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Machinery for forestry - Winches - Dimensions, performance and safety - Part 2: Traction aid winches (ISO/DIS 19472-2:2020)

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Machinery for forestry — Winches — Dimensions, performance and safety —

Part 2: Traction aid winches

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Foreword

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This document was prepared by Technical Committee ISO/TC 23/SC 15 *Forestry machinery (SFS)*.

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Introduction

Traction aid winches are used with forest machines when operating in sloped terrain and on soils with limited bearing capacity or poor traction. The winch provides traction assistance to a machine. The combined tractive effort provided by the machine's wheels or tracks and the traction aid winch make it easier to access steep slopes and manage unfavourable soil conditions while maintaining productivity by avoiding excess uphill driving or driving around a gradient, especially with harvesters, fellers, forwarders and skidders. Forest floor damages are greatly reduced which leads to a lower risk of erosion after logging operations. Machine stability is also enhanced and thus general safety of operation is improved. Traction aid winches offer a possibility for machines to work on slopes which otherwise would be difficult to negotiate. This makes it simpler to mechanize work in steep terrain which otherwise would have to be performed manually.

Forestry winches for typical logging such as the ones used for skidding or cable yarding of stems/logs are designed for a different application than traction aid winches. The control systems, safety features, and performance measures on forestry winches have been designed for a purpose that is incompatible with the requirements of traction aid applications. Therefore forestry winches should not be used in traction aid applications.

Main categories of winches for tractive efforts are shown in Fig I. Further aspects of the design and operation of traction aid winches can be found in Annex D.

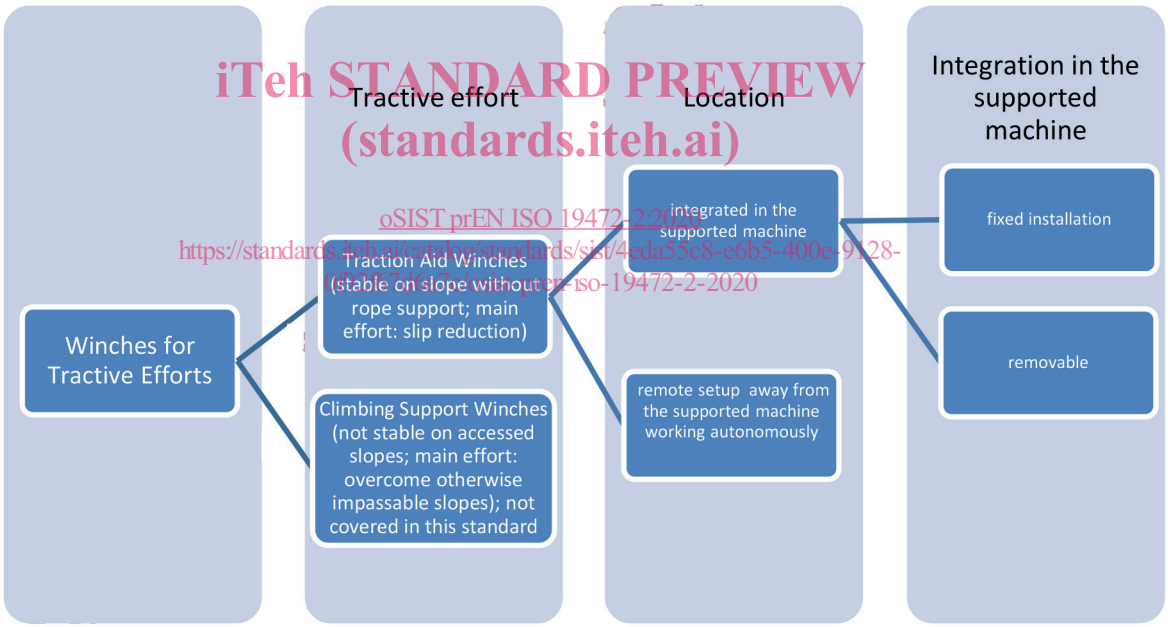

Fig I — Categorization of winches for tractive efforts

Machinery for forestry — Winches — Dimensions, performance and safety —

Part 2: Traction aid winches

1 Scope

This International Standard defines dimensions and specifies performance and safety requirements for traction aid winches used in forestry for assisting supported machines while going uphill and downhill (pulling and braking). It is applicable to fixed and detachable winches and their components, connections and communications, which are used with mobile and self-propelled forestry machinery as defined in ISO 6814 such as harvesters, forwarders, skidders, planting machines, machines for forest ground preparation and machines for extracting residual waste. It is also applicable to remote traction aid winch systems which are installed on a position away from the supported machine. It is not applicable to winches which are not using a controlled rope force while going downhill and winches used for skidding, hoisting operations on cranes, draglines, high lead logging, rope logging systems or yarding. This standard is intended to be applied to traction aid systems used on machines, where without use of these systems the machine would remain stationary on slopes under its independent control (see Appendix D).

Forestry machines, as defined in ISO 6814 that are used as anchor or supported machines, are not in the scope of this standard. For guidance refer to EN ISO 11850.

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.

EN 953:2009, *Safety of machinery. Guards. General requirements for the design and construction of fixed and movable guards*

ISO 2631-1:1997-05, *and AMD 1:2010-07, Mechanical vibration and shock — Evaluation of human exposure to whole-body vibration — Part 1: General requirements*

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

EN ISO 4254-1:2016, *Agricultural machinery - Safety - Part 1: General requirements*

ISO 4309:2003, *Cranes and lifting appliances - Selection of wire ropes - Part 1: General (ISO 16625:2013)*

ISO 4309:2012, *Cranes — Wire ropes — Care and maintenance, inspection and discard*

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

ISO 6750, *Earth moving machinery — Operator's manual — Content and format*

ISO 6814:2009-5, *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 9612:2009-09, *Acoustics — Determination of occupational noise exposure — Engineering method*

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

EN ISO 11850:2016, *Machinery for forestry - General safety requirements*

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

EN 12385-1:2009, *Steel wire ropes. Safety. Part 1: General requirements*

EN 12385-2:2008, *Steel wire ropes. Safety. Part 2: Definitions, designation and classification*

EN 12385-3:2018, *Steel wire ropes — Safety — Part 3: Information for use and maintenance*

EN 12385-4:2008, *Steel wire ropes. Safety. Part 4: Stranded ropes for general lifting applications*

EN 12385-5:2003-03, *Steel wire ropes—- Safety — Part 5: Stranded ropes for lifts*

ISO 12508, *Earth-moving machinery — Operator station and maintenance areas — Bluntness of edges*

EN ISO 13411-3:2009, *Terminations for steel wire ropes. Safety Part 3: Ferrules and ferrule securing*

EN ISO 13411-6:2009, *Terminations for steel wire ropes. Safety. Part 6: Asymmetric wedge socket*

EN ISO 13411-8:2011, *Terminations for steel wire ropes. Safety. Part 8: Swage terminals and swaging*

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

EN ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

ISO 13850:2006, *(EN 418), Safety of machinery. Emergency stop. Principles for design*

ISO 13857:2008, *(EN 294), Safety of machinery. Safety distances to prevent hazard zones being reached by upper and lower limbs*

EN 14492-1:2010, *Cranes. Power driven winches and hoists. Part 1: Power driven winches*

ISO 15077:2008, *Tractors and self-propelled machinery for agriculture — Operator controls — Actuating forces, displacement, location and method of operation*

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

ISO 16625:2013, *Cranes and hoists — Selection of wire ropes, drums and sheaves*

EN 17067:2019, *- Forestry machinery - Safety requirements on radio remote controls; German and English version EN 17067:2019*

ISO 19472:2006, *Machinery for forestry — Winches — Dimensions, performance and safety*

EN IEC 60204-1:2019, *Safety of machinery. Electrical equipment of machines. General requirements*

EN IEC 60447:2004, *Basic and safety principles for man-machine interface, marking and identification - Actuating principles*

EN 61000-6-4, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments (IEC 61000-6-4:2006 + A1:2010)*

EN IEC 62745:2017, *Safety of machinery - General requirements for cableless control systems of machinery (IEC 44/728/CDV)*

3 Terms and definitions

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

3.1
Traction aid
Working method in which a forest machine is using an assisting rope to support the machine's own tractive or braking effort by a regulated pulling and/or braking force which is kept constant or regulated according to the slip or other traction defined parameters of the supported machine while the supported machine when stopped remains stationary on the slope travelled upon without any further rope assistance; see Annex D.

3.2
Traction aid winch
A winch normally mounted on the self-propelled forest machine itself or placed separately providing additional traction and braking force to a forest machine on steep slopes or under unfavourable soil conditions in a regulated way in accordance with the machine's speed or the slip of its drivetrain, which consists mainly of a rope, a power driven drum or a capstan power transmission and spooling devices and control devices, attached to the base machine's frame or installed remotely.

3.3
Rope
Steel wire rope used in traction aid winches complying with EN 12385-5.

3.4
Rope diameter d
Diameter of the steel wire rope used in a traction aid winch

3.5
Service mass
Mass of the supported machine including the operating mass of the supported machine, and if the winch is mounted onto it, the mass of the winch system including rope and permitted payload.

3.6
Drum core diameter A
Diameter of the rope drum core in millimetres

3.7
Drum rim diameter B
Diameter of the rope drum rim in millimetres

3.8
Drum width C
Distance between the rims of the rope drum, measured in millimetres at the half depth of the flange minus the width of the rope free space on the drum in millimetres

3.9
Flange depth D
Radial distance from the outer diameter of the rope drum rim to the rope drum core in millimetres

3.10
Safety overhang S
Overhang in millimetres from the outer part of the winch rim or housing, which shall remain free when storing the entire rope length in order to ensure that the rope remains in the drum

Note 1 to entry: Measures 3.5 to 3.9 shall be used to calculate necessary safety distance on drums such as flanged pulleys, frames/housings or rope guides.

3.11
Chain drive
Power transmission system consisting of roller chains, driven and non-driven chain wheels and chain fastenings

3.12
Rope deflection angle
The angle between the actual running direction of the rope and a line perpendicular to the drum axis or the groove direction of the drum grooving while they are projected on a plane through the drum axis and parallel to the incoming direction of the rope

3.13
Power transmission
Two or more connected parts that transmit power

3.14
Maximum speed
Highest possible speed in the intended direction of movement

3.15
Pulling
Working action where the traction aid winch is spooling the rope while transferring a force between the assisted vehicle and an anchoring point at the body of the winch

3.16
Dynamic Braking (retarder action)
Working action where the traction aid winch is unspooling rope while transferring a force between the assisted vehicle and an anchoring point or the body of the winch

3.17
Static Braking (holding brake)
Working action where the traction aid winch is set fixed up to a predetermined force which is thus transferred between the supported machine and the anchoring point in order to hold the supported machine at a given position while it will allow the traction aid winch to unwind once a given maximum holding force is exceeded.

3.18
Nominal tensile force
Nominal tensile force/rated pulling force is the minimum breaking force of a rope divided by the required working coefficient (safe working limit).

3.19
Overload protection
Device which automatically prevents impermissible high loads at the winch during operation

3.20
Rope drive
System of ropes which run on rope drums and via rope pulleys as well as rope fastening parts

3.21
Rope end connector
Device situated at the free end of a winch rope which has direct contact to the rope that enables connection of the rope to the load, the supported machine, an anchoring point or allows transferring the rope force onto fastening gear.

Note 1 to entry: The rope end connector is capable of transmitting the rope force between elements (e.g. from the rope through shackles to an attachment point).

3.22
Rope fastening on the rope drum
All parts with which the rope is fastened on the rope drum