



National Standards Authority of Ireland

IRISH STANDARD

I.S. EN 13627:2001

ICS 53.100

**EARTH-MOVING MACHINERY -  
FALLING-OBJECT PROTECTIVE  
STRUCTURES - LABORATORY TESTS AND  
PERFORMANCE REQUIREMENTS  
(ISO 3449:1992 MODIFIED)**

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**EUROPEAN STANDARD**  
**NORME EUROPÉENNE**  
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**EN 13627**

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English version

**Earth-moving machinery - Falling-object protective structures -  
Laboratory tests and performance requirements (ISO 3449:1992  
modified)**

Engins de terrassement - Structures de protection contre  
les chutes d'objets - Essais de laboratoire et critères de  
performance (ISO 3449:1992 modifiée)

Erdbaumaschinen - Schutzaufbauten gegen herabfallende  
Gegenstände - Prüfungen und Anforderungen (ISO  
3449:1992 modifiziert)

This European Standard was approved by CEN on 30 September 2000.

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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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Central Secretariat: rue de Stassart, 36 B-1050 Brussels**

## Foreword

The text of the International Standard from Technical Committee ISO/TC 127 "Earth-moving machinery" of the International Organization for Standardization (ISO) has been taken over as an European Standard by 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of an identical text or by endorsement, at the latest by April 2001, and conflicting national standards shall be withdrawn at the latest by April 2001.

This European Standard supersedes EN 23449:1988.

Annex A is normative.

This European Standard 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 standard.

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

## Endorsement notice

The text of the International Standard ISO 3449:1992 has been approved by CEN as a European Standard with agreed common modifications as given below :

- Scope is modified
- Normative references are updated
- Special requirements for the deflection-limiting volume (DLV) of skid-steer loaders with front access are deleted
- Alternative temperature requirement for minimum charpy V-notch impact strengths of structural members of FOPS is added
- Annex A is amended by requirements of annex B in order to include some further means of verification.

## **0 Introduction**

This European 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. Therefore, two levels of acceptance criteria are provided based upon end use. It is intended to assure operators of reasonable protection from falling objects of different sizes and masses under the conditions stated in 4.4.

## **1 Scope**

### **1.1 This European Standard specifies**

- a) the laboratory tests for measurement of structural characteristics, and
- b) the performance requirements in a representative test of a falling-object protective structure (FOPS).

**1.2** The laboratory tests are a means of testing 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.

**1.3** This European 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.

NOTE: For the purposes of this European Standard, "representative test" means a test of a specimen whose material, dimensional, and processing requirements are typical of those FOPS currently being produced.

**1.4** This European Standard applies to ride-in operator-controlled earth-moving machines as defined in EN ISO 6165:1999.

### **1.5 This European Standard does not apply to**

- landfill compactors;
- excavators (see ISO 10262:1998);
- rollers;
- trenchers;
- pipelayers;
- part of machines where an additional seat is located for the operation of an additional attachment (e. g. attached backhoe).

## 2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ISO 148:1983	Steel - Charpy impact test (V-notch)
EN ISO 898-1:1999	Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs (ISO 898-1:1999)
EN 20898-2:1993	Mechanical properties of fasteners -Part 2: Nuts with specified proof load values (ISO 898-2:1980)
EN ISO 3164:1999	Earth-moving machinery - Laboratory evaluations of protective structures - Specifications for deflection-limiting volume (ISO 3164 : 1995)
EN 13510:2000	Earth-moving machinery – Roll-over protective structures - Laboratory tests and performance requirements (ISO 3471 : 1994, including Amendment 1 : 1997, modified)
EN ISO 6165:1999	Earth-moving machinery - Basic types – Vocabulary (ISO 6165 : 1997)
ISO 10262:1998	Earth-moving machinery – Hydraulic excavators – Laboratory tests and performance requirements for operator protective guards

## 3 Terms and definitions

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

**3.1 Falling-object protective structure (FOPS):** A system of structural members arranged in such a way as to provide operators with reasonable protection from falling objects (for example, trees, rocks, small concrete blocks, hand tools).

**3.2 Roll-over protective structure (ROPS):** System of structural members whose primary purpose is to reduce the possibility of a seat-belted operator being crushed should the machine roll-over. Structural members include any subframe, bracket, mounting, socket, bolt, pin, suspension or flexible shock absorption used to secure the system to the machine frame, but exclude mounting provisions that are integral with the machine frame.

**3.3 Deflection-limiting volume (DLV):** Orthogonal approximation of a large, seated, male operator wearing normal clothing and a hard hat (see EN ISO 3164:1999, figure 1).

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