

## General

In order to guarantee an effective and efficient distribution of brake force between the towing and the towed vehicle, the actual brake force of the vehicles has to be accurately determined. This then permits an easy and direct interchangeability of the vehicles and an influencing of the service life of the wear-relevant components in the brakes and the service life of surrounding components.

## Brake Force Distribution in the Truck

An optimum brake force distribution between the front and rear axles on a vehicle as well as the brake force distribution between tractor and trailer particularly influences:

- Wear behaviour
- Optimum braking and driving comfort
- Increase in road safety
- Avoidance of damage to the brake system and surrounding components.

A brake synchronisation is necessary on delivery of the new trailer, but not later than after 5,000 km of operation, in the event of increased brake pad wear, complaints about the braking efficiency or uneven heat development.

### **Important:**

All components contributing to the deceleration and braking effect influence the distribution of the brake force. Premature brake pad wear on one of the vehicles is a typical sign of an uneven brake force distribution.

On trailers with disc brakes, failure to perform or an incorrectly performed brake synchronisation or brake adaptation can result in serious damage. This can also lead to damage to surrounding parts such as the wheel bearings.

## To carry out a brake synchronisation

Requirements:

- The brakes in the tractor and trailer must be in good working order mechanically and pneumatically.
- The brakes on a new vehicle can only be checked after approx. 5000 km as the brake linings first have to be conditioned.
- The same is valid for vehicles after the pads have been changed as for new vehicles.
- 40% of the thickness of the pad must be remaining.
- Tractor and trailer must be fully loaded (at least 80%).
- When the vehicle is not fully loaded the ALB system must be set to simulate fully loaded.

# Brake Synchronisation



## Determining the actual brake force

- Connect the manometer to the yellow hose coupling (pm).
- Connect the manometer to the brake chambers of the front and back axle of the tractor and trailer.
- Adjust the indicated pressure over the pm according to the check sheet.
- Determine the brake forces for all axles on the roller type test stand and enter them on the check sheet.
- Enter the determined brake ratio in the EC braking chart.

## Determining the brake ratio z

- Measurement of the brake forces in daN and the brake chamber forces p<sub>zyl</sub>. Independent of the pressure setting pm (yellow hose coupling).
- The brake ratio can be determined according to the following formula:

$$Z = \frac{\text{Sum of all brake forces in daN}}{\text{Total permissible weight of the vehicle}} \times 100$$

## Brake Discs Basics

In as far as the pad wear on a complete vehicle exists then this cannot be caused in the mechanical part of the brake. In case of such claims, which can lead to total breakdown of the braking system, the complete pneumatic part of the braking system should be checked. In any case the valve setting and its correct function of the towing and towed vehicle must be assured. If no discrepancies are found here then a brake synchronisation of both vehicles to each other is indispensable (recommended by SAF). Even small differences in the pneumatic system can lead to a constant strain on the braking system of a disc-braked vehicle and to claims regarding the braking system.

## Regular Checks

Checks can prevent some repairs. The disc brake pads must be checked for wear regularly, e.g. at every tyre pressure check or every three months at the latest.

## Brake Force Distribution

When the brake force is not synchronised between a tractor without EBS and a trailer with EBS, this leads to an increased brake wear on the trailer as the trailer performs the majority of the braking work. If both the tractor and the trailer have EBS then both units synchronise themselves automatically according to the truck manufacturers. However, this applies only for the calculation pressure (6.5 bar).

# Brake Synchronisation



If the response pressure of tractor and trailer are not absolutely correct, tractor and trailer will comply with the EG braking chart to 71/320/EG or ECE R 13, but in the partial braking range will have a brake force difference of up to 100%. This automatically leads to a continuous overbraking of the trailer brake system.

## Note:

If tractor and trailer both have EBS, an adaptation inspection and a possible correction of the EBS parameters on the tractor or trailer will be necessary for an optimum brake force distribution. This corresponds to the recommendations of the system manufacturers. Tests, settings and corrections of EBS parameters can and may only be carried out by the trailer manufacturer.

A brake synchronisation must be carried out after not more than 5000 km even when only one vehicle in the combination has no EBS. This is also the case when both vehicles are without EBS.

If there are different brake systems in a vehicle combination, i.e. disc and drum brakes, then a tractor/trailer synchronisation is absolutely necessary. This is particularly valid for combinations without EBS.

## EBS

A defective ABS can lead to a considerable increase in brake pad wear on the trailer in vehicles with EBS where the warning signal is ignored!

The brake pad wear is not dependent on EBS. EBS is an optimisation of the brake force control and for this reason always the better because safer equipment for the customer – but only if the system is function correctly and with parameters matched on delivery (response behaviour) of the EBS systems. The instructions of the manufacturer must therefore be observed at all times.

## Important:

Even slight differences in the pneumatic system as, for example, brake pressure too high, lead to higher brake temperatures. The consequence of this higher temperature is increased brake pad wear on the complete vehicle.

In order to maximise the brake pad service life and avoid any consequential damage, a brake synchronisation (adaptation inspection - EBS on the complete unit) should always be carried out.

The different driving style in connection with the disc brakes as well as the tractor equipment are also to be considered.

## Enclosure:

- Check Sheet for Tractor/Trailer Synchronisation
- Braking chart Tractor loaded
- Braking chart Truck and Trailer

# Check Sheet for Tractor/Trailer Synchronisation



Tractor: Permissible total weight=Test Weight =										Trailer: Permissible total weight=Test Weight = kg										
1st. Axle			2nd. Axle			3rd. Axle			z %	pm bar	1st. Axle			2nd. Axle			3rd. Axle			z %
p1 bar	F1 le ( daN ) ri ( daN )		p2 bar	F2 le ( daN ) ri ( daN )		p3 bar	F3 le ( daN ) ri ( daN )				p1 bar	F1 le ( daN ) ri ( daN )		p2 bar	F2 le ( daN ) ri ( daN )		p3 bar	F3 le ( daN ) ri ( daN )		
									0,0											
									0,5											
									1											
									1,5											
									2											
									2,5											
									3,0											
									4,0											
									5,0											
									6											
									6,5											

**Tractor**

**Trailer**

Vehicle type :                      Test weight axle 1:                      kg  
 Manufacturer :                      Test weight axle 1:                      kg  
 Ident. No. :                      Test weight axle 1:                      kg  
 Date of Reg. :                      Permissible total weight:                      kg  
 Reg. No. :                      EBS                      :                      yes/no  
 Date of Check :  
 Mileage :

Vehicle type :                      Test weight axle 1:                      kg  
 Manufacture :                      Test weight axle 1:                      kg  
 Ident. No. :                      Test weight axle 1:                      kg  
 Date of Reg. :                      Permissible total weight:                      :                      kg  
 Reg. No. :                      EBS                      :                      yes/no  
 Date of Check :  
 Mileage :

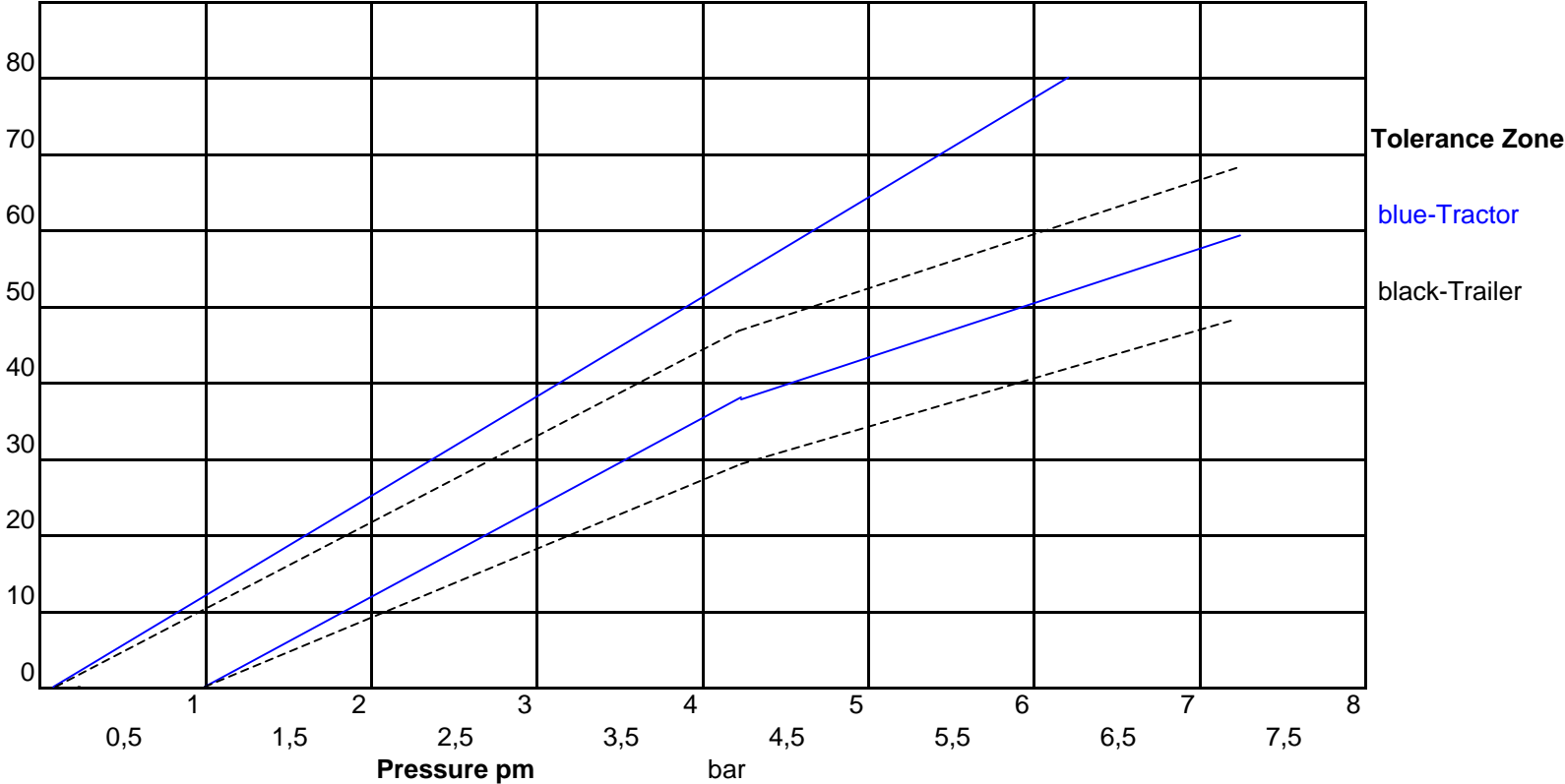
# Tractor/trailer synchronisation



## Brake band

Braking chart Tractor loaded

Braking ratio %



# Tractor/trailer synchronisation



## Brake band

Braking chart Truck and Trailer

Braking ratio

