
**Harvesting equipment —
Requirements for cutting elements —**

Part 1:

**Blades used on rotary disc mowers
and rotary drum mowers**

Matériel de récolte — Exigences relatives aux éléments coupants —

*Partie 1: Lames utilisées sur les faucheuses à disques rotatifs et les
faucheuses à tambours rotatifs*

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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 document 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 7, *Equipment for harvesting and conservation*.

This first edition of ISO 5718-1, together with ISO 5718-2, cancels and replaces ISO 5718:2013, which has been technically revised. It also incorporates the Amendment ISO 5718:2013/Amd 1:2019.

The main changes are as follows:

- In [Clause 1](#), additional information has been added to the Scope regarding applicability;
- In [Clause 3](#):
 - some terms and definitions have been modified, added or removed;
 - former Figure 1 has been removed;
 - former Figure 2 has been removed;
- In [Clause 4](#):
 - An alternate test fixture and procedure for the blade test has been added;
 - The test procedure requirements have been modified;
- Bibliography has been added.

A list of all parts in the ISO 5718 series can be found on the ISO website.

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.

Introduction

There are a variety of cutting elements that can be used on rotary disc and rotary drum mowers. This document provides specific requirements for blades.

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Harvesting equipment — Requirements for cutting elements —

Part 1: Blades used on rotary disc mowers and rotary drum mowers

1 Scope

This document specifies requirements for blades used as cutting elements on rotary disc mowers and rotary drum mowers used for forage crop harvesting in agriculture only (as defined in ISO 4254-12) that are mounted, semi-mounted, trailed or self-propelled.

It specifies requirements for testing and marking of such blades.

This document is not applicable to blades used on:

- flail mowers;
- large rotary mowers covered by ISO 4254-13;
- arm-type large rotary mowers;
- pedestrian-controlled motor mowers;
- lawn mowers covered by the ISO 5395 series.

NOTE 1 The main purpose of this document is to set material characteristics. Blades on rotary drum and rotary disc 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 are therefore included in this document.

NOTE 2 This document does not specify dimensional requirements.

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 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*

3 Terms and definitions

For the purpose 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>
- IEC Electropedia: available at <https://www.electropedia.org/>.

**3.1
blade**

pivoting element, which may be flat, twisted, wrenched or otherwise formed, that performs the cutting of the forage crop

**3.2
bending zone**

portion of the blade that is deformed during the bend test

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

**3.3
visible crack**

linear discontinuity in the material that is visible by the naked eye

4 Requirements

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

4.2.1 Bend test

4.2.1.1 The blade shall be progressively bent within the bending zone with an inside radius $R = 16$ mm (see [Figure 1](#)) at least through an angle α (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. 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 as shown in [Formula \(1\)](#):

$$l = (32 + 3s) \pm s / 2 \tag{1}$$

where s is the blade thickness (see [Table 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.

4.2.1.2 A spring-back rate is not taken into account.

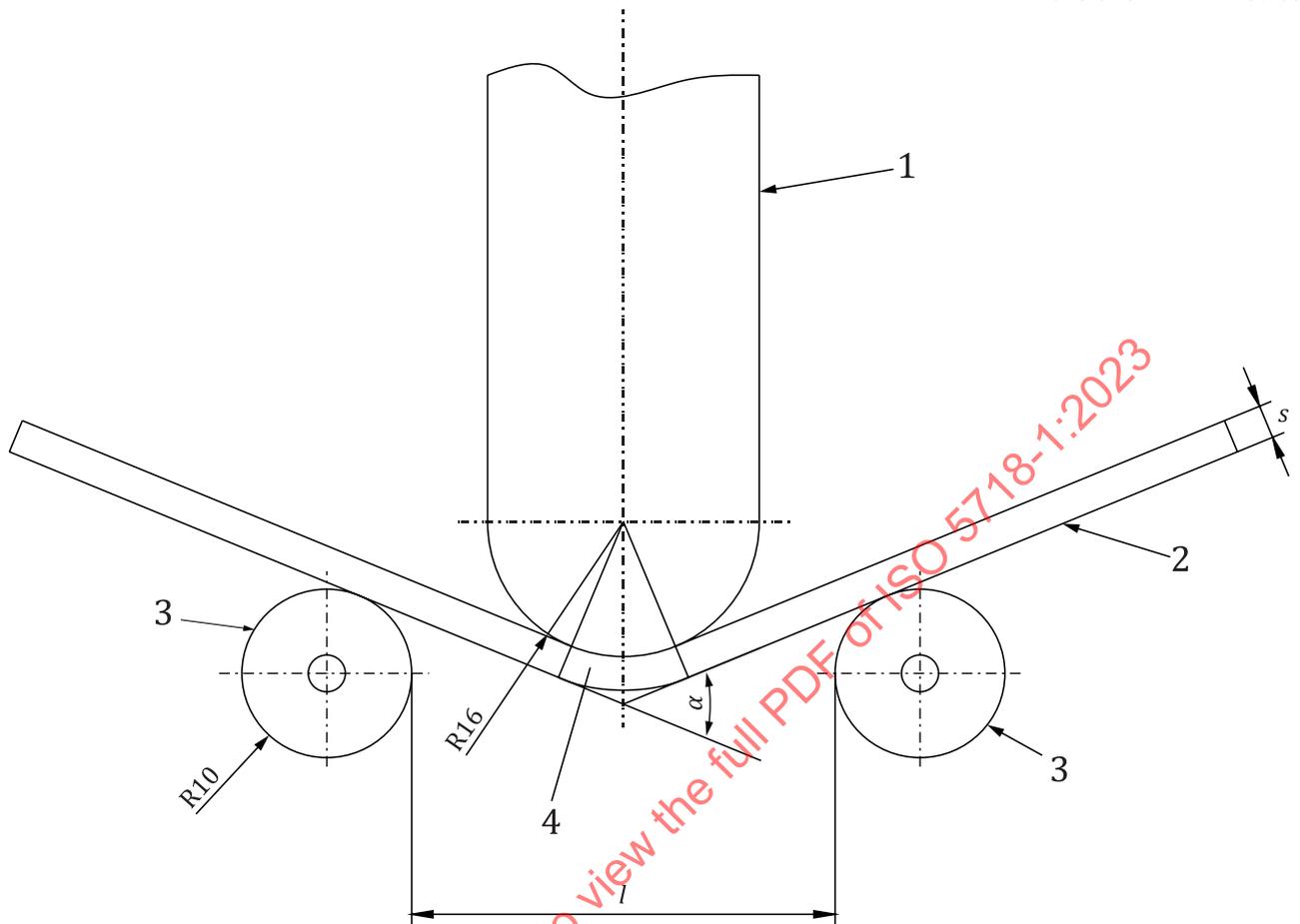
4.2.1.3 Alternate procedure

The following alternate procedure may be utilized.

- a) The objective of this test fixture and procedure is to produce 14,5 % permanent elongation in the surface of the metal all the way across the blade.
- b) This is based on the assumption that the neutral axis of the blade is located in from the inside bend surface a distance equal to 40 % of the thickness.
- c) Any other form of blade bend test fixture and procedure may be substituted as long as this objective is achieved.

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

Dimensions in millimetres



Key

- α bend angle
- l distance between bearings
- s thickness of blade
- 1 ram
- 2 blade
- 3 bearings
- 4 bending zone

NOTE 1 The rollers are one example for bearings.

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

Figure 1 — Bend test

Table 1

s (mm)	α (degrees)
< 3,5	75
$\geq 3,5$ - < 4,5	45
$\geq 4,5$	30

4.2.2 Impact test

4.2.2.1 General

4.2.2.1.1 This test is applicable for all types of blades as follows.

4.2.2.1.2 For blades made of homogenous material, it is only necessary for one blade out of each heat of steel independent of its geometry. For this purpose, the test of a reference blade is considered as sufficient.

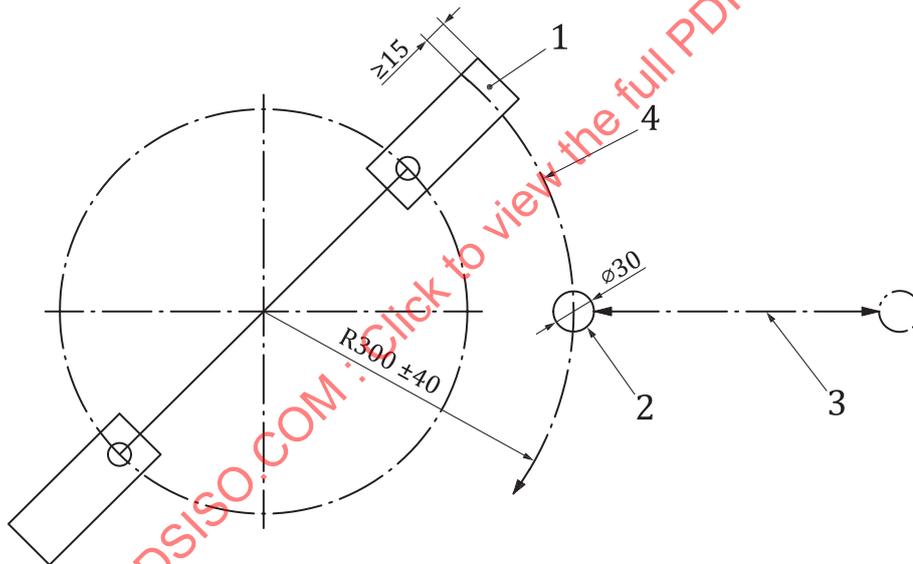
NOTE Typically heats are over 50 tons with many mills running heats about 300 tons.

4.2.2.1.3 For blades made of non-homogenous material and/or non-homogenous metallurgic properties and/or which are only partly heat-treated, it is required for one blade out of each production lot.

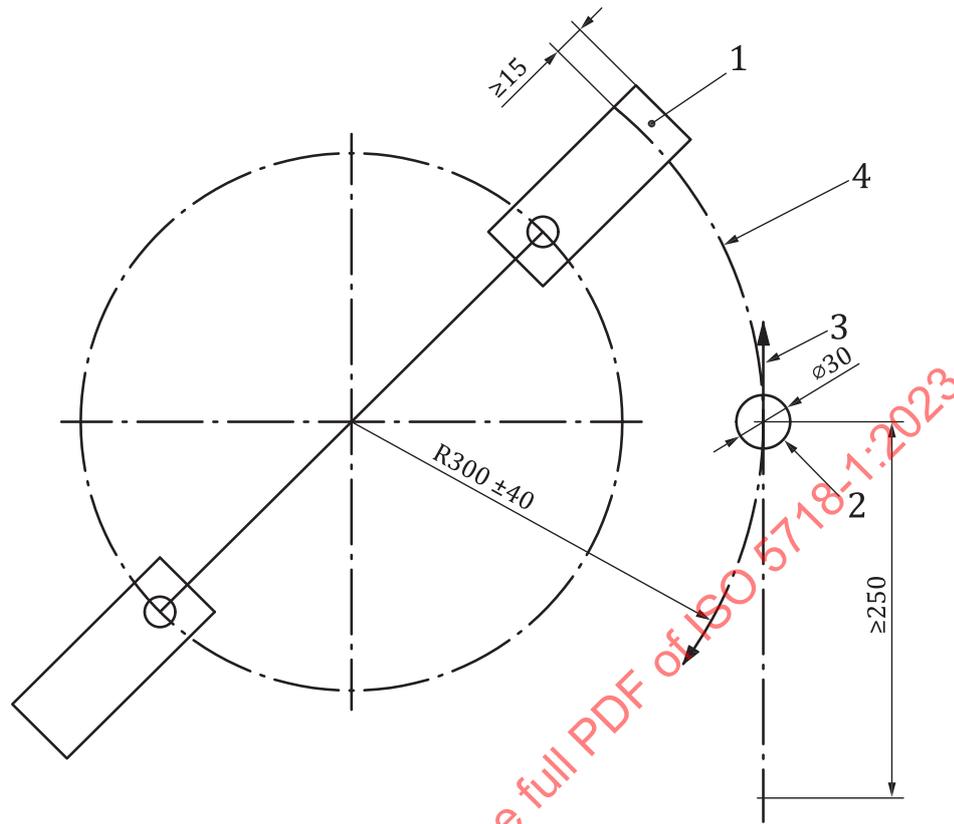
4.2.2.2 Test fixture

All blades selected for impact testing shall be tested on a test fixture as shown in [Figure 2](#).

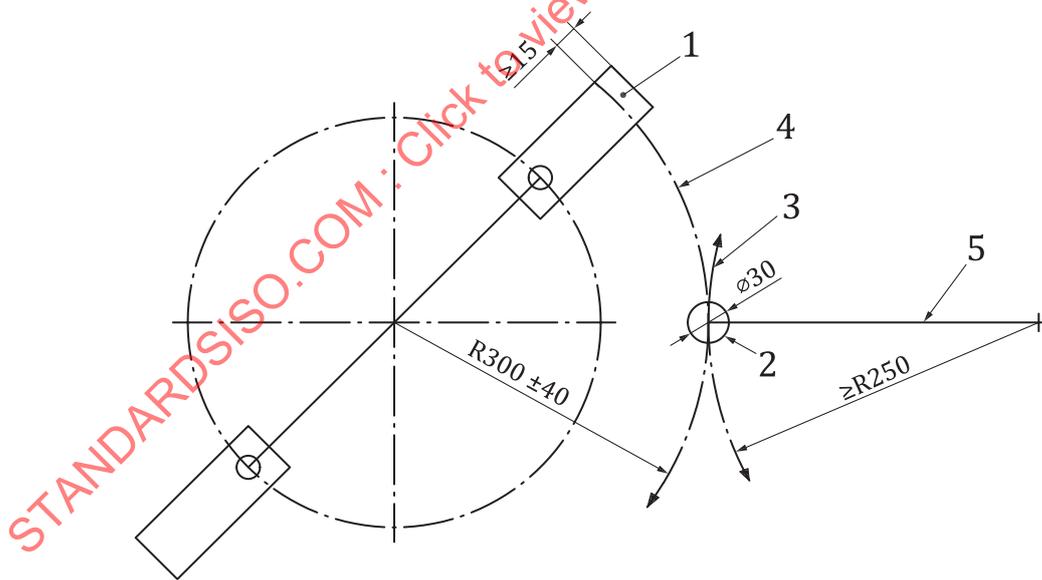
Dimensions in millimetres



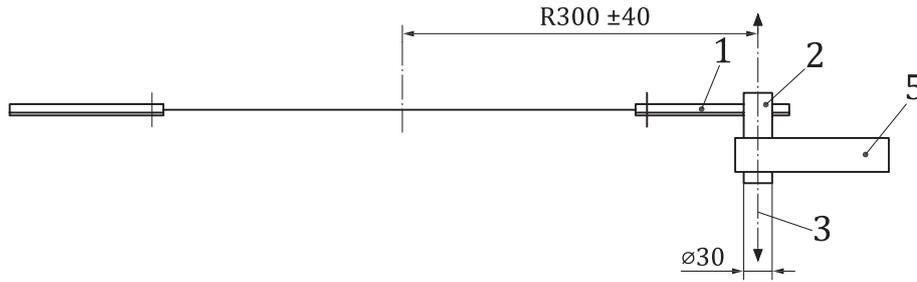
a) Steel rod insertion on a straight line perpendicular into the path of the blade



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 2 — 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 measured at the outer blade tip circle. When at specified rotating speed, insert a steel rod with a diameter of 30 mm having a tensile strength R_m between 490 N/mm² and 550 N/mm² into the path of the rotating blade as follows (see [Figure 3](#)):

- a) the steel rod is oriented vertically to the plane of the rotating blade;
- b) the steel rod is inserted either parallel or perpendicular to the plane of the rotating blade with an insert speed of no less than 3 m/s and no greater than 5 m/s. In case of insertion parallel to the plane of the rotating blade, 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;
- c) in case of insertion parallel to the plane of the rotating blade 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 3](#)). The minimum length of the steel rod above the clamp surface is at least 90 mm;
- d) 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;
- e) the dwell period of the steel rod shall be a minimum of 1 s with a minimum number of 29 calculated impacts. Afterwards the steel rod shall be removed from blade path.

4.2.2.3.2 For blades made of homogenous material and having two cutting edges, the test of one cutting edge is sufficient. For all other blades (for example, non-homogenous material, non-homogenous metallurgical properties, partly heat-treated) having two cutting edges, both edges shall be tested.