



PRASA PROJECT


SELF INSPECTION SHEET

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	1		PRA.FT1140.04	YES	
<input type="checkbox"/>	DTR3-PROCE-14	LEVELLING, WEIGHTING AND BALANCING TC CAR	FT1140	1					2	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"/>												
<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 209	TC2	Andrew	12/06/24	SI.FT1140.52	01/08



SELF INSPECTION INDUSTRIAL QUALITY

Rev:09

Date:

5/31/2022

Project:
PRASA

SI.FT1140.52

Carr:

NCR:

Work Station

FT1140



Safety Related



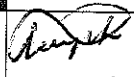








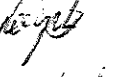

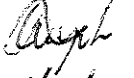


I - Document and Instrument Control



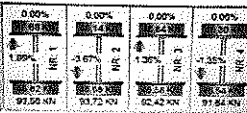
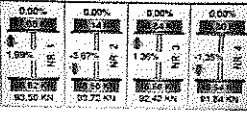


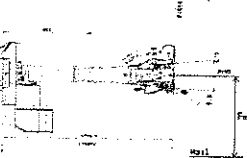
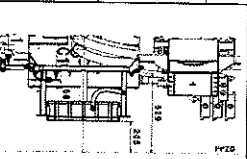
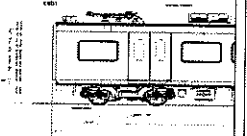
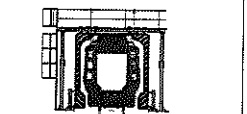
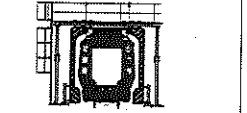
I.1 - Documents control

Document	TC1	M1	M2	M3	M4	TC2	Revision	Remark	OK	NO	Signature/Date
PRA.FT1140.04							✓				
PRA.FT1140.05									✓		Rogel 12/06/24
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	NO	Signature/Date
Measuring tape	G1B1A 0276	26/10/23-26/10/24	✓		12/06/24 Rogel
Vernier Calliper	G1BVR 0056	06/03/23-06/03/24	✓		12/06/24 Rogel
Torque Wrench 35 N.m	D2511033	19/12/23-19/12/24	✓		12/06/24 Rogel
Torque wrench 150 N.m	D28622009	14/12/23-14/12/24	✓		12/06/24 Rogel
Torque wrench 320 N.m	A9650027	14/12/23-14/12/24	✓		12/06/24 Rogel
Torque wrench 530 N.m	A9630053	21/12/23-21/12/24	✓		12/06/24 Rogel
Torque wrench 17 N.m	D2861617	14/12/23-14/12/23	✓		12/06/24 Rogel

	<h1>SELF INSPECTION INDUSTRIAL QUALITY</h1>		Rev:09	Project: 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	OK	Not 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		✓		 12/06/24								
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>993</u> bar Final pressure (FP): <u>981</u> bar FP - IP = <u>12</u> bar APPROVAL CRITERIA: After 5 minutes the pressure cannot drops more than 0,2 bar	✓		 14/06/24								
03		Movement performed at least 50m to shudder the car. And position on the leveled load coil, with wheels on the center.		✓		 12/06/24								
04		Measurement inspection was done with car on condition AWO and the rail leveled. (The load cells system must be leveled and calibrated)	Calibration Validation Date <u>19/12/2023</u>	✓		 12/06/24								
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 border="1"> <thead> <tr> <th>EQUIPMENT DESCRIPTION</th> <th>WEIGHT (kg)</th> </tr> </thead> <tbody> <tr> <td><u>DRIVER'S SEAT</u></td> <td><u>60</u></td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	EQUIPMENT DESCRIPTION	WEIGHT (kg)	<u>DRIVER'S SEAT</u>	<u>60</u>					✓		 12/06/24
EQUIPMENT DESCRIPTION	WEIGHT (kg)													
<u>DRIVER'S SEAT</u>	<u>60</u>													
06		The pressure difference between air spring on each bogie when raise the pressure was maintained < 0,3 bar.		✓		 12/06/24								
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")		✓		 12/06/24								

		<h1>SELF INSPECTION INDUSTRIAL QUALITY</h1>		Rev:09 Date: 5/31/2022		Project: PRASA		SI.FT1140.52	
Rev	Picture/Sketch	Description	Criteria/Record	✓	✗	Signature/Date			
09		Check that the levelling rods are torqued and have torque marker.		✓		<i>Angela</i> 12/06/24			
10		The difference of weight between the left and right wheels of each axis, must be ≤ 4%. (Verify on the T&C equipment if all arrows are in green).		✓		<i>Angela</i> 12/06/24			
11		Remove the car, move back onto the load cells and repeat the step 09. Confirm if both are in the tolerance of ≤ 4%.		✓		<i>Angela</i> 12/06/24			
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	✓		<i>Angela</i> 12/06/24			
13		Pivot fixation	1- M20 x 90 screws with application of torque according to PRA.FT1140.04 / 05	✓		<i>Angela</i> 12/06/24			
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	✓		<i>Angela</i> 12/06/24			
15		FOR TC CARS Height of Eurobalise Antenna = 205mm(+/-10mm) (Using levelled rail)	TC CAB #1= <u>196</u> mm	✓		<i>Angela</i> 12/06/24			
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. -Roof 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	✓		<i>Angela</i> 12/06/24			



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SI.FT1140.52

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'III											
AIR SPRING HEIGHT (FULL)	min 254 max 261	AII						260	251	257	258			AIII						258	257	257	258		
FLOOR COVERING HEIGHT	min 1096 max 1116	EII												EIII											
AIR SPRING PRESSURE	≤ 0.3 (Ci - Ci)	CII						372	3,47	3,82	3,65			CIII						2,93	3,15	2,67	2,90		
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D3												D5											
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D4												D6											
PIVOT VERTICAL GAP	min 25 max 32	KII												KIII											
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (JII - Ji)	JII												JIII											
QTY OF TURNS OF LEVELLING ROD	N/A	XII								123	0			XIII						0	11				
SHIMS OF ANTI-ROLL BAR	N/A	YII												YIII											

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

GOOD LOWER HIGHER

✓ ↓ ↑

WEIGHT COMPENSATION

EQUIPMENT

WEIGHT

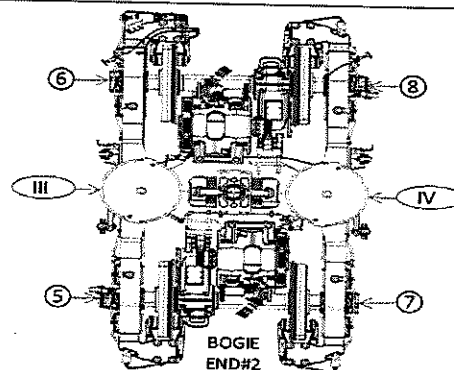
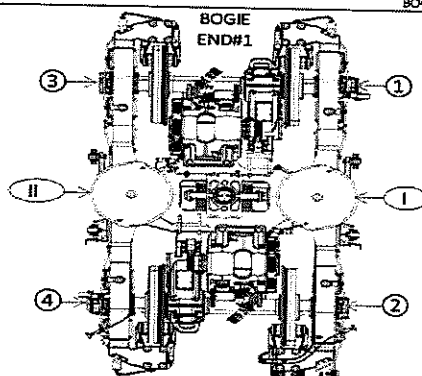
EQUIPMENT

WEIGHT

SECONDARY MEASUREMENTS (ONLY TC CARS)

AUTOMATIC COUPLER HEIGHT

ANTENNA HEIGHT





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

		END#1												
		LEFT SIDE						RIGHT SIDE						
DESCRIPTION	TOLERANCE	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 254 max 261	A _{II}												A _I
FLOOR COVERING HEIGHT	min 1096 max 1116	E _{II}												E _I
AIR SPRING PRESSURE	≤ 0.3 (Q _I - Q _I)	C _I												C _I
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ₃												D ₁
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ₄												D ₂
PIVOT VERTICAL GAP	min 25 max 32	K _{II}												K _I
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (J _I - J _I)	J _{II}												J _I
QTY OF TURNS OF LEVELLING ROD	N/A	X _{II}												X _I
SHIMS OF ANTI-ROLL BAR	N/A	Y _{II}												Y _I
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	A _{III}												A _{IV}
FLOOR COVERING HEIGHT	min 1096 max 1116	E _{III}												E _{IV}
AIR SPRING PRESSURE	≤ 0.3 (Q _{IV} - Q _{IV})	C _{II}												C _{IV}
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ₅												D ₇
PRIMARY SUSPENSION	SEE TABLE (ONLY REF)	D ₆												D ₈
PIVOT VERTICAL GAP	min 25 max 32	K _{III}												K _{IV}
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (J _{IV} - J _{IV})	J _{III}												J _{IV}
QTY OF TURNS OF LEVELLING ROD	N/A	X _{III}												X _{IV}
SHIMS OF ANTI-ROLL BAR	N/A	Y _{III}												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		

BOGIE
END#1

BOGIE
END#2



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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		M2 CAR		TCL CAR	
		TBext	TBint	MB1	MB1	MB1	MB1	MB2	MB2	MB1	MB1	MB2	MB2	TBext	TBint
Pivot lateral stop gap difference (mm)	J ₁ -J ₁₊₁ (1=1)	Fig. 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4
Air Spring height (mm)	A _n (1=1)	Fig. 5	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄
Air spring pressure at AWD (Bar)	C _n (1=1)	Fig. 5	3,76 (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.)	2,85 (Ref.)	2,83 (Ref.)	2,83 (Ref.)	3,76 (Ref.)
Primary Suspension gaps (mm)	C ₁ -C ₁ C ₂ -C ₂	Fig. 5	0,3 Máx.	0,3 Máx.	0,3 Máx.	0,3 Máx.	0,3 Máx.	0,3 Máx.	0,3 Máx.	0,3 Máx.	0,3 Máx.	0,3 Máx.	0,3 Máx.	0,3 Máx.	0,3 Máx.
	D ₁ D ₅	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
	D ₂ D ₆	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
	D ₃ D ₇	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
	D ₄ D ₈	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
Carbody Floor height (mm)	E _n (1=1)	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
Bolster height (mm)	N _n (1=1)	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
Coupling End height (mm)	F ₁	Fig. 8	895 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	895 (Ref.)	760 (Ref.)
	F ₂	Fig. 9	760 (Ref.)	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 _n	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



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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

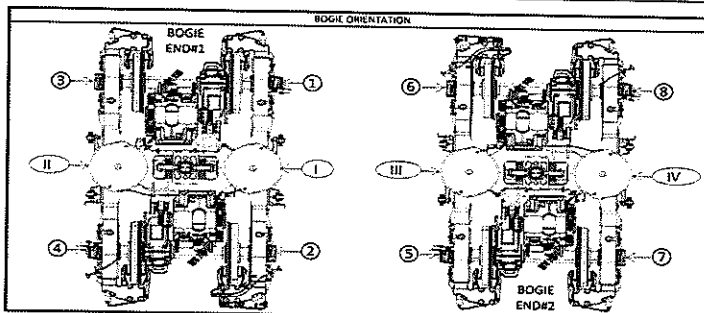
Jn Pivot Lateral stop gaps difference

Item	Reference [mm]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
A'n	N/A	A'i 236	A'ii 236	A'iii 241	A'iv 244
An	254 to 261	Ai 258	Aii 257	Aiii 257	Aiv 257
Bn = An - A'n	N/A	Bi 22	Bii 21	Biii 16	Biv 13
En	1105 ±10 mm	Ei 1111	Eii 1102	Eiii 1113	Eiv 1114
Item	Reference [bar]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
Cn	Table 02 (*)	Ci 3,68	Cii 3,65	Ciii 2,97	Civ 2,85
Cn - Cn-1	Difference ≤ 0,3	Ci - Cii 0,03		Ciii - Civ 0,12	
Gauge serial number	N/A	G1B05873		G1B05873	
Item	Reference [mm]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
Dn	Table 01 (*)	D1 42,22	D3 42,11	D5 42,81	D6 45,55
		D2 42,64	D4 42,74	D5 43,99	D7 44,25
Kn	25 to 45	Ki 32,50		Kii 34,59	
Jn	Difference ≤ 4	Ji 24,88	Jii 26,39	Jiii 25,96	Jiv 25,05

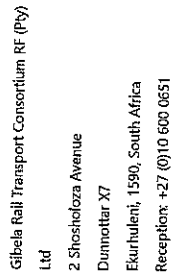
(*) Reference, only include values, isn't approval criteria.

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 Weighting fine)



TC2	Balance across front and rear bogies	Front Bogie [Tons]	Rear Bogie [Tons]	Longitudinal Imbalance [%]	Criteria Longitudinal Imbalance $\leq 10\%$
		18.48	15.47	8.87%	PASS
	Weight Measured vs Predicted	Weight Measured [Tons]	Weight Predicted [Tons]	Weight Difference [%]	Tolerance [%]
		33.95	34.42	1.38%	1.62%
					Criteria MinDiffMax
					PASS

[illegible]