



RDW

TEST REPORT



Concerning the braking system of certain vehicle categories in accordance with ECE Regulation R13.11.

**Test report number** : RDW-13R-0034608

0.1. **Make** : Berger

0.2. **Type** : SAPL 24 LTN

0.4. **Category of vehicle** : O4

0.5. **Name and address of the manufacturer** : SAF-HOLLAND GmbH  
Hauptstraße 26  
63856 Bessenbach  
Germany

**General** : The braking system complies with the requirements laid down in:  
- paragraph 5 of above-mentioned Regulation.  
See documentation: GEJK15012/GEJK15021/GEJK15022/TDB-0870

**Tests** : The tests have been conducted according to:  
Annex 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 and 21 of the  
above mentioned Regulation

**Conclusion** : The type O test results of the tested brake , see report TDB-0870 can be  
found further in this testreport.

**Tests conducted on** : 21/22 July 2015

**By** : W.Hartman

Radfeld, 23 July 2015  
The test engineer,

  
  
W.R. Hartman

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**List of attached diagrams**

Subject	Diagram number

**Reason for testing**

New brake type. SAF 3 Axle semi trailer

**Used test equipment**

Item	Identification number (make and type)	Calibration papers available
Scale	See quality system Berger	yes/not checked
Pressure meter	MAN 85	yes/not checked
Speed meas equipment	Vijf 70/GPS 04	yes/not checked
Deceleration meter	Vijf 70/GPS 04	yes/not checked
Temperature meter	TEM 43	yes/not checked
Tyre-pressure meter	MAN 43	yes/not checked
Force meas equipment	KRA 21	yes/not checked
Reaction-time equipment	-	yes/not checked
Brake test bench	-	yes/not checked
Recorder	RCH 12	yes/not checked
Amplifier	MVS 33	yes/not checked
Filter	-	yes/not checked
		yes/not checked

**Remarks**

N/A



Test report number: RDW-13R-0034608

**General information**

Make and type of the vehicle	Berger SAPL 24 LTN
Vehicle category	O4
Vehicle Identification Number	VA9USLAKTFFZT0484
Test conducted by	W.Hartman
Place	Radfeld, Austria
Date	21/22 July 2015

**Environmental information**

Date	21/22 July 2015
Road surface	Asphalt
Weather condition	Dry
Temperature	35 °C
Wind direction	South/West
Wind speed	1 m/s
Ambient pressure	1020 mbar
Relative humidity	58 %

**Static measurements:**

Maximum allowed weights (mass):			Weights laden/unladen <sup>(1)</sup> including - persons.		
King pin	17.000	kg	King pin		kg
Axle 1	9.000	kg	Axle 1		kg
Axle 2	9.000	kg	Axle 2		kg
Axle 3	9.000	kg	Axle 3		kg
Total	44.000	kg	Total	See below	kg
Tyre size(s)	385/65R22,5				
Tyre pressure	9.0	10 <sup>2</sup> kPa	Load Index	160 J	
Brake schedule	See doc.				
Brake cylinders			Brake levers		
Axle number 1	20	inch	Axle number 1	76	mm
Axle number 2	20/24	inch	Axle number 2	76	mm
Axle number 3	20/24	inch	Axle number 3	76	mm
<b>Tests:</b>					
Pressure after air supply line fracture (2.2.3.1. Annex II)	≥7,5	10 <sup>2</sup> kPa	Brake performance	Agreed/not-agreed	
Pressure after air supply line fracture and a deflation speed of at least 1 bar/s (2.2.1.18.4.2. Annex I)	≥2,0	10 <sup>2</sup> kPa	Brake performance	Agreed/not-agreed	



3 axle vehicle

Parking brake (2.2.2.1. Annex II)				Reaction time (2.3. Annex II and 3. Annex III)							
Brake force forward	9.200	daN		Make test equipment	Wabco						
Brake force rearward	8.900	daN		Feed line pressure	6,5	10 <sup>2</sup> kPa					
Control force	-	daN		t <sub>ss</sub>	-	s					
Lever length	76	mm		t <sub>ap</sub> + t <sub>sa</sub> axle 1	-	s					
Remarks: test done on 2 axle's				t <sub>ap</sub> + t <sub>sa</sub> axle 2	-	s					
				t <sub>ap</sub> + t <sub>sa</sub> axle 1 (Pneumatic)	-	s					
				t <sub>ap</sub> + t <sub>sa</sub> axle 1 (CAN)	-	s					
Mass of the combination	42.640	kg		Capacity of the air reservoirs							
Unladen weight under axles	3.680	kg		Volume air reservoirs	100	dm <sup>3</sup>					
Maximum weight under axles	9.000	kg		Maximum pressure P <sub>0</sub>	-	10 <sup>2</sup> kPa					
Rolling resistance combination	0,1			Rolling resistance trailer	0,1						
Calculation factor for deceleration (see 1.3. Annex IV)											
Laden	1,57			Pressure in reservoir after 1x braking P <sub>1</sub>	-	10 <sup>2</sup> kPa					
Unladen	3,55			Pressure in reservoir after 9x braking P <sub>9</sub>	-	10 <sup>2</sup> kPa					
<b>Additional tests according Directive 75/524/EEC (Appendix to Annex II check diagram 2 and 4B)</b>											
Command line pressure (10 <sup>2</sup> kPa)		Brake cylinder pressure (10 <sup>2</sup> kPa)		Deceleration combination (m/s <sup>2</sup> )		Diagram number		Deceleration calculated for trailer (m/s <sup>2</sup> )		Remarks	
up	down	up	Down	up	down			up	Down	Up	Down
2,0	2,0	1,6	1,6	0,87	0,84	-	-	1,308	1,26	laden	laden
4,0	4,1	3,6	3,8	1,44	2,03	-	-	2,20	3,13	laden	laden
6,0	6,0	5,8	5,8	2,11*	2,84	-	-	3,20	4,40	laden	laden
6,5	6,5	6,5	6,5	3,09	3,27	-	-	4,79	5,07	laden	laden
-	-	1,1	1,1	1,53	1,54	-	-	5,17	5,21	unlad.	Unlad.
LSD failure (6. Appendix to Annex II)				Agreed/not agreed/N.A. (1)							
<b>Remarks: * hot brake</b>											
<b>Weights of combination under test conditions</b>											
Un Laden				Laden				Tractor unit solo			
Axle 1	5.820	kg		Axle 1	6.320	kg		Axle 1	-	kg	
Axle 2	3.580	kg		Axle 2	7.380	kg		Axle 2	-	kg	
Axle 3	1.100	kg		Axle 3	9.480	kg					
Axle 4	1.220	kg		Axle 4	9.540	kg					
Axle 5	1.360	kg		Axle 5	9.920	kg					
Total	13.080	kg		Total	42.640	kg		Total	8.370	kg	



2 axle vehicle

Parking brake (2.2.2.1. Annex II)				Reaction time (2.3. Annex II and 3. Annex III)							
Brake force forward	-	daN		Make test equipment	Wabco						
Brake force rearward	-	daN		Feed line pressure	6,5	10 <sup>2</sup> kPa					
Control force	-	daN		t <sub>ss</sub>	-	s					
Lever length	-	mm		t <sub>ap</sub> + t <sub>sa</sub> axle 1	-	s					
Remarks:				t <sub>ap</sub> + t <sub>sa</sub> axle 2	-	s					
				t <sub>ap</sub> + t <sub>sa</sub> axle 3(Pneumatic)	-	s					
				t <sub>ap</sub> + t <sub>sa</sub> axle 3(CAN)	-	s					
Mass of the combination	35060	kg		Capacity of the air reservoirs							
Unladen weight under axles	3.520	kg		Volume air reservoirs		dm <sup>3</sup>					
Maximum weight under axles	9.000	kg		Maximum pressure P <sub>0</sub>	8,5	10 <sup>2</sup> kPa					
Rolling resistance combination	0,1			Rolling resistance trailer	0,1						
Calculation factor for deceleration (acc. 1.3. Annex IV)											
Laden	1,94			Pressure in reservoir after 1x braking P <sub>1</sub>	-	10 <sup>2</sup> kPa					
Unladen	3,73			Pressure in reservoir after 9x braking P <sub>9</sub>	-	10 <sup>2</sup> kPa					
<b>Additional tests according Directive 75/524/EEC (Appendix to Annex II check diagram 2 and 4B)</b>											
Command line pressure (10 <sup>2</sup> kPa)		Brake cylinder pressure (10 <sup>2</sup> kPa)		Deceleration combination (m/s <sup>2</sup> )		Diagram number		Deceleration calculated for trailer (m/s <sup>2</sup> )		Remarks	
up	down	up	Down	up	down			up	Down	Up	Down
2,0	2,0	1,3	1,5	0,78	0,59	-	-	1,41	1,05	laden	laden
4,0	4,0	3,6	3,3	1,38	1,47	-	-	2,58	2,75	laden	laden
6,0	6,5	6,1	6,6	2,37	2,44	-	-	4,50	4,63	laden	laden
4,8	4,8	2,5	2,6	1,83	1,87	-	-	6,55	6,70	unlad.	unlad.
LSD failure (6. Appendix to Annex II)				Agreed/not agreed/N.A. <sup>(1)</sup>							
<b>Remarks:</b>											
<b>Weights of combination under test conditions</b>											
Un Laden				Laden				Tractor unit solo			
Axle 1	5.880	kg		Axle 1	6.880	kg		Axle 1	-	kg	
Axle 2	3.760	kg		Axle 2	10.380	kg		Axle 2	-	kg	
Axle 3	Lifted	kg		Axle 3	Lifted	kg					
Axle 4	1.740	kg		Axle 4	8.760	kg					
Axle 5	1.780	kg		Axle 5	9.040	kg					
Total	13.160	kg		Total	35.060	kg		Total	8.370	kg	



1 axle vehicle

Parking brake (2.2.2.1. Annex II)				Reaction time (2.3. Annex II and 3. Annex III)							
Brake force forward	-	daN	Make test equipment	Wabco							
Brake force rearward	-	daN	Feed line pressure	6,5	10 <sup>2</sup> kPa						
Control force	-	daN	t <sub>ss</sub>	-	s						
Lever length	-	mm	t <sub>ap</sub> + t <sub>sa</sub> axle 1	-	s						
Remarks:			t <sub>ap</sub> + t <sub>sa</sub> axle 2	-	s						
			t <sub>ap</sub> + t <sub>sa</sub> axle 3(Pneumatic)	-	s						
			t <sub>ap</sub> + t <sub>sa</sub> axle 3(CAN)	-	s						
			Mass of the combination			17.840	kg	Capacity of the air reservoirs			
Unladen weight under axles			3.680	kg	Volume air reservoirs		dm <sup>3</sup>				
Maximum weight under axles			9.000	kg	Maximum pressure P <sub>0</sub>		8,5 10 <sup>2</sup> kPa				
Rolling resistance combination			0,1		Rolling resistance trailer		0,1				
Calculation factor for deceleration (acc. 1.3. Annex IV)											
Laden			1,982	Pressure in reservoir after 1x braking P <sub>1</sub>		-	10 <sup>2</sup> kPa				
Unladen			3,63	Pressure in reservoir after 9x braking P <sub>9</sub>		-	10 <sup>2</sup> kPa				
<b>Additional tests according Directive 75/524/EEC (Appendix to Annex II check diagram 2 and 4B)</b>											
Command line pressure (10 <sup>2</sup> kPa)		Brake cylinder pressure (10 <sup>2</sup> kPa)		Deceleration combination (m/s <sup>2</sup> )		Diagram number		Deceleration calculated for trailer (m/s <sup>2</sup> )		Remarks	
up	down	up	Down	up	down			up	Down	Up	Down
2,0	2,0	1,8	1,8	0,88	0,81	-	-	1,64	1,50	laden	laden
4,0	4,0	4,2	4,2	1,98	2,09	-	-	3,82	4,04	laden	laden
6,0	5,7	6,5	6,3	3,24	2,93	-	-	6,33	5,70	laden	laden
-	-	2,8	2,9	1,55	1,71	-	-	5,36	5,94	unlad.	unlad.
LSD failure (6. Appendix to Annex II)				Agreed/not agreed/N.A. (1)							
<b>Remarks:</b>											
<b>Weights of combination under test conditions</b>											
Un Laden				Laden				Tractor unit solo			
Axle 1	5.860	kg	Axle 1	5.920	kg	Axle 1	-	kg			
Axle 2	3.840	kg	Axle 2	4.040	kg	Axle 2	-	kg			
Axle 3	Lifted	kg	Axle 3	Lifted	kg						
Axle 4	3.680	kg	Axle 4	7.880	kg						
Axle 5	Lifted	kg	Axle 5	Lifted	kg						
Total	13.380	kg	Total	17.840	kg	Total	8.370	kg			



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**Distribution of braking force among the axles of the vehicle and requirements for compatibility between towing vehicles.**

The vehicle fulfils the requirements of paragraph 1.3.2 of Annex 4 in conjunction with Annex 10 Yes/ No

Validation of development of braking force according to Annex 10 paragraph 1.3

	Unladen		Laden	
	Left 10 <sup>2</sup> kPa	Right 10 <sup>2</sup> kPa	Left 10 <sup>2</sup> kPa	Right 10 <sup>2</sup> kPa
Axle nr 1	0,8	0,8	0,8	0,8
Axle nr 2	0,8	0,8	0,8	0,8
Axle nr 3	0,8	0,8	0,8	0,8

**5.1.4. Provisions for the periodic technical inspection of braking systems**

5.1.4.5. Data for braking systems

The data of the compressed-air braking system for the functional and efficiency test must be specified at the vehicle in a visible position in indelible form, or made freely available in another way (e.g. handbook, electronic data recorder) Sticker on the vehicle/Internet/Handbook

5.1.4.6. Reference braking forces

The reference of the brake force will be given on the trailer and/or into the manuel instruction of the trailer or on the internet Sticker on the vehicle/Internet/Handbook

**5.2.2. VEHICLES OF CATEGORY O**

The vehicle fulfils the requirements of paragraph 5.2.2.8.2. of the Regulation. Through inspection holes at the vehicle

Definition of the method by which wear may be assessed and definition of the maximum acceptable wear limit in accordance to 5.2.2.8.2.2. of the Regulation. See Inspection instruction: SAF (Will be made freely available)

**Mandatory provisions for vehicles equipped with a vehicle stability function**

The vehicle fulfils the requirements of paragraph 5.2.2.23. of the Regulation. pass/fail/N/A

Does the position of the EBS module comply with the mounting instructions of the manufacturer? pass/fail/N/A

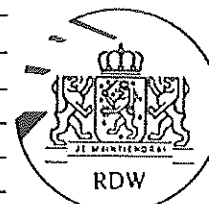
Verification of components and installation pass/fail/N/A

Is the RSS function in the parameter EOL fields switched on? (only for trailers till 3 axles) pass/fail/N/A



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<b>Brake schedule:</b>		Full trailer/Semi trailer <sup>(1)</sup>								
Brake schedule number		See doc.			VIN		VA9USLAKFFZT0484			
Make and type		Berger sapl 24			Wheelbase (E <sub>r</sub> )		7.700		mm	
<b>Axles:</b>										
Make and type		SAF SBS1937			Code		TDB 0870			
<b>Brakes:</b>										
Make and type		SAF SBS1918			Lining make and type		SAF 607			
<b>Bogie:</b>										
Make and type		SAF Intradisc			Security cable		Agreed/not agreed/N.A. <sup>(1)</sup>			
<b>Tyres:</b>										
Tyre size		385/65R22,5								
<b>Brake specification:</b>										
Axle number	1	2	3	4	5	6	7	8	9	
Brake cylinder(s)	20	20/24	20/24	-	-	-	-	-	-	
Brake lever length (mm)	76	76	76	-	-	-	-	-	-	
<b>Suspension:</b>										
Type		Mechanical/pneumatic <sup>(1)</sup>								
Make		SAF Intradisc								
Dimensions		Ø360								
<b>Parking brake:</b>										
Make		SAF								
Type		20/24TLD65								
On axle number		2+3								
Brake lever length		76 mm								
Support legs		Not used during the test!								
<b>LSD settings:</b>										
LSD plate		Agreed/not agreed <sup>(1)</sup>			Test connections		Agreed/not agreed <sup>(1)</sup>			
P <sub>m</sub>	6,5	bar	Suspension travel/suspension pressure		P <sub>out</sub> LSD		Mass (kg)		LSD lever length	
Position	Front	Rear	Front	Rear	Front	Rear	Total	Front	-	mm
Unladen		0,4		1,2	-	1.200		Rear	-	mm
Laden		5,4		6,0	-	9.000				
<b>Reaction time test:</b>										
Axle number	T1 (s)	T2 (s)	T1 (s)	T2 (s)	T1 (s)	T2 (s)	T1 (s)	T2 (s)		
1 (pneumatic)	-	-	-	-	-	-	-	-	-	
1 (can only)	-	-	-	-	-	-	-	-	-	
<b>Air reservoir capacity test:</b>										
P <sub>0</sub> ≥ 0,5 P <sub>1</sub>		Agreed/not agreed			Volume		-			dm <sup>3</sup>
P <sub>0</sub> (10 <sup>2</sup> kPa)	P <sub>1</sub> (10 <sup>2</sup> kPa)	P <sub>2</sub> (10 <sup>2</sup> kPa)	P <sub>3</sub> (10 <sup>2</sup> kPa)	P <sub>4</sub> (10 <sup>2</sup> kPa)	P <sub>5</sub> (10 <sup>2</sup> kPa)	P <sub>6</sub> (10 <sup>2</sup> kPa)	P <sub>7</sub> (10 <sup>2</sup> kPa)	P <sub>8</sub> (10 <sup>2</sup> kPa)	P <sub>9</sub> (10 <sup>2</sup> kPa)	
-	-	-	-	-	-	-	-	-	-	
Additional tests according to R13 11 paragraph 5.2.2.16 and 5.2.2.16.1										
At which pressure does the red and yellow warning light, light up								-		10 <sup>2</sup> kPa
P <sub>0</sub> (10 <sup>2</sup> kPa)	P <sub>1</sub> (10 <sup>2</sup> kPa)	P <sub>2</sub> (10 <sup>2</sup> kPa)	P <sub>3</sub> (10 <sup>2</sup> kPa)	P <sub>4</sub> (10 <sup>2</sup> kPa)	Deceleration ≥ 2,25 m/s <sup>2</sup>		Yes/No			
-	-	-	-	-						
P <sub>0</sub> (10 <sup>2</sup> kPa)	P <sub>1</sub> (10 <sup>2</sup> kPa)	P <sub>2</sub> (10 <sup>2</sup> kPa)	P <sub>3</sub> (10 <sup>2</sup> kPa)							
-	-	-	-							
Parking brake releases after 3 applications				Yes/no <sup>(1)</sup>						
Parking brake operating pressure				-		10 <sup>2</sup> kPa				
Remarks: N/A										





<b>ABS test of full trailer:</b>				
- $V_{initial} = 50 \text{ km/h}$				
- ABS inoperative				
- Condition of the vehicle: unladen				
Annex X section 6.2. (Appendix 2 ad 2.2.)				
<b>Determination of the coefficient of adhesion with the front axle(s) braked (<math>k_f</math>)</b>				
$k_H = \pm 0,8$				
Braking test	$V_{initial}$ (km/h)	$t_{40-20}$ (sec.)	$P_{cylinder}$ ( $(10^2 \text{ kPa})$ )	Diagr. Number
number 1				
number 2				
number 3				
number 4				
$t_{min} =$				
$t_m \text{ or } t_{min} = ^{(1)}$				
$z_{Cmax} = 0,566/t_m \text{ or } t_{min} ^{(2)}$				
$F_{bRmaxi} = z_{Cmaxi} \times (F_M + F_R) - 0,010 \times F_{cnd} - 0,015 \times F_{cd}$				
$F_{idyn} = F_1 + \frac{z_{Cmaxi} \times (F_M \times h_D + g \times P \times h_R) - F_{wM} \times h_D}{E}$				
$k_f = \frac{F_{bRmaxi}}{F_{idyn}}$				
<b>Determination of the coefficient of adhesion with the rear axle(s) braked (<math>k_r</math>)</b>				
$k_H = \pm 0,8$				
Braking test	$V_{initial}$ (km/h)	$t_{40-20}$ (sec.)	$P_{cylinder}$ ( $(10^2 \text{ kPa})$ )	Diagr. Number
number 1				
number 2				
number 3				
number 4				
$t_{min} =$				
$t_m \text{ or } t_{min} = ^{(1)}$				
$z_{Cmax} = 0,566/t_m \text{ or } t_{min} ^{(2)}$				
$F_{bRmaxi} = z_{Cmaxi} \times (F_M + F_R) - 0,010 \times F_{cnd} - 0,015 \times F_{cd}$				
$F_{idyn} = F_1 - \frac{z_{Cmaxi} \times (F_M \times h_D + g \times P \times h_R) - F_{wM} \times h_D}{E}$				
$k_r = \frac{F_{bRmaxi}}{F_{idyn}}$				



<b>ABS test of semi-trailer or centre-axle trailer:</b>				
- $V_{initial} = 50$ km/h				
- ABS inoperative				
- Condition of the vehicle: unladen				
- Wheels fitted to only one axle, the wheels on the other axle(s) are removed.				
Annex X section 6.2. (Appendix 2 ad 2.3.)				
<b>Determination of the coefficient of adhesion (k)</b>				
$k_H = \pm 0,8$				
Braking test	$V_{initial}$ (km/h)	$t_{40-20}$ (sec.)	$P_{cylinder}$ ( $10^2$ kPa)	Diagr. Number
number 1				
number 2				
number 3				
number 4				
$t_{min} =$				
$t_m$ or $t_{min} =^{(1)}$				
$z_{Cmax} = 0,566/t_m$ or $t_{min}^{(2)}$				
$F_{bRmax} = z_{Cmax} \times (F_M + F_R) - 0,010 \times F_{cnd} - 0,015 \times F_{cd}$				
$F_{Rdyn} = F_R - \frac{F_{bRmax} \times h_K + z_C \times g \times P \times (h_R - h_K)}{E_R}$				
$k = \frac{F_{bRmax}}{F_{Rdyn}}$				



ABS test, determination of the maximum braking rate ( $z_{RAL}$ ) and calculation of $k_R$ and $\epsilon$ .								
- $V_{initial} = 50$ km/h								
- ABS in operation								
- Condition of the vehicle: unladen								
- For a semi-trailer all wheels are fitted.								
Annex X section 6.2. (Appendix 2 ad 2.2. and 2.3.)								
Full trailer								
Braking test	$k_L = \leq 0,3^{(1)}$				$k_H = \pm 0,8$			
	$V_{initial}$ (km/h)	$t_{40-20}$ (sec.)	$P_{cylinder}$ ( $10^2$ kPa)	Diagr. number	$V_{initial}$ (km/h)	$t_{40-20}$ (sec.)	$P_{cylinder}$ ( $10^2$ kPa)	Diagr. number
number 1								
number 2								
number 3								
number 4								
$t_{min} =$								
$t_m$ or $t_{min} =^{(2)}$								
$z_{CAL} = 0,566/t_m$ or $t_{min}^{(3)}$								
$k_R = \frac{k_f \times F_{fdyn} + k_r \times F_{rdyn}}{P \times g}$								
$z_{RAL} = \frac{z_{CAL} \times (F_M + F_R) - 0,010 \times F_{cnd} - 0,015 \times F_{cd}}{F_R}$								
$\epsilon = \frac{z_{RAL}}{k_R}$ (rounded to 2 decimals)								
Semi-trailer or centre-axle trailer								
Braking test	$k_L = \leq 0,3^{(1)}$				$k_H = \pm 0,8$			
	$V_{initial}$ (km/h)	$t_{40-20}$ (sec.)	$P_{cylinder}$ ( $10^2$ kPa)	Diagr. number	$V_{initial}$ (km/h)	$t_{40-20}$ (sec.)	$P_{cylinder}$ ( $10^2$ kPa)	Diagr. number
number 1								
number 2								
number 3								
number 4								
$t_{min} =$								
$t_m$ or $t_{min} =^{(2)}$								
$z_{CAL} = 0,566/t_m$ or $t_{min}^{(3)}$								
$F_{bRAL} = z_{CAL} \times (F_M + F_R) - 0,010 \times F_{cnd} - 0,015 \times F_{cd}$								
$F_{Rdyn} = F_R - \frac{F_{bRAL} \times h_K + z_{CAL} \times g \times P \times (h_R - h_K)}{E_R}$								
$z_{RAL} = \frac{F_{bRAL}}{F_{Rdyn}}$								
$\epsilon = \frac{z_{RAL}}{k}$ (rounded to 2 decimals)								



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<b>ABS test, energy consumption <math>k &gt; 0,5</math>.</b>									
- $V =$ minimum 30 km/h									
- capacity of reservoirs: -      dm <sup>3</sup>									
- ABS in operation									
- Condition of the vehicle: unladen with LSD set to the laden position.									
- Initial energy level in the energy storage device shall be 8,0 10 <sup>2</sup> kPa.									
<b>Annex X section 6.1.</b>									
$V_{max} =$ km/h									
- $t =$ 15 seconds									
- Maximum pressure stated by manufacturer :      10 <sup>2</sup> kPa									
- Pressure of the reservoir before braking :      10 <sup>2</sup> kPa									
Speed (km/h)			Braking time (s)				Diagram number		
- Pressure in the reservoir after 15 seconds =      10 <sup>2</sup> kPa									
- Pressure in the reservoir after 4 times fully actuating the brakes (at standing position):									
		Front axle (10 <sup>2</sup> kPa)			Rear axle (10 <sup>2</sup> kPa)			Air reservoir (10 <sup>2</sup> kPa)	
number 1									
number 2									
number 3									
number 4									
number 5									
- Pressure necessary for secondary braking: 2,97 $P_{cil}$ 10 <sup>2</sup> kPa									
<b>Static energy consumption test according to Annex XIV section 6.2</b>									
$P_{1(10^2 \text{ kPa})}$	$P_{2(10^2 \text{ kPa})}$	$P_{3(10^2 \text{ kPa})}$	$P_{4(10^2 \text{ kPa})}$	$P_{5(10^2 \text{ kPa})}$	$P_{6(10^2 \text{ kPa})}$	$P_{7(10^2 \text{ kPa})}$	$P_{8(10^2 \text{ kPa})}$	$P_{9(10^2 \text{ kPa})}$	$P_{10(10^2 \text{ kPa})}$
-	-	-	-	-	-	-	-	-	-
$P_{11(10^2 \text{ kPa})}$	$P_{12(10^2 \text{ kPa})}$	$P_{13(10^2 \text{ kPa})}$	$P_{14(10^2 \text{ kPa})}$	$P_{15(10^2 \text{ kPa})}$	$P_{16(10^2 \text{ kPa})}$				
-	-	-	-	-	3,0				
Remarks : Knorr TEBS EB154.6E $N_e = 13$									



<b>ABS test, road behaviour tests (additional checks paragraph 6.3.)</b>		
- Maximum braking		
- ABS in operation		
- Condition of the vehicle: unladen		
Road behaviour on $k_H$ (ad 6.3.1.)		
Speed	Results	Diagram no
40 km/h		
80 km/h		

- $V = 50$ km/h		
- Maximum braking		
- ABS in operation		
- LSD is set to cycling pressure.		
- Category ABS: A		
Split $\mu$ ( $k_I/k_{II}$ ) <sup>(2)</sup> (ad 6.3.2. and 6.3.3.)		
Speed km/h	Results Locking behaviour	Diagram no

<b>Determination of the braking rate <math>z_{RALS}</math> (additional checks paragraph 6.3.2. and Appendix 3)</b>			
- $V = 50$ km/h			
- Maximum braking			
- ABS in operation			
- Category ABS: A			
- Condition of the vehicle: unladen			
Braking test split $\mu$	$V_{initial}$ (km/h)	Results $t_{40-20}$ (s)	Diagram number
number 1			
number 2			
number 3			
$z_{RALS} = 0,566/t$			
$\frac{0,75}{\epsilon_H} \times \frac{4 \times z_{RALL} + z_{RALH}}{5}$ <sup>(3)</sup>			
$z_{RALS} \geq \frac{0,75}{\epsilon_H} \times \frac{4 \times z_{RALL} + z_{RALH}}{5}$ and $z_{RALS} > \frac{z_{RALL}}{\epsilon_{II}}$		OK/not OK	



4. General requirements.
- 4.1. Is any electrical failure (supply, wiring) or sensor anomaly signalled to the driver by a specific optical warning signal? : Yes/no
- 4.1.1. Does the warning signal light up when the ABS-system is energised? : Yes/no
- Does the warning signal only extinguish if none of the in 4.1. mentioned defects are present? : Yes/no
- 4.1.2. Does the static sensor check verify that a sensor was not functioning the last time that the vehicle was at a greater speed than 10 km/h? : Yes/no/N.A.  
The warning signal may light up again while the vehicle is stationary, provided that it is extinguished before the vehicle reaches 10 km/h when no defect is present.
- Does the electrically controlled pneumatic modulator cycle at least once during the above mentioned verification phase? : Yes/no/N.A.
- 4.4. Does the electrical connection between the trailer and the towing vehicle conform to ISO Standard 7638-1985 or ISO/DIS Standard 7638-1996? (not for vehicles of category O1 and O2) : Yes/no/N.A.  
The wiring specification of point 6.2 of ISO 7638-1985 or point 5.4. of ISO/DIS 7638-1996 for the trailer may only be reduced if the trailer is equipped with its own independent fuse. The rating of the fuse shall be such that the current rating of the conductors is not exceeded. With the exception of vehicles of categories N3 and O4, and until a uniform international standard has been agreed, the electrical connection between towing vehicles and trailers equipped with a 12 volt electrical system shall conform with DIN standard 72570, Part 4.
- 4.5. Is the residual braking performance in the event of a defect in the anti-lock braking system (according to point 4.1. of this Annex) at least 80% of the laden prescribed performance for the service braking system? : Yes/no
- 4.6. The operation of the anti-lock system shall not be adversely affected by magnetic or electrical fields. This shall be demonstrated by compliance with Regulation No. 10, 03 series of amendments. : Yes/no
- 4.7. Is there no manual device to disconnect the ABS or to change the control mode of the ABS? : Yes/no/N.A.  
Only allowed on N2 and N3 OFF-ROAD vehicles under special conditions, see item 4.7.1. - 4.7.5. of Annex X.
- Annex XVIII Is the vehicle complying with the requirements of Annex 18 concerning complex electronics? See report EB155.2E : Yes/no/N.A.

