
Proposals for the braking of electrical vehicles

Proposals for the braking of electrical vehicles

Vorschläge für das Bremsen elektrisch angetriebener Fahrzeuge

Propositions pour le freinage des véhicules électriques

Ta slovenski standard je istoveten z: CR 1955:1995

[SIST CR 1955:2000](https://standards.iteh.ai/catalog/standards/sist/4c1cbebe-a07a-4037-a0e4-edcc45aa286c/sist-cr-1955-2000)

<https://standards.iteh.ai/catalog/standards/sist/4c1cbebe-a07a-4037-a0e4-edcc45aa286c/sist-cr-1955-2000>

ICS:

43.040.40	Zavorni sistemi	Braking systems
43.120	Električni vozila	Electric road vehicles

SIST CR 1955:2000**en**

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

SIST CR 1955:2000

<https://standards.iteh.ai/catalog/standards/sist/4c1cbebe-a07a-4037-a0e4-edcc45aa286c/sist-cr-1955-2000>

REPORT RAPPORT BERICHT

CR 1955:1995

June 1995

English version

Proposals for the braking of electrical vehicles

Propositions pour le freinage des
véhicules électriquesVorschläge für das Bremsen
elektrisch angetriebener Fahrzeuge

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST CR 1955:2000](https://standards.iteh.ai/catalog/standards/sist/4c1cbebe-a07a-4037-a0e4-edcc45aa286c/sist-cr-1955-2000)<https://standards.iteh.ai/catalog/standards/sist/4c1cbebe-a07a-4037-a0e4-edcc45aa286c/sist-cr-1955-2000>

This CEN REPORT has been prepared by Technical Committee CEN/TC 301 "Electrically propelled road vehicles" and has been approved by CEN on 1995-03-27.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Rue de Stassart 36, B - 1050 Brussels

1 Benefit of regenerative braking on electrical vehicles and induced problems

The traction batteries, currently available give to electrical vehicles low practical ranges, in the scale of 50 to 100 km, which limits their use mainly to urban. The urban drives offer a high potential of regenerative braking during deceleration phases : the ratio regenerative energy to supplied energy on the traction wheels may exceed 50 %.

On the other hand, the applied techniques for the electrical traction naturally allow a running of, not only as an engine, but also as a generator for reducing the speed of the vehicle. Then, an increase of range is reached, that can be up to 25 % after taking into account all the yields of the system (engine, generator, charge and discharge of batteries).

The regenerative braking has moreover the advantage to smoothly reduce the wear of brake linings of conventional braking system. This remains to day, according to the technology state of the art, demanded to ensure the reducing of speed and the stopping of the vehicle whatever the conditions of use : important decelerations or failure of the regenerative braking.

But the co-existence of both devices may lead to security problems :

- particular proportion of braking effect between axles, the regenerative braking being only applied to wheel drive;
- control of the regenerative braking possibly separated from the conventional brake pedal;
- possibility for the regenerative braking to be influenced by the state of charge or the temperature of the traction battery, then not constant in time;
- failure of the regenerative braking according to multiple modes considering its complexity.

As a consequence, it seems convenient to propose suggestions to adjust Directive 71/320 to the case of electrical vehicles fitted with a regenerative electrical braking system in order to guarantee the user's safety.

The following proposals come from a european working group CEN/TC301/WG2 made of braking and electrical vehicle specialists.

2 Category of electrical vehicle fitted with a regenerative electrical braking system

Except for type III vehicles defined below, the service braking system shall be considered as a complete system including regenerative and friction parts.

After considering different solutions, it leads to define the three following types :

- type I : vehicles fitted with a single control device for the service and the emergency braking, the service braking system being constituted of a conventional friction system and a regenerative electrical braking system, without anti-lock device.
- type II : vehicles fitted with a single control device for the service and the emergency braking, the service braking system being constituted of a conventional braking system and a regenerative electrical braking system, with an anti-lock device.
- type III : vehicles fitted with a separate control device for the regenerative electrical braking system.

3 Adaptation proposals of Directive 71/320 for electrical vehicle from type I

First proposal :

iTeh STANDARD PREVIEW
(standards.iteh.ai)

In normal conditions, total retardation and constraints of braking proportion between axles described in Directive 71/320 shall be strictly respected whatever the state of the drive system (including batteries).

In case of a vehicle fitted with a clutch pedal, this constraint shall be respected both in clutched and declutched positions. This is to guarantee a vehicle stability in any conditions of use and stopping distances compatible with those from the current automotive fleet.

Second proposal :

Forbid a switch that allow the driver to inhibit the regenerative braking system when driving. This was proposed in the past for vehicles that did not respect the first proposal. But, according to custom it seems illusive to guarantee a correct using of this switch (disactivation of the regenerative braking on low grip road) even in the case of a vehicle which demands a special licence.

Third proposal :

In case of a failure of the service braking leading to proportion constraints recalled above not being respected, demand to switch on a red light "failure of the service braking" on the dash board. Now, according to the current state of the art of the techniques, it is not possible to detect strictly all failures of both friction and regenerative braking components, that can affect the service braking; As a consequence, regarding the failures of the regenerative electrical braking system we propose to take into account only those which may disturb significantly the liaison between the information issued from the sensor associated to the control and an electrical parameter which represents the regenerative power.

Fourth proposal :

Use the test procedure described in Directive 71/320 in so far as they can be really applied. The preliminary examination of the procedures has already allowed to point out the following inconsistencies :

- some electric vehicles have no neutral gear position or declutched capability. As a consequence, they cannot be tested in such a configuration;
- some electric vehicles have not a sufficient range to do in a short time the deceleration number required by the Directive, without recharging the battery and cooling the braking. Electric vehicles shall perform all the tests required by Directive 71/320 (with recharge of batteries between tests if necessary) except the 15 steps fade test which shall not last more than one discharge of the batteries.

Fifth proposal :

In a normal running, the control of the service braking shall remain adjustable and gradual whatever the electric regenerative braking state, particularly whatever the state of charge, and the temperature of the traction battery.

4 Adaptation proposals of Directive 71/320 for electrical vehicle from type II

Sixth proposal :

Application of the current regulation for the thermal engine vehicles fitted with an anti-lock device, and application of the test procedure in so far as they are compatible with specificities of the electric vehicle.

5 Adaptation proposal of Directive 71/320 for electric vehicle from type III

Seventh proposal :

Application of the current regulation for thermal engine vehicles fitted with an independant retarding and application of the test procedures in so far as they are compatible with the specificities of the electric vehicle.