

**Mullatöömasinad. Langevate objektide eest  
kaitsvad konstruktsioonid. Laborikatsed ja  
toimivus**

Earth-moving machinery - Falling-object protective  
structures - Laboratory tests and performance  
requirements

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 3449:2005 sisaldab Euroopa standardi EN ISO 3449:2005 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 25.10.2005 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 3449:2005 consists of the English text of the European standard EN ISO 3449:2005.</p> <p>This document is endorsed on 25.10.2005 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b> This International Standard specifies laboratory tests for measuring the structural characteristics of, and gives performance requirements in a representative test for, falling-object protective structures (FOPS) intended for use on ride-on earth-moving machines as defined in ISO 6165.</p>	<p><b>Scope:</b> This International Standard specifies laboratory tests for measuring the structural characteristics of, and gives performance requirements in a representative test for, falling-object protective structures (FOPS) intended for use on ride-on earth-moving machines as defined in ISO 6165.</p>
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**Võtmesõnad:** drop tests, earth-moving equipment, falling bodies protection, laboratory tests, safety devices, tests

English Version

Earth-moving machinery - Falling-object protective structures -  
Laboratory tests and performance requirements (ISO  
3449:2005)

Engins de terrassement - Structures de protection contre  
les chutes d'objets - Essais de laboratoire et critères de  
performance (ISO 3449:2005)

Erdbaumaschinen - Schutzaufbauten gegen herabfallende  
Gegenstände - Prüfungen und Anforderungen (ISO  
3449:2005)

This European Standard was approved by CEN on 15 July 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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## Foreword

This document (EN ISO 3449:2005) has been prepared by Technical Committee ISO/TC 127 "Earth-moving machinery" in collaboration with Technical Committee CEN/TC 151 "Construction equipment and building material machines - Safety", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2006, and conflicting national standards shall be withdrawn at the latest by March 2006.

This document supersedes EN 13627:2000.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

## Endorsement notice

The text of ISO 3449:2005 has been approved by CEN as EN ISO 3449:2005 without any modifications.

## **ANNEX ZA**

(informative)

### **Relationship between this European Standard and the Essential Requirements of EU Directive 98/37 EEC**

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Directive 98/37/EC, Machinery, amended by 98/79/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard, except Clause 8 and Annex A, confers, within the limits of the scope of this standard, a presumption of conformity with Essential Requirement 3.4.4 of that Directive and associated EFTA regulations.

**WARNING:** Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

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**Earth-moving machinery — Falling-object  
protective structures — Laboratory tests  
and performance requirements**

*Engins de terrassement — Structures de protection contre les chutes  
d'objets — Essais de laboratoire 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 3449 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 2, *Safety requirements and human factors*.

This fifth edition cancels and replaces the fourth edition (ISO 3449:1992), which has been technically revised.

## Introduction

This International Standard provides performance criteria for falling-object protective structures (FOPS). It recognizes that there are various classes and sizes of machines that operate in a variety of environmental conditions. It is intended to assure operators of reasonable protection from falling objects of different sizes and masses.

Its laboratory tests are a means of evaluating the characteristics of the structures used to protect the operator from localized impact penetration and, indirectly, of the load-carrying capacity of the supporting structure to resist impact loading.

This International Standard establishes a consistent, repeatable means of evaluating characteristics of FOPS under loading and prescribes performance requirements for these structures under such loading in a representative test.

For similar tests on FOPS for excavators and excavator-based machines, see ISO 10262.



# Earth-moving machinery — Falling-object protective structures — Laboratory tests and performance requirements

## 1 Scope

This International Standard specifies laboratory tests for measuring the structural characteristics of, and gives performance requirements in a representative test for, falling-object protective structures (FOPS) intended for use on ride-on earth-moving machines as defined in ISO 6165. It is applicable to both FOPS supplied as an integral part of the machine and those supplied separately for attachment to the machine. It is not intended to apply to FOPS intended for use on landfill compactors, excavators, rollers, trenchers, pipelayers, for the additional seat for operation of an attachment (e.g. attachment backhoe), or on machines with a power rating of less than 15 kW.

**NOTE** This International Standard can be used to provide guidance to the manufacturers of roll-over or falling-object protective structures should it be decided to provide such protection for these or other machines for a particular application.

## 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 148:1983, *Steel — Charpy impact test (V-notch)*<sup>1)</sup>

ISO 898-1:1999, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*

ISO 898-2:1992, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread*

ISO 3164:1995, *Earth-moving machinery — Laboratory evaluations of protective structures — Specifications for deflection-limiting volume*

ISO 3471:1994, *Earth-moving machinery — Roll-over protective structures — Laboratory tests and performance requirements*

ISO 6165:—<sup>2)</sup>, *Earth-moving machinery — Basic types — Vocabulary*

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1) Under revision.

2) To be published. (Revision of ISO 6165:2001)