

CONTROL



**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	MA	M1	M2	M3	TC2			
<input type="checkbox"/>	DTR3-PROCE-14	LEVELLING, WEIGHTING AND BALANCING M CAR	FT1140	X	1	1	1	1	1	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	1	PRA.FT1140.05	YES
<input type="checkbox"/>	DTR3-PROCE-17	LEVELLING, WEIGHTING AND BALANCING TC CAR	FT1140	1	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
TS 221	T61	Sandire	06/08/24	SI.FT1140.52	01/08

	<b>SELF INSPECTION INDUSTRIAL QUALITY</b>	Rev:09	Proj: PRASA	<b>SI.FT1140.52</b>
		Date: 5/31/2022		

Car:	NCR:	Work Station FT1140
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**I - Document and Instrument Control**

I.1 - Documents control									
Document	T01	M1	M2	M3	M4	T02	Revision	Remark	Signature/Date
PRA.FT1140.04	X								✓ Signature 06/05/24
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	OK	Signature/Date
Measuring tape	WBTA 0276	26/10/23 / 26/10/23	✓	 06/05/24
Vernier Caliper	WBR 0056	06/11/23 / 06/11/24	✓	
Torque wrench 320 N.M	A96 80027	21/12/23 - 21/11/24	✓	
Torque Wrench 150N.M	D28622009	19/12/23 - 19/12/24	✓	
Torque Wrench 35 N.m	D2511023	19/12/23 - 17/12/24	✓	
Torque Wrench 530 N.m	A96 30053	21/12/23 - 21/12/24	✓	
Torque wrench	D23617	19/12/23 / 19/12/24	✓	





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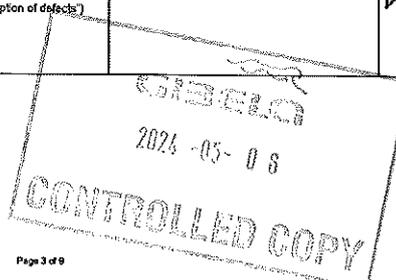
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## II - Self Inspection - Items to Check

### 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		✓	<i>[Signature]</i> 06/05/24
02		Check underframe pipe system Air tightness Test performance according to WI PRA FT 1130.15.	The test was performed and no leak was observed. Initial pressure (IP) 2.57 bar Final pressure (FP) 2.24 bar FP - IP = 0.33 bar APPROVAL CRITERIA: After 5 minutes the pressure cannot drop more than 0.2 bar	✓	<i>[Signature]</i> 06/05/24
03		Movement performed at least 50m to shudder the car. And position on the leveled load cell, with wheels on the center.		✓	<i>[Signature]</i> 06/05/24
04		Measurement inspection was done with car on condition AW0 and the rail leveled. (The load cells system must be leveled and calibrated)	Calibration Validation Date 24/12/19	✓	<i>[Signature]</i> 06/05/24
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 test)	EQUIPMENT DESCRIPTION Driver's seat WEIGHT (kg) 60	✓	<i>[Signature]</i> 06/05/24
06		The pressure difference between air spring on each bogie when raise the pressure was maintained < 0.3 bar.		✓	<i>[Signature]</i> 06/05/24
07		Measurement recorded with empty suspension and loaded are on conformity with tolerances of the project.		✓	<i>[Signature]</i> 06/05/24
08		All leveling measurements are according to the reference. (Values out of reference must be recorded on "Description of defects")		✓	<i>[Signature]</i> 06/05/24





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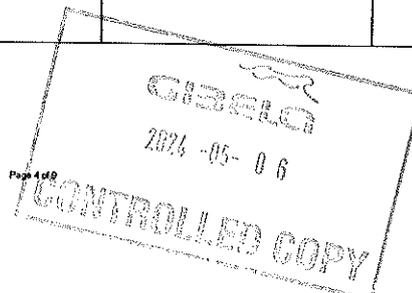
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Item	Picture/Sketch	Description	Criteria/Record	Pass	Fail	Signature/Date
09		Check that the leveling rods are torqued and have torque marker.		✓		 06/08/24
10		The difference of weight between the left and right wheels of each axis, must be $\leq 4\%$ .  (Verify on the T&C equipment if all arrows are in green)		✓		 06/08/24
11		Remove the car, move back onto the load cells and repeat the step 09. Confirm if both are in the tolerance of $\leq 4\%$ .		✓		 06/08/24
12		1 - Record shims thickness used on rod.  2 - All screws were torqued and have torque marker.	THICKNESS (mm) I <u>2mm</u> II <u>0</u> III <u>2mm</u> IV <u>0</u>	✓		 06/08/24
13		Pivot fixation	1- M20 x 90 screws with application of torque according to PRA.FT.1140.04 / 05	✓		 06/08/24
14		FOR TC CARS F= Height of the center of Automatic coupler F = 895mm (+5 / -10mm) (Using levelled rail)	TC CAB #1= <u>896</u> mm	✓		 06/08/24
15		FOR TC CARS Height of Eurobase Antenna = 205mm(+/-10mm) (Using levelled rail)	TC CAB #1= <u>199</u> mm	✓		 06/08/24
16		Check pantograph piping air tightness. Test performance according to WI.PRA.FT.1140.17.	The test was performed and no leak was observed -Roof piping connection fittings -Room piping connection fittings(Roof arch and door trimming)			N/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			N/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	✓		 06/08/24





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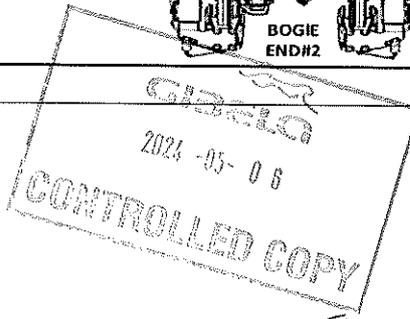
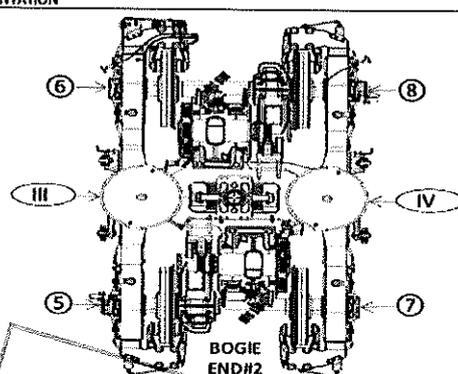
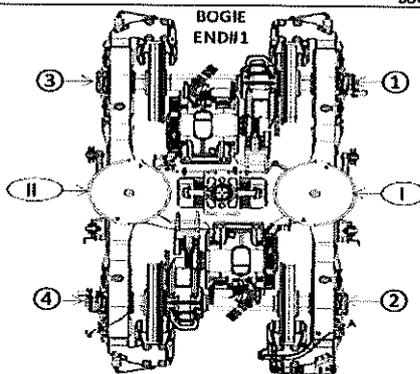
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## DRAFT TO MEASUREMENTS DURING LEVELLING (ALL UNITS MUST BE IN mm/bar/kg)

DESCRIPTION	TOLERANCE	END#1													
		LEFT SIDE						RIGHT SIDE							
		A	B	5	4	3	2	1	1	2	3	4	5	6	A
AIR SPRING HEIGHT (EMPTY)	N/A	A'ii													A'i
AIR SPRING HEIGHT (FULL)	min 254 max 261	Aii				285	255	245	246	253	256				Ai
FLOOR COVERING HEIGHT	min 1096 max 1116	Eii				1110	1112	1107	1110	1110	1103				Ei
AIR SPRING PRESSURE	≤ 0.3 (Q1 - Q)	Cii				3,56	3,58	3,52	3,52	3,57	3,62				Ci
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D3													D1
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D4													D2
PIVOT VERTICAL GAP	min 25 max 32	Kii													Ki
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (A1 - A)	Jii													Ji
QTY OF TURNS OF LEVELLING ROD	N/A	Xii					3/4	2 1/2	2 1/2	3/4	1 1/2				Xi
SHIMS OF ANTI-ROLL BAR	N/A	Yii													Yi
DESCRIPTION	TOLERANCE	END#2													
		LEFT SIDE						RIGHT SIDE							
		A	B	5	4	3	2	1	1	2	3	4	5	6	A
AIR SPRING HEIGHT (EMPTY)	N/A	A'iii													A'iv
AIR SPRING HEIGHT (FULL)	min 254 max 261	Aiii				255	254	246	247	255	251				Aiv
FLOOR COVERING HEIGHT	min 1096 max 1116	Eiii				1107	1106	1110	1107	1110	1106				Eiv
AIR SPRING PRESSURE	≤ 0.3 (Qv - Q)	Ciii				2,91	2,87	2,81	2,69	2,78	2,79				Civ
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D5													D7
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D6													D8
PIVOT VERTICAL GAP	min 25 max 32	Kiii													Kiv
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (AV - A)	Jiii													Jiv
QTY OF TURNS OF LEVELLING ROD	N/A	Xiii					3/4	2 1/2	2 1/2	3/4	1 1/2				Xiv
SHIMS OF ANTI-ROLL BAR	N/A	Yiii													Yiv

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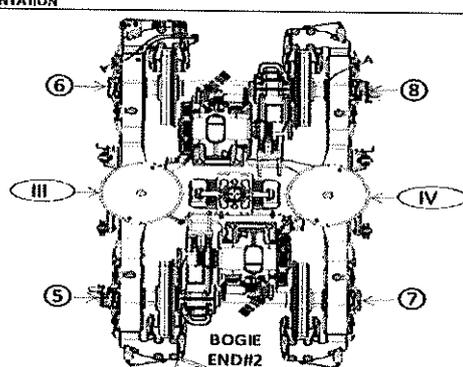
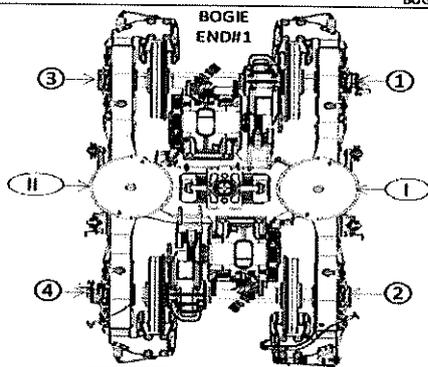
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## DRAFT TO MEASUREMENTS DURING LEVELLING (ALL UNITS MUST BE IN mm/bar/kg)

DESCRIPTION	TOLERANCE	LEFT SIDE						RIGHT SIDE							
		6	5	4	3	2	1	1	2	3	4	5	6		
AIR SPRING HEIGHT (EMPTY)	N/A	A <sup>ii</sup>												A <sup>i</sup>	
AIR SPRING HEIGHT (FULL)	mh 234 max 261	A <sup>ii</sup>												A <sup>i</sup>	
FLOOR COVERING HEIGHT	mh 1096 max 1116	E <sup>ii</sup>												E <sup>i</sup>	
AIR SPRING PRESSURE	≤ 0.3 (O <sub>i</sub> - O)	C <sup>ii</sup>												C <sup>i</sup>	
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D <sub>3</sub>												D <sub>1</sub>	
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D <sub>4</sub>												D <sub>2</sub>	
PIVOT VERTICAL GAP	mh 25 max 32	K <sup>ii</sup>												K <sup>i</sup>	
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (A <sub>i</sub> - A)	J <sup>ii</sup>												J <sup>i</sup>	
QTY OF TURNS OF LEVELLING ROD	N/A	X <sup>ii</sup>												X <sup>i</sup>	
SHIMS OF ANTI-ROLL BAR	N/A	Y <sup>ii</sup>												Y <sup>i</sup>	
DESCRIPTION	TOLERANCE		6	5	4	3	2	1	1	2	3	4	5	6	
AIR SPRING HEIGHT (EMPTY)	N/A	A <sup>iii</sup>													A <sup>iv</sup>
AIR SPRING HEIGHT (FULL)	mh 254 max 261	A <sup>iii</sup>													A <sup>iv</sup>
FLOOR COVERING HEIGHT	mh 1096 max 1116	E <sup>iii</sup>													E <sup>iv</sup>
AIR SPRING PRESSURE	≤ 0.3 (Q <sub>v</sub> - Q <sub>h</sub> )	C <sup>iii</sup>													C <sup>iv</sup>
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D <sub>5</sub>													D <sub>7</sub>
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D <sub>6</sub>													D <sub>8</sub>
PIVOT VERTICAL GAP	mh 25 max 32	K <sup>iii</sup>													K <sup>iv</sup>
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (A <sub>v</sub> - A <sub>h</sub> )	J <sup>iii</sup>													J <sup>iv</sup>
QTY OF TURNS OF LEVELLING ROD	N/A	X <sup>iii</sup>													X <sup>iv</sup>
SHIMS OF ANTI-ROLL BAR	N/A	Y <sup>iii</sup>													Y <sup>iv</sup>

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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# SELF INSPECTION INDUSTRIAL QUALITY

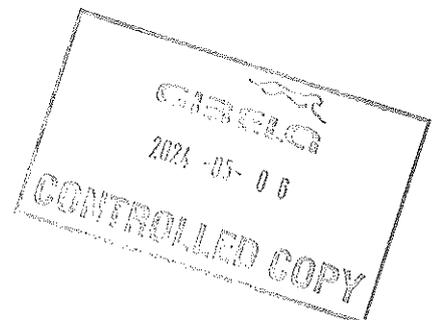
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5/31/2022

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

ITEM	THEORETICAL VALUES													
	T1 CAR		M4 CAR		M3 CAR		M2 CAR		M1 CAR		T2 CAR		T3 CAR	
	TBack	TBlnt	MB1	TBlnt	TBack									
Pivot lateral stop gaps difference [mm]	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4
Air Spring height [mm]	Fig. 4	255 <sup>+4</sup> <sub>-4</sub>												
	Fig. 5	3,76 (Ref.)	2,82 (Ref.)	2,87 (Ref.)	2,83 (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.)	3,76 (Ref.)
Air spring pressure at AWD [Bar]	C <sub>1</sub> - C <sub>2</sub>	0,3 Mbx.												
	C <sub>3</sub> - C <sub>4</sub>	0,3 Mbx.												
Primary Suspension gaps [mm]	D <sub>1</sub> ; D <sub>2</sub>	35 <sup>+3</sup> <sub>-3</sub>												
	D <sub>3</sub> ; D <sub>4</sub>	1106 <sup>+10</sup> <sub>-10</sub>												
	D <sub>5</sub> ; D <sub>6</sub>	850 <sup>+3</sup> <sub>-3</sub>												
	D <sub>7</sub> ; D <sub>8</sub>	895 (Ref.)	760 (Ref.)	895 (Ref.)	760 (Ref.)									
Chassis Floor height [mm]	Fig. 7	1106 <sup>+10</sup> <sub>-10</sub>												
Booster height [mm]	Fig. 7	850 <sup>+3</sup> <sub>-3</sub>												
Coupling End height [mm]	F <sub>1</sub>	760 (Ref.)												
	F <sub>2</sub>	760 (Ref.)												
Pivot Vertical Gap [mm]	K <sub>1</sub>	30 <sup>+3</sup> <sub>-3</sub>												
	K <sub>2</sub>	30 <sup>+3</sup> <sub>-3</sub>												





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

References for secondary suspension empty

A'n Air spring height empty

References for secondary suspension full

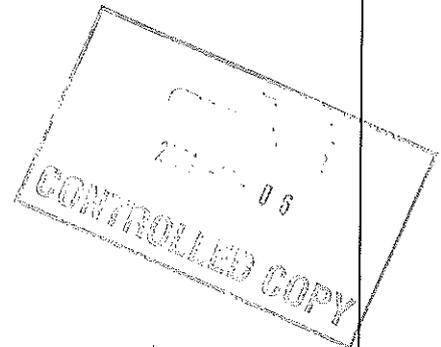
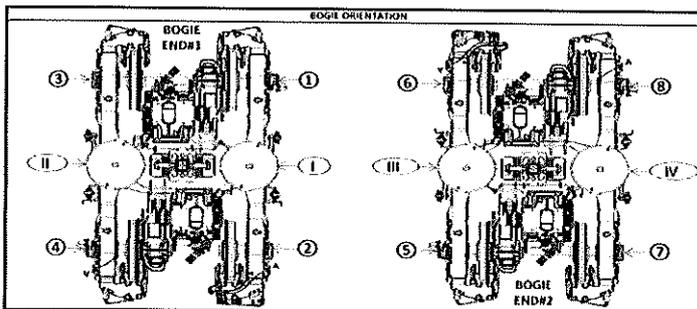
- An Air spring height
- Bn Difference between measurement A'n and An
- En Floor covering height
- Cn Air spring pressure
- Dn Primary suspension
- Kn Pivot Vertical gap
- Jn Pivot Lateral stop gaps difference

Item	Reference [mm]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
A'n	N/A	A'i 234	A'ii 233	A'is 242	A'iv 242
An	254 to 261	Ai 256	Aii 255	Ais 257	Aiv 258
Bn = An - A'n	N/A	Bi 22	Bii 22	Bis 15	Biv 16
En	1108 ±10 mm	Ei 1110	Eii 1103	Eis 1107	Eiv 1106
Item	Reference [bar]	END#1		END#2	
Cn	Table 02 (*)	Ci 3,59	Cii 3,55	Cis 2,91	Civ 2,73
Cn - Cn+1	Difference ≤ 0,3	0,04		0,18	
Gauge serial number	N/A	GIB05873	GIB05873	GIB05873	GIB05873
Item	Reference [mm]	END#1		END#2	
Dn	Table 01 (*)	D1 42,06	D2 43,15	D3 43,79	D4 44,46
		D2 42,83	D4 43,04	D5 43,60	D7 45,73
Kn	25 to 45	32,21		37,03	
Jn	Difference ≤ 4	Ji 24,97	Jii 26,10	Jis 24,90	Jiv 25,17

(\*) 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	Mb1	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	Mb1	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 Weighting fine)



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TRAIN SET 220	REF: GIB000001672_JO PRASA WEIGHT BALANCE EN PC09 WEIGHING REPORT
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	Front Bogie [Tons]	Rear Bogie [Tons]	Longitudinal Imbalance [%]	Criteria Longitudinal Imbalance [%]
Balance across front and rear bogies	18.57	15.57	8.79%	PASS
	Weight Measured [Tons]	Weight Predicted [Tons]	Weight Difference [%]	Criteria MinDiff[Max]
Weight Measured vs Predicted	34.14	34.42	0.83%	1.62% PASS

Test Participant	
Name	Date
Theto Mushi	20/05/24
Company: gibela	
Department: EOS	
Signature: <i>[Signature]</i>	