
**Earth-moving machinery — Hazard
detection systems and visual aids —
Performance requirements and tests**

*Engins de terrassement — Dispositifs de détection des risques et d'aide
visuelle — Exigences de performances et essais*



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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 16001 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 2, *Safety requirements and human factors*.

Introduction

This International Standard outlines test procedures and sets criteria for the development of hazard detection systems (HDS) and visual aids (VA) for detecting people.

Proper job-site organization, operator training and the application of relevant vision standards (ISO 5006 and ISO 14401) address the safety of people on job sites. In some cases, vision of the working area cannot be achieved either by the operator's direct view or indirect view using mirrors. In such cases, operator awareness can be improved by the use of HDS and VA.

HDS and VA provide information to the operator as to whether a person or object is in the path of the machine, primarily during rearward movement.

It is essential to note that HDS and VA have both advantages and disadvantages. There is no device that works perfectly in all situations. It is especially important that the shortcomings of HDS and VA be recognised and known to system users. The advantages and disadvantages of selected devices are summarized in Annex A.

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Earth-moving machinery — Hazard detection systems and visual aids — Performance requirements and tests

1 Scope

This International Standard specifies general requirements and describes methods for evaluating and testing the performance of hazard detection systems (HDS) and visual aids (VA) used on earth-moving machines. It covers the following aspects:

- detection of people in the detection zone;
- visual and/or audible warning(s) to the operator and/or to the persons in the detection zone;
- operational reliability of the system;
- compatibility and environmental specifications of the system.

It is applicable to machines as defined in ISO 6165. HDS and/or VA can be used to augment the operator's direct vision (see ISO 5006) or indirect vision using mirrors (see ISO 14401) or to provide additional means of hazard detection, for example, where ergonomic considerations limit the effectiveness of direct vision, e.g. to avoid repeated turning of the head and upper body.

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

ISO 6394, *Earth-moving machinery — Determination of emission sound pressure level at operator's position — Stationary test conditions* ¹⁾

ISO 9533, *Earth-moving machinery — Machine-mounted forward and reverse audible warning alarm — Sound test method*

ISO 13766, *Earth-moving machinery — Electromagnetic compatibility*

ISO 15998 ²⁾, *Earth-moving machinery — Machine-control systems (MCS) using electronic components — Performance criteria and tests for functional safety*

1) To be published. (Revision of ISO 6394:1998)

2) To be published.