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

*Engins de terrassement — Visibilité du conducteur — Méthode d'essai
et critères de performance*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 5006 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 2, *Safety requirements and human factors*.

This first edition of ISO 5006 cancels and replaces ISO 5006-1:1991, ISO 5006-2:1993 and ISO 5006-3:1993, which have been technically revised.

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Introduction

The purpose of this International Standard is to address operator's visibility in such a manner that the operator can see around the machine to enable proper, effective and safe operation that can be quantified in objective engineering terms. This International Standard includes a test method that uses two lights placed at the location of the operator's eyes. The maskings due to the machine, its components and attachments are determined around the machine, on a boundary line 1 m away from the smallest rectangle that encompasses the machine and on the visibility test circle. The radius of the circle is 12 m. The method used doesn't capture all of the aspects of operator's visibility, but provides information to assist in determining the acceptability of visibility from the machines. Criteria are included in this International Standard to provide guidance for designers as to the extent of visibility maskings that are acceptable.

Because of the operator's capability and the operation mode of the machines, the test method divides the area around the machine into six sectors: the front (sector A), to the front sides (sectors B and C), to the rear sides (sectors D and E), and to the rear (sector F).

For each of the sectors, the operator has physical characteristics that are considered. Besides the eye spacing of 65 mm (the nominal binocular eye spacing of the 50th percentile operator), additional adjustments can be made considering that the operator has the capability to turn the head and move the body torso side to side. This allows the range of eye spacing to be enlarged up to 405 mm for the sectors A, B and C. For the sectors D, E and F, the turning of the operator's head and the rotation of the body torso are restricted by the physical aspects for seated operator. Thus, the maximum achievable eye spacing is 205 mm for sectors D, E, and F. For certain machine types, the eye spacings used are less than the maximum permitted values based on the ergonomics of the operator. This is done to maintain the current state-of-the-art of machines.

The established visibility performance criteria are based on the physical aspects of the human operators and ground personnel using various representative dimensions and the design of machines that have provided acceptable visibility. To establish the visibility criteria, a combination of the eye spacings and masking widths are used. Multiple maskings in sectors are acceptable where there is adequate spacing between the individual maskings.

Where the direct visibility is considered inadequate, additional devices for indirect visibility [mirrors or closed-circuit television cameras (CCTV)], can be used to achieve acceptable visibility. For the rectangular 1 m boundary (RB) additional devices for indirect visibility (mirrors or CCTV) are preferred. Other aids (see ISO 16001) can be used exceptionally.

Jobsite organization can be an additional effective measure to compensate for remaining visibility maskings.

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1 Scope

This International Standard specifies a static test method for determining and evaluating the operator's visibility on a rectangular 1 m boundary close around the machine and on a 12 m visibility test circle.

This International Standard applies to the earth-moving machines listed in Table 1 and as defined in ISO 6165 that have a specific seated operator's position. For machines not listed in Table 1, including larger machines, derivative earth-moving machines and other types of earth-moving machines, the visibility test procedures can be used — see 10.4.

It applies to earth-moving machines for operation on work sites and for travelling on public roads.

This International Standard provides visibility performance criteria for machines up to a maximum operating mass (see ISO 6016) depending on the type of machine family (see Table 1).

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.

ISO 3411, *Earth-moving machinery — Human physical dimensions of operators and minimum operator space envelope*

ISO 5353, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

ISO 6016, *Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components*

ISO 6165, *Earth-moving machinery — Basic types — Identification and terms and definitions*

ISO 7135, *Earth-moving machinery — Hydraulic excavators — Terminology and commercial specifications*

ISO 16001, *Earth-moving machinery — Hazard detection systems and visual aids — Performance requirements and tests*¹⁾

1) To be published.