Operating and maintenance Manual for container wagon Sgns 60' ROMVAG

Content

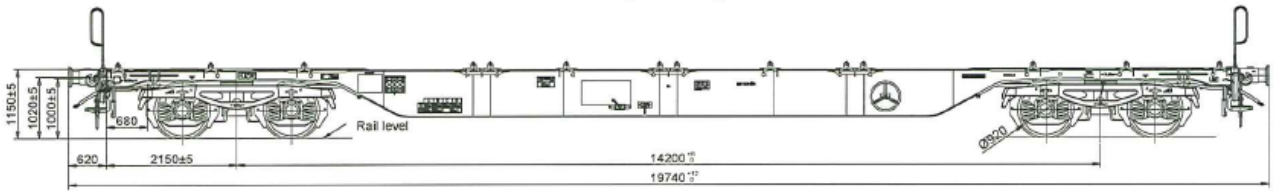
1 Description of the wagon

1.1 Function of the wagon

The wagon is designed in accordance with the UIC 571-4 (type 2a) regulations. It is intended for transportation of 20'', 30'' and 40'' containers manufactured according to UIC 592-2 and swap bodies manufactured according to UIC 592-4.

Outer crossbeams are fitted with container pins for fastening of container manufactured according to UIC 571-4. They can transport containers and swap bodies in separate or combined carriages according to the Figure 1.

1.2 Main technical characteristics of the wagon



1. Useful length of wagon		18 500 mm
2. Max. Height of loading plane		1155 mm
3. Wheel diameter on the rolling circle		920 mm
4. Minimum curve radius (wagon alone)		75 m
5. Maximum admissible slope on ferry:		2°30 '. :
6. Type of bogie design		Y25Ls(s)d1
7. Wagon tare		Maximum 20 t
8. Type of braking system		KNORR KE-GP-A
9. Screw coupling		850 KN
Draw gear		1000 KN
10. Buffering gear: Ring spring		600 KN
	Stroke	105 mm
	Buffer plate	550 x 340 mm
11. Maximum speed : for load per 1 wheel set 22,5 t		100 km/hr

Limit load:

	A	B	C	D
S	44.0	52.0	62.0	70.0
120	0			

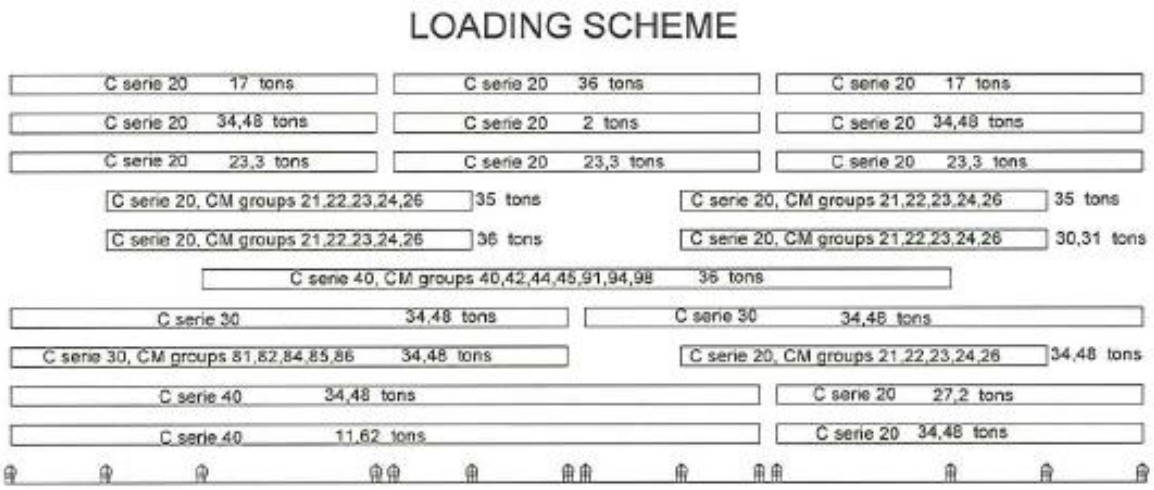


Figure 1 : loading scheme for containers and replaceable vessels
for all carriage combinations

1.3 Bogie

The type of the bogie is Y25 Ls(s)d1 with a load per wheelset of 22.5 t. The type of design of wheel set is BA 004 with wheel diameter on the rolling circle 920 mm and wheel set axle type B with journal diameter 130 mm according to UIC 510-1. Bearing body is fitted with axle box type CU2 according to UIC 510-1.

Wear plates are made of manganese steel. Wheel tread profile according to EN 13715 is : S1002/30.5/15%

1.4 Underframe

Underframe is welded structure consisting of two main longitudinal girders connected with cross-beams in head parts, the main cross beam and transverse bracings. Head part of the underframe is in conformity with UIC 530 requirements for the future instalment of automatic coupling.

For underframe it is used S 355 J2G3 according to EN 10025-2. The area above the bogies is protected with spark proof plate guard.

There are 28 container pins on the outer longitudinal beams. Taking into consideration stresses arising as a result of pushes during erection, container pins are manufactured of high-strength steel casting.

Shape and dimensions of container pins are in conformity with UIC 571-4, Attachment 4.

Container pins are installed on the frames. Frames of container pins are welded to the underframe. The frames make around the container pins stopper and support of folding holder at the same time. The places of wagon lifting are in the area of rope hooks.

1.5 Draw and coupling gear

The wagon is equipped with removable draw and coupling gear manufactured according to UIC 520. The hook of draw and coupling gear is designed for minimum 1000 kN. Material is according to UIC 825.

Draw and coupling gear is equipped with elastomer element and it is in conformity with UIC 827-1. Screw coupling is designed according to UIC 520, Attachment 1 for minimum draw force 850 kN. Material is according to UIC 827-1.

1.6 Buffering gear

The wagon is equipped with 4 buffers, class A, with minimum absorbing capacity 32 kJ according to UIC 526-1. Buffer plates are in conformity with UIC 527-1. Buffer amortization is effected by the ring spring 60 kN and with stroke 105 mm.

1.7 Braking system

The wagon is equipped with Knorr-Bremse system KE-GP-A. There are weight valves on the bogies for automation braking on loading regime. Pressure in the brake cylinder is limited to 3,8 bar. When load on wheel sets is increasing, pressure T is increasing on pro rata basis and pressure C remains constant 3,8 bar.

2 Operating instructions

For various combinations of cargo units, container pins before wagon loading shall be put into operating position according loading scheme (Figure 1). The structure of container pins and frames is designed to provide irreproachable lifting of container and swap bodies by loaders.

Container pins which are not needed during carriage shall be rotated down and will abut on supports (Figure 2).

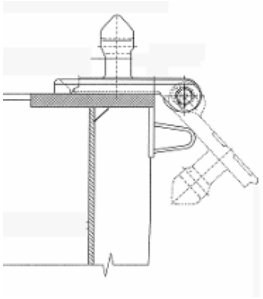


Figure 2

At the ends of the wagon there is a shunting handle. During the wagon handling, the handle is folded in the horizontal position, fixed at the console, item 2, welded to the underframe, Figure 3. At wagon handling, the handle is rotated by 90° (pos. 1) and a movable bush lowers down up to the end and in that way it secures a handle vertical position (Figure 3).

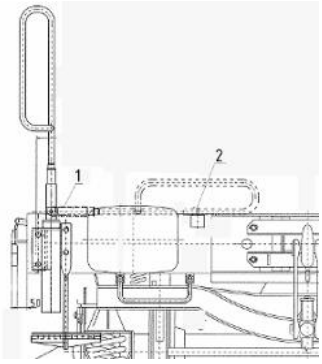


Figure 3

3 Maintenance of the container car type Sgns 60' ROMVAG

3.1 General information

The maintenance plan of the Sgns 60' ROMVAG wagons follows the **VPI maintenance rules**.

The nature of the maintenance operations may be :

- **Preventive**, which is repeated periodically and planned in advance,
- **Corrective**, performed to remediate damages, wearing or deficiencies.

Preventive maintenance is made of two complementary processes :

- **Permanent supervision** consisting of a visual survey of the technical functionality and the completeness of the wagon, to be carried out :
  - before and after loading,
  - before wagon acceptance,
  - after unloading.

Typically, the permanent supervision is performed within the GCU rules

- **Scheduled revisions** at regular time intervals, which consists of :
  - Overhaul of wagon
  - Overhaul of wheelsets
  - Intermediate controls between revisions, in case of intense or specific conditions of use,

according to the VPI prescriptions. Details of these revisions are explained hereafter.

3.2 List of applicable documents

- VPI Maintenance Guidelines
- GCU

3.3 Corrective Maintenance

The corrective maintenance is based on the GCU regulations. TOAUX appoints a fleet manager dedicated for each lease agreement to the management of the events within the wagon operation. Depending on the type of damage, the fleet manager decides and organizes either a repair in a workshop or on site by a mobile team.

Damage is considered as damage of parts, equipment and assembly units as a result of wear, deformation, corrosion, material fatigue, works for making up a train, loading, unloading.

A brake control Br 0 (according to VPI 07 Annex 02) is to be done in the following cases within corrective maintenance:

- when the brake system has been damaged,
- after the exchange of the brake shoes or of the wheelsets,
- After the exchange of bogies or a temporary lifting of the underframe.

Test brake reports are to be sent to the wagon keeper TOUAX (for contact person, see § 3.9). The brake test report template is the document TOUAX-DT-092.

3.4 Preventive Maintenance

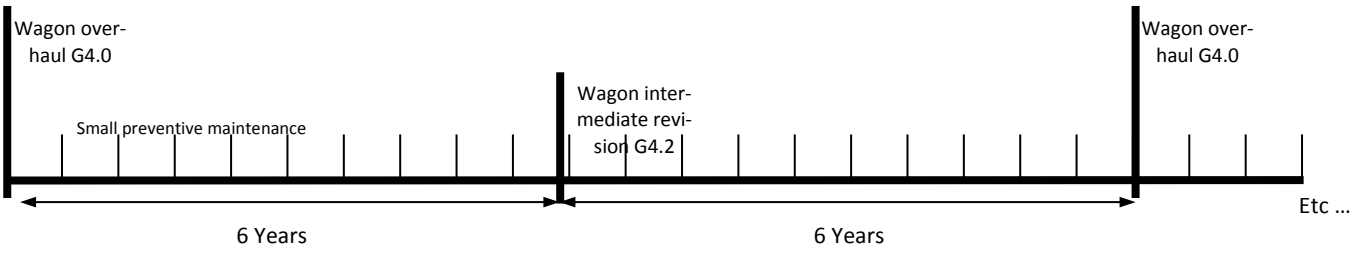
3.4.1 Sequence of operations

3.4.1.1 Wagon

The sequence and the intervals of the planned maintenance steps of the wagons are defined as follows, according to the VPI maintenance rules and to the manufacture maintenance file.

The sequence and the intervals of the planned maintenance steps of the wagons Sgns 60' ROMVAG are defined as follows (VPI 04 Annex 5):

- Wagon Main Overhaul G4.0 every 12 years
- Wagon Intermediate Revision G4.2 between two main overhaul.



The maintenance plate of the wagons must be updated on a 6 years basis.

3.4.1.2 Wheelsets

The wheelsets have a wheel diameter of 920mm. The time interval between two overhauls of the wheelsets must not exceed 10 years or 800 000km.

The wheel reprofiling is needed every 300 000km in average.

The maintenance work plan of the wheelset revision must follow the VPI 04 rules in the last version and the TOUAX-DT-214-Part1 in the last version.

3.4.2 Overhaul and intermediate revision

The overhauls of the wagon are done according to the VPI maintenance rules in authorized workshops. After an overhaul, wagon and wheelsets will fully recoverded their service life.

3.4.3 Small preventive maintenance

The small preventive maintenance consists of supervision and regular light operations of maintenance on site (generally at one end or at both ends of the route).

A maximum span of 50 000km or 6 months between every preventive control is recommended.

- Visual Check of the wagons according GCU Annex 9

And in particular:

  - Check of the wheel-set profile
  - Check the wagon against cracks
  - Check connection between bogie and underframe

- Check the upper center casting against cracks

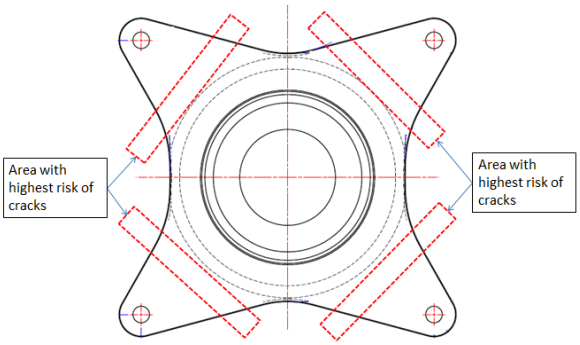


Figure 1: Area on the upper center casting with the highest risk of cracks

- Check container pins
- Check earth cables
- Check the superstructure (ladders, gangways, handles, steps, etc.)
- Check the side bearer fixation
- Check brake gear and hand brake
- Check buffer and screw coupling
- Check axle guard
- Check spark guard

- Correction of the defect found during the visual check
- Greasing of the wagon

And in particular:

- Buffer. To lubricate with Ceplattyn Eco 300 Plus

Figure 2: Greasing of the buffers

- Screw coupling. To lubricate with Ceplattyn Eco 300 Plus

Figure 3: Greasing of the screw coupling

- Drawbar hook guide. To lubricate with Ceplattyn Eco 300 Plus
- Brake gear. To lubricate with molybdenum disulphide base.
- Handbrake. To lubricate with graphite grease.
- G/P changeover. To lubricate with molybdenum disulphide base.
- Folding handles. To lubricate with lubricating oil L-AN 68

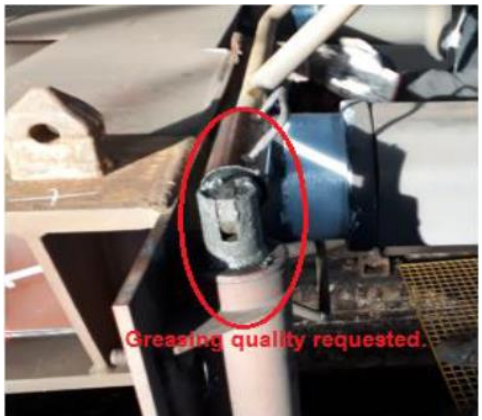


Figure 4: Greasing of the folding handles

The greasing of those parts has to be done according VPI01 Annex 12.

Prior to lubrication, layers of dirt and encrustations of oil, lubrication grease, dust and cargo residue must be removed (Point 4 Annex 12 VPI01)

- Brake shoes replacement under 20 mm
- Cleaning of the markings

A special preventive cartridge is painted on the wagon to facilitate the follow up (TOUAX-DT-203)

3.5 Special Operation: wagon height adjustment

During the maintenance operations, the wear of the wheels needs to be controlled. If the wear is ~20 mm (wheel diameter is Ø 880 mm), then the height of the wagons needs to be adjusted thanks to the following operations :

- to put over the lower pivot a 10 mm thick insert, item 1 according to the drawing No RVG 03.02.17.09 (Annex F) and to Figure 5. Then screw M24x100 SR ISO 4014-94, group 8.8 shall be used.

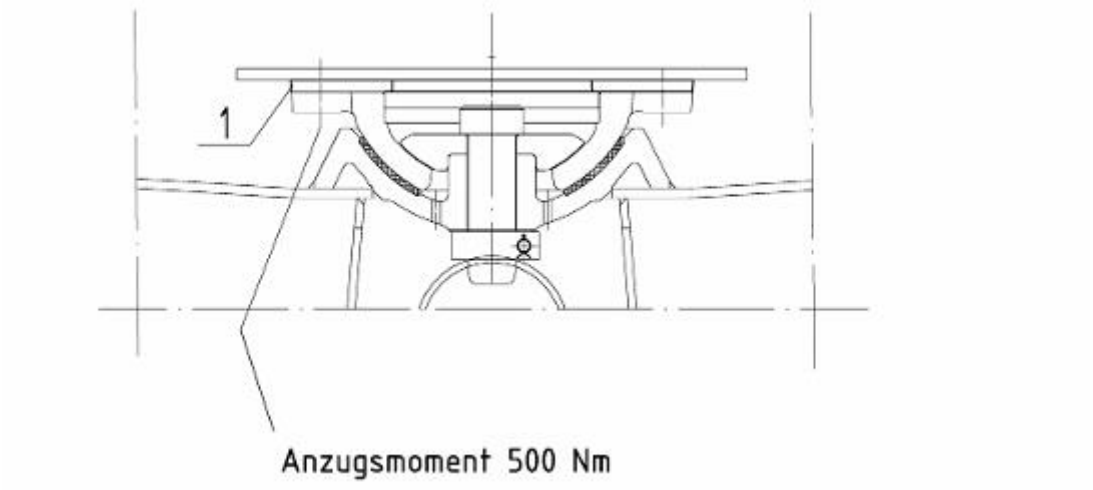


Figure 5

- under the sliders put 10 mm thick inserts, item 2 according to the drawing No. RVG 03.02.17.17 (Annex G) , and to Figure 6. Then screw M16x80 Gruppe 8.8.shall be used.

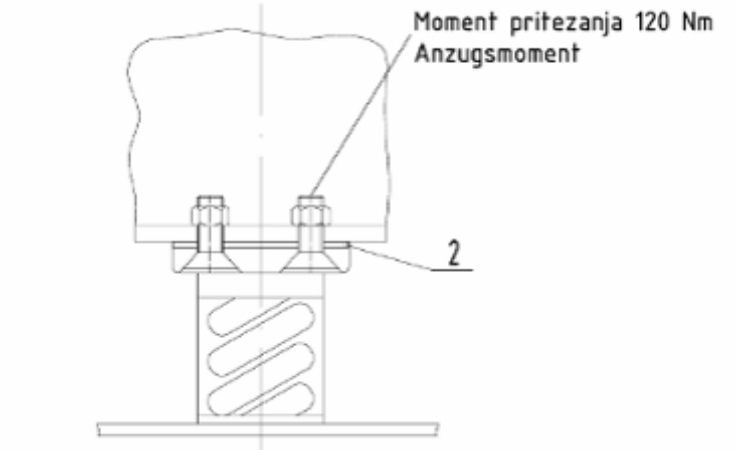


Figure 6

3.6 Container pins

Maintenance of these parts consists of planned inspection or visual control of the container pins and of their frames.

In case it is discovered component deformation able to influence the wagon functionality, or damage able to influence the safety, then the wagon shall be sent for repair according to the acting instructions in the following table :

Control / Survey Description
Inspection of components for deformation and damage
Control of measurement “C” 2307 ≤ C ≤ 2317 Figure 7
Control of measurement “a1” 2264 ≤ a1 ≤ 2274 Figure 7
Control of measurement “a2” 2264 ≤ a2 ≤ 2274 Figure 7
Measuring of spigot Figure 7a

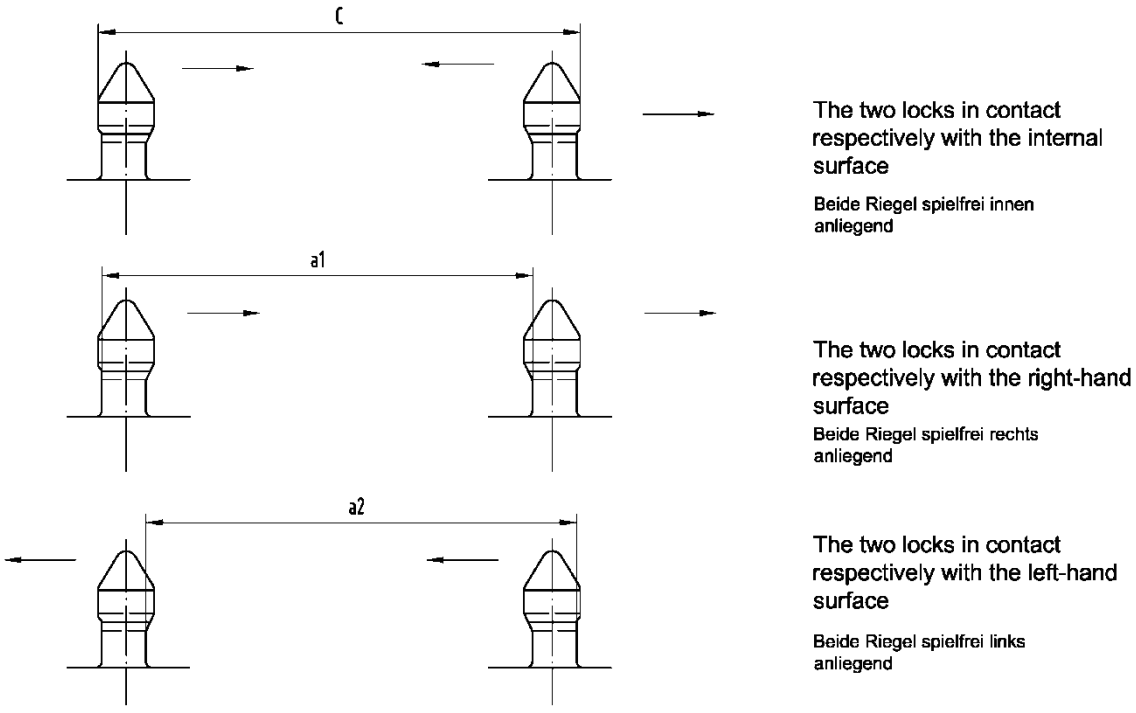
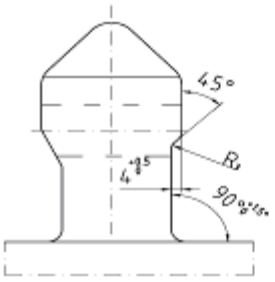


Figure 7



Dimension at manufacture	Limit dimension when running
R3	Maximum R15
45°	Maksimum 65°
4 +0.5/0	Minimum 3.5 mm
90°0/+1.5	Maximum 90° 0/+2° (see Note)

Herstellungsmaße	Betriebsgrenzmaße
R3	Maximal R15
45°	Maksimal 65°
4 +0.5/0	Mindestens 3.5 mm
90°0/+1.5	Maximal 90° 0/+2° (siehe Anmerkung)

Figure 7a

Note : When exerting a lateral force on the head of the spigot in the direction of the center of the wagon (i.e. removal of all play), the angle should be measured between the body of the spigot and a steel rule placed at right angles to the sole bars of the opposing spigots.

3.7 Parts list of «KNORR» pneumatic brake

Description	**Designation**
Distributor	KE2dSL-ALBd63
Support of distribution valve	Included in the distributor
Brake cylinder	16''
Air tank	125 litters
Load proportional valve	WM10
Slack adjuster	DRV 2A-600TH
Switch G – P	Yes
Switch I – U	Yes

Prescribed rates of brake system inspection are defined in the Annex B.

3.8 Material and spare parts required for the maintenance

Specifications of materials and parts necessary for maintenance of Sgns wagons are indicated in the list of spare parts in Annex A. The instructions to order the spare parts are detailed in the TOUAX-DT-102.

4 Annexes

ANNEX A – SPARE PARTS LIST

ANNEX B – BRAKE CALCULATION

ANNEX C – MEASUREMENT OF BOGIE

ANNEX D – MEASUREMENT OF UNDERFRAME

ANNEX E – ANTI-RUST PROTECTION TECHNOLOGY

ANNEX F – LOWER PIVOT INSERT

ANNEX G – SLIDER INSERT

ANNEX A

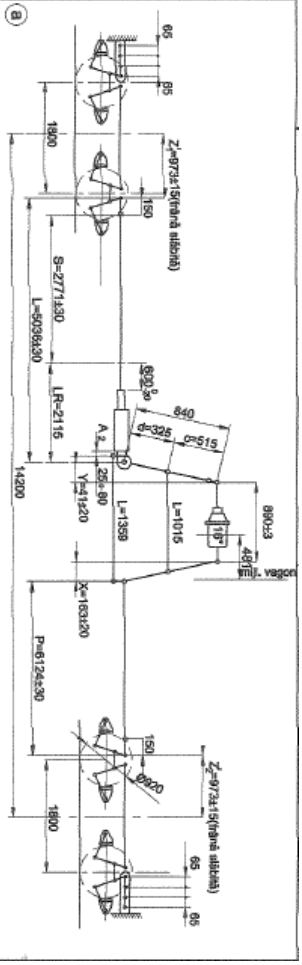
Spare parts list

Item	Component's denomination
1	Wheel sets with axle load of 22.5tons
2	Suspension springs
3	Air distributor KE2dSL-ALBd63
4	Slack adjuster DRV-2AT 600
5	Weighting valve WM10
6	Air reservoir of 125 litters
7	Brake cylinder of 16"
8	Draw hook of 1.000 KN acc. UIC 520 sheet
9	Screw coupling of 850 KN acc. UIC 520 sheet
10	Buffer A type with course of 105mm acc. to UIC 526-1
11	Ladders, steps, handles
12	Container pins

ANNEX B

Brake calculation

Tara vagonului	19,4t ± 2%
Greutatea totală	90t
Viteza maximă de circulație	120 km/h până la 58t; 100km/h de la 58t÷90t
Regim de circulație	S
Tipul frânei	KE-GP-A
Tipul distribuitorului	KE2dSL-ALBd63
Roleu de presiune	RLV 11d63
Ventili de cântărire	2 x WM10
Cilindrul de frână	16"
Regulator de timonerie	DRV-2AT-600 DRV 2A-600TH
Schimbătorul de regim	G-P
Diametrul cercului de rulare nou/uzat	920/840mm
Numărul portsaboților	n=16 (dubli)
Suprafața de frecare a saboților montați pe un portsabot	A_b=400cm² (2x200cm²)
Număr de suspensie	n_W=16
Masa nesuspendată	W_0=5,5t.
Suprafața pistonului	A=1295 cm²
Dimensiunile levierilor timoneriei centrale :c/d	515/325
Raport de amplificare boghiu	i_0 =4
Raport de amplificare total(conf. anexei O,fig.6, fișa UIC 544-1, ed. a 4-a.)	j= 2·i_0·c/d =12,68
Efortul arcului de rapel cilindru de frână	F_c =1,5KN
Rezistența opusă de regulator	F_{rg} =2KN
Randamentul timoneriei	η =0,83
Cursa pistonului	C_m =125mm
Uzura luată în calcul	u=67mm
Tipul saboților de frână/tip material	dubli Bgu/P10
Tipul boghiului	Y25 Ls(s)d



Greutatea		G(t)	19,4	30	40	50	58	60	70	80	90
Sarcina pe un ventil de cântărire	F_w= (G-W_0)/n_W x9,81	F_w(KN)	8,522	15,021	21,152	27,284	32,189	33,415	39,546	45,677	51,809
Presiunea de comandă(conf. diagramei WM 10 anexată)	T(bar)	0,581	1,201	1,892	2,182	2,575	2,673	3,163	3,654	4,144
Presiunea în cilindrul de frână(conf. diagramei T(C) anexată)	P_c (bar)	1,10	1,811	2,268	3,112	3,8	3,8	3,8	3,8	3,8
Forța la tija pistonului F_p =10²x A x P_c - F_c	F_p(KN)	12,745	19,362	27,741	38,800	47,71	47,71	47,71	47,71	47,71
Suma forțelor la saboți Fσyn=(F_p·j·2·i_0· F_p)·η	$F_{\sigma n}$(KN)	120,853	190,493	278,577	395,056	488,839	488,839	488,839	488,839	488,839
Forța pe un portsabot dublu F_s =Fσyn/16	F_s (KN)	7,563	11,905	17,417	24,691	30,552	30,552	30,552	30,552	30,552
Coef.de calitate conf. fișei UIC 544/1 ed. 4	K_{bgu}	1,793	1,832	1,462	1,284	1,170	1,170	1,170	1,170	1,170
Masa frânată B = Fσyn·K / 9,81	B(t)	22,088	31,690	41,531	51,708	58,301	58,301	58,301	58,301	58,301
Procentul masei frânate λ = B/G ·100	λ(%)	113,855	105,633	103,827	103,416	100,518	97,168	83,287	72,878	64,778
Procentul de frânare δ = Fσyn/9,81T ·100	δ(%)	63,501	84,727	71,016	80,543	85,914	83,051	71,186	62,288	55,387
Presiunea pe saboții portsabotului R_b =F_s/A_b	R(N/cm²)	18,882	29,762	43,542	61,727	76,38	76,38	76,38	76,38	76,38

Masa frânată : Max.58t.

Notă:Calculul frânei automate s-a făcut conform fișei UIC 544-1 ed. a 4-a ,masele frânate ce se înscriu pe vagon, pentru timonerie convențională(anexa O,fig.9 din fișă),sunt cele rezultate din calcul.

a	1	Modificat la sesiz	Ing.Grădinaru F	15.06.2005	Ing.Grădinaru F	
		Protocitat	Ing. Grădinaru F			
		Desenat	Ing. Niculescu I			
		Verificat	Ing. Trucă V			
		Contr.STAS	Ing. Eichelber V			
		Aprobat				

S.C. ROMVAG S.A. Caracal

CALCULUL FRÂNEI AUTOMATE Vagon tip Sgns

RVG 35.10.16

Înlocuiește desen nr.

Nr. inventar

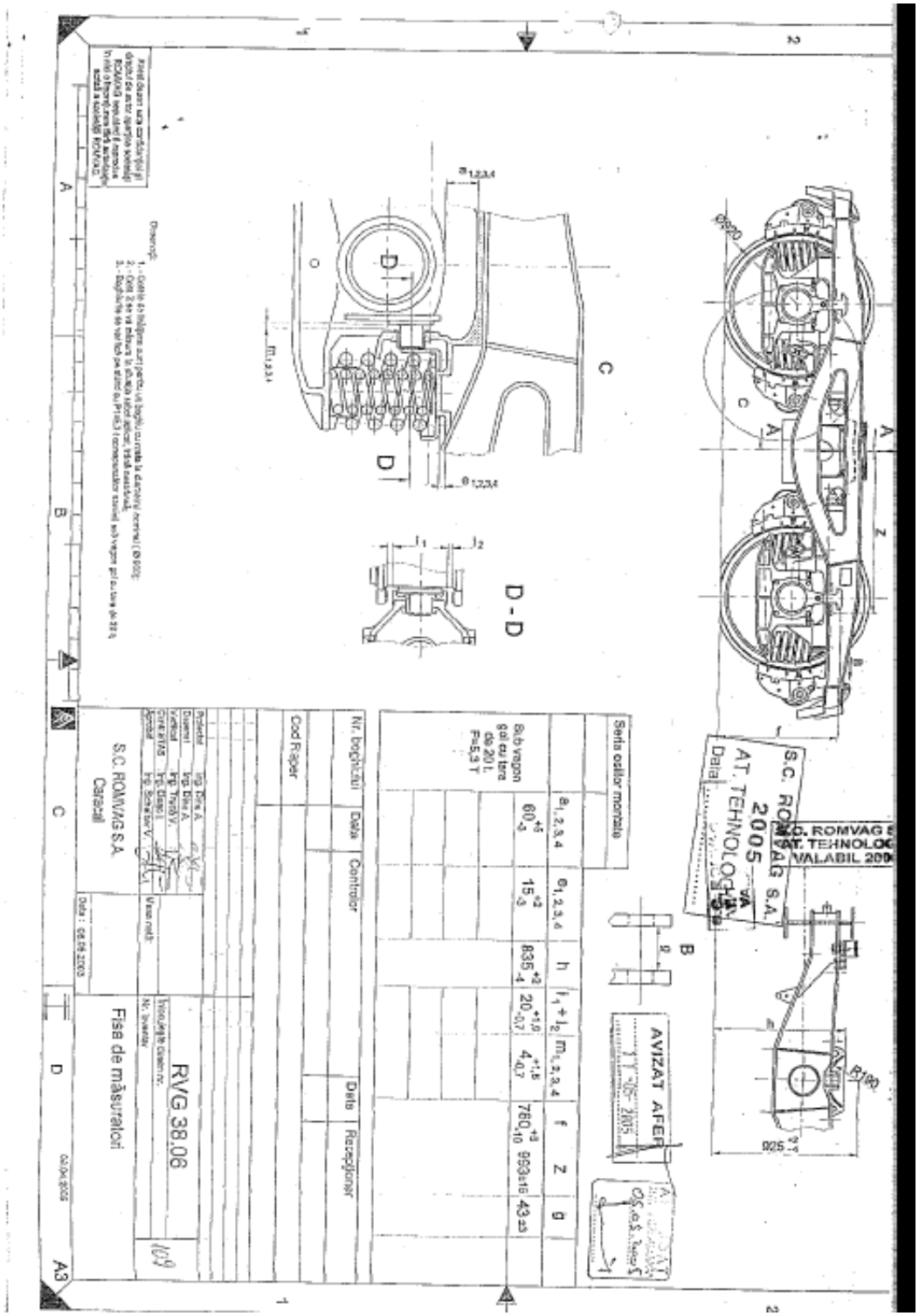
Masa netă:

Data : 05.01.2005

1/2

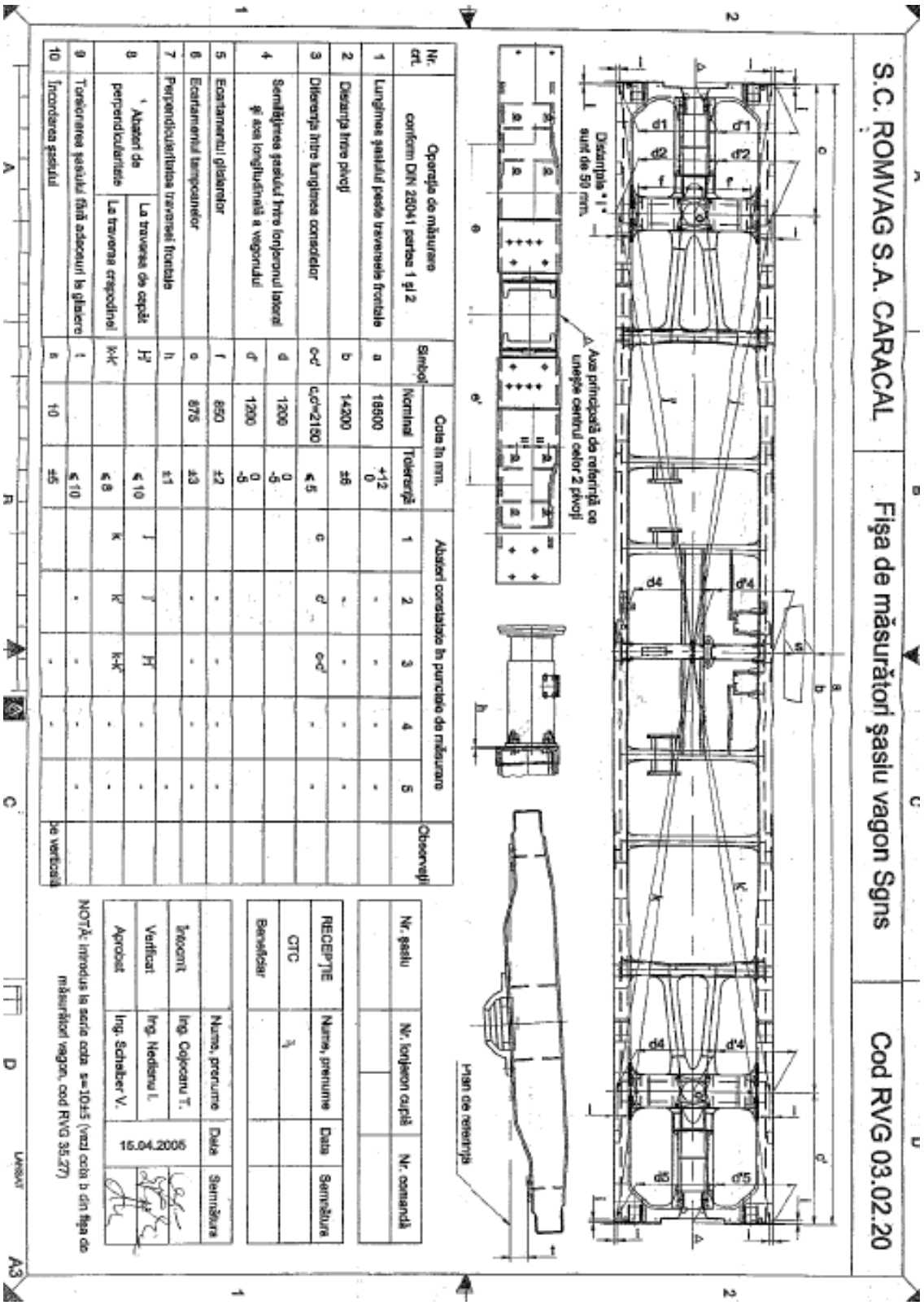
ANNEX C

Measurement of bogie



ANNEX D

Measurement of Underframe



ANNEX E

ANTI-RUST PROTECTION

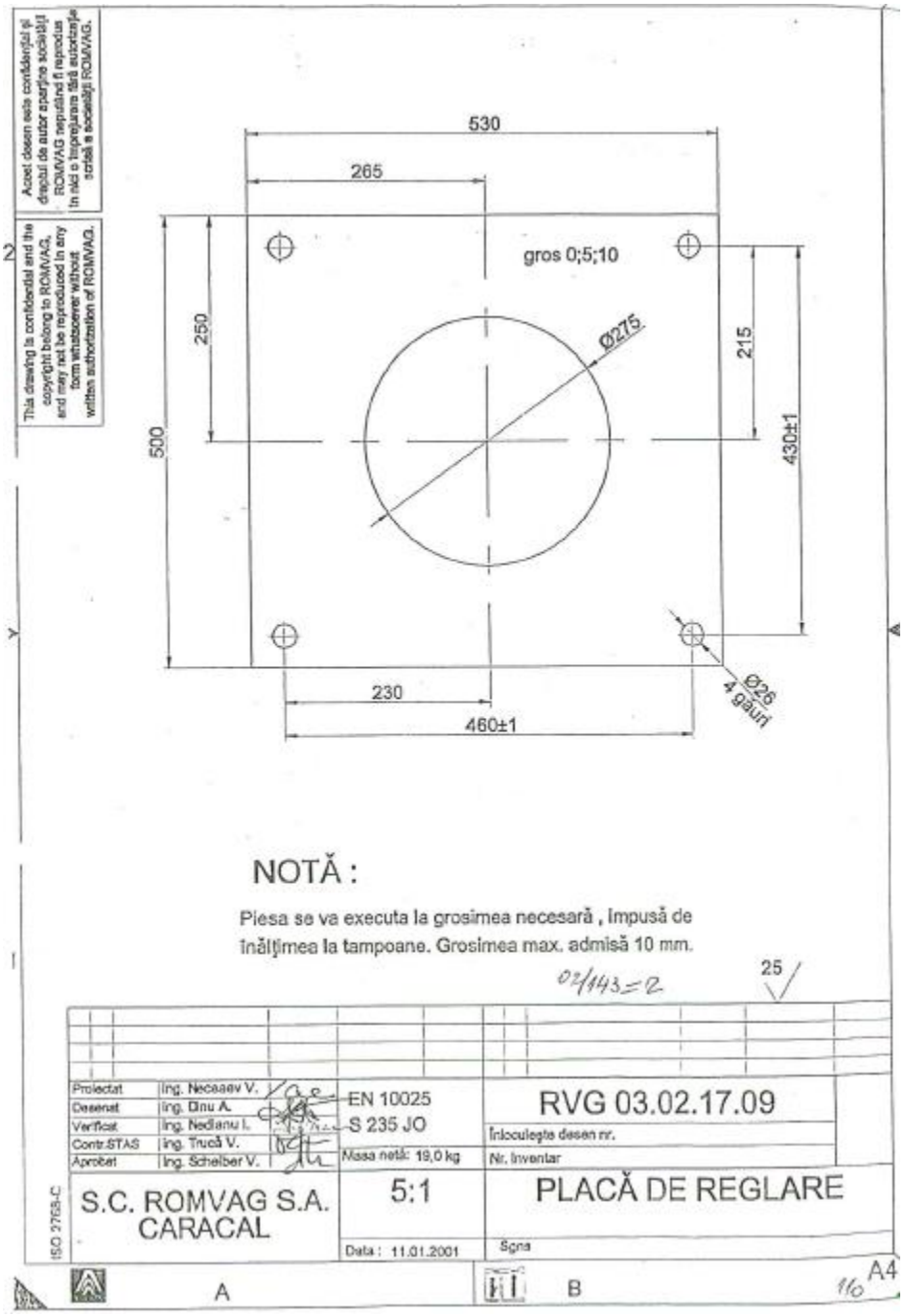
The painting is performed in epoxy system, with two coats of primer paint (minimum 60 microns in dry condition) and two coats of enamel paint (minimum 70 microns in dry condition).

The total minimum thickness of dry coat of the painting system in both cases is ≥130µm.

Painting colour of the wagons is according to RAL 3009.

ANNEX F

LOWER PIVOT INSERT



ANNEX G

SLIDER INSERT