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

**GB/T 16937-2020**

Replacing GB/T 16937-2010

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**Earth-moving machinery--Operator's field of view--Test method  
and performance criteria**

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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 16937-2010 "Earth-moving machinery driver visual field test methods and performance criteria". This standard and

Compared with GB/T 16937-2010, the main technical changes except for editorial changes are as follows.

---Modified the normative reference documents, replacing the corresponding Chinese documents with international documents (see Chapter 2, Chapter 2 of the.2010 edition);

---Modified some terms and definitions (see 3.5, 3.6 and 3.9, 3.5, 3.6 and 3.9 in the.2010 edition);

---Added the auxiliary visual field requirements and the location of the display device (see 7.1 and 7.2);

---Modified the requirements of the performance criteria of the reflector (see 7.3, 7.1 of the.2010 edition);

---Added the provision of using auxiliary devices to meet relevant standards for shadow

measurement (see 8.3.1);

---Modified the performance criteria for the visibility of the 1m bounding rectangle (see 10.2, 10.2 in the.2010 edition);

---Modified the requirements for large, derived and other types of earth-moving machinery not included in the standard (see 10.4, 10.4 in the.2010 edition);

---Added the content related to visual field assistance in the detailed report of the machine (see 11.1);

---Added the cleaning of visual aids in the driver's manual (see Chapter 12);

---Added the position size used in the graphical test of "backhoe loader-side shift" and "skid steer loader" (see Appendix A).

The translation method used in this standard is equivalent to ISO 5006.2017 "Earth-moving machinery driver visual field test methods and performance criteria".

The Chinese documents that have consistent correspondence with the normatively cited international documents in this standard are as follows.

---GB/T 6572 earthmoving machinery hydraulic excavator terms and commercial specifications (GB/T 6572-2014, ISO 7135.2009, IDT)

---GB/T 8420 The body size of the earth-moving machinery driver and the minimum activity space of the driver (GB/T 8420-2011, ISO 3411.2007, IDT)

---GB/T 8498 basic type identification, terms and definitions of earth-moving machinery (GB/T 8498-2017, ISO 6165.2012, IDT)

---GB/T 8591 Earth-moving machinery driver seat calibration point (GB/T 8591-2000, eqvISO 5353.1995)

---GB/T 21154 Earth-moving machinery and the quality measurement method of its working devices and parts (GB/T 21154-2014, ISO 6016.2008, IDT)

---GB/T 32070 Earth-moving machinery hazard monitoring system and its visual auxiliary device performance requirements and tests (GB/T 32070-2015, ISO 16001.2008, IDT)

This standard was proposed by China Machinery Industry Federation.

This standard is under the jurisdiction of the National Earth-moving Machinery Standardization Technical Committee (SAC/TC334).

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## Introduction

The purpose of this standard is to use objective engineering terms that can be quantified to express the visibility around the machine that the driver can see.

The driver can operate the machine correctly, effectively and safely. This standard includes a test method using two lights located in the eyes of the driver. By machine

The shadow caused by the device and its components and accessories is determined on the minimum rectangular boundary line and the visibility test circle with a distance of 1m around the machine.

Fixed. The radius of the test circle is 12m. The method used does not capture the full position of the driver's visibility, but provides information to help determine

Acceptable performance of machine visibility. The guidelines in this standard provide designers with guidance on acceptable visibility shading areas.

According to the visibility of the driver and the operation mode of the machine, the test method divides the area around the machine into six areas. front (zone A), front side

Face (Zone B and C), back side (Zone D and E) and back (Zone F).

For each area, the physical characteristics of the driver are taken into consideration. Except for 65mm eye distance (50% of the driver's normal binocular distance),

Considering that the driver may turn the head and move the upper body left and right, additional eye distance adjustment is added. So for area A, area B and area C, the eye distance

The range is expanded to 405mm. For Zone D, Zone E and Zone F, the driver's head rotation and upper body rotation are determined by the body shape of the seated driver.

limited. Therefore, for zone D, zone E and zone F, the maximum reachable eye distance is 205mm. For some machine types, follow the driver's

Ergonomics, the eye distance used is less than the maximum allowable value. This is done

to keep the machine at the current state of the art.

The 300mm shadow size on the bounding rectangle represents the approximate thickness of the chest of the person working on the approach area of the earthmoving machinery (see

2D "chest thickness" in ISO 3411).

The performance criteria for visibility are based on the body shape of human drivers and ground personnel using various representative sizes, as well as

Provide machine design that meets visibility requirements. In order to formulate visibility criteria, a combination of eye position and shadow width is used. In each

There is an appropriate position between the shadows, which can meet the requirements when there are multiple shadows in the area.

In situations where direct vision is deemed insufficient, indirect visibility auxiliary devices (reflectors or closed circuit television (CCTV)) can be used to achieve

Acceptable visual performance. For the bounding rectangle (RB), it is better to use a supplementary indirect view device (reflector or CCTV). Other auxiliary equipment

Set (see ISO 16001) can be used in special cases.

On-site organization can be an effective form of supplementation to compensate for the remaining visibility shading.

Earthmoving machinery driver's vision

Test methods and performance criteria

## 1 Scope

This standard specifies the boundary rectangle and 12m visibility test circle (VTC) used to determine and evaluate driver visibility around the machine

The static test method.

This standard applies to earth-moving machinery that is defined by ISO 6165 and that travels on construction sites and on highways and has a seated driver position. this

According to the type of machine family in Table 1, the standard specifies the performance criteria for the visibility of various machines that reach the maximum work quality of ISO 6165.

For machines not listed, including large machines, derived earth-moving machinery and other types of earth-moving machinery, the visibility test procedure can be

Refer to the implementation and use it in conjunction with the risk assessment procedures