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**Harvesting equipment — Blades  
for agricultural rotary mowers —  
Requirements**

*Matériel de récolte — Lames pour faucheuses rotatives agricoles —  
Prescriptions*

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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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 7, *Equipment for harvesting and conservation*.

This second edition cancels and replaces the first edition (ISO 5718:2002), which has been technically revised.

# Harvesting equipment — Blades for agricultural rotary mowers — Requirements

## 1 Scope

This International Standard specifies requirements for blades used on rotary disk mowers and rotary drum mowers, mounted, semi-mounted, trailed, or self-propelled, as used for forage crop harvesting in agriculture only.

It specifies requirements for testing and marking of such blades.

NOTE 1 The main purpose of this International Standard is to set material characteristics. Blades on agricultural rotary mowers are exposed to considerable centripetal forces and impacts with foreign objects. A bend test and impact test to check the brittleness and toughness of the material is therefore included in this International Standard.

NOTE 2 This International Standard does not specify dimensional requirements.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)*

## 3 Terms and definitions

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

### 3.1

#### **rotary mower**

mower in which one or more functional components cut or shear forage crop by impact without mulching and rotate about a vertical axis

#### 3.1.1

##### **drum mower**

*rotary mower* (3.1) where the drive line is above the path of the cutting elements

Note 1 to entry: See [Figure 1](#).

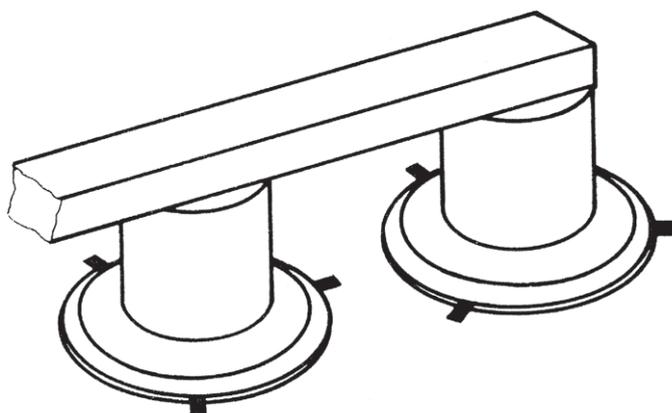


Figure 1 — Drum mower

### 3.1.2

#### **rotary disc mower**

*rotary mower* (3.1) where the drive line is below the path of the cutting elements

Note 1 to entry: See [Figure 2](#).

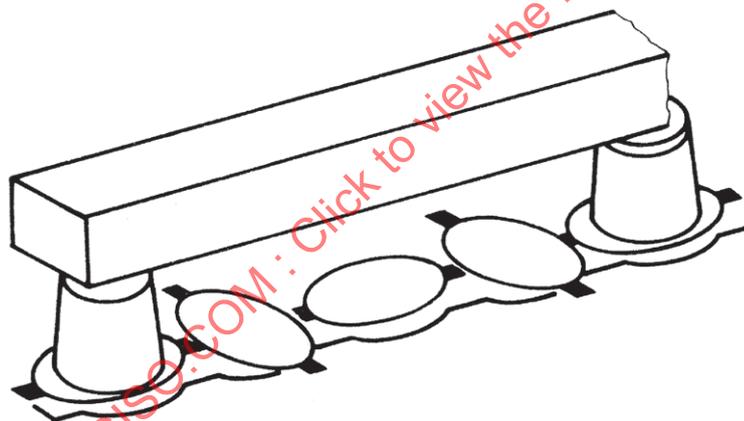


Figure 2 — Disc mower

### 3.2

#### **blades**

pivoting element, which can be flat, twisted, wrenched, or deformed, otherwise performing the cutting of the crop

### 3.3

#### **bending zone**

area in which the blade is deformed by the bend test

Note 1 to entry: See [Figure 3](#).

## 4 Requirements for blades

### 4.1 Material requirements

Blades shall be made of steel chosen by the manufacturer. The values of Rockwell hardness shall be at least 38 HRC, in accordance with ISO 6508-1. The degree of brittleness shall meet the requirements of [4.2](#).

### 4.2 Test procedures for blades

#### 4.2.1 Bend test

The blade shall progressively be bent within the bending zone with an inside radius  $r = 16$  mm (see [Figure 3](#)), at least through an angle  $\alpha$  (see [Table 1](#)), and with a minimum test speed of the ram of 20 mm/s. The width of the ram and of the bearings shall be at least equal to or greater than the width of the blade to be tested.

**Table 1**

$s$ mm	$\alpha$ degrees (°)
<3,5	75
$\geq 3,5$ to <4,5	45
$\geq 4,5$	30

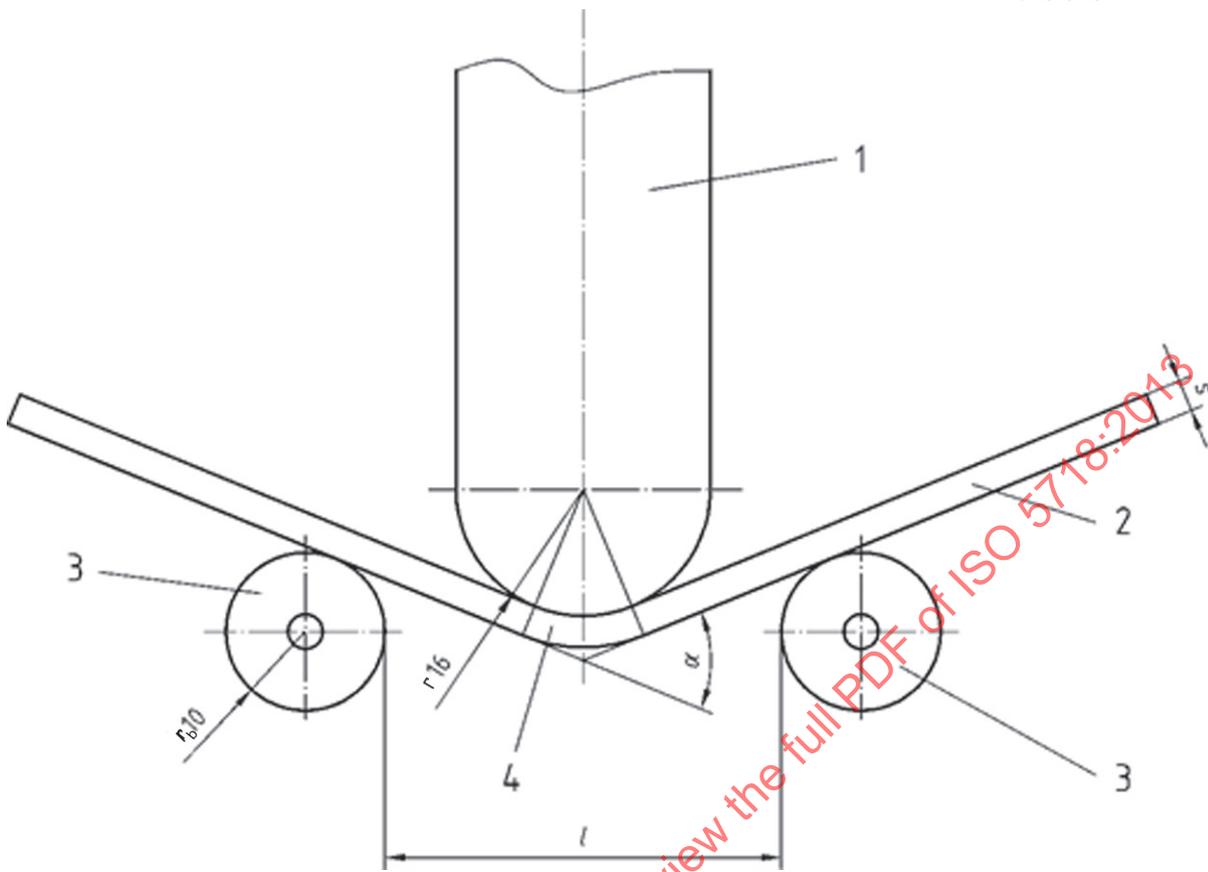
Blades which are not flat shall be tested in the most unfavourable position. The middle of the bending zone shall be at the middle of the total length of the blade. The distance,  $l$ , between the bearings shall be calculated using Formula (1):

$$l = (32 + 3s) \pm s/2 \quad (1)$$

and shall be constant during the bend test. The bearings shall have an outside radius  $r_b = 10$  mm and shall be mounted rotatable.

A spring-back rate is not taken into account.

After the bend test, the blade shall not present any visible cracks.



**Key**

- 1 ram
- 2 blade
- 3 bearings
- 4 bending zone

NOTE 1 The rollers are one example of bearings.

NOTE 2 The flat blade shown is only one example of blades covered by this International Standard.

**Figure 3 — Bend test**

**4.2.2 Impact test**

**4.2.2.1 General**

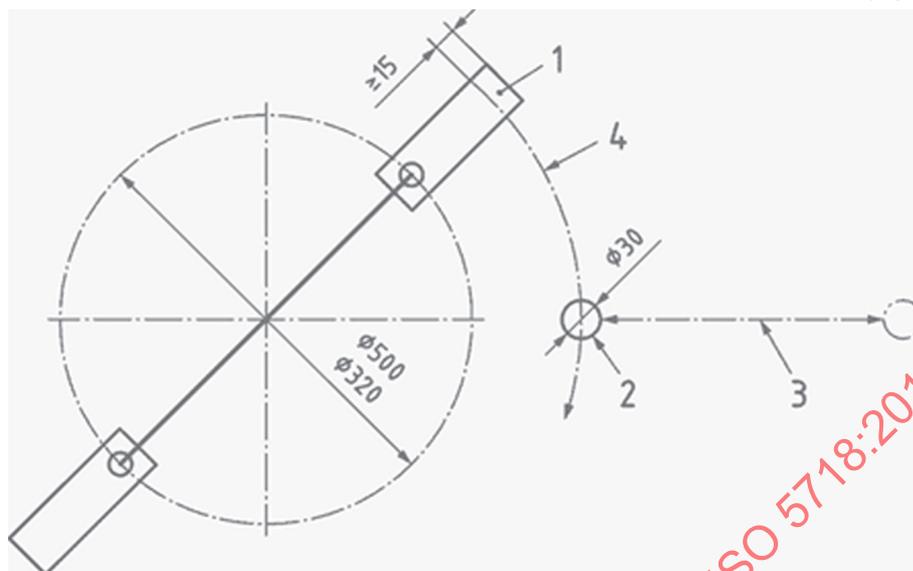
This test is only applicable for blades made of non-homogenous material and/or non-homogenous metallurgic properties and/or which are only partly heat treated. For homogenous material, it is only necessary for one blade out of each heat of steel.

NOTE Typically, heats are over 50 tons with many mills running heats about 300 tons.

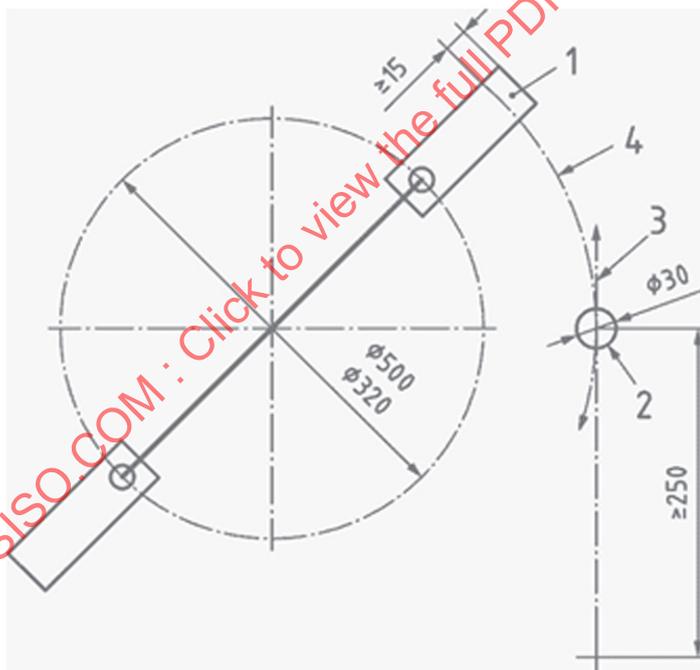
**4.2.2.2 Test fixture**

All blades selected for impact testing shall be tested on a test fixture with a pitch circle diameter of between 320 mm and 500 mm (see [Figure 4](#)).

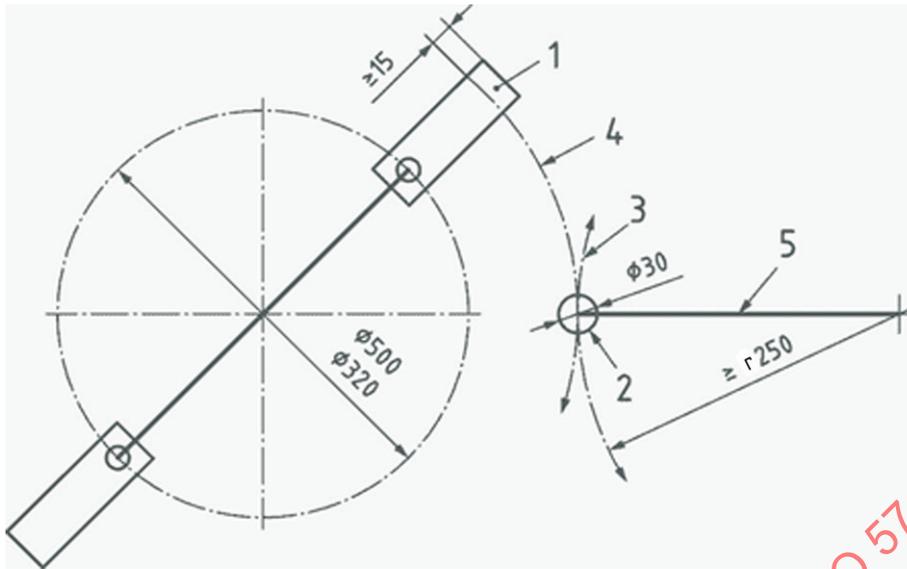
Dimensions in millimetres



a) steel rod insertion on a straight line perpendicular into the path of the blade



b) steel rod insertion on a straight line tangential into the path of the blade



c) steel rod insertion on a circular line into the path of the blade



d) steel rod insertion on a straight line from below into the path of the blade

**Key**

- 1 rotating blade
- 2 steel rod
- 3 path of the steel rod
- 4 path of the blade
- 5 test fixture for the steel rod

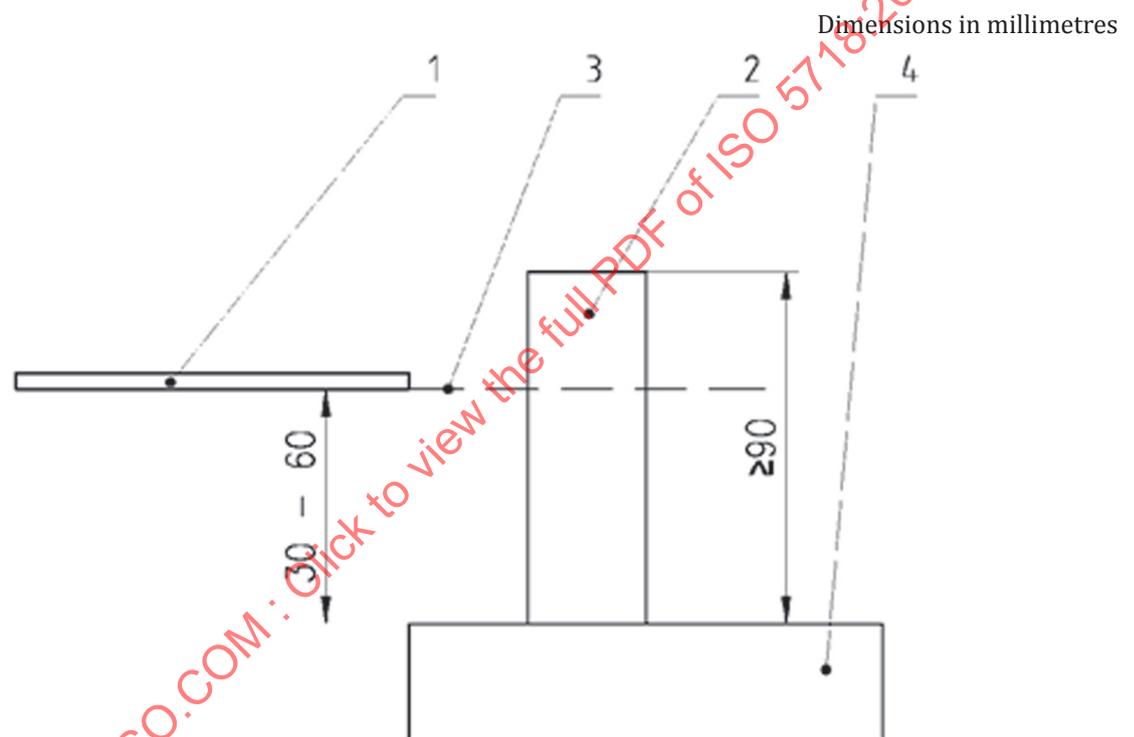
**Figure 4 — Example of a blade impact test fixture**

**4.2.2.3 Test procedure**

**4.2.2.3.1** The blade shall be fixed into the test fixture as it is fixed on the disc or drum. The test fixture with the blade shall be rotated with a rotating speed of minimum 90 m/s and maximum 96,5 m/s measured at the outer blade tip circle. When at specified rotating speed, insert a steel rod with a diameter of 30 mm having a minimum tensile strength  $R_m$  of 490 N/mm<sup>2</sup> into the path of the rotating blade as follows (see [Figure 4](#)).

- The steel rod is oriented vertically to the plane of the rotating blade.

- The steel rod is inserted parallel to the plane of the rotating blade with an insert speed of between 3 m/s and 5 m/s. The path of insertion can be either straight line or circular. In the latter case, the minimum radius of the circular path shall be 250 mm.
- The distance between the cutting plane of the rotating blade and the steel rod is at least 30 mm from the top surface of the rod clamp, but not more than 2/3 of the total length of the steel rod exposed above the clamp surface (see [Figure 5](#)). The minimum length of the steel rod above the clamp surface is at least 90 mm.
- The position of insertion shall be such that the whole cross section of the steel rod is just covered by the outermost path of the blade.
- The dwell period of the steel rod shall be between 1 s and 2 s. Afterwards, the steel rod shall be removed from the blade path.



#### Key

- 1 blade
- 2 steel rod
- 3 cutting plane
- 4 rod clamp

**Figure 5 — Test rod and cutting plane intersection**

**4.2.2.3.2** Blades having two cutting edges shall be tested on both cutting edges.

**4.2.2.3.3** After each test run, prior to the next test run, the steel rod shall be either replaced or rotated to a location not damaged.

#### **4.2.2.4 Test acceptance**

**4.2.2.4.1** After the test, the blade can show deformation but shall not show any visible cracks.