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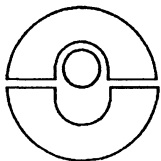
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4th Edition, 01.07.1989

Air brakes

Standard programme of tests



International Union of Railways

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Leaflet to be classified in Volume :

V - Transport stock

Amendments

Note

This leaflet forms part of a set which also includes :

Leaflet 520 : Wagons, coaches and vans - drawgear

Leaflet 526-1 : Wagons - Buffers with a stroke of 105 mm

Leaflet 526-2 : Wagons - Buffers with a stroke of 75 mm

Leaflet 540 : Brakes - Air brakes for freight and passenger trains

Leaflet 541-00: Brakes - Regulations concerning manufacture of the different brake parts (1)

Leaflet 541-03: Brakes - Regulations concerning manufacture of the different brake parts - Driver's brake valve

Leaflet 541-5 : Brakes - Electropneumatic brakes for passenger trains and freight trains

Leaflet 543 : Brakes - Regulations relative to the equipment and use of vehicles

Leaflet 544-1 : Brakes - Braking power

Leaflet 546 : Brakes - High power brakes for passenger trains

Leaflet 571-1 : Standard wagons - Ordinary two-axle wagons - Characteristics

Leaflet 571-2 : Standard wagons - Ordinary bogie wagons - Characteristics

(1) Leaflet 541-00 is in course of preparation and will replace Leaflet 541-1.

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0 - General

This leaflet contains programmes for implementation of the tests which new air brakes are required to undergo before they can be accepted for use in international traffic. These tests are intended to confirm that the conditions of Leaflet 540 have been met.

The UIC Sub-Committee for Braking is authorised to arrange for any further checks and tests which may be necessary outside the scope of this leaflet.

The leaflet defines the scope of the test report required under point 3 of Leaflet 540, together with the scope of the tests undertaken for presentation purposes.

The railway presenting a new air brake for acceptance shall provide all locomotives, trailing vehicles and other equipment necessary for the presentation of this brake.

Acceptance for use in international traffic, of supplementary equipment belonging to a new air brake, such as :

- quick-release valves,
- automatic control equipment for the “empty/load” changeover,
- automatically variable load braking equipment,
- brake pipe emptying accelerators,

is governed by the provisions of Leaflet 541.00.

See leaflet 546 for high power brakes (R brakes).

1 - Arrangements for carrying out tests**1.1 - Staff**

The railway presenting the brake shall provide an engineer to supervise the tests, together with the staff necessary for their performance and for driving the trains.

The Sub-Committee for Braking shall appoint staff to monitor and supervise the tests undertaken on the train, on the locomotive and in the recording cars. The staff shall be selected from member railways of the Sub-Committee, with the exception of the railway presenting the brake for acceptance.

1.2 - Measurements undertaken

Measurements must be undertaken for all tests.

The Sub-Committee for Braking shall specify on which vehicles in the train the following measurements are to be made :

- pressure in the main brake pipe ;
- at least three pressures within the main brake capacities ;
- decelerations (see also point 4.1.1) with a view to detecting longitudinal reactions. These measurements are also made during the running tests.

The measurements must be undertaken at the front and rear of the test train at least and on the vehicles immediately preceding and following the recording car.

The values measured must be transmitted without any undue time lag to the recording car.

The equipment in the recording car shall include, in particular :

- a) recording equipment with continuous time-synchronised paper feed, providing an indication of the time and simultaneous recording of :
 - marks corresponding to operations of the driver's control valve to apply and release the brakes,
 - 1 special mark for the locomotive and for the recording car,
 - the values measured in the vehicles specified by the Sub-Committee for Braking,
 - train speed as measured in the recording car,
 - tracks reference points at intervals of 100 m.

It must be possible to insert reference marks simultaneously on all diagrams produced so that an exact comparison can be made at any given time between the recordings made.

The paper feed mechanism linked to the test equipment in the recording car must be selected with a view to providing good data legibility.

Other methods may also be used for the recording of measurements made and must provide diagrams of an equivalent standard immediately after the tests have been carried out.

- b) easily visible equipment to display the values recorded and/or the following braking conditions :
 - pressure gauges showing pressures in the main brake pipe at any given time or, where applicable, in the main reservoir pipe, the pressures being shown for a number of brake capacities of the recording car and, at the same time, for a number of brake capacities of the vehicles immediately preceding and following the recording car,
 - speed-indicators,
 - measuring equipment to record braking distances.

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- c) equipment enabling propagation time to be measured,
- d) falling-ball accelerometer conforming to Appendix 3,
- e) telephone link with the locomotive and other observation points.

During the stationary tests, it must also be possible for the pressures in the main brake pipe, in the brake cylinder and in two other capacities of the brake submitted, together with the "brake applied" and "brake released" indications, to be recorded on two additional vehicles specified by the Sub-Committee for Braking. All vehicles must be suitably prepared for this purpose.

It must be possible, by means of a modified driver's control valve or other variable control device, to create a temporary and limited overcharge in the train and subsequently reduce this. The control device must enable a minimum filling pressure of 7 bars at the front of the train to be lowered to 5.2 bars within 1 second and subsequently restored to the rated pressure.

In order to carry out the tests on individual vehicles, a portable control unit will be necessary and will incorporate a variable pressure driver's control valve with a neutral setting. It must be possible to produce clearly defined leakages which must occur when the control valve is in the neutral position.

It must be possible to measure the forces applied to the brake blocks of individual vehicles when these are stationary.

1.3 - Test procedure (presentation tests)

All handling/manipulation of the distributor units on vehicles under test is prohibited during the course of the presentation. The Sub-Committee for Braking reserves the right to prescribe appropriate safety measures.

Each hauled vehicle in the test formation will be numbered on both sides from 1 onwards, from front to rear of train. Members of the Sub-Committee will be provided with a diagram showing all possible formations of the test train. This diagram must show :

- the serial numbers of the hauled vehicles,
- the UIC marking,
- the load,
- the marks used to identify the points at which the train is split to make up formations of differing lengths when the stationary tests are carried out,
- the total length of the trains formed and their main brake pipes, excluding branch pipes.

Unless authorized by the Sub-Committee for Braking, all non-programmed modifications to the test train and all interference with the vehicles, are prohibited.

Before commencing the tests, the Sub-Committee for Braking shall satisfy itself that :

- the formation of the test train is correct,
- the locomotive is in a suitable condition as regards the driver's control valve, the compressor and pneumatic pipes, including air-tightness,
- the transmission equipment relaying the values measured and the recording apparatus itself are functioning correctly.

The railway presenting a brake for acceptance shall distribute to members of the Sub-Committee for Braking bilingual forms (French/German) listing the tests in consecutive order with their serial number, stating the nature of these tests and any special conditions which apply. Before a test is commenced, the engineer supervising the test arrangements shall give all necessary instructions concerning the manner in which it is to be carried out.

The recording equipment shall be switched on suitably in advance of each test.

Each diagram sheet must contain the following particulars, arranged in accordance with the model layout given below :

UIC Sub-Committee for Braking

Date :

Time :

Type of brake :

Number of test :

Nature of test :

Signature :

The diagram sheets are to be countersigned by an authorised member of the Sub-Committee after each test.

During runs made over level track, the automatic brake on the locomotive shall remain in operation, but must not be released separately. In contrast, the automatic brake on the locomotive will be isolated during all runs made over gradients.

The use of brakes which are operative on the locomotive only, on both level track and on gradients, is prohibited.

Except where certain clauses stipulate other values, the normal rated pressure of 5.0 bars shall, in principle, be maintained in the main brake pipe throughout all of the tests.

2 - Vehicles, test rigs

For the purpose of the tests, the railway presenting the brake must, as far as possible, equip standard UIC 2-axle wagons and bogie wagons fitted with cast iron brake blocks and suitable for running under S conditions with the new compressed air brake. The main brake pipe on these wagons will have an inside diameter of 32 mm and the wagons must have a braking force conforming to point 8 of Leaflet No. 543 for an axle load of 20 t. The wagons must also be fitted with buffers in accordance with Leaflets Nos. 526-1 and 526-2 and with non-continuous drawgear conforming to Leaflet No. 520.

As a general rule, the wagons to be used should be fitted with a manually operated "empty/load" changeover. On wagons fitted with an automatically variable load brake, it must be possible for the latter to be set to a comparable brake ratio position.

A certain number of reserve vehicles should be on hand.

The railway presenting the brake for acceptance must provide the Sub-Committee with outline diagrams of the different series of vehicles and locomotives used for the tests ; the railway concerned must also provide full information on the characteristics of these vehicles and locomotives, such as tare, load, braking, braked mass, brake changeover mass, coupler equipment, buffing- and drawgear equipment, type of driver's control valve, power of compressors, reservoir capacities, etc.

2.1 - Individual vehicles

Standard type bogie wagons, i.e. 4-axle wagons as referred to under point 2 of this leaflet and fitted with a manually-controlled "empty/load" changeover, will be subjected to individual vehicle tests.

In order that the correct functioning of the brake may be verified while continuous refilling of the auxiliary reservoir is in progress, the wagon must be fitted with a main brake pipe.

2.2 - Test trains, recording cars

The composition of trains which are to undergo tests is shown in Appendix 4.

Where the stationary tests are concerned, the train must be formed of a minimum of 75 vehicles with a maximum length of 1,200 m (locomotive excluded).

Where running tests are concerned, the following test trains must be provided :

- *G braking* :
maximum length of 700 m (including locomotive), minimum number of vehicles 45 and gross hauled weight approximately 1,200 t.
- *P braking* :
maximum length of 600 m (including locomotive), minimum number of vehicles 40 and gross hauled weight approximately 1,000 t.

Apart from the vehicles specified under point 2 of this leaflet, which will be fitted with the brake being presented for acceptance, the presenting railway shall acquire, for "mixed freight trains", a certain number of wagons fitted with a different brake already accepted for use in international traffic. In accordance with the provisions of point 4.0, the Sub-Committee will itself determine the number and nature of these vehicles, after having taken note of the operational characteristics of the brake presented.

2.3 - Locomotive

The locomotive shall be fitted with an automatic graduated release brake with "passenger" and "goods" positions. This brake can be set for simultaneous operation with the train brakes or be isolated.

The capacity of the main reservoir shall be between 800 and 1,000 litres. A main pipe will be provided. The automatic brake will be activated by means of a driver's control valve complying with the conditions of leaflet No. 541-03.

2.4 - Test rigs

(In reserve).

3 - Stationary tests

The tests will be divided into two sections : tests on individual vehicles and tests with complete trains.

Diagrams will be produced for all of these tests and will show the most significant pressure readings obtained.