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Translation

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Brakes - Regulations concerning the manufacture of brake components - Self-adjusting load-proportional braking system and automatic "empty-loaded" control device

Frein - Prescriptions concernant la construction des différents organes de frein - Appareil de freinage autovisible en fonction de la charge et dispositif de commande automatique de l'appareil "vide-chargé"
Bremse - Vorschriften für den Bau der verschiedenen Bremsteile - Automatische Lastabbremmung und automatische Lastwechseleinrichtung "leer - beladen"



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Summary

This leaflet contains regulations and minimum requirements to be met by self-adjusting load-proportional braking systems and automatic "empty-loaded" control devices to be used in international service. Additional regulations and guidelines for different braking systems and their individual component parts are set out in other leaflets of the 54 series.

1 - General characteristics of self-adjusting load-proportional braking equipment

1.1 - By adjusting braking forces automatically and gradually to vehicle loads, self-adjusting load-proportional brakes are able to offer braked weight percentages which remain virtually constant up to the maximum weight on rail allowed by the braking system involved. Appendix A - page 13 charts the pattern of characteristic percentage curves for self-adjusting load-proportional braking. In the case of vehicles with axle-loads lower than the value specified, self-adjusting load-proportional braking must guarantee compliance with the braking percentages.

1.2 - Compressed-air brakes incorporating a self-adjusting load-proportional system must fulfil the conditions defined in *UIC Leaflet 540, point 1* (see Bibliography - page 19). The value of the maximum brake-cylinder pressure must be $3,8 \text{ bar} \pm 0,1$, in line with the provisions of *UIC Leaflet 540, point 1.7*. For older-type equipment, the value of 4,0 bar is accepted. Minimum permissible brake-cylinder pressure ... (to be completed later).

1.3 - The extra components required for the self-adjusting load-proportional equipment must not alter the characteristics of already-approved air brakes. This applies both to brakes used in conjunction solely with the main brake-pipe and those used also in conjunction with the main air-supply pipe.

1.4 - Brake force adjustment must be performed rapidly, automatically and progressively in relation to the load. Impacts and short-lasting load variations withstood by the axles must not be allowed to affect adjustment of this load in any significant way.

1.5 - The air consumption of the weight-recording system used to ascertain the load during running must be minimal and must not interfere with normal braking performance.

2 - Types of self-adjusting load-proportional braking system

2.1 - Self-adjusting load-proportional braking for wagons worked under SS conditions

- **2.1.1** - The self-adjusting load-proportional braking equipment for wagons worked under SS conditions must provide an approximately constant braked weight of 100% as per *UIC Leaflet 543*, point 1.3.6 (see Bibliography - page 19).
- **2.1.2** - For wagons with tread brakes only, the value of $\lambda = 100\%$ is allowed solely up to an axle-load of 18 t. For additional loading, the value of λ decreases progressively down to 90% for a 20 t axle-load (maximum permissible axle-load).
- **2.1.3** - In order to obtain a value of $\lambda = 100\%$ for an axle-load of over 18 t, additional braking equipment (for example: disc brakes) must be provided.
- R **2.1.4** - It is recommended that modified relay valve combinations be fitted on tread-braked wagons suitable for working under SS conditions, for instance a relay valve with a supplementary integrated valve, a relay valve with an additional fitting or a combination of relay valves of a different design.

In the case of moderate service braking ($P_{MBP} = 4,6 - 4,2$ bar), the reference curve produced by the valve combination should lower the braking force of an SS wagon to that of an S wagon.

In the case of heavy service braking ($P_{MBP} = 4,2 - 3,8$ bar), the level of braking force should rise again continuously when the brakes are applied at over $P_{MBP} \leq 3,8$ bar to match that of an SS wagon.

By using such relay valve combinations, wheels can be protected from overheating, in particular on long downhill runs.

The technical approval test for relay valve combinations is set out in point 4.8 - page 7.

The features of the modified relay valve combination must not impact upon the specific features of the compressed air brake (e. g. pilot pressure, graduation).

o 2.2 - Automatic load-proportional braking for wagons worked under S conditions

2.2.1 - The automatic load-controlled equipment of wagons worked under S conditions must provide a maximum braked weight of $\lambda = 100\%$ ¹, up to a load limit equal to 65% of the maximum permissible wagon weight.

2.2.2 - When an extra load is placed on wagons, the braked weight percentage may decrease continuously to reach the minimum λ value of 65%.

2.2.3 - For wagons with brake blocks of cast iron only, the braked mass for each axle shall not exceed 18 t.

o 2.3 - Automatic load-proportional braking for vehicles fitted with high performance brakes

This braking equipment - whether used under the G, RIC or R systems and irrespective of load conditions - must provide a constant braked weight percentage λ up to the braked-weight value stipulated in each case. However, the design characteristics of such vehicle may require application of specific conditions.

1. Corresponding to a 14,5 t axle-load for wagons designed for 22,5 t axle-loads.