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Electrically propelled road vehicles — Test specification for electric propulsion components —

Part 5: Operating load testing of the motor system

Véhicules à propulsion electrique — Spécification d'essai pour les composants de propulsion électrique —

Partie 5: Essai de charge de fonctionnement d'un système de moteur

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Contents

Page

Foreword ..... **iv**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Symbols and abbreviated terms **1**

5 Tests and requirements **1**

5.1 Endurance test 1

5.1.1 General 1

5.1.2 Test diagram 2

5.1.3 Test conditions 2

5.1.4 Test procedure 3

5.1.5 Test requirements 5

5.2 Surge voltage measurement test 6

5.2.1 General 6

5.2.2 Test diagram 6

5.2.3 Test conditions 7

5.2.4 Test procedure 8

5.2.5 Test requirements 8

5.3 Over speed test 8

5.3.1 General 8

5.3.2 Test diagram 8

5.3.3 Test conditions 9

5.3.4 Test procedure 9

5.3.5 Test requirements 9

6 Test report **9**

Annex A (informative) **Methods for determining the rank for over speed test** **10**

Annex B (informative) **Test report** **12**

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 37, *Electrically propelled vehicles*.

A list of all parts in the ISO 21782 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Electrically propelled road vehicles — Test specification for electric propulsion components —

Part 5: Operating load testing of the motor system

1 Scope

This document specifies operating load tests and test criteria for the motor system designed as a voltage class B electric propulsion system for electrically propelled road vehicles.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 21782-1:2019, *Electrically propelled road vehicles — Test specification for electric propulsion components — Part 1: General test conditions and definitions*

ISO 21498-1, *Electrically propelled road vehicles — Specification of voltage sub-classes for voltage class B*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21782-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Symbols and abbreviated terms

For the purposes of this document, symbols and abbreviated terms given in ISO 21782-1 apply.

5 Tests and requirements

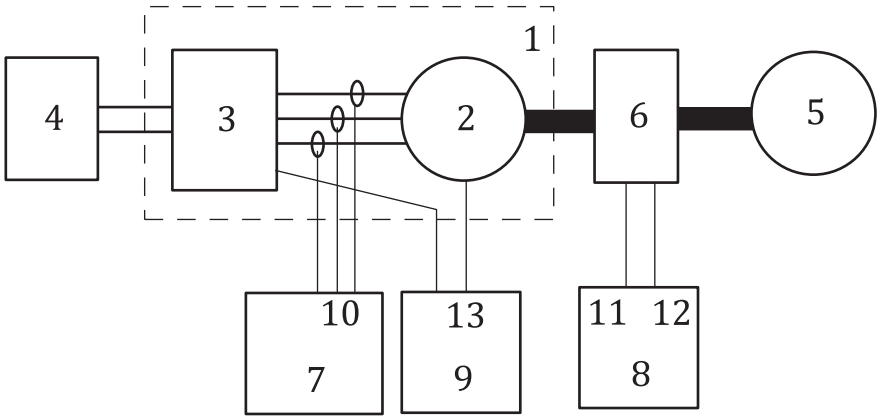
5.1 Endurance test

5.1.1 General

The purpose of this test is to evaluate and rank the strength for the components – motor shaft key, rotor fixture, shaft tightening part, stator fixtures, power semiconductor chip, and DC bus capacitor – which are affected by mechanical or electrical fatigue. The test is set considering repeated operations at the upper specification limits of the motor system, which operate under the conditions of the paired inverter and motor combination. Unless otherwise specified, the test method can be decided by the supplier and customer.

5.1.2 Test diagram

The test diagram is shown in Figure 1.



Key

1 DUT
2 motor
3 inverter
4 DC power supply
5 load
6 torque / speed detector
7 power meter
8 torque / speed meter
9 thermo meter
10 inverter output current (in A)
11 motor torque (in Nm)
12 motor speed (in min^{-1})
13 measurement points temperatures (in °C)

Figure 1 — Diagram for the endurance test of the motor system

5.1.3 Test conditions

Test conditions are shown in Table 1.

Table 1 — Conditions for endurance test of the motor system

Items		Value	Remark
Inverter input voltage		Rated voltage as defined in ISO 21782-1:2019, 3.22	— DC voltage tolerance, see ISO 21782-1:2019, 5.3
Ambient conditions		Room temperature (RT) and humidity as defined in ISO 21782-1:2019, 5.4	
Coolant temperature	Liquid	Maximum temperature for unlimited operating capability	— Ethylene glycol and propylene glycol as example of coolant
	Air	Maximum temperature for unlimited operating capability	
Coolant flow rate	Liquid	Minimum flow rate for unlimited operating capability	
	Air	Minimum flow rate for unlimited operating capability	