


PRASA PROJECT



CONFIDENTIAL INFORMATION



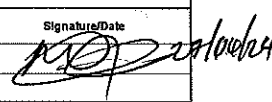
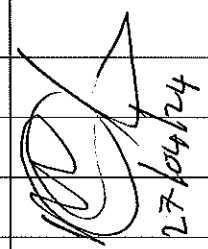
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






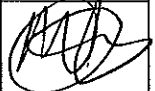



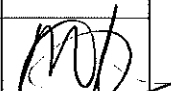


APPLICATION REFERENCE


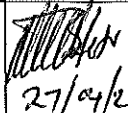
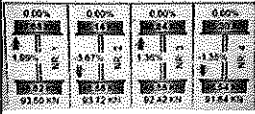
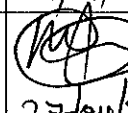

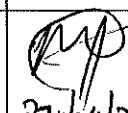

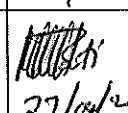

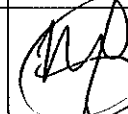

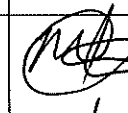
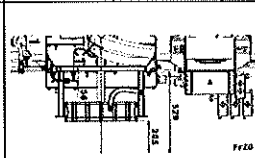
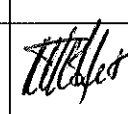
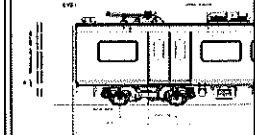
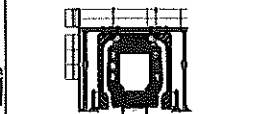
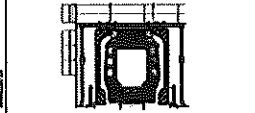
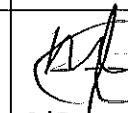
MOUNTING	DESCRIPTION	STATION	CAR TYPE						WORK INSTRUCTION	SAFETY ? 
			TC1	M4	M1	M2	M3	TC2		
<input type="checkbox"/>	DTR3-PROCE-14	LEVELLING, WEIGHTING AND BALANCING M CAR	FT1140	1	1	1	1		PRA.FT1140.04	YES
<input type="checkbox"/>	DTR3-PROCE-14	LEVELLING, WEIGHTING AND BALANCING TC CAR	FT1140	1				1	PRA.FT1140.05	YES
<input type="checkbox"/>	DTR3-PROCE-17	LEVELLING, WEIGHTING AND BALANCING TC CAR	FT1140	1	1	1	1	1	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
TS 220	TC2	P. SETHA	27/04/24	SI.FT1140.52	01/08

	SELF INSPECTION INDUSTRIAL QUALITY		Rev:09 Date: 5/31/2022	Project: PRASA	SI.FT1140.52					
	Car: _____ NCR: _____		Work Station: FT1140							
 Safety Related										
I - Document and Instrument Control										
I.1 - Documents control										
Document	TC1	M1	M2	M3	M4	TC2	Revision	Remark	OK	Signature/Date
PRA.FT1140.04						K			✓	 27/10/24
PRA.FT1140.05										
PRA.FT1140.05										
I.2 - Instruments Control - Monitoring and Measuring Instrument Control (Used for all instrument with calibration needed)										
Instrument description	Serial number		Calibration or Verification Validation Date		OK	Signature/Date				
Measuring tape	GIBTA 0276		26/10/23 - 26/10/24		✓					
Venier - Calliper	GIBVA 0056		06/06/23 - 06/06/24		✓					
Torque Wrench 35 N.m	D2511023		19/12/23 - 19/12/24		✓	 27/10/24				
Torque Wrench 150 N.m	D28622009		19/12/23 - 19/12/24		✓					
Torque Wrench 320 N.m	A9660027		21/12/23 - 21/12/24		✓					
Torque Wrench 530 N.m	A9630053		21/12/23 - 21/12/24		✓					
Torque Wrench 17 N.m	D2861617		19/12/23 - 19/12/24		✓					

	<h1 style="text-align: center;">SELF INSPECTION INDUSTRIAL QUALITY</h1>		Rev:09	Projet: PRASA	SI.FT1140.52									
			Date: 5/31/2022											
II - Self inspection - Items to Check														
II.1 - Items to Check														
Item	Picture/Sketch	Description	Criteria/Record	CR	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		✓		 27/04/24								
02		Check underframe pipe system Air tightness. Test performance according to VII PRA FT1130.15.	The test was performed and no leak was observed. Initial pressure (IP) <u>9.8</u> bar Final pressure (FP) <u>9.74</u> bar FP - IP = <u>0.02</u> bar APPROVAL CRITERIA: After 5 minutes the pressure cannot drops more than 0,2 bar	✓		 27/04/24								
03		Movement performed at least 50m to shudder the car. And position on the leveled load cell, with wheels on the center.		✓		 27/04/24								
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 _ / _ / _	✓		 27/04/24								
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 border="1"> <thead> <tr> <th>EQUIPMENT DESCRIPTION</th> <th>WEIGHT (kg)</th> </tr> </thead> <tbody> <tr> <td>Driver Seat</td> <td>60</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	EQUIPMENT DESCRIPTION	WEIGHT (kg)	Driver Seat	60					✓		 27/04/24
EQUIPMENT DESCRIPTION	WEIGHT (kg)													
Driver Seat	60													
06		The pressure difference between air spring on each bogie when raise the pressure was maintained < 0.3 bar.		✓		 27/04/24								
07		Measurement recorded with empty suspension and loaded are on conformity with tolerances of the project.		✓		 27/04/24								
08		All leveling measurements are according to the reference. (Values out of reference must be recorded on "Description of defects")		✓		 27/04/24								

		SELF INSPECTION INDUSTRIAL QUALITY		Rev:09	Projet: PRASA	SI.FT1140.52
				Date: 5/31/2022		
Item	Pictures/Notes	Description	Criteria/Record	✓		Signature/Date
09		Check that the leveling rods are torqued and have torque marker.		✓		 27/04/24
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).		✓		 27/04/24
11		Remove the car, move back onto the load cells and repeat the step 09. Confirm if both are in the tolerance of $\leq 4\%$.		✓		 27/04/24
12		1 - Record shims thickness used on rod. 2 - All screws were torqued and have torque marker.	THICKNESS (mm) I <u>0</u> II <u>0</u> III <u>0</u> IV <u>0</u>	✓		 27/04/24
13		Pivot fixation	1- M20 x 90 screws with application of torque according to PRA.FT1140.04 / 05	✓		 27/04/24
14		FOR TC CARS F= Height of the center of Automatic coupler F = 895mm (+5/-10mm) (Using levelled rail)	TC CAB #1= <u>895</u> mm	✓		 27/04/24
15		FOR TC CARS Height of Eurobase Antenna = 205mm(+/-10mm) (Using levelled rail)	TC CAB #1= <u>201</u> mm	✓		 27/04/24
16		Check pantograph piping air tightness. Test performance according to WI PRA.FT1140.17.	The test was performed and no leak was observed. -Roof piping connection fittings. -Room piping connection fittings(Roof arch and door bracing)			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	✓		 27/04/24



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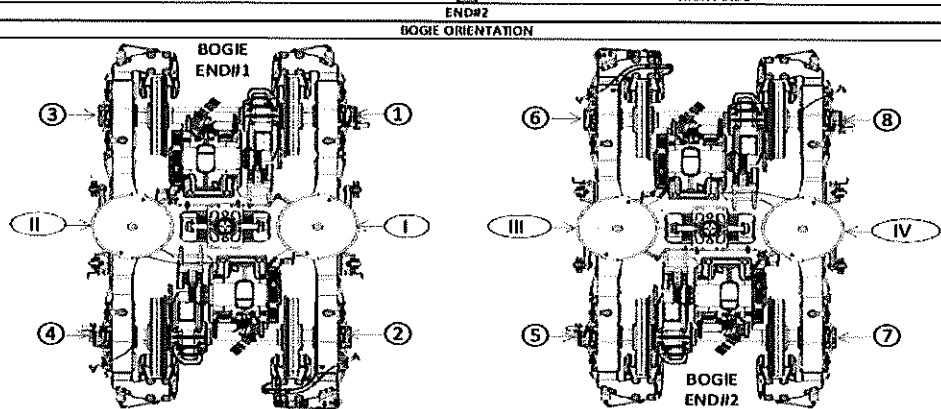
Projet:
PRASA

SI.FT1140.52

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'II											A'1
AIR SPRING HEIGHT (FULL)	min 254 max 261	AII				256	256	253	256				A1
FLOOR COVERING HEIGHT	min 1096 max 1116	EII				1104	1104	1103	1106				E1
AIR SPRING PRESSURE	≤ 0.3 (Ci - Ci)	CII				3,62	3,66	3,51	3,58				C1
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D3											D1
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D4											D2
PIVOT VERTICAL GAP	min 25 max 32	KII											K1
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (Ji - Ji)	JII											J1
QTY OF TURNS OF LEVELLING ROD	N/A	XII					0	1	4				X1
SHIMS OF ANTI-ROLL BAR	N/A	YII											Y1
AIR SPRING HEIGHT (EMPTY)	N/A	A'III											A'IV
AIR SPRING HEIGHT (FULL)	min 254 max 261	AIII				254	252	254	255				AIV
FLOOR COVERING HEIGHT	min 1096 max 1116	EIII				1102	1100	1105	1108				EIV
AIR SPRING PRESSURE	≤ 0.3 (Civ - Cii)	CIII				2,89	2,82	2,83	2,76				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 (Jiv - Jii)	JIII											JIV
QTY OF TURNS OF LEVELLING ROD	N/A	XIII					1/2	1/2	4				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		





SELF INSPECTION INDUSTRIAL QUALITY

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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'ii											A'i
AIR SPRING HEIGHT (FULL)	min 284 max 261	Aii											Ai
FLOOR COVERING HEIGHT	min 1096 max 1116	Eii											Ei
AIR SPRING PRESSURE	≤ 0.3 (Ci - Cj)	Cii											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 (Ji - Jj)	Jii											Ji
QTY OF TURNS OF LEVELLING ROD	N/A	Xii											Xi
SHIMS OF ANTI-ROLL BAR	N/A	Yii											Yi
DESCRIPTION	TOLERANCE	6	5	4	3	2	1	1	2	3	4	5	6
AIR SPRING HEIGHT (EMPTY)	N/A	A'iii											A'iv
AIR SPRING HEIGHT (FULL)	min 254 max 261	Aiii											Aiv
FLOOR COVERING HEIGHT	min 1096 max 1116	Eiii											Eiv
AIR SPRING PRESSURE	≤ 0.3 (Civ - Cjv)	Ciii											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 (Jiv - Jjv)	Jiii											Jiv
QTY OF TURNS OF LEVELLING ROD	N/A	Xiii											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

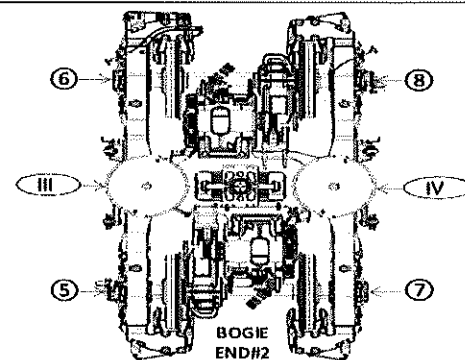
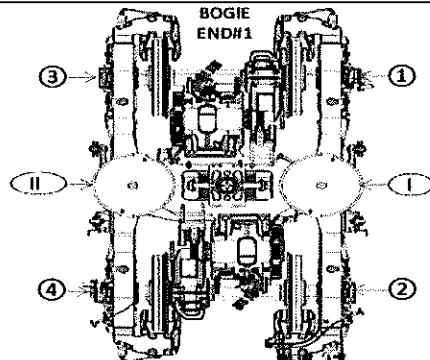
EQUIPMENT

WEIGHT

SECONDARY MEASUREMENTS (ONLY TO CARS)

AUTOMATIC COUPLER HEIGHT

ANTENNA HEIGHT





SELF INSPECTION INDUSTRIAL QUALITY


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PRASA

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

ITEM		THEORETICAL VALUES											
		TCL CAR		M4 CAR		M1 CAR		M2 CAR		M3 CAR		TCL CAR	
		TBext	TBint	MB1	MB2	MB1	MB2	MB1	MB2	MB1	MB2	TBint	TBext
Pivot lateral stop gaps difference [mm]	J ₁₂ /J ₁₄ [mm]	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4
Air Spring height [mm]	A ₁ [mm]	255 ⁺⁴ ₋₄	255 ⁺⁴ ₋₄	255 ⁺⁴ ₋₄	255 ⁺⁴ ₋₄	255 ⁺⁴ ₋₄	255 ⁺⁴ ₋₄	255 ⁺⁴ ₋₄	255 ⁺⁴ ₋₄	255 ⁺⁴ ₋₄	255 ⁺⁴ ₋₄	255 ⁺⁴ ₋₄	255 ⁺⁴ ₋₄
Air spring pressure at AWD [Bar]	C ₁₁ (1,2)	3,76 (Ref.)	2,82 (Ref.)	2,83 (Ref.)	3,02 (Ref.)	2,91 (Ref.)	3,07 (Ref.)	2,85 (Ref.)	2,83 (Ref.)	2,83 (Ref.)	2,83 (Ref.)	2,83 (Ref.)	3,76 (Ref.)
	C ₁₁ -C ₁₂ C ₁₁ -C ₁₄	0,3 M3x (Ref.)	0,3 M3x (Ref.)	0,3 M3x (Ref.)	0,3 M3x (Ref.)	0,3 M3x (Ref.)	0,3 M3x (Ref.)	0,3 M3x (Ref.)	0,3 M3x (Ref.)	0,3 M3x (Ref.)	0,3 M3x (Ref.)	0,3 M3x (Ref.)	0,3 M3x (Ref.)
Primary Suspension gaps [mm]	D ₁₂ /D ₁₃	35 ⁺²⁵ ₋₅	35 ⁺²⁵ ₋₅	35 ⁺²⁵ ₋₅	35 ⁺²⁵ ₋₅	35 ⁺²⁵ ₋₅	35 ⁺²⁵ ₋₅	35 ⁺²⁵ ₋₅	35 ⁺²⁵ ₋₅	35 ⁺²⁵ ₋₅	35 ⁺²⁵ ₋₅	35 ⁺²⁵ ₋₅	35 ⁺²⁵ ₋₅
	D ₁₂ /D ₁₄	1106 ⁺²⁰ ₋₂₀	1106 ⁺²⁰ ₋₂₀	1106 ⁺²⁰ ₋₂₀	1106 ⁺²⁰ ₋₂₀	1106 ⁺²⁰ ₋₂₀	1106 ⁺²⁰ ₋₂₀	1106 ⁺²⁰ ₋₂₀	1106 ⁺²⁰ ₋₂₀	1106 ⁺²⁰ ₋₂₀	1106 ⁺²⁰ ₋₂₀	1106 ⁺²⁰ ₋₂₀	1106 ⁺²⁰ ₋₂₀
	D ₁₂ /D ₁₇	850 ⁺³ ₋₃	850 ⁺³ ₋₃	850 ⁺³ ₋₃	850 ⁺³ ₋₃	850 ⁺³ ₋₃	850 ⁺³ ₋₃	850 ⁺³ ₋₃	850 ⁺³ ₋₃	850 ⁺³ ₋₃	850 ⁺³ ₋₃	850 ⁺³ ₋₃	850 ⁺³ ₋₃
	D ₁₂ /D ₁₈	895 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	895 (Ref.)	760 (Ref.)
Coupling End height [mm]	E ₁	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)
	E ₂	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)
Pivot Vertical gap [mm]	K ₁	30 ⁺²⁵ ₋₅	30 ⁺²⁵ ₋₅	30 ⁺²⁵ ₋₅	30 ⁺²⁵ ₋₅	30 ⁺²⁵ ₋₅	30 ⁺²⁵ ₋₅	30 ⁺²⁵ ₋₅	30 ⁺²⁵ ₋₅	30 ⁺²⁵ ₋₅	30 ⁺²⁵ ₋₅	30 ⁺²⁵ ₋₅	30 ⁺²⁵ ₋₅

	<h1 style="text-align: center;">SELF INSPECTION INDUSTRIAL QUALITY</h1>	Rev:09	Projet: PRASA	SI.FT1140.52
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		5/31/2022		

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

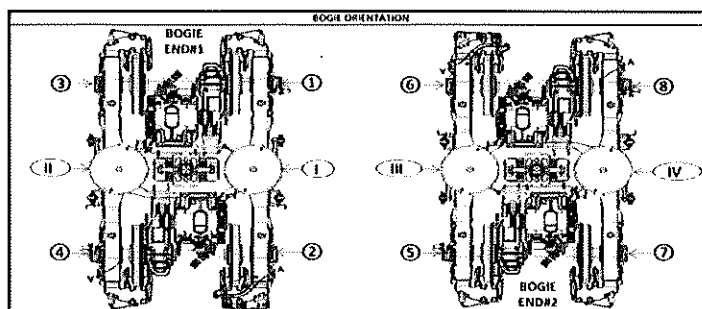
An Air spring height
 Bn Difference between measurement A'n and An
 En Floor covering height
 Cn Air spring pressure
 Dn Primary suspension
 Kn Pivot Vertical gap
 Jn Pivot Lateral stop gaps difference

Item	Reference [mm]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
A'n	N/A	A'i 234	A'n 234	A'ii 242	A'iv 241
An	254 to 281	At 256	An 256	Ain 254	Anv 255
Bn = An - A'n	N/A	Bi 22	Bii 22	Bin 12	Biv 14
En	1108 ±10 mm	Ei 1106	En 1104	Eii 1102	Eiv 1105
Item	Reference [bar]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
Cn	Table 02 (*)	Ci 3.55	Cii 3.61	Cin 2.89	Civ 2.71
Cn - Cn+1	Difference ≤ 0,3	Ci - Cii 0,06		Cin - Civ 0,18	
Gauge serial number	N/A	91B05873		91B05873	
Item	Reference [mm]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
Dn	Table 01 (*)	D1 44.10	D3 43.05	D5 43.84	D7 44.94
		D2 43.80	D4 43.62	D6 43.71	D8 45.03
Kn	25 to 45	Ki 34.03		Kii 38.01	
Jn	Difference ≤ 4	Ji 26.32	Jii 24.62	Jin 26.18	Jiv 25.57

(*) 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	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	

Table 02 C Theoretical Values	TC1		M4		M1		M2		M3		TC2	
	Tbex	TBin	Mb1	Mb1	Mb1	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 Weighting fine)

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TRAIN SET 220	REF: GIB000001672_0 PRASA WEIGHT BALANCE EN
	PC09 WEIGHING REPORT

TC2	Balance across front and rear bogies Weight Measured vs Predicted	Front Bogie [Tons]		Rear Bogie [Tons]		Longitudinal Imbalance [%]		Criteria Longitudinal Imbalance ≤ 10%	
		18.54		15.58		8.69%		PASS	
		Weight Measured [Tons]		Weight Predicted [Tons]		Weight Difference [%]		Tolerance [%]	
		34.12		34.42		0.88%		1.62%	
								Criteria MinDiffMax	
								PASS	

Test Participants				Date
Name	Company	Department	Signature	
Dadhara	Gibela	EOC	ADD	22/04/2024
N/A				