





Company: Genese Ltd  
Author: Chris Clarke

Created: 10/08/2008 Document: 7A8H9000297776399  
Modified: 10/08/2008 Page: 1 / 7

Database version: 9.0.13

Calculation in accordance with ECE Regulation 13 (10 Series) and EEC Directive 71/320 EEC (2002/76/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 Co-op Ltd

Vehicle: 7A8H9000297776399

Project: 4 axle milk collection full trailer

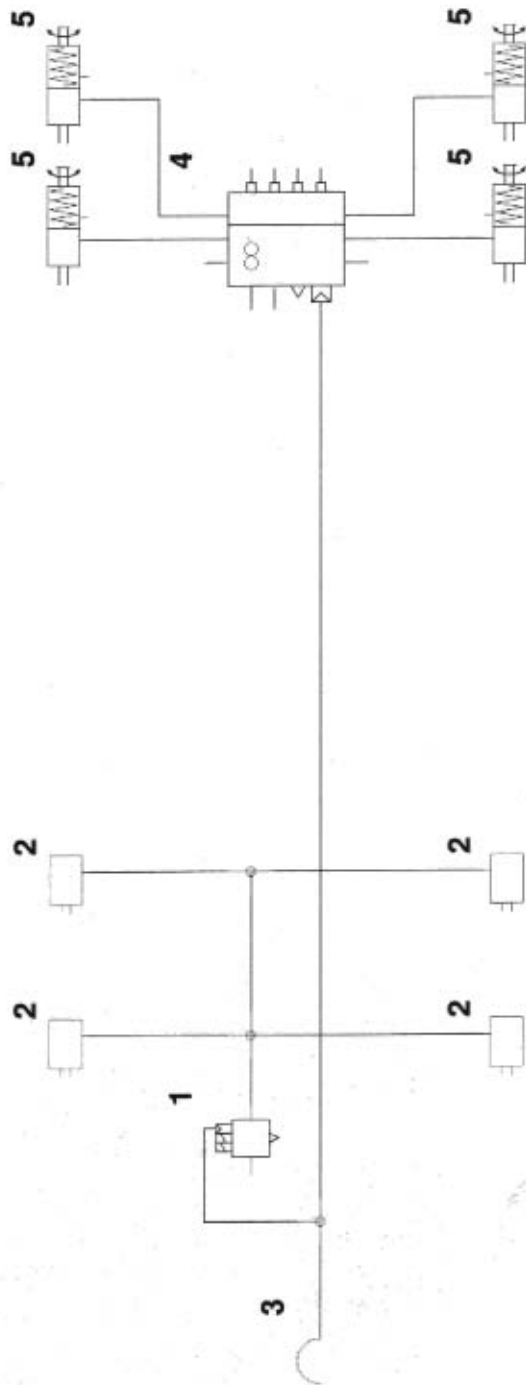
### Vehicle

Type	2x2 Drawbar trailer
Calculated effective wheelbase [m]	4.90
Laden (max.) mass [kg]	29000.00
Laden (max.) front axle group load [kg]	14500.00
Laden vertical position of CoG [m]	1.96
Unladen (min.) mass [kg]	6718.00
Unladen (min.) front axle group load [kg]	4048.00
Unladen vertical position of CoG [m]	1.27
Laden/unladen front air spring press. [bar]	-/-
Laden/unladen rear air spring press. [bar]	4.50/0.40

Axles	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	6260	6260
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

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### Laden vehicle

	Intact system	Front circuit only	Rear circuit only	Calculation press.
Deceleration [m/s <sup>2</sup> ]	6.08	-	-	5.55
Pressure [bar]	8.50	-	-	6.50

### Unladen vehicle

	Intact system	Front circuit only	Rear circuit only	Calculation press.
Deceleration [m/s <sup>2</sup> ]	15.03	-	-	15.03
Pressure [bar]	8.50	-	-	6.50

**Calculation pressure [bar]:** 6.5

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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 : 2.76 Axle2 : 2.76 Axle3 : 2.58 Axle4 : 2.58

**Automatic braking performance ( at 6.0 [bar], laden case )**

Deceleration [ $m/s^2$ ] : 3.46

Braking rate [%] : 35.2

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

**Front axle group**

Deceleration [ $m/s^2$ ] : -

Braking rate [%] : -

**Rear axle group**

Deceleration [ $m/s^2$ ] : 5.70

Braking rate [%] : 58.1

Parking brake

Laden vehicle Unladen vehicle

	Up	Down	Up	Down
Max.slope [%] (must be > 18%)	-40.99	31.05	-41.38	27.16

(max.spring force = 7120 N at 30 mm strok

Required spring force at 18% slope

Axle 1 [N] -

Axle 2 [N] -

Axle 3 [N] 3264

Axle 4 [N] 3264

**Calculation pressure [bar]: 6.5**

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Trailer EBS parameters

Number of axles: 4  
 Number of teeth: 90  
 Dynamic tyre radius [cm]: 42.1  
 Inshot pressure [bar]: 0.56  
 Coupling head pressure [bar]: 0.70  
 Pressure compensation (at 1.6 bar) [bar]: 0.20  
 Output pressure (at 6.5 bar) [bar]

Laden: 5.60  
 Unladen: 1.40

**Air spring pressure [bar]**

Laden : 4.50  
 Unladen : 0.40

**Axle boogie load [kg]**

Laden: 14500  
 Unladen: 2670

**Pressure limitation [bar]**

5.30

**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	0.56	
1.6	0.74	1.54
6.5	1.40	5.60

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

Air spring pressure [bar]	Unladen :	Laden :
	0.40	4.50

Axle boogie load [kg]	Unladen	Laden
	2670	14500



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**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
29000	7250	4.50	1.23	5.3	5.3
28000	7000	4.33	1.23	5.3	5.3
27000	6750	4.15	1.24	5.2	5.2
26000	6500	3.98	1.28	5.1	5.1
25000	6250	3.81	1.33	4.9	4.9
24000	6000	3.63	1.38	4.7	4.7
23000	5750	3.46	1.43	4.5	4.5
12718	2835	1.44	2.64	2.5	2.5
11718	2585	1.27	2.84	2.3	2.3
10718	2335	1.09	3.08	2.1	2.1
9718	2085	0.92	3.36	1.9	1.9
8718	1835	0.75	3.70	1.8	1.8
7718	1585	0.57	4.12	1.6	1.6
6718	1335	0.40	4.64	1.4	1.4

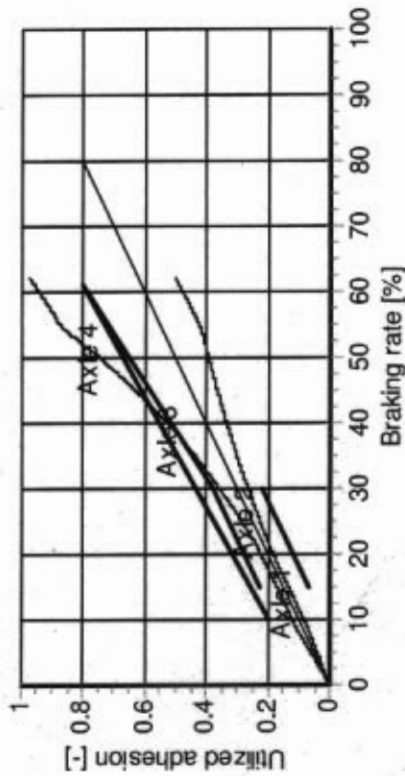
**Calculation pressure [bar]:** 6.5

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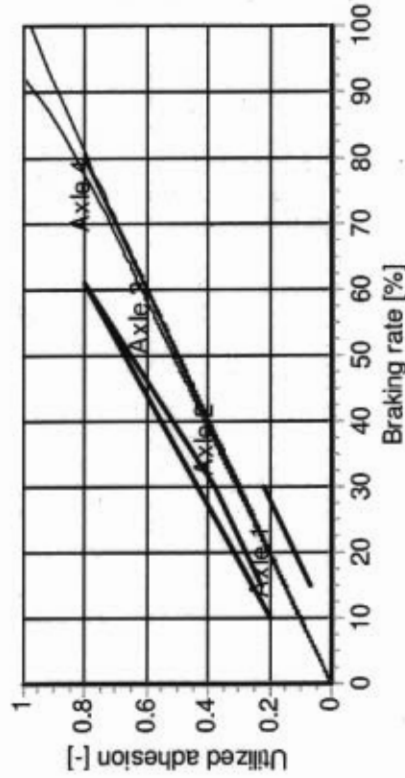


Laden vehicle - adhesion utilisation



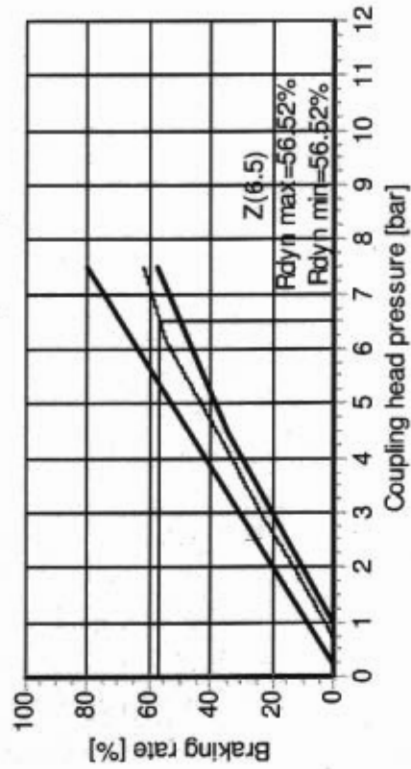
(With anti-lock system the adhesion requirements do not have to be fulfilled.)

Unladen vehicle - adhesion utilisation

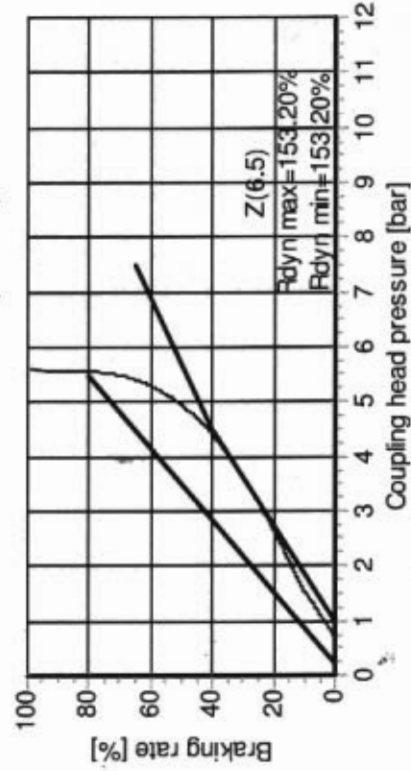


(With anti-lock system the adhesion requirements do not have to be fulfilled.)

Laden vehicle - compatibility



Unladen vehicle - compatibility







KNORR-BREMSE

ECUtalk V.3.3.1.10

# EOL PROTOCOL REPORT

SYSTEM		Trailer EBS		MATCH CODE		ES 2053				
PRODUCTION DATE		week 49 in 2007		SERIAL NUMBER		203				
PART NUMBER		II 39782		VIN		7ASH9000297776399				
MANUFACTURER		Domett Trailers		BRAKE CALCULATION NO.		7ASH9000297776399				
TYPE		Full trailer		FORMER PIN ACTUAL PIN		30 32 4D 52 30 32 4D 52				
DIFFERENTIAL SLIP [%]  -0.2	AUX1	OFF	IN A	Disabled		SOFTWARE VERSION	521.17	AXLE	BRAKE CHAMBER SIZE	LEVER LENGTH
	AUX2	OFF	IN B	Disabled		ISS INVERTED	-	1	16	-
	AUX3	OFF	IN C	Disabled		RSP	St 2	2	16	-
	AUX4	ON	IN D	-		ABS CONFIGURATION	4S/3M	3	1624	-
	AUX5	-	POLE WHEEL TEETH SR, SL		90	DYN.TYRE DIAMETER [MM]	840	4	1624	-
	POLE WHEEL TEETH SAR, SAL		90	COMPENSATION AT 1.6 BAR		0.2		5	-	-
REAR AXLE PRESSURE LIMIT [BAR]		5.3	CONTROLL PRESSURE [BAR]		6.5	CONTROLL PRESSURE [BAR]		0.7	1.6	6.5
AXLE	AXLE LOAD UNLADEN [KG]	SUSP.PRESS.UNL. [BAR]	BRAKE PRESS.UNL. [BAR]	AXLE LOAD LADEN [KG]	SUSP.PRESS.LADEN [BAR]	BRAKE PRESS.LADEN [BAR]				
1	2024	0	-	7250	0	-	-	-		
2	2024	0	-	7250	0	-	-	-		
3	1335	0.5	1.4	7250	4.5	0.56	1.5	5.6		
4	1335	0.5	1.4	7250	4.5	0.56	1.5	5.6		
5	-	-	-	-	-	-	-	-		
KILOMETER COUNTER[KM]	0	NEXT SERVICE [KM]		8000000	ECU SUPPLY VOLTAGE [V]	21.1	VALVE SUPPLY VOLTAGE [V]		21.4	
AIR GAP SPEED SL [KM/H]	1.6	AIR GAP SPEED SR [KM/H]		1.0	AIR GAP SPEED SAL [KM/H]	4.1	AIR GAP SPEED SAR [KM/H]		2.7	
<b>EOL TEST RESULTS</b>										
System pressure test			Succeeded			-		-		
Warning lamp test			Succeeded			-		-		
LSF test			Succeeded			-		-		
SL wheel speed sensor test			Succeeded			-		-		
SR wheel speed sensor test			Succeeded			-		-		
Axle modulator test			Succeeded			-		-		
RSP installation test			Succeeded			-		-		
Active faults in the system			No			-		-		
TESTER NAME		Chris Clarke			SIGNATURE					
LOCATION		Genese Ltd								
DATE		10/08/2008								
ADDITIONAL INFORMATION		Fonterra Refurbish No 7								



**KNORR-BREMSE**

ECUtalk V.3.3.1.10

# EOL PROTOCOL REPORT

SYSTEM		Trailer EBS		MATCH CODE		ES 2053				
PRODUCTION DATE		week 49 in 2007		SERIAL NUMBER		203				
PART NUMBER		II 39782		VIN		7ABH9000297776399				
MANUFACTURER		Domett Trailers		BRAKE CALCULATION NO.		7ABH9000297776399				
TYPE		Full trailer		FORMER PIN ACTUAL PIN		30 32 4D 52 30 32 4D 52				
DIFFERENTIAL SLIP [%]  -0.2	AUX1	OFF	IN A	Disabled		SOFTWARE VERSION	521.17	AXLE	BRAKE CHAMBER SIZE	LEVER LENGTH
	AUX2	OFF	IN B	Disabled		ISS INVERTED	-	1	16	-
	AUX3	OFF	IN C	Disabled		RSP	St 2	2	16	-
	AUX4	ON	IN D	-		ABS CONFIGURATION	4S/3M	3	1624	-
	AUX5	-	POLE WHEEL TEETH SR, SL		90	DYN.TYRE DIAMETER (MM)	840	4	1624	-
			POLE WHEEL TEETH SAR, SAL		90	COMPENSATION AT 1.6 BAR	0.2		5	-
REAR AXLE PRESSURE LIMIT [BAR]		5.3	CONTROLL PRESSURE [BAR]		6.5	CONTROLL PRESSURE [BAR]		0.7	1.6	6.5
AXLE	AXLE LOAD UNLADEN [KG]	SUSP.PRESS.UNL. [BAR]	BRAKE PRESS.UNL. [BAR]	AXLE LOAD LADEN [KG]	SUSP.PRESS.LADEN [BAR]	BRAKE PRESS.LADEN [BAR]				
1	2024	0	-	7250	0	-	-	-		
2	2024	0	-	7250	0	-	-	-		
3	1335	0.5	1.4	7250	4.5	0.56	1.5	5.6		
4	1335	0.5	1.4	7250	4.5	0.56	1.5	5.6		
5	-	-	-	-	-	-	-	-		
KILOMETER COUNTER [KM]	0	NEXT SERVICE [KM]	8000000	ECU SUPPLY VOLTAGE [V]	21.1	VALVE SUPPLY VOLTAGE [V]	21.4			
AIR GAP SPEED SL [KM/H]	1.6	AIR GAP SPEED SR [KM/H]	1.0	AIR GAP SPEED SAL [KM/H]	4.1	AIR GAP SPEED SAR [KM/H]	2.7			
<b>EOL TEST RESULTS</b>										
System pressure test		Succeeded		-		-				
Warning lamp test		Succeeded		-		-				
LSF test		Succeeded		-		-				
SL wheel speed sensor test		Succeeded		-		-				
SR wheel speed sensor test		Succeeded		-		-				
Axle modulator test		Succeeded		-		-				
RSP installation test		Succeeded		-		-				
Active faults in the system		No		-		-				
TESTER NAME	Chris Clarke			SIGNATURE 						
LOCATION	Genese Ltd									
DATE	10/08/2008									
ADDITIONAL INFORMATION	Fonterra Refurbish No 7									