






CONFIDENTIAL INFORMATION
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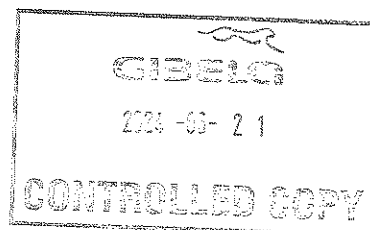
APPLICATION REFERENCE

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 231	M2	Mamba	21/06/2024	SI.FT1140.52	01/08

	SELF INSPECTION INDUSTRIAL QUALITY		Rev:09 Date: 5/31/2022	Projet: PRASA	SI.FT1140.52					
Car: _____		NCR: _____		Work Station: FT1140						
 Safety Related										
1 - Document and Instrument Control										
1.1 - Documents control										
Document	TC1	M1	M2	M3	M4	TC2	Revision	Remark	CK	Signature/Date
PRA.FT1140.04										
PRA.FT1140.05			✓						✓	M. M. M.
PRA.FT1140.05										
1.2 - Instruments Control - Monitoring and Measuring Instrument Control (Used for all Instrument with calibration needed)										
Instruments description	Serial number		Calibration or Verification Validation Date		CK	Signature/Date				
Measuring Tape	GIBTA 0276		26/10/23-26/10/24							
Vernier Caliper	GIBVR 0056		27/10/23-27/10/24							
Torque wrench 35NM	PDS11023		19/12/23-19/12/24							
Torque wrench 150NM	PDS8622009		19/12/23-19/12/24							
Torque wrench 320NM	1A9650027		2/12/23-2/12/24							
						2/06/24				





SELF INSPECTION INDUSTRIAL QUALITY

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II - Self Inspection - Items to Check

II.1 - Items to Check

IL1 - 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		✓		 21/06/24										
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): 10.05 bar Final pressure (FP): 10.02 bar FP - IP = 0.03 bar APPROVAL CRITERIA: After 5 minutes the pressure cannot drops more than 0,2 bar	✓		 21/06/24										
03		Movement performed at least 50m to shudder the car. And position on the leveled load cell, with wheels on the center.		✓		 21/06/24										
04		Measurement inspection was done with car on condition AWO and the rail levelled. (The load cells system must be levelled and calibrated)	Calibration Validation Date <u>19/12/2023</u>	✓		 21/06/24										
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>Barguany</td><td>360</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></tbody></table>	EQUIPMENT DESCRIPTION	WEIGHT (kg)	Barguany	360							✓		 21/06/24
EQUIPMENT DESCRIPTION	WEIGHT (kg)															
Barguany	360															
06		The pressure difference between air spring on each bogie when raise the pressure was maintained < 0.3 bar.		✓		 21/06/24										
07		Measuremet recorded with empty suspension and loaded are on conformity with tolerances of the project		✓		 21/06/24										
08		All levelling measurements are according to the reference. (Values out of reference must be recorded on "Description of defects")		✓		 21/06/24										

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2024-06-21

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Item	Picture/Sketch	Description	Criteria/Record	OK	Signature/Date
09		Check that the leveling rods are torqued and have torque marker.		<input checked="" type="checkbox"/>	 21/06/24
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).		<input checked="" type="checkbox"/>	 21/06/24
11		Remove the car, move back onto the load cells and repeat the step 09. Confirm if both are in the tolerance of $\leq 4\%$.		<input checked="" type="checkbox"/>	 21/06/24
12		1 - Record shims thickness used on rod. 2 - All screws were torqued and have torque marker.	THICKNESS (mm) I <input type="text"/> II <input type="text"/> III <input type="text"/> IV <input type="text"/>	<input checked="" type="checkbox"/>	 21/06/24
13		Pivot fixation	1- M20 x 90 screws with application of torque according to PRA.FT1140.04 / 05	<input checked="" type="checkbox"/>	 21/06/24
14		FOR TC CARS F= Height of the center of Automatic coupler F = 895mm (+5/-10mm) (Using levelled rail)	TC CAB #1= _____ mm		N/A
15		FOR TC CARS Height of Eurobalise Antenna = 205mm(+/-10mm) (Using levelled rail)	TC CAB #1= _____ mm		N/A
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 timing)	<input checked="" type="checkbox"/>	 21/06/24
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	<input checked="" type="checkbox"/>	 21/06/24
18		Car does not come into contact with the gauge.	No Contact with Car and Gauge -GO Contact with Car and Gauge - NO GO	<input checked="" type="checkbox"/>	 21/06/24

GIBELQ

2024-03-21

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SELF INSPECTION INDUSTRIAL QUALITY

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Date:

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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					258	258	255				265	257	266										A ₁₂
FLOOR COVERING HEIGHT	min 1096 max 1116	E ₁₁												E ₁₁											E ₁₁
AIR SPRING PRESSURE	≤ 0.3 (Ci - Ci)	C ₁₁								261			357												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 (Ji - Ji)	J ₁₁												J ₁₁											J ₁₁
QTY OF TURNS OF LEVELLING ROD	N/A	X ₁₁								91			91												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					258	258	258				253	258	259										A ₁₄
FLOOR COVERING HEIGHT	min 1096 max 1116	E ₁₃												E ₁₃											E ₁₃
AIR SPRING PRESSURE	≤ 0.3 (Ci - Ci)	C ₁₃								327			235												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 (Ji - Ji)	J ₁₃												J ₁₃											J ₁₃
QTY OF TURNS OF LEVELLING ROD	N/A	X ₁₃								0			91												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

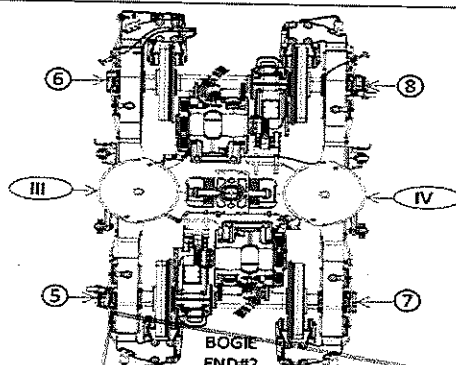
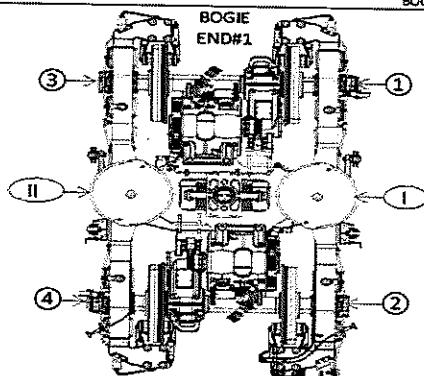
WEIGHT

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 _{II}											A _{II}
FLOOR COVERING HEIGHT	min 1096 max 1116	E _{II}												E _{II}											E _{II}
AIR SPRING PRESSURE	≤ 0.3 (Q _I - Q _I)	C _{II}												C _{II}											C _{II}
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 _{II}												K _{II}											K _{II}
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (J _I - J _I)	J _{II}												J _{II}											J _{II}
QTY OF TURNS OF LEVELLING ROD	N/A	X _{II}												X _{II}											X _{II}
SHIMS OF ANTI-ROLL BAR	N/A	Y _{II}												Y _{II}											Y _{II}
AIR SPRING HEIGHT (EMPTY)	N/A	A _{III}												A _{III}											A _{III}
AIR SPRING HEIGHT (FULL)	min 254 max 261	A _{III}												A _{III}											A _{III}
FLOOR COVERING HEIGHT	min 1096 max 1116	E _{III}												E _{III}											E _{III}
AIR SPRING PRESSURE	≤ 0.3 (Q _{IV} - Q _{IV})	C _{III}												C _{III}											C _{III}
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 _{III}												K _{III}											K _{III}
PIVOT LATERAL STOP GAPS DIFFERENCE	≤ 4 (J _{IV} - J _{IV})	J _{III}												J _{III}											J _{III}
QTY OF TURNS OF LEVELLING ROD	N/A	X _{III}												X _{III}											X _{III}
SHIMS OF ANTI-ROLL BAR	N/A	Y _{III}												Y _{III}											Y _{III}

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

GOOD LOWER HIGHER

✓ ↓ ↑

WEIGHT COMPENSATION

EQUIPMENT

WEIGHT

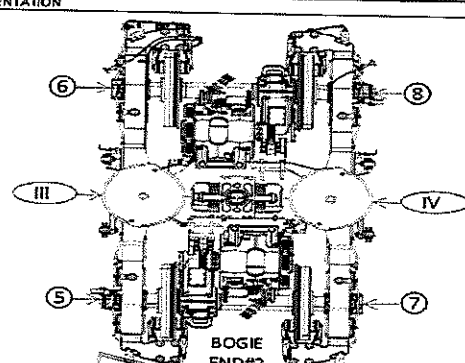
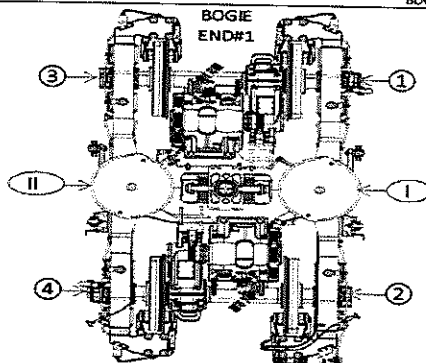
EQUIPMENT

WEIGHT

SECONDARY MEASUREMENTS (ONLY TC CARS)

AUTOMATIC COUPLER HEIGHT

ANTENNA HEIGHT



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2021-02-21
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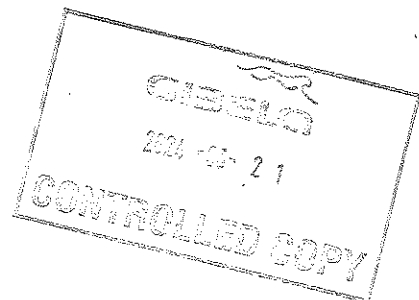
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Table 1 - Reference Values and Measurement Tolerances for the Car Levelling.

ITEM		THEORETICAL VALUES														T2 CAR	
		T1 CAR		M4 CAR		M1 CAR		M2 CAR		M3 CAR		M5 CAR		T2 CAR			
		T1Ext	T1Int	M4B1	M4B2	M1B1	M1B2	M2B1	M2B2	M3B1	M3B2	M5B1	M5B2	T2Ext	T2Int		
Pivot lateral stop gaps difference [mm]	Fig. 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	
Air Spring height [mm]	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	255 ⁺⁸ ₋₄	255 ⁺⁸ ₋₄	
Air spring pressure at AWD [Bar]	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.)	2,85 (Ref.)	2,83 (Ref.)	2,83 (Ref.)	3,76 (Ref.)	
Primary Suspension gaps [mm]	C ₁ -C ₄ C ₆ -C ₇	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.	0,3 Máx.	0,3 Máx.	
	D ₁ ; D ₅	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	35 ⁺¹² ₋₄	
	D ₂ ; D ₆																
	D ₃ ; D ₇																
	D ₄ ; D ₈																
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	1106 ⁺¹⁰ ₋₁₀	
Bolster height [mm]	Fig. 7	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋₇	850 ⁺³ ₋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.)	760 (Ref.)	760 (Ref.)	760 (Ref.)	895 (Ref.)	895 (Ref.)	
	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.)	760 (Ref.)	760 (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	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

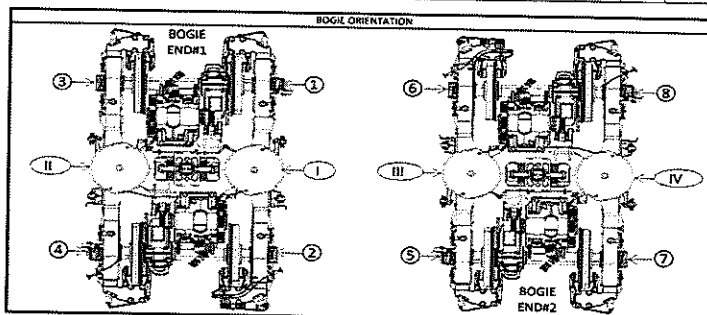
An Air spring height
Bn Difference between measurement A'n and An
En Floor covering height
Cn Air spring pressure
Dn Primary suspension
Kn Pivot Vertical gap
Jn Pivot Lateral stop gaps difference

Item	Reference [mm]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
A'n	N/A	A'i 241	A'ii 243	A'iii 241	A'iv 242
An	254 to 281	Bi 256	Bii 258	Biii 257	Biv 258
Bn = An - A'n	N/A	Bi 15	Bii 15	Biii 16	Biv 16
En	1106 ±10 mm	Ei 1106	Eii 1109	Eiii 1112	Eiv 1107
Item	Reference [bar]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
Cn	Table 02 (*)	Ci 3,07	Cii 2,97	Ciii 2,95	Civ 2,72
Cn - Cn+	Difference ≤ 0,3	Ci - Cii 0,1		Ciii - Civ 0,23	
Gauge serial number	N/A	GIB05873		GIB05873	
Item	Reference [mm]	END#1		END#2	
		Right Side	Left Side	Left Side	Right Side
Dn	Table 01 (*)	Di 43,73	Di 44,38	Di 44,06	Di 46,75
		Dz 44,60	Dz 45,50	Dz 44,08	Dz 46,04
Kn	25 to 45	Ki 33,43		Kii 34,83	
Jn	Difference ≤ 4	Ji 24,28	Jii 26,59	Jiii 26,60	Jiv 26,35

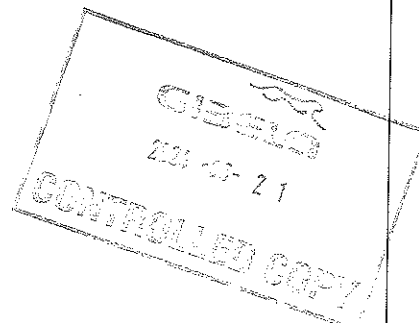
(*) Reference, only include values, isn't approval criteria.

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



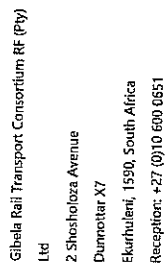
Weighting report from Test and Commissioning (Final measurements after Levelling and Weighting fine)



Quality Manager / Team Leader

21-01-21

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	Balance across front and rear bogies	Front Bogie [Tons]	Rear Bogie [Tons]	Longitudinal Imbalance [%]	Criteria Longitudinal Imbalance < 3%
M2		18.68	17.96	1.97%	PASS
	Weight Measured vs Predicted	Weight Measured [Tons]	Weight Predicted [Tons]	Weight Difference [%]	Criteria MinDiffMax
		36.64	37.06	1.14%	1.37% PASS

Name	Company	Department	Signature	Date
S.M.T	GIBELA	EDC		10/05/2018