

# Development, Testing and TSI-Certification of the New Bogie Mounted Tread Brake Unit for Freight Cars

- 
- Design and Function
  - Advantages
  - Testing and TSI Certification
  - Handling of the CFCB for Car Builder and Operator



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**Graz, 16<sup>th</sup> of September 2008**



## Conventional Freight Car Brake



Y25 bogie with  
brake rigging,  
brake triangles,  
hangers  
and brake shoes

Pull rod

Brake cylinder  
type "BG"

Slack adjuster  
type "DRV"

Pull rod

Y25 bogie with  
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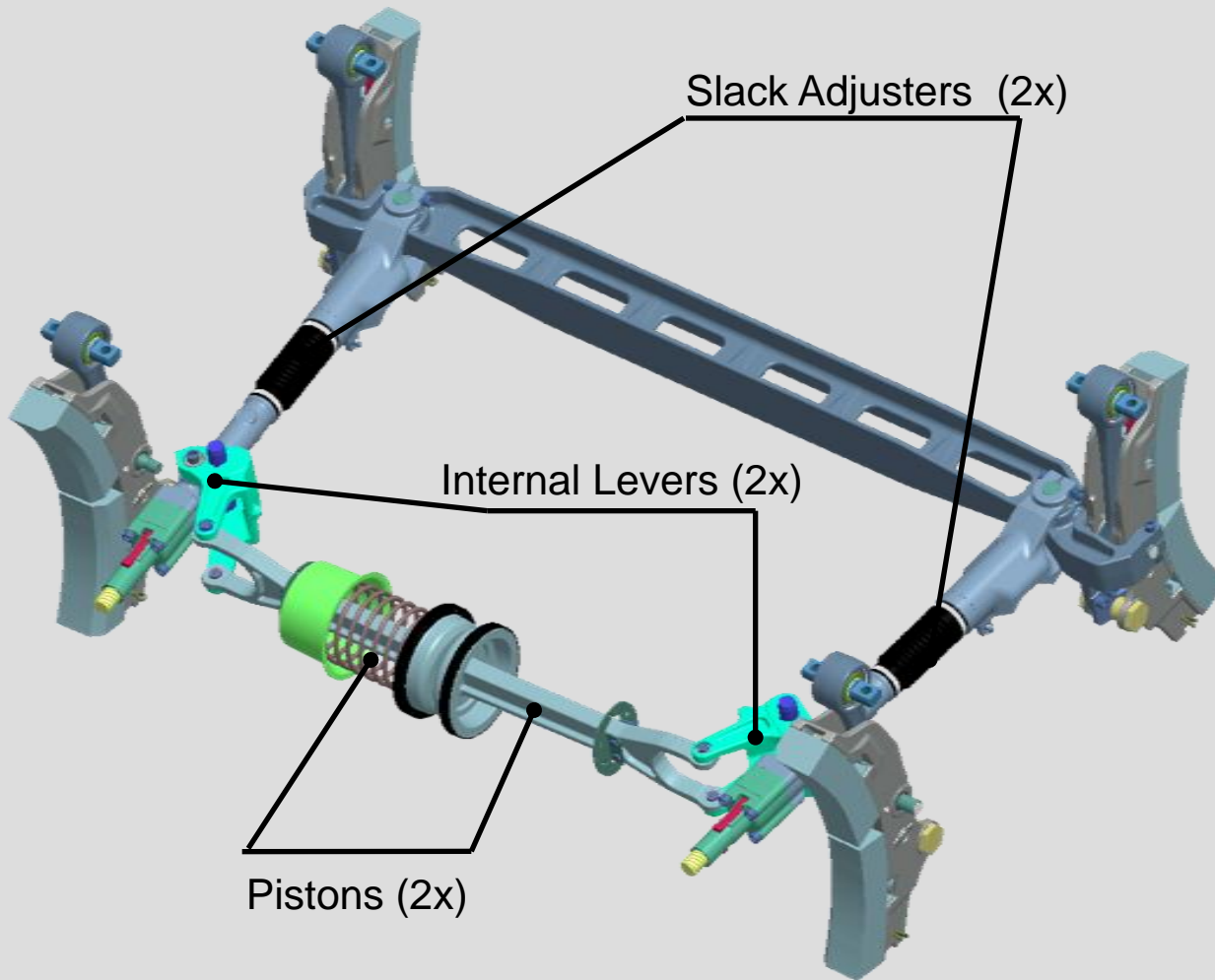
# Compact Freight Car Brake CFCB – Technical Data and Installation

Hangers (4x)

Brake application:	Single sided
Max. Block Force:	38 kN, (3,8bar)
Brake Cylinder:	Ø 8 inch
Internal Ratio:	2,5 to 3,85
Slack Adjuster:	single acting
Slack Adjuster Capacity:	205 mm
Weight:	< 250 kg

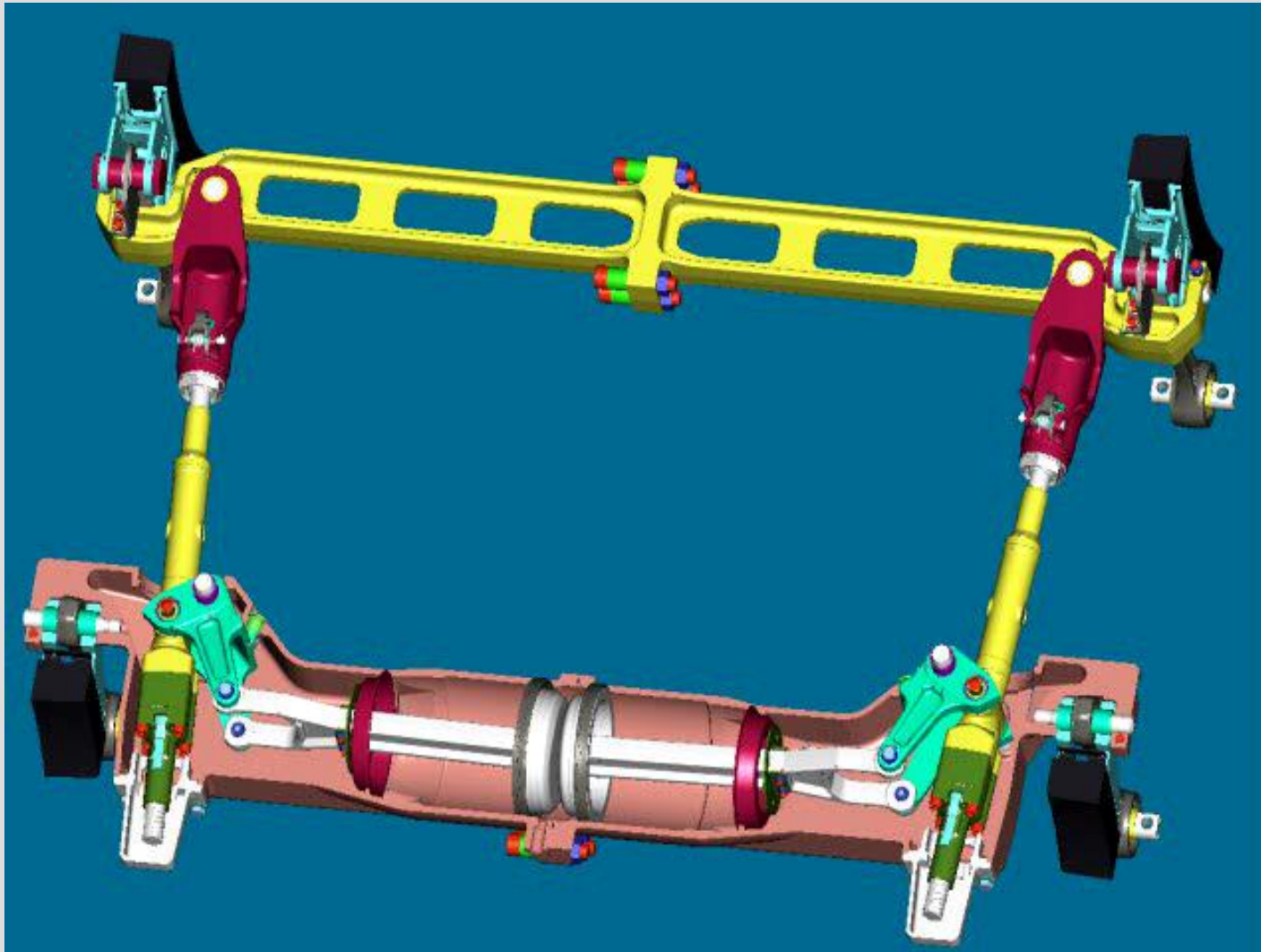


## CFCB – Design and Function – Service Brake

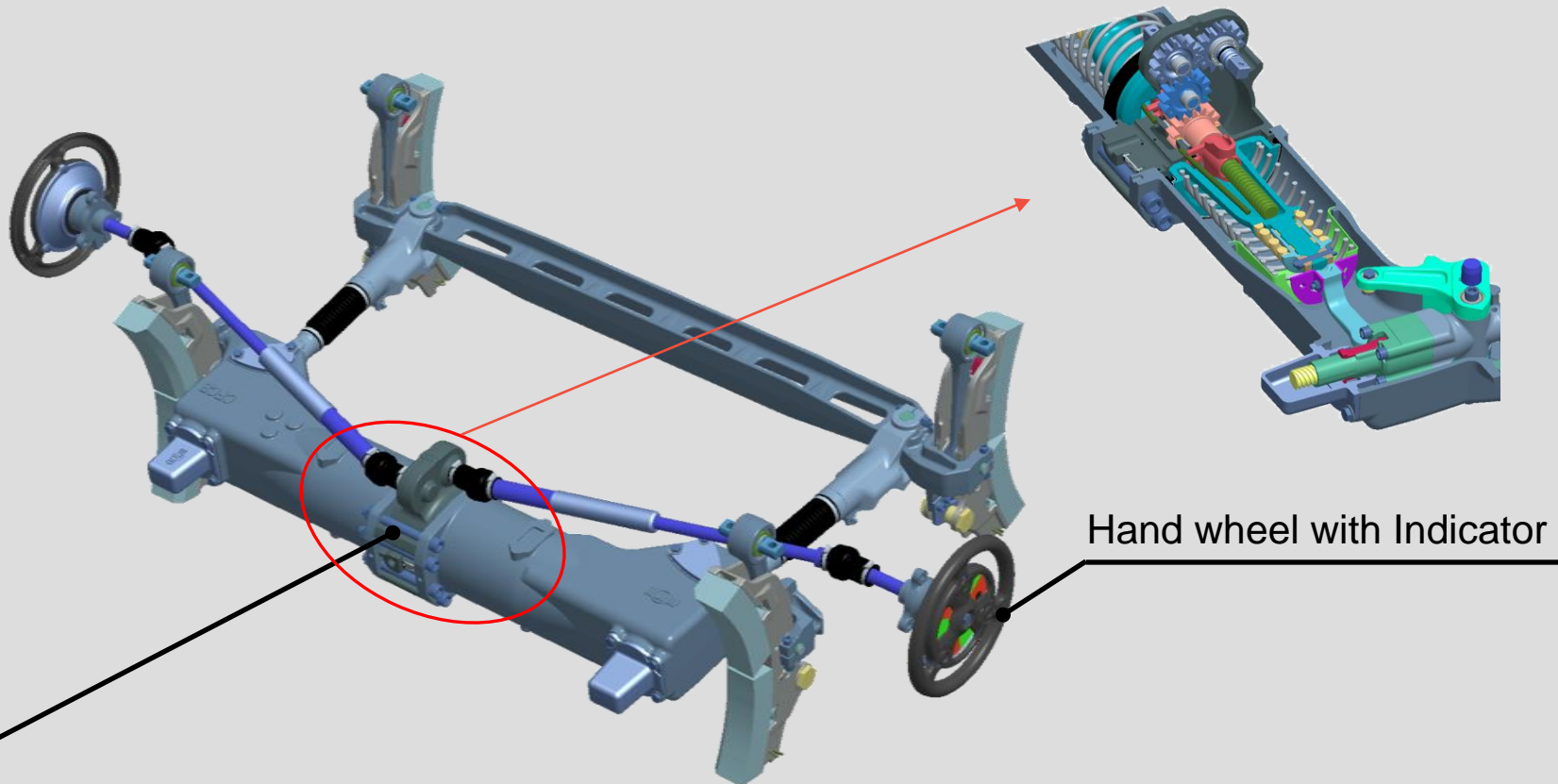


Brake cylinder:	Sealed in the housing
Transmission:	Sealed in the housing
Slack adjuster:	Single acting
	Sealed
Bushings:	Sealed
Suspension:	Rubber

## CFCB – Design and Function – Service Brake



## CFCB – Design and Function – Manual Parking Brake



- Constant Efficiency
- Sealed Transmission, no Maintenance
- Modular Design, Identical Parts

## CFCB - Advantages

- **Low Noise:**
  - Small number of bearings with low clearance
  - Vibration damped suspension
- **Improved Design:**
  - Modularized and standardized design, variable internal ratio
  - Full automatic compensation of block and wheel wear
- **Reduced LCC:**
  - Maintenance free also under severe environmental conditions
  - High, constant efficiency ( $\eta = 0,95$ ), Low hysteresis
  - Less air-consumption, up to -60%
- **Low weight :**
  - Up to 1000 kg less weight

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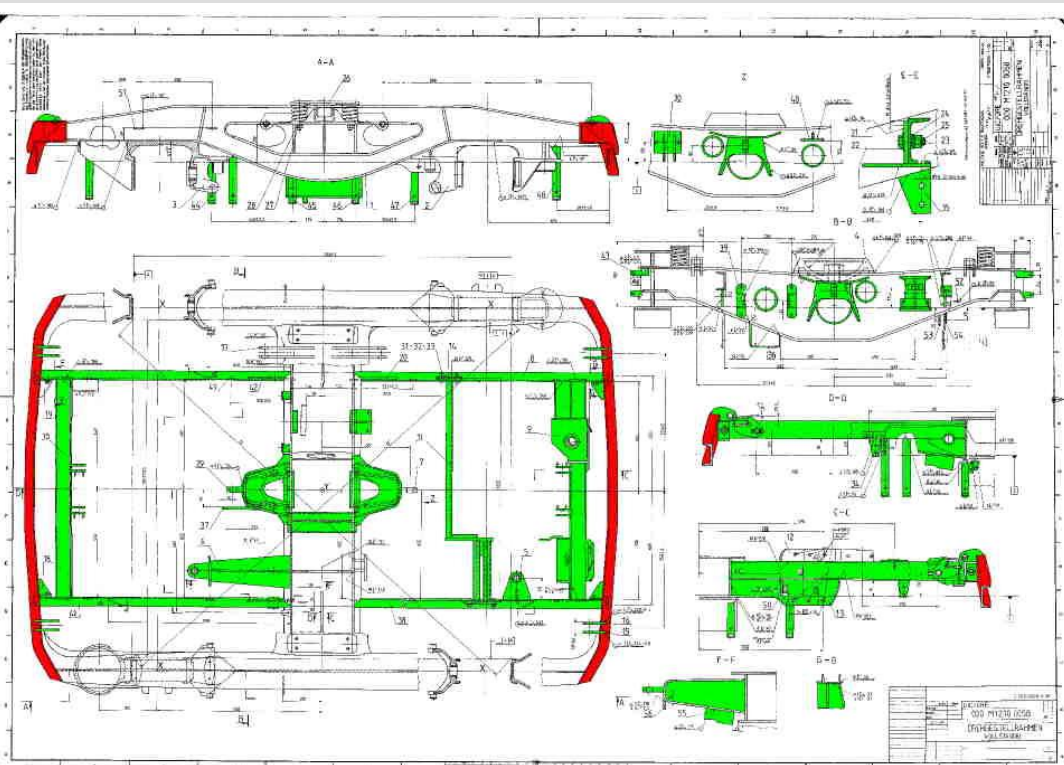
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## CFCB – Advantages - Low weight

**Drawing of standard Y25i bogie frame  
(000 M1210 0058 UIC/ORE):**

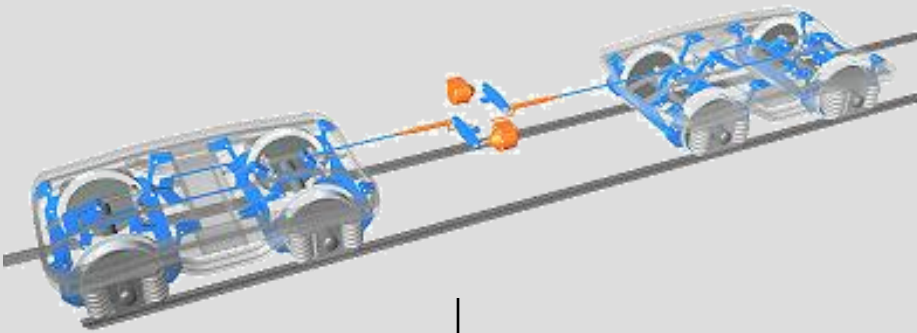
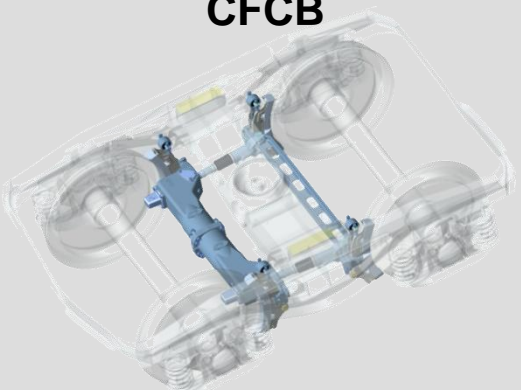
the green coloured parts of the bogie frame are not needed when using the Bogie Mounted Tread Brake PDC8.



**Y25 TTV Fa. Kockums:**



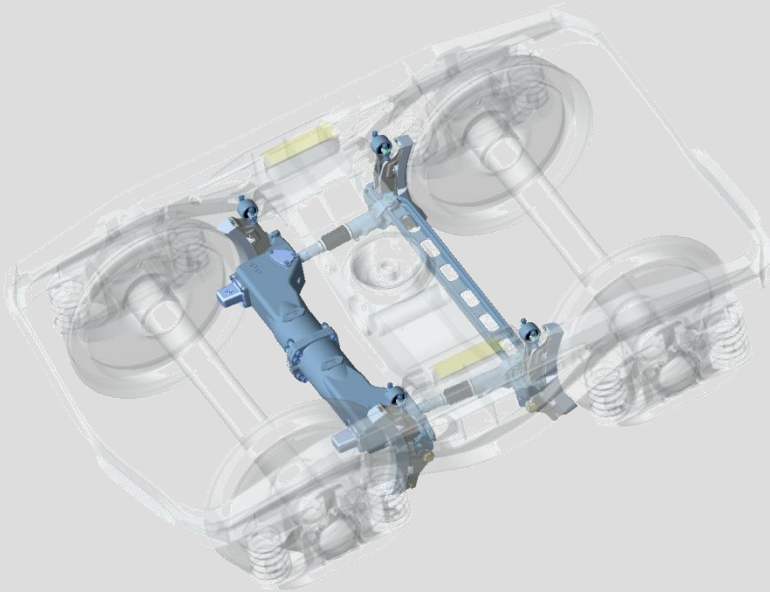
## CFCB – Advantages - Low weight

	Conventional brake equipment		CFCB
	GG-block (2xBgu)	Comp. block (2xBg)	Comp. block (1xBgu)
<div> <div></div> : car body  <div></div> : bogie </div>			
brake cylinder slack adjuster brake rigging brake suspension	496 kg	426 kg	- kg
brake rigging brake suspension	1408 kg	1136 kg	550 kg
<b>total weight</b>	1.904 kg	1.562 kg	550 kg
<b>Weight saving per wagon</b>	<b>1.365 kg</b>	<b>1.012 kg</b>	<b>- kg</b>



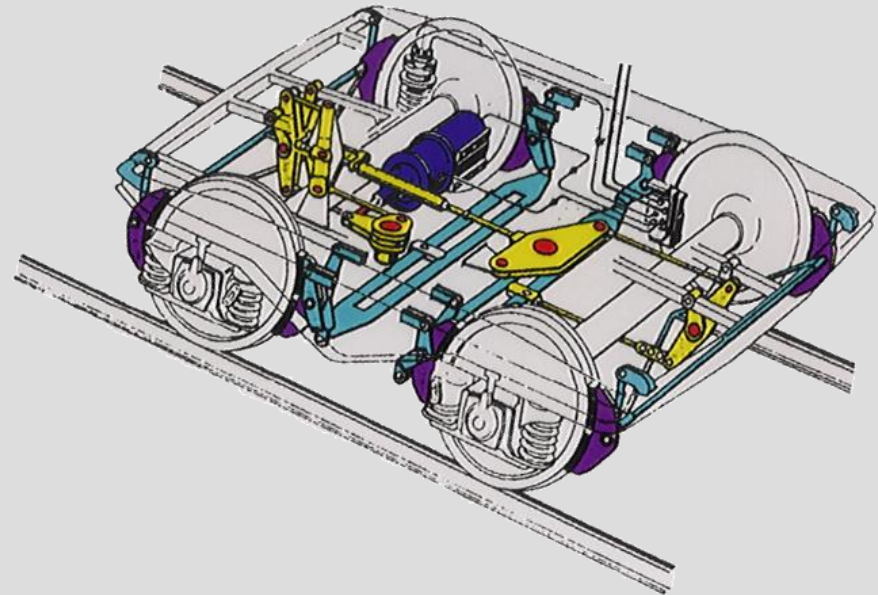
## CFCB – Advantages - Low weight - Tanoos Wagon

**CFCB with composite blocks  
Standard Y25 bogie**



Weight per wagon including brackets  
and two CFCBs  
**550 kg**

**Conventional bogie mounted brake equipment  
with composite blocks  
Standard Y25 bogie**

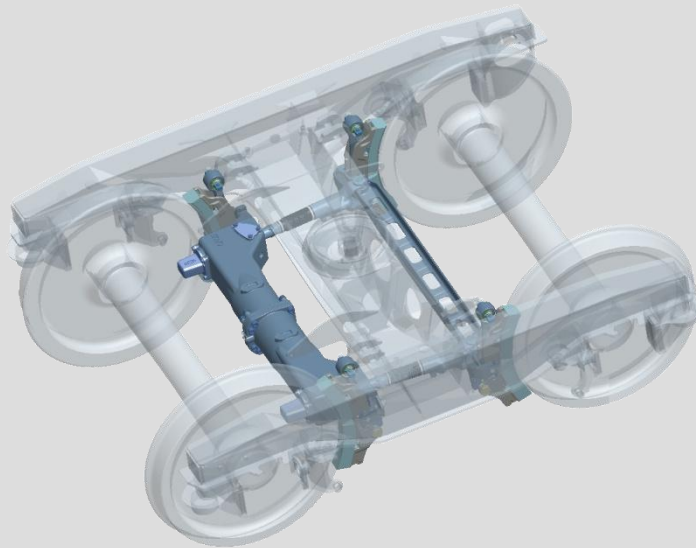


Weight per wagon including rigging  
and brake system  
**1070 kg**

Weight saving per wagon  
**520 kg**

## Low weight - Dangerous Goods Wagon – Feldbinder/ELH

CFCB with composite blocks  
Y25Lsi-C bogie without front beams  
Designed by ELH

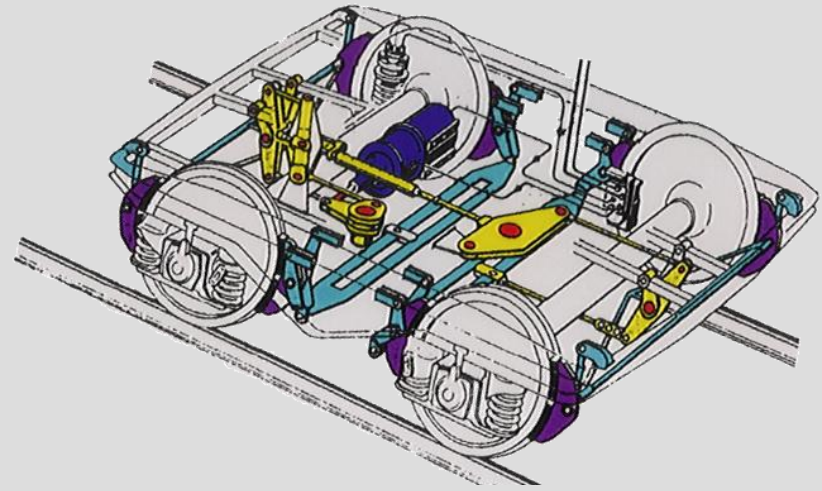


Weight per bogie including brackets and CFCB

**4153 kg**

**4205 kg** (including a bogie mounted manual parking brake)

Conventional bogie mounted brake equipment  
with composite blocks  
Standard Y25 bogie



Weight per bogie including rigging and brake system

**4480 kg**

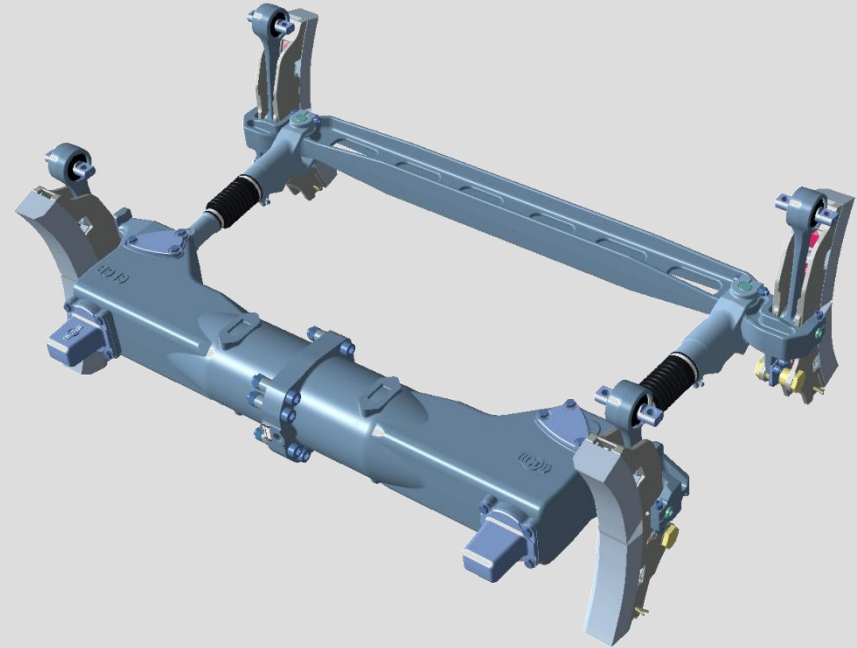
**4591 kg**

Weight saving per wagon

**654 kg**

**713 kg** (including a bogie mounted manual parking brake)

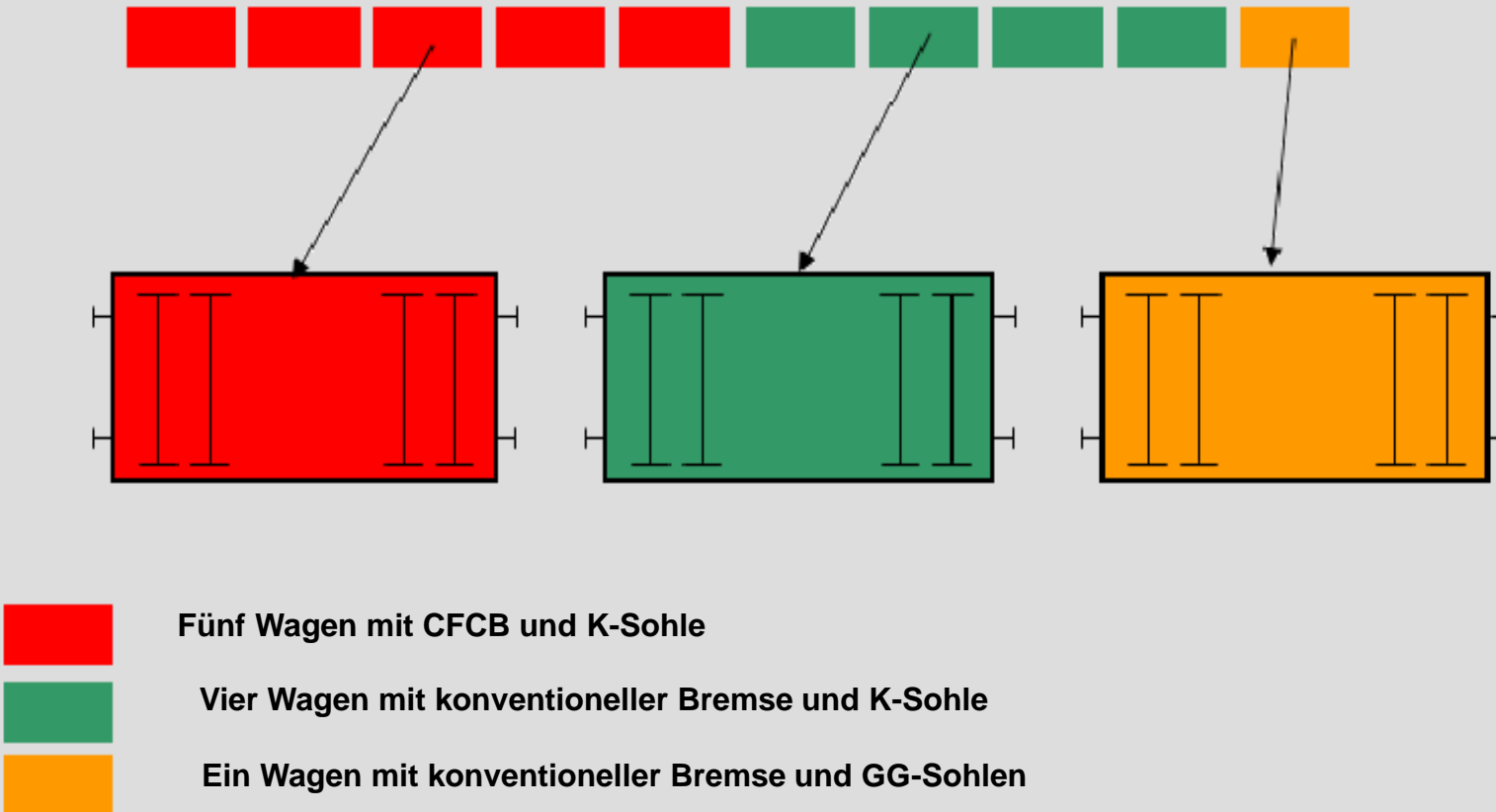
## CFCB – Brake Performance Test according to UIC-544-1



### Results

- CFCB was released for S- and SS application by DB expertise 06-TZO-31/00/016-13-01
- Maximal measured wheel temperature after 25km/360KW haul drive:
  - 380°C (Cosid 810)
  - 300°C ABEX 333-1

## CFCB Field Test – Arrangement of the test wagons

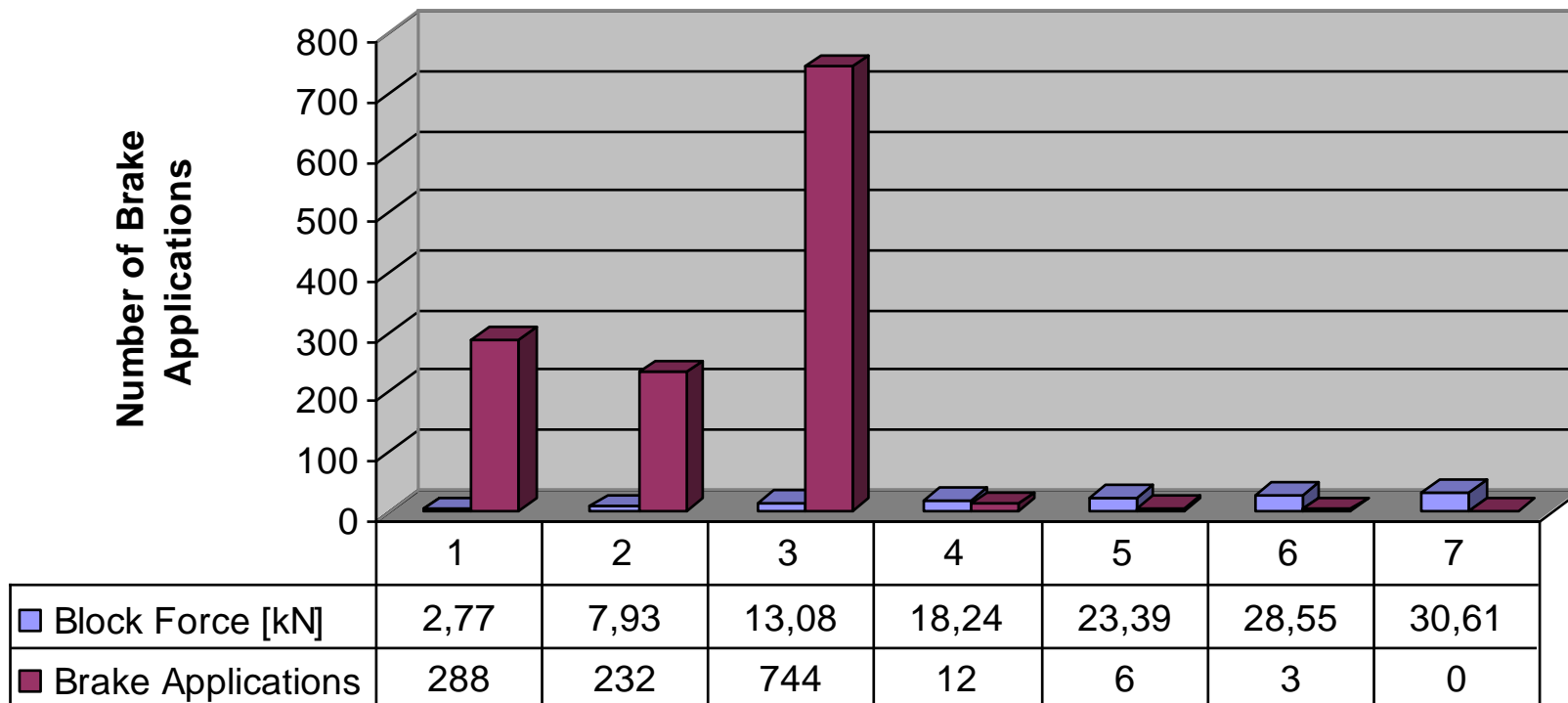




## CFCB - Field Test Result - Recording of Brake Applications

### Number of Brake Applications related to the Block Force

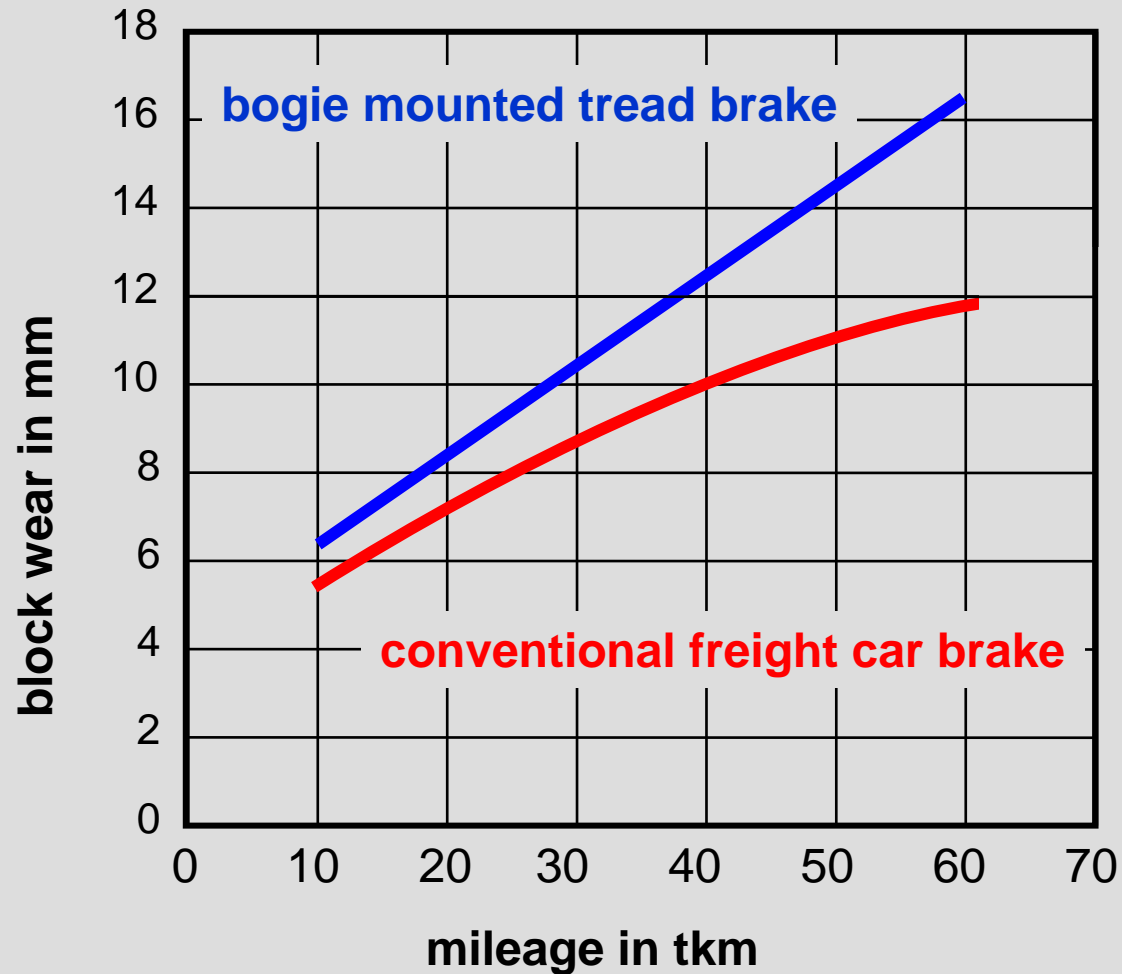
Recorded at Tanoos Wagon during three months and 14370 km



1,3 bar

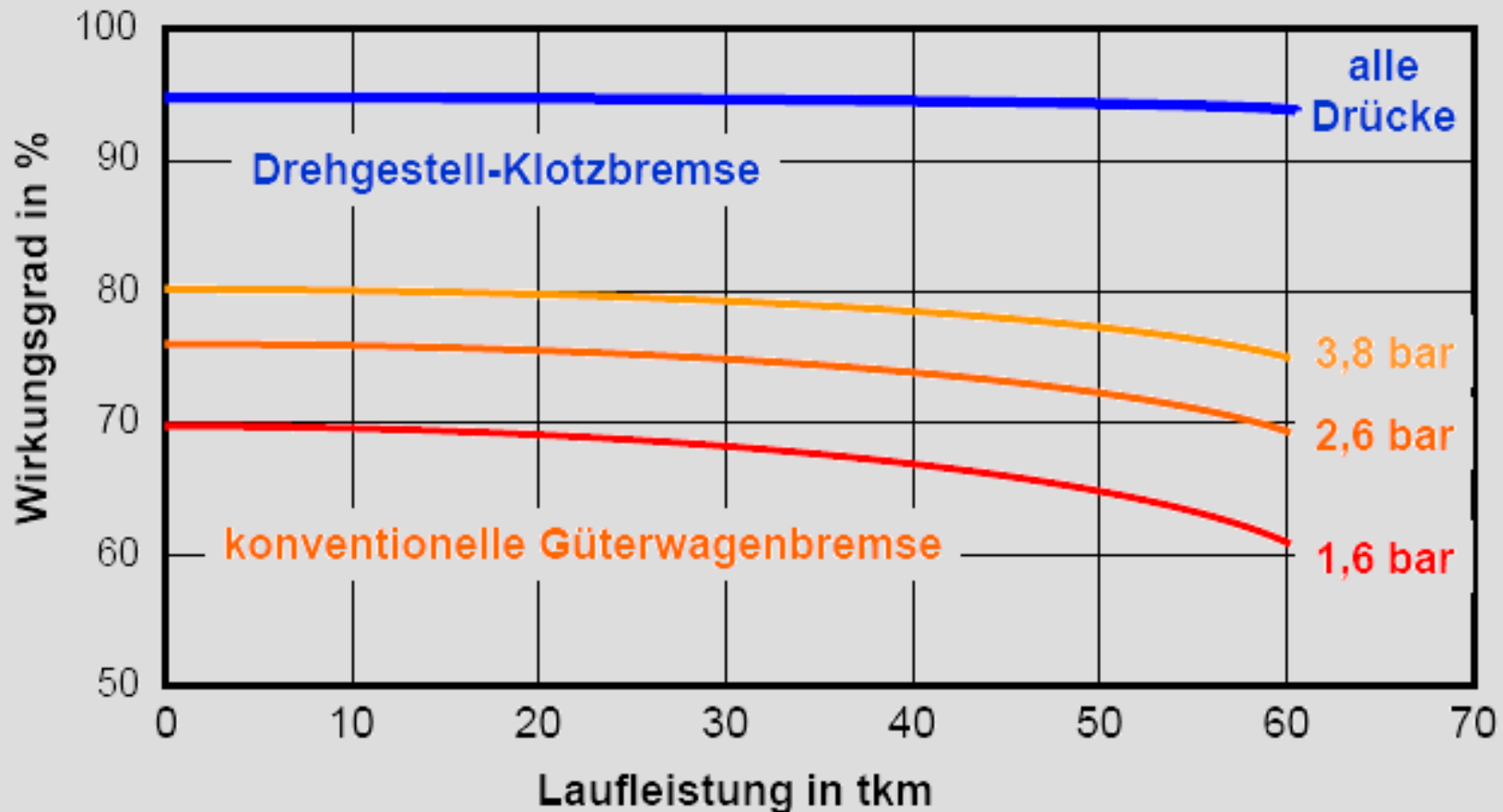
3,1 bar

## CFCB- Field Test Result - Block Wear in mm



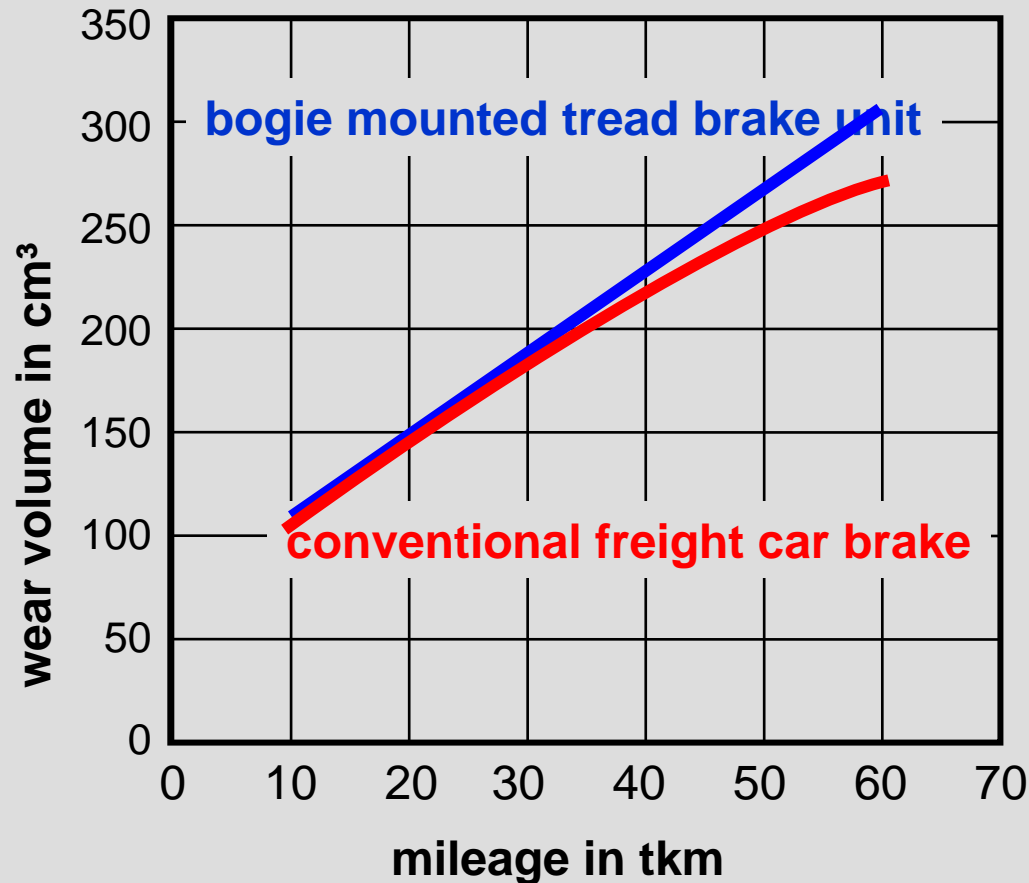
The block wear in mm seems to be smaller at the conventional freight car brake

## CFCB - Field Test Result – Static Efficiency



After 60.000 km the static efficiency of the CFCB units is still higher than 90 %. For the relevant piston pressures the efficiency of the conventional units is only between 60 % and 65%.

## CFCB- Field Test Result - Block Wear in cm<sup>3</sup>



- Up to 40.000 km block wear in cm<sup>3</sup> of the CFCB is equal to the block wear of the conventional units
- After 60.000 km block wear in cm<sup>3</sup> of the CFCB, is higher than the block wear of the conventional units

**This is caused by the poor and degreasing efficiency of the conventional equipment**



## CFCB - TSI Certification

**TSI:** Technical Specification for Interoperability  
A TSI Certification is accepted in all European countries  
and allows the car builders an easy accreditation of their freight cars.

The following verifications have been carried out  
according to the guideline 2001/16/EG and the TSI for freight cars

Module B: Type Test  
Check of drawings and Documentation

Module D: Quality Check  
Inspection of the production site

Module V: Field Test  
A field trail including function tests and finale disassembly

**The TSI certification was issued the 12.11.2007**

The certification has been carried out by **DB AG** as the Associated Partner and the **EBC** as the Notified Body

## CFCB - Handling of the CFCB for Car Builder and Operator

An independent company (Gmeinder Lokomotivenfabrik GmbH) carried out some typical investigations concerning handling and repair of the CFCB. The efforts are documented as below.

Action	Needed Time
Installation of a CFCB into the freight car	2 man hours
Disassembly of a CFCB out of a freight car	2 man hours
Change of all brake blocks	0,5 man hours
Change of one brake block shoe	1 man hours
Change of all rubber bellows	3 man hours
Leakage test and brake system check	0,5 man hours

## Summary

- Compact Freight Car Brake CFCB is successfully developed and tested
- Modular integration of manual parking brake in CFCB-concept offers additional advantages compared to conventional parking brake solutions
- Manual parking brake wheel with optical indicators improves the safety in service
- Field tests under severe environmental conditions proved the performance advantages of the CFCB
- Installations in standard Y25 bogie show the significant weight reduction; installation of CFCB in different types of bogies is also possible
- Based on the field tests and other audits, the TSI-certification is given
- Handling tests of CFCB show the easy use of the CFCB
- Serial delivery has started in February 2008