SLOVENSKI STANDARD
SIST EN 745:1999+A1:2009

01-november-2009

Kmetijski stroji - Rotacijske kosilnice in mulļ erji - Varnost

Agricultural machinery - Rotary mowers and flail-mowers - Safety

Landmaschinen - Kreiselmähwerke und Schlegelmäher - Sicherheit

Matériel agricole - Faucheuses rotatives et faucheuses-broyeuses - Sécurité

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65.060.50 Oprema za spravilo pridelkov Harvesting equipment

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Agricultural machinery - Rotary mowers and flail-mowers - Safety

Matériel agricole - Faucheuses rotatives et faucheuses-broyeuses - Sécurité

Landmaschinen - Kreiselmähwerke und Schlegelmäher - Sicherheit

This European Standard was approved by CEN on 20 February 1999 and includes Amendment 1 approved by CEN on 23 May 2009.

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Foreword

This document (EN 745:1999+A1:2009) has been prepared by Technical Committee CEN/TC 144 “Tractors and machinery for agriculture and forestry”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by January 2010, and conflicting national standards shall be withdrawn at the latest by January 2010.

This document includes Amendment 1, approved by CEN on 2009-05-23.

This European Standard supersedes EN 745:1999.

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1⟩ ⟨A1].

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).

[A1⟩ For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. ⟨A1]

Annex A is normative and contains the "list of hazards".

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

Introduction

The extent to which hazards are covered is indicated in the scope of this standard. These hazards are specific to rotary mowers and flail-mowers.

The hazards that are common to all agriculture machines (self-propelled, mounted, semi-mounted and trailed) will be dealt with in a standard currently in preparation (prEN 1553).

1 Scope

This standard specifies specific safety requirements and their verification for the design and construction of rotary mowers and flail-mowers with one or several vertical axes or a horizontal axis, mounted, semi-mounted, trailed or self-propelled.

This standard is also applicable to mowers equipped with a conditioning device.

This standard applies only to mowers intended to work at ground level.

NOTE 1 Examples of such machines are given in annex D.1.

It does not apply to:

— mowers with an articulated arm;

NOTE 2 An example of such a machine is given in annex D.2.

— pedestrian controlled motor mowers (dealt with in prEN 12733[1)]);

— lawn mowers or machines designed as lawn mowers dealt with in EN 836;

— inter-row mowing units (dealt with in prEN... [1)]).

In addition, it specifies the type of information on safe working practices to be provided by the manufacturer.

The list of significant hazards dealt with in this standard is given in annex A. Annex A also indicates the hazards which have not been dealt with.

Environmental aspects have not been considered in this standard.

This standard applies primarily to machines which are manufactured after the date of issue of the standard.

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

1) in preparation

this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 292-1:1991, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology.*

EN 292-2:1991, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications (including amendment A1:1995).*

EN 294:1992, *Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs*

EN 836:1997, *Garden equipment - Powered lawnmowers – Safety.*

prEN 1553:1998, *Agricultural machinery - Agricultural self-propelled, mounted, semi-mounted and trailed machines - Common safety requirements.*

prEN 12733:1997, *Agricultural and forestry machinery - Pedestrian controlled motor mowers – Safety.*

ISO 525:1986, *Bonded abrasive products - General - Designation, marking, range of outside diameters and tolerances.*

ISO 730-1:1994, *Agricultural wheeled tractors – Rear-mounted three-point-linkage - Part 1: Categories 1, 2, 3 and 4.*

ISO 845:1988, *Cellular plastics and rubbers - Determination of apparent (bulk) density.*

ISO 2288:1997, *Agricultural tractors and machines – Engine test code (bench test) – Net power.*

ISO 2758:1983, *Paper - Determination of bursting strength.*

ISO 4004:1983, *Agricultural tractors and machinery – Track widths.*

ISO 5718-1:1989, *Harvesting equipment - Flat blades for rotary mowers - Specifications - Part 1: Type A flat blades.*

ISO 5718-2:1991, *Harvesting equipment - Flat blades for rotary mowers - Part 2: Specifications for type B flat blades.*

3 Definitions

For the purpose of this standard, the definitions given in EN 292-1:1991 and EN 292-2:1991 apply together with the following.

NOTE Annex D.1 gives illustrations of mowers and components.

3.1
rotary mower
Mower that cuts the grass without mulching it so that it can subsequently be picked up

3.2
flail mower
Mower that cuts the grass and mulches it with the same tools, the mulched grass being left on the soil

3.3
conditioning device
Mechanical device for accelerating the crop drying process

3.4
swath board
Adjustable device for controlling the swath width

3.5
rigid imperforate guard
Inflexible guard without holes

3.6
vertical axes mower
Mower where each cutting head rotates about a vertical axis

3.7
horizontal axis mower
Mower where the tools rotate about a horizontal axis

4 Safety requirements and/or measures

4.1 General

The machinery shall comply as appropriate with EN 292 for hazards which are not dealt with and especially with annex A of EN 292-2:1991/A1:1995 when EN 292 does not give precise requirements.

Unless otherwise specified in this standard, the machine shall comply with the requirements of prEN 1553:1998 and with tables 1, 3, 4 and 6 of EN 294:1992.

4.2 Protection against unintentional contact with the tools

4.2.1 General

The mower shall be designed or guarded in such a way that any unintentional contact with the tools at the front, at the rear, at the sides and on the top is prevented:

4.2.1.1 Vertical axes mower

— The top protection shall be achieved by a rigid imperforate guard or by the device used to prevent projections (see 4.3);

— At the sides, the protection shall be achieved by:

  — a barrier located in such a way that the distances defined in figure 1 are respected. These distances are measured from the tool path and with the mower in working position, the cutting height being adjusted at 50 mm or as near as possible to 50 mm;

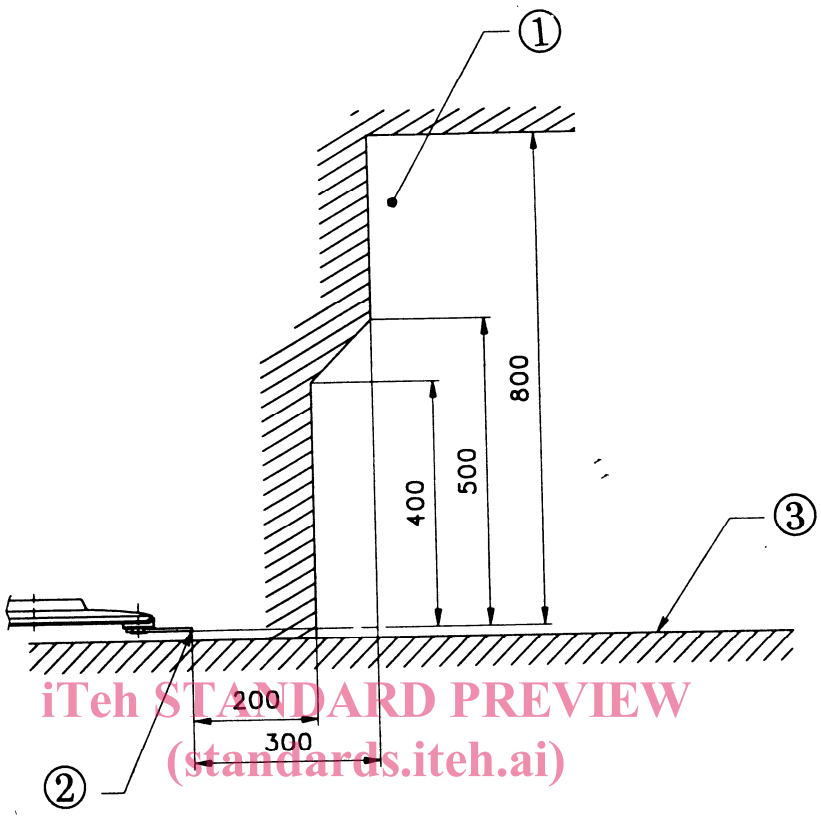
  This barrier may be removable or folded for transport. The removal of the barrier shall only be possible by use of a tool;

  and/or

  — a rigid imperforate guard, located near the tools and in such a way that its lower edge extends below the tool path by a minimum of 3 mm (see figure 2);

— On the front and at the rear, the protection shall be achieved by a barrier located in such a way that the distances as defined in figure 1 are respected.

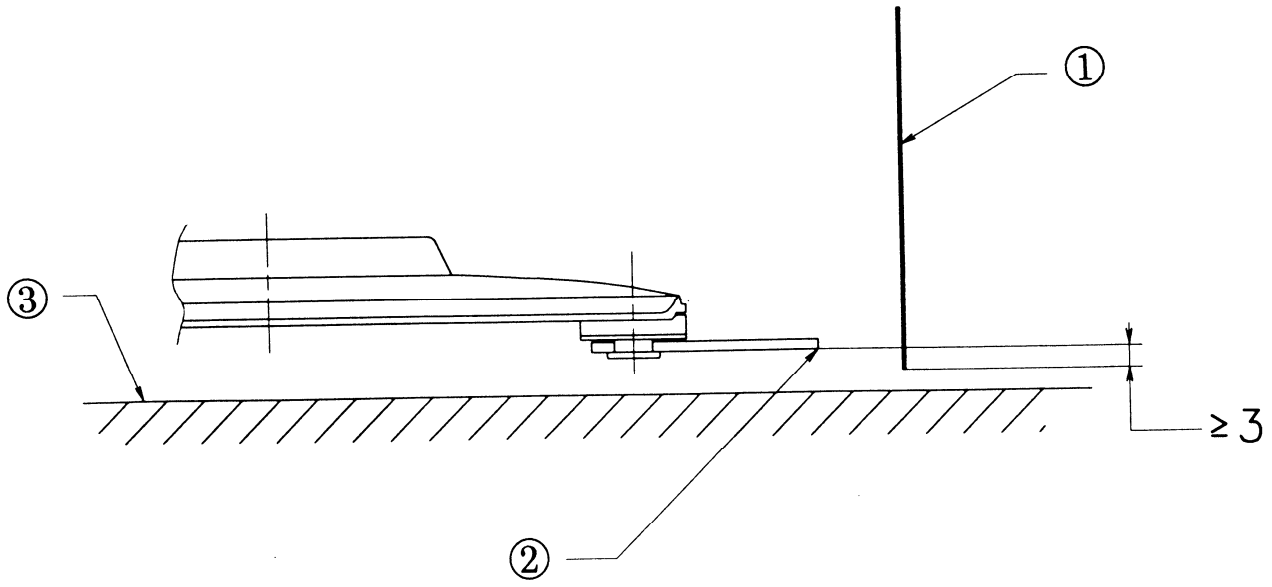
Dimensions in millimetres



① - Area in which the barrier shall be located
② - Tool path
③ - Ground

Figure 1 — Vertical axes mower - Protection ensured by a barrier

Dimensions in millimetres



① - Guard
② - Tool path
③ - Ground

Figure 2 — Vertical axes mower - Lateral protection ensured by a rigid imperforate guard

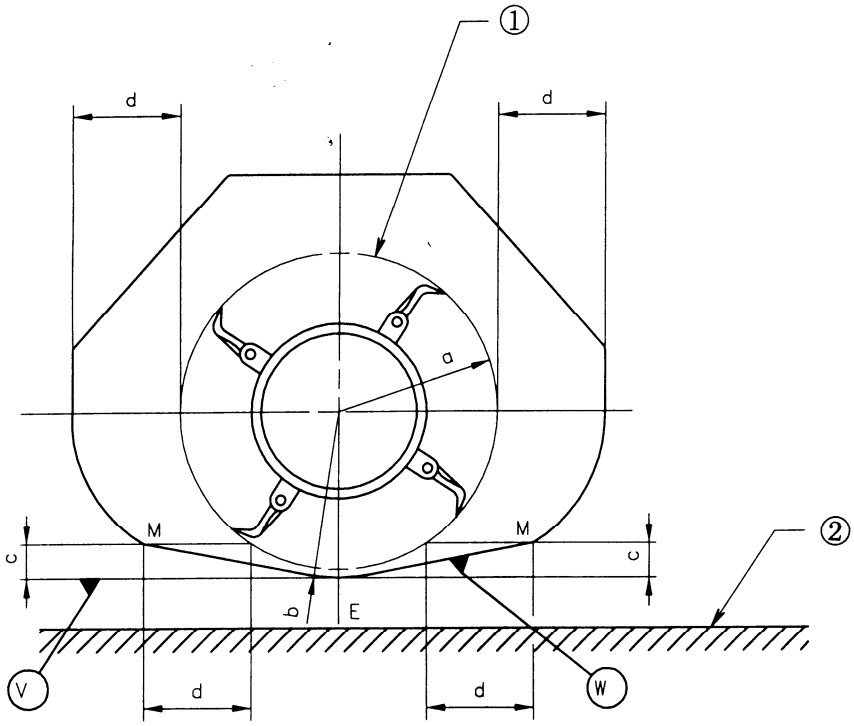
4.2.1.2 Horizontal axis mower

— Top protection shall be achieved by a rigid imperforate guard.

— At the sides, the protection shall be achieved by a rigid imperforate guard, located near the tools and in such a way that its lower edge extends below the tool path by a minimum of 3 mm. Above point M, the guard shall extend at least 200 mm beyond the tool path. Below point M, the guard shall not be above line W (see figure 3).

— On the front and at the rear, protection shall be achieved by a barrier located in such a way that the distances as defined in figure 4 are respected.

Dimensions in millimetres

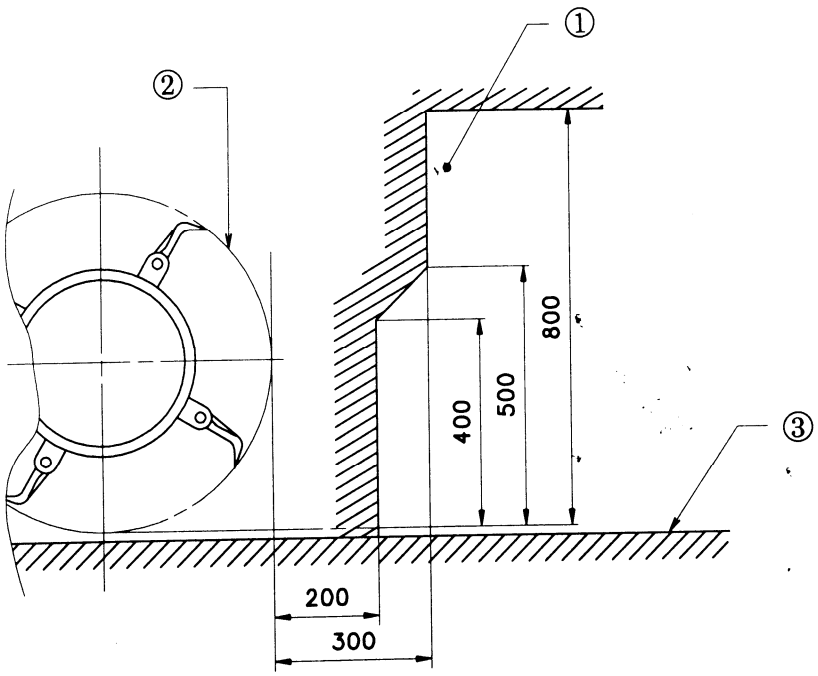


① - Tool path
② - Ground

a: tool path radius
b: tool path radius + 3 mm minimum
c: distance between point M and V (max 120 mm)
d: horizontal safety distance of 200 mm minimum from tool path
E: point on the circle with radius b on the vertical plane including the rotating axle
V: horizontal line passing through point E
W: straight line passing through point M and tangential to a circle with radius b

Figure 3 — Horizontal axis mower - Lateral protection

Dimensions in millimetres



① - Area in which the barrier shall be located
② - Tool path
③ - Ground

Figure 4 — Horizontal axis mower - Rear and front protection

4.2.2 Derogation for offset mowers with one or several vertical axes attached at the rear three-point tractor linkage (see figure 5)

To avoid interference with the tractor wheel, the distance between the front barrier and the tool path may be reduced to 150 mm within a 90° sector as shown in figure 5.

Dimensions in millimetres

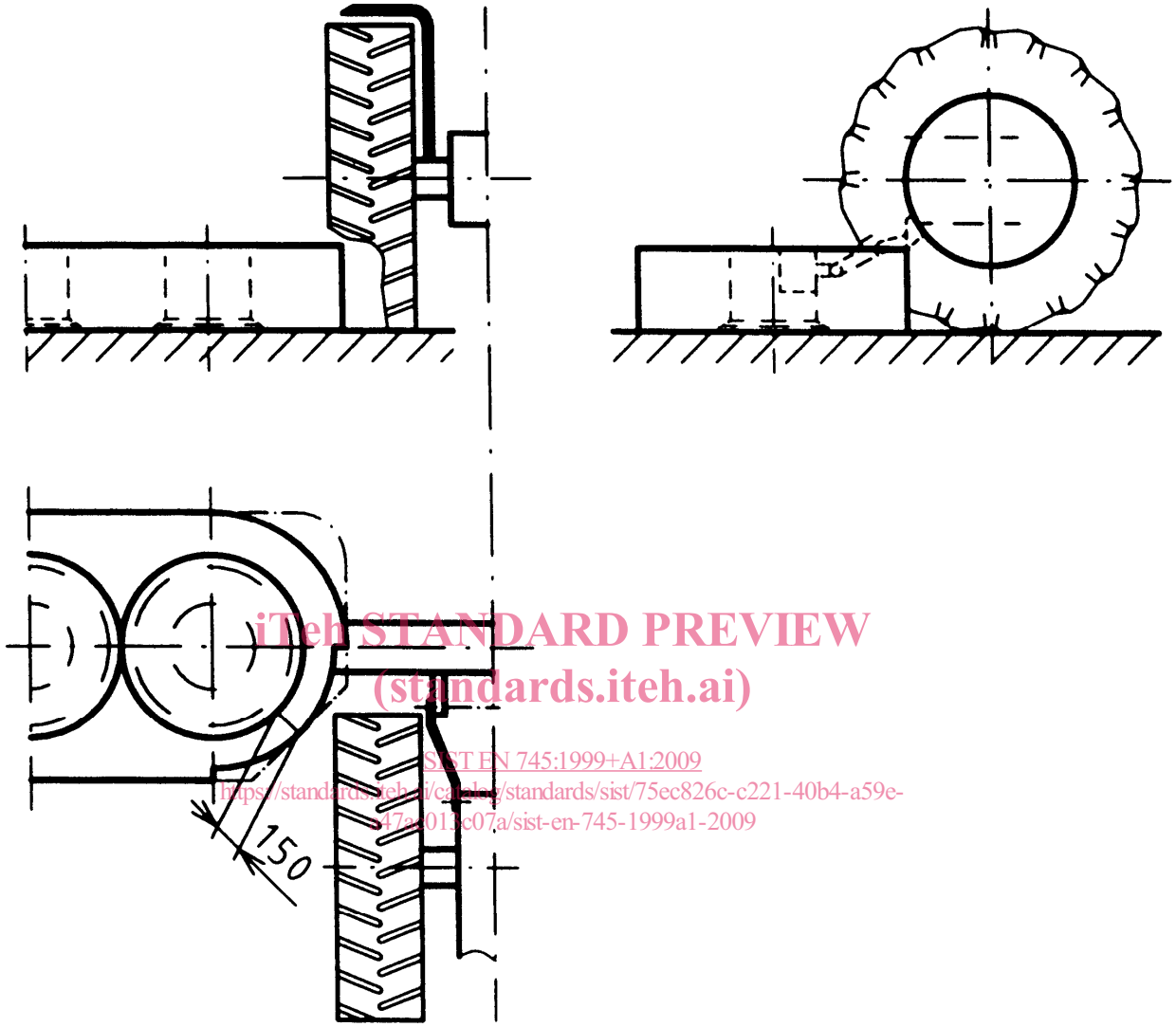


Figure 5 — Specific requirement for offset mowers

4.3 Protection against ejection of projectiles other than parts of the machine

4.3.1 General

The mower shall be fitted with a protective device to prevent ejection of projectiles so that tests defined in 5.1 are satisfied.

NOTE This protective device may be for example canvas, rigid imperforate guard, chains or rubber strips.

In the case where this device consists of canvas, this canvas shall comply with the requirements of 5.2. In addition, its attachment shall meet the following requirements:

— if the canvas is clamped between two metal elements over its entire length, these elements shall not have sharp edges where they come into contact with the canvas;

— if the canvas is attached by being applied directly to a metal element, attachment devices (e.g. screws, rivets ...) shall be used with corresponding washers having a minimum diameter of four times the nominal diameter of the attaching devices. These washers shall not have any sharp edges. The distance between two attaching devices shall not exceed 250 mm;

— if the canvas is attached indirectly (e.g. by sliding over a tube) attachment elements shall not have any sharp edges.

Side protection may be made by skirts attached on their upper parts.

NOTE 2 The strength of the attachment of the canvas will be considered at the revision of the standard.

4.3.2 Additional requirements for offset mowers with one or several vertical axes attached at the rear three-point tractor linkage

Between the innermost and outermost rotor axis, the protective device to prevent ejection of projectiles from the top of the mower shall extend towards the front of the mower at least up to its intersection with the imaginary line connecting points A and B (see figure 6).

Point A is located on a line parallel to the mower's forward direction. This line is located 900 mm from the cutting path of the innermost rotor and 2 100 mm from the ground level. Point A is 1 750 mm in front of the lower hitch point (see ISO 730-1) of the mower.

Point B is located where the line from point A, projected on the plan view, is tangent to the front part of the tool path of the outermost rotor.

Dimensions in millimetres

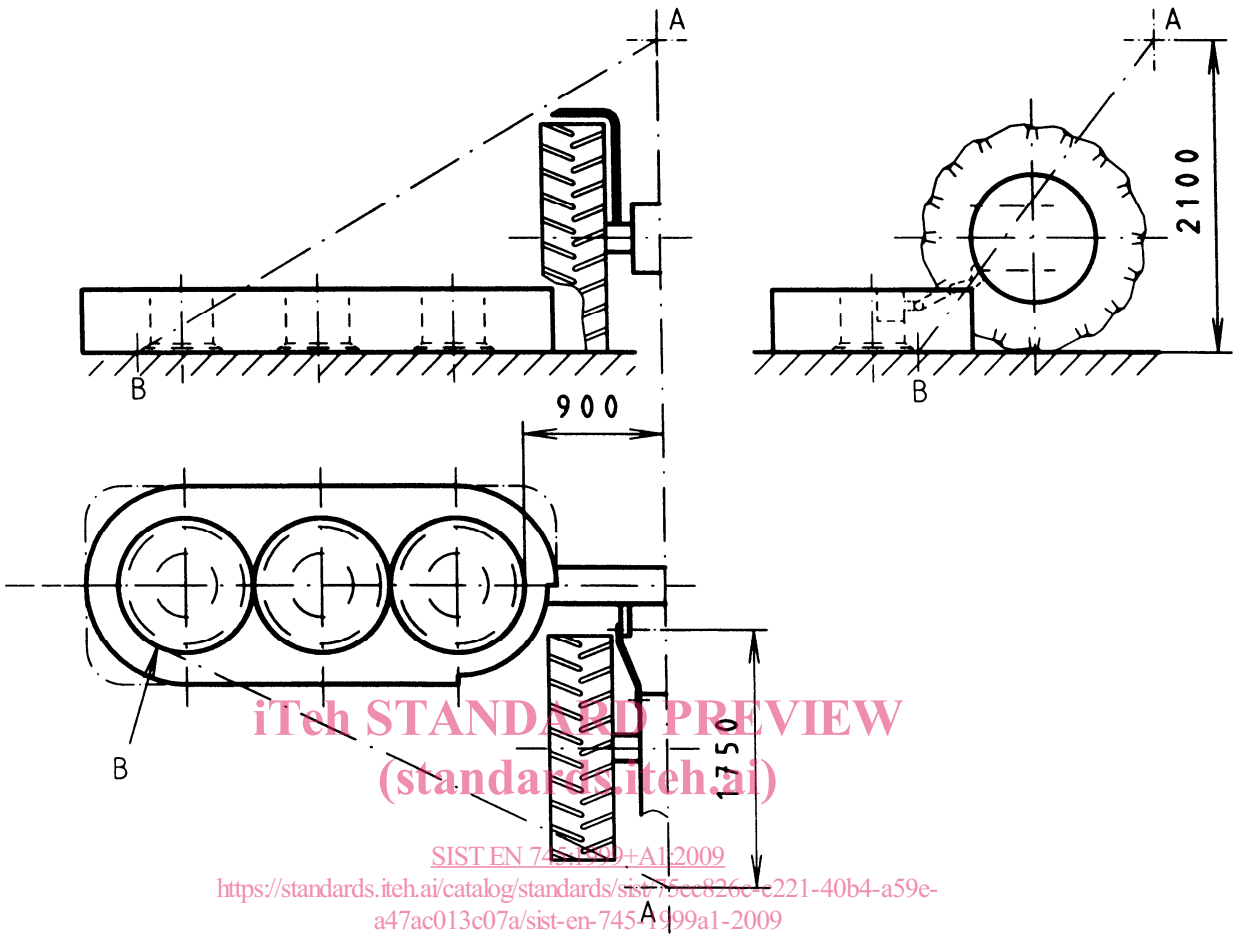


Figure 6 — Protection against projectiles for offset mowers

4.4 Protection during handling and transport

Machines with folding elements shall be supplied with a mechanical locking device for use in the transport position. The change from the working position to the transport position and vice versa shall occur without causing a crushing or pinching hazard. The movement of the folding elements shall be powered if the manual force needed for the manoeuvre exceeds 250 N.

Folding elements that can be manually moved shall be fitted with two handles located at a distance of at least 300 mm from the nearest articulation. These handles may be integral parts of the elements, provided they are suitably designed and clearly identified.

In the case of powered operation, the control shall be of the hold-to-run type and the manual control shall be located outside the swivelling zone.

These requirements shall also apply to any folding wheels fitted for transport.