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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 18148-2015

Replacing GB/T 18148-2000

**Earth-moving machinery - Test method for the compaction
performance of rollers and compactors**

土方机械 压实机械压实性能试验方法

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Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009. This Standard replaces GB/T 18148-2000 Testing method of the compaction performance of rollers and compactors. Compared with GB/T 18148-2000, in addition to editorial modifications, the main technical changes are as follows: - modified the normative references (see Clause 2 of this Edition; Clause 2 of Edition 2000); - modified the definitions of "water content of soil" and "specific gravity of soil" (see 3.1,

3.2 of this Edition; 3.1,

3.2 of Edition 2000); - added the definitions of "theoretical compactness" and "actual compactness" (see 3.7,

3.8 of this Edition); - added the characteristics of test soil; specified the soil plasticity index range (see

4.5 of this Edition); - modified the test content of water content of soil; re-specified the water content division interval and allowable parallel difference (see

4.5.1 of this Edition;

4.5.1 of Edition 2000); - deleted some test equipment and test methods (see 4.5.4.1 ~

4.5.4.5 of Edition 2000); - modified the test content of boundary water content of soil (see

4.5.4 of this Edition;

4.5.4 of Edition 2000); - modified the water content tolerance of test soil (see

5.1.1 of this Edition;

5.1.1 of Edition 2000); - modified the division of prototype work quality range in Table 2 (see

5.1.2 of this Edition;

5.1.2 of Edition 2000); - modified the requirements for compaction speed and the selection of vibration compaction's vibration parameters (see

1 Scope

China's national test method for measuring what a compaction machine actually achieves in the ground. It specifies the testing method for the compaction performance of rollers and compactors, and it applies to vibratory rollers, static wheel rollers, pneumatic tyre rollers, oscillatory rollers, vibrating plate compactors and vibrating impact rammers. Compaction is the cheapest and most consequential operation in earthworks. A road, an embankment, a dam or a foundation fill that is under-compacted settles unevenly after it is finished, and the cost of that shows up years later as cracking and differential settlement that cannot be repaired without rebuilding. Machines are therefore selected on compaction performance - but performance is not a property of the machine alone. It depends on the soil type, on the moisture content relative to optimum, on the lift thickness, on the number of passes and on the travel speed, which is why a manufacturer's claim means nothing without the conditions attached. The method makes the conditions explicit and comparable. A test area of specified soil is prepared and characterised, laid in lifts of stated thickness at a controlled moisture content, and the machine makes a defined number of passes at a defined speed. The resulting density is measured as a function of depth and of pass number, from which the useful compaction depth and the number of passes required to reach a target density are derived. That is what a purchaser needs: not a single figure but the curve, since a heavy machine that compacts deeply may be worse in thin lifts than a lighter one, and a machine needing six passes where another needs three costs twice as much to operate. Issued on 9 October 2015 and in force since 1 June 2016, it replaces GB/T 18148-2000.

This Standard specifies the testing method of the compaction performance of rollers and compactor. This Standard is applicable to compaction performance test of vibratory roller, wheel roller, tire roller, oscillatory roller, vibration plate ram and vibration impact ram.

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 50123-1999, Standard for soil test method JTG E40-2007, Test Methods of Soils for Highway Engineering

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 water content of soil the ratio of the amount of water lost to the constant weight of dry

soil at 105°C ~ 108°C, in percentage

3.2 specific gravity of soil the ratio of the mass of the soil to the constant volume at 105°C ~ 108°C and the mass of distilled water at 4°C

3.3 grain composition test of soil a method for determining the percentage of the total mass of the soil in each of the dry granules

3.4 liquid limit of soil the boundary water content of the soil from the plastic state to the flow state

3.5 plastic limit of soil the boundary water content of the soil from the semi-solid state to the plastic state

3.6 compaction test the test of the relationship between the water content and the dry density of the testing material under certain conditions

3.7 theoretical compactness the ratio of the actual dry density after compaction of the soil to the maximum dry density corresponding to the optimum water content of the soil

3.8 actual compactness the ratio of the actual dry density after compaction of the soil to the dry density corresponding to the actual water content of the soil

4 Test equipment

4.1 Information required for testing The standards and various record sheets required for the test.

4.2 Test prototype Before the test, the prototype shall be subjected to trial operation so as to make it in normal working condition.

4.3 Main instruments and appliances The test instruments and appliances must be verified by the national statutory metrological verification organization and shall be used within validity period. If necessary, carry out the calibration and standardization.

4.4 Test site The compaction test site shall be a ground trough with concrete bottom and concrete side (it can be replaced by a fully-compacted soil groove).

4.5 Test soil

a) ring knife. diameter of 6 cm ~ 8 cm, height of 2 cm ~ 3 cm, wall thickness of

b) balance. weighing of 500 g, resolution of

0.1 g;

c) others. ring cover, hammer, soil repair knife, small shovel, ruler and water content determination equipment, etc.

4.5.6.2 Test method Carry out the density test according to the following methods.

a) remove the loose soil from the sampling surface; put the known mass of the knife on the surface; then place the ring cover on the ring knife; align the guide bar with the groove on the top of the ring cover; use a hammer hit the ring knife into the soil till the soil out of the ring knife;

b) remove hammer and ring cover; dig the ring knife out together with the soil sample; cut off both ends of the soil so as to make the soil sample and ring knife mouth even;

c) wipe the outer edge of the ring knife; weigh the masses of ring knife and soil sample, to the nearest of

0.1 g; then take two soil samples of about 15 g ~ 30 g from soil sample center; determine the water content of the soil according to 4.5.1;

d) calculate the wet density and the dry density according to equation (2) and equation (3), to the nearest of 0.01; where, ρ - wet density, in grams per cubic centimeter (g/cm³); ρ_{d} - dry density, in grams per cubic centimeter (g/cm³); m_0 - ring knife and soil box mass, in grams (g); m_h - ring knife mass, in grams (g); V - ring knife volume, in cubic centimeters (cm³).

e) record the test results into Table A.7.

5.1.4 Compaction times shall be carried out according to the following requirements.

a) the compaction times for vibratory roller, oscillatory roller are specified to 12; conduct the test in accordance with

5.3 after compacting respectively at 2, 4, 6, 8 and 12 times; for single wheel vibratory roller of more than 12 t, use large amplitude for compaction odd times, small amplitude for even times; use vibration parameters specified by the manufacturer for other vibratory rollers;