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Test method of static vibration for all terrain vehicles

全地形车静态振动试验方法

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Test method of static vibration for all terrain vehicles

1 Scope

This Standard specifies terms and definitions as well as test methods related to static vibration for all terrain vehicles.

This Standard is applicable to all terrain vehicles.

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 3241, *Octave-band and fractional-octave-band filters*

GB/T 13441.1-2007, *Mechanical vibration and shock - Evaluation of human exposure to whole-body vibration - Part 1: General requirements* (ISO 2631-1:1997, IDT)

GB/T 13824, *Mechanical vibration of rotating and reciprocating machinery - Requirements for instruments for measuring vibration severity*

GB/T 14412, *Mechanical vibration and shock - Mechanical mounting of accelerometers*

GB/T 14790.1-2009, *Vibration - Measurement and evaluation of human exposure to hand - Transmitted vibration - Part 1: General requirements* (ISO 5349-1:2001; IDT)

GB/T 23716-2009, *Human response to vibration - Measuring instrumentation* (ISO 8041:2005, IDT)

GB/T 24936-2010, *Terms for all terrain vehicles*

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in 3.1 of GB/T 24936-2010 as well as the followings apply.

3.1 static vibration

mechanical vibration generated by the engine (motor) when the all-terrain vehicle is in neutral or equivalent non-driving (such as driving wheels off the ground)

3.2 hand-transmitted vibration

mechanical vibration that acts directly through the hand or is transmitted to the arm

3.3 whole-body vibration

mechanical vibration transmitted to the whole body through the support surface of the human body

4 Test conditions

4.1 Driver requirements

4.1.1 The driver's height is $1.75\text{m} \pm 0.05\text{m}$.

4.1.2 The total mass of the driver and his equipment is $75\text{kg} \pm 5\text{kg}$.

4.2 Placement and status of test vehicle

4.2.1 The test vehicle is the whole kerb vehicle mass. If the accessory that has a large influence on the vibration of the vehicle is optional, it shall be tested with the accessory that can produce the strongest vibration of the vehicle.

4.2.2 The test vehicle transmission is in neutral; the clutch is engaged. If there is no neutral, the drive wheel can be emptied so that the drive wheel can run without load.

4.2.3 The test vehicle shall not load occupants and cargo.

5 Test method

5.1 General

5.1.1 The static vibration of a four-wheeled all-terrain vehicle shall be tested in the direction of the handle, seat cushion, pedal and other parts. The direction and the left and right sides of the pedal are tested, and the larger value is taken as the total effective acceleration value.

5.1.2 Static vibration of multi-purpose all-terrain vehicles or recreational vehicles shall be tested for pedals, seat cushions, seat-backrests, etc.

each part.

5.3.4 Repeat step 5.3.3 by the other two drivers, and 3 different drivers measure a total of 3 sets of data.

5.3.5 The test speed (such as resonance speed) or the test position (such as the occupant position) can be appropriately increased as needed.

6 Test parameters and data processing

6.1 Test parameters

6.1.1 Frequency weighted acceleration test requires frequency weighting and band limiting filter. For hand-transmitted vibration, refer to the requirements of Annex A of GB/T 14790.1-2009. Record vibration signals in the 1/3 octave frequency range of the center frequency from 6.3Hz~1250Hz. For foot vibration, seat cushion vibration and seat-back vibration, refer to the requirements of Annex B of GB/T 23716-2009. Record vibration signals in the 1/3 octave frequency range of the center frequency from 6.3Hz~400Hz. When the vibration signal is analyzed by 1/3 octave spectrum, the filtering characteristics shall meet the requirements of GB/T 3241, and the vibration sensor and connecting cable shall meet the requirements of GB/T 13824.

6.1.2 Frequency weighted acceleration RMS test on x, y, z directions shall use linear integration method. The integration time of each valid value is between 2s~5s.

6.2 Data processing

Among the three sets of data measured, each group of data excludes the highest and lowest values of 7 consecutive tests. The remaining 15 values are averaged and calculated according to equation (1).

$$a_{wo} = \sqrt{k_x^2 \bar{a}_x^2 + k_y^2 \bar{a}_y^2 + k_z^2 \bar{a}_z^2} \quad \dots\dots\dots (1)$$

where,

a_{wo} - Total weight acceleration effective value, in meters per square second (m/s^2);

$\bar{a}_{(x,y,z)}$ - Average value of the effective value of the weighted acceleration of each axis corresponding to the frequency, in meters per square second (m/s^2);

$k_{(x,y,z)}$ - Axis corresponding weighting coefficient, see Annex A.

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