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Machinery for forestry - Winches - Part 1: Dimensions, performance and safety (ISO/DIS 19472-1:2026)

Maschinen für die Forstwirtschaft - Winden - Abmessungen, Leistung und Sicherheit (ISO/DIS 19472-1:2026)

Matériels forestiers - Treuils - Partie 1: Dimensions, performance et sécurité (ISO/DIS 19472-1:2026)

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Machinery for forestry — Winches —

Part 1: Dimensions, performance and safety

Matériels forestiers — Treuils —

Partie 1: Dimensions, performance et sécurité

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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*.

A list of all parts in the ISO 19472 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

This document is a type-C standard as stated in ISO 12100.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine manufacturers (small, medium and large enterprises);

— health and safety bodies (regulators, accident prevention organisations, market surveillance etc.)

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

— machine users/employers (small, medium and large enterprises);

— machine users/employees (e.g. trade unions, organizations for people with special needs);

— service providers, e. g. for maintenance (small, medium and large enterprises);

— consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the scope of this document.

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

Machinery for forestry — Winches —

Part 1: Dimensions, performance and safety

1 Scope

This document specifies requirements with respect to performance and safety for winches that are used in forestry and agriculture for logging and skidding work.

It applies to permanently mounted and removable winches and their components, which are mounted on mobile and self-propelled forestry machines as defined in ISO 6814:2009, as well as to winches for forestry mounted on agricultural tractors or other implements that are used for forestry work. This document also applies to capstan winches and winches using driving sheaves or driving pulleys and portable winches used for forestry.

It applies exclusively to winches that are used for dragging loads on horizontal and inclined ground during logging operations, which are used for unspooling and positioning of the winch rope of another winch for forestry or which are used to support tree felling work.

It does not apply to winches:

— that are used for hoisting or lifting operations;

— that are used in draglines;

— that are used in yarders;

— designed for traction aid purposes;

— using ropes made from natural fibres

— using operating and control voltages > 60 V;

— that are used with log splitters according to EN 609-1.

Control systems for winches with fully or partially self-evolving behaviour or logic are not covered by this document.

The significant hazards included in this document are identified in Annex A.

This document is not applicable to winches manufactured before the date of its publication.

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 730:2009, *Agricultural wheeled tractors — Rear-mounted three-point linkage — Categories 1N, 1, 2N, 2, 3N, 3, 4N and 4*

ISO 730:2009/Amd 1:2014, *Agricultural wheeled tractors — Rear-mounted three-point linkage — Categories 1N, 1, 2N, 2, 3N, 3, 4N and 4 — Amendment 1*

ISO 3411:2007, *Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope*

ISO 3457:2003, *Earth-moving machinery — Guards — Definitions and requirements*

ISO 3600:2022, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and format*

ISO 3744:2025, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

ISO 3767-1:2016, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 1: Common symbols*

ISO 3767-1:2016/Amd 1:2020, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 1: Common symbols*

ISO 3767-2:2016, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 2: Symbols for agricultural tractors and machinery*

ISO 3767-2:2016/Amd 1:2020, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 2: Symbols for agricultural tractors and machinery*

ISO 4254-1:2013, *Agricultural machinery — Safety — Part 1: General requirements*

ISO 4254-1:2013/Amd 1:2021, *Agricultural machinery — Safety — Part 1: General requirements — Amendment 1*

ISO 4301-1:2016, *Cranes — Classification — Part 1: General*

ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment*

ISO 5674:2024, *Tractors and machinery for agriculture and forestry — Guards for power take-off (PTO) drive-shafts — Strength and wear tests and acceptance criteria*

ISO 6750-1:2019, *Earth-moving machinery — Operator's manual — Part 1: Contents and format*

ISO 6814:2009, *Machinery for forestry — Mobile and self-propelled machinery — Terms, definitions and classification*

ISO 8084:2003, *Machinery for forestry — Operator protective structures — Laboratory tests and performance requirements*

ISO 8084:2003/Amd 1:2015, *Machinery for forestry — Operator protective structures — Laboratory tests and performance requirements — Amendment 1*

ISO 9244:2008, *Earth-moving machinery — Machine safety labels — General principles*

ISO 9244:2008/Amd 1:2016, *Earth-moving machinery — Machine safety labels — General principles — Amendment 1*

ISO 10968:2020, *Earth-moving machinery — Operator's controls*

ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections*

ISO 11684:2023, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Safety labels — General principles*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13732-1:2006, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces*

ISO 13766-1:2018, *Earth-moving and building construction machinery — Electromagnetic compatibility (EMC) of machines with internal electrical power supply — Part 1: General EMC requirements under typical electromagnetic environmental conditions*

ISO 13849-1:2023, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 14120:2015, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

ISO 14982:1998, *Agricultural and forestry machinery — Electromagnetic compatibility — Test methods and acceptance criteria*

ISO 15817:2012, *Earth-moving machinery — Safety requirements for remote operator control systems*

ISO 19014-4:2020, *Earth-moving machinery — Functional safety — Part 4: Design and evaluation of software and data transmission for safety-related parts of the control system*

IEC 60204-32:2023, *Safety of machinery — Electrical equipment of machines — Part 32: Requirements for hoisting machines*

EN 12077-2:2024, *Cranes safety — Requirements for health and safety — Part 2: Limiting and indicating devices*

EN 12965:2019+A1:2025, *Tractors and machinery for agriculture and forestry — Power take-off (PTO) drive shafts and their guards — Safety*

EN 13411-3:2022, *Terminations for steel wire ropes — Safety — Part 3: Ferrules and ferrule securing*

EN 13411-6:2004+A1:2008, *Terminations for steel wire ropes — Safety — Part 6: Asymmetric wedge socket*

EN 13411-7:2021, *Terminations for steel wire ropes — Safety — Part 7: Symmetric wedge socket*

EN 13557:2024, *Cranes — Control devices and control stations*

EN 17067:2018, *Forestry machinery — Safety requirements on radio remote controls*

EN 17822:2023, *Forestry machinery — Requirements for sling gear and deflection pulleys for forestal hauling operations*

EN 60529:1991+A1:2000+A2:2013, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100:2010 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
drum core diameter
diameter of the rope drum core in millimetres

Note 1 to entry: See Figure 2.

3.2
drum rim diameter
diameter of the rope drum rim in millimetres

Note 1 to entry: See Figure 2.

3.3
drum width
distance between the rims of the rope drum, measured in millimetres

Note 1 to entry: See Figure 2.

3.4
flange depth
radial distance from the outer diameter of the rope drum rim to the surface of the rope drum core in millimetres

Note 1 to entry: See Figure 2.

3.6
safety overhang
overhang in millimetres from the outer part of the winch rim or housing, which shall remain free after winding the entire rope length in order to ensure that the rope remains in the drum

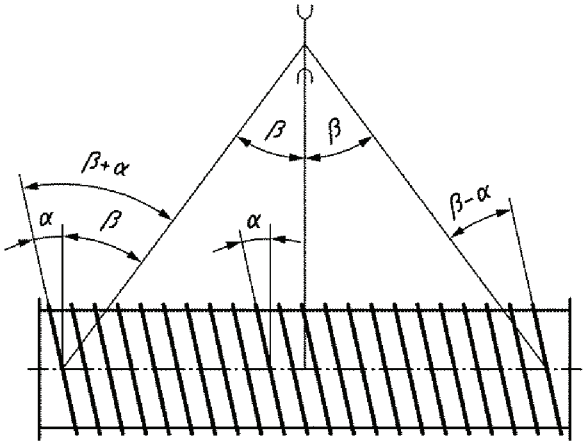
Note 1 to entry: Suitable measures in order to attain the safety overhang at drums are e.g. flanged pulleys, frames/ housings or rope guides.

Note 2 to entry: See Figure 3.

3.7
constant force winch
forestry winch whose maximum pulling force does not drop below the rated line pull, regardless of the unwound rope length

3.8
rope deflection angle
angle between the actual running direction of the rope and a reference direction on the winch drum

Note 1 to entry: See Figure 1.



Key

β	rope deflection angle at the rope entering pulley
$\beta - \alpha$	rope deflection angle, right drum side
$\beta + \alpha$	rope deflection angle, left drum side
α	angle of a reference direction on the drum e.g. the drum grooves

Figure 1 — Rope deflection angle

Note 2 to entry: In case of non-grooved drums, the rope deflection angle is the angle β.

3.9
power transmission
two or more connected moving or turning parts that transmit forces or torque

3.10
maximum speed
highest respective speed in the intended direction of movement

3.11
pulling
load movement initiated by a force transmitted from the winch via a rope to the load (trees or parts of trees, logs etc.) which is located on the ground and does not float freely at any time or to a tree subject to a felling operation or to a winch rope being positioned

3.12
rated line pull
force exerted by the rope for which the winch is designed according to the manufacturer's specification given in kN

Note 1 to entry: For calculating the rated line pull see equations (5) to (8).

3.13
overload
the operating forces which exceed those specified for the design of the winch

EXAMPLE Line pull in excess of the rated line pull.

3.14
overload protection
device which automatically prevents impermissibly high forces at the winch during operation

3.15
rope drive
system of ropes which run on rope drums and via rope pulleys as well as rope fastening parts

3.16
rope end connector
device that enables connection of the rope to the load or transfer of the rope's line pull to *sling gear* (3.19)

3.17
rope fastening on the rope drum
all parts by which the rope is fastened on the winch drum

3.18
operating coefficient
minimum breaking force of the rope divided by the rated line pull

3.19
sling gear
parts and devices that form the connection between an anchor point and an additional deflection pulley or between the rope and the load

EXAMPLE Shackles, loop fastening straps, round slings or rope slings together with shackles choker chains, choker ropes.

3.20
chocker chain
length of chain, which has a sling hook at one end and can have an insertion pin at the other end and which serves for moving wood in hauling operations while it is held by a rope slide eyelet mounted on a hauling rope

Note 1 to entry: To move wood, the choker chain is joined to a rope slide eyelet running on the hauling rope and tied around the wood to be moved during hauling forming a sling.

Note 2 to entry: Choker chains have a length of approx. 2 m to 3 m

3.21
implement support winch
winch using limited line pull solely for collecting individual stems, trunks and logs from their resting position after initial processing into the normal working range of an implement whose reach otherwise would be insufficient (e.g. the grapple of a forestry trailer)

3.22
deflection pulley
fixed component of a winch for forestry with a rope deflection > 90°

3.23
guide roller
fixed component of a winch for forestry with a rope deflection ≤ 90°

3.24
pressure roller
fixed component of a winch for forestry used for improving the quality of spooling or increasing the pressure on the rope during winding

3.25
hill support
movable component at the rear end of a self-propelled forestry machine (e.g. the winch shield or a separate shield) which, when lowered to the ground, is able to hold the forestry machine positioned with the rear end downward in the dropline of a slope at a given position without the need to apply any further brakes or other holding devices

EXAMPLE The winch shield of a three-point hitch logging winch or a separate shield on a self-propelled forestry machine.

3.26
winch shield
enforced manly plain structure usually with an angled lower part covering a forestry winch at the operating side and used to shield winch mechanics and the operator against flung back parts of rope and sling gear and to anchor the winch in the ground during pulling

3.27
straight shield
movable component of a winch carrier vehicle which fulfils the function of the winch shield but is separated from the winch system so that it can be moved independently and act as a hill support

3.28
rope entering zone
area within a 5 m horizontal radius around the point, where the rope enters the housing of the winch covering angles of 90° symmetrical to a horizontal line angled at 90° to the winch shield and pointing into the working direction of the winch

3.29
rope splice
connection within one rope or of two ropes or two parts of a rope which are united by interweaving the strands so that a loop is created or that a connection between two ropes is formed which in turn are able to support load during the intended use of such a rope or such ropes

Note 1 to entry: Rope splices can be used as rope end connectors for ropes manufactured from steel and from synthetic fibres.

Note 2 to entry: The Flemish eye is a special form of a rope splice.

Note 3 to entry: Rope splicing can be used repair broken ropes manufactured from synthetic fibres while ropes manufactured from steel and used for logging purposes are usually not repaired.

4 Symbols, measures and calculations

4.1 Symbols

A_P relevant width in mm of the guard against parts flung back;

$A_{P\text{-}Side}$ minimum distance in mm from the deflection pulley to the outer side of the guard against parts flung back;

B_P distance from the ground plane to the upper end of the guard against parts flung back;

Br_{min} minimum rope breaking force in kN;

C drum width in mm;

d_r rope diameter in mm;

d_{dc} drum core diameter in mm;

d_{dr} drum rim diameter in mm;

d_{rP} relevant diameter of a pulley in mm;

D flange depth in mm;

D_{2T} safety distance around a tree during winch assisted felling;

F line pull in kN;