



PRASA PROJECT

CONFIDENTIAL INFORMATION




This document and the information contemplated therein have to be considered as Confidential Information pursuant to the provisions of Clause 25 of the MSA, and treated as such.

APPLICATION REFERENCE

MOUNTING	DESCRIPTION	STATION	CAR TYPE						WORK INSTRUCTION	SAFETY ? 
			TC1	M4	M1	M2	M3	TC2		
<input type="checkbox"/>	DTR3-PROCE-14	LEVELLING, WEIGHTING AND BALANCING M CAR	FT1140	1	1	1	X		PRA.FT1140.04	YES
<input type="checkbox"/>	DTR3-PROCE-14	LEVELLING, WEIGHTING AND BALANCING TC CAR	FT1140	1				1	PRA.FT1140.05	YES
<input type="checkbox"/>	DTR3-PROCE-17	LEVELLING, WEIGHTING AND BALANCING TC CAR	FT1140	1	1	1	1	1	PRA.FT1140.05	YES
<input type="checkbox"/>	DTR3-PROCE-17	LEVELLING, WEIGHTING AND BALANCING TC CAR	FT1140	1	1	1	1	1	PRA.FT1140.05	YES
<input type="checkbox"/>										
<input type="checkbox"/>										
<input type="checkbox"/>										

REV	DATE	MODIFICATION CONTENT	RESPONSIBLE	NAME	DATE
7	2/11/2020	UPDATE OF AIR TIGHTNESS TEST TIME FROM 4 MIN TO 5 MIN. ADD PANTOGRAPH AIR TIGHTNESS.	APPROVER	GIVEN SILOWA	2/11/2020
			CHECKER	SIMON MOKOENA	2/11/2020
			COMPILER	COMFORT MALATJI	2/11/2020
8	9/13/2021	ADDING GAUGE MEASUREMENT CHECK ON THE SI.	APPROVER	MAKOFANE LUCY	9/13/2021
			CHECKER	RATAU EDISON	9/13/2021
			COMPILER	TSAKANI KHOSA	9/13/2021
9	5/31/2022	pressure valve (APV) Isolation	APPROVER	MAKHURUPETJI THABANG	5/31/2022
			CHECKER	HAZEL MGIBA	5/31/2022
			COMPILER	RATAU EDISON	5/31/2021

TUE	CAR	OPERATOR NAME	DATE	SELF INSPECTION NUMBER	PAGES
TS229	M3	Gordon	13/06/24	SI.FT1140.52	01/08

	SELF INSPECTION INDUSTRIAL QUALITY		Rev:09	Project: PRASA	SI.FT1140.52					
			Date: 5/31/2022							
Car:		NCR:		Work Station FT1140						
 Safety Related										
I - Document and Instrument Control										
I.1 - Documents control										
Document	TC1	M1	M2	M3	M4	TC2	Redesign	Remark	SI	Signature/Date
PRA.FT1140.04				X					✓	13/06/24
PRA.FT1140.05										
PRA.FT1140.05										
I.2 - Instruments Control - Monitoring and Measuring Instrument Control (Used for all instrument with calibration needed)										
Instruments description	Serial number		Calibration or Verification Validation Date		SI	Signature/Date				
Measuring Tape	GIBTA 0276		26/10/23 - 26/10/24		✓	13/06/2024 				
Vernier Gauge	GIBVR 0056		06/08/23 - 06/08/24		✓					
Torque Wrench 3MM	D2511023		19/12/23 - 19/12/24		✓					
Torque Wrench 150MM	D28622009		19/12/23 - 19/12/24		✓					
Torque Wrench 320MM	A9650027		21/12/23 - 21/12/24		✓					



SELF INSPECTION INDUSTRIAL QUALITY

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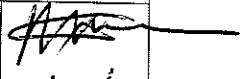
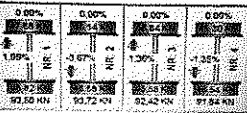
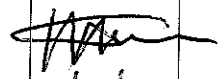
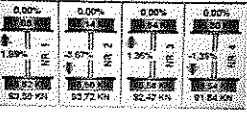
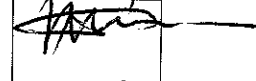
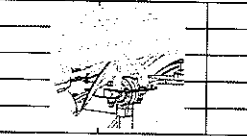

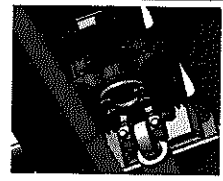
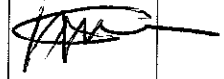
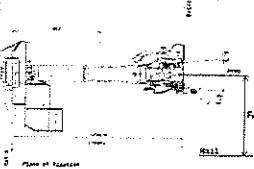
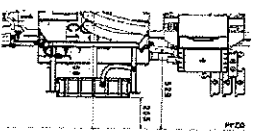
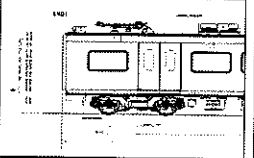
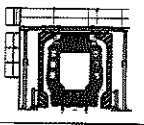
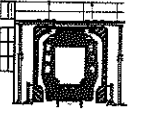
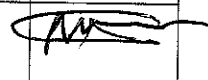
Project:
PRASA

SI.FT1140.52

II - Self Inspection - Items to Check

II.1 - Items to Check

Item	Picture/Sketch	Description	Criteria/Record	OK	Signature/Date								
01		Ensure that the average pressure valve (APV) is isolated by capping the two input pipes at the fittings installing the blanking fitting on the pipes highlighted		✓	 13/06/24								
02		Check underframe pipe system Air tightness. Test performance according to WI PRA.FT1130.15.	The test was performed and no leak was observed. Initial pressure (IP): 10.20 Final pressure (FP): 9.84 FP - IP = 0.36 APPROVAL CRITERIA: After 5 minutes the pressure cannot drops more than 0,2 bar	✓	 13/06/24								
03		Movement performed at least 50m to shudder the car. And position on the leveled load cell, with wheels on the center.		✓	 13/06/24								
04		Measurement inspection was done with car on condition AWD and the rail levelled. (The load cells system must be levelled and calibrated)	Calibration Validation Date 19/12/24	✓	 13/06/24								
05		In case of the equipments not installed, equivalent weight of the item should be added in the same place to simulate the equipment. (Any simulated weight, add on pending list)	<table><thead><tr><th>EQUIPMENT DESCRIPTION</th><th>WEIGHT (kg)</th></tr></thead><tbody><tr><td>Gong Way</td><td>30</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></tbody></table>	EQUIPMENT DESCRIPTION	WEIGHT (kg)	Gong Way	30					✓	 13/06/24
EQUIPMENT DESCRIPTION	WEIGHT (kg)												
Gong Way	30												
06		The pressure difference between air spring on each bogie when raise the pressure was maintained < 0,3 bar.		✓	 13/06/24								
07		Measuremet recorded with empty suspension and loaded are on conformity with tolerances of the project.		✓	 12/06/24								
08		All levelling measurements are according to the reference. (Values out of reference must be recorded on "Description of defects")		✓	 13/06/24								

		<h1>SELF INSPECTION INDUSTRIAL QUALITY</h1>		Rev:09 Date: 5/31/2022		Projet: PRASA		SI.FT1140.52	
Item	Picture/Sketch	Description	Criteria/Record	OK	NO	Signature/Date			
09		Check that the leveling rods are torqued and have torque marker.		✓		 13/06/24			
10		The difference of weight between the left and right wheels of each ax, must be $\leq 4\%$. (Verify on the T&C equipment if all arrows are in green).		✓		 13/06/24			
11		Remove the car, move back onto the load cells and repeat the step 09. Confirm if both are in the tolerance of $\leq 4\%$.		✓		 13/06/24			
12		1 - Record shims thickness used on rod. 2 - All screws were torqued and have torque marker.	THICKNESS (mm) I 0 II 0 III 0 IV 0	✓		 13/06/24			
13		Pivot fixation	1- M20 x 90 screws with application of torque according to PRA.FT1140.04 / 05	✓		 13/06/24			
14		FOR TC CARS F= Height of the center of Automatic coupler F = 895mm (+5 / -10mm) (Using levelled rail)	TC CAB #1= _____ mm			M/A			
15		FOR TC CARS Height of Eurobalise Antenna = 205mm(+/-10mm) (Using levelled rail)	TC CAB #1= _____ mm			M/A			
16		Check pantograph piping air tightness. Test performance according to W1 PRA.FT1140.17.	The test was performed and no leak was observed. -Roof piping connection fittings. -Room piping connection fittings(Roof arch and door trimming)			M/A			
17		Pantograph does not come in contact with the higher height gauge when passing through.	No Contact with Pantograph and Gauge -GO Contact with Pantograph and Gauge - NO GO			M/A			
18		Car does not come into contact with the gauge.	No Contact with Car and Gauge -GO Contact with Car and Gauge - NO GO	✓		 13/06/24			



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DRAFT TO MEASUREMENTS DURING LEVELLING (ALL UNITS MUST BE IN mm/bar/kg)

DESCRIPTION	TOLERANCE	END#1												END#2											
		LEFT SIDE						RIGHT SIDE						LEFT SIDE						RIGHT SIDE					
AIR SPRING HEIGHT (EMPTY)	N/A	A ₁₁												A ₁₁											A ₁₁
AIR SPRING HEIGHT (FULL)	min 254 max 261	A ₁₂												A ₁₂											A ₁₂
FLOOR COVERING HEIGHT	min 1096 max 1126	E ₁₁												E ₁₁											E ₁₁
AIR SPRING PRESSURE	≤ 0.3 (Ci - Cj)	C ₁₁												C ₁₁											C ₁₁
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ₃												D ₃											D ₃
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ₄												D ₄											D ₄
PIVOT VERTICAL GAP	min 25 max 32	K ₁₁												K ₁₁											K ₁₁
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (J ₁₁ - J ₁₂)	J ₁₁												J ₁₁											J ₁₁
QTY OF TURNS OF LEVELLING ROD	N/A	X ₁₁												X ₁₁											X ₁₁
SHIMS OF ANTI-ROLL BAR	N/A	Y ₁₁												Y ₁₁											Y ₁₁
AIR SPRING HEIGHT (EMPTY)	N/A	A ₁₃												A ₁₃											A ₁₃
AIR SPRING HEIGHT (FULL)	min 254 max 261	A ₁₄												A ₁₄											A ₁₄
FLOOR COVERING HEIGHT	min 1096 max 1126	E ₁₃												E ₁₃											E ₁₃
AIR SPRING PRESSURE	≤ 0.3 (Cv - Cw)	C ₁₃												C ₁₃											C ₁₃
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ₅												D ₅											D ₅
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ₆												D ₆											D ₆
PIVOT VERTICAL GAP	min 25 max 32	K ₁₃												K ₁₃											K ₁₃
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (J ₁₃ - J ₁₄)	J ₁₃												J ₁₃											J ₁₃
QTY OF TURNS OF LEVELLING ROD	N/A	X ₁₃												X ₁₃											X ₁₃
SHIMS OF ANTI-ROLL BAR	N/A	Y ₁₃												Y ₁₃											Y ₁₃

COMPARE EACH TENTATIVE WITH
THE TOLERANCE AND IDENTIFY
EACH MEASURE AS BELOW

GOOD LOWER HIGHER

✓ ↓ ↑

WEIGHT
COMPENSATION

EQUIPMENT

WEIGHT

EQUIPMENT

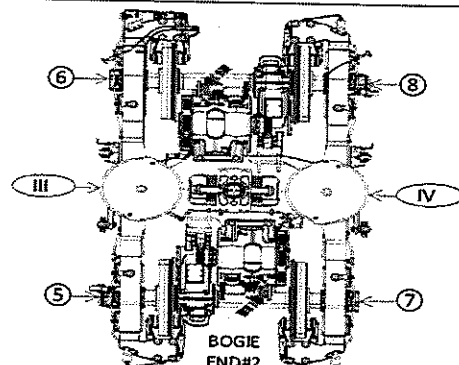
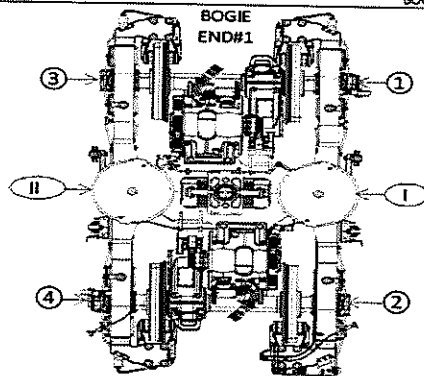
WEIGHT

SECONDARY MEASUREMENTS
(ONLY TO CARS)

AUTOMATIC COUPLER

HEIGHT

ANTENNA HEIGHT





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DRAFT TO MEASUREMENTS DURING LEVELLING (ALL UNITS MUST BE IN mm/bar/kg)

DESCRIPTION	TOLERANCE	END#1												END#2											
		LEFT SIDE						RIGHT SIDE						LEFT SIDE						RIGHT SIDE					
AIR SPRING HEIGHT (EMPTY)	N/A	A ^{II}												A ^I											A ^I
AIR SPRING HEIGHT (FULL)	min 254 max 261	A ^{II}												A ^I											A ^I
FLOOR COVERING HEIGHT	min 1096 max 1116	E ^{II}												E ^I											E ^I
AIR SPRING PRESSURE	≤ 0.3 (Q _I - Q _I)	C ^{II}												C ^I											C ^I
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ⁵												D ¹											D ¹
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ⁴												D ²											D ²
PIVOT VERTICAL GAP	min 25 max 32	K ^{II}												K ^I											K ^I
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (J _I - J _I)	J ^{II}												J ^I											J ^I
QTY OF TURNS OF LEVELLING ROD	N/A	X ^I												X ^I											X ^I
SHIMS OF ANTI-ROLL BAR	N/A	Y ^{II}												Y ^I											Y ^I
AIR SPRING HEIGHT (EMPTY)	N/A	A ^{III}												A ^{IV}											A ^{IV}
AIR SPRING HEIGHT (FULL)	min 254 max 261	A ^{III}												A ^{IV}											A ^{IV}
FLOOR COVERING HEIGHT	min 1096 max 1116	E ^{III}												E ^{IV}											E ^{IV}
AIR SPRING PRESSURE	≤ 0.3 (Q _V - Q _S)	C ^{III}												C ^{IV}											C ^{IV}
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ⁵												D ⁷											D ⁷
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ⁶												D ⁸											D ⁸
PIVOT VERTICAL GAP	min 25 max 32	K ^{III}												K ^{IV}											K ^{IV}
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (J _{IV} - J _{III})	J ^{III}												J ^{IV}											J ^{IV}
QTY OF TURNS OF LEVELLING ROD	N/A	X ^{III}												X ^{IV}											X ^{IV}
SHIMS OF ANTI-ROLL BAR	N/A	Y ^{III}												Y ^{IV}											Y ^{IV}

COMPARE EACH TENTATIVE WITH THE TOLERANCE AND IDENTIFY EACH MEASURE AS BELOW

GOOD LOWER HIGHER



WEIGHT COMPENSATION

EQUIPMENT

WEIGHT

EQUIPMENT

WEIGHT

SECONDARY MEASUREMENTS (ONLY TO CARS)

AUTOMATIC COUPLER HEIGHT

ANTENNA HEIGHT

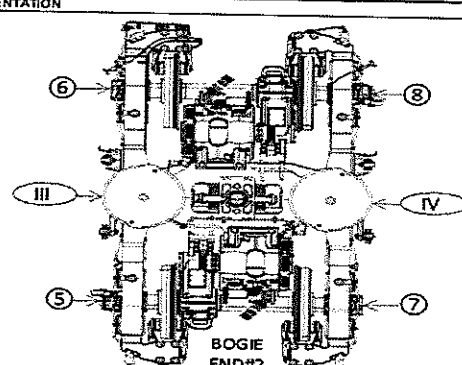
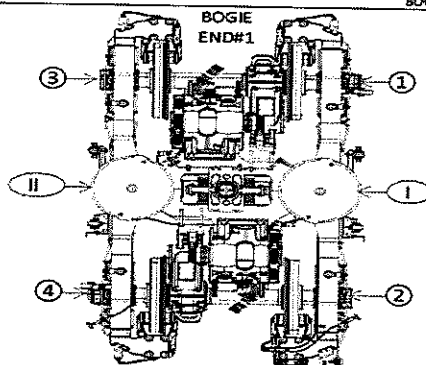


Table 1 - Reference Values and Measurement Tolerances for the Car Levelling.

ITEM		THEORETICAL VALUES													
		TCL CAR		M4 CAR		M1 CAR		M2 CAR		M3 CAR		T12 CAR			
		TBext	TBint	MB1	MB2	MB1	MB2	MB1	MB2	MB1	MB2	TBint	TBext		
Pivot lateral stop gap difference (mm)	Fig. 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4		
Air Spring height (mm)	Fig. 5	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}	255^{+6}_{-1}
Air spring pressure at AWD (bar)	Fig. 5	3,76 (Ref.)	2,82 (Ref.)	2,87 (Ref.)	3,02 (Ref.)	2,91 (Ref.)	3,07 (Ref.)	2,85 (Ref.)	2,83 (Ref.)	2,87 (Ref.)	2,83 (Ref.)	2,83 (Ref.)	2,83 (Ref.)	2,83 (Ref.)	3,76 (Ref.)
Primary Suspension gaps (mm)	Fig. 6	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}	35^{+11}_{-5}
Carbody Floor height (mm)	Fig. 7	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}	1106^{+10}_{-10}
Booster height (mm)	Fig. 7	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}	850^{+15}_{-7}
Coupling End height (mm)	Fig. 8	895 (Ref.)	895 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	895 (Ref.)	895 (Ref.)	895 (Ref.)	895 (Ref.)
Pivot Vertical gap (mm)	Fig. 10	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}	30^{+15}_{-5}



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Leveling report from Production (Final measurements after Levelling and Weighing fine)

References for secondary suspension empty

A'n Air spring height empty

References for secondary suspension full

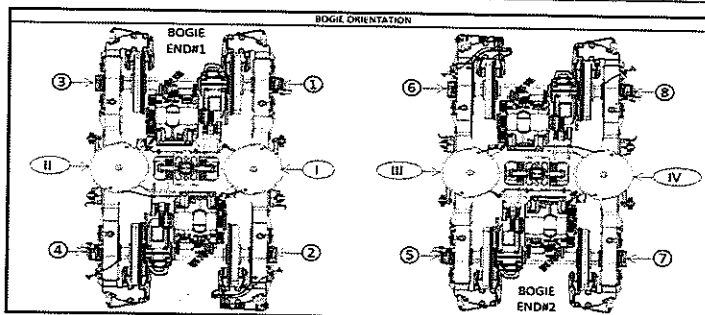
An Air spring height
Bn Difference between measurement A'n and An
En Floor covering height
Cn Air spring pressure
Dn Primary suspension
Kn Pivot Vertical gap
Jn Pivot Lateral stop gaps difference

Item	Reference [mm]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
A'n	N/A	A'i 242	A'ii 242	A'iii 241	A'iv 241
An	254 to 261	Ai 257	Aii 256	Aiii 258	Aiv 257
Bn = An - A'n	N/A	Bi 15	Bii 14	Biii 17	Biv 16
En	1106 ±10 mm	Ei 1110	Eii 1110	Eiii 1112	Eiv 1110
Item	Reference [bar]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
Cn	Table 02 (*)	Ci 2,73	Cii 2,84	Ciii 2,77	Civ 2,84
Cn - Cn+1	Difference ≤ 0,3	Ci - Cii 0,11		Ciii - Civ 0,07	
Gauge serial number	N/A	G1805873	G1805873	G1805873	G1805873
Item	Reference [mm]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
Dn	Table 01 (*)	D1 46,40	D3 45,20	D5 45,30	D6 45,61
		D2 46,41	D4 45,38	D6 45,40	D7 44,50
Kn	25 to 45	Ki 35,52		Kii 34,90	
Jn	Difference ≤ 4	Ji 25,20	Jii 24,49	Jiii 25,20	Jiv 25,00

(*) Reference, only include values, isn't approval criteria.

Table 01 D Theoretical Values	TC1		M4		M1		M2		M3		TC2	
	Tbex	TBin	Mb1	Mb1	Mb1	Mb2	Mb2	Mb1	Mb1	Mb1	Tbin	Tbex
D=	35 ⁺¹² ₋₅	35 ⁺¹² ₋₅	35 ⁺¹² ₋₅	35 ⁺¹² ₋₅	35 ⁺¹² ₋₅	35 ⁺¹² ₋₅	35 ⁺¹² ₋₅	35 ⁺¹² ₋₅	35 ⁺¹² ₋₅	35 ⁺¹² ₋₅	35 ⁺¹² ₋₅	35 ⁺¹² ₋₅

Table 02 C Theoretical Values	TC1		M4		M1		M2		M3		TC2	
	Tbex	TBin	Mb1	Mb1	Mb1	Mb2	Mb2	Mb1	Mb1	Mb1	Tbin	Tbex
C=	3.76	2.82	2.87	2.83	3.02	2.91	3.07	2.85	2.83	2.87	2.83	3.76



Weighting report from Test and Commissioning (Final measurements after Levelling and Weighing fine)



Gibela Rail Transport Consortium RF (Pty)
Ltd
2 Shosholoza Avenue
Dunmottar XT
Ekurhuleni, 1590, South Africa
Reception: +27 (0)10 600 0651

TRAIN SET 229	REF: GIB0000001672_JO PRASA WEIGHT BALANCE EN
	PC09 WEIGHING REPORT

M3	Balance across front and rear bogies	Front Bogie [Tons]	Rear Bogie [Tons]	Longitudinal Imbalance (%)	Criteria Longitudinal Imbalance $\leq 3\%$
		17.75	17.72	0.08%	PASS
	Weight Measured vs Predicted	Weight Measured [Tons]	Weight Predicted [Tons]	Weight Differences (%)	Tolerance (%)
		35.47	35.90	1.20%	1.36% Criteria MinDiffMax PASS

Test Participants			
Name	Company	Department	Date
Thato Musi	GIBELA	EOC	13/06/24