

ASSOCIATION STANDARD

T/CEEIA 415-2023

**Insulation system for driving motor of new energy vehicle -
Technical specification**

新能源汽车驱动电机绝缘结构 技术规范

(English Translation)

Issued on: December 28, 2023

Implemented on: December 28, 2023

Issued by: China Electrical Equipment Industry Association

Table of Contents

Foreword
Introduction
1 Scope
2 Normative references
3 Terms and definitions
4 Technical requirements
5 Test method
6 Inspection rules
Annex A (normative) Preparation of sealed containers
Annex B (normative) Winding model coil
Annex C (informative) Calculation of the water content in gearbox oil under sealed conditions
Annex D (informative) Testing of gearbox oil
Annex E (informative) Impulse voltage insulation class (IVIC)
Annex F (informative) Dual-temperature test method for thermal evaluation of insulation systems
Bibliography

Foreword

This document was issued on 28 December 2023 by the China Electrical Equipment Industry Association, and has applied since 28 December 2023.

It is a T/CEEIA association standard, published by the China Electrical Equipment Industry Association and applied by agreement.

1 Scope

This document specifies the technical requirements for insulation systems and insulation component materials of driving motors for new energy vehicles, describes the corresponding test methods and inspection procedures, and specifies the corresponding inspection rules.

This document is applicable to the design and test evaluation of insulation systems for driving motors of new energy vehicles.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this document. For dated references, only the edition cited applies. For undated references, the latest edition (including any amendments) applies.

GB/T 507-2002 Insulating liquids - Determination of the breakdown voltage at power frequency

GB/T 1408.1-2016 Insulating materials - Test methods for electric strength - Part 1: Tests at power frequencies

GB/T 2408-2021 Plastics - Determination of burning characteristics - Horizontal and vertical test

GB/T 2900.25-2008 Electrotechnical terminology - Rotating electrical machines

GB/T 4074.5-2008 Winding wires - Test methods - Part 5: Electrical properties

GB/T 4074.7-2009 Winding wire - Test methods - Part 7: Test procedure for the determination of the temperature index of enamelled winding wires

GB/T 5591.2-2017 Combined flexible materials for electrical insulation - Part 2: Methods of test

GB/T 5591.3-2018 Combined flexible materials for electrical insulation - Part 3: Specifications for individual materials

GB/T 5654-2007 Insulating liquids - Measurement of relative permittivity, dielectric dissipation factor ($\tan\delta$) and d.c. resistivity

GB/T 6109.1-2008 Enamelled round winding wire - Part 1: General requirements

GB/T 7095.1-2008 Enamelled rectangular copper winding wires - Part 1: General requirements

GB/T 7113.2-2014 Flexible insulating sleeving - Part 2: Methods of test

GB/T 7124-2008 Adhesives - Determination of tensile lap-shear strength of rigid-to-rigid bonded assemblies

GB/T 7304-2014 Standard test method for acid number of petroleum products by potentiometric titration

GB/T 11021-2014 Electrical insulation - Thermal evaluation and designation

GB/T 11026.4-2012 Electrical insulating materials - Thermal endurance properties - Part 4: Aging ovens - Single-chamber ovens

GB/T 11028-1999 Test methods for the determination of bond strength of impregnating

agents to an enamelled wire substrate

GB/T 15022.2-2017 Resin based reactive compounds used for electrical insulation - Part 2: Methods of test

GB/T 17948.1-2018 Rotating electrical machines - Functional evaluation of insulation systems - Test procedures for wire-wound windings - Thermal evaluation and classification

GB/T 17948.3-2017 Rotating electrical machines - Functional evaluation of insulation systems - Test procedures for form-wound windings - Thermal evaluation and classification of insulation systems used in rotating machines

GB/T 17948.7-2016 Rotating electrical machines - Functional evaluation of insulation systems - General guidelines

GB/T 18488.1-2015 Drive motor system for electric vehicles - Part 1: Specification

GB/T 20112-2015 Evaluation and qualification of electrical insulation systems

GB/T 20139.1-2016 Electrical insulation systems - Thermal evaluation of modifications to an established electrical insulation system (EIS) - Part 1: Wire-wound winding EIS

GB/T 20139.2-2017 Electrical insulation systems - Thermal evaluation of modifications to an established electrical insulation system (EIS) - Part 2: Form-wound winding EIS

GB/T 20629.2-2013 Non-cellulosic paper for electrical purposes - Part 2: Methods of test

GB/T 20629.3-2019 Non-cellulosic papers for electrical purposes - Part 3: Unfilled aramid (aromatic polyamide) papers

GB/T 20631.2-2006 Pressure sensitive adhesive tapes for electrical purposes - Part 2: Methods of test

GB/T 21707-2018 Insulation specification for variable frequency adjustable speed definite purpose converter-fed three-phase induction motors

GB/T 22472-2008 Tests for flammability of plastic materials for parts in devices and appliances

GB/T 22720.1-2017 Rotating electrical machines - Qualification and quality control tests of partial discharge free electrical insulation systems (Type I) used in rotating electrical machines fed from voltage converters

GB/T 22720.2-2019 Rotating electrical machines - Qualification tests for the partial discharge resistant electrical insulation systems (Type II) used in rotating electrical machines fed from voltage converters

GB/T 28046.3-2011 Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical loads

GB/T 28046.4-2011 Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 4: Climatic loads

GB/T 31838.2-2019 Solid insulating materials - Dielectric and resistive properties - Part 2: Resistive properties (DC methods) - Volume resistance and volume resistivity

JB/T 10508-2020 Slot wedges used in small and middle size electric machines - Specification

NB/SH/T 6042-2021 Lubricant oil for electric vehicle reducer

ASTM D6304-20: 2020 Standard Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration

3 Terms and definitions

For the purposes of this document, the terms and definitions given in GB/T 2900.25 and GB/T 18488.1 and the following apply.

3.1

electrical insulating material

solid or liquid material, or a simple combination of such materials, having a negligibly low electrical conductivity, used to separate conductive parts at different potentials in electrical equipment

[Source: GB/T 11021-2014, 3.1]

3.2

insulation system

insulating material, or an assembly of insulation materials, to be considered in relation to associated conducting parts, as applied to a particular type or size, or part of electrical equipment

[Source: GB/T 2900.25-2008, 3.9]

3.3

coil

physical assembly of one or more electrical coil sections generally surrounded by common insulation

[Source: GB/T 2900.25-2008, 3.8]

3.4

random wound winding

winding in which the individual conductors occupy random positions in the coil side

[Source: GB/T 2900.25-2008, 3.8]