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Static stiffness test methods for 15° drop center commercial vehicle steel wheels

商用车 15° 深槽钢制车轮静态刚度试验方法

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Annex:

References, names and dates of implementation of 42 automotive industry standards

No.	Standard reference	Standard name	Standard reference being substituted	Date of implementation (YY-MM-DD)
419	QC/T 243-2018	Flatness requirements and test methods of wheel attachment face	QC/T 243-2004	2018-09-01
420	QC/T 1092-2018	Static stiffness test methods for 15° drop center commercial vehicle steel wheels		2018-09-01
421	QC/T 932-2018	Emergency shutoff valve of road tanker for dangerous liquid goods transportation	QC/T 932-2012	2018-09-01
422	QC/T 456-2018	Bulk vehicles for particle grain	QC/T 456-1999	2018-09-01
423	QC/T 790-2018	Performance requirements and bench test methods of brake chamber for automotive vehicle and trailer	QC/T 790-2007	2018-09-01
424	QC/T 1093-2018	Side impact tube beam for passenger car		2018-09-01
425	QC/T 696-2018	The centralized lubrication system of automotive chassis	QC/T 696-2011	2018-09-01
426	QC/T 695-2018	Automotive relay	QC/T 695-2002 QC/T 419-1999	2018-09-01

Static stiffness test methods for 15° drop center commercial vehicle steel wheels

1 Scope

1.1 This Standard specifies the terms and definitions, test samples, test devices, test methods and test determination for static stiffness of commercial vehicle steel wheels.

1.2 This Standard is applicable to 15° drop center steel wheels of commercial vehicle.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 2933, *Wheels and rims for pneumatic tyres - Vocabulary, designation and marking*

GB/T 31961, *Rims for truck-bus*

GB/T 2977, *Size designation, dimensions, inflating pressure and load capacity for truck tyres*

GB/T 1796.4, *Tyre valves - Part 4: Tubeless clamp-in valves*

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 2933 as well as the followings apply.

3.1 wheel static stiffness

the ability of the rim, the flange and the bead seat of the wheel to withstand deformation under static conditions after pressurization

3.2 wheel-tire assembly

6 Test methods

6.1 Installation of inflating valve

6.1.1 The model of inflating valve shall comply with GB/T 1796.4.

6.1.2 Mount the inflating valve on the test wheel. Tighten the inflating valve according to the tightening torque specified in GB/T 1796.4.

6.2 Tire installation

6.2.1 Select the tire according to GB/T 2977. It shall be the tire that is specified by the major machine manufacturer, that is matched with test wheel load.

6.2.2 Mount the tire on the test wheel.

6.2.3 Put the wheel-tire assembly into the safety guard.

6.2.4 Fill the right amount of air pressure into the tire so as to make the tire bead area to completely fit with the wheel rim bead seat.

6.3 Water-filling of tire

6.3.1 Move the wheel-tire assembly outside the safety guard, near the water source. Lay it on the ground. The inflating valve is facing up.

6.3.2 Remove the valve cores of 2 inflating valves. Connect 1 of the inflating valves to the water pipe.

6.3.3 Fill the tire with water. When the inflating valve of the unconnected water pipe overflows, remount the valve core of the inflating valve.

6.4 Tire inflation

6.4.1 Put the wheel-tire assembly into the safety guard.

6.4.2 Inflate the wheel-tire assembly. Use a pressure gauge to monitor the inflating pressure. The boosting speed does not exceed 300kPa/min. When the tire pressure reaches 2.4 times the matching tire pressure to the test wheel load that is specified by the main machine manufacturer or that is regulated in GB/T 2977, stop inflating.

6.4.3 Monitor current air pressure for 3 min.

7 Test determinations

In case one of the following situations, it shall determine that this test wheel

Formulation explanation

for QC/T 1092-2018 “Static stiffness test methods for 15° drop center commercial vehicle steel wheels”

1 Job profile

1.1 Task source

The preparation and revision plan of this Standard was proposed on the third session of the fourth meeting of Subcommittee on Wheels of National Technical Committee on Automobiles of Standardization Administration of China (hereinafter referred to as the Subcommittee) (held in Tianjin), based on the requirements for the “Twelfth Five-Year” automotive wheel industry standard system. In accordance with “The plans for the third batch of automobile industry standard projects issued by the Ministry of Industry and Information Technology (MIIT)”, the project approval number is MIIT (2014) No. 628; the plan number is 2014-1629T-QC; the project name is “Static stiffness requirements and test methods for 15° drop center commercial vehicle steel wheels”; the plan drafting organization is Shandong Xingmin Wheel Co., Ltd.

1.2 Main working process

In November 2009, on the fourth session of the fourth meeting of the Wheel Subcommittee that was held in Wuhan, it was proposed that Xingmin Intelligent Transportation Systems(Group)Co., Ltd. (the former Shandong Xingmin Wheel Co., Ltd.) would be responsible for the project research of “Static stiffness requirements and test methods for 15° drop center commercial vehicle steel wheels”. In October 2011, on the standard review meeting held in Changsha, it was formally confirmed that the standard would be jointly drafted by Xingmin Intelligent Transportation Systems (Group) Co., Ltd. (the former Shandong Xingmin Wheel Co., Ltd.), MEFRO Wheel China Co., Ltd. Plant Jining (the former Jining Centurion Wheels Manufacturing Co., Ltd.) and Jining Junda Machinery Manufacturing Co. Ltd. After the standard preparation task was issued, Shandong Xingmin Wheel Co., Ltd. and the other two companies established the standard preparation working group. The group completed the first draft based on the research on relevant standards at home and abroad.

In April 2012, the group submitted the standard draft on the standard discussion meeting held in Suizhou to discuss. The meeting proposed five amendments to the main content and the format of the standard. It also required the group to verify the test methods of the standard and the rationality of inflating pressure.

Plant Jining (the former Jining Centurion Wheels Manufacturing Co., Ltd.) and China Automobile Association Wheel Quality Supervision and Inspection Center Co., Ltd. The main drafters and their jobs were as follows:

Liang Zhishan: responsible for the comprehensive work of standard preparation;

Chen Yunqing: responsible for the collection, translation and market research of domestic and international standards;

Song Zhijian: responsible for the verification of test methods and the preparation of standard texts;

Jiang Er: responsible for the preparation of the standard text and preparation instructions;

Zhao Ensheng: responsible for the verification of test data;

Xu Zailing: responsible for the preparation of the standard text and preparation instructions.

2 Standard preparation principle and main content

2.1 Standard preparation principle

The preparation of this Standard strictly follows the regulations and requirements of GB/T 1.1-2009 “Directives for standardization - Part 1: Structure and drafting of standards”. The frame, structure and content of this Standard meet the requirements.

During the preparation process of this Standard, it referred to the Association of European Wheel Manufacturers EUWA ES3.22:2003 “Static stiffness of 15° drop centre truck steel wheels”. It repeatedly demonstrated the test methods for static stiffness of 15° drop centre truck steel wheels in the standard. It proposed the test methods for static stiffness of 15° drop center steel wheels that were suitable for commercial vehicles in China.

2.2 Main content

2.2.1 Applicable scope

This Standard specifies the test methods for static stiffness of commercial vehicle steel wheels. It is applicable to 15° drop center commercial vehicle steel wheels.

2.2.2 Test devices

The test device mainly consists of inflating device, pressure gauge, pipeline and

wheels are fitted with level-18 12R22.5 radial tires; the exit-factory pressure is 0.93MPa; overload is particularly serious for heavy truck; the actual pressure used by user is maintained between 1.20MPa ~ 1.40MPa, nearly 1.5 times the exit-factory pressure. 17.5×6.75 series wheels are fitted with 14-level 9R17.5 radial tires; the exit-factory pressure is 0.83MPa; overload is not particularly serious for medium-sized vehicle; the actual pressure used by user is maintained between 0.8MPa ~ 1.0MPa, slightly greater than the exit-factory pressure. The exit-factory tire pressure is consistent with the rated pressure of the tire specified in GB/T 2977.

Because the airflow during the puncture is large and unsafe, first fill a part of the water in the tire so as to absorb energy. The first rounds of tests were carried out in June 2012. The test process is as follows:

1) Sample preparation: Respectively extract three 22.5×9.00 wheels and three 17.5×6.75 wheels that are produced by Xingmin Wheel and MEFRO Wheel. Process 1 more inflating valve hole on the opposite side of the original inflating valve hole. Process the rim and flange widths to the minimum values required by the product. The assembled inflating valve models are V3-20-6 and V3-20-4. The assembled tires are level-18 12R22.5 radial tires (rated pressure is 0.93MPa) and level-14 9R17.5 radial tires (rated pressure is 0.83MPa);

2) Installation of inflating valve and tire: Mount the inflating valve on the test wheel and tighten. Then mount the tire on the wheel. Fill the right amount of air pressure into the tire so as to make the tire bead area to completely fit with the wheel rim bead seat;

3) Water-filling of tire: Lay the wheel-tire assembly on the ground. The inflating valve is facing up. Remove the valve cores of 2 inflating valves. Connect 1 of the inflating valves to the water pipe. Fill the tire with water. When the inflating valve of the unconnected water pipe overflows, remount the valve core of the inflating valve;

4) Inflation of wheel-tire assembly: Put the wheel-tire assembly into the safety guard. Inflate the wheel-tire assembly. When the 22.5×9.00 wheel-tire assembly is quickly inflated to 1.40MPa, remain the pressure for 3 min. Remain the pressure for 3 min after each increase of 0.20MPa. Observe whether the inflating air pressure drops until the puncture pressure drops rapidly. When the 17.5×6.75 wheel-tire assembly is quickly inflated to 1.00MPa, remain the pressure for 3 min. Remain the pressure for 3 min after each increase of 0.20MPa. Observe whether the inflating pressure drops until the puncture or the air pressure drops rapidly. See Table 1 and Table 2 for test results.

Process the rim and flange widths to the minimum values required by the product. 22.5×9.00 wheels are fitted with level-18 11R22.5 radial tires. After the 22.5×9.00 wheel-tire assembly is quickly inflated to 1.8MPa, remain the pressure for 3 min. Remain the pressure for 3 min for each increase of 0.10MPa. Observe whether the inflating pressure drops. When the air pressure increases to 2.40MPa, remain the pressure for 3 min. Suspend the test. After the air pressures of 2 wheel-tire assemblies reach to 2.20MPa (2.36 times the rated air pressure of the tire), remain the air pressure less than 3 min. Water in the tire flashes. The flange is deformed. The tire falls off. After the air pressure of other wheel-tire assembly reaches 2.40MPa, remain the air pressure for 3 min, intact.

17.5×6.75 wheels are fitted with level-14 9R17.5 radial tires. After the 17.5×6.75 wheel-tire assembly is quickly inflated to 1.40MPa, remain the pressure for 3 min. Remain the pressure for 3 min for each increase of 0.10MPa. Observe whether the inflating pressure drops. When the air pressure increases to 2.00MPa, remain the pressure for 3 min. Suspend the test. After the air pressure of 2 wheel-tire assemblies reach to 2.00MPa (2.41 times the rated air pressure of tire), remain the air pressure less than 3 min. Water in the tire flashes. The flange is deformed. The tire falls off. After the air pressure of rest wheel-tire assemblies reaches 2.00MPa, remain the air pressure for 3 min, intact.

Through three rounds of tests, the preparation group thought that when the tire air pressure reaches 2.40 times the rated inflating pressure of the tire that matches the wheel load, the tire falls off, and the wheel shall be determined as rejected. The preparation group, based on the results of three rounds of tests, finally set the test tire air pressure as 2.4 times the rated inflating pressure of the tire that matches the wheel load.

4 Patent involvements in standard

This Standard does not involve with any patent and copyright issues.

5 Expected social benefits and effects on industrial development

This Standard is mainly to test the ability of the wheel rim, flange and bead seat to withstand deformation under static conditions after pressurization. The purpose is to prevent the wheel from falling off due to deformation of the wheel rim, flange and bead seat during normal driving, which shall result in a safety accident.

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