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

Part 1: General test conditions and definitions

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Foreword

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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.

Introduction

Until now, there was no international standardized test procedure for the motor system including motors, inverters DC/DC converters and their combinations for electric propulsion systems of electrically propelled road vehicles available. There are some International Standards for industrial use which consider the steady/constant running of motors and inverters but don't consider the dynamic operation (acceleration/deceleration).

The ISO 21782 series was prepared aiming at the reproducibility of test results which will enable to compare and evaluate fairly the performance and reliability of electric propulsion system components such as the motor system (the motor, inverter, DC/DC converter and their combinations).

The overview of the ISO 21782 series is in Tables 1 to 4 shown below.

Table 1 — Contents of Part 1: general test conditions and definitions

Item of Part 1	Description
Introduction	Background and purpose of the ISO 21782 series
Terms and definitions	Terms to use in the ISO 21782 series
Abbreviated terms	Abbreviated terms to use in the ISO 21782 series
General test conditions	Definition of general condition; — Operating point — Current, voltage and power — DC input voltage — Temperature and humidity — Measurement accuracy

Table 2 — Contents of Part 2: performance testing of the motor system

Item of Part 2	Description	Motor	Inverter	Chopper	Motor system
Measurement of total loss and total efficiency	This test measures total loss and total efficiency between the input power of inverter and the output power of the motor.				5.1
Temperature rise test	This test investigates the temperature rise characteristics of each part of the motor system within the specified range.				5.2
Torque characteristic test	This test measures the torque characteristics specified in the specifications of the motor system.				5.3
Torque ripple test	This test measures the torque ripple of the motor.				5.4

Table 3 — Contents of Part 3: performance testing of the motor and the inverter

Item of Part 3	Description	Motor	Inverter	Chopper	Motor system
Measurement of loss and efficiency	This test measures loss and efficiency between the input power and the output power.	5.1.1	5.2.1	5.3.1	
	This test measures conversion rate between the input power and the output power.		5.2.1	5.3.1	

Table 3 *(continued)*

Item of Part 3	Description	Motor	Inverter	Chopper	Motor system
Temperature rise test	This test investigates the temperature rise characteristics of each part of the component within the specified range.	5.1.2	5.2.2	5.3.2	
Torque characteristic test	This test measures the torque characteristics specified in the specifications of the motor.	5.1.3			
Cogging torque test	This test measures the cogging torque of the permanent magnetic motor.	5.1.4			

Table 4 — Contents of Part 6: operating load testing of the motor and the inverter

Item of Part 6	Description	Motor	Inverter	Chopper	Motor system
Operation endurance tests of motor	Cyclic test of high acceleration/deceleration endurance	4.1.1			
	Cyclic test of torque pattern endurance including maximum torque	4.1.2			
	Over speed test	4.1.3			
Operation endurance tests of inverter	Cyclic test of output current pattern endurance including maximum current		4.2.1		
Breakdown strength verification test	Contents of this test are mainly spin test, data acquisition of mechanical strength of the motor.	4.3.1			