

CSDD

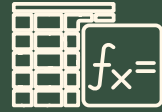
Testing of pneumatic brakes

Technical Department





Testing method



Calculation and
extrapolation



Technical data



Training



Test connections
and sensors



Implementation



Measuring process



Costs and benefits

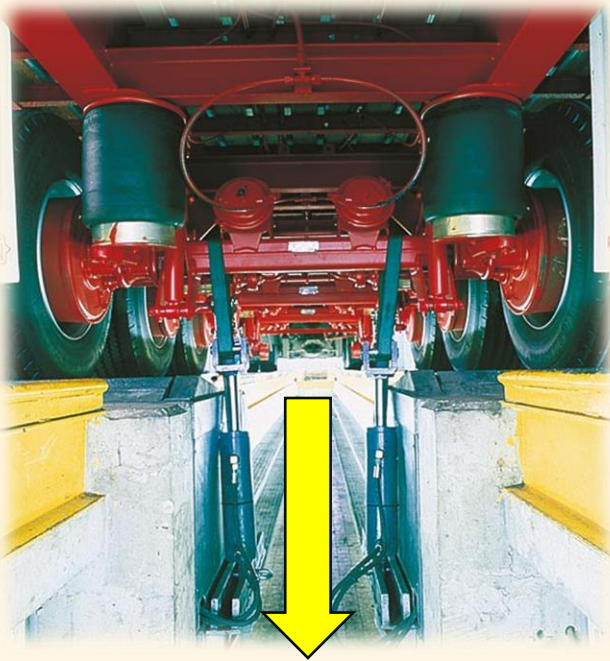


Testing method ISO 21069-1:2017

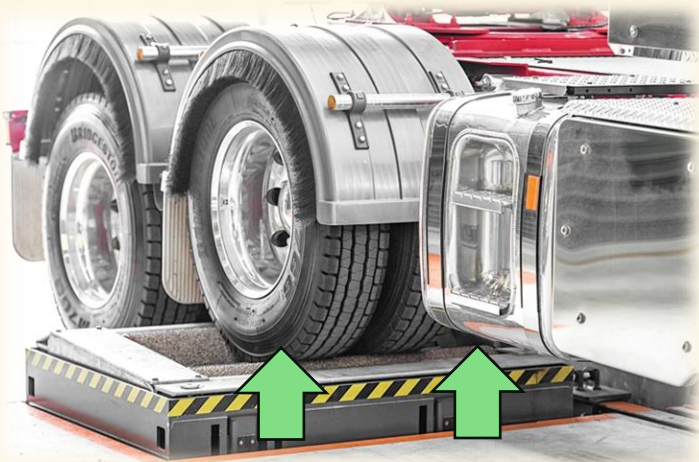
- Force and pressure measurement
- Load simulation
- Brake force extrapolation
- Calculation of the braking efficiency

Possible load simulation options

Pulling method



Lifting method

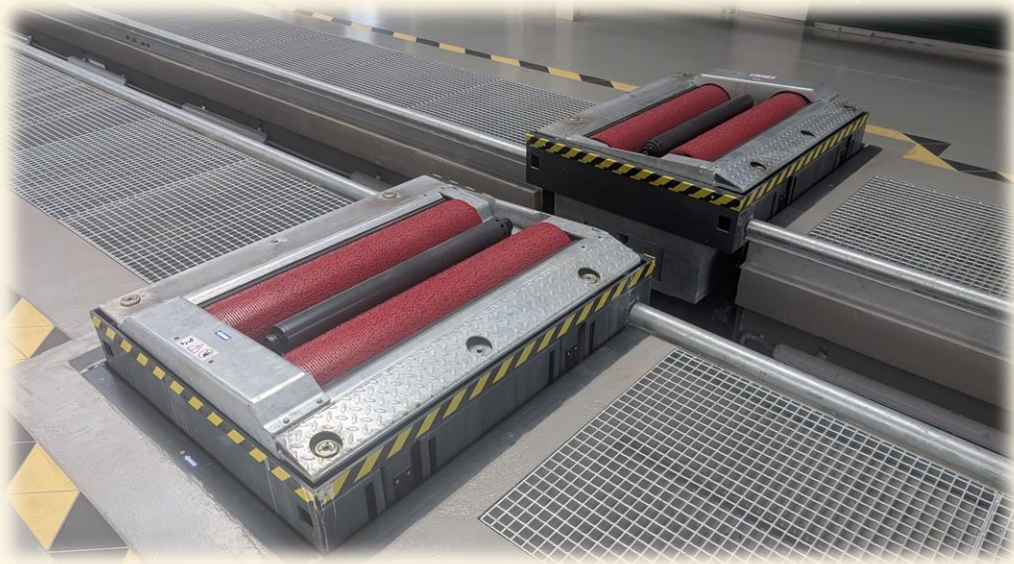


Loading with cargo



Brake testing in Latvia

Equipment



Roller brake tester - lifting function (with scales)



Wireless pressure sensors



Technical data

- Max axle load (for semi trailers)
- Max permissible mass
- Designed max pressure

Technical data

On vehicle data plate

SCHMITZ CARGOBULL
Schmitz Cargobull Gotha

Typ: **SGF⁺S3**

Approval No.: **e1*2007/46*0810**

Vehicle Id. No.: **WSK00000001285853**

Length (L): **8,8**

Width (W): **2,55**

Max. Gross Weight	35000	39000
max. coupling load - 0	11000	12000
max. Axle Load - 1	8000 T	9000 T
max. Axle Load - 2	8000 T	9000 T
max. Axle Load - 3	8000 T	9000 T
max. Axle Load - 4		

bmin (m) bmax (m)

kg kg

7,5

ORR-BREMSE

Type	Typ	Schaltanhanger	RB Help Centre
Brake calculation no.	Bremberechnungs-Nr	SMK90599S	RD-Länge
VIN	TIN	1285853	Hersteller
			Schmitz Gotha

Brake Max. Axle Load (kg)	Achsaggregat last (kg)	3000	ABS Konfiguration	2S/2M	Ass. Axles	Max. Axle (kg)	Max. Last (kg)	
Brake load (kg)	Achsaggregat belastung (kg)	27000	For trailer demand	Nein	1	9000	16	82
Type diameter (mm)	Polen Durchmesser (mm)	1040	Pressure relief (CAN) (bar)		2	9000	16	82
Steering stop base	Polen stop base	90	Dockbegrenzung (CAN)	Nein	3	9000	16	82
Module turned	Modul geneigt	Nein	3rd Modulator		4			
			Differential slip (%)		5			
			Differential Schlupf (%)					
			Max slip demand (bar)					
			Steuerdruck max. Schlupf					

TPM 4.0 Type	TPM 4.0 Typ	TBM-Intern	TPM 4.0 Type	TPM 4.0 Typ	Kein TPM
TPM 4.0 Type	TPM 4.0 Typ		TPM 4.0 Type	TPM 4.0 Typ	
TPM 4.0 Type	TPM 4.0 Typ		TPM 4.0 Type	TPM 4.0 Typ	
TPM 4.0 Type	TPM 4.0 Typ		TPM 4.0 Type	TPM 4.0 Typ	

Front pressure parameters	Druckparameter vorne	Rear pressure parameters	Druckparameter hinten
Control pressure (bar)	Steuerdruck (bar)	Control pressure (bar)	Steuerdruck (bar)
Brake press. unladen (bar)	Bremstdruck leer (bar)	Brake press. unladen (bar)	Bremstdruck leer (bar)
0,70	1,6	4,5	6,5
0,48	0,6	1,0	1,2

National vehicle data base / registration document

AF 5024822

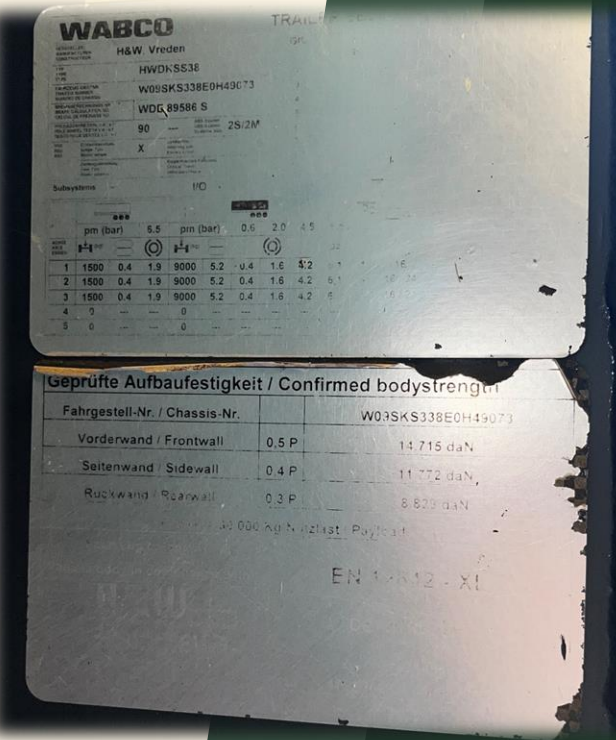
D.2. Tips	**		
Variants	**		
Versija	**		
F.1. Pilna masa (kg)	26500		
G Pašmasa (kg)	14360		
I Izdota	11.09.2024. CSDD RĪGA		
J Kategorija	N3	Q Jauda/svars(kW/kg)	**
K Tipa apstiprinājuma Nr	**		
P.1. Motora tipums (cm3)	9290	P.2. Motora maks. jauda (kW)	206
P.3. Degviela	Dizēļdegviela		
R Krāsa	**		
S.1. Sēdvietas	3	S.2. Stāvvietas	**
(Y) Veids	Kravas atkritumvedējs		
(Z) Piezīmes	Euro 5		
**			
**			

E I R O P A S K O P I E N A

CBMΔEΠECTBO ZA YΠAΦEPEHHE ΠEPMHCO DE CIRCULACION, OSVEDČENÍ O REGISTRACI, REGISTRERINGSATTEST, ZULASSUNGSBESCHEINIGUNG, REGISTREETIMISTUNNISTUS, AΔEIA KYKΛOΦOPHAE / MHTOΠOIHHTIKO EΓΓPAΦH, REGISTRATION CERTIFICATE, CERTIFICAT D'IMMATRICULATION, TEASTAS CLARAITHE, PROMETNA DOZVOLA, CARTA DI CIRCOLAZIONE, REGISTRACIJAS APĻIECĪBA, REGISTRACIJOS LIUDIJIMAS, FÖRGAENI EINGEDELJ, CERTIFIKAT TA' REGISTRAZZJONI, KENTEKENBEWĪS DOWOH REJESTRACYNY, CERTIFICADO DE MATRICULA, CERTIFICAT DE IMMATRICULARE, OSVEDČENIE O EVIDENCI, PROMETNO DOVOLJENJE, REGISTROINTODIŠTUS, REGIST PERHOSBEVĪST.

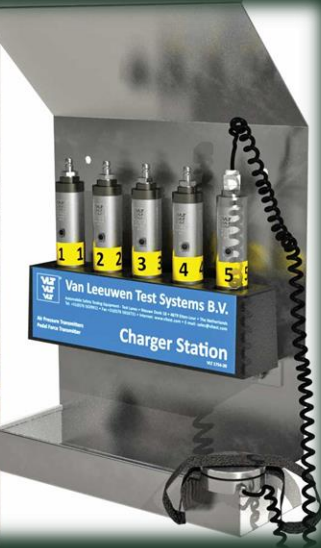
(p₃) Designed max pressure table (if not available)

Vehicle category	Pressure (p ₃)	
	< 01.01.2012	> 01.01.2012
N2, N3, M3	6.5 bar	8.0 bar
O3, O4	6.5 bar	





Test connections and sensors (preparation for measurement)



At least 3 pressure sensors

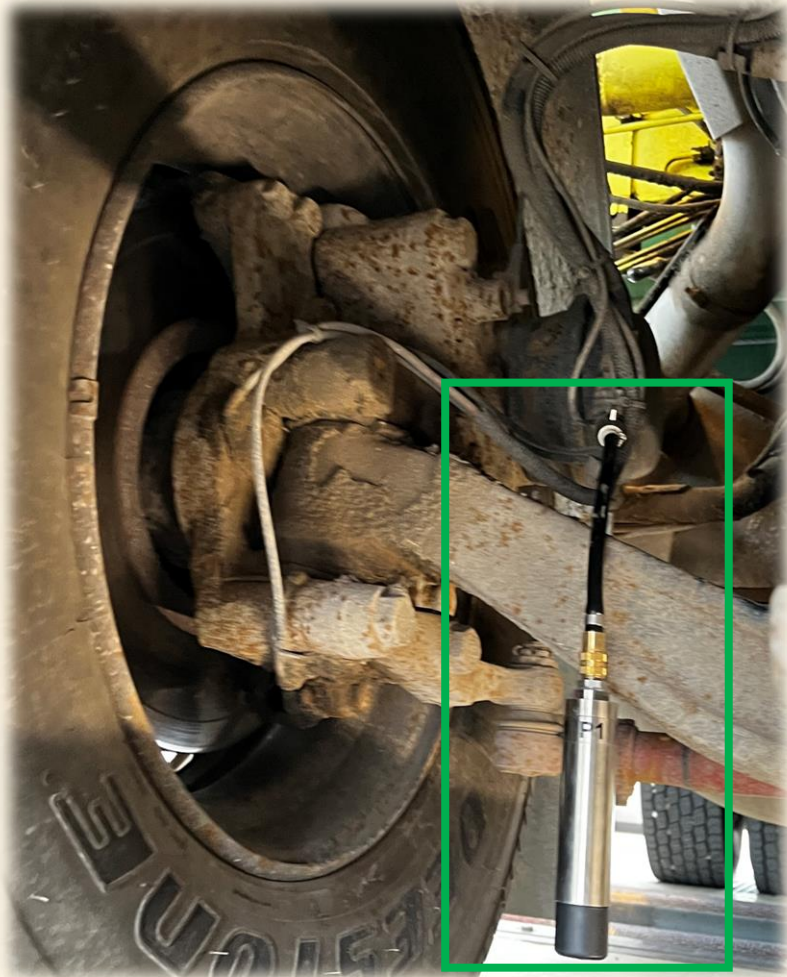


Sensor 1

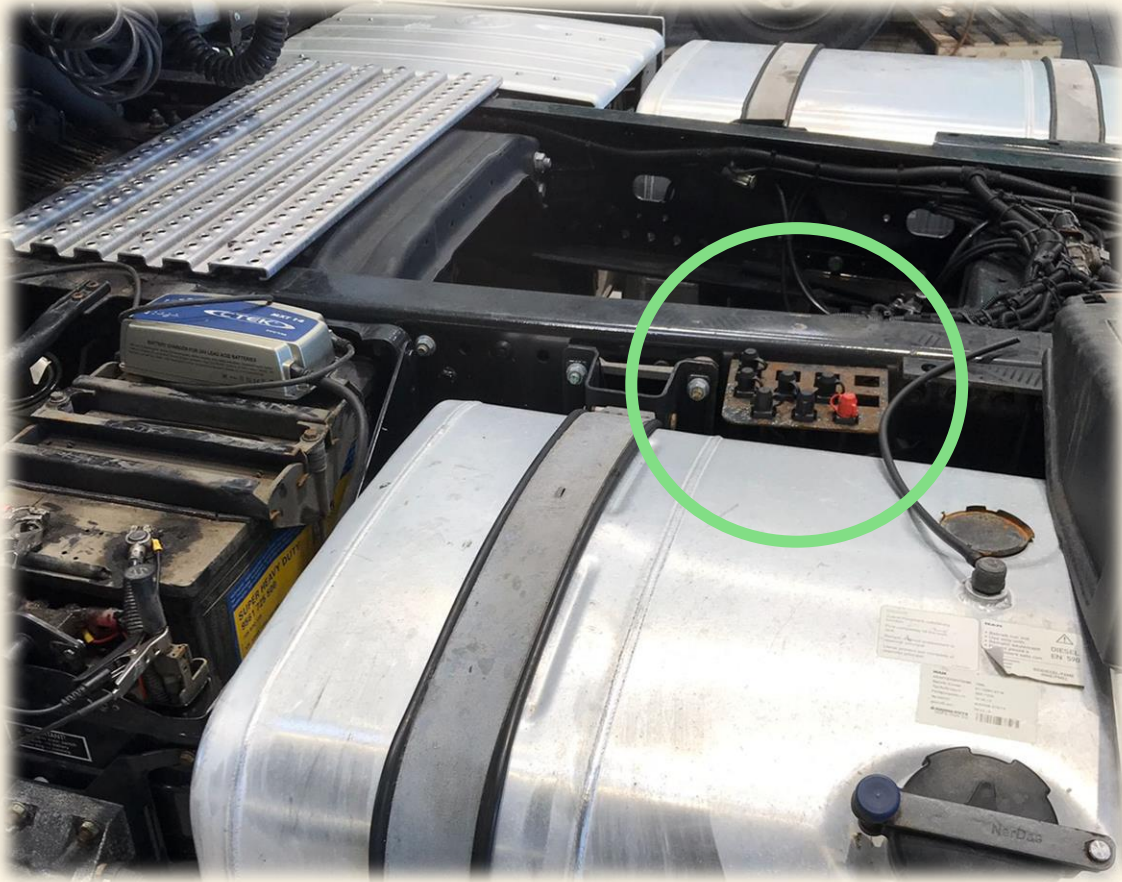
Sensor 2

Sensor 3

Conecting to brake actuators



Conecting to brake conectors panel



On side



Conecting to semi trailer conectors panel



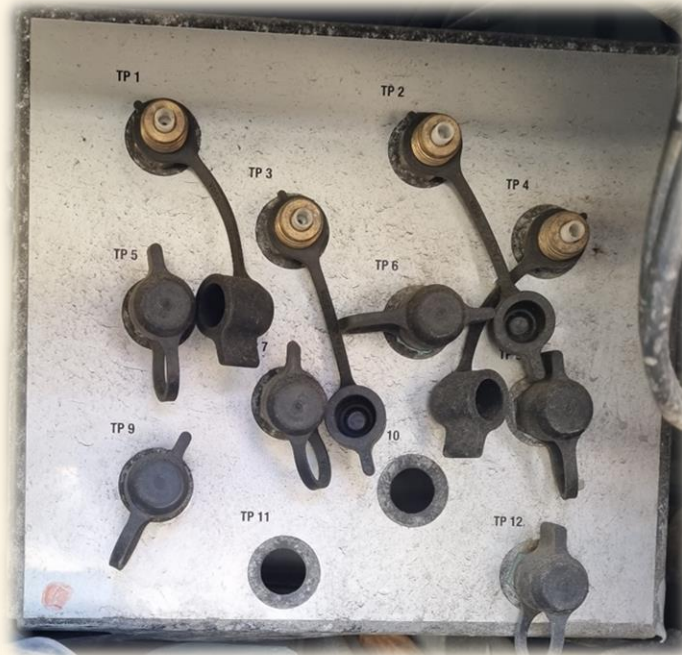
On side



Conecting to buses



Conectors panel



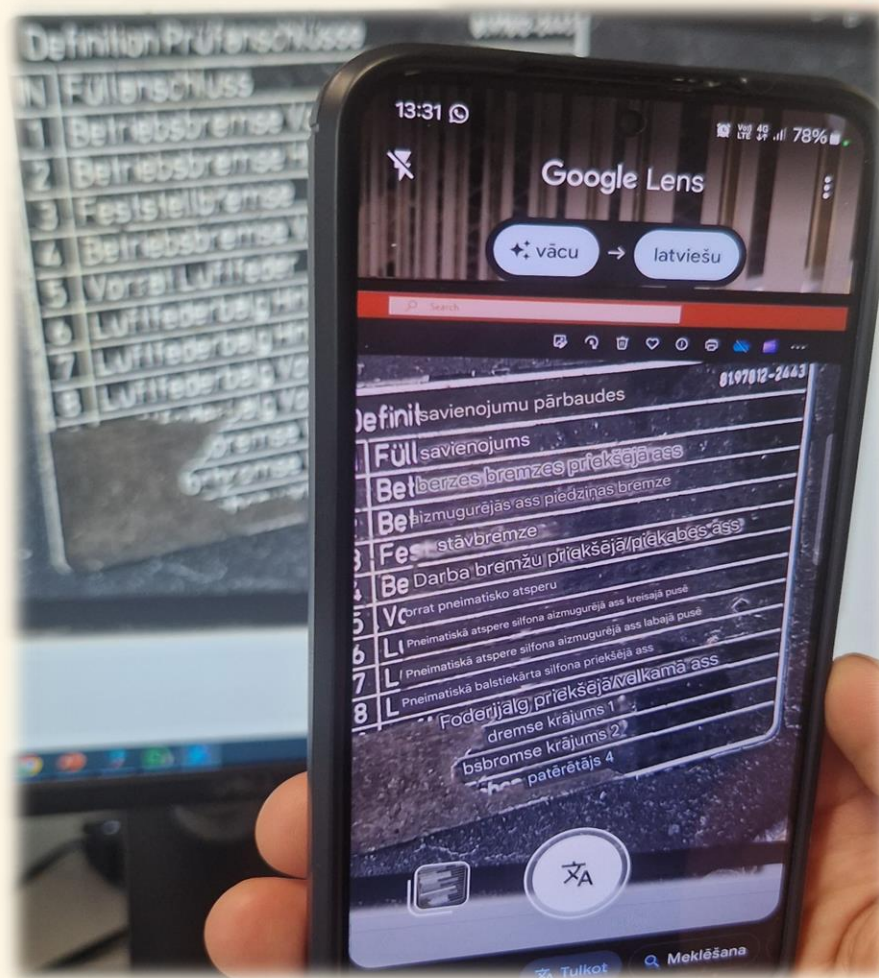
Information on connectors plate



8197812-2443

Definition Prüfanschlüsse

IN	Füllanschluss
1	Betriebsbremse Vorderachse
2	Betriebsbremse Hinterachse
3	Feststellbremse
4	Betriebsbremse Vor-/Nachlaufachse
5	Vorrat Luftfeder
6	Luftfederbalg Hinterachse links
7	Luftfederbalg Hinterachse rechts
8	Luftfederbalg Vor-/Nachlaufachse
	... Federbalg Vorrat 1
	... bremse Vorrat 2
	... bremse Vorrat 4





Measuring process



CSDD

MIN pressure and load requirements

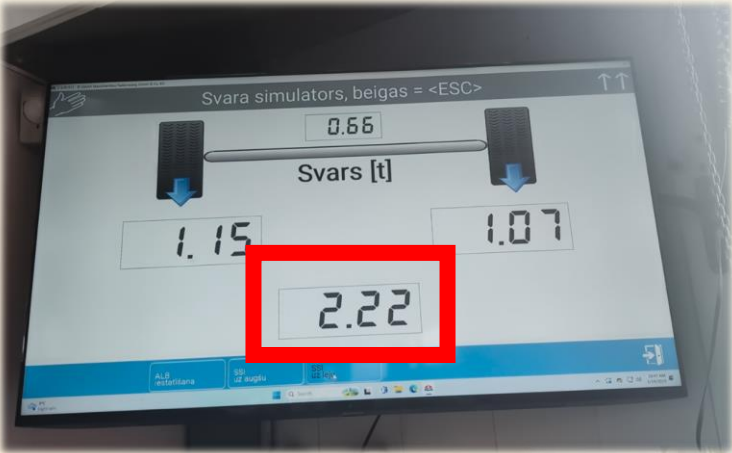
At least 30 % pressure from designed pressure

- *1.95 bar – Vehicle category O3, O4*
- *1.95 bar – Vehicle category M2, M3, N2, N3 up to 2012*
- *2.4 bar – Vehicle category M2, M3, N2, N3 starting from 2012*

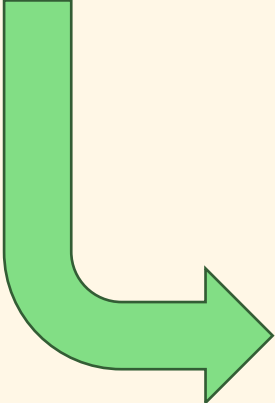
MIN 3,5t axle load need to be reached

Load simulation by lifting

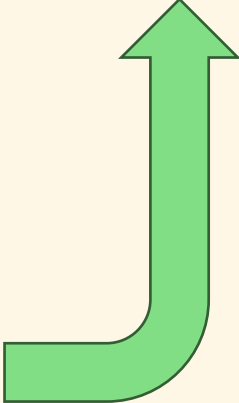
3,5 t



Before lifting



After lifting

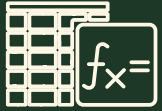


Brake force and pressure measurement

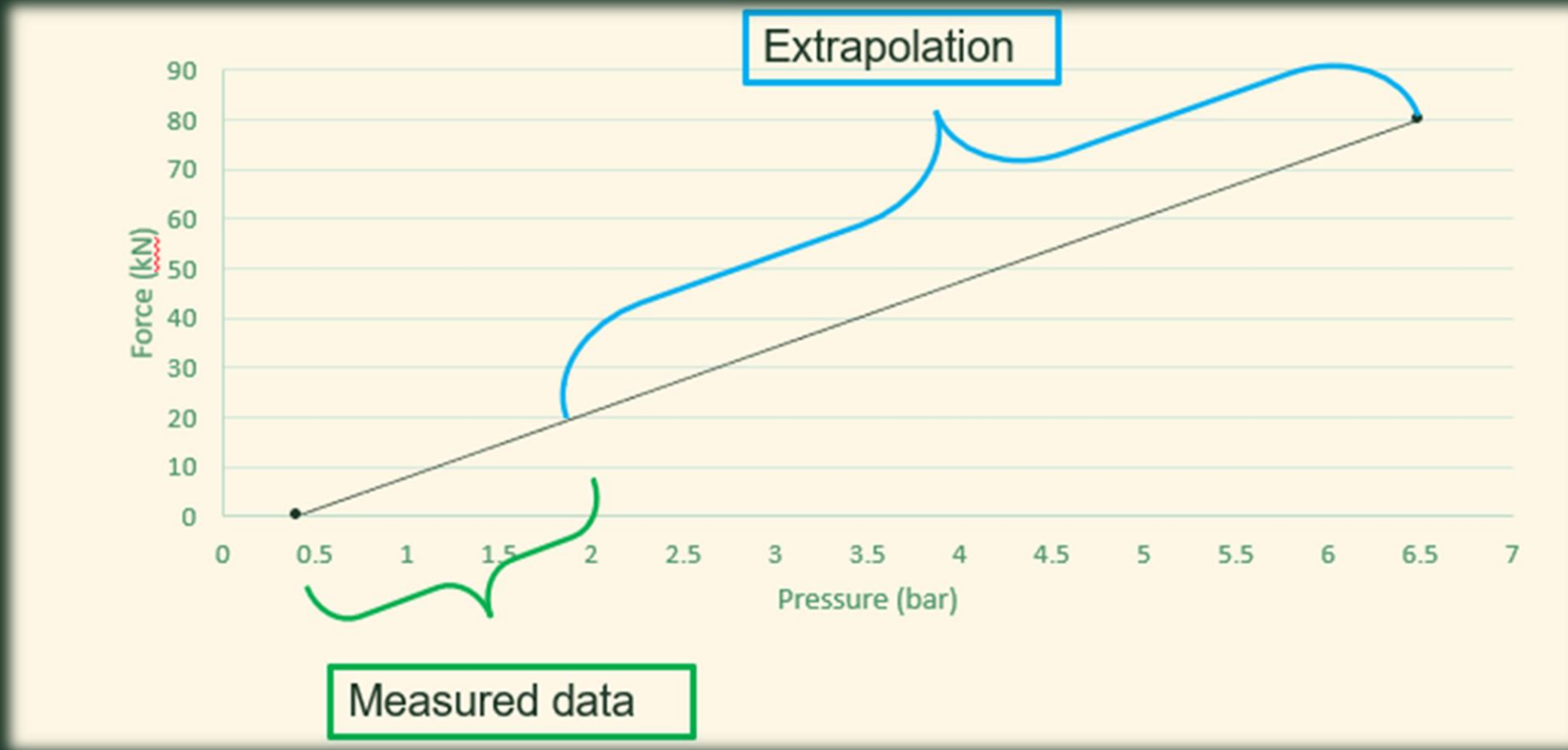
Pressure



Sum (kN) = 21,2



Calculation and extrapolation

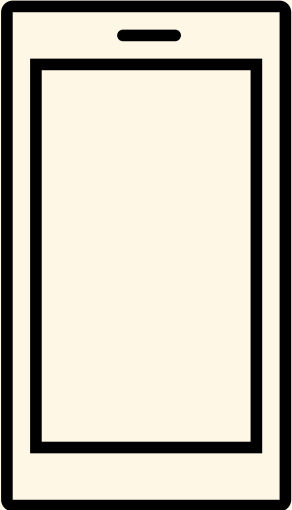


Data transfer



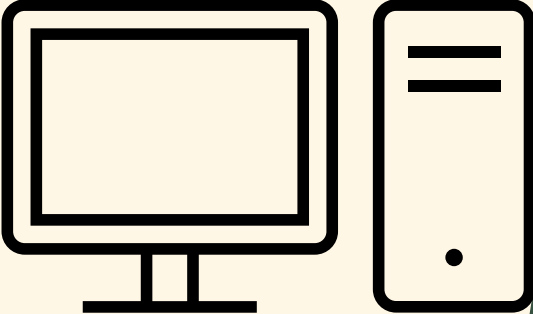
Brake tester

Measured data



Tablet

Data transfer



PTI program

Extrapolation and Calculation

Calculation & extrapolation

Efficiency

49%

Projektētais spiediens (bar):

6.5 8.0 Cits

Z vērtība:

0.49

Neizdevās:

	Kreisais	Labais	Defekts	Summa (kN)	Spiediens (bar)	Ass slodze (t)	Spēks (kN) pēc ekstrapolācijas	Defekts
Darba bremzes								
1	12.14	12.81	<input type="checkbox"/>	24.95	4.12	8	40.91	<input type="checkbox"/>
2	12.42	10.98	<input type="checkbox"/>	23.40	4.36	8	36.05	<input type="checkbox"/>
3	14.57	15.09	<input type="checkbox"/>	29.66	5.06	8	38.83	<input type="checkbox"/>

Measured data

Brake SUM

Calculated data

Extrapolation

Technical data

CSDD



Training

- Experience exchange from other countries
- Testing equipment & methodology
- Methodology & instructions
- Theoretical training of inspectors
- Practical training of inspectors
- Consultations & support



Implementation

- PTI station reconstruction (pit)
- New equipment
- New IT software (PTI program, data transfer tablet)
- Information for clients – prepare for PTI test connections
- Training inspectors
- Provisional statistical data analysis
- Efficiency evaluation after full implementation – aprox.

2026



Costs and benefits

Benefits

- **Wider brake force measuring range** to evaluate
 - Brake force difference on axle
 - Fluctuation
 - Variation in brake effort
- Easier to indicate problems in brake system –
pneumatic or mechanical

PTI prices

Vehicle category	Price
M2	€ 42.51
M3	€ 71.18
N2	€ 61.33
N3	€ 72.18
O3	€ 46.36
O4	€ 54.21

Most frequent deficiencies heavy duty vehicles

1	Suspension	25%
2	Lights	24%
3	Chassis, frame	24%
4	Brake forces	20%
5	Brake components	17%
6	Cabin, cargo space	16%
	...	
9	<i>Brake efficiency (provisional)</i>	<i>12%</i>

Total failure rate – 44%

CSDD

Thank you for attention!