

---

---

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

**Part 3:  
Performance testing of the motor and  
the inverter**



This document is a preview generated by ERS



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

<b>Foreword</b>	<b>iv</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>1</b>
<b>3 Terms and definitions</b>	<b>1</b>
<b>4 Abbreviated terms</b>	<b>1</b>
<b>5 Tests</b>	<b>1</b>
5.1 Motor test	1
5.1.1 Measurement of loss and efficiency	1
5.1.2 Temperature rise test	4
5.1.3 Torque characteristic test	5
5.1.4 Cogging torque test	7
5.2 Inverter test	9
5.2.1 Measurement of loss, efficiency and conversion rate	9
5.2.2 Temperature rise test	11
5.3 Chopper test	13
5.3.1 Measurement of loss, efficiency and conversion rate	13
5.3.2 Temperature rise test	16
<b>6 Test reports</b>	<b>17</b>
<b>Annex A (informative) Precautions for measuring motor/inverter loss and efficiency</b>	<b>18</b>
<b>Annex B (informative) Test report</b>	<b>20</b>

## 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](http://www.iso.org/directives))

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. (see [www.iso.org/patents](http://www.iso.org/patents))

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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](http://www.iso.org/members.html).

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

## Part 3: Performance testing of the motor and the inverter

### 1 Scope

This document specifies performance tests for the motor and the inverter 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, *Electrically propelled road vehicles — Test specification for electric propulsion components — Part 1: General test conditions and definitions*

### 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 Abbreviated terms

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

### 5 Tests

#### 5.1 Motor test

##### 5.1.1 Measurement of loss and efficiency

###### 5.1.1.1 General

The purpose of this test is to operate the motor under the specified operating conditions and to measure the loss and efficiency of the motor in order to ensure that the performance is as designed.

###### 5.1.1.2 Test diagram

The test diagram is shown in [Figure 1](#).