



## **VERSA working for traffic safety for Austria**

### **DERAILMENT OF TRAIN 41328**

**on 9 September 2007**

**Österreichische  
Bundesbahnen (*Austrian  
federal railways*), route 13201  
in Wien (*Vienna*) Donaukaibf  
station**

The investigation takes place in conformity with the federal law which came into force on 1 January 2006, and by which the federal accident investigation office is set up (accident investigation law, BGBl. (*Bundesgesetzblatt = federal gazette*) I No 123/2005) and the aviation law, the railway law of 1957, the shipping law and the motor transport law of 1967 are changed, and on the basis of Directive 2004/49/EC of the European Parliament and Council of 29 April 2004. The purpose of the investigation is exclusively to establish the cause of the incident, so that future incidents can be prevented. It is not the purpose of the investigation to establish guilt or liability.

Where person-related designations are used, the chosen form applies to both sexes.

Without the written approval of the federal office of transport, extracts of this report must not be circulated.

Postal address: A-1210 Wien, Lohnergasse 9

**BMVIT-795.077-  
II/BAV/UUB/SCH/2007**

**BUNDESANSTALT FÜR  
VERKEHR (*FEDERAL OFFICE  
OF TRANSPORT*)**

**Unfalluntersuchungsstelle des  
Bundes (*federal accident  
investigation office*)**

**Fachbereich Schiene (*rail  
division*)**

Investigation report

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## List of abbreviations

AVV	Allgemeiner Vertrag über die Verwendung von Güterwagen ( <i>general contract on the use of goods waggons</i> )
Bf	station
CFR	CFR MAFRA SA (Güterverkehr der Rumänische Eisenbahn ( <i>goods transport of Romanian railways</i> ))
DV	Dienstvorschrift ( <i>service regulation</i> )
EK	railway crossing
GI	track
IM	infrastructure manager
ÖBB	Österreichische Bundesbahnen ( <i>Austrian federal railways</i> )
PZB	intermittent automatic train-running control
RCA	ÖBB-Rail Cargo Austria AG
RIV	Übereinkommen über den Austausch und die Benützung von Güterwagen zwischen Eisenbahnverkehrsunternehmen ( <i>agreement about exchange and use of goods waggons between railway transport companies</i> )
RoLa	highway on wheels
RU	railway undertaking
Tfz	locomotive vehicle
Tfzf	locomotive vehicle driver
UIC	International Union of Railways
UUB	Unfalluntersuchungsstelle des Bundes ( <i>federal accident investigation office</i> ), Fachbereich Schiene ( <i>rail division</i> )
UUG	Unfalluntersuchungsgesetz ( <i>accident investigation law</i> )
VzG	list of locally permitted speeds
Z	train
ZSB	Zusatzbestimmungen zur Signal- und Betriebsvorschrift ( <i>additional provisions of the signal and operation regulation</i> )

## 1. Summary

On 9. September 2007, at 03:38, on ÖBB route 13201, in the Wien Donaukaibf station, track 103, at km 1.467 (before the railway crossing at km 1.647), train 41328, travelling from the direction of Wien Erdbergerlande, derailed at the eighth axle of the 10th waggon (10-axle RoLa waggon of CFR 81 53 498 3 066-2).

The derailment at km 1.467, followed by the loss of the axle (it escaped from the running gear to the left of the railway) at km 1.639, caused relatively little damage to the train, so that the driver of locomotive vehicle Z 41328 did not notice the incident and continued to drive the train according to the route.

Because of the loss of the axle, the axle guard of the running gear concerned dropped in the region of the suspension of the lost axle, and further on it damaged safety equipment (axle counters and track magnets of the PZB) which was fitted around the track on which the train was travelling. In connection with the damage to axle counters, interference with clear track signalling equipment occurred. In the Klosterneuburg-Weidling station, the train was stopped and subjected to a train inspection.

In the inspection by the driver of the locomotive vehicle, it was established that a spring support and an axle were missing from the 10th waggon.

The 27 travellers in the train (lorry drivers in the accompanying coach) and the locomotive vehicle driver were not injured in the incident.

## 2. Place

Infrastructure manager: ÖBB-Infrastruktur Betrieb AG

- route 13201 from Wien Erdbergerlande to Wien Donaukaibf
- Wien Donaukaibf station
- track 103
- km 1.467 (sector before the railway crossing at km 1.647)

### 3. Date and time

Sunday, 9 September 2007, 03:38

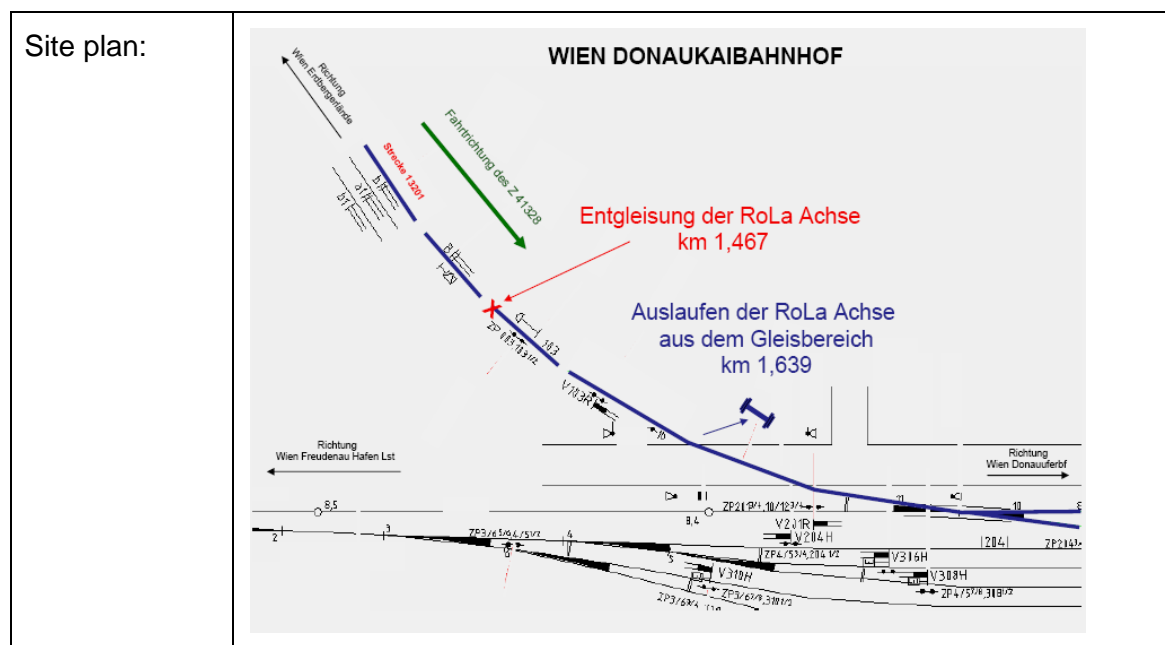
#### 4. Weather, visibility

Rain, +10 °C, visibility was not restricted because of weather.

## 5. Local conditions

## 5.1. General

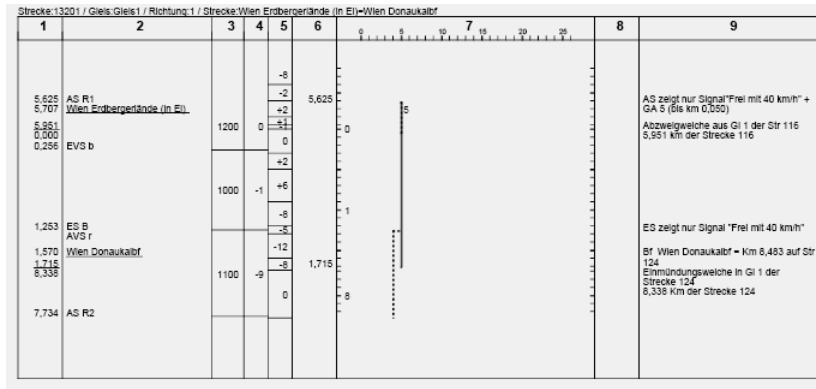
The place of the event, in the direction of travel of the train, is on a curve to the left (radius 200 m) with a downward gradient of 12 ‰, at km 1.467 (sector before the railway crossing at km 1.647) of the single-track electrified ÖBB route 13201, from Wien Erdbergerlande station to Wien Donaukaibf, in Wien Donaukaibf station. The operating procedure is according to the provisions and requirements of ÖBB DV V2 ('Signalling regulation'), ÖBB DV V3 ('Operating regulation') and ZSB.



The following speeds apply in the area of the incident:

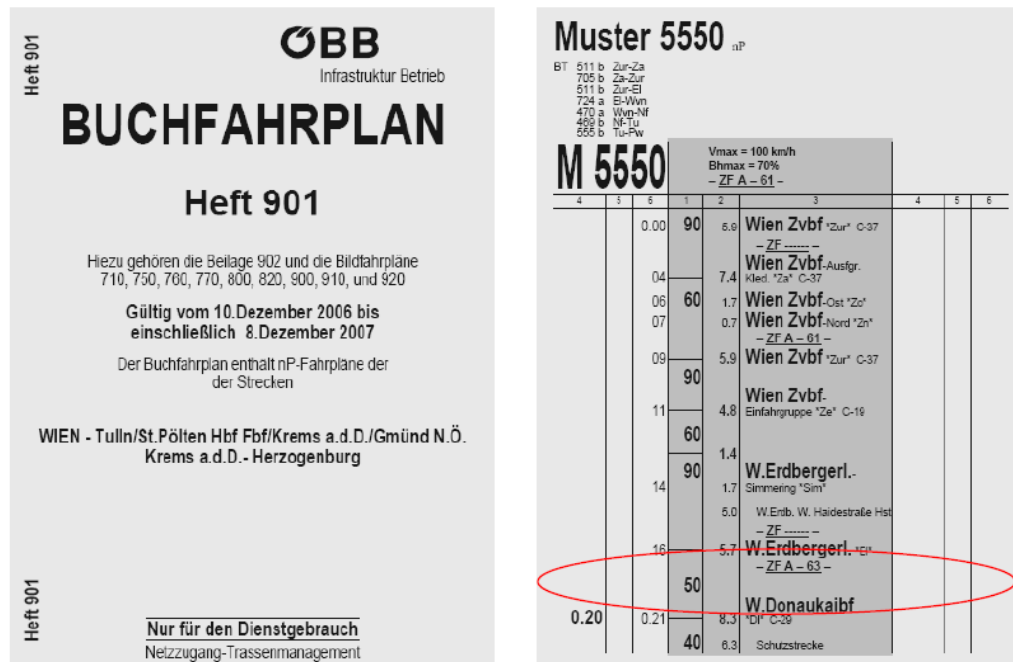
## 5.2. List of locally permitted speeds (VzG)

The permitted speed according to ÖBB-VzG is 50 km/h.



## 5.3. Working timetable

The permitted speed according to the ÖBB working timetable is 50 km/h.



## 5.4. Signalled speed

At the entry to Wien Donaukaibf station on track 103 from the direction of Wien Erdbergerlande station, the signalled speed is 40 km/h.

## 6. Composition of participating journeys

Train 41328 (RoLa train of RU ÖBB-Rail Cargo Austria AG)

### Running:

- from Kiskundorozsma station via Hegyeshalom station to Wels marshalling yard

### Composition:

- 1294 t total train weight (measured according to measurement and calibration law)
- 493 m total train length
- locomotive vehicle 1047 003-2
- RoLa accompanying coach
- 23 RoLa waggons (all loaded)
- working timetable volume 901 / timetable pattern 5550 of ÖBB-Infrastruktur Betrieb AG
- maximum timetable speed 100 km/h
- required effective braking power 70%
- existing effective braking power 79%
- braked continuously and sufficiently

## 7. Description of incident

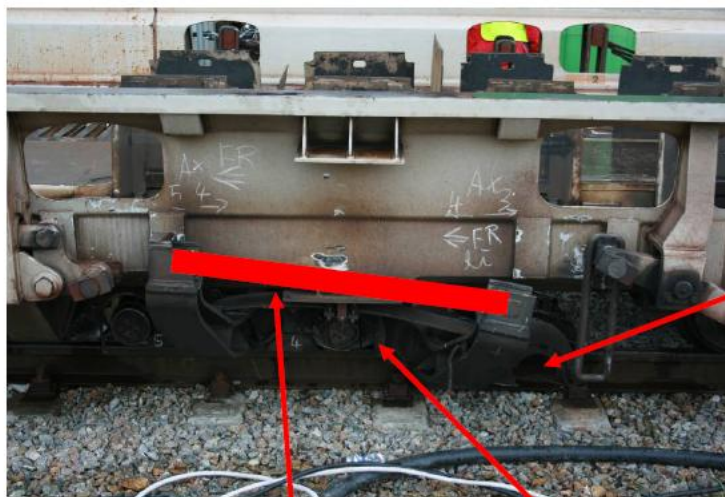
While train 41328 was travelling from Wien Erdbergerlände station to Wien Donaukaibf station at a speed of 33 km/h, at km 1.467 of Wien Donaukaibf station, the 10th waggon (RoLa waggon of CFR 81 53 498 3 066-2) derailed at the 8th axle.

The derailment was followed by the 8th axle being thrown sideways from the running gear, followed by the loss of the axle. After hitting a grit container, the thrown axle came to rest, to the left in the direction of travel, at km 1.639 directly before the railway crossing at km 1.647.

The locomotive vehicle driver did not notice the loss of the axle, so that he continued to drive the train. Because of the loss of the 8th axle, the axle guard dropped, and as a further consequence the bearings of the 7th axle in front of it broke. The dropping of the running gear part resulted in damage to the track magnets of the PZB and the axle counter equipment, causing interference with the clear track signalling equipment.

The train was stopped by a signal in Klosterneuburg-Weidling station, and visually inspected by the locomotive vehicle driver. As a result of this inspection, it was established that a spring support was missing on the left in the direction of travel, as well as the 8th axle of the 10th waggon.

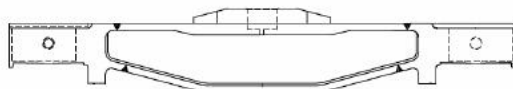
Representation:



Escaped 8th axle



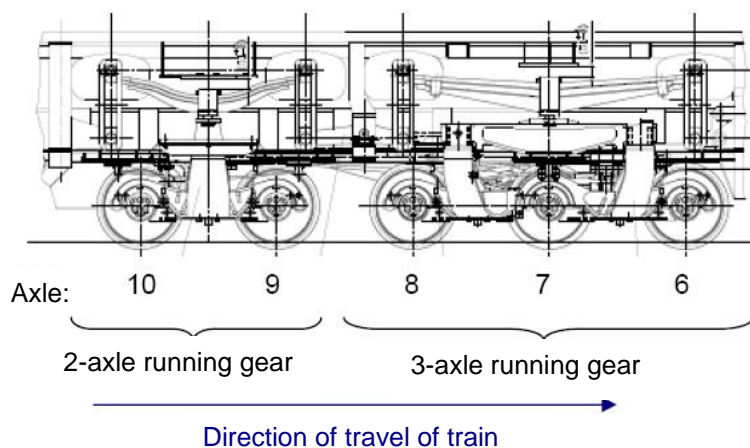
Missing spring support



Broken bearing  
of 7th axle



5-axle pony truck





## 8. Material damage

### 8.1. Track

Track 103 of Wien Donaukaibf station was damaged over a length of about 150 m.

### 8.2. Safety equipment

In the route sections Wien Erdbergerlande station – Wien Donaukaibf station (ÖBB route 13201), Wien Donaukaibf station – Nussdorf station (ÖBB route 12401), Nussdorf station – Klosterneuburg-Weidling station (ÖBB route 10901), several track magnets of the PZB and axle counters were damaged.

### 8.3. Rolling stock

Derailed RoLa waggon of CFR 8153 498 3 066-2:





## 9. Interference with operation

Track 103 of Wien Donaukaibf station blocked; trains delayed

## 10. Participants, contractors and witnesses

- IM ÖBB-Infrastruktur Betrieb AG
- movements inspector of Heiligenstadt station (ÖBB-Infrastruktur Betrieb AG)
- RU ÖBB-Railcargo Austria AG
- ÖBB-Traktion GmbH (traction provider)
- locomotive vehicle driver of train 41328 (ÖBB-Traktion GmbH)

## 11. Evidence, results of analysis and investigation

### 11.1. Local inspection

The derailed RoLa waggon of CFR 81 53 498 3 066-2 was visually inspected in Klosterneuburg-Weidling station.

#### Result of the visual inspection:

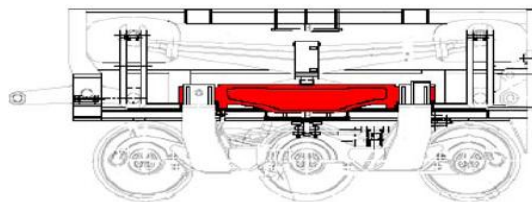
- missing spring support
- missing 8th axle
- broken bearing of 7th axle
- five missing suspension rings
- missing suspension spring of 3-axle running gear

### 11.2. Missing waggon parts

Because of the missing waggon parts, the route sections were searched where the train ran (from Kiskundorozsma station to Hegyeshalom, on UUB's request, by the Hungarian accident investigation office, and from Hegyeshalom station to Klosterneuburg-Weidling station by ÖBB and UUB).

#### Result of search for missing waggon parts

- The **missing spring support** of the 3-axle running gear could not be found despite an intensive search.



- The missing eighth axle was found in Wien Donaukaibf station at km 1.639.
- The fragments of the bearing of the seventh axle were found in Wien Donaukaibf station, between km 1.498 and km 1.590.
- The missing suspension rings were found in the following sectors:
  - one suspension ring in Wien Donaukaibf station at km 1.571
  - one suspension ring between Wien Brigittenau station and Wien Donauuferbf station at km 3.070
  - one suspension ring in Wien Zentralverschiebe (*central marshalling yard*) station – reception sidings
  - two suspension rings could no longer be secured
- The missing suspension spring was secured in Wien Donaukaibf station at km 1.571.

### 11.3. Technical inspection of derailed waggon

The derailed waggon and all found parts were subjected to a technical inspection.

#### Result of technical inspection

- The following was established about the derailed 8th axle:
  - notch about 15 mm deep (impact point)
  - abrasion and traces of impact (damage because of rotating loosely)
  - normal wear on running surface
  - correct state of wheel flange
  - no bearing damage



- Suspension spring (parabolic spring) - traces of abrasion inside (because of the missing spring support, the suspension spring slipped)



- Secured suspension rings
  - no damage such as cracks or deformation could be established



- Brake system
  - the brake system was partly damaged in the derailment (missing bolts)



- Lift-off safety system of eighth axle
  - traces of abrasion (because of the dropping of the running gear, track magnets of the PZB came into contact with axle counters)



- Preceding seventh axle



- traces of abrasion on running surface and wheel flange (damage because of loose rotation of eighth axle)



- Axle bearing of seventh axle



- bearings were destroyed on both sides (broken by force, not hot running)



- Spring support bearing

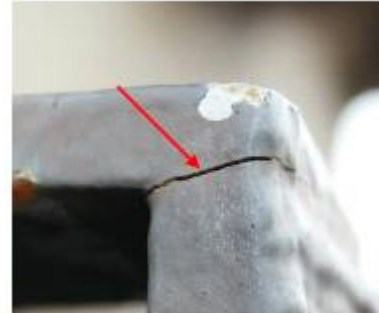


- traces of abrasion in region of bearing surface of spring support (this indicates that the spring support was broken)
- the hole to secure the bolt of the spring support was fused



- Securing shackle of spring support bearing

- crack approx. 4.5 cm long (indicative of the broken spring support )




- Inspection

- carried out on 24 November 2006 by ÖBB-Technische Services GmbH in Knittelfeld works

Writing on waggon



Workshop order for inspection:

		
Auftrag / Vorg: 886700028057		SAM - Auftrag: 200610206838
Werk	:	
Organisation	:	
Fahrzeug	:	81 53 4983 066-2
Gattung	:	
Auftragsart	:	TSQC
Ausbesserungsart	:	REV_D
Ersteller	:	49103
Auftragsverantwortlicher	:	49103
Auftragsstatus	:	In Arbeit
Km Stand / Datum	:	0
		Erhaltung TS - Intern Revision mit Dgsl-Tausch Role Auftragsbeginn: 15.11.2006 00:00:00 Auftragsende:



#### 11.4. Licensing of derailed waggon

Subsequently, the UUB checked the licensing of the waggon on routes of ÖBB-Infrastruktur Betrieb AG, and established that:



On the waggon, there was an agreement grid with 'ÖBB' written on it in accordance with AVV, (Annex 11, item 2.2, agreement grid: 'Because of differences from the UIC code, these waggons are not marked with the "RIV" symbol. Use of them is therefore agreed bilaterally or multilaterally between railway transport companies, and the short names of the parties to the agreement are entered in this grid. These waggons can therefore be used only by the railway transport companies whose names are written on them, i.e. they are not suitable for transit without restriction' and 'every railway transport company bears the costs associated with licensing waggons without an RIV symbol to travel on the relevant routes').

According to ÖBB-ZSB 31 ('Guidelines for the safe technical use of rolling stock on the ÖBB network'), Section 12, paragraph 6, goods waggons without an RIV symbol can be used for transport across borders if they carry an agreement grid which contains the short names of the railway which undertakes it.

- ÖBB-Infrastruktur Betrieb AG  
Until now, ÖBB-Infrastruktur Betrieb AG has issued no licence for transport on the infrastructure of ÖBB.
- ÖKOMBI Waggonbetriebsgesellschaft mbH  
Since the network licence is held by the waggon owner, no documents (copies, correspondence, etc.) could be made available.
- Bundesministerium für Verkehr, Innovation und Technologie (federal ministry for transport, innovation and technology)  
On reviewing the documents for the RoLa waggons, no required authorisation documents for authorisation of operation of the relevant waggon could be found.
- Documents of ÖBB-Technische Services GmbH  
According to communicated documents (correspondence from 2004), on the placement of the 'ÖBB' symbol on the 10-axle RoLa waggon of CFR, the ÖBB-Traktion GmbH – the technical wagon-service constituted the written order for putting the 'ÖBB' symbol in the agreement grid.



## 11.5. Analysis by wheel diagnostic system of Himberg station

Between Gramatneusiedl and Himberg stations, there is a train-traffic technical checkpoint in trial operation. Among other things, it measures axle and wheel loads.

### Wheel diagnostic system GRD - 2006

10/09/2007 09:28

System name:	Gutenhof	Date commissioned:	6/5/2004
Place:	Himberg	Km:	16.200
Message number:	0732786		
Date and time:	09/09/2007 02:58		
Number of axles:	234	Speed:	102 km/h
Direction of travel:	normal		
Maximum permitted axle weight:	25.00 t		(0 axles)
Max. permitted weight displacement:	35% (from axle weight of 6.00 t)		(10 axles)
Wheel flat factors:	2.50: f, 4.00: ff		(0 wheels)
Min. wheel weight for wheel flat assessment:	4.0 t		

	Axle	Left t	Right t	Total t	Displacement %	Wheel flat left	Right
Locomotive vehicle	1	9.88	10.39	20.27	-5		
	2	10.50	9.75	20.25	8		
	3	10.02	10.04	20.06	-0		
	4	10.46	9.76	20.22	7		

10th (derailed) RoLa waggon	89	3.36	3.67	7.03	-9	2-axle running gear	
	90	3.53	3.20	6.73	10		
	91	3.54	3.68	7.22	-4	3-axle running gear	
	92	3.57	3.38	6.95	6		
	93	4.42	4.67	9.09	-6		
	94	4.44	2.51	6.96	77	3-axle running gear	
	95	5.71	3.46	9.17	65		
	96	4.12	1.69	5.82	143	derailed axle	
	97	3.97	5.55	9.52	-40	2-axle running gear	
	98	3.37	6.23	9.59	-85		

The derailed RoLa waggon was not in its proper condition even before the derailment point. The limits for wheel load differences (1.25 : 1 according to RIV) of the individual axles in the affected pony truck were exceeded at the measurement point. At the measurement point, the derailed axle had a value of 4.12 t : 1.69 t = 2.44 : 1.

## 11.6. Check on the waggon documents

The waggon list and loading list were secured and checked by UUB. Because of the incident, weighing of the load was arranged by UUB.

- Loading list at dispatch station, giving total weight of load. (Loading list begins with No 0, so No 9 is the 10th waggon.)

Nachw. Nr.: 00508-2		Ladeliste		Szeged - Weis		2007.09.08. 16:16	
Zug: 41328 2007.09.08.		Versandbahnhof: Kiskundorozsma Rola Terminal / Ankunftsbahnhof: Weis ÖBB-Güterabfertigung Terminal		Seite: 1			
Nr. Vagonnr.	Trasp.Firma Frachtzähler	Bezeichnung	Kennzeichen	Ladegew. Ges. Gew.	Va. Nr. Bem.		
0.							
1.	BILKAR	BAR	34BL1027	7448	240009105		
2.	BILKAR	TE0117	34BL3280	21478	160124462		
3.	SE-FA	BAR	34UR4932	10061	240009091		
4.	BILKAR	TE0116	34BL0235	11188	240009091		
5.	BILKAR	TE0116	34BL0235	25108	160124474		
6.	INTERCOMBI	BAR	34DC3648	23391	38575		
7.	INTERCOMBI	TE0107	34DC3648	38575	4977		
8.	BALNAK NAK	BAR	34BY6330	4977	240009088		
9.	BALNAK NAK	TE0115	34DR6552	20638	14297		
10.	ORKUN ISTANBUL	BAR	34ZEL60	14297	120020503		
11.	ORKUN ISTANBUL	TE0115	34ZJ5125	29327	20000		
12.	UGUR TRANS ULUS NAK	BAR	61K3141	20000	160124486		
13.	UGUR TRANS ULUS NAK	TE0106	34DT1472	33639	11347		
14.	ALPIN	KFK	34FPY33	11347	25365		
15.	TURKSPED	BAR	34EN1066	25365	12928		
16.	KÖÇÜK	BAR	42KN140	12928	230006297		
17.	KÖÇÜK	TE0116	42KN053	27821	10725		
18.	BARSAK GLOBAL LOGISTIK AS	BAR	34BL1027	10725	25885		
19.	BARSAK GLOBAL LOGISTIK AS	TE0107	34VH402	25885	11410		
20.	BETZ ULUS	KFK	34BU2652	11410	230006302		
21.	WILLI BETZ	BAR	34BU2679	26095			

10th waggon

- Loading list at final station, giving 'checked' total weight (reweighing) of load. (Loading list begins with No 0, so No 9 is the 10th waggon.)

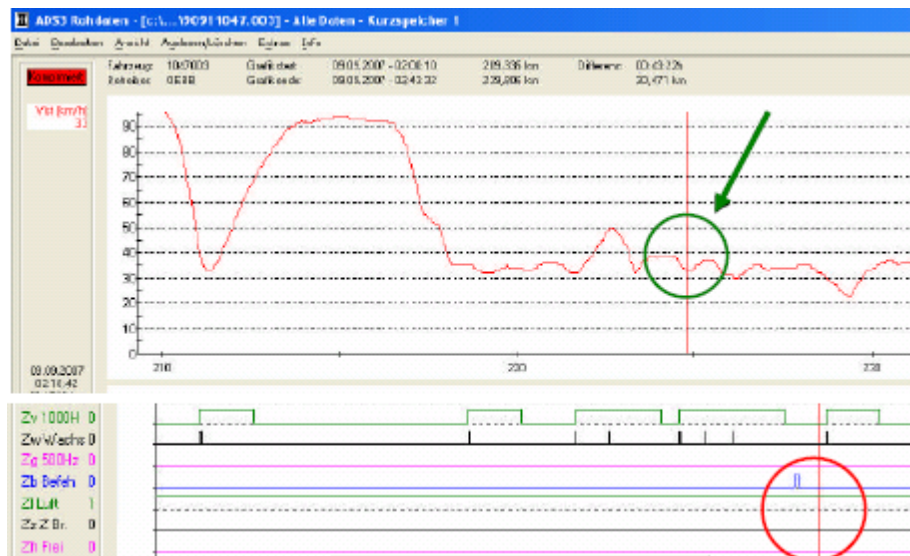
Nachw. Nr.: 00508-2		Ladeliste		Szeged - Weis		2007.09.08. 16:16:28	
Zug: 41328 2007.09.08.		Versandbahnhof: Kiskundorozsma Rola Terminal / Ankunftsbahnhof: Weis ÖBB-Güterabfertigung Terminal		Seite: 1			
Nr. Vagonnr.	Trasp.Firma Frachtzähler	Bezeichnung	Kennzeichen	Ladegew. Ges. Gew.	Va. Nr. Bem.		
0.							
1.	BILKAR	BAR	34BL1027	7448	240009105		
2.	BILKAR	TE0117	34BL3280	21478	160124462		
3.	SE-FA	BAR	34UR4932	10061	240009091		
4.	BILKAR	TE0116	34BL0235	11188	240009091		
5.	BILKAR	TE0116	34BL0235	25108	160124474		
6.	INTERCOMBI	BAR	34DC3648	23391	38575		
7.	INTERCOMBI	TE0107	34DC3648	38575	4977		
8.	BALNAK NAK	BAR	34BY6330	4977	240009088		
9.	BALNAK NAK	TE0115	34DR6552	20638	14297		
10.	ORKUN ISTANBUL	BAR	34ZEL60	14297	120020503		
11.	ORKUN ISTANBUL	TE0115	34ZJ5125	29327	20000		
12.	UGUR TRANS ULUS NAK	BAR	61K3141	20000	160124486		
13.	UGUR TRANS ULUS NAK	TE0106	34DT1472	33639	11347		
14.	ALPIN	KFK	34FPY33	11347	25365		
15.	TURKSPED	BAR	34EN1066	25365	12928		
16.	KÖÇÜK	BAR	42KN140	12928	230006297		
17.	KÖÇÜK	TE0116	42KN053	27821	10725		
18.	BARSAK GLOBAL LOGISTIK AS	BAR	34BL1027	10725	25885		
19.	BARSAK GLOBAL LOGISTIK AS	TE0107	34VH402	25885	11410		
20.	BETZ ULUS	KFK	34BU2652	11410	230006302		
21.	WILLI BETZ	BAR	34BU2679	26095			

10th waggon

- 10th waggon

The speed was approx. 33 km/h. In the area of the derailment point (entrance into Wien Donaukaibf station) no automatic brake application occurred.

## Graphic representation:



### 11.8. Statement by locomotive vehicle driver of train 41328

As train 41328 travelled from Hegyeshalom station to Klosterneuburg-Weidling, nothing unusual was noticed. In Klosterneuburg-Weidling station, the train was stopped by an exit signal showing 'STOP'. The reason for stopping was an assumed blocked brake on the train, since another train reported flying sparks. A train inspection was then carried out, and it was established that a spring support and a whole axle were missing from the 10th wagon.

### 11.9. Statement by movements inspector of Heiligenstadt station

As train 41328 travelled from Erdbergerlande station to Wien Donaukaibf, faults occurred in the safety installation (red indication of points and main line). After this was followed by a further fault (red indication of main line) between Wien Donaukaibf station and Wien Donauuferbf station, train 44349 was instructed to undergo an assessment in Wien Donauuferbf station. The rear end of the train was assessed visually, and train 41328 was directed via Nussdorf station in the direction of Klosterneuburg-Weidling. Since faults in the safety installation occurred again in the section between Nussdorf station and the Nussdorf 1 automatic block, Klosterneuburg-Weidling station was instructed to stop and inspect train 41328. After the irregularities were established, the affected sections were blocked and checked by means of a reconnaissance journey.

### 11.10. Assessment of track

The superstructure report which was made available establishes that the track is in a correct state.

## 12. Further investigations

### Inspection of spring support

Since the spring support of the 3-axle running gear of the derailed RoLa waggon was lost and breaks in spring supports of the same series have occurred in the past, in relation to the incident a break in the spring support was again assumed.

#### 12.1. Incidents with damaged spring supports in the past

##### 12.1.1. Damaged spring support in May 2004

Tear in a spring support in May 2004 on a RoLa waggon of CFR.

Action: RCA immediately declared acceptance action No 100 (forbidding acceptance of loaded RoLa waggons of CFR 81 53 498 3 **060 – 119**).



The broken spring support was inspected in an institute for damage analysis:

The result of the inspection was a faulty weld seam.

On the basis of the inspection, the faulty spring supports were replaced and acceptance action No 100 was cancelled.

##### 12.1.2. Damaged spring support in July 2005

Tear in a spring support in July 2005 on a RoLa waggon of RCA.

Action: For waggon engineering inspection of RoLa waggons, INFO No 112 of ÖBB, which refers to tears in spring supports, was issued to staff of the waggon service. As a further consequence, in the case of the RoLa waggons of RCA 83 81 4982 **000 – 200**, all 'CFR series' spring supports were replaced by the new 'ÖBB series'.



### 12.1.3. Damaged spring support on 7 September 2007

Tear in the spring support on 7 September 2007 on a CFR waggon.

Action: For waggon engineering inspections of RoLa waggons, INFO No 186 of ÖBB, which refers to tears in spring supports, was issued to staff of the waggon service.



The broken spring support was also inspected in an institute for damage analysis:

The result of the inspection was a faulty weld seam.

### 12.2. Testing the damaged spring supports in September 2007

Because of the derailment of 9 September 2007 in Wien Donaukaibf station and the torn spring support which was found on 7 September 2007, 2 spring supports of the 'ÖBB series' and 4 spring supports of the 'CFR series' were subjected to a technical test at ÖBB-Technische Services in Knittelfeld.

#### Test of 'ÖBB series' spring supports

##### Spring support NS-243



##### Spring support NS-272





## Ultrasound test



## Test log NS-243

OBB		ZFP - Prüfprotokoll		Dokument: 40/114													
Technische Services																	
Bestell-Nr.: NF - Fedelager Bonart Granbrar (NS-243) 04.04.04																	
Material: 10-3-10-000		Fertigstellungs-Nr.: 050152		Fertigstellungs-Nr.: 050152													
Anfertiger: Skizze/Bild:		Anfertiger: Skizze/Bild:															
<table border="1"> <thead> <tr> <th>Abmessungen</th> <th>Material</th> <th>Min. Abmessung</th> <th>Benennung</th> <th>Einheit</th> <th>Einheit</th> </tr> </thead> <tbody> <tr> <td>10-3-10-000</td> <td>10-3-10-000</td> <td>10-3-10-000</td> <td>10-3-10-000</td> <td>mm</td> <td>mm</td> </tr> </tbody> </table>						Abmessungen	Material	Min. Abmessung	Benennung	Einheit	Einheit	10-3-10-000	10-3-10-000	10-3-10-000	10-3-10-000	mm	mm
Abmessungen	Material	Min. Abmessung	Benennung	Einheit	Einheit												
10-3-10-000	10-3-10-000	10-3-10-000	10-3-10-000	mm	mm												
Zeichnungs-Nr.: 10-3-10-000 Zeichnungs-Nr.: 10-3-10-000 Zeichnungs-Nr.: 10-3-10-000																	

## Test log NS-272

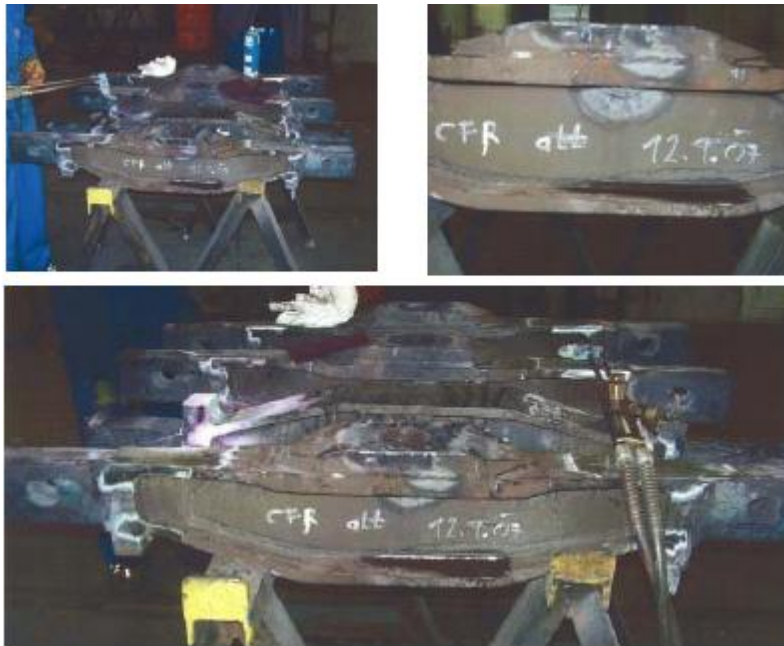
OBB		ZFP - Prüfprotokoll		Dokument: 40/114													
Technische Services																	
Bestell-Nr.: NF - Fedelager Bonart Granbrar (NS-272) 04.04.04																	
Material: 10-3-10-000		Fertigstellungs-Nr.: 050152		Fertigstellungs-Nr.: 050152													
Anfertiger: Skizze/Bild:		Anfertiger: Skizze/Bild:															
<table border="1"> <thead> <tr> <th>Abmessungen</th> <th>Material</th> <th>Min. Abmessung</th> <th>Benennung</th> <th>Einheit</th> <th>Einheit</th> </tr> </thead> <tbody> <tr> <td>10-3-10-000</td> <td>10-3-10-000</td> <td>10-3-10-000</td> <td>10-3-10-000</td> <td>mm</td> <td>mm</td> </tr> </tbody> </table>						Abmessungen	Material	Min. Abmessung	Benennung	Einheit	Einheit	10-3-10-000	10-3-10-000	10-3-10-000	10-3-10-000	mm	mm
Abmessungen	Material	Min. Abmessung	Benennung	Einheit	Einheit												
10-3-10-000	10-3-10-000	10-3-10-000	10-3-10-000	mm	mm												
Zeichnungs-Nr.: 10-3-10-000 Zeichnungs-Nr.: 10-3-10-000 Zeichnungs-Nr.: 10-3-10-000																	

## Result of test of 'ÖBB series' spring supports

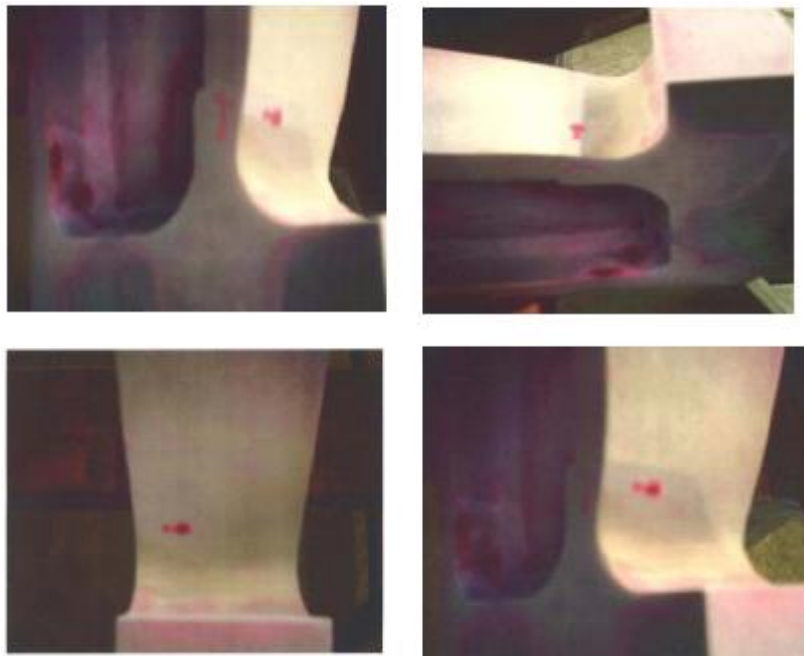
In the case of both spring supports, no faults could be established.

## Test of 'CFR series' spring supports





Magnetic particle test



Test log CFR Gst. No 112/1

<b>OB</b> Technische Services		<b>ZIP - Prüfprotokoll</b>		Version: <b>04/14</b> Nr.: <b>1000000000</b> Datum: <b>1.1.2014</b>	
<b>Bezeichnung:</b>					
<b>UF - Fehlfähige Bauteile Spezialwerkzeug (Gr. Nr. 442)</b>					
<b>Material:</b> <b>HT</b>	<b>Partikelnr.:</b> <b>HT 04-2005</b>	<b>Größe:</b> <b>505 x 150 x 10 mm</b>	<b>Geometrie (Gr. Nr.):</b> <b>HT 04-2005</b>	<b>Prüfungsmethode:</b> <b>HT 04-2005</b>	<b>Prüfungsort:</b> <b>HT 04-2005</b>
<b>Anlagen:</b> <b>Seite 1/1</b>					
<b>Anlage 1:</b>					
<b>Anlage 2:</b>					
<b>Anlage 3:</b>					
<b>Anlage 4:</b>					
<b>Anlage 5:</b>					
<b>Anlage 6:</b>					
<b>Anlage 7:</b>					
<b>Anlage 8:</b>					
<b>Anlage 9:</b>					
<b>Anlage 10:</b>					
<b>Anlage 11:</b>					
<b>Anlage 12:</b>					
<b>Anlage 13:</b>					
<b>Anlage 14:</b>					
<b>Anlage 15:</b>					
<b>Anlage 16:</b>					
<b>Anlage 17:</b>					
<b>Anlage 18:</b>					
<b>Anlage 19:</b>					
<b>Anlage 20:</b>					
<b>Anlage 21:</b>					
<b>Anlage 22:</b>					
<b>Anlage 23:</b>					
<b>Anlage 24:</b>					
<b>Anlage 25:</b>					
<b>Anlage 26:</b>					
<b>Anlage 27:</b>					
<b>Anlage 28:</b>					

Test log CFR Gst. No 112/2

[illegible]

All tests were carried out according to test instructions (attached) of ÖBB-Technische Services.

### 12.3. Test actions by RCA

In relation to the derailment of 9 September 2007, further test actions on all 10-axle RoLa waggons were ordered by RCA.

#### Result of test actions

In the tests, further damage such as missing bolts, cracks and breaks in the bogie was established, and the following actions were taken:

- 13/09/2007 - movement prohibition for CFR waggons of Series 81 53 498 3 **000 – 159**
- 26/09/2007 - on the basis of measurement journeys, a speed restriction of 80 km/h for RoLa waggons of RCA, Series 8381 498 2 **000 – 200** was imposed
- 19/11/2007 - because faults occurred again, the RoLa waggons of RCA, Series 8381 498 2 **000 – 200**, were taken out of operation.

## 13. Cause

With probability bordering on certainty, the derailment was caused by the missing / broken spring support of the 3-axle running gear of waggon No 81 53 498 3 066-2, and the resulting unbalanced load distribution.

The cause is directly related to the incidents from the years 2004, 2005 and 2007.

Tear in spring support, 2004



Tear in spring support, 2005



Spring support bearing of waggon  
No 81 53 4983 066-2



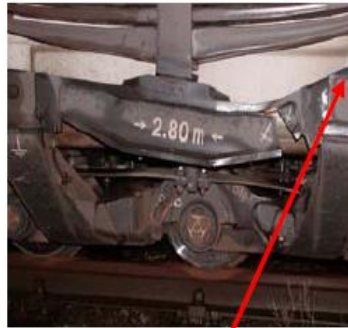
Because of the buckling of the spring supports, there are traces of abrasion in the region of the spring support bearing



Tear in spring support, 2004



Tear in spring support, 2007



Securing shackle of waggon  
No 81 53 498 3 066-2



Because of the buckling of the spring supports a lever effect occurs, thus breaking the securing shackle of the spring support bearing

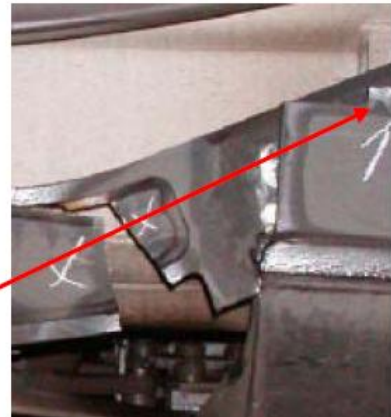
Spring support  
'WITHOUT' damage



Securing shackle of  
spring support  
bearing  
ok

Securing shackle of  
spring support bearing  
broken

Spring support 'WITH' damage



## 14. Special feature of investigation procedure

On 1 August 2008, Mr Sigfried Kranzl was replaced as investigation leader by Engineer Johannes Piringner.

## 15. Safety recommendations

According to EU Directive 49/2004, Article 25 - paragraph 2, *Recommendations shall be directed to the safety authority and, where needed by reason of the character of the recommendation, to other bodies or authorities in the Member State, or to other Member States. Member States and their safety authorities shall take the necessary measures to ensure that the safety recommendations issued by the investigating bodies are duly taken into consideration and, where appropriate, acted upon.*

The safety recommendation according to UUG Section 16 paragraph 2 and according to document BMVIT-795.077/0001- II/BAV/SCH/2007 of 13 September 2007 is cancelled, and replaced by the following safety recommendations:

15.1	Use 10-axle RoLa waggons of CFR (Nos: 81 53 498 3 000 to 159) which are equipped with spring supports of the same design (as those inspected at ÖBB-Technische Services GmbH, Knittelfeld works) only after replacement of the spring supports, as already fitted on RoLa waggons of RCA.	RU
15.2	To avoid exceeding the highest permitted loading of RoLa waggons, or generating wrong train data (e.g. extent of braking) because of incorrect weight data, all lorries must be weighed before loading (even if they are loaded outside Austria). Irregularities must be detected and action must be taken.	RU
15.3	It is necessary to ensure that when the 'ÖBB' symbol is put on rolling stock, the authorisation documents for circulation on the routes of ÖBB-Infrastruktur Betrieb AG are proved to exist.	RU
15.4	Checks on waggons which carry the 'ÖBB' symbol in the agreement grid, whether the required authorisations by the authority also exist for them.	RU
15.5	In relation to the writing on the waggon (Item 11.4), the extent to which the provisions of AVV and ÖBB-ZSB 31 regarding the 'ÖBB' entry in the agreement grid concern IM or different railway transport companies as 'undertaking railways' must be checked.	railway safety authority
15.6	It must be ensured that all necessary and required authorisation documents for waggons which are permitted on an infrastructure are published in appropriate form and can be called upon without delay. Implementation of a national rolling stock register is therefore suggested.	railway safety authority



*The safety authority and other authorities or bodies or, when appropriate, other Member States to which the recommendations have been addressed, shall report back at least annually to the investigating body on measures that have been taken or are planned as a consequence of the recommendation (EU Directive 49/2004, Article 25 - paragraph 3).*

Vienna, 8 September 2008

Investigation leader:

Engineer Johannes Piringer, [Signed on original]

**Attachments**

Photographic documentation  
Design documents of RoLa waggons  
Test instructions  
Comments

## Attachment: Photographic documentation



Entrollte 8. Achse des 10 RoLa-Wagen = Thrown 8th axle of 10th RoLa waggon

**Fahrtrichtung des Zuges = Direction of travel of train**



Entgleisungsstelle = Derailment  
point X

**Fahrtrichtung des Zuges =  
Direction of travel of train**

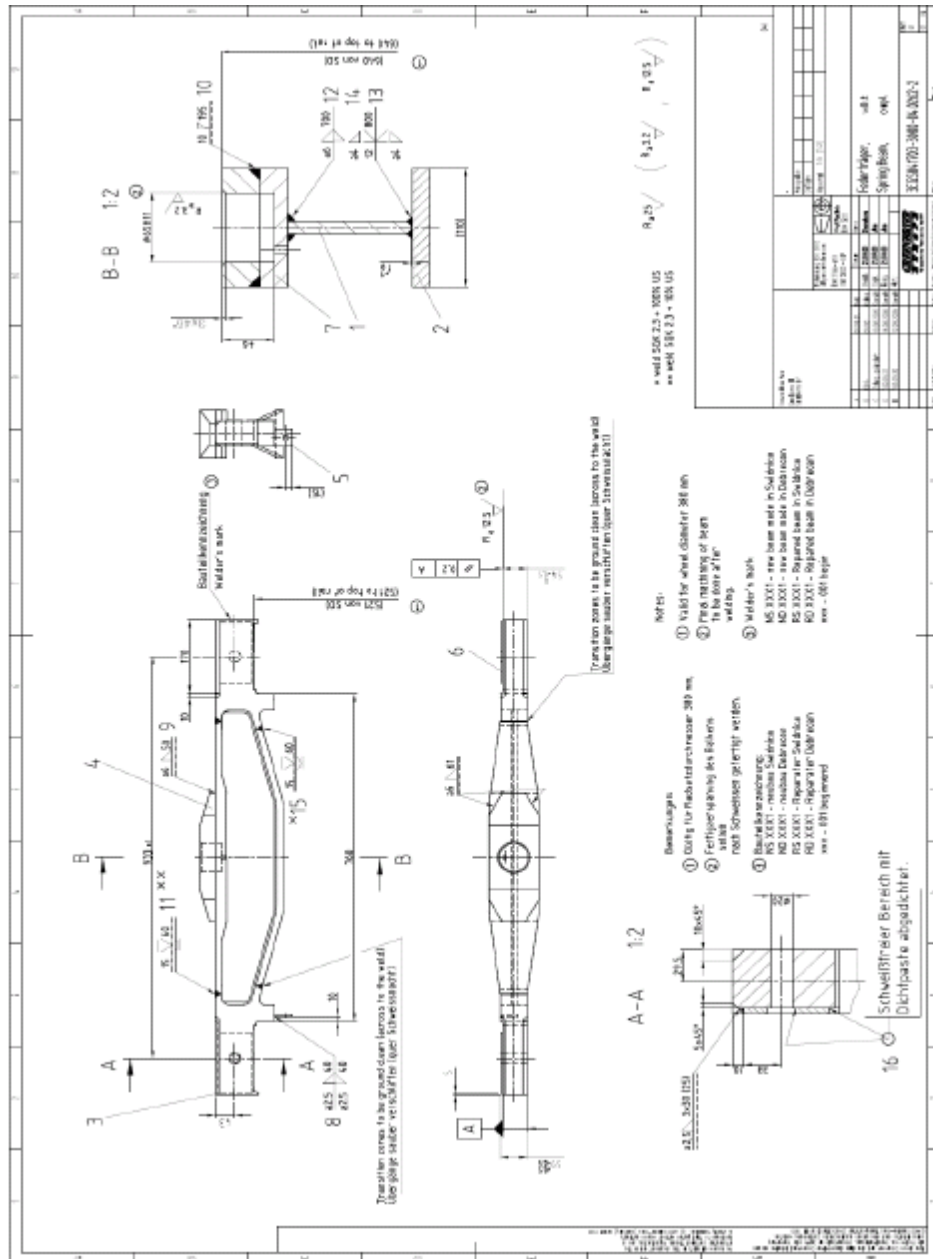


**Einschlagstelle der entrollten 8. Achse im Bereich der  
EK km 1,647 = Point of impact of the thrown 8th axle in area  
of railway crossing, km 1.647**



Abgestellter Z 41328 im Bf Klosterneuburg-Weidling = Parked train 41328 in Klosterneuburg-Weidling station

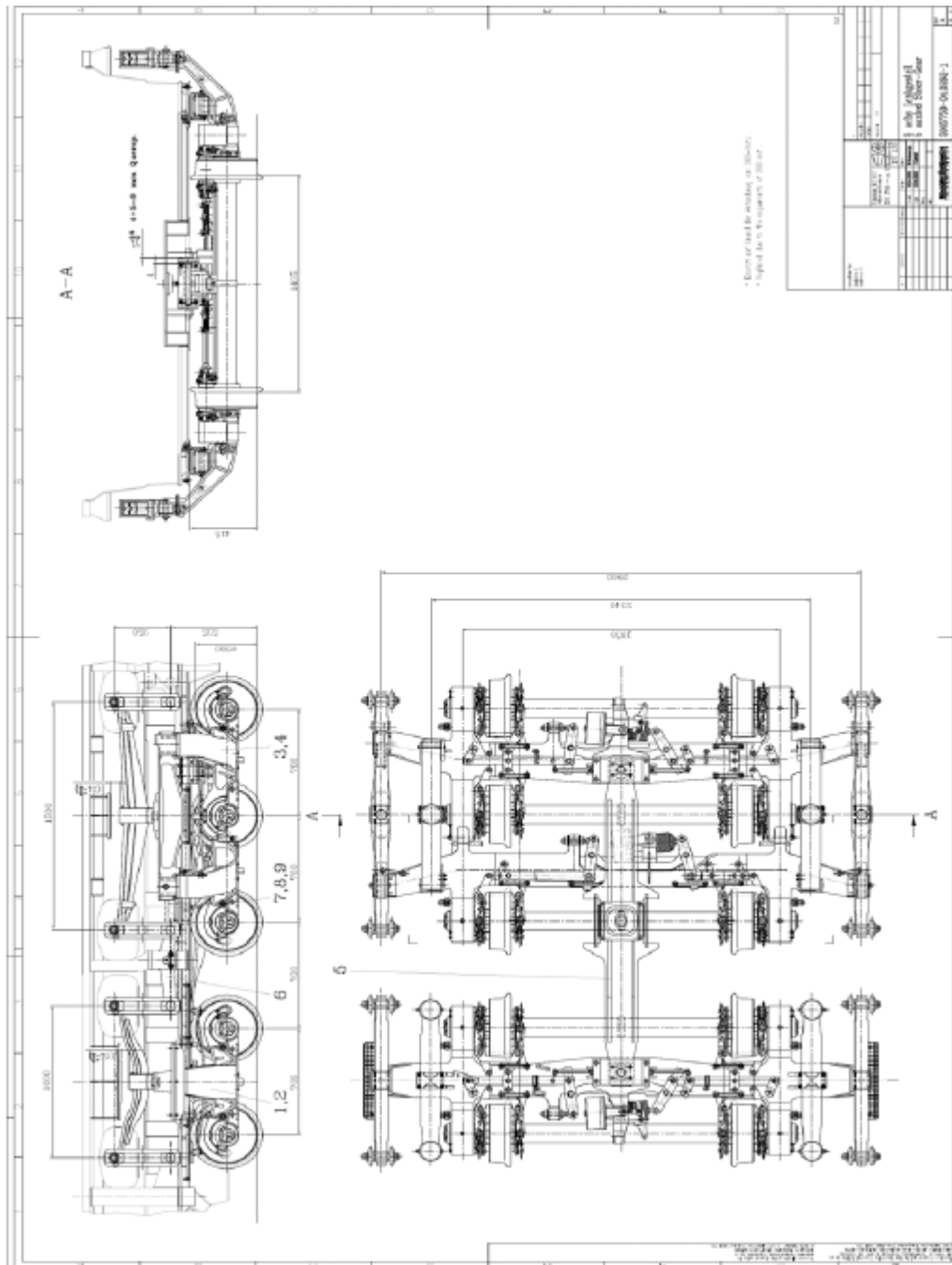
## Spring support



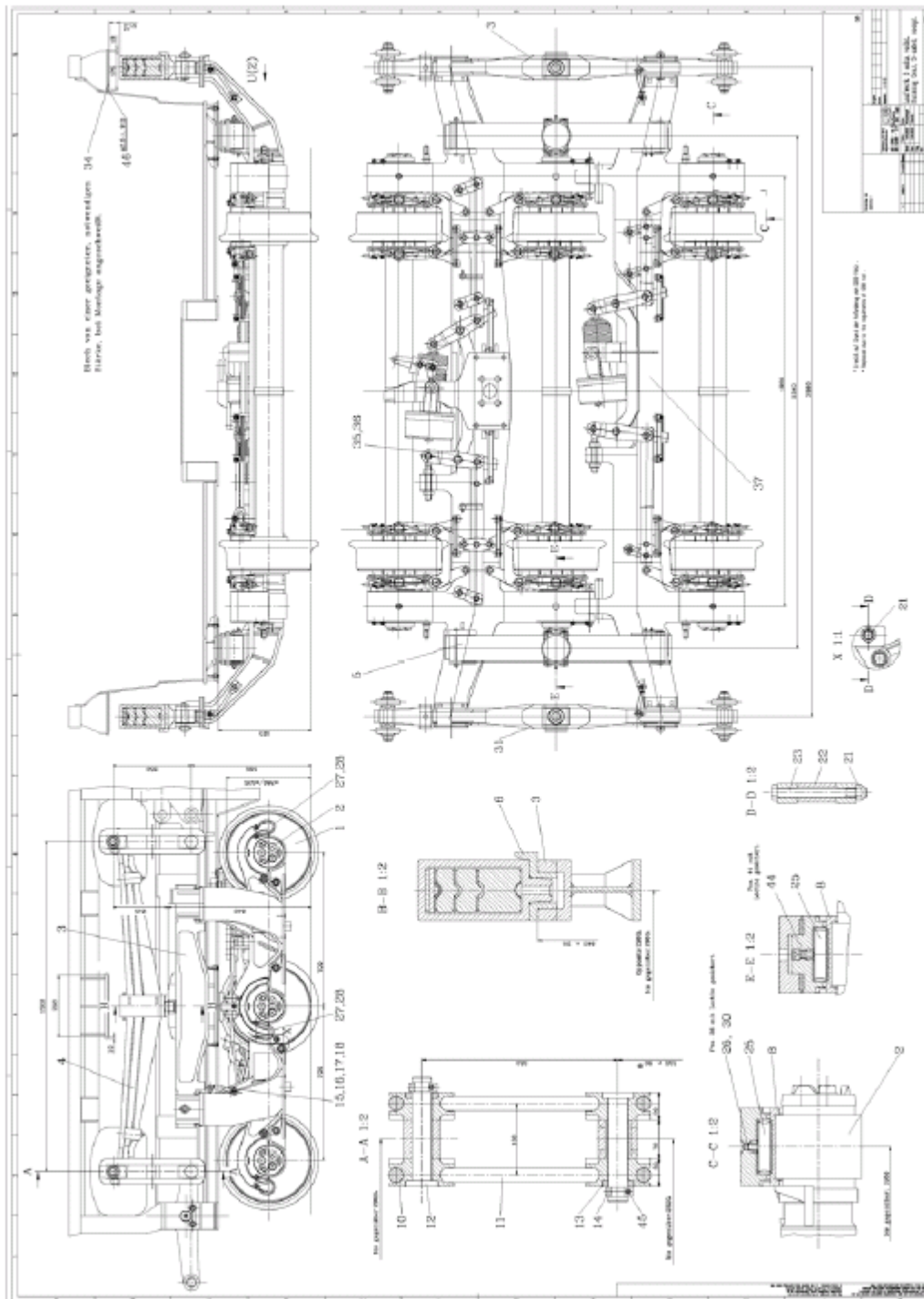
# List

Pos.	2 Menge				3 Einheit	4 Bezeichnung	5 Sachsummen-Norm-Kurzbezeichnung	6 Werkstoff	7 Gewicht kg/Stück	8 Bemerkung	
	D	C	B	A						RG	Bemerkung
			-	X	-	Federträger, vollst. w.g. Spring Beam, comp.			49,60		
			X	-	-	Federträger, vollst. s.g. Spring Beam, comp.			49,60		
1			1	1	Stk.	Steg für Federträger Web for Spring Beam	3EGS036389-0000-04.0262-3		6,20		
2			1	1	Stk.	Untergurt für Federträger Lower Flange for Spring Beam	3EGS036382-2000-04.0262-3		7,10		
3			2	2	Stk.	Kopfstück für Federträger Head stock for Spring Beam	3EGS036383-3000-04.0262-3		10,48		
4			1	1	Stk.	Druckstück für Federträger Pressure Piece for Spring Beam	3EGS036384-4000-04.0262-3		6,90		
5			1	1	Stk.	Öse Eye	3EGS036409-5000-04.0262-4		0,06		
6			2	2	2	Verschleißplatte Wear plate	8003482-04.0262-4		0,4		
7			1	1	Stk.	Obergurt, vollst. Top Flange, compl.	3EGS041721-6000-04.0262-3		8,90		
8			0,16	0,16	m	Kehlnaht 2,5 Fillet weld 2,5	DIN 6700-5 2.3	EN 440 G462MG3Si1	0,016		
9			0,22	0,22	m	Kehlnaht 6 Fillet weld 6	DIN 6700-5 2.3	EN 440 G462MG3Si1	0,60		
10			0,39	0,39	m	HV-Naht 10 Single-bevel V butt weld 10	DIN 6700-5 2.3	EN 440 G462MG3Si1	0,16		
11			0,12	0,12	m	V-Naht 15 V-butt weld 15	DIN 6700-5 2.3+10%US	EN 440 G462MG3Si1	0,09		
12			1,4	1,40	m	Kehlnaht 6 Fillet weld 6	DIN 6700-5 2.3	EN 440 G462MG3Si1			
13			0,8	0,8	m	DHV-Naht 12 Double half-bevel V butt weld 12	DIN 6700-5 2.3	EN 440 G462MG3Si1			
14			1,6	1,6	m	Kehlnaht 4 Fillet weld 4	DIN 6700-5 2.3	EN 440 G462MG3Si1			
15			0,12	0,12	m	V-Naht 15 V-butt weld 15	DIN 6700-5 2.3+100%US	EN 440 G462MG3Si1	0,09		
16			0,005	0,005	kg	Dichtpaste		Z.B. Sista B1/M 537			Fa. Henkel
						Ende der Stückliste End of list of parts					

## 5-axle pony truck



### 3-axle running gear





## Attachment: Test instructions

### Ultrasound test

 Technische Services	<b>Ultraschallprüfung (UT) von Schweißnähten</b>		<b>PRÜFANWEISUNG</b> DOK-Nr.: 10-3-10-005
	Standort/Name	Datum	Gesehen und anwendbar
Inhalt geprüft und freigegeben (Prüfer für den Inhalt verantwortlich)	TS-QSU-ZVF-Linz / Ing. Huber	06.09.2003	(Nicht zutreffendes durch HB-Isch. streichen)
Systemkonformität geprüft und freigegeben für Verteilung	TS-QSU-Wien / D.J. Kabylik	24.09.2003	

1. **Geltungsbereich**  
Gilt für die Ultraschallprüfung (UT) von neu gefertigten Schweißnähten an Schienenfahrzeugen und deren Komponenten.
2. **Prüferqualifikation**  
UT-Prüfer nach ÖN EN 473 (zertifiziert und autorisiert)
3. **Prüfungsdurchführung**
  - 3.1 **Prüfvorschrift**  
ÖN EN 1714, Prüfkategorie B, Methode 2. (die Bezugslinie ist auf den Bildschirm zu übertragen).
  - 3.2 **Annahmenvorschrift**  
DIN 6700-5
  - 3.3 **Prüfumfang**  
Lt. Schweißnahtgüteklasse DIN 6700-5 Tabelle 2, Angaben in Auftrags- und Fertigungsunterlagen (z.B. Zeichnungen, Schweißerarbeitsanweisung, ZFP-Prüfauftrag, usw.) jedoch immer plus der Breite der WEZ (zumindest 10 mm) links und rechts der Schweißnaht.
  - 3.4 **Oberflächenvorbereitung**  
Die Prüflfläche muss frei von Schweißspritzern, Rost, Zunder und sonstigen Verunreinigungen sein, die das Prüfergebn beeinträchtigen könnten, Ra. max. 12,5 µm.
  - 3.5 **Visuelle Kontrolle**  
Durchführung lt. Prüfanweisung 10-3-10-005.
  - 3.6 **Prüfgerät**  
Krautkrämer USD-10, USK-7D, USN-50, USN 52, USM 25 oder gleichwertige.
  - 3.7 **Prüfgeschwindigkeit**  
Bei kontinuierlicher Prüfkopfbewegung max. 100 mm /sek.

DOK-Nr.: 10-3-10-005	Änd.Nr.: 00	FFS-CODE: Derzeit nicht belegt.	Seite 1 von 2
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### 3.8 Prüfkopf und Justierung

	Grundwerkstoffdicke t (mm)		
	t ≤ 8	8 < t ≤ 15	15 ≤ t < 40
Prüfkopf	MWB 70-4	MWB 60-4	MWB 60-4 + MWB 45-4
Zusätzlicher Prüfkopf *	MWB 60-4	MWB 45-4	
Entfernungsjustierung		mm Sw, et Kontrollkörper K2	0 - 175 mm Sw, et Kontrollkörper K2
Empfindlichkeitsjustierung = Registrierschwelle	AVG - KSR 1	AVG - KSR 1	AVG - KSR 1,5
Beobachtungsschwelle	KSR 1 minus 4 dB	KSR 1 minus 4 dB	KSR 1,5 minus 4 dB

\* bei Anzeigen mit einer Länge l > t ist der Bewertungsabschnitt (= zumindest 6 x t) mit einem zweiten Einschallwinkel zu prüfen; die Anzeigenlänge l ist die Länge des Bereichs der Überschreitung der Beobachtungsschwelle.

## 4. Prüfergebnisse

### 4.1 Zulässigkeitsgrenzen:

	Grundwerkstoffdicke t (mm)		
	t ≤ 8	8 < t ≤ 15	15 ≤ t < 40
Anzeigenlänge l ≤ 0,5 t	KSR 1 + 6 dB	KSR 1 + 6 dB	KSR 1,5 + 10 dB
Anzeigenlänge l > 0,5 t, ≤ t	KSR 1 + 6 dB	KSR 1 + 6 dB	KSR 1,5 + 4 dB
Anzeigenlänge l > t	KSR 1	KSR 1	KSR 1,5

Die max. Gesamtlänge zulässiger Einzelanzeigen oberhalb der Registrierschwelle darf 20% der Länge des Bewertungsabschnittes (6 x t) nicht überschreiten.  
Für aneinander gereihte und gehäuft auftretende Anzeigen gilt EN 1712, Pkt. 4.5

### 4.2 Vorgangsweise bei unzulässigen Anzeigen

Stellen mit unzulässigen Anzeigen sind auszubessern und erneut zu prüfen.

## 5. Dokumentation und Archivierung

### 5.1 Protokollierung

ZiP Prüfprotokoll (Formblatt F10-10-023) oder  
Prüfereinsatzliste oder  
Checkliste Schweißaufsicht

### 5.2 Archivierung

Lt. Archivierungsmatrix

### 5.3 Durchführungsabweichungen

Abweichungen bei der Prüfdurchführung sind im Prüfprotokoll zu vermerken.


## 6. Mitgeltende Unterlagen

DIN 6700-5, ÖN EN 1712, ÖN EN 1714, ÖN EN 583-2, PA 10-3-10-005

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## Magnetic particle test

 <b>Magnetpulverprüfung von NF-Federträger Bauart Greenbrier</b>		<b>PRÜFANWEISUNG</b> MT 01 - 2005	
<b>Inhalt geprüft und freigegeben</b> (Prüfer für den Inhalt verantwortlich)		<b>Standort/Name</b> 	<b>Datum</b> 28.07.2005
<b>Systemkonformität geprüft und freigegeben für Verteilung</b>			<b>Gesehen und anwendbar</b> (nicht zutreffendes durch HBS-Inh. streichen)

1. **Zweck**  
Diese Prüfanweisung regelt die Durchführung der Schweißnaht - Oberflächenprüfung der Federträger von Niederflur-Dreilachs. Lenkgestell der Bauart Greenbrier.
2. **Personalqualifikation**  
Prüfer Stufe 1 nach EN 473
3. **Prüfungsdurchführung**
  - 3.1 **Prüfverschrift**  
DI 09-5-10-005
  - 3.2 **Prüfbereich**  
Anschlussnähte vom Kopfstück zum Ober- bzw. Untergurt (siehe Prüfplan).
  - 3.3 **Prüfumfang**  
100 % der Schweißnahtoberfläche + WEZ
  - 3.4 **Prüfzeitpunkt**  
Nach der Demontage der Anbauteile.
  - 3.5 **Oberflächenvorbereitung**  
Von den Prüfflächen ist Farbe, Rost und Schmutz zu entfernen.
  - 3.6 **Visuelle Kontrolle**  
Auf Oberflächenfehler des Prüfbereiches.
  - 3.7 **Prüfmittel**  
Nass, fluoreszierend
  - 3.8 **Prüfmittelkontrolle**  
Testkörper MTU Nr. 3, ASTM Bime
  - 3.9 **Prüfmittelkontrolle**  
UV - Intensitätsmessgerät

MT 01 - 2005	Änd.Nr.: 00	FFS-C006: derzeit nicht belegt	Seite 1 von 3
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### 3.10 Prüfsystem

#### 3.10.1 Prüfgerät

Wechselstrom Handmagnet JWM 220

#### 3.10.2 Magnetisierungsart

JEW nach DIN 54 130

### 3.11 Prüfsystemkontrolle

Testkörper Berthold

### 3.12 Magnetisierungsdauer

5 sec. bzw. bis Prüfmittel abgeronnen

### 3.13 Registriergrenzen

derzeit nicht belegt

### 3.14 Zulässigkeitsgrenzen

Längliche Anzeigen > 1,5 mm und runde Anzeigen > 2 mm sind unzulässig!

## 4. Vorgangsweise bei unzulässigen Anzeigen :

Der Niederflur-Dreiechs. Lenkgestell Federträger ist zu sperren und die weitere Vorgangsweise ist mit der Technik abzuklären.

## 5. Dokumentation und Archivierung

### 5.1 Protokollierung

MT Prüfprotokoll für Niederflur-Dreiechs. Lenkgestell Federträger

### 5.2 Archivierung

lt. Archivierungsmatrix

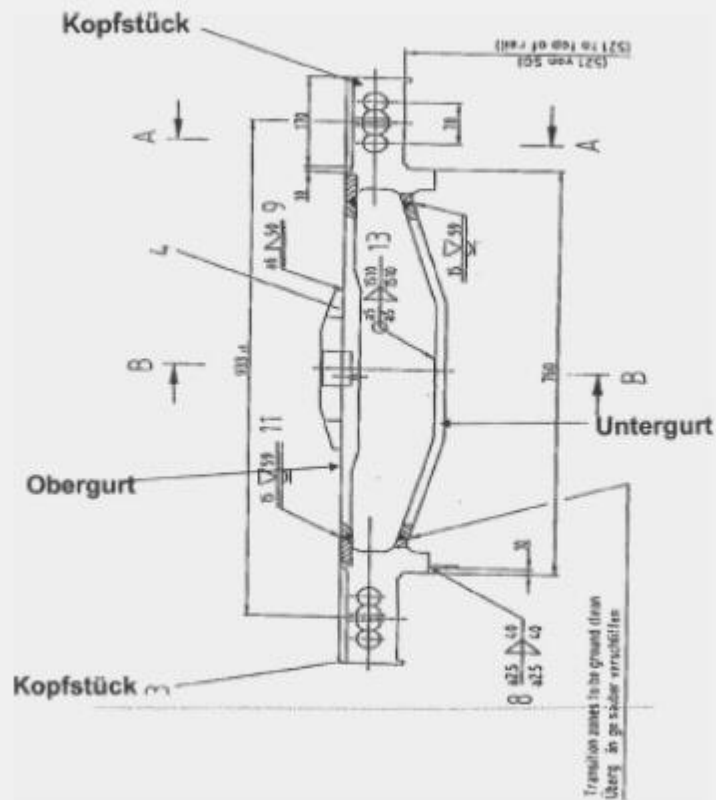
## 6. Mitgeltende Unterlagen

ÖNORM EN 473

DI 09-5-10-005

## Prüfplan

Prüfbereich: Anschlussnähte (V – Nähte) vom  
Kopfstück zu Ober- bzw. Untergurt





## Attachment: Comments

Body/person	External reference number	Date received	Item(s) taken into account
ÖBB-Infrastruktur Betrieb AG	NB 2 02-01-1.025.f- 2007	29/04/2008	Item 11.10: Insert correct state of track Item 11.4: Wording Item 15: Assignment of safety recommendations
BMVIT-VI	BMVIT-224.043/0001-IV/SCH2/2007	14/04/2008	Item 15: Assignment of safety recommendations Item 15.2: New wording Item 15.5: Replacement by an additional safety recommendation