



Heavy Vehicle Specialist Inspector and Inspecting Organisation

Heavy Vehicle Specialist Inspector's Name (PRINT IN CAPS)

CHRIS CLARKE

ID

CJC

Vehicle Registration*

VIN / Chassis Number

7A8M0030295668286

Component being certified:

Chassis Modification

Load Anchorage

Log Bolsters

Certification Category

HOEK

Towing Connection

Brake Code

SRT

Description of Work

COMPLIANCE OF TRAILER TO NZHUBR SCHEDULE 5

Code/Standard Certified to

NZHUBR SCHED 5

Component Load Rating(s)

N/A

General Drawing Number(s)

N/A

Supporting Documents

BRAKE CALCULATION DOCUMENTATION

*Special Conditions

N/A

Certification Expiry Date

N/A

OR

Hubodometer Reading (whichever comes first)

Declaration

I the undersigned, declare that I am the Heavy Vehicle Specialist Inspector identified above and I hold a current valid appointment. I certify that the above mentioned vehicle component's design, manufacture and installation, and this certification complies in all respects with the Land Transport Rule Vehicle Standards Compliance 2002 and my Deed of Appointment. To the best of my knowledge the information contained in this Certificate is true and correct.

Designer's ID (if certified by a manufacturer)

Inspector's / Delegate's Signature

*Delegate's Name (PRINT IN CAPS)

Date

16-07-2008

Number

296514

COF Vehicle Inspector ID:

COF Vehicle Inspector Signature:

Date

All fields excluding those marked with * must be completed before this certificate can be accepted.



Company: Genese Ltd
Author: Chris Clarke

Created: 16/07/2008
Modified: 16/07/2008

Document: 7A8M0030295668286
Page: 1 / 7

Database version: 9.0.13

Calculation in accordance with ECE Regulation 13 (10 Series) and EEC Directive 71/320 EEC (2002/79/EC) using Knorr-Bremse Braking System Designer software (level 9.0).

Results based on vehicle data and components as defined by the Braking System Designer program user.

No liability assumed by Knorr-Bremse regarding the use of non-Knorr-Bremse product data.

Customer: Fonterra

Vehicle: 7A8M0030295668286

Project: 4 axle full trailer refurbishment project

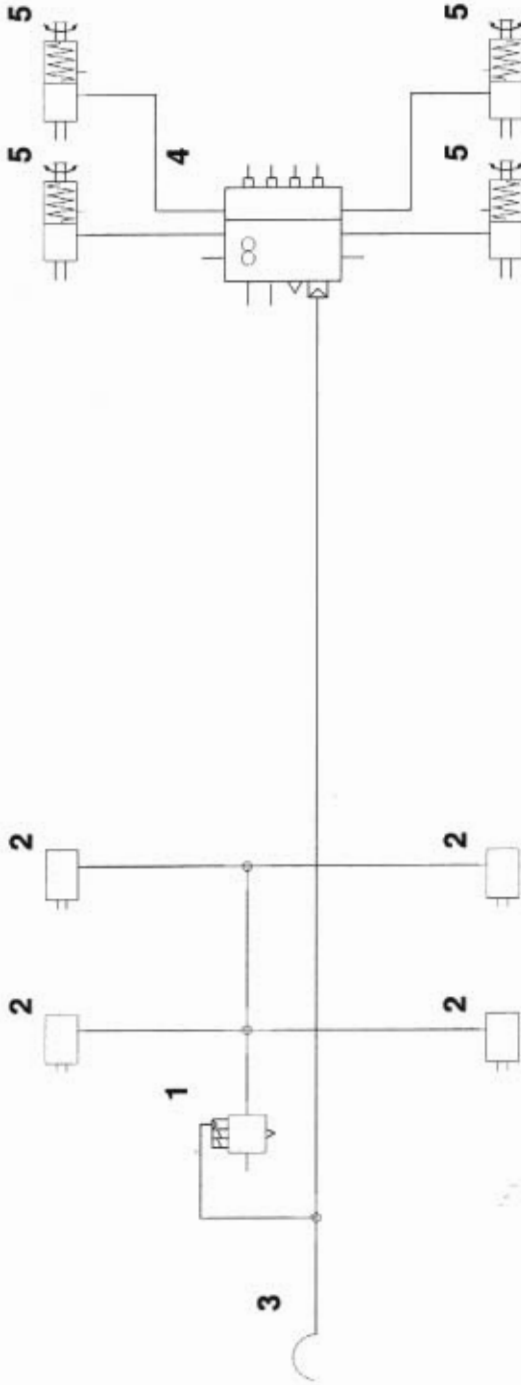
Vehicle

| | |
|---|---------------------|
| Type | 2x2 Drawbar trailer |
| Calculated effective wheelbase [m] | 4.70 |
| Laden (max.) mass [kg] | 26000.00 |
| Laden (max.) front axle group load [kg] | 13000.00 |
| Laden vertical position of CoG [m] | 1.80 |
| Unladen (min.) mass [kg] | 6718.00 |
| Unladen (min.) front axle group load [kg] | 4048.00 |
| Unladen vertical position of CoG [m] | 1.00 |
| Laden/unladen front air spring press. [bar] | -/- |
| Laden/unladen rear air spring press. [bar] | 4.80/0.40 |

| Axes | Axle 1 | Axle 2 | Axle 3 | Axle 4 |
|---|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Type | MERITOR (ROR) 361-0022-02-FBKV | MERITOR (ROR) 361-0022-02-FBKV | MERITOR (ROR) 361-0022-02-FBKV | MERITOR (ROR) 361-0022-02-FBKV |
| Tyre size | 265/70 R 19.5 | 265/70 R 19.5 | 265/70 R 19.5 | 265/70 R 19.5 |
| Dyn. tyre radius [mm] | 421 | 421 | 421 | 421 |
| Stat. tyre radius [mm] | 401 | 401 | 401 | 401 |
| Brake type | Disc Elsa195 LE | Disc Elsa195 LE | Disc Elsa195 LE | Disc Elsa195 LE |
| Brake size [mm] or drum/disc radius [mm] | 340x200 | 340x200 | 340x200 | 340x200 |
| Actuator size | 16 | 16 | 16/24 | 16/24 |
| Actuator force at 6,5 bar [N] | 6590 | 6590 | 6598 | 6598 |
| Slack adjuster length [mm] | - | - | - | - |
| Thresh.mom.[Nm] or force[N] | 81.00 | 81.00 | 81.00 | 81.00 |
| Brake Factor by Annex 19 | 20.3 | 20.3 | 20.3 | 20.3 |
| Discbrake lever length [mm] | 74 | 74 | 74 | 74 |
| Internal brake factor (C*) | - | - | - | - |
| Mechanical efficiency (Eta) | - | - | - | - |
| Internal brake factor x | - | - | - | - |
| Mech. efficiency (C* x Eta) | - | - | - | - |
| S-Cam radius [mm] or mech.ratio or wedge angle[-] | - | - | - | - |
| Friction material | ROR 8616 AF | ROR 8616 AF | ROR 8616 AF | ROR 8616 AF |

Calculation pressure [bar]: 6.5

Warning! This brake calculation has been produced using information from a source not controlled by Knorr-Bremse. The results produced by this calculation are therefore dependent upon the accuracy of this information and Knorr-Bremse does not take responsibility for any resulting errors.



Part list

| No. | Name | Type | Characteristics | Qty. |
|-----|-----------------------|--------|-----------------|------|
| 1 | ABS Modulator | BR9234 | - | 1 |
| 2 | Brake Chamber | ROR | - | 4 |
| 3 | Coupling head - brake | KU1400 | - | 1 |
| 4 | Trailer EBS ECU | ES20.. | - | 1 |
| 5 | Spring Brake Actuator | ROR | - | 4 |

Calculation pressure [bar]: 6.5

Warning! This brake calculation has been produced using information from a source not controlled by Knorr-Bremse. The results produced by this calculation are therefore dependent upon the accuracy of this information and Knorr-Bremse does not take responsibility for any resulting errors.



Laden vehicle

| Service | 0.50 | 1.00 | 1.50 | 2.00 | 2.50 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 | 6.00 | 6.50 | 7.00 | 7.50 |
|----------------------------------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Coupling head pres. [bar] | 0.00 | 0.29 | 0.80 | 1.27 | 1.76 | 2.28 | 2.89 | 3.47 | 3.99 | 4.51 | 5.03 | 5.55 | 6.07 | 6.49 | 6.78 |
| Deceleration [m/s ²] | 0.00 | 3.00 | 8.14 | 12.98 | 17.94 | 23.23 | 29.44 | 35.38 | 40.68 | 45.97 | 51.27 | 56.57 | 61.86 | 66.11 | 69.16 |
| Braking rate [%] | 0.00 | 0.65 | 1.02 | 1.48 | 2.00 | 2.57 | 3.26 | 3.88 | 4.39 | 4.90 | 5.41 | 5.92 | 6.43 | 6.94 | 7.45 |
| Axle 1 actuator pres. [bar] | 0.00 | 0.66 | 1.86 | 3.34 | 4.99 | 6.82 | 9.05 | 11.03 | 12.67 | 14.31 | 15.95 | 17.59 | 19.23 | 20.87 | 22.50 |
| Axle 1 braking torque [kNm] | 0.00 | 1.57 | 4.41 | 7.93 | 11.85 | 16.20 | 21.49 | 26.20 | 30.10 | 33.98 | 37.88 | 41.78 | 45.67 | 49.56 | 53.45 |
| Axle 1 adhesion utilised | 0.00 | 0.02 | 0.07 | 0.11 | 0.16 | 0.22 | 0.27 | 0.32 | 0.36 | 0.39 | 0.43 | 0.46 | 0.49 | 0.52 | 0.55 |
| Axle 2 actuator pres. [bar] | 0.00 | 0.65 | 1.02 | 1.48 | 2.00 | 2.57 | 3.26 | 3.88 | 4.39 | 4.90 | 5.41 | 5.92 | 6.43 | 6.94 | 7.45 |
| Axle 2 braking torque [kNm] | 0.00 | 0.66 | 1.86 | 3.34 | 4.99 | 6.82 | 9.05 | 11.03 | 12.67 | 14.31 | 15.95 | 17.59 | 19.23 | 20.87 | 22.50 |
| Axle 2 adhesion utilised | 0.00 | 0.02 | 0.07 | 0.11 | 0.16 | 0.22 | 0.27 | 0.32 | 0.36 | 0.39 | 0.43 | 0.46 | 0.49 | 0.52 | 0.55 |
| Axle 3 actuator pres. [bar] | 0.20 | 0.74 | 1.23 | 1.58 | 1.89 | 2.21 | 2.55 | 2.92 | 3.30 | 3.67 | 4.05 | 4.42 | 4.80 | 5.00 | 5.00 |
| Axle 3 braking torque [kNm] | 0.00 | 0.95 | 2.51 | 3.63 | 4.64 | 5.65 | 6.76 | 7.96 | 9.17 | 10.37 | 11.58 | 12.78 | 13.99 | 14.63 | 14.63 |
| Axle 3 adhesion utilised | 0.00 | 0.04 | 0.10 | 0.15 | 0.20 | 0.26 | 0.33 | 0.41 | 0.50 | 0.60 | 0.71 | 0.84 | 0.99 | 1.10 | 1.16 |
| Axle 4 actuator pres. [bar] | 0.20 | 0.74 | 1.23 | 1.58 | 1.89 | 2.21 | 2.55 | 2.92 | 3.30 | 3.67 | 4.05 | 4.42 | 4.80 | 5.00 | 5.00 |
| Axle 4 braking torque [kNm] | 0.00 | 0.95 | 2.51 | 3.63 | 4.64 | 5.65 | 6.76 | 7.96 | 9.17 | 10.37 | 11.58 | 12.78 | 13.99 | 14.63 | 14.63 |
| Axle 4 adhesion utilised | 0.00 | 0.04 | 0.10 | 0.15 | 0.20 | 0.26 | 0.33 | 0.41 | 0.50 | 0.60 | 0.71 | 0.84 | 0.99 | 1.10 | 1.16 |

Unladen vehicle

| Service | 0.50 | 1.00 | 1.50 | 2.00 | 2.50 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 | 6.00 | 6.50 | 7.00 | 7.50 |
|----------------------------------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|
| Coupling head pres. [bar] | 0.00 | 0.42 | 1.12 | 1.60 | 2.05 | 2.52 | 3.10 | 3.82 | 4.64 | 5.65 | 7.07 | 10.03 | 15.76 | 17.11 | 18.45 |
| Deceleration [m/s ²] | 0.00 | 4.26 | 11.39 | 16.34 | 20.90 | 25.72 | 31.58 | 38.95 | 47.34 | 57.65 | 72.02 | 102.19 | 160.68 | 174.41 | 188.11 |
| Braking rate [%] | 0.00 | 0.55 | 0.75 | 0.89 | 1.02 | 1.16 | 1.34 | 1.58 | 1.86 | 2.22 | 2.76 | 3.98 | 6.43 | 6.94 | 7.45 |
| Axle 1 actuator pres. [bar] | 0.00 | 0.36 | 0.98 | 1.43 | 1.85 | 2.31 | 2.89 | 3.65 | 4.55 | 5.72 | 7.45 | 11.37 | 19.23 | 20.87 | 22.50 |
| Axle 1 braking torque [kNm] | 0.00 | 0.85 | 2.32 | 3.39 | 4.40 | 5.50 | 6.87 | 8.67 | 10.82 | 13.59 | 17.70 | 27.01 | 45.67 | 49.56 | 53.45 |
| Axle 1 adhesion utilised | 0.00 | 0.04 | 0.11 | 0.16 | 0.21 | 0.25 | 0.31 | 0.38 | 0.47 | 0.57 | 0.71 | 1.00 | 1.47 | 1.54 | 1.62 |
| Axle 2 actuator pres. [bar] | 0.00 | 0.55 | 0.75 | 0.89 | 1.02 | 1.16 | 1.34 | 1.58 | 1.86 | 2.22 | 2.76 | 3.98 | 6.43 | 6.94 | 7.45 |
| Axle 2 braking torque [kNm] | 0.00 | 0.36 | 0.98 | 1.43 | 1.85 | 2.31 | 2.89 | 3.65 | 4.55 | 5.72 | 7.45 | 11.37 | 19.23 | 20.87 | 22.50 |
| Axle 2 adhesion utilised | 0.00 | 0.04 | 0.11 | 0.16 | 0.21 | 0.25 | 0.31 | 0.38 | 0.47 | 0.57 | 0.71 | 1.00 | 1.47 | 1.54 | 1.62 |
| Axle 3 actuator pres. [bar] | 0.20 | 0.52 | 0.63 | 0.71 | 0.77 | 0.84 | 0.91 | 0.99 | 1.07 | 1.15 | 1.24 | 1.32 | 1.40 | 1.48 | 1.56 |
| Axle 3 braking torque [kNm] | 0.00 | 0.23 | 0.60 | 0.84 | 1.05 | 1.25 | 1.49 | 1.75 | 2.01 | 2.28 | 2.54 | 2.80 | 3.06 | 3.33 | 3.59 |
| Axle 3 adhesion utilised | 0.00 | 0.04 | 0.12 | 0.17 | 0.21 | 0.26 | 0.32 | 0.40 | 0.49 | 0.60 | 0.75 | 1.12 | 3.98 | 9.10 | -92.75 |
| Axle 4 actuator pres. [bar] | 0.20 | 0.52 | 0.63 | 0.71 | 0.77 | 0.84 | 0.91 | 0.99 | 1.07 | 1.15 | 1.24 | 1.32 | 1.40 | 1.48 | 1.56 |
| Axle 4 braking torque [kNm] | 0.00 | 0.23 | 0.60 | 0.84 | 1.05 | 1.25 | 1.49 | 1.75 | 2.01 | 2.28 | 2.54 | 2.80 | 3.06 | 3.33 | 3.59 |
| Axle 4 adhesion utilised | 0.00 | 0.06 | 0.13 | 0.19 | 0.24 | 0.29 | 0.35 | 0.41 | 0.48 | 0.54 | 0.61 | 0.68 | 0.75 | 0.81 | 0.87 |

Warning! This brake calculation has been produced using information from a source not controlled by Knorr-Bremse. The results produced by this calculation are therefore dependent upon the accuracy of this information and Knorr-Bremse does not take responsibility for any resulting errors.



Miscellaneous

Coupling head pressure where $z = 22.5\%$ (laden case)
Pressure [bar] : 2.90

Brake chamber pressure [bar] where $z = 22.5\%$ (laden case)
Axle1 : 2.45 Axle2 : 2.45 Axle3 : 2.14 Axle4 : 2.14

Automatic braking performance (at 6.0 [bar], laden case)
Deceleration [m/s²] : 4.12

Braking rate [%] 42.0

Vehicle performance in case of a load sensing device control failure (at 6.5 [bar], laden case)

Front axle group

Deceleration [m/s²] : -

Braking rate [%] -

Rear axle group

Deceleration [m/s²] : 6.07

Braking rate [%] 61.9

Parking brake Laden vehicle

| Max.slope [%] (must be > 18%) | Up | Down |
|---|--------|-------|
| (max.spring force = 7605 N at 30 mm strok Required spring force at 18% slope | -50.40 | 31.38 |
| Axle 1 [N] | - | - |
| Axle 2 [N] | - | - |
| Axle 3 [N] | 2935 | 2935 |
| Axle 4 [N] | 2935 | 2935 |

Calculation pressure [bar]: 6.5

Warning! This brake calculation has been produced using information from a source not controlled by Knorr-Bremse. The results produced by this calculation are therefore dependent upon the accuracy of this information and Knorr-Bremse does not take responsibility for any resulting errors.



Trailer EBS parameters

Number of axles: 4
 Number of teeth: 90
 Dynamic tyre radius [cm]: 42.1
 Inshot pressure [bar]: 0.45
 Coupling head pressure [bar]: 0.70
 Pressure compensation (at 1.6 bar) [bar]: 0.20
 Output pressure (at 6.5 bar) [bar]

Laden: 4.80
 Unladen: 1.40

Air spring pressure [bar]

Laden : 4.80
 Unladen : 0.40

Axle boogie load [kg]

Laden: 13000
 Unladen: 2670

Pressure limitation [bar]

5.00

Slip differential [%]

-0.20

Corresponding sheet on the PC Diagnostic tool (ECU Talk)

| Coupling head pressure [bar] | Brake chamber pressure [bar] | |
|------------------------------|------------------------------|-------|
| | Unladen | Laden |
| 0.70 | 0.45 | |
| 1.6 | 0.66 | 1.32 |
| 6.5 | 1.40 | 4.80 |

| | |
|---|------|
| Brake pressure compensation at 1.6 bar coupling head pressure [bar] | 0.20 |
|---|------|

| Air spring pressure [bar] | Laden : | |
|---------------------------|-----------|---------|
| | Unladen : | Laden : |
| | 0.40 | 4.80 |

| Axle boogie load [kg] | Laden | |
|-----------------------|---------|-------|
| | Unladen | Laden |
| | 2670 | 13000 |



Company: Genese Ltd
Author: Chris Clarke

Created: 16/07/2008 Document: 7A8M0030295668286
Modified: 16/07/2008 Page: 6 / 7

Database version: 9.0.13

Load sensing valve settings at 6.5 bar on rear axle group. Type: ES20..

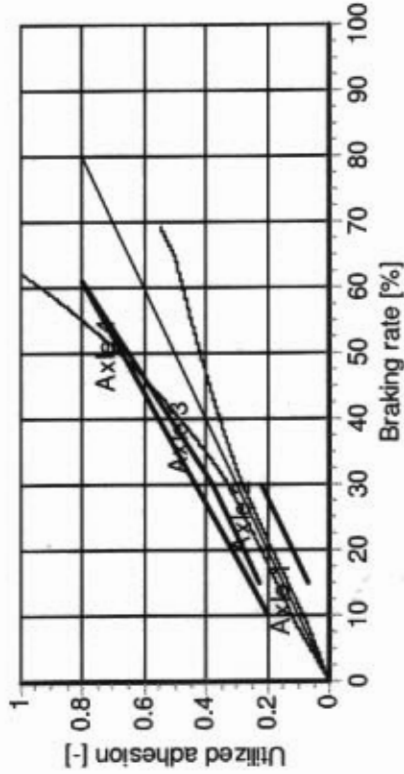
| Gross weight [kg] | Axle load [kg] | Air spring pressure [bar] | LSV ratio [-] | LSV Output pressure [bar] |
|-------------------|----------------|---------------------------|---------------|---------------------------|
| | | | | input:6,5bar 6.5 bar |

Calculation pressure [bar]: 6.5

Warning! This brake calculation has been produced using information from a source not controlled by Knorr-Bremse. The results produced by this calculation are therefore dependent upon the accuracy of this information and Knorr-Bremse does not take responsibility for any resulting errors.

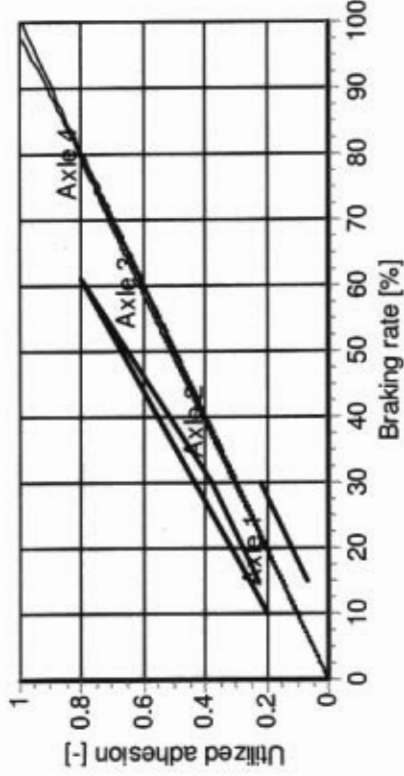


Laden vehicle - adhesion utilisation



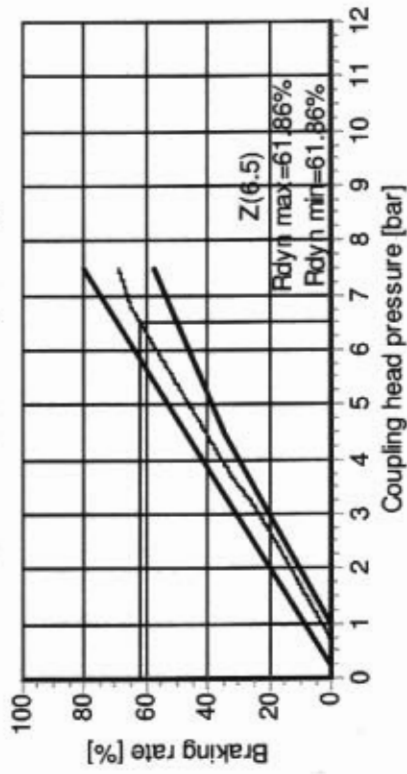
(With anti-lock system the adhesion requirements do not have to be fulfilled.)

Unladen vehicle - adhesion utilisation



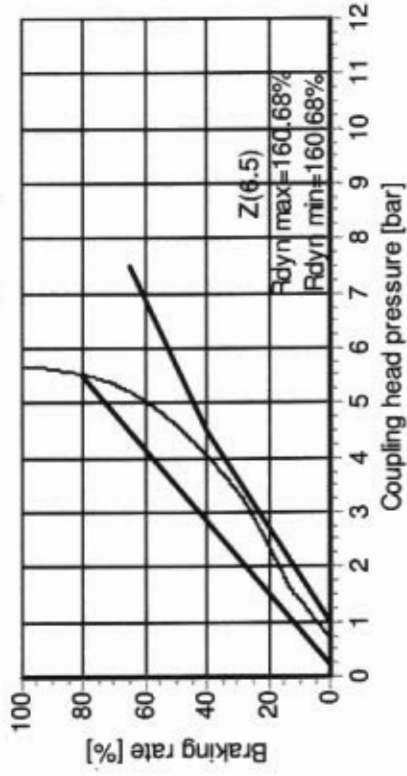
(With anti-lock system the adhesion requirements do not have to be fulfilled.)

Laden vehicle - compatibility



Calculation pressure [bar]: 6.5

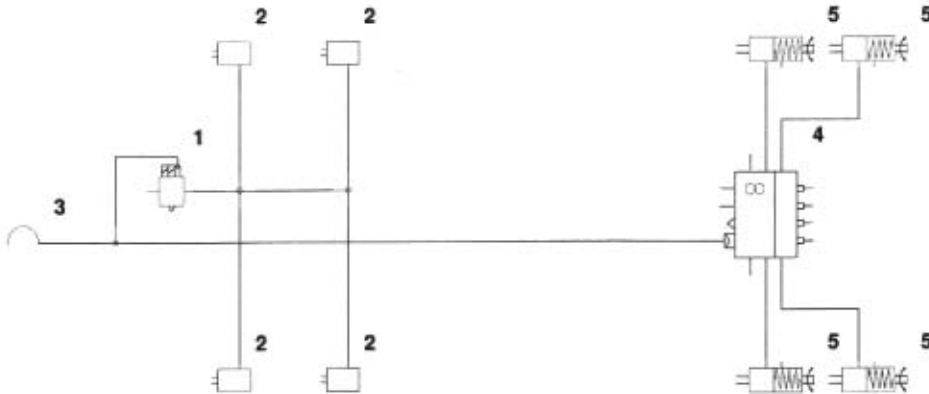
Unladen vehicle - compatibility



Warning! This brake calculation has been produced using information from a source not controlled by Knorr-Bremse. The results produced by this calculation are therefore dependent upon the accuracy of this information and Knorr-Bremse does not take responsibility for any resulting errors.



Complet system diagram



Part list

| No. | Name | Type | Characteristics | Qty. |
|-----|-----------------------|--------|-----------------|------|
| 1 | ABS Modulator | BR9234 | - | 1 |
| 2 | Brake Chamber | ROR | - | 4 |
| 3 | Coupling head - brake | KU1400 | - | 1 |
| 4 | Trailer EBS ECU | ES20.. | - | 1 |
| 5 | Spring Brake Actuator | ROR | - | 4 |

Trailer EBS parameters

| Coupling head pressure [bar] | Brake chamber pressure [bar] | |
|---|------------------------------|-------|
| | Unladen | Laden |
| 0.70 | 0.45 | |
| 1.6 | 0.66 | 1.32 |
| 6.5 | 1.40 | 4.80 |
| Brake pressure compensation at 1.6 bar coupling head pressure [bar] | | 0.20 |
| Air spring pressure [bar] | Unladen | Laden |
| | 0.40 | 4.80 |
| Axle bogie load [kg] | Unladen | Laden |
| | 2670 | 13000 |
| Pressure limitation [bar] | | 5.00 |
| Slip differential [%] | | -0.20 |

ABS Modulator Sensors on axle 2
 Brake Chamber 16" stroke: 64 BZ 122.1 15/09/2000
 Brake Chamber 16" stroke: 64 BZ 122.1 15/09/2000
 Brake Chamber 16" stroke: 64 BZ 122.1 15/09/2000
 Brake Chamber 16" stroke: 64 BZ 122.1 15/09/2000
 Coupling head - brake -
 Trailer EBS ECU Sensors on axle 4
 Spring Brake Actuator 16/24" stBZ 119.6 01/02/2001
 Spring Brake Actuator 16/24" stBZ 119.6 01/02/2001
 Spring Brake Actuator 16/24" stBZ 119.6 01/02/2001
 Spring Brake Actuator 16/24" stBZ 119.6 01/02/2001