code : RAMVEER MEENA	
Defect Location GE	
Test Results (Pass/Fail/other):	
If other, then Remarks	
Frame No: ASC03 *	

(A-Scan)



 Data Setup

 Gain: 36.0 dB
 Gate 1 (Status): OFF

 RANGE: 2500.00mm
 Gate 2 (Status): OFF

 MTL VEL: 5920 M/S
 Gate 1(Echo height): 0 %

 REJECT: 12 %
 Gate 1(Beam Path): 0.00mm

 DELAY: 0.06mm
 Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us

Gate 1(Depth): 0.00mm

MODE: SINGLE

Gate 2(Echo height):

PROBE ANGLE: 0.0DEG

THICK: 100.00mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time.......:Dt:27/5/2025 Tm:9:39

UFD Model: Arya 1(R) Sr No:AA0362-4220

Railway/Workshop....: BS PLW

Type of Axle/wheel...: WAG9 Axle/wheel No:28649

Operator Name/Code: RAMVEER MEENA

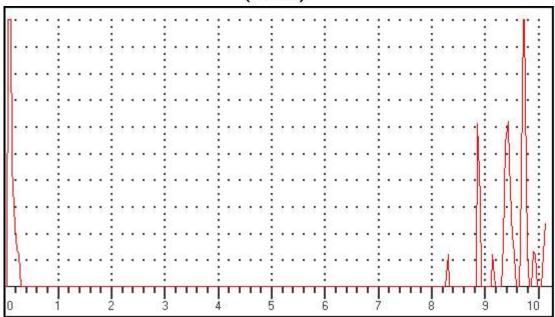
Defect Location: GE

Test Results (Pass/Fail/other):

If other, then Remarks......

(A-Scan)

Frame No: ASC04 *



Data Setup
Gain: 36.0 dB
RANGE: 2500.00mm
MTL VEL: 5920 M/S
REJECT: 12 %

PROBE ZERO: 8.78us

DELAY: 0.06mm

PROBE ANGLE: 0.0DEG

THICK: 100.00mm

.....

Gate 1 (Status): OFF

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......:Dt:27/5/2025 Tm:9:40
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0
Railway/Workshop.....: <u>BS PLW</u>

Type of Axle/wheel....: WAG9 Axle/wheel No:28649

Operator Name/Code : RAMVEER MEENA

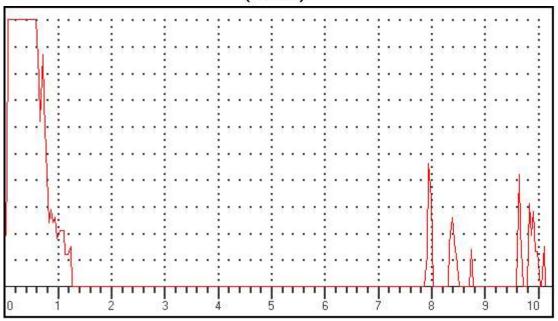
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC05 *

(A-Scan)



Data Setup

Gain: 50.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 %

REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height):

PROBE ANGLE: 10.0DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:9:40 UFD Model: Arya 1(R) Sr No:AA0362-4220 Railway/Workshop.....: BS PLW Type of Axle/wheel....: WAG9 Axle/wheel No:28649 Operator Name/Code : RAMVEER MEENA

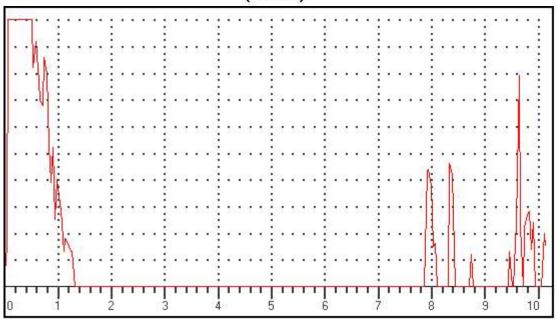
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC06 *

(A-Scan)



Data Setup

Gain: 50.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height):

PROBE ANGLE: 10.0DEG Gate 2(Beam Path): mm THICK: 100.00mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Operator Name/Code : RAMVEER MEENA

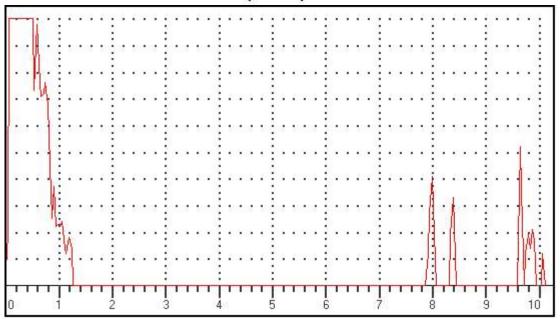
Defect Location: GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC07 *

(A-Scan)



Data Setup

Gain: 49.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 %

REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height):

PROBE ANGLE: 10.0DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

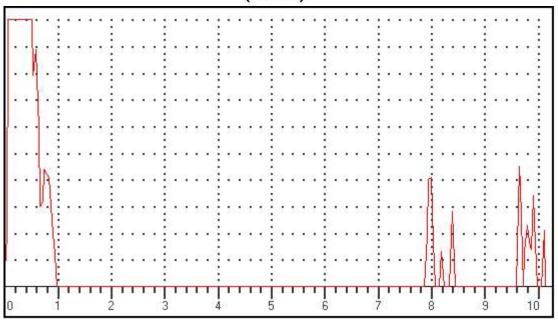
Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:9:41 UFD Model: Arya 1(R) Sr No:AA0362-4220 Railway/Workshop.....: BS PLW Type of Axle/wheel....: WAG9 Axle/wheel No:28649 Operator Name/Code : RAMVEER MEENA Defect Location GE

Test Results (Pass/Fail/other): If other, then Remarks.....

Frame No: ASC08 *

(A-Scan)



Data Setup

Gain: 49.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 %

Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 10.0DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......:Dt:27/5/2025 Tm:9:43 UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28649

Operator Name/Code : RAMVEER MEENA

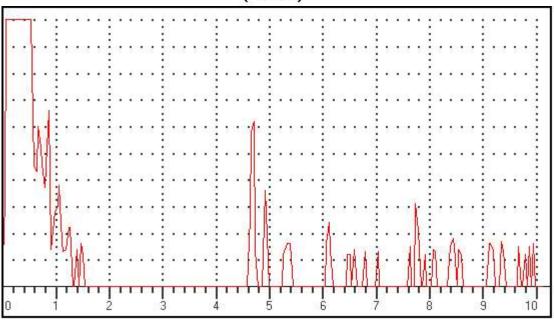
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC09 *

(A-Scan)



Data Setup

Gain: 48.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......:Dt:27/5/2025 Tm:9:43 UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28649

Operator Name/Code : RAMVEER MEENA

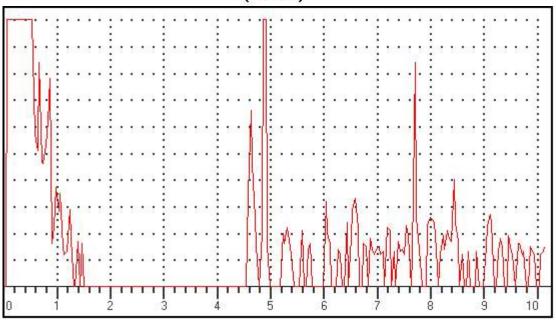
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC10 *

(A-Scan)



Data Setup

Gain: 49.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......:Dt:27/5/2025 Tm:9:43 UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28649

Operator Name/Code : RAMVEER MEENA

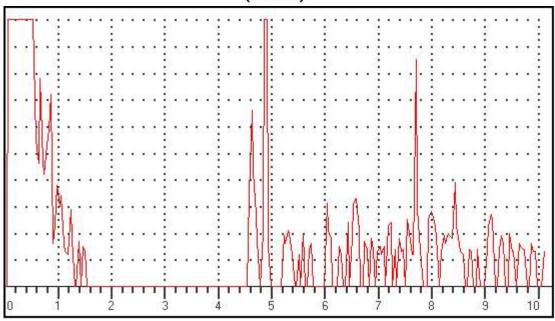
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC11 *

(A-Scan)



Data Setup

Gain: 49.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......:Dt:27/5/2025 Tm:9:43 UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28649

Operator Name/Code : RAMVEER MEENA

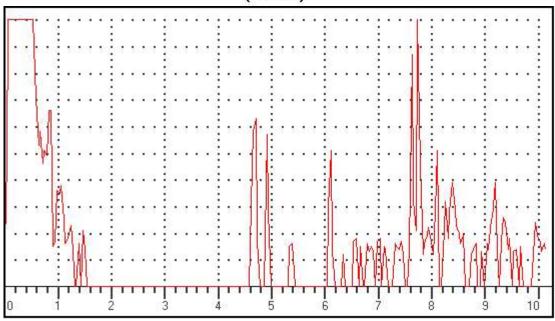
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC12 *

(A-Scan)



Data Setup

Gain: 49.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:9:48 UFD Model: Arya 1(R) Sr No:AA0362-4220 Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28649

Operator Name/Code : RAMVEER MEENA

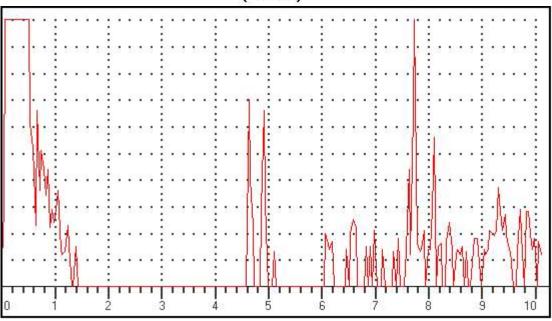
Defect Location FE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC13 *

(A-Scan)



Data Setup

Gain: 48.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......:Dt:27/5/2025 Tm:9:48
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28649

Operator Name/Code : RAMVEER MEENA

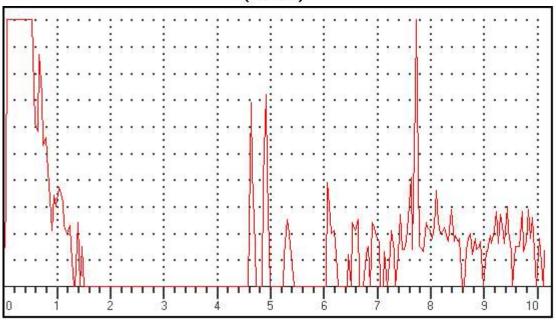
Defect Location FE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC14 *

(A-Scan)



Data Setup

Gain: 50.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:9:48
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0
Railway/Workshop.....: <u>BS PLW</u>

Type of Axle/wheel....: WAG9 Axle/wheel No:28649

Operator Name/Code : RAMVEER MEENA

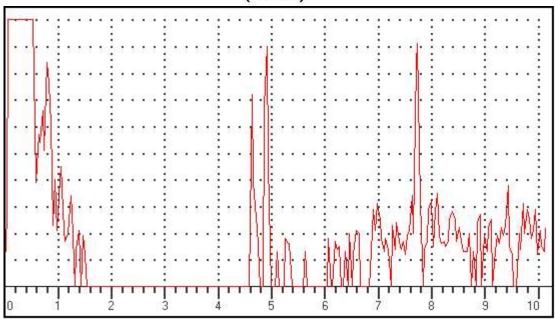
Defect Location FE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC15 *

(A-Scan)



Data Setup

Gain: 50.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......:Dt:27/5/2025 Tm:9:48
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28649

Operator Name/Code : RAMVEER MEENA

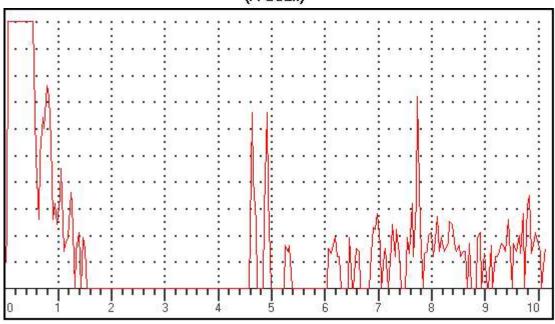
Defect Location FE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC16 *

(A-Scan)



Data Setup

Gain: 50.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

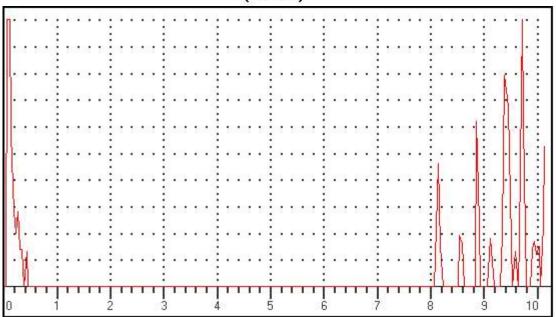
Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and TimeDt:27/5/2025 Tm:9:48	
UFD Model: Arya 1(R) Sr No:AA0362-4220	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28649
Operator Name/Code : RAMVEER MEENA	
Defect LocationFE	
Test Results (Pass/Fail/other):	
If other, then Remarks	
Frame No: ASC17 *	

(A-Scan)



Data Setup Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm

Gate 2(Depth): mm

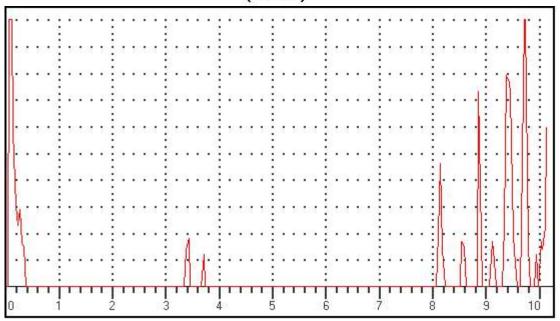
Gate 2(Surface Distance): mm

Observation/Remarks (If Any):

THICK: 100.00mm

Date and TimeDt:27/5/2025 Tm:9:49	
UFD Model: <u>Arya 1(R)</u> Sr No: <u>AA0362-422</u> 0	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28649
Operator Name/Code : RAMVEER MEENA	
Defect Location FE	
Test Results (Pass/Fail/other):	
If other, then Remarks	

(A-Scan)



Data Setup Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Observation/Remarks (If Any):

Frame No: ASC18 *

Date and Time.........:Dt:27/5/2025 Tm:9:49

UFD Model: Arya 1(R) Sr No:AA0362-4220

Railway/Workshop.....: BS PLW

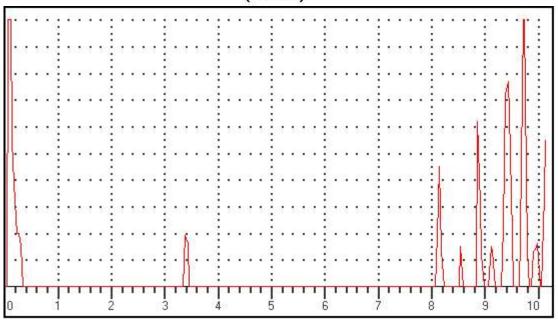
Type of Axle/wheel....: WAG9 Axle/wheel No:28649

Operator Name/Code: RAMVEER MEENA

Defect Location: FE

Frame No: ASC19 *

(A-Scan)



Data Setup

Gain: 38.0 dB

RANGE: 2500.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 0.0DEG

THICK: 100.00mm

Gate 1 (Status): OFF

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

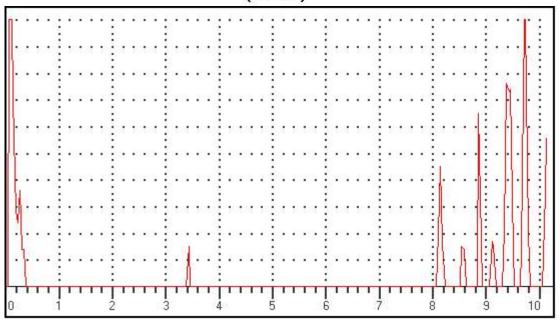
Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Frame No: ASC20 *

(A-Scan)



Data Setup Gain: 38.0 dB RANGE: 2500.00mm MTL VEL: 5920 M/S

REJECT: 12 % DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 0.0DEG

THICK: 100.00mm

Gate 1 (Status): OFF

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

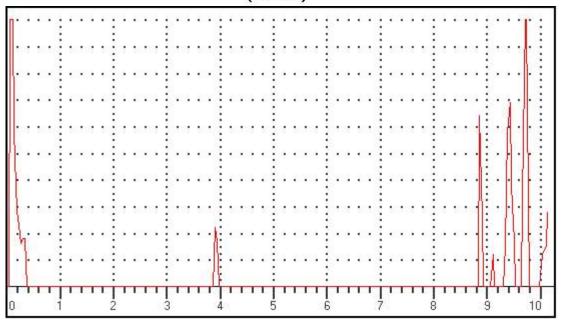
Gate 2(Echo height):

Gate 2(Beam Path): mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and TimeDt:27/5/2025 Tm:9:51	
UFD Model: Arya 1(R) Sr No:AA0362-4220	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28953
Operator Name/Code : RAMVEER MEENA	
Defect Location GE	
Test Results (Pass/Fail/other):	
If other, then Remarks	
Frame No: ASC21 *	

(A-Scan)



Data Setup Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time.......:Dt:27/5/2025 Tm:9:51

UFD Model: Arya 1(R) Sr No:AA0362-4220

Railway/Workshop....: BS PLW

Type of Axle/wheel...: WAG9 Axle/wheel No:28953

Operator Name/Code: RAMVEER MEENA

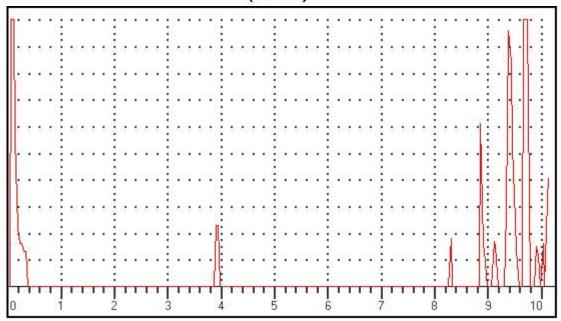
Defect Location: GE

Test Results (Pass/Fail/other):

If other, then Remarks......

(A-Scan)

Frame No: ASC22 *



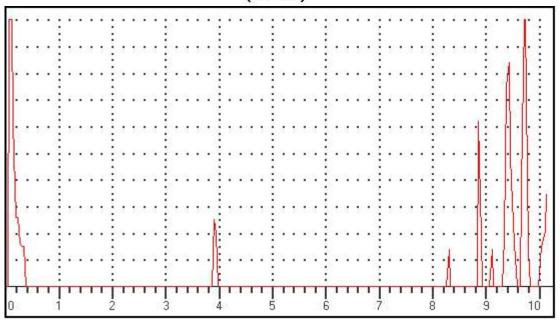
Data Setup Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm Gate 2(Depth): mm

Date and TimeDt:27/5/2025 Tm:9:51	
UFD Model: <u>Arya 1(R)</u> Sr No: <u>AA0362-422</u> 0	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28953
Operator Name/Code : RAMVEER MEENA	
Defect Location GE	
Test Results (Pass/Fail/other):	
If other, then Remarks	

Frame No: ASC23 *

Observation/Remarks (If Any):

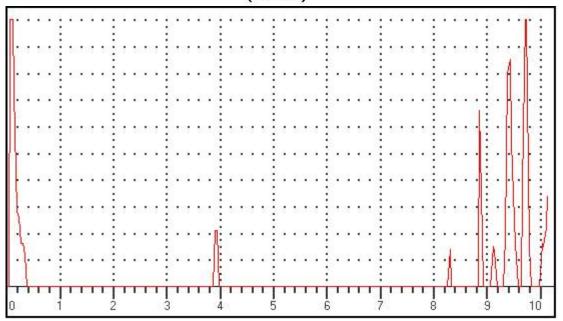
(A-Scan)



Data Setup Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm Gate 2(Depth): mm

Date and TimeDt:27/5/2025 Tm:9:51	
UFD Model: Arya 1(R) Sr No:AA0362-4220	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28953
Operator Name/Code : RAMVEER MEENA	
Defect Location GE	
Test Results (Pass/Fail/other):	
If other, then Remarks	
Frame No: ASC24 *	

(A-Scan)



Data Setup Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm Gate 2(Depth): mm

Date and Time......:Dt:27/5/2025 Tm:9:52

UFD Model: Arya 1(R) Sr No:AA0362-4220

Railway/Workshop....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28953

Operator Name/Code: RAMVEER MEENA

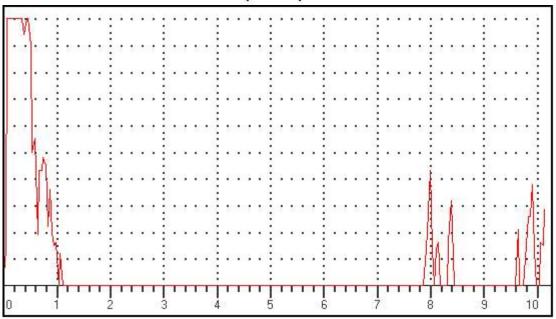
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC25 *

(A-Scan)



Data Setup

Gain: 47.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 %
REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height):
PROBE ANGLE: 10.0DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

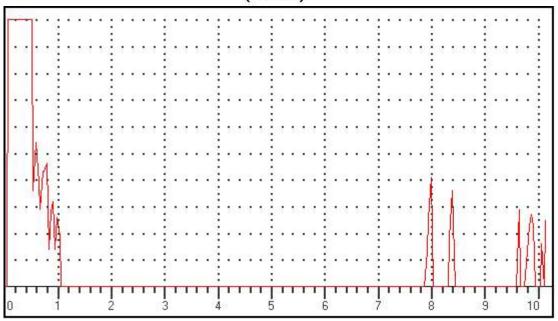
Date and Time......Dt:27/5/2025 Tm:9:52 UFD Model: Arya 1(R) Sr No:AA0362-4220 Railway/Workshop.....: BS PLW Type of Axle/wheel....: WAG9 Axle/wheel No:28953 Operator Name/Code : RAMVEER MEENA

Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks..... Frame No: ASC26 *

(A-Scan)



Data Setup

Gain: 47.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height):

PROBE ANGLE: 10.0DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......:Dt:27/5/2025 Tm:9:52

UFD Model: Arya 1(R) Sr No:AA0362-4220

Railway/Workshop....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28953

Operator Name/Code: RAMVEER MEENA

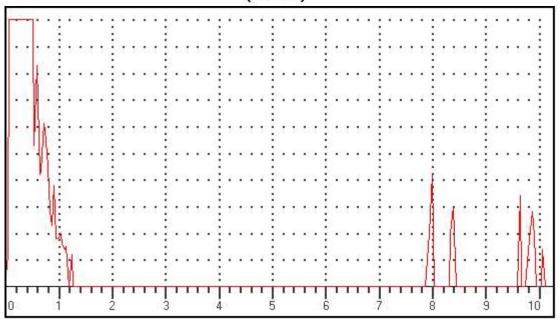
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC27 *

(A-Scan)



Data Setup

Gain: 47.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 %

REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height):

PROBE ANGLE: 10.0DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:9:53
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0
Railway/Workshop.....: <u>BS PLW</u>

Type of Axle/wheel....: WAG9 Axle/wheel No:28953

Operator Name/Code : RAMVEER MEENA

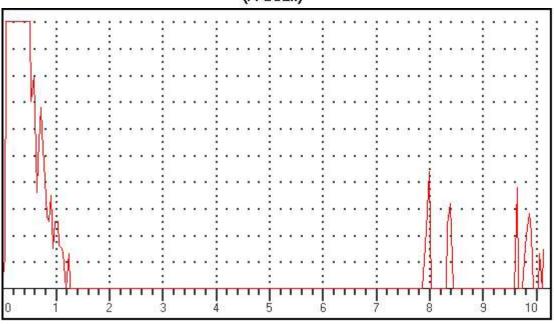
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC28 *

(A-Scan)



Data Setup

Gain: 47.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 %

REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height):

PROBE ANGLE: 10.0DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:9:53 UFD Model: Arya 1(R) Sr No:AA0362-4220 Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28953 Operator Name/Code : RAMVEER MEENA

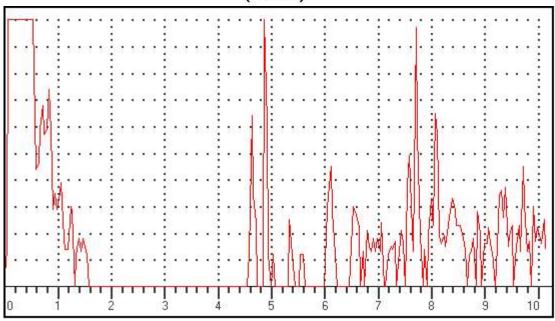
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC29 *

(A-Scan)



Data Setup

Gain: 50.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 17.5DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......:Dt:27/5/2025 Tm:9:53 UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28953

Operator Name/Code : RAMVEER MEENA

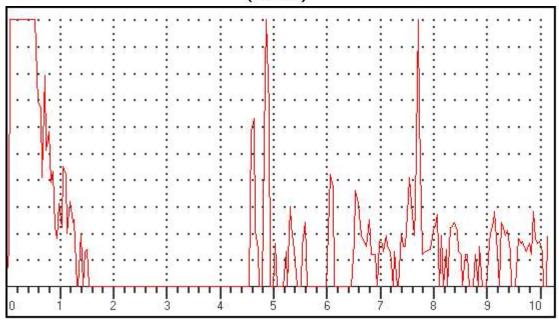
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC30 *

(A-Scan)



Data Setup

Gain: 50.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:9:54
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0
Railway/Workshop.....: <u>BS PLW</u>

Type of Axle/wheel....: WAG9 Axle/wheel No:28953

Operator Name/Code : RAMVEER MEENA

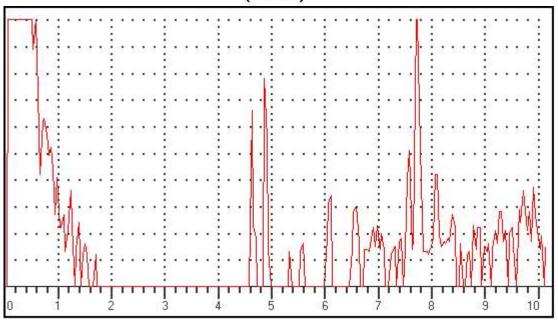
Defect Location GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC31 *

(A-Scan)



Data Setup

Gain: 52.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:9:54

UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28953

Operator Name/Code : RAMVEER MEENA

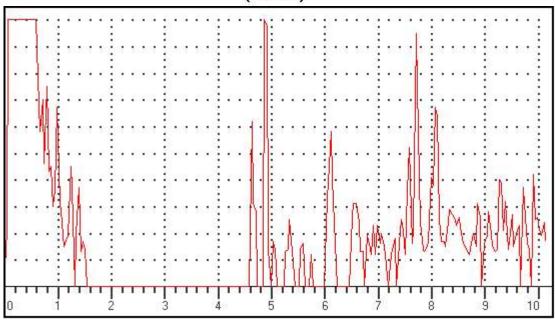
Defect Location: GE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC32 *

(A-Scan)



Data Setup

Gain: 52.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:9:59 UFD Model: Arya 1(R) Sr No:AA0362-4220 Railway/Workshop.....: BS PLW Type of Axle/wheel....: WAG9 Axle/wheel No:28953

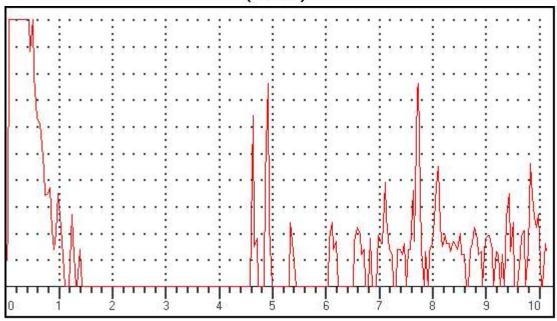
Operator Name/Code : RAMVEER MEENA

Defect Location FE Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC33 *

(A-Scan)



Data Setup

Gain: 47.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 17.5DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time.......:Dt:27/5/2025 Tm:9:59

UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0

Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28953

Operator Name/Code : RAMVEER MEENA

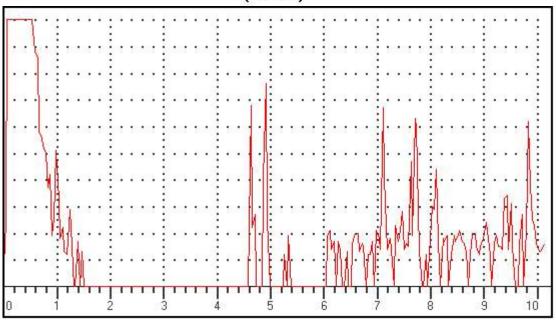
Defect Location FE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC34 *

(A-Scan)



Data Setup

Gain: 50.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:9:59
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0
Railway/Workshop.....: BS PLW

Type of Axle/wheel....: WAG9 Axle/wheel No:28953

Operator Name/Code : RAMVEER MEENA

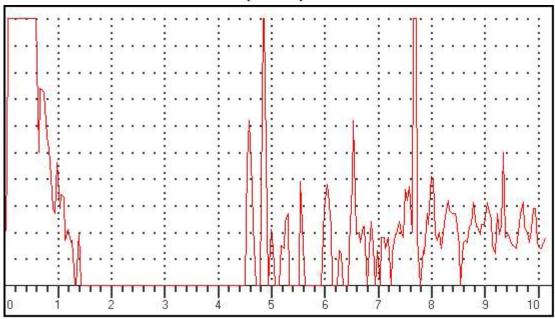
Defect Location FE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC35 *

(A-Scan)



Data Setup

Gain: 50.0 dB Gate 1 (Status): PLOGIC

RANGE: 1000.00mm Gate 2 (Status): OFF

MTL VEL: 5920 M/S Gate 1(Echo height): 0 %
REJECT: 12 % Gate 1(Beam Path): 0.00mm

DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm

PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm

MODE: SINGLE Gate 2(Echo height):

MODE: SINGLE Gate 2(Echo height):

PROBE ANGLE: 17.5DEG Gate 2(Beam Path): mm

THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and Time......Dt:27/5/2025 Tm:9:59
UFD Model: <u>Arya 1(R)</u> Sr No:<u>AA0362-422</u>0
Railway/Workshop.....: <u>BS PLW</u>

Type of Axle/wheel....: WAG9 Axle/wheel No:28953

Operator Name/Code : RAMVEER MEENA

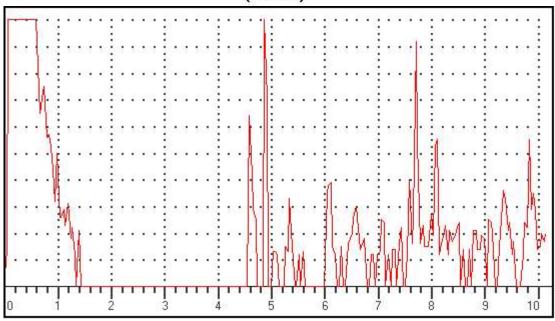
Defect Location FE

Test Results (Pass/Fail/other):

If other, then Remarks.....

Frame No: ASC36 *

(A-Scan)



Data Setup

Gain: 50.0 dB

RANGE: 1000.00mm

MTL VEL: 5920 M/S

REJECT: 12 %

DELAY: 0.06mm

PROBE ZERO: 8.78us

MODE: SINGLE

PROBE ANGLE: 17.5DEG

THICK: 100.00mm

Gate 1 (Status): PLOGIC

Gate 2 (Status): OFF

Gate 1(Echo height): 0 %

Gate 1(Beam Path): 0.00mm

Gate 1(Surface Distance): 0.00mm

Gate 1(Depth): 0.00mm

Gate 2(Echo height):

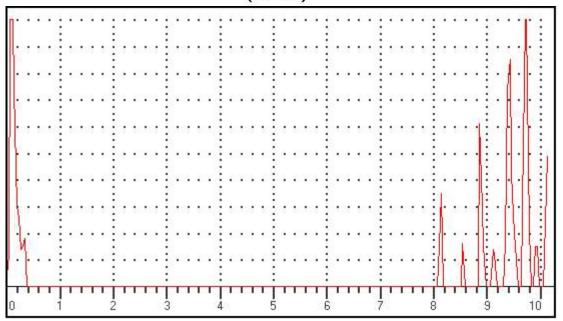
Gate 2(Beam Path): mm

Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Date and TimeDt:27/5/2025 Tm:10:0	
UFD Model: Arya 1(R) Sr No:AA0362-4220	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28953
Operator Name/Code : RAMVEER MEENA	
Defect Location FE	
Test Results (Pass/Fail/other):	
If other, then Remarks	
Frame No: ASC37 *	

(A-Scan)

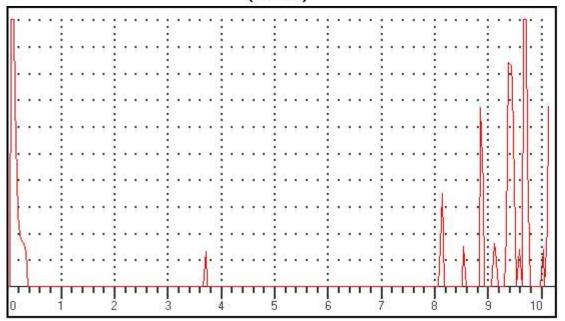


Data Setup Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm Gate 2(Depth): mm

Odie Zibepini, min

Date and TimeDt:27/5/2025 Tm:10:0	
UFD Model: <u>Arya 1(R)</u> Sr No: <u>AA0362-422</u> 0	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28953
Operator Name/Code : RAMVEER MEENA	
Defect Location FE	
Test Results (Pass/Fail/other):	
If other, then Remarks	

(A-Scan)



Data Setup Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

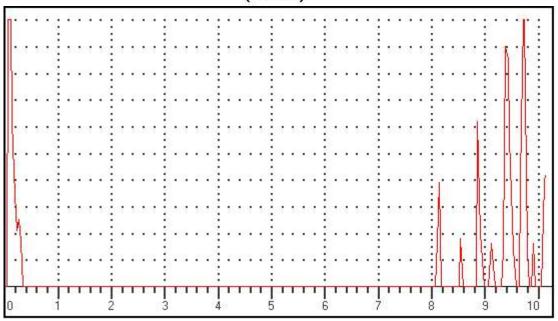
Observation/Remarks (If Any):

Frame No: ASC38 *

Date and TimeDt:27/5/2025 Tm:10:0	
UFD Model: <u>Arya 1(R)</u> Sr No: <u>AA0362-422</u> 0	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28953
Operator Name/Code : RAMVEER MEENA	
Defect LocationFE	
Test Results (Pass/Fail/other):	
If other then Remarks	

Frame No: ASC39 *

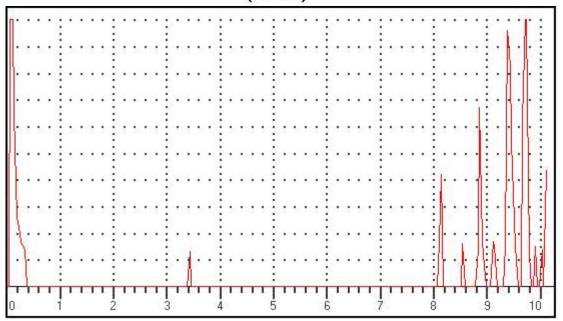
(A-Scan)



Data Setup Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm Gate 2(Depth): mm

Date and TimeDt:27/5/2025 1m:10:0	
UFD Model: <u>Arya 1(R)</u> Sr No: <u>AA0362-422</u> 0	
Railway/Workshop: BS PLW	
Type of Axle/wheel: WAG9	Axle/wheel No:28953
Operator Name/Code : RAMVEER MEENA	
Defect LocationFE	
Test Results (Pass/Fail/other):	
If other, then Remarks	

(A-Scan)



Data Setup Gain: 38.0 dB Gate 1 (Status): OFF RANGE: 2500.00mm Gate 2 (Status): OFF MTL VEL: 5920 M/S Gate 1(Echo height): 0 % REJECT: 12 % Gate 1(Beam Path): 0.00mm DELAY: 0.06mm Gate 1(Surface Distance): 0.00mm PROBE ZERO: 8.78us Gate 1(Depth): 0.00mm MODE: SINGLE Gate 2(Echo height): PROBE ANGLE: 0.0DEG Gate 2(Beam Path): mm THICK: 100.00mm Gate 2(Surface Distance): mm

Gate 2(Depth): mm

Observation/Remarks (If Any):

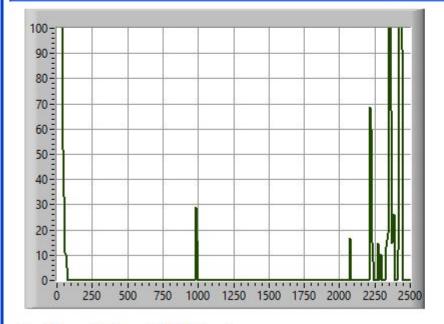
Frame No: ASC40 *

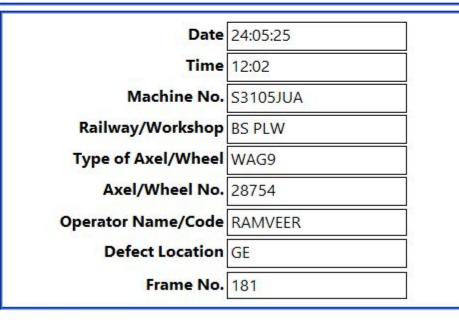


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 33.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 0 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





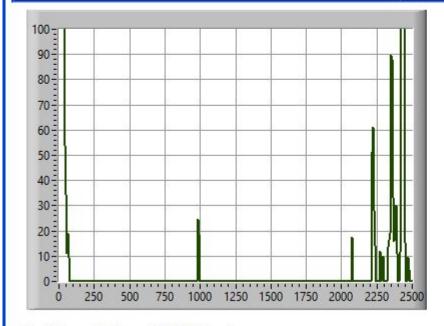
Test Result(Pass/Fail/Other) : If Other, then Remarks :

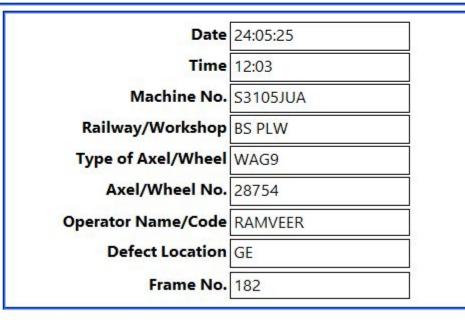


DATE: 24-May-25 **TIME:** 1:45 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 33.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 0 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





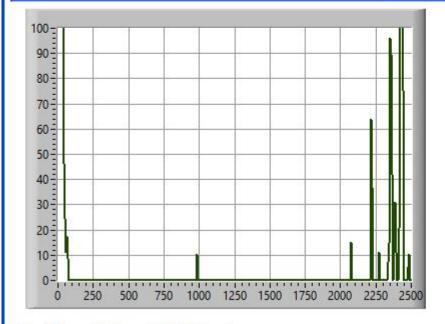
Test Result(Pass/Fail/Other) : If Other, then Remarks :

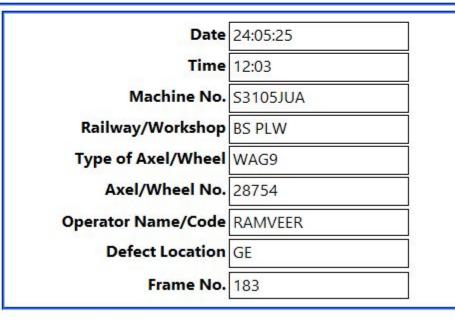


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 33.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 0 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





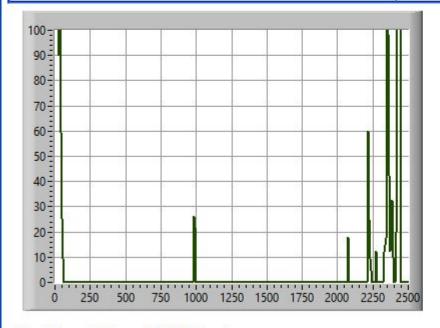
Test Result(Pass/Fail/Other) : If Other, then Remarks :

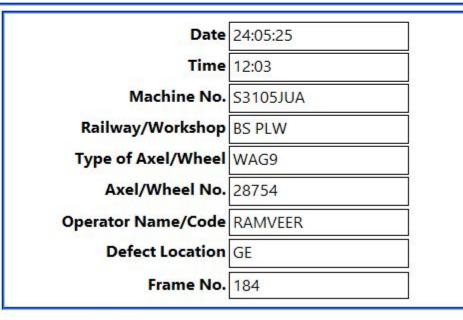


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 33.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 0 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





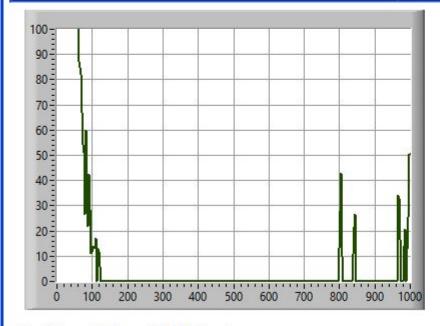
Test Result(Pass/Fail/Other) : If Other, then Remarks :

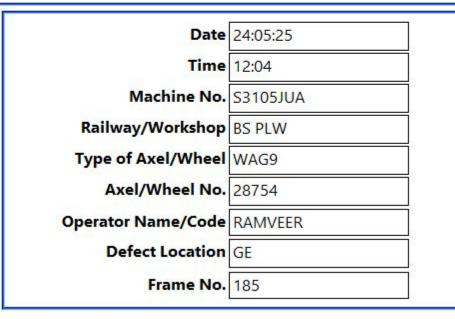


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 45.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm]		Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





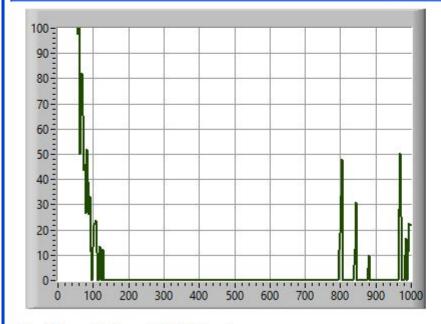
Test Result(Pass/Fail/Other) : If Other, then Remarks :

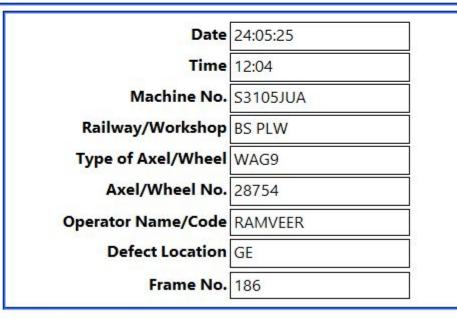


DATE: 24-May-25 **TIME:** 1:45 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 45.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm]		Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





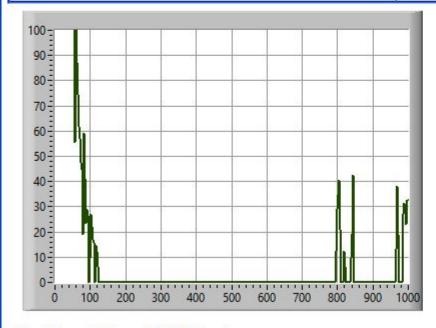
Test Result(Pass/Fail/Other) : If Other, then Remarks :

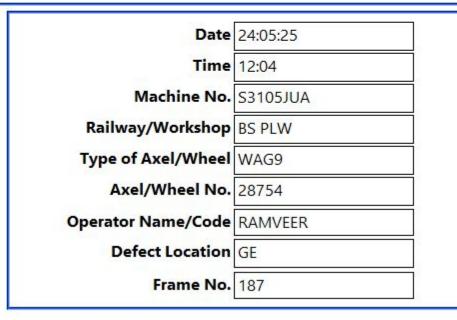


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





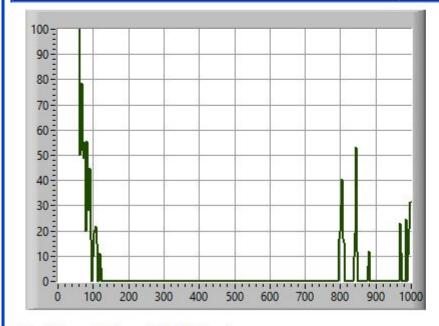
Test Result(Pass/Fail/Other) : If Other, then Remarks :

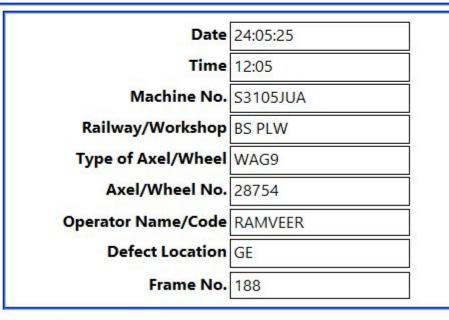


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.O.OO.AE.O4.06

Testing Parameters				Gate Measure			
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





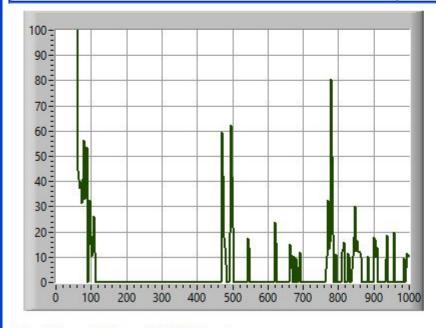
Test Result(Pass/Fail/Other) : If Other, then Remarks :

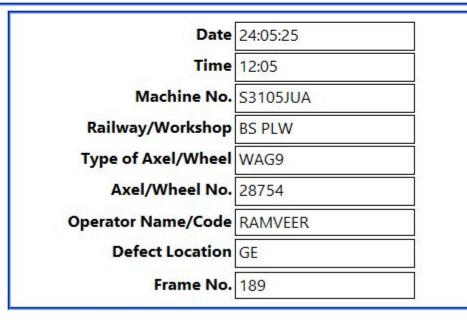


DATE: 24-May-25 **TIME:** 1:45 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





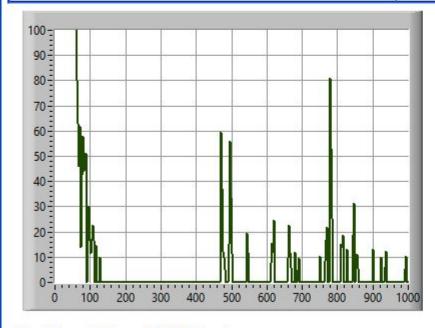
Test Result(Pass/Fail/Other) : If Other, then Remarks :

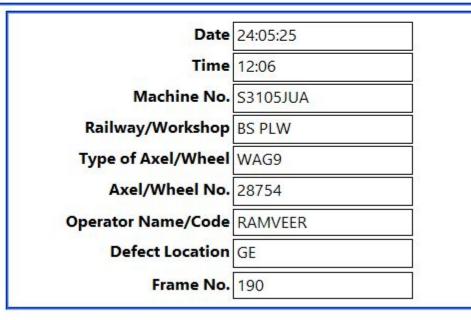


DATE: 24-May-25 **TIME:** 1:45 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure			
Gain	: 45.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	: 9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm]		Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





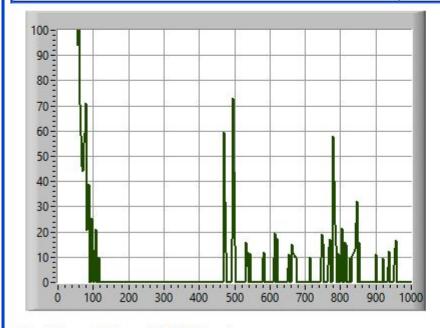
Test Result(Pass/Fail/Other) : If Other, then Remarks :

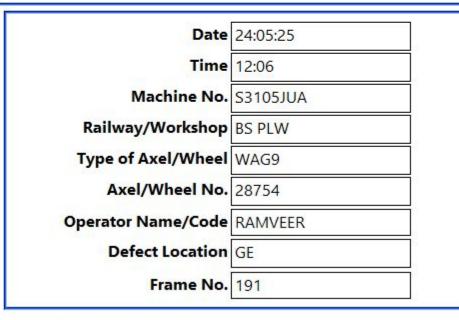


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





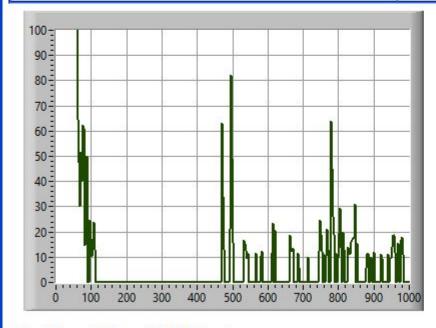
Test Result(Pass/Fail/Other) : If Other, then Remarks :

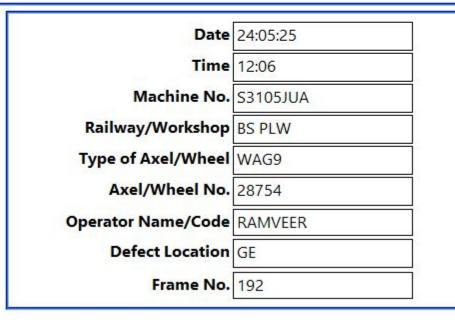


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





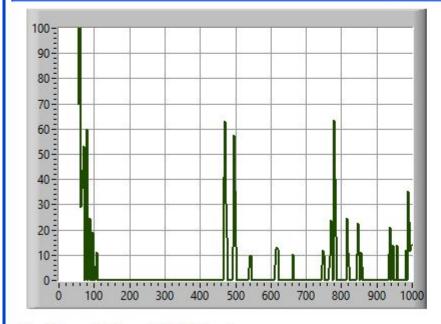
Test Result(Pass/Fail/Other) : If Other, then Remarks :

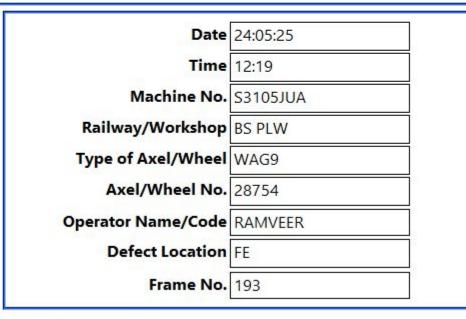


DATE: 24-May-25 **TIME:** 1:45 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 42.3 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





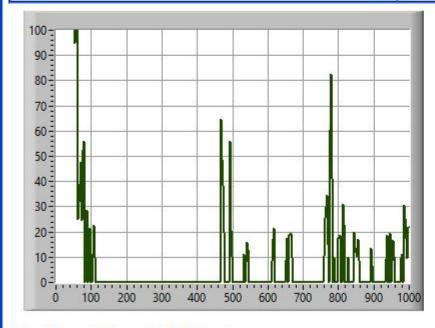
Test Result(Pass/Fail/Other) : If Other, then Remarks :

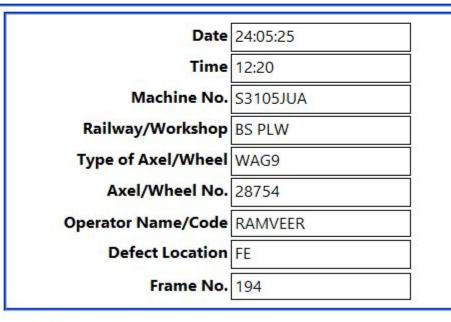


DATE: 24-May-25 TIME: 1:45 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 42.3 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status	: OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height)	: 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path)	: 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance)	: 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth)	: 0 mm	





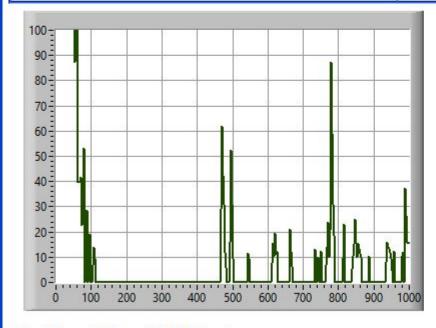
Test Result(Pass/Fail/Other) : If Other, then Remarks :

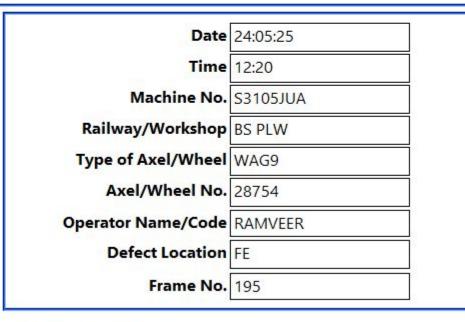


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 42.3 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance): 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





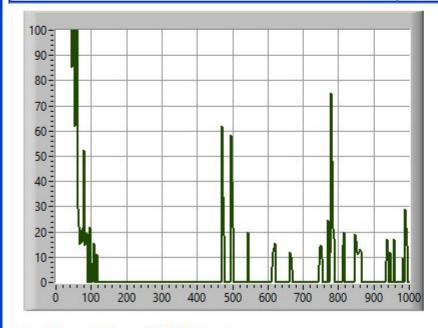
Test Result(Pass/Fail/Other) : If Other, then Remarks :

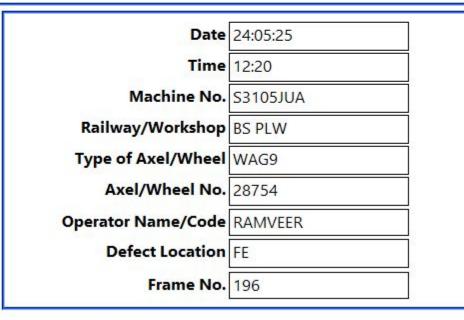


DATE: 24-May-25 TIME: 1:45 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 42.3 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





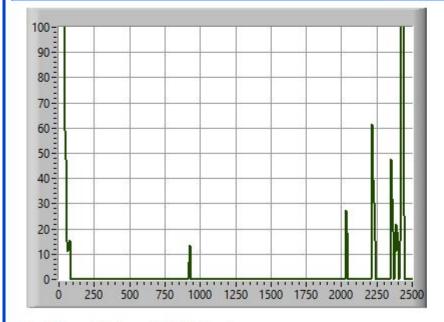
Test Result(Pass/Fail/Other) : If Other, then Remarks :

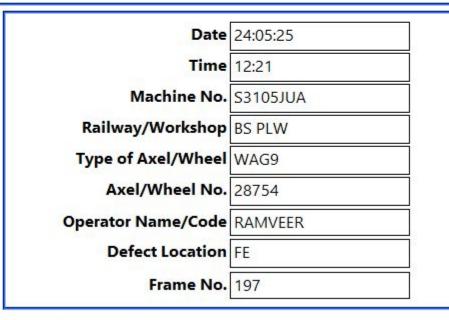


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 32.3 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 0 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





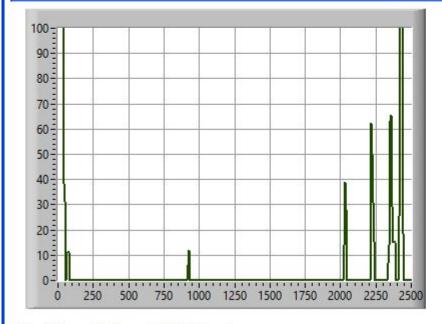
Test Result(Pass/Fail/Other) : If Other, then Remarks :

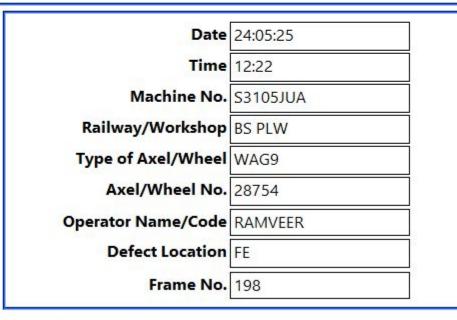


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 32.3 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 0 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





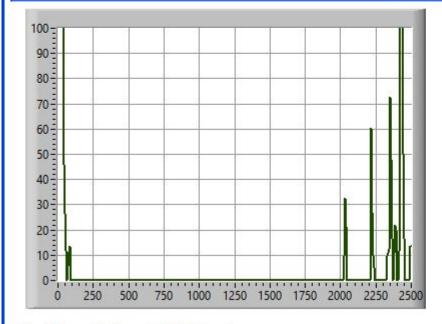
Test Result(Pass/Fail/Other) : If Other, then Remarks :

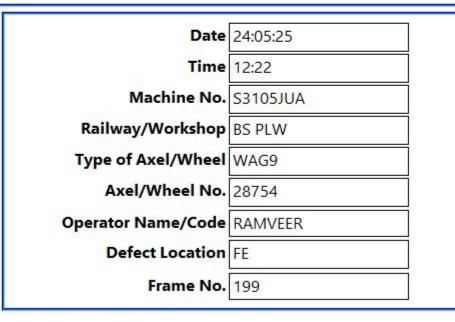


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SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 32.3 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance): 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





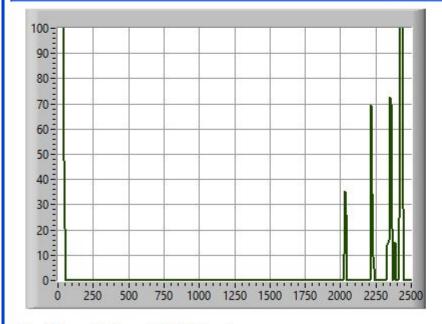
Test Result(Pass/Fail/Other) : If Other, then Remarks :

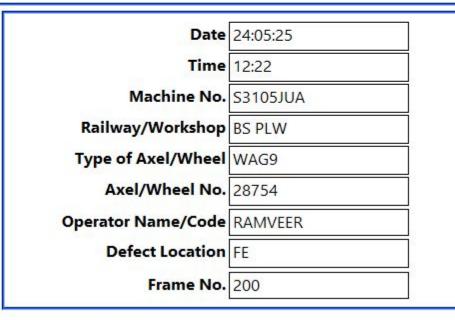


DATE: 24-May-25 TIME: 1:45 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.O.OO.AE.O4.06

	Testing Paran	neters		Gate Measure				
Gain	: 32.3 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 0 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





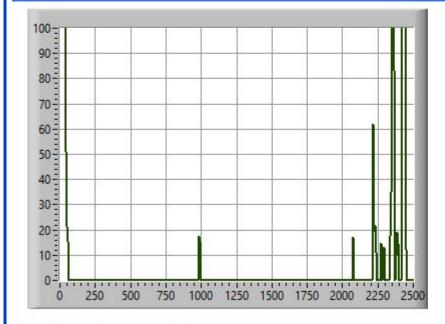
Test Result(Pass/Fail/Other) : If Other, then Remarks :

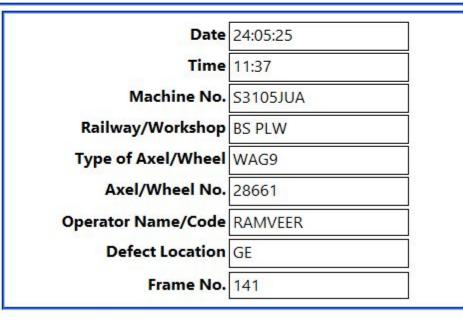


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SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 31.3 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





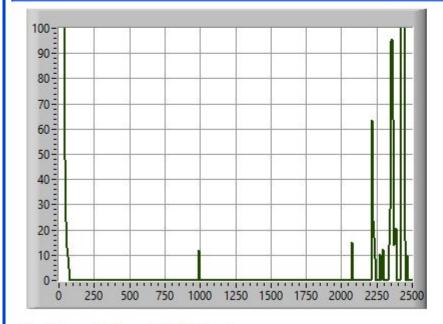
Test Result(Pass/Fail/Other) : If Other, then Remarks :

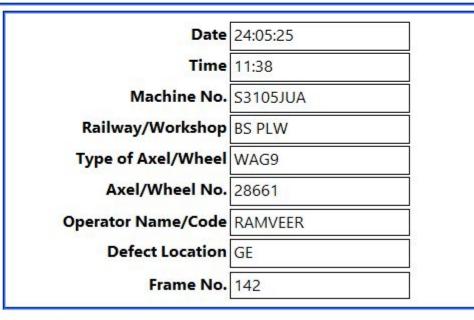


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 31.3 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





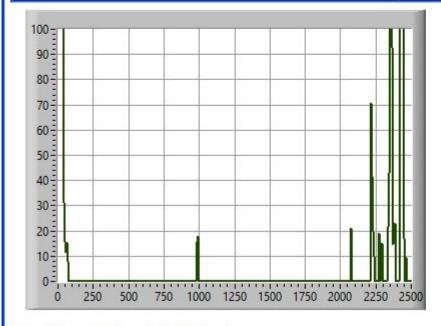
Test Result(Pass/Fail/Other) : If Other, then Remarks :

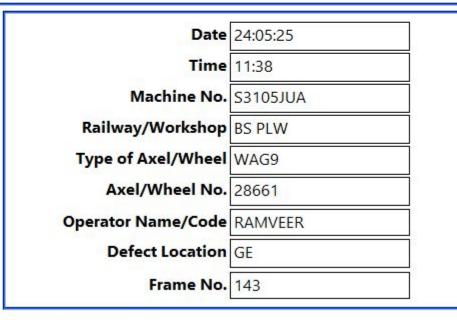


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 31.3 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





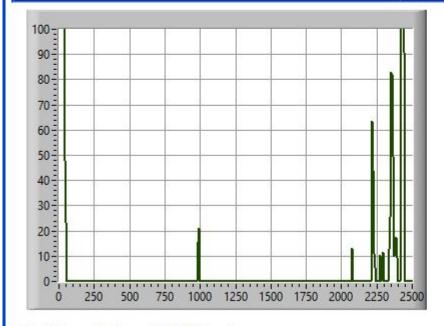
Test Result(Pass/Fail/Other) : If Other, then Remarks :

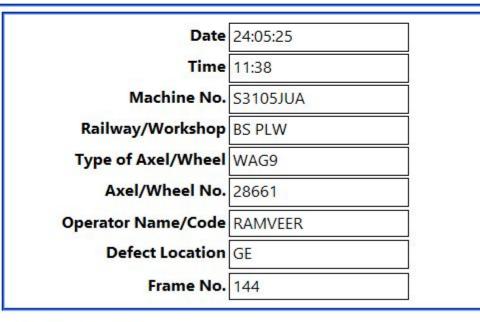


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 31.3 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





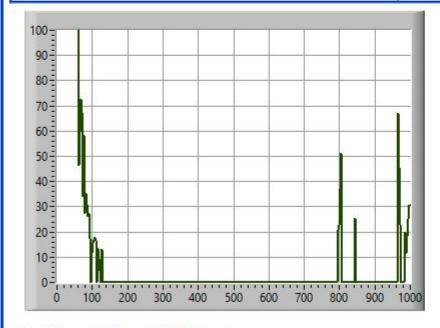
Test Result(Pass/Fail/Other) : If Other, then Remarks :

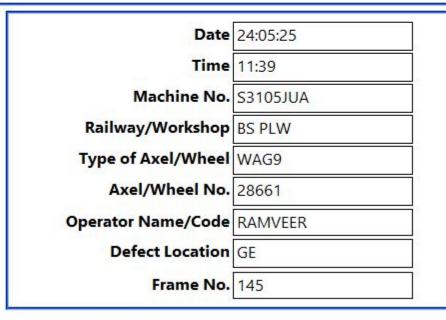


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	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





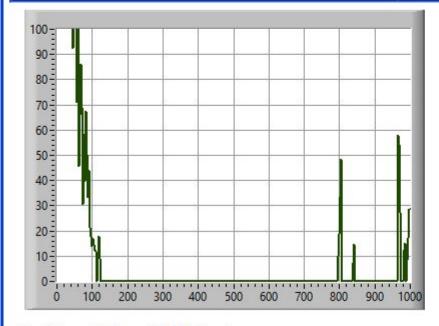
Test Result(Pass/Fail/Other) : If Other, then Remarks :

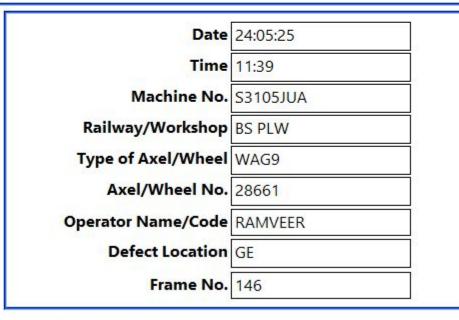


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





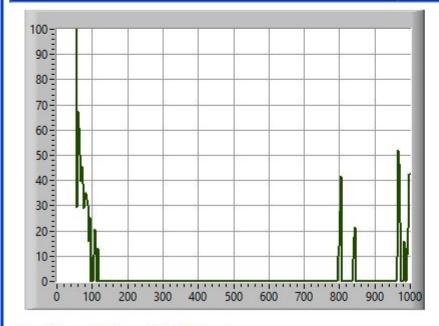
Test Result(Pass/Fail/Other) : If Other, then Remarks :

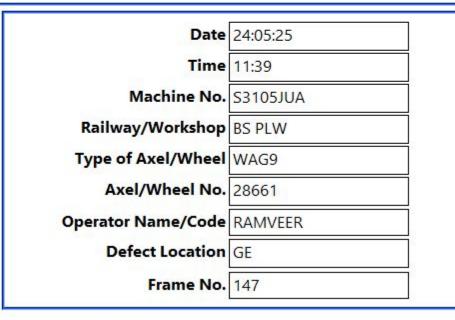


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





Test Result(Pass/Fail/Other) : If Other, then Remarks :

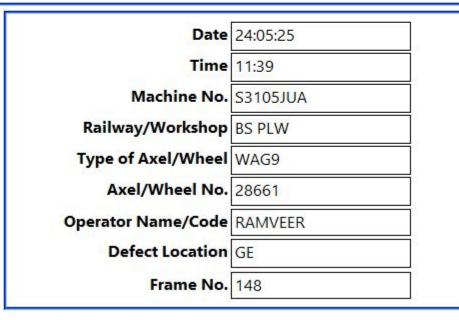


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 10°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





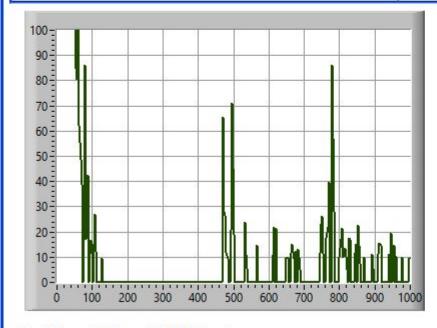
Test Result(Pass/Fail/Other) : If Other, then Remarks :

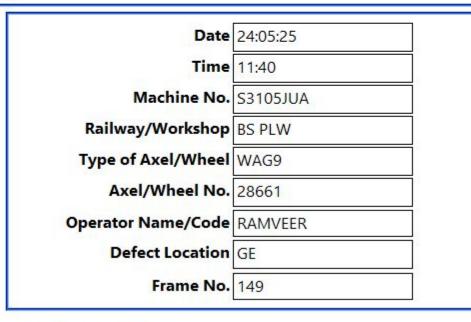


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance): 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





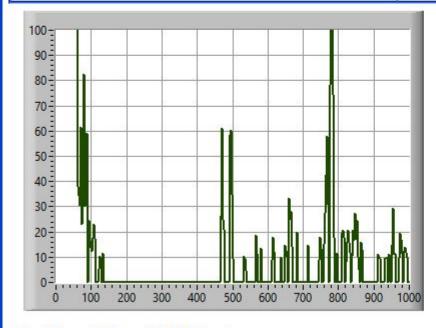
Test Result(Pass/Fail/Other) : If Other, then Remarks :

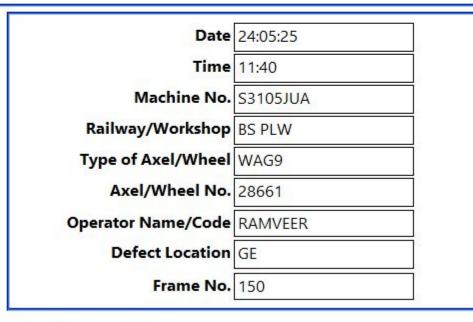


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance): 0 mm		
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





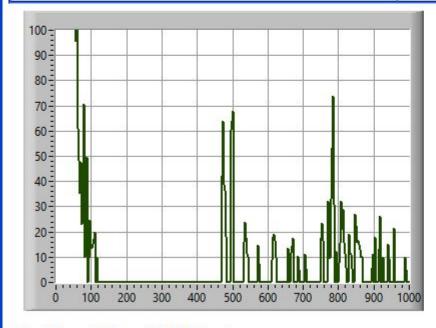
Test Result(Pass/Fail/Other) : If Other, then Remarks :

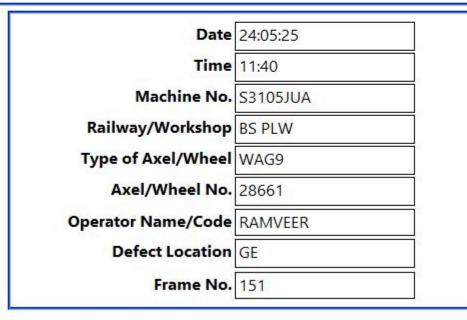


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

	Testing Paran	neters		Gate Measure				
Gain	: 45.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF		
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %		
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm		
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm		
Delay	: 0 mm]		Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm		





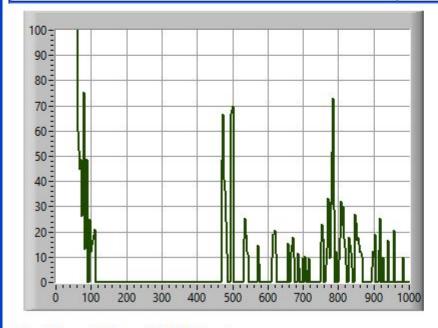
Test Result(Pass/Fail/Other) : If Other, then Remarks :

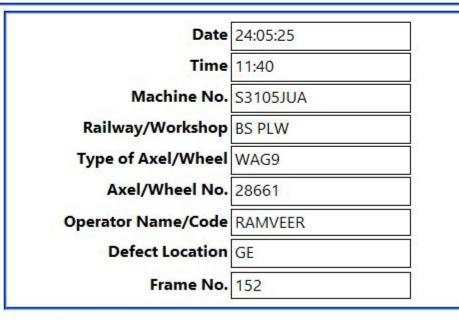


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





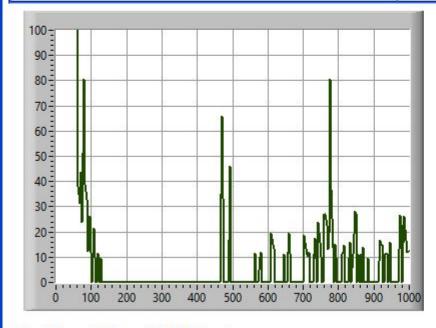
Test Result(Pass/Fail/Other) : If Other, then Remarks :

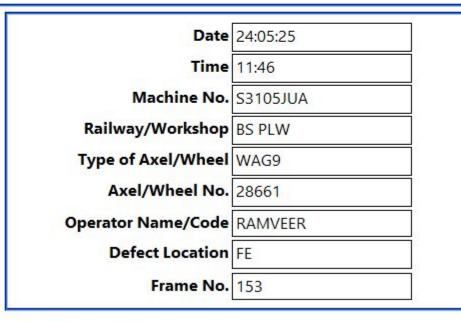


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 45.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance): 0 mm	
Delay	: 0 mm]		Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





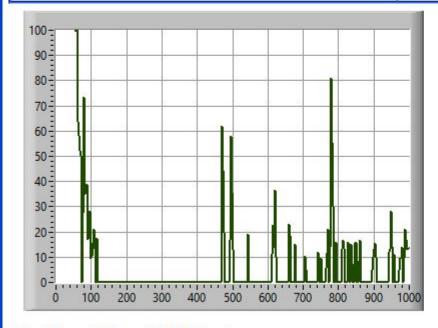
Test Result(Pass/Fail/Other) : If Other, then Remarks :

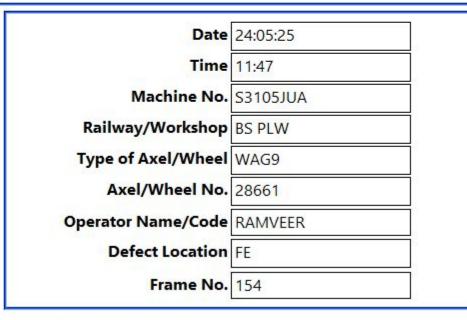


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





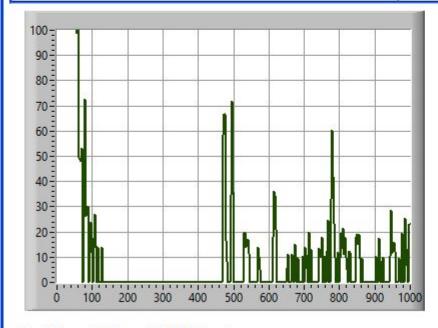
Test Result(Pass/Fail/Other) : If Other, then Remarks :

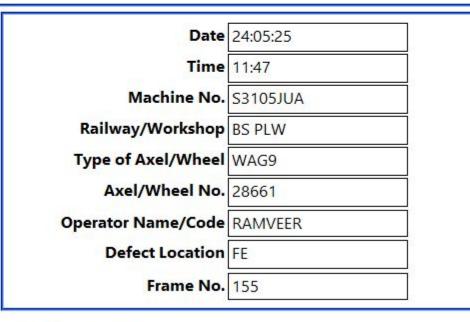


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 45.8 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance): 0 mm	
Delay	: 0 mm]		Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





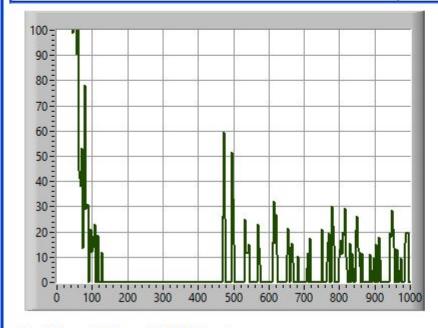
Test Result(Pass/Fail/Other) : If Other, then Remarks :

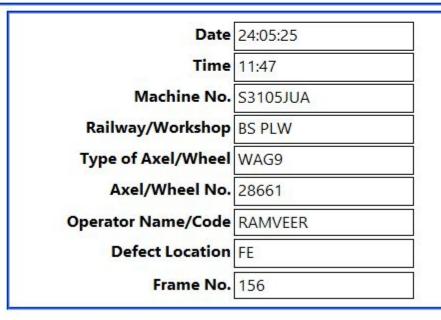


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 45.8 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 1000 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	: 17.5 °	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





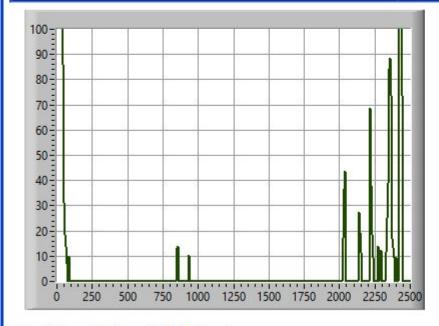
Test Result(Pass/Fail/Other) : If Other, then Remarks :

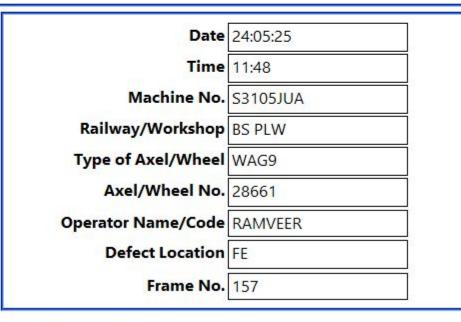


DATE: 24-May-25 TIME: 1:44 PM INSTRUMENT VER: 0000

SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 34.3 dB	Probe Zero	: 3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





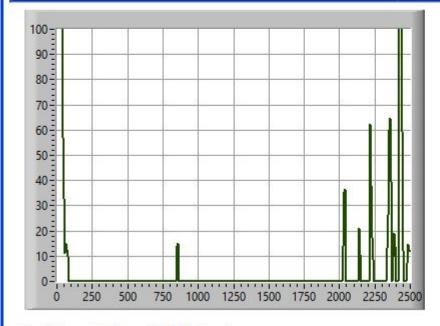
Test Result(Pass/Fail/Other) : If Other, then Remarks :

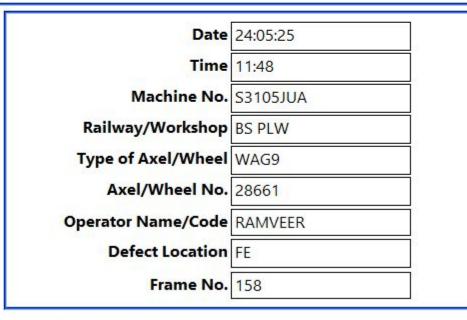


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 34.3 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





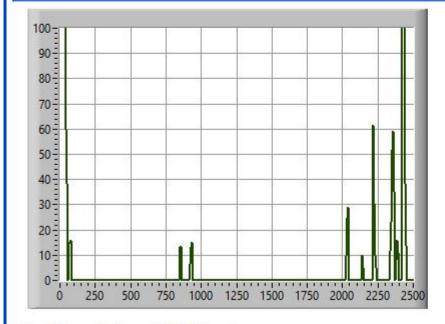
Test Result(Pass/Fail/Other) : If Other, then Remarks :

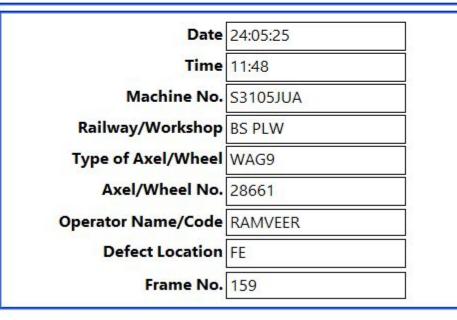


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 34.3 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





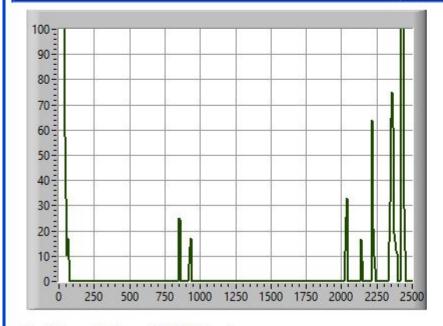
Test Result(Pass/Fail/Other) : If Other, then Remarks :

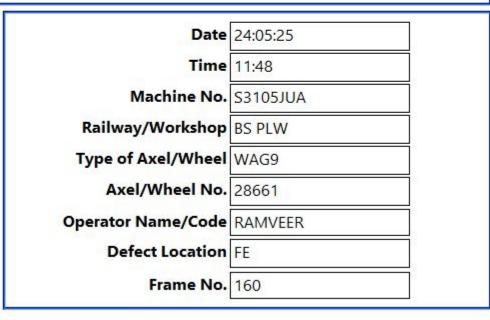


DATE: 24-May-25 TIME: 1:44 PM

INSTRUMENT VER: 0000 SOFTWARE VER: P.0.00.AE.04.06

Testing Parameters				Gate Measure			
Gain	: 34.3 dB	Probe Zero	3.8	G1 Status	: OFF	G2 Status : OFF	
Range	: 2500 mm	Mode	: Single	Gate 1 (Echo Height)	: 0 %	Gate 2 (Echo Height) : 0 %	
Velosity	: 5910 m/sec	Probe Angle	:0°	Gate 1 (Beam Path)	: 0 mm	Gate 2 (Beam Path) : 0 mm	
Reject	9 %	Thickness	: 100 mm	Gate 1 (Surface Distance)	: 0 mm	Gate 2 (Surface Distance) : 0 mm	
Delay	: 0 mm			Gate 1 (Depth)	: 0 mm	Gate 2 (Depth) : 0 mm	





Test Result(Pass/Fail/Other) : If Other, then Remarks :

TOP 12 COSTLIEST ITEMS OF WAG9HC LOCO WITH WARRANTY CONDITIONS AS PER TENDERS

S No	PL No	DESCRIPTION	Warranty Period
1	29741075	IGBT BASED 3-PHASE DRIVE PROPULSION EQUIPMENT	60 months after commissioning or 72 months from date of supply whichever earlier as per special conditions given by CLW
2	29731057	MAIN TRANSFORMER 7775 KVA TYPE LOT 7500 FOR WAP7 3- PHASE ELECTRIC LOCOMOTIVE TO CLW SPECN NO.CLW/ES/3/0660/C	AS PER IRS CONDITIONS OF CONTRACT [i.e. 30 MONTHS FROM THE DATE OF SUPPLY OR 24 MONTHS FROM THE DATE OF COMMISSIONING, WHICHEVER IS EARLIER] WILL BE APPLICABLE.
3	29171064	COMPLETE SHELL ASSLY (PIPED & PAINTED) FOR WAP-7 LOCO TO CLW SPEC. NO. CLW/MS/3/152 ALT-8	AS PER IRS CONDITIONS-30 MONTHS FROM THE DATE OF SUPPLY OR 24 MONTHS FROM THE DATE OF COMMISSIONING, WHICHEVER IS EARLIER.
4	29600418	LOCOMOTIVES TO CLW SPECN. NO. CLW/ES/03/646 ALT-NIL WITH DMW REQUIREMENT OF HARNESSED	As per clause no.9 of CLW Specn. CLW/ES/3/0458 & Clause No.10 of CLW SpecnCLW/ES/3/0459. [18 months after commissioning or 20 months from date of supply for single core & 18 months after commissioning or 24 months from date of supply for multi core]

7	29942007	3-PHASE ASYNCHRONOUS TRACTION MOTOR (RESISTANCE RING MECHANICALLY INTERLOCKED TO END PLATE DESIGN ROTOR, SCHEME-II), TYPE 6FRA-6068 FOR WAP-7 ELECTRIC LOCO WITHOUT ACTIVE SPEED SENSOR TO SPECIFICATION NO. 4TMS.096.081 ALT-2 AND STR NO. CLW/2008/3PHTM/STR/0001.	AS PER IRS CONDITIONS OF CONTRACT [i.e. 30 MONTHS FROM THE DATE OF SUPPLY OR 24 MONTHS FROM THE DATE OF COMMISSIONING, WHICHEVER IS EARLIER] WILL BE APPLICABLE.
6	29480140	COMPLETE FILTER CUBICLE ALONG WITH ALL EQUIPMENTS AND CABLING TO DRG./SPEC NO. [1] CLW/ES/3/0193 ALT-F OR LATEST AND CLW DRG. NO. 1209-15-143-004 ALT-10 AND PART DRG./SPEC NO AS PER ANNEXURE-A ATTACHED.	AS PER IRS CONDITIONS OF CONTRACT [i.e. 30 MONTHS FROM THE DATE OF SUPPLY OR 24 MONTHS FROM THE DATE OF COMMISSIONING, WHICHEVER IS EARLIER] WILL BE APPLICABLE.
5	29180016	BRAKE CONTROL SYSTEM INCLUDING DRIVER'S VIGILANCE CONTROL DEVICE TO SET LIST NO.EL29180016.	As per specification no. CLW/MS/3/001 Alt. 16 i.e. the manufacturer is required to guarantee that the brakevalves/equipment work satisfactorily for a period of five (5) years after commissioning. Any equipment/part which failsduring the guarantee period shall be replaced free of cost by the manufacturer. The replaced components shallfurther be under warranty for five (5) years from the date of their fitment and should the replaced components proveunsatisfactory in service, they shall be replaced by modified and improved components by the supplier free of cost.

8	29105146	Bogie Frame Complete for WAP-7 for 3 Phase Co Co Locomotive to CLW specification No. CLW/MS/3/Bogie/003 alt-1 and CLW Drg.No.1209.01.112-202 Alt-Nil	As per clause 16 of Spec.No.CLW/MS/3/Bogie/003 Alt-1. [60 months after commissioning or 72 months from date of supply]
9	29171192	COMPLETE AUXILIARY CUBICLE HB2 ALONG WITH ALL EQUIPMENTS AND CABLING TO CLW SPEC.NO.CLW/ES/3/0192 ALT-E OR LATEST FOR WAP7 LOCO WITH HOTEL LOAD WITH BARE CUBICLE AS PER CLW SPEC.NO.CLW/MS/3/155 ALT-NIL.	AS PER IRS CONDITIONS OF CONTRACT [i.e. 30 MONTHS FROM THE DATE OF SUPPLY OR 24 MONTHS FROM THE DATE OF COMMISSIONING, WHICHEVER IS EARLIER] WILL BE APPLICABLE.
10	29171210	COMPLETE CONTROL CUBICLE SB2 ALONG WITH ALL EQUIPMENTS AND CABLING (EXCLUDING CONTROL ELECTRONICS) TO CLW SPECN. NO. CLW/ES/3/0195/A ALT-H OR LATEST FOR WAP7 LOCO WITH HOTEL LOAD	AS PER IRS CONDITIONS OF CONTRACT [i.e. 30 MONTHS FROM THE DATE OF SUPPLY OR 24 MONTHS FROM THE DATE OF COMMISSIONING, WHICHEVER IS EARLIER] WILL BE APPLICABLE.
11	29171209	COMPLETE CONTROL CUBICLE SB1 (PUSH PULL SCHEME COMPLIANT) ALONG WITH ALL EQUIPMENTS AND CABLING (EXCLUDING CONTROL ELECTRONICS) TO CLW SPECN. NO. CLW/ES/3/0194 ALT-G OR LATEST FOR WAP7 LOCO WITH HOTEL LOAD	AS PER IRS CONDITIONS OF CONTRACT [i.e. 30 MONTHS FROM THE DATE OF SUPPLY OR 24 MONTHS FROM THE DATE OF COMMISSIONING, WHICHEVER IS EARLIER] WILL BE APPLICABLE.
12	29171180	COMPLETE AUXILIARY CUBICLE HB1 ALONG WITH ALL EQUIPMENTS AND CABLING TO CLW SPEC.NO.CLW/ES/3/0191 ALT-D OR LATEST FOR WAP7 LOCO WITH HOTEL LOAD WITH BARE CUBICLE AS PER CLW SPEC.NO.CLW/MS/3/155 ALT-NIL.	AS PER IRS CONDITIONS OF CONTRACT [i.e. 30 MONTHS FROM THE DATE OF SUPPLY OR 24 MONTHS FROM THE DATE OF COMMISSIONING, WHICHEVER IS EARLIER] WILL BE APPLICABLE.



भारत सरकार GOVERNMENT OF INDIA

रेल मंत्राल्य

MINISTRY OF RAILWAYS

पटियाला रेलइंजन कारखाना

PATIALA LOCOMOTIVE WORKS

Email: dyceeloco.dmw@gmail.com फैक्स/Fax No.: 0175-2397244

फोन/ Phone: 0175- 2396422 मोबाईल: 9779242310 पटियाला, 147003, भारत्

PATIALA, 147003, INDIA



Date: As signed

(An ISO 9001, ISO 14001, ISO 45001 & ISO 50001, 5S & Green Building certified Organization)

No. PLW/M/ECS/Tech/Kavach

(Through Mail)

Sr. Div. Electrical Engineer, Electric Loco Shed, Bhusawal.

Email: srdeetrsbslcrly@gmail.com

Sub:- Fitment of KAVACH in three Phase Electric Loco. No. 42042 WAG9-HC.

Ref:- (i). Director General Stds./Electrical/RDSO letter no. EL/0.1.3/3 dated 21.08.2023.

(ii).Director General Stds./Electrical/RDSO letter no. EL/0.1.3/3 dated 26.09.2023

In ref. to the above letter's Loco No. 42042 has been dispatched with fittings for implementation of KAVACH system in locomotive at home shed in Zonal Railway. This Loco was dispatched to ELS/BSL/CR on 22.06.2025. The details of fittings are attached as Annexure-A (pneumatic fittings), Annexure-B (Kavach equipment mounting Brackets) & Annexure-C (Wago with harnessed lay out).

This is for your information & necessary action please.

Digitally signed by NISHANT BANSIWAL Date: 2025.08.06

(निशांत बंसीवाल)

उप मुख्य विद्युत अभियंता/लोको

प्रतिलिपि:-

CEE/Loco & CEE/D&Q, CMM, CELE/CR:- for kind information please Dy CME/Design, Dy. CMM/Depot: for information & necessary action please AEE/LAS, AWM/LFS&ABS, AWM/ECS: for necessary action please

Loco No. 420 42

SN	PL No.	Description of item	Qty.
	<u>.</u>	ISOLATING COCK 3/8" (FEMALE) LEGRIS TYPE WITH VENT	04 nos.
1	29163341	ISOLATING COCK 3/8" (FEMALE) LEGRIS TYPE WITHOUT VENT	02 nos.
2		TEE UNION 3/8"X3/8"X3/8" BRASS FITTINGS	02 nos.
		MALE CONNECTORS 3/8" TUBE OD X 3/8" BSPT, BRASS FITTINGS	09 nos.
		MALE CONNECTORS 1/2" TUBE OD X 1/2" BSPT, BRASS FITTINGS	06 nos.
		FEMALE CONNECTORS (NYLON TUBE) DIA 6 TUBE X 3/8" BSPP BRASS FITTINGS	01 no.
		MALE CONNECTOR (NYLON TUBE) DIA 6 TUBE X 3/8" BSPP BRASS FITTINGS	03 nos
		FEMALE TEE 3/8" BSPP – BRASS	06 nos
2	29611994	HEX PLUG -3/8" BSPT – BRASS	02 nos
		FEMALE TEE 1/2" BSPP – BRASS	04 nos
		HEX NIPPLE 3/8X3/8" BSPT – BRASS	04 nos
		RED HEX NIPPLE 3/8X1/2" BSPT - BRASS	02 nos
	-	HEX PLUG – 1/2" BSPT – BRASS	04 nos
		MALE ELBOW CONNECTORS 3/8" TUBE OD X 3/8) BSPT. BRASS FITTINGS	02 nos
3	29170114	Copper Tube OD 9.52mm (3/8") X 1.245 Mm W.T X 6 Mtr	1.2Mtr

AWMABS 8 LES

SSE/G/ABS

SN	PL No.	Description of item	Quantity
1.	29611945	Mounting bracket arrangement provided for RF Antenna on the roof top of both driver cabs.	04 nos.
2.		Mounting bracket arrangement provided for GPS/GSM Antenna on the roof top of both driver cabs.	02 nos.
3.		Protection Guards for RFID reader provided behind the cattle guards of both side.	04 nos.
4.		Inspection door with latch provided on the both driver desk covers (LP side) in each cab to access isolation cock.	02 nos.
5.	1	Cable Entry Plate fitted for routing of cable with RF Antenna & GPS/GSM Antenna bracket.	06 nos.
6.	<u> </u>	WAGO bracket fitted in Machine room at back side of SB-1.	01 no.
7.	-	One circular hole of 80 mm dia. provided in each cabs on LP side behind the driver desk toward the wall for routing of OCIP (DMI) cables.	02 nos.
8.	- 4	80 mm holes provided on TM1 and TM6 Junction box inspection cover hole for drawing of RFID reader cables.	02 nos.
9.	-	DIN Rail fitted inside the driver desk (LP Side)	02 nos.





Annexure-C

SN	man PL No.	Description of item	- Mark of the second	Quantity .
1.	42310301	Flexible conduit size 25mm ² provided for RF- Antenna cable layout from CAB-1&2 to Machine	1, 2 & GPS room.	06 mtr.
2.	29611982	Wago terminals in CAB-1&2 (25 nos. in each CA	∖B).	50 nos.
3.	29611982	Wago terminal in Machine room at back side of	SB-1.	75 nos.
4.		Harness provided from KAVACH SB to SB-1		07 wires
5.	-	Harness provided from KAVACH SB to SB-2		05 wires
6.	-	Harness provided from KAVACH SB to Pneuma	tic Panel	12 wires
7.	- `	Harness provided from KAVACH SB to CAB-1		24 wires
8.		Harness provided from KAVACH SB to CAB-2		16 wires

AWMECS

SSEIGIECS