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Translation

ORI

Brakes - A study of minimum standards for maintenance of goods wagon brakes

Frein - Contrôle d'un standard minimal dans la maintenance du frein équipant les wagons

Bremse - Überprüfung eines Mindeststandards der Instandhaltung der Bremse für Güterwagen



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Summary

This leaflet deals in point 1 with a "Minimum test procedure" and in point 2 with "Technical requirements for brake testing equipment".

The "Minimum test procedure" describes minimum standards for technical inspections carried out in repairing faulty air brakes on rolling stock used in international traffic.

The "Technical requirements for brake testing equipment" set out basic requirements for brake testing equipment so that the "Minimum test procedure" can be carried out. These technical requirements could form part of a specification sheet.

1 - Minimum test procedure

1.1 - Preconditions

1.1.1 - Preamble

These minimum tests are intended to form part of a standard for examinations that can be used in contracted repair of faulty brakes on rolling stock for operating railway companies that do not own or keep rolling stock. The results serve as a declaration and documentation of a fault or damage and as proof for the owner/keeper or their repair workshop.

Each step of the minimum tests sets target values and permissible variations. These are based on the guidelines of *UIC Leaflets 540, 541-04 and 547* (see Bibliography - [page 30](#) and corresponding references to the UIC leaflets in question for a better understanding of each test) but are not identical in every case. This is because the aim of the minimum tests is to review the minimum requirements for safe brake operation on a single wagon in a train which has been removed from service due to suspected or proven damage to its brakes.

R 1.1.2 - Initial visual inspection of brake operation

- Fill automatic brake train pipe level to 5,0 bar,
- Reduce automatic brake train pipe level to 3,5 bar: the brake must apply,
- Fill automatic brake train pipe level to 5,0 bar: the brake must release.

The initial inspection should detect faults that are not connected to faulty distributor operation and do not therefore require the use of the brake test equipment.

O 1.1.3 - Connecting the automatic brake train pipe to the testing equipment

Before beginning the tests the following connections need to be made between the wagon and the testing equipment. The guidelines set out in Appendix [A - page 18](#) are to be followed when choosing the MBP connecting pipe and the measuring pipe:

- Main brake pipe (MBP),
- Control reservoir (A) (see point [1.2.2.5 - page 7](#)),
- Pilot pressure (C_v) (recommended in order to determine the cause of values in excess of tolerances if these are recorded during measurement of C-pressure or brake application and release times),
- R- Additional reservoir,
- Brake cylinder (C), (all separately piloted C pressure values are to be measured),
- Pilot line T (all separately piloted T pressure values are to be measured) on wagons with automatic mechanical or two-level pneumatic empty-loaded devices or with automatic load braking

- For measuring of brake cylinder pressure C all goods wagons must be equipped with a testing lead as described in Appendix A - page 18,
- Wagons with automatic mechanical or two-level pneumatic empty-loaded devices, or with automatic load braking (pneumatic piloting) must also be equipped with a control lead T as described in Appendix A.

It is recommended that C and T pressures, and all brake piston travel values that are specific to the vehicle should be inscribed on the wagon.

1.1.4 - Brake test equipment requirements

R 1.1.4.1 - Order of test procedure

For dependability reasons it is recommended that the brake testing equipment carry out the entire test procedure from point 1.2.2 - page 5 onwards on a computerised basis as stipulated by point 2 - page 12 of this UIC leaflet (except for any adjustments to be made to the wagon).

O 1.1.4.2 - Variance comparison of the measured values

Each step of the test procedure and the variance comparison is carried out automatically without the operator's intervention. The variance comparison uses stored or previously entered target values. This presupposes that before each new step of the procedure the testing equipment sets up and checks the initial situation as defined under point 1.1.5 - page 3 and that it does so independently of the operator.

O 1.1.5 - Checking the initial situation before each step of the test

- Stabilising
 - Pressure values are considered stabilised when they remain stable for at least 60 s.
- Absolute pressures
 - Stabilised pressure in the automatic train brake pipe means $5 \pm 0,05$ bar.
 - Stabilised pressure in the control reservoir (A) means a value within 0,05 bar of the automatic brake pipe value.
 - Stabilised pressure in the auxiliary reservoir means a value over 4,8 bar.
 - Stabilised pressure in the brake cylinder means $\leq 0,05$ bar.

o 1.2 - Procedure for the minimum brake tests

1.2.1 - Checking the mechanical characteristics of the brake components

plus the accessibility and operation of the installations.

All brake components must be correctly installed.

1.2.1.1 - Brake switching devices and mechanical load changeover devices

Check that the switching devices (on/off switches, brake position switches, empty/loaded device) are in good working order and accessible.

The efficiency of mechanical load changeover devices on wagons of types I a and I b (for type descriptions see point [1.2.2 - page 5](#)) is to be checked. It is recommended that this check take the form of a measurement of the piston travel empty and loaded and calculate the difference (test procedure, see point [1.2.2.6.1 - page 8](#) for type I a, test procedure, see point [1.2.2.6.2 - page 9](#) for type I b).

1.2.1.2 - Brake shoes and brake shoe play

The brake shoes must be

- Sufficiently thick,
- Not broken,
- Not overflowing.

The automatic rigging regulator checks the play and ensures an average brake shoe play of circa 5 mm.

1.2.1.3 - Automatic brake train pipe, cut-off cock, release mechanisms

The automatic brake train pipe and the brake coupling hose must be in working order.

The cut-off cocks must:

- Be in useable working order
- Lock securely in the end positions
- Bleed the air from the brake coupling hose when in the "closed" position.

The release mechanisms must be accessible from both sides.

1.2.1.4 - Arresting gear

The arresting gear must be present and correct.

1.2.1.5 - Brake rigging, bolts

Brake rigging and bolts must have free movement (ie not rusted up). Bolts must be secured.

1.2.1.6 - Handbrake

The handbrake must be accessible and in working order.

1.2.2 - Checking the pneumatic characteristics of the brake components

Wagons are classified as follows according to brake type:

Type I a Wagon with two-level mechanical empty/loaded device.
(manually operated)

$$C_{\text{empty}} = C_{\text{loaded}}.$$

On wagons not fitted with distributors with the universal function (not compliant with *UIC Leaflet 540, point 1.7*) then $C_{\text{empty}} > C_{\text{loaded}}$

Type I b Wagon with two-level mechanical empty/loaded device.
(automatically piloted by the cradle device and T-pressure)

$$C_{\text{empty}} = C_{\text{loaded}}$$

Type II a Wagon with two-level pneumatic empty/loaded device.
(manually operated)

$$C_{\text{empty}} < C_{\text{loaded}}$$

Type II b Wagon with two-level pneumatic empty/loaded device.
(automatically piloted by the cradle device and T-pressure)

$$C_{\text{empty}} < C_{\text{loaded}}$$

Type III Wagon with automatic load braking (A)

$$T_{\text{empty}} : T_{\text{loaded}} \approx C_{\text{empty}} : C_{\text{loaded}}$$

1.2.2.1 - Leak tightness of the brake system

Test organisation:

The distributor is on. All cut-off cocks are open and the unused coupling heads from the brake couplings are sealed with plugs.

Procedure:

- Fill the automatic brake pipe to 5,0 bar and check the initial position,
- Shut off the automatic brake pipe supply on the brake test equipment,
- Measure the automatic brake pipe pressure: maximum permissible pressure decrease without refilling is 0,3 bar in 5 minutes.

1.2.2.2 - Leak tightness of the brake cylinder

Test organisation:

Brake position P, empty/loaded device in loaded position for Type I a and II a. For Types I b, II b & III the T-pressure must be loaded for the mechanical switch to trip or to reach C-pressures from C_{loaded} to C_{max} .

Test procedure:

- Fill the automatic brake pipe to 5,0 bar and check the initial position,
- Reduce automatic brake pipe to 0,0 bar as in rapid application of the brakes,
- Wait 60 s for the pressure to stabilis,
- R-pressure must drop no more than $\leq 0,25$ bar over 180 s.

1.2.2.3 - Brake responsiveness

(UIC Leaflet 540, point 1.10.2)

Test organisation:

Brake position P, empty/loaded device in loaded position for Type I a & Type II a. For Types I b, II b & III the T-pressure must be loaded for the mechanical switch to trip or to reach C-pressures from C_{loaded} to C_{max} .

Test procedure:

- Fill the automatic brake pipe to 5,0 bar and check the initial position,
- Reduce the brake-pipe pressure in linear fashion from 5,0 bar to 4,4 bar over 6 s and then maintain this level,
- After these 6 s C-pressure must maintain $\geq 0,2$ bar for ≥ 10 s.

1.2.2.4 - Insensitivity of released brakes

(UIC Leaflet 540, point 1.10.1)

Test organisation:

Brake position P, empty/loaded device in loaded position for Type I a and Type II a. For Types I b, II b and Type III the T-pressure must be loaded for the mechanical switch to trip or to reach C-pressures from C_{loaded} to C_{max} .

Test procedure:

- Fill the brake-pipe to 5,0 bar and check the initial position,
- Reduce the brake-pipe pressure in linear fashion to 4,4 bar over 120 s,
- C-pressure must remain at 0 bar (0,05 bar).

1.2.2.5 - Release characteristics

(UIC Leaflet 540, point 1.5)

Test organisation:

Brake position P, empty/loaded device in loaded position for Type I a and Type II a. For Types I b, II b and Type III the T-pressure must be loaded for the mechanical switch to trip or to reach C-pressures from C_{loaded} to C_{max} .

Test procedure **without** A-pressure measurement

- Raise brake pipe pressure to 5,0 bar and check the initial position,
- Lower brake-pipe pressure to 4,5 bar and maintain this level,
- Let C-pressure stabilise for 10 s and then measure,
- Measure C-pressure again after 180 s. On wagons with¹ C_{loaded} or $C_{\text{max}} = 3,8$ bar C-pressure may only change by $\leq 0,2$ bar or by $\leq 5,3$ % relative to a C-pressure value deviating from the above,
- Raise brake-pipe pressure to 4,85 bar at a rate of 0,5 to 0,6 bar per minute,
- C-Pressure must show 0 ($< 0,05$ bar) bar after maximum 60 s.

If any of the target values are not met then the distributor must be immediately replaced, or a second test **with** A-pressure measurement must follow to support the diagnosis:

Test procedure **with** A-pressure measurement

- Establish test connection to control reservoir A,
- Raise brake-pipe pressure to 5,0 bar and check the initial position,
- Lower brake-pipe pressure to 4,2 bar and maintain for 60 s,
- Measure A-pressure,
- Raise brake-pipe pressure to 4,7 bar (without going beyond this level) and maintain for 60 s. Over this period A-pressure must not fall by more than $\leq 0,05$ bar and C-pressure¹ must show $\geq 0,3$ bar on wagons with C_{loaded} or $C_{\text{max}} = 3,8$ bar or $\geq 7,9$ % relative to a C-pressure value deviating from the above,
- Raise brake-pipe pressure to 4,85 bar at a rate of 0,5 to 0,6 bar per minute,
- C-Pressure must show 0 ($< 0,05$ bar) bar after maximum 60 s.

1. On system where the brake power is adjusted using a pneumatically-controlled device (types II a, II b and III where $C_{\text{empty}} < C_{\text{loaded}}$), the pressure of 0,2 or 0,3 bar corresponds to the pilot pressure (C_v).

1.2.2.6 - Application and release times, brake cylinder pressure

(UIC Leaflet 540, points 1.7, 1.18, 1.19, UIC Leaflet 541-04, points 1.2, 1.3)

The vehicle-specific test values for brake piston travel, C-pressure and T-pressure can be read off the label on the wagon or the brake calculation. For brake design types, see point 1.2.2 - page 5.

1.2.2.6.1 - Test procedure for Type I a and Type II a (manual load changeover)

- Set brake and load configuration,
- Raise brake-pipe pressure to 5,0 bar and check the initial position,
- Lower brake-pipe pressure to under 3,4 bar in less than 3 s,
- Measure brake cylinder application time (see Table 1),
- Measure C-pressure (see Table 1),
- Measure piston travel (see Table 1),
- Raise brake-pipe pressure to 5,0 bar (see Table 1),
- Measure brake cylinder release time (see Table 1),
- Measure C-pressure (see Table 1).

Table 1 hereafter indicates the tests to be conducted (A to E):

Table 1 :

		Configuration:		Measure:				
Test	Type	Of brake	Of empty/ loaded changeover device	Braking time	C- pressure	Piston travel	Release time	C- pressure
A	I a	G	loaded	X	X		X	X
	II a	G	loaded	X	X		X	X
B	I a							
	II a	G	empty	X	X			X
C	I a	P	loaded	X	X	X	X	X
	II a	P	loaded	X	X		X	X
D	I a							
	II a	P	empty	X	X			X
E	I a	P	empty			X		
	II a							