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**AUTOMOBILE INDUSTRY STANDARD
OF THE PEOPLE'S REPUBLIC OF CHINA**

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**Performance requirements and bench
test methods of vehicle air compressor**

汽车用空气压缩机性能要求及台架试验方法

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Announcement
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No.17, 2016

The Ministry of Industry and Information Technology approved 587 industry standards such as “Stainless Steel Sintering Net” (standard number, name, main content and implementation date are shown in Annex 1), including 156 mechanical industry standards, 35 automotive industry standards, and 33 marine industry standards, 16 pharmaceutical industry equipment standards, 45 chemical industry standards, 35 metallurgical industry standards, 24 non-ferrous metal industry standards, 26 light industry standards, 49 textile industry standards, 72 electronic industry standards, and 96 communication industry standards. It approved 3 non-ferrous metal industry standard samples such as “Aluminum Alloy 7A52 Spectrometer Single Point Standard Sample” (standard sample list and ingredient content table are shown in Annex 2), and are hereby announced. Industry standard samples are implemented from the date of release.

The above machinery industry standards are published by the Machinery Industry Press, the automotive industry standards are published by the Science and Technology Literature Publishing House, the ship industry standards are published by the China Shipbuilding Industry Comprehensive Technology and Economic Research Institute, the pharmaceutical equipment industry standards and the non-ferrous metal industry engineering construction standards are published by China Planning Press, the chemical industry standards are published by the Chemical Industry Press, the metallurgical industry standards are published by the Metallurgical Industry Press, the non-ferrous metal and textile industry standards are published by the China Standard Press, and the light industry standards are published by the China Light Industry Press, the industry standards are published by the Electronics Industry Standardization Institute of the Ministry of Industry and Information Technology, and the communication industry standards are published by the People's Posts and Telecommunications Press.

Annex: References, names and dates of implementation of 35 automotive industry standards.

Ministry of Industry and Information Technology of the People's Republic of
China

April 5, 2016

Annex:

References, names and dates of implementation of 35 automotive industry standards

No.	Standard reference	Standard name	Standard reference being substituted	Date of implementation (Year-Month-Day)
326	QC/T 16-2016	General technical specifications for ignition coil	QC/T 16-1992	2016-09-01
327	QC/T 224-2016	Specifications of engine used in motorcycles and mopeds	QC/T 224-2007	2016-09-01
328	QC/T 228-2016	Manipulation inhaul cable of motorcycle and moped	QC/T 228.1-1997, QC/T 228.2-1997, QC/T 228.3-1997, QC/T 228.4-1997, QC/T 228.5-1997, QC/T 228.6-1997, QC/T 228.7-1997, QC/T 228.8-1997, QC/T 228.9-1997, QC/T 228.10-1997	2016-09-01
329	QC/T 307-2016	Technical specifications for vacuum booster	QC/T 307-1999	2016-09-01
330	QC/T 414-2016	Color specification and model preparation method for automobile wires (cables)	QC/T 414-1999, QC/T 730-2005	2016-09-01
331	QC/T 415-2016	Automotive cigarette lighter and cigarette-lighter power socket	QC/T 415-1999	2016-09-01
332	QC/T 469-2016	Automotive engine valve technical conditions	QC/T 469-2002	2016-09-01
333	QC/T 681-2016	Technical conditions for starting relay of motorcycle and moped	QC/T 681-2002	2016-09-01

346	QC/T 1038-2016	Automotive Light Emitting Diodes (LEDs) and Modules		2016-09-01
347	QC/T 1039-2016	Solar sensor for automotive air conditioning		2016-09-01
348	QC/T 1040-2016	Motorcycle and moped electric fuel pump		2016-09-01
349	QC/T 1041-2016	Technical requirements for motorcycle evaporative pollutant control systems (devices) for motorcycles and mopeds		2016-09-01
350	QC/T 1042-2016	Motorcycle and moped vibration comfort test method		2016-09-01
351	QC/T 1043-2016	Nylon tube for automotive fuel system		2016-09-01
352	QC/T 1044-2016	Foot pad for automobile		2016-09-01
353	QC/T 1045-2016	Heat-shrinkable tubing for automotive pipe		2016-09-01
354	QC/T 1046-2016	Heat pipe shrinkage for automobile pipeline protection		2016-09-01
355	QC/T 1047-2016	City bus plastic seat		2016-09-01
356	QC/T 1048-2016	Bus emergency hammer		2016-09-01
357	QC/T 1049-2016	Technical requirements and test methods for matching of automobile rack and pinion hydraulic power steering system		2016-09-01

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Performance requirements and bench test methods of vehicle air compressor

1 Scope

This standard specifies the terms and definitions, product classification, performance requirements, test methods for bench test of air compressor of automobiles.

This standard is applicable to the reciprocating piston air compressors for automobiles (hereinafter referred to as “air compressor”). The air compressors for construction machinery and other vehicles may make reference to this standard.

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 standard.

GB/T 3853 Displacement compressors - Acceptance tests

GB/T 4980 Determination of sound level for noise emitted by displacement compressors

3 Terms and definitions

The terms and definitions as defined in GB/T 3853 as well as the following terms and definitions apply to this standard.

3.1

Standard discharge pressure, P_e

The maximum working pressure of the air compressor as adapted to the requirements of the complete vehicle (gauge pressure).

3.2

Standard rotational speed, n_e

4 Product's classification

4.1 According to the standard discharge pressure of the air compressor, it is divided into three levels: 0.8 MPa, 1.0 MPa, 1.25 MPa.

4.2 According to the structure of the air inlet valve and air outlet valve of the air compressor, it is divided into plate valve and reed valve.

4.3 According to the cooling method, it is divided into water-cooled air compressor and air-cooled air compressor.

5 Performance requirements

5.1 Volume flow

The measured volumetric flow rate of the air compressor under standard conditions shall not be less than the standard volume flow as specified in the product's technical documentation.

5.2 Shaft power

The measured shaft power of the air compressor under standard conditions shall not exceed the standard shaft power as specified in the product's technical documentation.

5.3 Speed characteristics

5.3.1 The variation curve of the volumetric flow rate and shaft power of the air compressor with the crankshaft's rotational speed shall meet the technical requirements of the product. The discharge temperature shall meet the requirements of the discharge temperature of continuous working as specified in 5.3. The unload shaft power shall meet the requirements of the product's technical drawings.

5.3.2 The volumetric power ratio (q) and the volumetric efficiency (η_v) of the air compressor shall meet the requirements of Table 1.

- a) The drop of volumetric efficiency shall not exceed 6%;
- b) The increase of shaft power increase under unload conditions shall not exceed 6%;
- c) The drop of volume flow shall not exceed 6%;
- d) For air compressors which have a standard rotational speed of less than 2000 r/min, the oil discharge along with gas shall not exceed 0.08 g/m³. For air compressors which have a standard rotational speed of more than or equal to 2000 r/min, the oil discharge along with gas shall not exceed 0.1 g/m³.

5.10 Durability of unload device

For the air compressor which is equipped with unload device, after finishing the 1000 h durability test for unload device, the unload device shall be able to work normally; the increase of shaft power under unload condition shall not exceed 6%.

6 Test methods

6.1 Volume flow

The test of volume flow of air compressor is in accordance with GB/T 3853.

6.2 Shaft power

The test of shaft power of air compressor is in accordance with GB/T 3853.

6.3 Speed characteristics

6.3.1 Under standard discharge pressure, follow the requirements of GB/T 3853 to measure the variation relationship of the volume flow, shaft power, discharge temperature of the air compressor with the crankshaft's rotational speed; draw the relevant test curve. The maximum rotational speed during the test shall not be lower than 120% of the standard rotational speed (when the standard rotational speed is higher than 2000 r/min, it shall be not less than 110%).

When using interval measurement, the number of measurement points shall not be less than 5.

After the test, calculate the volumetric efficiency and volumetric power ratio of the air compressor.

6.3.2 Under the unload conditions, follow the requirements of GB/T 3853 to measure the variation relationship of the shaft power of the air compressor with

4980.

6.6 Oil discharge along with gas

The oil discharge along with gas is measured in accordance with Appendix A.

6.7 Lubricant consumption

Lubricant consumption is measured in accordance with Appendix B.

6.8 Durability of air compressor

6.8.1 Before the durability test, first follow the requirements of 6.3, 6.4.1, 6.6 to respectively measure the speed characteristics, air-tightness, oil discharge along with gas of the air compressor.

6.8.2 Install the air compressor on the test bench of the durability of air compressor. Under standard conditions, continuously run it for 500 h. The cooling air speed is as specified in Table 3.

6.8.3 After the durability test, follow the requirements of 6.3, 6.4.1, 6.6 to respectively re-measure the speed characteristics, air-tightness, oil discharge along with gas of the air compressor.

6.9 Durability of unload device

6.9.1 Before the durability test of the unload device, first follow the requirements of 6.2 to measure the shaft power.

6.9.2 Install the air compressor on the test bench of the durability of air compressor. According to the following working modes, run it for 1000 h:

- a) Run at standard condition for 1 min;
- b) Run at unload condition for 3 min.

6.9.3 After the durability test, follow the requirements of 6.2 to re-measure the shaft power under the unload conditions.

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