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Testing of pneumatic brakes

Technical Department

- Testing method
- Calculation and extrapolation
- Technical data
- Training
- Test connections and sensors
- Implementation
- Measuring process
- Costs and benefits

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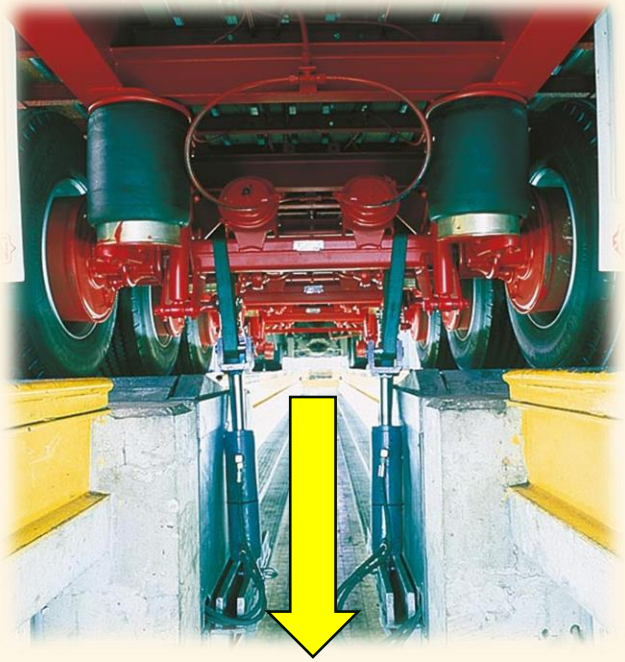
Testing method ISO 21069-1:2017

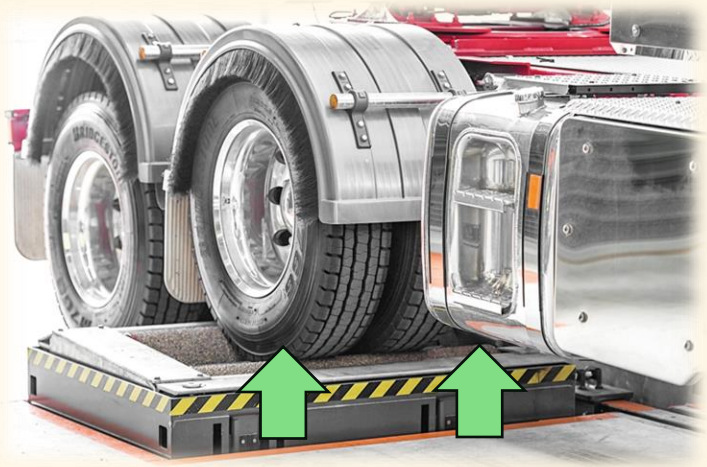
- Force and pressure measurement
- Load simulation
- Brake force extrapolation
- Calculation of the braking efficiency

Possible load simulation options

Pulling method



Lifting method



Loading with cargo

Brake testing in Latvia

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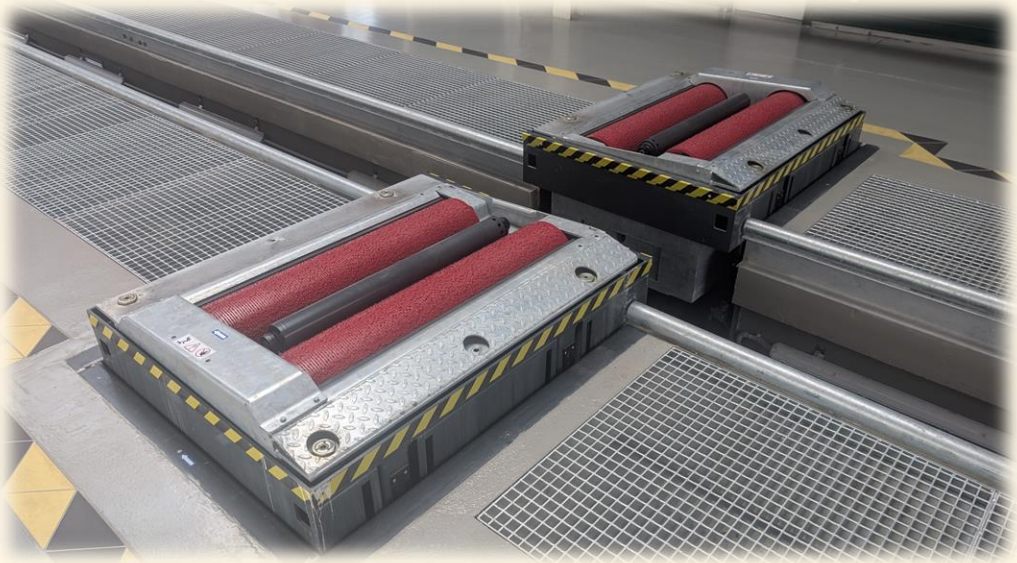
Equipment



Roller brake tester - lifting function (with scales)

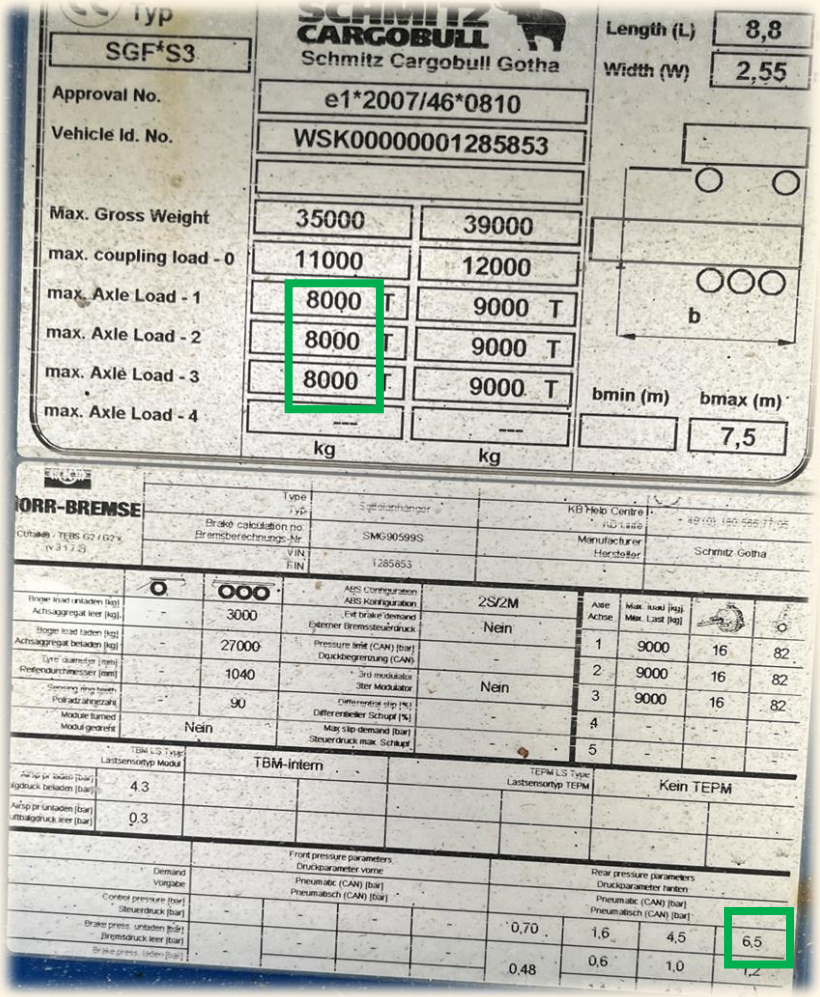
Wireless preasure sensors

Technical data

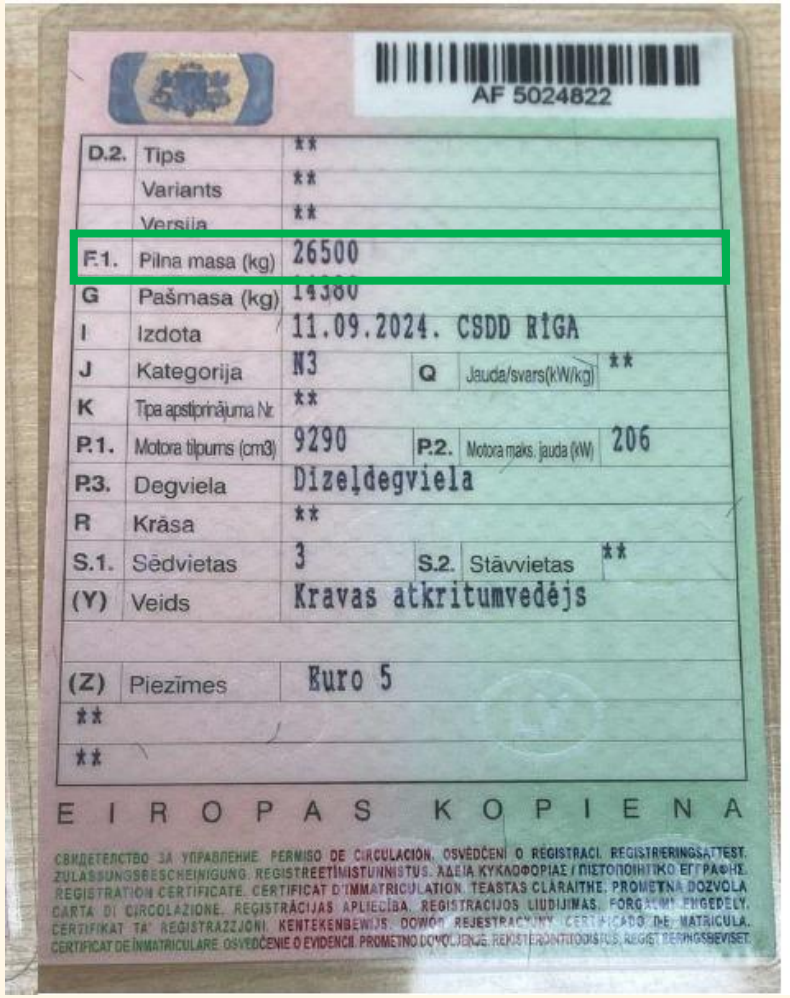
- Max axle load (for semi trailers)
- Max permissible mass
- Designed max pressure

Technical data

On vehicle data plate

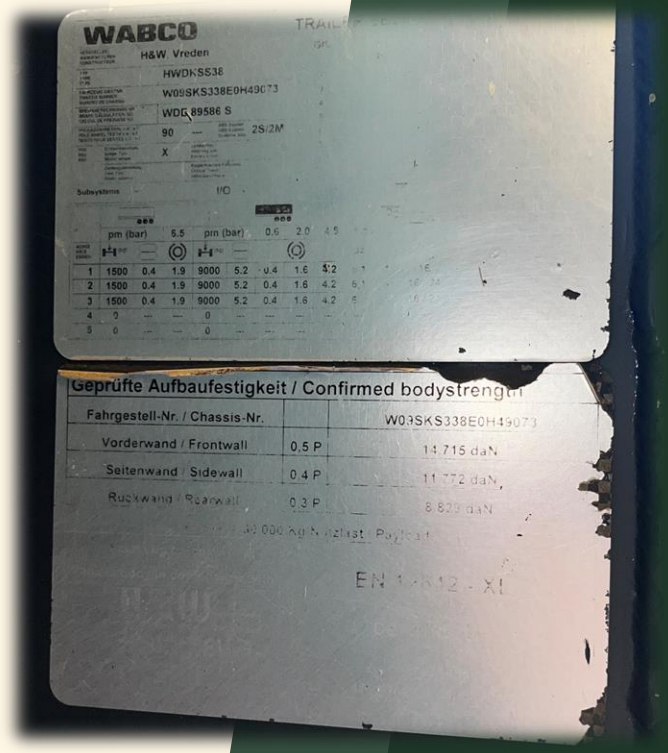


National vehicle data base / registration document



(p_3) 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	



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Test conections and sensors (preperation for measurement)

At least 3 pressure sensors

Sensor 1

Sensor 2

Sensor 3

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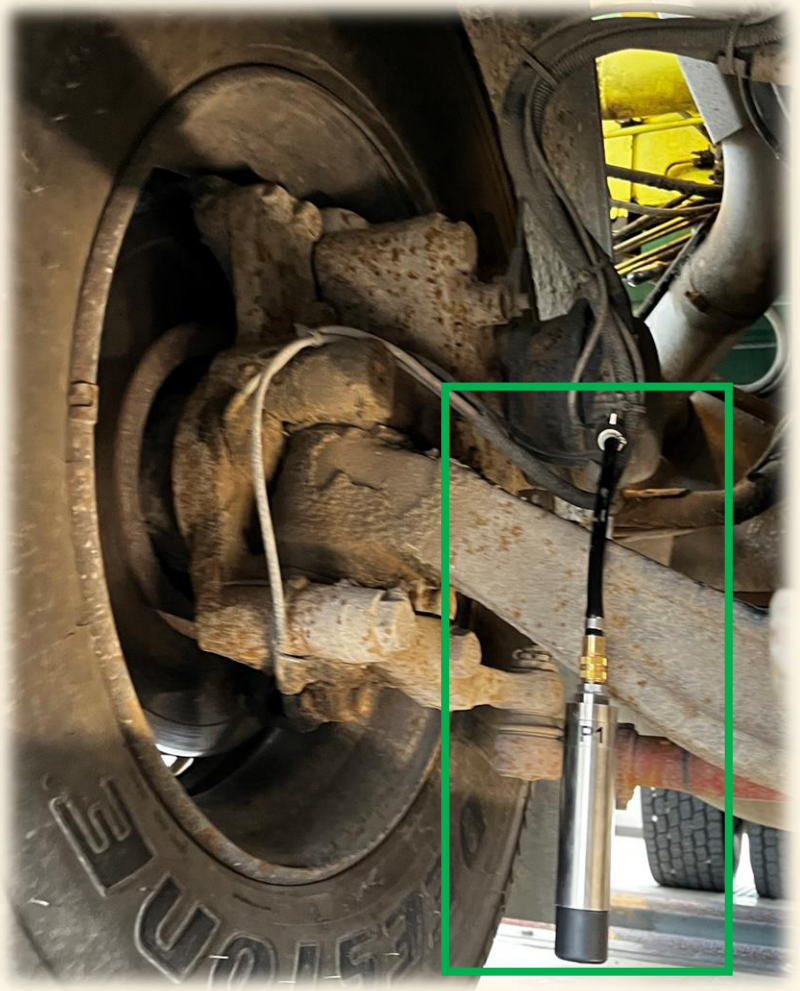
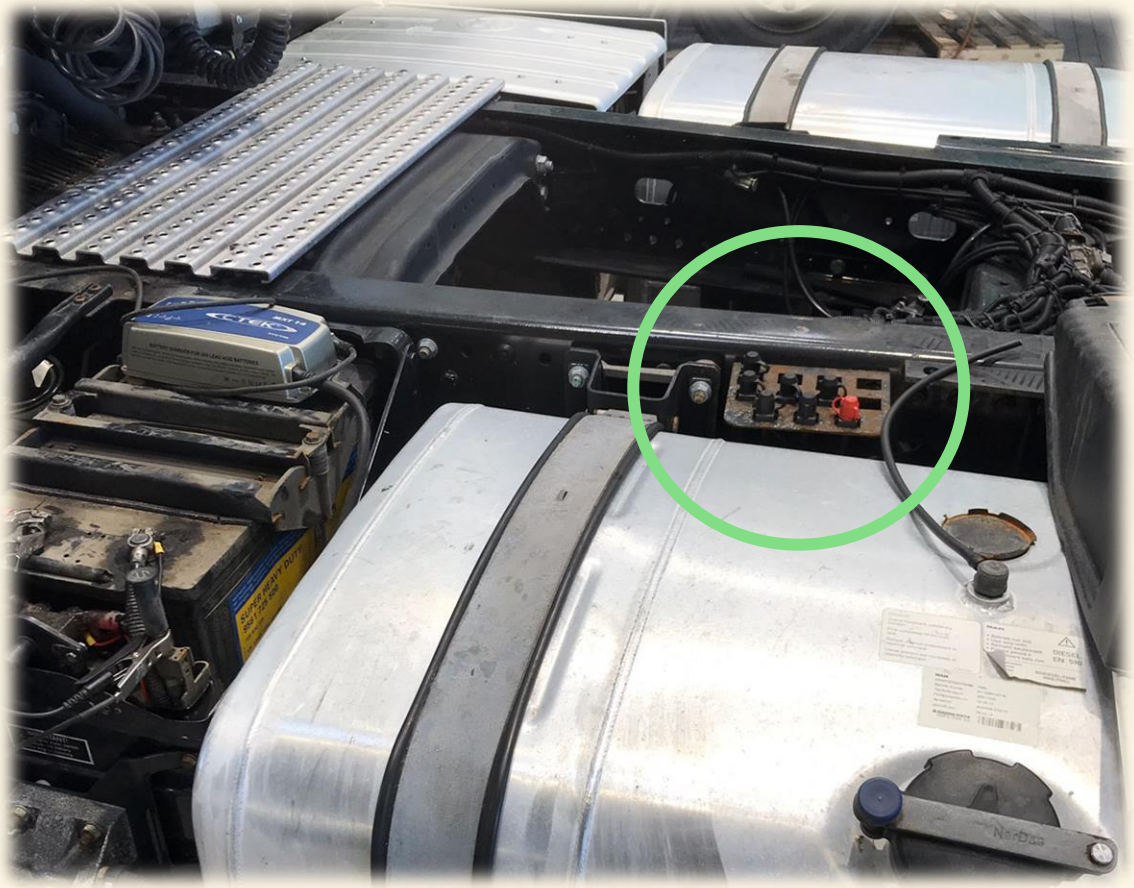
Conecting to brake actuators



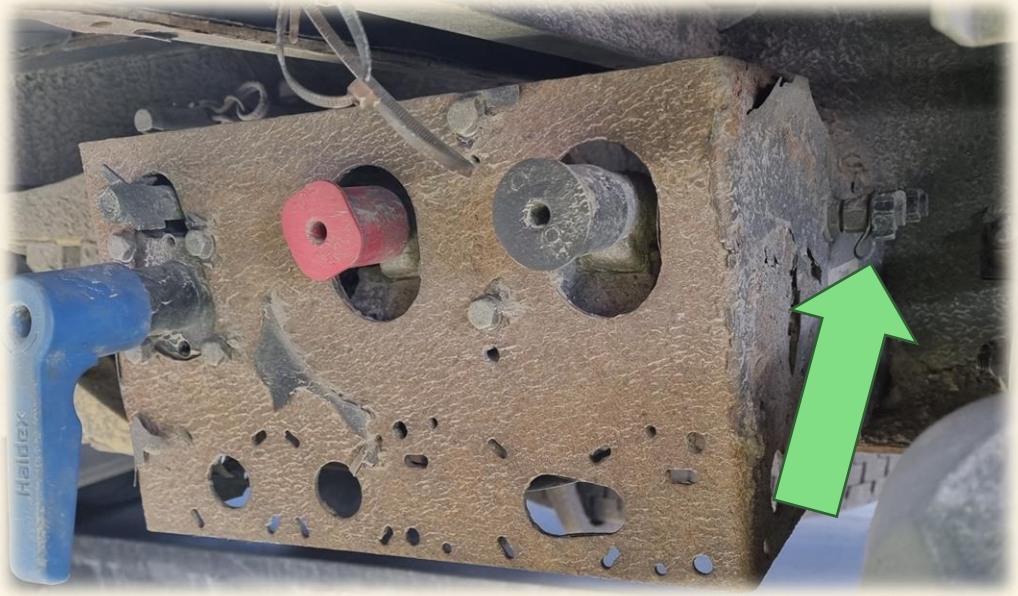
Conecting to brake conectors panel



On side

Conecting to semi trailer conectors panel

On side



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Conecting to buses

Conectors panel

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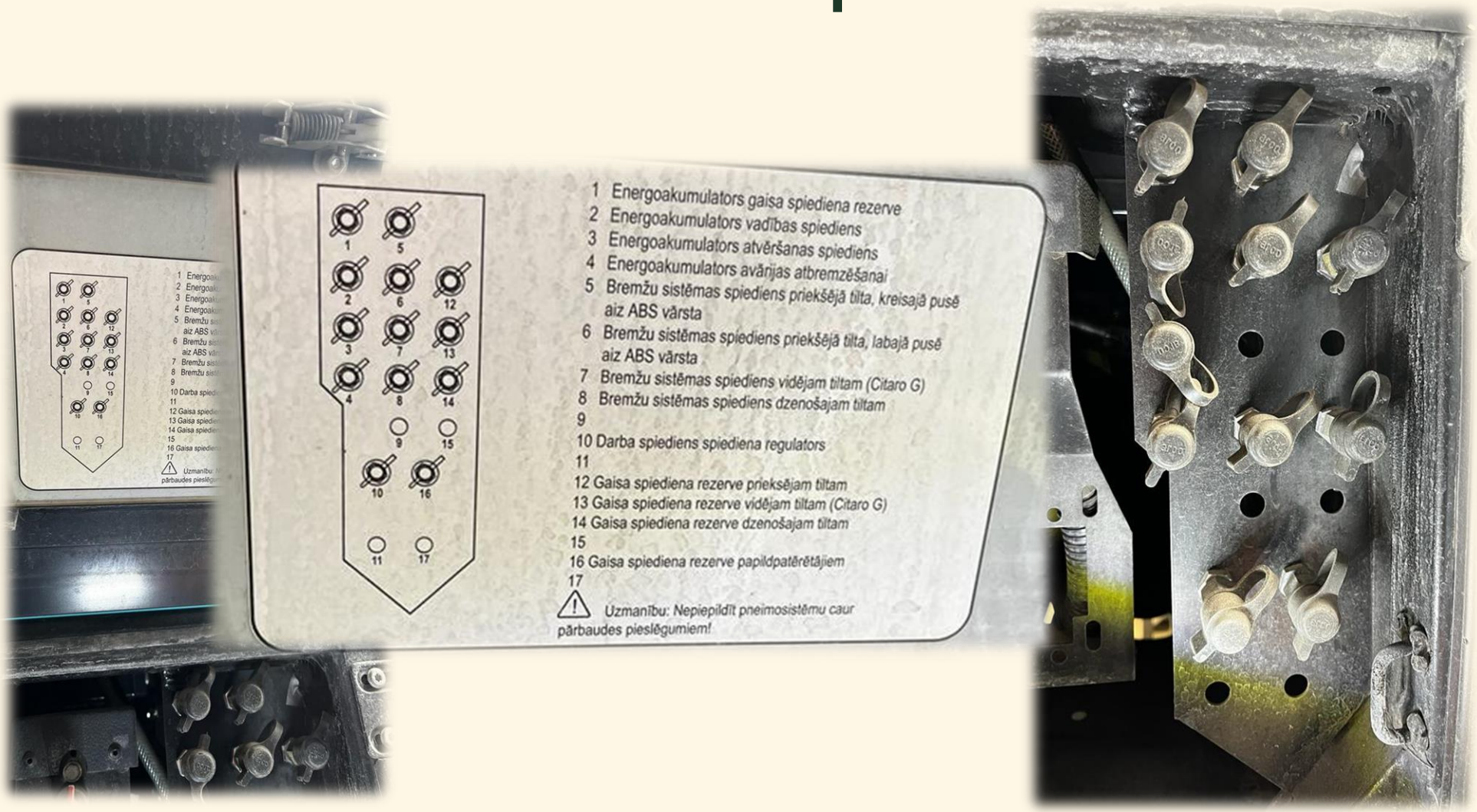
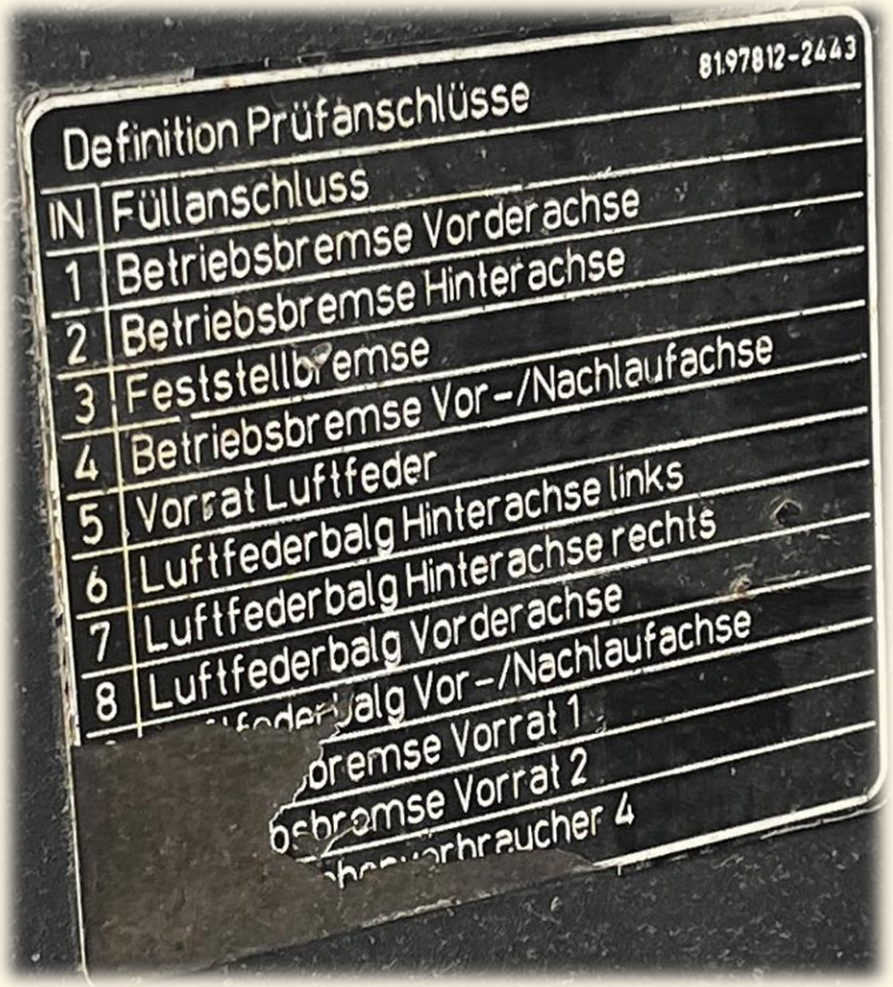
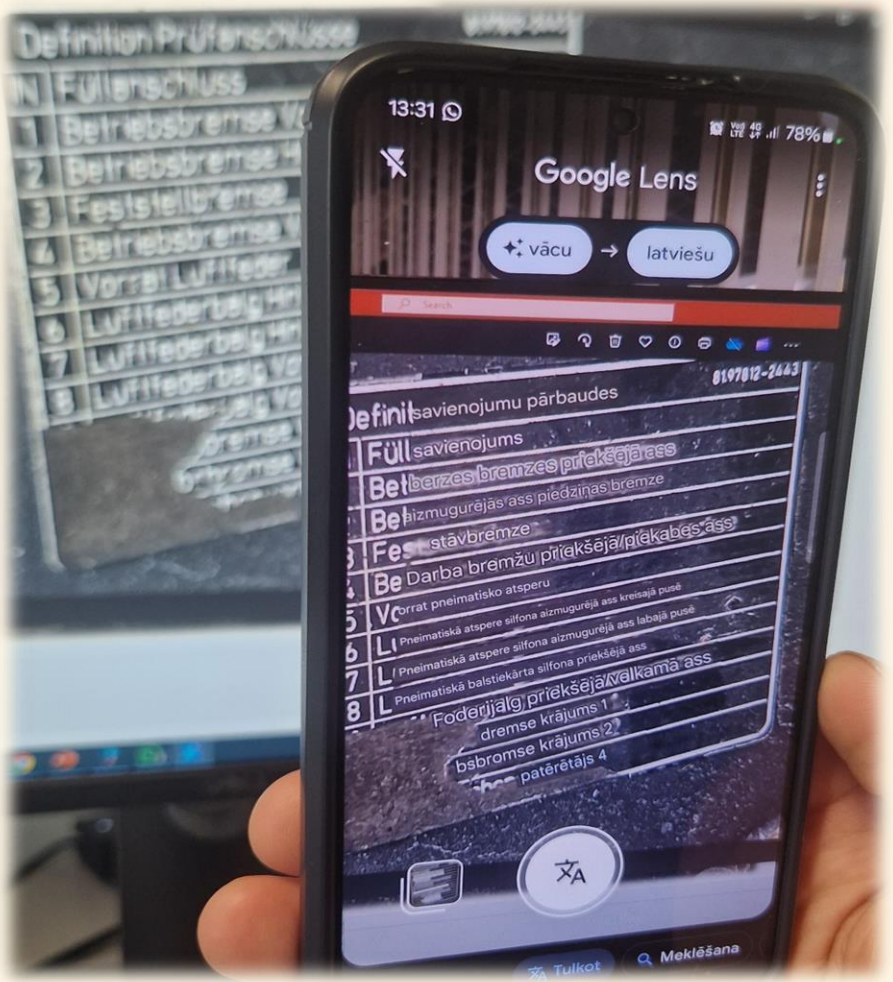
Information on conectors plate




81.97812-2443
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 Vorderachse
Luftfederbalg Vor-/Nachlaufachse
bremse Vorrat 1
bsbremse Vorrat 2
Verbraucher 4


13:31
78%
Google Lens
vācu
latviešu
81.97812-2443
savienojumu pārbaudes
savienojums
berzes bremzes priekšējā ass
aizmugurējās ass piedziņas bremze
stāvbremze
Darba bremžu priekšējā/piekabes ass
Vorrat pneimatisko atsperu
Pneimatiskā atspere sīlfona aizmugurējā ass kreisajā pusē
Pneimatiskā atspere sīlfona aizmugurējā ass labajā pusē
Pneimatiskā balstiekārta sīlfona priekšējā ass
Foderjalg priekšējā/velkamā ass
dremse krājums 1
bsbromse krājums 2
patērētājs 4
Tulkot
Meklēšana

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Measuring process

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*

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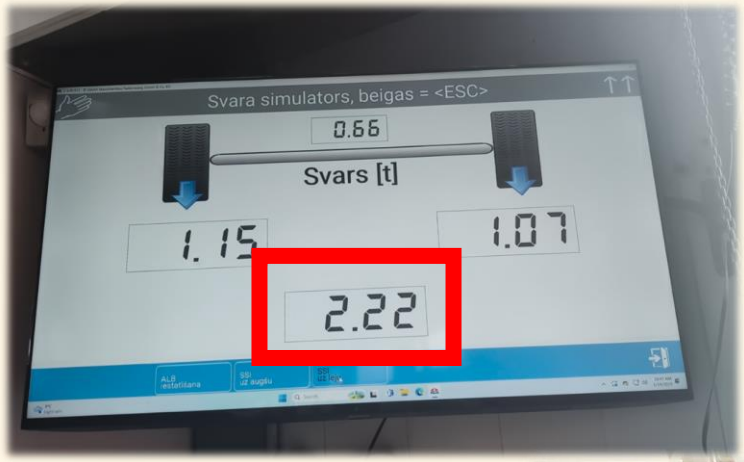
Load simulation by lifting



Before lifting

3,5 t

After lifting

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Brake force and pressure measurement

Pressure

Sum (kN) = 21,2

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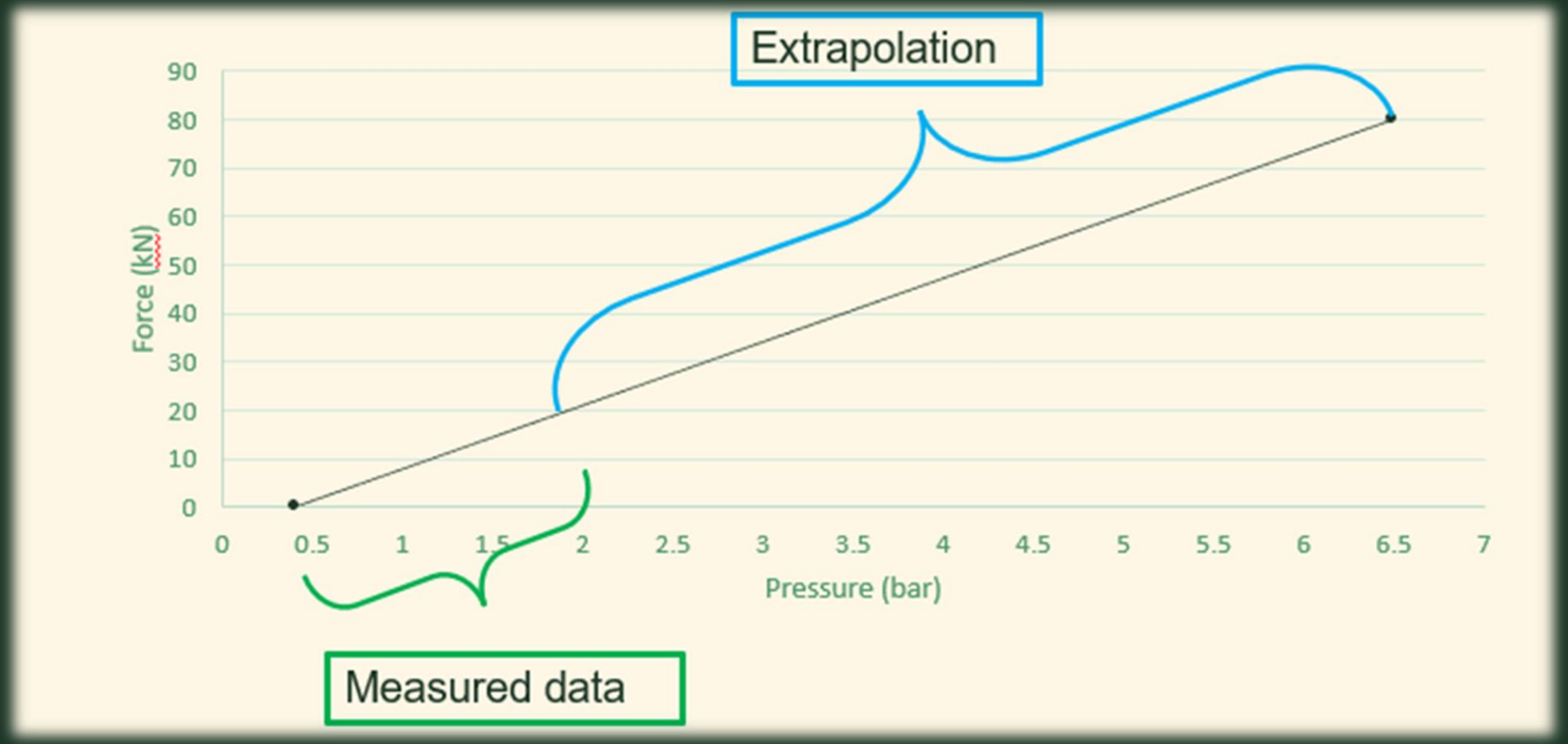
Calculation and extrapolation



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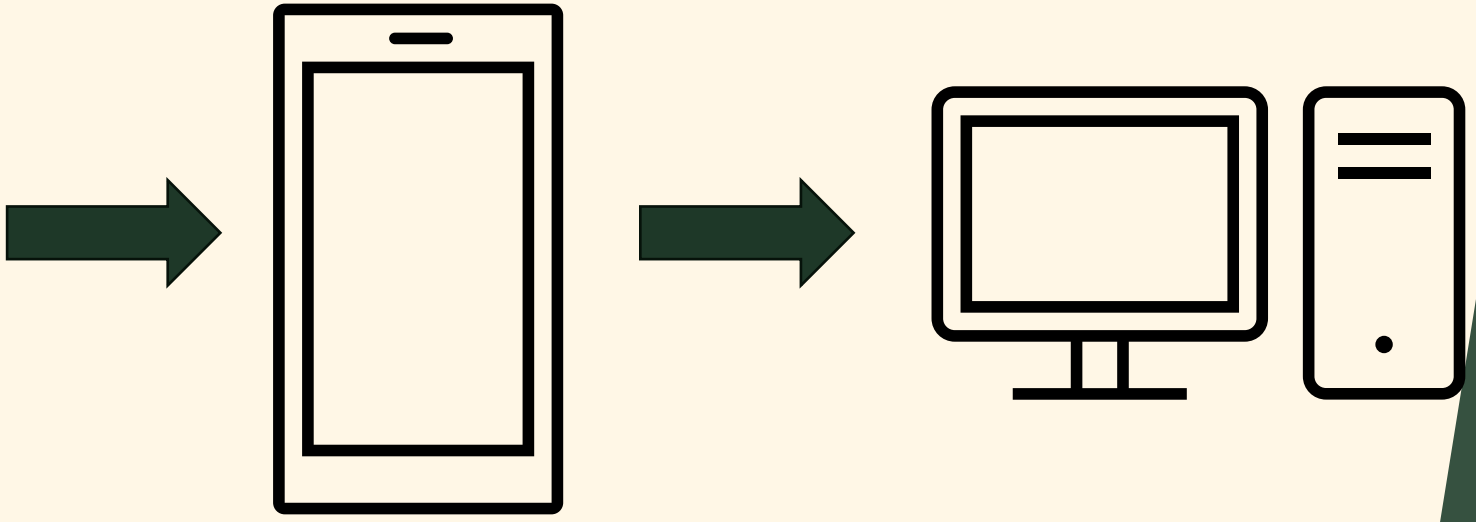
Data transfer

Brake tester

Measured data



Tablet

Data transfer

PTI program

Extrapolation and Calculation

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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	☐	24.95	4.12	8	40.91	☐
2	12.42	10.98	☐	23.40	4.36	8	36.05	☐
3	14.57	15.09	☐	29.66	5.06	8	38.83	☐

Measured data

Calculated data

Technical data

Brake SUM

Extrapolation

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Training

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

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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

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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**

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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	*Brake efficiency (provisional)*	*12%*

Total failure rate – 44%

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Thank you for attention!