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**Agricultural machinery — Guards for  
moving parts of power transmission —  
Guard opening with tool**

*Matériel agricole — Protecteurs pour éléments mobiles de transmission  
de puissance — Protecteur à ouverture avec outil*

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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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote.
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

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An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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/TS 28923 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 3, *Safety and comfort*.

## Introduction

The structure of safety standards in the field of machinery is as follows.

- a) Type-A standards (basis standards) give basic concepts, principles for design, and general aspects that can be applied to machinery.
- b) Type-B standards (generic safety standards) deal with one or more safety aspect(s) or one or more type(s) of safeguards that can be used across a wide range of machinery:
  - type-B1 standards on particular safety aspects (e.g. safety distances, surface temperature, noise);
  - type-B2 standards on safeguards (e.g. two-hands controls, interlocking devices, pressure sensitive devices, guards);
- c) Type-C standards (machinery safety standards) deal with detailed safety requirements for a particular machine or group of machines.

This Technical Specification is a type-C standard as stated in ISO 12100-1.

When provisions of this type-C standard are different from those which are stated in type-A or type-B standards, the provisions of this type-C standard take precedence over the provisions of the other standards for machines that have been designed and built according to the provisions of this type-C standard.

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# Agricultural machinery — Guards for moving parts of power transmission — Guard opening with tool

## 1 Scope

This Technical Specification gives safety requirements, and the means of verifying them, for the design and construction of guards, only able to be opened with a tool, which are used to guard the moving parts of the power transmission of self-propelled ride-on machines and mounted, semi-mounted or trailed machines used in agriculture. In addition, it specifies the type of information on safe working practices (including residual risks) to be provided by the manufacturer.

It deals with the significant hazards (as listed in Annex A), hazardous situations and events relevant to guards of moving parts of power transmission used as intended and under the conditions foreseen by the manufacturer (see Clauses 4 and 5).

It is not applicable to guards for moving parts of the power transmission of

— tractors,

— aircraft,

— air cushion vehicles, or

— lawn and garden equipment.

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## 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 4254-1, *Agricultural machinery — Safety — Part 1: General requirements*

ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

ISO 13852:1996, *Safety of machinery — Safety distances to prevent danger zones being reached by the upper limbs*

## 3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 4254-1 apply.

## 4 Moving parts for power transmission

4.1 Power transmission moving parts which generate hazards shall be guarded by location, by safety distance or with fixed guarding.

4.2 The design of guards shall take into consideration the risk to the operator, the proper functioning of the machine and the generation of other hazards such as drainage, avoidance of debris accumulation or blockages and the impediment of a machine's material handling functions.

4.3 Guards shall be designed such that normal operation and service of the machine can be readily carried out.

4.4 Guards may be formed of a rigid mesh or grille. The size of the opening permitted depends on the distance between the guard and the hazard/hazardous area (see ISO 13852:1996, Table 1, 3, 4 or 6). The design of the guard shall be such that it is not possible to distort the mesh or the grille during normal operation and use such that the opening size and distance relationship exceeds the limits in accordance with ISO 13852.

4.5 If normal access is foreseen — for example, for adjustment or maintenance — guards shall be used and, where practical, shall be of a type which remains attached to the machine (e.g. by means of hinges or tethers).

4.6 Machines with access doors or guards which can be opened or removed to expose machine elements which continue to rotate or move after the power is disengaged shall have, in the immediate area, a readily visible evidence of rotation, or an audible indication of rotation, or a suitable safety sign (see 6.1. and 6.2).

4.7 Guards shall be such that they can only be opened by use of a tool (in order to make opening an intentional action) and that they automatically lock without the use of a tool, if under normal working conditions access is required.

NOTE "Normal access" is given when the operator must adjust certain components for given functions during normal operation according to the intended use of the machine.

If this type of guard is not used, moveable guards in accordance with ISO 12100-2:2003, 4.2.2.3, shall be provided, which

- cause the stop of the hazardous movement before reaching the hazard zone, or
- prevent their opening as long as the hazardous movement exists.

4.8 The strength of the guards shall comply with ISO 4254-1.

## 5 Verification of safety requirements or protective measures

See Table 1.

**Table 1 — List of safety requirements and/or protective measures and their verification**

| Clause/subclause | Verification |             |  |
|------------------|--------------|-------------|--|
|                  | Inspection   | Measurement | Procedure/reference  |
| 4.5              | X            | —           | Shall be verified by carrying out adjustment or maintenance operations described in the operator's manual. |

## **6 Information for use**

### **6.1 Operator's manual**

The manual shall include warnings about the significant residual risks and how these are to be controlled, as well as any training requirements (see 4.6).

### **6.2 Safety and instructional signs**

A safety sign shall be provided on access doors or guards to indicate the rotation of parts, if applicable (see 4.6).

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**Annex A**  
(informative)

**List of significant hazards**

Table A.1 specifies the significant hazards, significant hazardous situations and significant hazardous events that have been identified as being significant to the guards for moving parts of power transmissions covered by this Technical Specification and which require specific action by the designer or manufacturer to eliminate or reduce the risk.

**Table A.1 — List of significant hazards**

| Clause/<br>subclause<br>of ISO 4254-1 | Hazard  | Hazardous situation and event | Clause(s)/subclause of ISO/TS 28923 |
|---------------------------------------|---|-------------------------------|-------------------------------------|
| <b>A.1</b>                            | <b>Mechanical hazards</b>   |                               |                                     |
| A.1.1                                 | Crushing hazard   | Power transmission parts      | 4; 6                                |
| A.1.2                                 | Shearing hazard   | Power transmission parts      | 4; 6                                |
| A.1.4                                 | Entanglement hazard   | Power transmission parts      | 4; 6                                |
| A.1.5                                 | Drawing-in or trapping hazard   | Power transmission parts      | 4; 6                                |
| A.14                                  | Break-up during operation   | Guards                        | 4.8                                 |
| A.19.4                                | Mechanical hazards at the working position:<br>a) contact with power transmission parts | Guards                        | 4; 6                                |



## Bibliography

- [1] ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

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