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AUTOMOTIVE INDUSTRY STANDARD
OF THE PEOPLE'S REPUBLIC OF CHINA

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QC/T 1084-2017

Sensor for Automobile Electrical Power Steering

汽车电动助力转向装置用传感器

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Number, name and date of implementation of 22 automotive industry standards

No.	Standard number	Standard name	Number of standard replaced	Date of implementation
301	QC/T 727-2017	Instrument for automobile and motorcycle	QC/T 727-2007	2017-10-01
302	QC/T 803-2017	Oxygen sensor for automobile	QC/T 803.1-2008	2017-10-01
303	QC/T 1072-2017	Gear position sensor for automobiles		2017-10-01
304	QC/T 1073.1-2017	Accelerometers for automobiles - Part 1: Linear accelerometers		2017-10-01
305	QC/T 1074-2017	Technical specifications for automotive parts remanufacturing products		2017-10-01
306	QC/T 1075-2017	Technical conditions for metal honeycomb carrier of exhaust catalytic converter		2017-10-01
307	QC/T 777-2017	Technical conditions for electromagnetic fan clutch of automobile	QC/T 777-2007	2017-10-01
308	QC/T 1076-2017	Performance requirements and test methods for continuously variable transmission (CVT)		2017-10-01
309	QC/T 1077-2017	Terminology and definitions for classification of automatic control transmission for automobile		2017-10-01
310	QC/T 1078-2017	Advertising vehicle		2017-10-01
311	QC/T 1079-2017	Suction & delivery vehicle		2017-10-01
312	QC/T 1080-2017	Mobile loudspeaker for popularization of science		2017-10-01
313	QC/T 1081-2017	Electric power steering device for automobile		2017-10-01
314	QC/T 1082-2017	Motor for electric power steering device of automobile		2017-10-01
315	QC/T 1083-2017	Controller for electric power steering device of automobile		2017-10-01
316	QC/T 1084-2017	Sensor for electric power steering device of automobile		2017-10-01
317	QC/T 1085-2017	X-ray testing for light-alloy wheel of motorcycle		2017-10-01

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Sensor for Automobile Electrical Power Steering

1 Scope

This Standard specifies the general requirements, technical requirements and test methods of sensor for automobile electrical power steering.

This Standard is applicable to the torque sensor and (angle) displacement sensor (hereinafter referred to as sensor) for automobile electrical power steering.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 2423.1 Environmental Testing for Electric and Electronic and Electronic Products - Part 2: Test Methods - Tests A: Cold

GB/T 2423.2 Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Tests B: Dry Heat

GB/T 2423.6 Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test Eb and Guidance: Bump

GB/T 2423.8 Environmental Testing for Electric and Electronic Products Part 2: Test Methods - Test Ed: Free Fall

GB/T 2423.17 Environmental Testing for Electric and Electronic Products - Part 2: Test Method - Test Ka: Salt Mist

GB/T 2423.22 Environmental Testing - Part 2: Tests Methods - Test N: Change of Temperature

GB/T 2423.34 Environmental Testing - Part 2: Test Methods - Test Z/AD: Composite Temperature/Humidity Cyclic Test

GB/T 18459 Methods for Calculating the Main Static Performance Specifications of Transducers

- b) Non-contact sensor: in the sensor working stroke, the signal is obtained by magnetic coupling, electrical coupling, optical coupling, etc. (such as the sensor with coil induction, Hall effect, giant magnetic (MR) bridge, capacitive electric field, and other principles).

4 Technical Requirements

4.1 General requirements

4.1.1 Sensor.

The sensor is manufactured according to the product drawings and technical documents approved by prescribed procedures.

4.1.2 Working temperature.

The sensor shall work properly in the temperature range of $-40^{\circ}\text{C}\sim+85^{\circ}\text{C}$ or $+105^{\circ}\text{C}$ (the sensor for automobile electrical power steering is installed outside the cab).

4.1.3 Relative humidity.

The relative humidity that the sensor can withstand shall be $\leq 95\%\text{RH}$.

4.1.4 Sensor power supply or auxiliary working power.

The sensor power supply uses a DC regulated power supply of 24V or less.

4.1.5 Test apparatus equipment.

4.1.5.1 In the temperature range of $23^{\circ}\text{C}\pm 5^{\circ}\text{C}$, the measurement accuracy of the torque, (angle) displacement, current, and voltage shall be no less than 0.5%FS.

4.1.5.2 In the temperature range of $23^{\circ}\text{C}\pm 5^{\circ}\text{C}$, the resolution of temperature measurement shall be no less than 1°C .

4.1.5.3 In the temperature range of $23^{\circ}\text{C}\pm 5^{\circ}\text{C}$, the resolution of humidity measurements shall be no less than 10%RH.

4.1.6 Resistance to industrial solvent.

The resistance to industrial solvent of sensor shall conform to the provisions of 3.14 in QC/T 413.

4.1.7 Surface protection properties.

The surface protection properties of the sensor shall conform to the provisions of 3.15

4.2.8 Overvoltage.

After the test, the sensor can work properly.

4.2.9 Short circuit.

After the test, the sensor can work properly.

4.3 Environment

4.3.1 High temperature.

After the test, the sensor can work properly, and meet the requirements of 4.2.1~4.2.3.

4.3.2 Low temperature.

After the test, the sensor can work properly, and meet the requirements of 4.2.1~4.2.3.

4.3.3 High-low temperature-alternation.

After the test, the sensor can work properly, and meet the requirements of 4.2.1~4.2.3.

4.3.4 Temperature/humidity combination cycle.

After the test, the sensor can work properly, and meet the requirements of 4.2.1~4.2.3.

4.4 Reliability

4.4.1 Vibration.

After the sweeping vibration tests (for the contact sensor, it is required to do the sweeping vibration test under the working state) of the sensor in the six directions of up and down, front and rear, left and right, no visible cracks or breaks are allowed to appear; shall meet the requirements of 4.2.1~4.2.3.

4.4.2 Vibration shock.

After the test, the sensor can work properly, and meet the requirements of 4.2.1~4.2.3.

4.4.3 Endurance.

The sensor shall, after reciprocating motion for 2 million times in the working stroke, work properly; the entire vehicle works ≥ 300 thousand km with the electrical steering device.

5.2.4.2 Insulation resistance.

When the withstand voltage test is required, apply a 50Hz/550V (rms) sinusoidal voltage between the sensor conductive pin and the insulation housing for 1min; then check that the insulation has no breakdown.

5.2.4.3 Lead wire tensile strength.

Apply a force of 50N along the direction of the lead wire for 2min; check whether there is damage; perform the test in 5.2.1~5.2.3.

5.2.5 Drop.

Place the sensor at 1m height; then drop freely (the ground is hard solid ground), for twice in the directions of up and down, front and rear, left and right; after the test, check whether the sensor can work properly.

5.2.6 Reverse connection of power supply.

The sensor input is reversed by 1.1 times of the rated working voltage for 1min. After the test is completed, restore the normal connection, check whether the sensor can work properly.

5.2.7 Overvoltage.

Separately perform the short-circuit BETWEEN sensor's (with a supply voltage of 12V) output signal terminal, positive terminal of the power supply, reference ground pin AND 16V power supply (as per the user's requirements) for 1min; after the test is completed, check whether the sensor can work properly.

5.2.8 Short-circuit.

When the sensor works properly, separately perform short-circuit of the output signal terminal, positive terminal of the power supply, reference ground pin for 1min; after the test is completed, check whether the sensor can work properly.

5.3 Environment

5.3.1 High temperature.

5.3.1.1 The sensor works properly; test as per the test B: high temperature test method stipulated in GB/T 2423.2.

5.3.1.2 Place it at the temperature of +85°C or +105°C (sensor is installed outside the cab) for 96h.

5.3.1.3 After the test is completed, directly test in the test chamber as stipulated in

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