



SLOVENSKI STANDARD
SIST HD 91 S1:1999

01-maj-1999

Pravila za ohmske upore, ki se uporabljajo v močnostnih tokokrogih elektrovlečnih vozil

Rules for ohmic resistors used in the power circuits of electrically powered vehicles (IEC 60322:1970)

Regeln für Ohmsche Widerstände in den Hauptstromkreisen elektrisch angetriebener Fahrzeuge

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Règles concernant les résistances ohmiques insérées dans les circuits de puissance des véhicules moteurs

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Rules for ohmic resistors used in the power
circuits of electrically powered vehicles

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ohmiques insérées dans les circuits
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in den Hauptstromkreisen elektrisch
angetriebener Fahrzeuge

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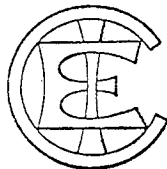
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CONTENTS

	Page
FOREWORD	5
PREFACE	5
Clause	
CHAPTER I: GENERAL	
1. Scope	7
2. Object	7
3. Definitions	7
4. Categories of tests	9
CHAPTER II: CONDITIONS TO BE SATISFIED BY RESISTORS	
5. Resistance values	11
6. Permissible temperatures and temperature rises	13
7. Short-circuit withstand	13
8. Vibration and shock withstand	13
9. Protection against corrosion	13
10. Performance in rain and snow	13
CHAPTER III: TESTS	
11. List of tests	15
12. Check on characteristics of resistor elements material (type test)	15
13. Check on rated resistance (type and routine tests)	15
14. Temperature-rise tests (type test)	17
15. Tests for withstanding vibration and shock (optional type test)	17
16. Dielectric tests (routine test)	19
17. Hygroscopic test (optional type test)	19
18. Short-circuit test (optional type test)	21
19. Test for performance in rain (type test)	21
20. Condition of resistor after tests	21
CHAPTER IV: RATING PLATE	
21. Rating plate	21

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RULES FOR OHMIC RESISTORS USED IN THE POWER CIRCUITS OF
ELECTRICALLY POWERED VEHICLES**

FOREWORD

- 1) The formal decisions or agreements of the I E C on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote this international unification, the I E C expresses the wish that all National Committees having as yet no national rules, when preparing such rules, should use the I E C recommendations as the fundamental basis for these rules in so far as national conditions will permit.
- 4) The desirability is recognized of extending international agreement on these matters through an endeavour to harmonize national standardization rules with these recommendations in so far as national conditions will permit. The National Committees pledge their influence towards that end.

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PREFACE

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This Recommendation is based on draft rules prepared by the International Union of Railways and submitted in 1963 to the International Mixed Committee on Electric Traction Equipment.

Various amendments were discussed at the meetings held in Tokyo in 1965 and in Prague in 1967. As a result of this latter meeting, a new draft was submitted in November 1967 to the IEC National Committees for approval under the Six Months' Rule, and to the International Union of Railways. Some amendments were submitted to the IEC National Committees for approval under the Two Months' Procedure in January 1969.

The text thus amended was explicitly approved by the following IEC National Committees:

Australia	Netherlands
Belgium	Norway
Denmark	Poland
France	South Africa
Germany	Sweden
Hungary	Switzerland
Israel	Turkey
Italy	Union of Soviet Socialist Republics
Japan	United Kingdom

and by the International Union of Railways.

RULES FOR OHMIC RESISTORS USED IN THE POWER CIRCUITS OF ELECTRICALLY POWERED VEHICLES

CHAPTER I: GENERAL

1. Scope

The rules contained in this Recommendation apply to ohmic resistors (resistors for starting, transition, circuit interruption, braking, shunting, stabilizing, etc.) used in the power circuits of electrically powered vehicles in the following categories:

- vehicles supplied with so-called high-voltage d.c., i.e. with a voltage between 600 V and 3 000 V;
- vehicles supplied with high-voltage a.c. at industrial frequency or at special frequencies;
- multi-system vehicles capable of being supplied from a number of the systems described above;
- vehicles with independent power source (i.e. accumulators, or heat engines with electrical or other transmission) but excluding road vehicles.

They are also applicable to resistors permanently or temporarily inserted in the main auxiliary circuits of the above vehicles, and any trailers and driving trailers in motor coach trains.

Note. — Certain of these rules may, after agreement between user and manufacturer, be used for resistors installed on other vehicles such as d.c. electric rolling stock supplied at voltages below 600 V, mine locomotives, trolley buses, etc.

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2. Object

The present rules are intended to define:

- the conditions which resistors should satisfy;
- the tests to check that the conditions are in fact satisfied;
- the descriptive markings to be applied.

3. Definitions

For the definitions of general terms used in this Recommendation, reference should be made to IEC Publications 50(05) and 50(30), International Electrotechnical Vocabulary, Group 05: Fundamental Definitions, and Group 30: Electric Traction. For the purposes of this Recommendation, the following definitions shall apply.

3.1 Resistor element

Resistive conductor, designed without break of continuity, forming part of a resistance box or frame.

The elements are usually in the form of grids, plates, strips, ribbons or wires. They may have intermediate tapings.

3.2 Resistor box or frame

A set of resistor elements assembled into a single structure.

3.3 Resistor block

A frame or compartment in which a number of resistor boxes or frames are mounted.

3.4 Resistor section

Part of a resistant circuit contained between two consecutive terminals connected to apparatus such as contactors or controllers.

3.5 Complete starting or braking resistor

Set of starting or braking resistors on a vehicle.

3.6 Primary insulation

The insulation next to live metal.

3.7 Maximum temperature (t_m)

The maximum conductor temperature which a resistor box, frame or block can withstand permanently without any resulting damage to their constituent materials, including insulants.

3.8 Continuous current (I_c)

Current value specified by the manufacturer that a resistor, or resistor section, can withstand on the test bed for an indefinite period in specified ventilation or cooling conditions, without the temperature t_m being exceeded.

3.9 Rated values of resistances

Rated values of resistances are specified values.

These values do not include the resistance of connections between boxes connected in series or in parallel to form a set, nor the resistance of connections to apparatus (contactors, controllers).

Except when stated otherwise, the rated values of resistance are shown at a temperature of 20 °C.

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4. Categories of tests

4.1 General

There are three categories of tests:

- type tests;
- routine tests;
- investigation tests.

The differentiation between these three categories of tests is brought out in the text.

4.2 Type tests

Type tests are those made on a single piece of apparatus of a given design.

Equipment in current manufacture is considered to have satisfied the type tests and is exempted from them, if the manufacturer presents duly signed reports of type tests already made on identical apparatus constructed on a previous occasion.

Optional type tests may only be required if they have been expressly specified in the order.

4.3 Routine tests

Routine tests are those made on the whole of the equipment of the same order. For certain apparatus, after agreement between user and manufacturer, routine tests may be replaced by spot checks on part of the order.