ICS 43.060.01

CCS T14

QC

PRC Automotive Industry Standard

QC/T 777-2025

Replaces QC/T 777-2017

Electromagnetic clutch for automobile cooling system

Issued: December 17, 2025

Effective: July 1, 2026

Ministry of Industry and Information Technology Issued

Table of Contents

Foreword

This document is drafted in accordance with the provisions of GB/T 1.1-2020 Directives for Standardization—Part 1: Structure and Drafting Rules of Standardization Documents.

This document supersedes QC/T 777-2017 Technical Specifications for Electromagnetic Fan Clutches of Automobiles. Compared with QC/T 777-2017, in addition to structural adjustments and editorial revisions, the major technical changes are as follows:

— Added the definitions of power-off release electromagnetic clutch, power-off engage electromagnetic clutch, variable-speed water pump and input rotational speed (see 3.6, 3.7, 3.8, 3.15);

— Deleted the definitions of engagement temperature, release temperature, moment of inertia, slip ratio, initial static friction torque and after-running-in static friction torque (Clause 3.1, 3.2, 3.6, 3.10, 3.12, 3.15 of the 2017 edition);

— Deleted the classification of electromagnetic fan clutches (Chapter 4 of the 2017 edition);

— Deleted the content to be specified in the product drawings and technical documents of electromagnetic clutches (Clause 5.1.2 of the 2017 edition);

— Revised the requirements for rotational speed characteristics of electromagnetic clutches (see Clause 4.4, Clause 5.2.5 of the 2017 edition);

— Revised the requirements for operating voltage of electromagnetic clutches (see Clause 4.5, Clause 5.2.3 of the 2017 edition);

— Revised the requirements for engagement voltage of electromagnetic clutches (see Clause 4.7, Clause 5.2.6 of the 2017 edition);

— Revised the requirements for temperature rise performance of electromagnetic clutches (see Clause 4.10, Clause 5.2.9 of the 2017 edition);

— Revised the requirements for temperature resistance performance of electromagnetic clutches (see Clause 4.14, Clause 5.2.13 of the 2017 edition);

— Revised the requirements for overspeed performance of electromagnetic clutches (see Clause 4.15, Clause 5.2.14 of the 2017 edition);

— Revised the requirements for reliability performance of electromagnetic clutches (see Clause 4.21, Clause 5.3 of the 2017 edition);

— Added the appearance inspection method for electromagnetic clutches (see Clause 5.1);

— Added the type of dynamic balancing machine and the installation position of the tested parts (see Clause 5.2.1, 5.2.3);

— Added the test method for operating voltage requirements (see Clause 5.5);

— Added the illustration of output rotational speed characteristic curve of electromagnetic clutches (see Clause 5.4.2, 5.4.3);

— Revised the test method for engagement voltage of electromagnetic clutches (see Clause 5.7, Clause 6.6 of the 2017 edition);

— Revised the test method for release voltage of electromagnetic clutches (see Clause 5.8, Clause 6.7 of the 2017

edition);

— Revised the test method for electromagnetic radiation immunity of electromagnetic clutches (see Clause 5.11, Clause 6.10 of the 2017 edition);

— Revised the test method for electromagnetic disturbance of electromagnetic clutches (see Clause 5.12, Clause 6.11 of the 2017 edition);

— Revised the vibration test method for electromagnetic clutches (see Clause 5.13, Clause 6.12 of the 2017 edition);

— Deleted the duplicate requirements in the waterproof performance test of electromagnetic clutches (Clause 6.17 of the 2017 edition);

— Added the reliability test requirements for electromagnetic clutches for other fans and electromagnetic clutches for variable-speed water pumps (see Clause 5.21);

— Deleted the vehicle-mounted durability test of electromagnetic clutches (Clause 6.19.4 of the 2017 edition);

— Added the accuracy requirements for moment of inertia testers (see Clause 5.21);

— Revised the requirements for inspection items of electromagnetic clutches (see Clause 6.1.2, Clause 7.1.2 of the 2017 edition);

— Revised the evaluation rules for type approval test of electromagnetic clutches (see Clause 6.3.1, 6.3.2, Clause 7.3 of the 2017 edition);

— Revised the requirements for marking, packaging, transportation and storage of electromagnetic clutches (see Clause 7.1, 7.2, 7.3, Clause 8.1, 8.2, 8.3 of the 2017 edition).

Attention is drawn to the fact that some contents of this document may involve patents. The issuing body of this document shall not assume the responsibility for identifying any such patents.

This document is proposed and under the jurisdiction of the National Technical Committee of Automobile Standardization (SAC/TC114).

Drafting Organizations: Longkou Zhongyu Thermal Management System Technology Co., Ltd.; Dongfeng Motor Group Co., Ltd.; FAW Jiefang Automotive Co., Ltd.; Dongfeng Commercial Vehicle Co., Ltd.; Longkou Zhongyu Automotive Fan Clutch Co., Ltd.; China National Heavy Duty Truck Group Co., Ltd.; Weichai Power Co., Ltd.; Shandong Yutai Intelligent Technology Co., Ltd.

Principal Drafters: Wang Zhaoyu, Xu Junling, Cai Wenxin, Liu Zhongyin, Wang Hongzhi, Li Xiaoxia, Zhou Xiangjun, Chen Xiaoliang, Wang Chuanbin, Li Wei, Gong Tianchuan, Ren Zhijun, Hou Fengkang, Zhao Hu, Yao Junwei, Yu Liyi.

The history of issuance of this document and the document it supersedes is as follows:

— First issued as QC/T 777-2007 in 2007;

— First revised as QC/T 777-2017 in 2017;

— This is the second revision.

Electromagnetic clutch for automobile cooling system

1 Scope

This document specifies the terms and definitions, technical requirements, test methods, inspection rules, marking, packaging, transportation and storage of electromagnetic clutches for water pumps and fans in automobile cooling systems.

This document applies to electromagnetic clutches for automobile cooling systems (hereinafter referred to as electromagnetic clutches), and can be referenced for other electromagnetic clutches.

2 Normative References

The contents of the following documents constitute indispensable provisions of this document through normative reference in the text. For dated reference documents, only the edition corresponding to that date shall apply to this document; for undated reference documents, the latest edition (including all amendments) shall apply to this document.

GB/T 191 Packaging—Pictorial Markings for Handling of Goods

GB/T 4942 Protection Levels (IP Code) for the Integral Structure of Rotating Electrical Machines—Classification

GB/T 2423.38—2008 Environmental Testing for Electric and Electronic Products—Part 2: Test Methods—Test R: Water Test Methods and Guidelines

GB/T 2828.1—2012 Sampling Procedures for Inspection by Attributes—Part 1: Sampling Schemes Indexed by Acceptance Quality Limit (AQL) for Lot-by-Lot Inspection

GB/T 13384 General Technical Requirements for Packaging of Mechanical and Electrical Products

GB/T 17619 Limits and Methods of Measurement for Electromagnetic Radiation Immunity of Vehicle Electronic and Electrical Components

GB/T 18655 Road Vehicles, Ships and Internal Combustion Engines—Radio Disturbance Characteristics—Limits and Methods of Measurement for the Protection of On-Board Receivers

QC/T 413—2002 Basic Technical Specifications for Automobile Electrical Equipment

QC/T 625 Coatings, Plated Layers and Chemical Treatment Layers for Automobiles

JB/T 4159—2013 General Technical Specifications for Tropical Electrical Products

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 engaged state

The state after the driving disk and the driven disk of the electromagnetic clutch are engaged.

3.2 disengaged state

The state after the driving disk and the driven disk of the electromagnetic clutch are separated.

3.3 engaged gap

The distance between the driving disk and the driven disk when the electromagnetic clutch is in the disengaged state.

3.4 single stage electromagnetic clutch

An electromagnetic clutch that achieves two output speeds through the on-off operation of one winding circuit.

3.5 multistage electromagnetic clutch

An electromagnetic clutch that achieves multiple output speeds through the on-off operation of multiple winding circuits.

3.6 power-off separation electromagnetic clutch

An electromagnetic clutch where the disengagement between the driven disk and the driving disk is achieved when the winding circuit is de-energized.

3.7 power-off engaging electromagnetic clutch

An electromagnetic clutch where the engagement between the driven disk and the driving disk is achieved when the winding circuit is de-energized.

3.8 various speed water pump

A water pump capable of adjusting the impeller speed via an electromagnetic clutch.

3.9 following speed

The output speed of the electromagnetic clutch when it is in the disengaged state.

3.10 synchronized speed

The output speed when the driven disk and the driving disk of the electromagnetic clutch operate synchronously in the engaged state.

3.11 multistage speed

The output speed of a multistage electromagnetic clutch other than the following speed and synchronized speed.

3.12 static friction torque

The maximum torque that can be transmitted by the electromagnetic clutch under the conditions of normal temperature and static engagement.

Note: Static friction torque includes pre-running-in static friction torque and post-running-in static friction torque.

3.13 engaged voltage

The voltage at which the driven disk and the driving disk of the electromagnetic clutch perform the engagement action when the circuit is energized.

3.14 disengaged voltage

The voltage at which the driven disk and the driving disk of the electromagnetic clutch perform the disengagement action when the circuit is energized.

3.15 input speed

The driving speed of the electromagnetic clutch under the conditions of rated engine speed and the speed ratio specified in the technical documents.