Council Directive of 26 July 1971 on the approximation of the laws of the Member States relating to the braking devices of certain categories of motor vehicles and of their trailers (71/320/EEC) (repealed)

[F1ANNEX IV

Energy reservoirs and sources of energy

Textual Amendments

F1 Substituted by Commission Directive 98/12/EC of 27 January 1998 adapting to technical progress Council Directive 71/320/EEC on the approximation of the laws of the Member States relating to the braking devices of certain categories of motor vehicles and their trailers (Text with EEA relevance).

A.Compressed-air braking systems

1. CAPACITY OF RESERVOIRS

1.1. *General requirements*

1.1.1. Vehicles on which the operation of the braking system depends on the use of compressed-air shall be fitted with reservoirs of a capacity meeting the requirements of points 1.2 and 1.3.

1.1.2. However, the reservoirs shall not be required to be of a prescribed capacity if the braking system is such that in the absence of any energy reserve it is possible to achieve a braking performance at least equal to that prescribed for the secondary braking system.

1.1.3. When verifying compliance with the requirements of points 1.2 and 1.3 the brakes shall be adjusted as closely as possible.

1.2. *Motor vehicles*

1.2.1. The air brake reservoirs of motor vehicles shall be so designed that after eight full-stroke actuations of the service braking system control, the pressure remaining in the air brake reservoir shall be not less than the pressure required to obtain the specified secondary braking performance.

1.2.2. During the test, the following requirements shall be satisfied:

1.2.2.1. The initial pressure in the reservoirs shall be that indicated by the manufacturer[(1)]. This pressure shall be such as to enable the prescribed performance for the service braking system to be achieved.

1.2.2.2. The reservoir or reservoirs shall not be replenished; in addition, the reservoir or reservoirs of auxiliary equipment shall be isolated.

1.2.2.3. In the case of motor vehicles authorised to tow a trailer, the supply line shall be blocked off and a reservoir of 0,5 litre capacity shall be connected to the control line. The pressure in this reservoir shall be exhausted before each actuation of the brakes. After the test referred to in point 1.2.1 the pressure in the control line shall not be less than one half of the pressure obtained at the first brake application.

1.3. *Trailers (including semi-trailers)*

1.3.1. Reservoirs fitted to trailers shall be such that after eight full-stroke actuations of the towing vehicle's service braking system, the pressure supplied to the operating parts using it does not fall below a level equivalent to one-half of the figure obtained at the first brake application and without actuating either the automatic or the parking braking system of the trailer.

1.3.2. During the test, the following requirements shall be satisfied:

1.3.2.1. The pressure in the reservoirs at the beginning of the test shall be 8,5 bar.

1.3.2.2. The supply line shall be blocked off; in addition, the auxiliary equipment reservoirs shall be isolated.

1.3.2.3. The reservoir shall not be replenished during the test.

1.3.2.4. For each brake application, the pressure in the control line shall be 7,5 bar.

2. CAPACITY OF ENERGY SOURCES

2.1. *General provisions*

Compressors shall satisfy the requirements laid down in the following points:

2.2. *Definitions*

2.2.1. p_1 the pressure corresponding to 65 % of the pressure p_2 defined in point 2.2.2.

2.2.2. p_2 is the value specified by the manufacturer and referred to in point 1.2.2.1.

2.2.3. T_1 is the time required for the relative pressure to rise from 0 to p_1; T_2 is the time required for the relative pressure to rise from 0 to p_2.

2.3. *Conditions of measurement*

2.3.1. In all cases the speed of the compressor shall be that obtained when the engine is running at the speed corresponding to its maximum power or at the speed allowed by the governor.

2.3.2. The auxiliary equipment reservoirs shall be isolated during the tests for determining the periods T_1 and T_2.

2.3.3. On motor vehicles constructed to tow trailers, the trailer shall be represented by a reservoir whose maximum relative pressure p (expressed in bars) is that which can be supplied through the feed circuit of the towing vehicle and whose volume V (expressed in litres) is given by the formula $p \times V = 20\ R$ (R being the permissible maximum load, expressed in metric tonnes, on the axles of the trailer or semi-trailer).

2.4 *Interpretation of results*

2.4.1. The time T_1 for the least efficient reservoir shall not exceed:

— three minutes in the case of vehicles to which the coupling of a trailer or semi-trailer is not authorised

— six minutes in the case of vehicles to which the coupling of a trailer or semi-trailer is authorised.

2.4.2. The time T_2 for the least efficient reservoir shall not exceed:

— six minutes in the case of vehicles to which the coupling of a trailer or semi-trailer is not authorised

— nine minutes in the case of vehicles to which the coupling of a trailer or semi-trailer is authorised.

2.5. *Additional test*

2.5.1. When the vehicle is equipped with an auxiliary equipment reservoir or reservoirs with a total capacity exceeding 20 % of the total capacity of the brake reservoirs, an additional test shall be carried out during the course of which there shall be no interference with the functioning of the valves controlling the filling of the auxiliary equipment reservoir(s). A check shall be made during the course of this test that the period T_3 required to bring about a rise in the pressure in the brake reservoirs from 0 to p_2 is less than:

— eight minutes in the case of vehicles to which the coupling of a trailer or semi-trailer is not authorised

— eleven minutes in the case of vehicles to which the coupling of a trailer or semi-trailer is authorised.

2.5.2. The test shall be performed in the conditions prescribed in points 2.3.1 and 2.3.3.

2.6 *Towing vehicles*

2.6.1. Vehicles to which the coupling of a category O vehicle is authorised shall also comply with the above requirements for vehicles not so authorised. In that case, the tests in points 2.4.1, 2.4.2 (and 2.5.1) will be conducted without the reservoir mentioned in item 2.3.3 of this Annex.

3. PRESSURE TEST CONNECTIONS

3.1. A pressure test connection shall be fitted at the closest readily accessible position to the least-favourably placed reservoir within the meaning of point 2.4 of this Annex.

3.2. The pressure test connections shall comply with clause 4 of ISO standard 3583-1984.

B. Vacuum braking systems

1. CAPACITY OF RESERVOIRS

1.1. *General*

1.1.1. Vehicles on which the operation of the braking system requires the use of a vacuum shall be equipped with reservoirs of a capacity meeting the requirements of points 1.2 and 1.3 below.

1.1.2. However, the reservoirs shall not be required to be of a prescribed capacity if the braking system is such that in the absence of any energy reserve it is possible to achieve a braking performance at least equal to that prescribed for the secondary braking system.

1.1.3. In verifying compliance with the requirements of points 1.2 and 1.3 below, the brakes shall be adjusted as closely as possible.

1.2. *Motor vehicles*

1.2.1. The reservoirs of motor vehicles shall be such that it is still possible to achieve the performance prescribed for the secondary braking system

1.2.1.1. after eight full-stroke actuations of the service braking system control where the energy source is a vacuum pump; and

1.2.1.2. after four full-stroke actuations of the service braking system control where the energy source is the engine.

1.2.2. Testing shall be performed in conformity with the following requirements:

1.2.2.1. The initial energy level in the reservoir(s) shall be that specified by the manufacturer. It shall be such as to enable the prescribed service-braking performance to be achieved and shall correspond to a vacuum not exceeding 90 % of the maximum vacuum furnished by the energy source[(2)];

1.2.2.2. The reservoir(s) shall not be fed; in addition, any reservoir(s) for auxiliary equipment shall be isolated.

1.2.2.3. In the case of motor vehicles authorised to tow a trailer, the supply line shall be blocked off and a reservoir of 0,5 litre capacity shall be connected to the control line. After the test referred to in point 1.2.1, the vacuum level provided at the control line shall not have fallen below a level equivalent to one-half of the figure obtained at the first brake application.

1.3. *Trailers* (category O_1 and O_2 only)

1.3.1. The reservoir(s) with which trailers are equipped shall be such that the vacuum level provided at the user points shall not have fallen below a level equivalent to one-half of the value obtained at the first brake application after a test comprising four full-stroke actuations of the trailer's service braking system.

1.3.2. Testing shall be performed in conformity with the following requirements:

1.3.2.1. The initial energy level in the reservoir(s) shall be that specified by the manufacturer. It shall be such as to enable the prescribed service braking performance to be achieved[1].

1.3.2.2. The reservoir(s) shall not be fed; in addition, any reservoir(s) for auxiliary equipment shall be isolated.

2. CAPACITY OF ENERGY SOURCES

2.1. *General*

2.1.1. Starting from the ambient atmospheric pressure, the energy source shall be capable of achieving in the reservoir(s) in three minutes, the initial level specified in point 1.2.2.1. In the case of a motor vehicle to which the coupling of a trailer is authorised, the time taken to achieve that level in the conditions specified in point 2.2 shall not exceed six minutes.

2.2. *Conditions of measurement*

2.2.1. *The speed of the vacuum source shall be:*

2.2.1.1. Where the vacuum source is the vehicle engine, the engine speed obtained with the vehicle stationary, the neutral gear engaged and the engine idling;

2.2.1.2. where the vacuum source is a pump, the speed obtained with the engine running at 65 % of the speed corresponding to its maximum power output; and

2.2.1.3. where the vacuum source is a pump and the engine is equipped with a governor, the speed obtained with the engine running at 65 % of the maximum speed allowed by the governor.

2.2.2. Where it is intended to couple to the motor vehicle a trailer whose service braking system is vacuum-operated, the trailer shall be represented by an energy storage device having a capacity V in litres determined by the formula:

$$V = 15 \times R$$

where R is the maximum permissible mass, in metric tonnes, on the axles of the trailer.

C. Hydraulic braking systems with stored energy

1. CAPACITY OF STORAGE DEVICES (ENERGY ACCUMULATORS)

1.1. *General*

1.1.1. Vehicles on which the operation of the braking system requires the use of stored energy provided by hydraulic fluid under pressure shall be equipped with energy storage devices (energy accumulators) of a capacity meeting the requirements of point 1.2 below.

1.1.2. However, the energy storage devices shall not be required to be of a prescribed capacity if the braking system is such that in the absence of any energy reserve it is possible with the service braking system control to achieve a braking performance at least equal to that prescribed for the secondary braking system.

1.1.3. In verifying compliance with the requirements of points 1.2.1, 1.2.2 and 2.1 below, the brakes shall be adjusted as closely as possible and, for point 1.2.1, the rate of full-stroke actuations shall be such as to provide an interval of at least one minute between each actuation.

1.2. *Motor vehicles*

1.2.1. Motor vehicles equipped with a hydraulic braking system with stored energy shall meet the following requirements:

1.2.1.1. After eight full-stroke actuations of the service braking system control, it shall still be possible to achieve, on the ninth application, the performance prescribed for the secondary braking system.

1.2.1.2. Testing shall be performed in conformity with the following requirements:

1.2.1.2.1. Testing shall commence at a pressure that may be specified by the manufacturer but is not higher than the cut-in pressure.

1.2.1.2.2. The accumulator(s) shall not be fed; in addition, any accumulator(s) for auxiliary equipment shall be isolated.

1.2.2. Motor vehicles equipped with a hydraulic braking system with stored energy which cannot meet the requirements of point 2.2.1.5.1 of Annex I shall be deemed to satisfy that point if the following requirements are met:

1.2.2.1. After any single transmission failure it shall still be possible after eight full-stroke actuations of the service braking system control, to achieve, at the ninth application, at least the performance prescribed for the secondary braking system or, where secondary performance requiring the use of stored energy is achieved by a separate control, it shall still be possible after eight full-stroke actuations to achieve, at the ninth application, the residual performance prescribed in point 2.2.1.4 of Annex I.

1.2.2.2. Testing shall be performed in conformity with the following requirements:

1.2.2.2.1. with the energy source stationary or operating at a speed corresponding to the engine idling speed, any transmission failure may be induced. Before inducing such a failure the energy storage device(s) shall be at a pressure that may be specified by the manufacturer but not exceeding the cut-in pressure.

1.2.2.2.2. The auxiliary equipment and its accumulators, if any, shall be isolated.

2. CAPACITY OF HYDRAULIC FLUID ENERGY SOURCES

2.1. The energy sources shall meet the requirements set out in the following paragraphs:

2.1.1. *Definitions*

2.1.1.1. 'p_1' represents the maximum system operational pressure (cut-out pressure) in the accumulator(s) specified by the manufacturer.

2.1.1.2. 'p_2' represents the pressure after four full-stroke actuations with the service braking system control, starting at p_1, without having fed the accumulator(s).

2.1.1.3. 't' represents the time required for the pressure to rise from p_2 to p_1 in the accumulator(s) without application of the service braking system control.

2.1.2. *Conditions of measurement*

2.1.2.1. During the test to determine the time t, the feed rate of the energy source shall be that obtained when the engine is running at the speed corresponding to its maximum power or at the speed allowed by the governor.

2.1.2.2. During the test to determine the time t, accumulator(s) for auxiliary equipment shall not be isolated other than automatically.

2.1.3. *Interpretation of results*

2.1.3.1. In the case of all vehicles except those of categories M_3, N_2 and N_3, the time t shall not exceed 20 seconds.

2.1.3.2. In the case of vehicles of categories M_3, N_2 and N_3, the time t shall not exceed 30 seconds.

3. CHARACTERISTICS OF ALARM DEVICES

With the engine stationary and commencing at a pressure that may be specified by the manufacturer but does not exceed the cut-in pressure, the alarm device shall not operate following two full-stroke actuations of the service braking system control.**]**

(1) **[**[F1]The initial energy level shall be stated in the information document.

(2) The initial energy level shall be stated in the information document.**]**

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