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Machinery for forestry — Thrown object guard — Test method and performance criteria

Matériel forestier — Protection contre les projections d'objets — 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 15, *Machinery for forestry*.

This second edition cancels and replaces the first edition (ISO 11839:2010), which has been technically revised. It also incorporates the Technical Corrigendum ISO 11839:2010/Cor 1:2012.

The main changes compared to the previous edition are as follows:

— revises the test procedure to a more repeatable and realistic representation of the guarding system.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Mobile and self-propelled machinery used in forestry and related operations that use powered cutting or grinding attachments can expose the operator to a hazard from thrown cutting or grinding elements, and residual matter created during the cutting or grinding procedures. Guarding meeting the requirements of this document can be incorporated into other operator protective structures (e.g. ROPS, FOPS, OPS) or as provided as an independent guard to provide protection from the hazard from these thrown objects.

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Machinery for forestry — Thrown object guard — Test method and performance criteria

CAUTION — The test method specified in this document involves the use of dynamic processes which could lead to a hazardous situation. The test creates projectile shots. Under no circumstances shall the test be performed without the containment structure for the test apparatus in place.

1 Scope

This document establishes a laboratory test method and performance requirements for thrown object guards (TOG) that provide operator protection against thrown objects. This applies to mobile and self-propelled machinery used in forestry and related operations including, but not limited to, those defined in ISO 6814. The TOG is intended to provide reasonable protection for the operator on the host machine from powered rotating cutting or grinding elements and residual matter thrown by an attachment on the host machine.

As the tests in the document are dependent upon the mass, velocity, and the cutting or grinding element profile, the TOG meeting the requirements of this document are specific to each cutting or grinding attachment and the host machine model.

This document does not address protection from saw chain shot.

NOTE A separate standard ISO 21876 addresses saw chain shot hazards.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread*

ISO 898-2, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 2: Nuts with specified property classes — Coarse thread and fine pitch thread*

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

ISO 9248, *Earth-moving machinery — Units for dimensions, performance and capacities, and their measurement accuracies*

ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ASTM A-108, *Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

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— IEC Electropedia: available at http://www.electropedia.org/

3.1
cutting or grinding element
cutting or grinding component incorporating single or multiple cutting or grinding surfaces

Note 1 to entry: The cutting or grinding element attachment hardware is not considered part of the cutting or grinding element for purposes of calculating the cutting element mass.

3.2
cutting or grinding attachment
mechanism designed to control and propel *cutting or grinding elements* (3.1) that are used in mobile and self-propelled machinery used in forestry and related operations

3.3
deflection-limiting volume
DLV
approximation of a large seated operator as defined in ISO 3411

[SOURCE: ISO 3164:2013, 3.1]

3.4
falling-object protective structure
FOPS
system of structural members arranged in such a way as to provide operators with reasonable protection from falling objects (e.g. trees, rocks)

[SOURCE: ISO 8083:2006, 3.1]

3.5
independent guard
protective guard that is not attached to and does not receive support from an operator cab or canopy

3.6
indicator panel
corrugated cardboard approximately 3,2 mm thick

3.7
operator protective structure
OPS
system of structural members arranged in such a way as to minimize the possibility of operator injury from penetrating objects (e.g. whipping saplings, branches, broken winch lines)

3.8
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

[SOURCE: ISO 8082-1:2009, 3.1, modified — Note 1 to entry is not included here]

3.9
sabot
device or holder used in an *impact object launcher* (3.11) that carries an *impact object* (3.10) as it travels through the launcher

3.10
impact object
representative object used to test the TOG

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3.10.1
F1 profile
impact object (3.10) consisting of a representative four-point shankless sawtooth

Note 1 to entry: See Figure 1.

3.10.2
F2 profile
impact object (3.10) consisting of a representative four-point shank sawtooth

Note 1 to entry: See Figure 1.

3.10.3
F3 profile
spherical *impact object* (3.10) with a mass representative of cutting or grinding element mass

Note 1 to entry: See Table 1

3.11
impact object launcher
device that can consistently accelerate and release an *impact object* (3.10) to a defined, consistent velocity

3.12
impact target
area where the *impact object* (3.10) is intended to strike the TOG

3.13
test sample
representative specimen of the TOG including mounting system

3.14
thrown object guard
TOG
system of structural members, screens and panels arranged in such a way as to minimize the possibility of operator injury from thrown *cutting or grinding elements* (3.1) and subsequently thrown residual matter

4 General

4.1 A risk assessment shall be conducted in accordance with ISO 12100 to determine if the operator is in the direct path of a thrown cutting or grinding element.

Only panels in the path of a potential thrown object as identified in the risk assessment need to be tested.

4.2 Fasteners used to mount the structure of the TOG and fasteners used to mount the panel materials shall be

— property class 8.8, 9.8 or 10.9 in accordance with ISO 898-1, or equivalent, for bolts, and

— property class 8, 9 or 10 in accordance with ISO 898-2, or equivalent, for nuts.

5 Laboratory tests

5.1 Safety

The test facility should complete a risk assessment to determine the containment structure surrounding the test projectile trajectory, target assembly and thrown object guard provides suitable protection for test personnel and bystanders. The risk assessment should determine the access and energy control systems (e.g. ISO 14118) will assure the safety of laboratory and observer personnel.

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