SLOVENSKI STANDARD
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Gozdarski stroji - Zahteve za zanke in upogibne jermenice za gozdno vleko

Forestry machinery - Requirements for sling gear and deflection pulleys for forestal hauling operations

Forstmaschinen - Sicherheitsanforderungen für Anschlagmittel und Umlenkrollen für die Holzrückung

Machines forestières - Exigences relatives aux élingues et poulies de renvoi pour les opérations de transport forestier

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65.060.80 Gozdarska oprema Forestry equipment

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Forestry machinery - Requirements for sling gear and deflection pulleys for forestal hauling operations

Machines forestières - Exigences relatives aux élingues et poulies de renvoi pour les opérations de transport forestier

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 17822:2022) 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 document is currently submitted to the CEN Enquiry.

Introduction

When performing forestal hauling operations, tree trunks, stalks or logs, etc. need to be fastened to a towing rope using sling gear (e.g. choker chains, choker ropes) in order to haul them out of the stand. Such gear can be of various designs.

Test and condition requirements need to be defined in a standard for such sling gear so that when they are fulfilled the sling gear can absorb the forces acting on it without breaking. Sling gear for forestal hauling operations is subject to loads different from those acting on sling gear for lifting applications or cranes. It is necessary to formulate requirements for sling gear for forestal hauling operations in order to meet the needs of this situation.

1 Scope

This document specifies basic test and condition requirements for deflection pulleys and sling gear which are attached to ropes and rope end connectors in forestal applications.

It is applicable to forestal hauling operations including rope-assisted felling.

This document is applicable to the following elements, sling gear and fastening elements:

— deflection pulleys used in forestal hauling operation (see 3.22);

— choker ropes;

— choker chains;

— radio controlled chokers;

— shackles;

— round slings/tree protectors;

— tree towing ropes;

— rope slide hooks/rope sliders/choker hooks.

It is not applicable to the following sling gear:

— the functional safety of radio controlled chokers;

— non-sheathed tree towing ropes made of synthetic fibres;

— slings and deflection pulleys for the function and structure of mobile yarders as defined in EN 16517 (e.g. for the installation of the haul-back line).

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.

EN 13889, *Forged steel shackles for general lifting purposes - Dee shackles and bow shackles - Grade 6 - Safety*

EN 14492-1:2006+A1:2009,[1] *Cranes - Power driven winches and hoists - Part 1: Power driven winches*

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

EN 16517, *Agricultural and forestry machinery - Mobile yarders for timber logging - Safety*

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

[1] As impacted by EN 14492-1:2006+A1:2009/AC:2010.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19472 and EN 16517 and the following apply.

3.1
rope-assisted felling
felling operation where the traction force of a logging winch is used to maintain the direction of felling

EXAMPLE In cases of safety felling or for felling in another direction as driven by gravity.

Note 1 to entry: This provides safety-relevant and ergonomic advantages.

3.2
choker rope
rope that is tied around the wood to be moved during hauling and held by a choker hook mounted on the hauling rope

Note 1 to entry: Choker ropes can be manufactured from steel wire or of synthetic fibres.

3.3
choker chain
short chain piece, which has a sling hook at one end and may 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 eyeletmounted 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.

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

3.4
tree towing rope
synthetic fibre or wire rope with loops at the ends, which is joined via shackles to the tree and to the rope of a logging winch

Note 1 to entry: Tree towing ropes made of synthetic fibres having a sheathing are usually used when laced.

3.5
laced application of tree towing ropes
lark's head
application in which the tree towing rope is placed around the tree forming a tightening noose usually using a shackle

3.6
two-string application of tree towing ropes
application in which the tree towing rope is placed around the tree and in which both loops of the tree towing rope are inserted in a shackle

3.7
shackle
sling gear, comprising two quick-release individual elements, a shackle body and a bolt, for connecting the load directly to a hauling device or when using other sling gear

3.8
working load limit
WLL
maximum permissible load according to the manufacturer's specifications

EXAMPLE Loading capacity, useful load or permissible traction force.

Note 1 to entry: This indicates the maximum force for which a component is designed and which is borne by this without damage under defined application conditions.

3.9
forest tractive force
FTF
maximum tractive load applied to the rope of a tractive appliance during forestal hauling operations according to the manufacturer's specifications

EXAMPLE Permissible traction force of a logging winch.

Note 1 to entry: This indicates the maximum force for which a tractive appliance is designed for when performing forestal hauling operations and which is borne by this without damage under these application conditions.

3.10
sling gear
means to attach a load to a hauling rope for forestal hauling operations

Note 1 to entry: The hauling rope is no sling gear.

3.11
rope slide hook
connecting element which runs freely on a pulling rope which can support the loop attached at the end of the rope

3.12
rope slide eyelet
rope pulley
connecting element, with an attachment point usually intended for choker chains, which runs freely on a hauling rope

3.13
choker hook
connecting element running freely on a hauling rope rope with an attachment point suitable for attaching the steel head of a choker rope

3.14
deflection pulley
element with a pulley for guiding a rope, which is used for deflecting the pulling direction or for increasing the tractive force

Note 1 to entry: A deflection pulley is attached either at a fixed point or on the load to be moved.

3.15
choker
element with an attachment point for the steel head of a choker rope and an eyelet which allows the formation of a noose

3.16
radio controlled choker
choker, whose noose can be opened via a received radio signal

3.17
sling
flexible, closed strap made from synthetic fibre in a protective hose, which is used as sling gear for components of a logging system

EXAMPLE Application for deflection pulleys.

3.18
tree protector
wide, fixed strap made from synthetic fibre for protecting the tree, which is used as sling gear for components of a logging system

EXAMPLE Application for deflection pulleys.

3.19
operating coefficient
arithmetic ratio between the breaking force and maximum permissible load/loading indicated on the sling gear or deflection pulley or fastening elements

3.20
total load
TL
load resulting from the deflection of ropes in a deflection pulley and which is to be assumed to be twice the value of the maximum rope force permissible in the operation of the rope running through the pulley

Note 1 to entry: For the origin of TL, see 4.9.

3.21
load factor
f
ratio between TL and FTF at deflection pulleys depending on the angle of deflection

3.22
forestal hauling operation
forestal operation using a rope pulled by a tractive appliance in order to haul harvested wood out of the stand or to support tree felling

3.23
tractive appliance
machinery which is used to pull a rope which in term is used for hauling harvested wood out of the stand or to support tree felling

EXAMPLE Typical tractive appliances are logging winches.

3.24
minimum breaking load
MBL
maximum load which sling gear and deflection pulleys are able to support without braking

4 Safety requirements

4.1 General

Forestal sling gear (see Annex B) shall correspond to the safety requirements of this clause. In addition, forestal sling gear shall be designed corresponding to the principles of EN ISO 12100 for relevant, but not significant hazards, which are not treated in this document.

If operating coefficients are not specified for individual sling gear in the following subsections, these shall be ≥ 2 related to the FTF-value of the tractive appliance.

Forestal sling gear shall be designed for application temperatures from −20 °C to +60 °C.

For the design of forestal sling gear the static and dynamic forces that can occur during the intended use shall be taken into account. Forces that occur e.g. during the action of the overload protection and the emergency stop device of logging winches and act on the sling gear shall be considered.

Sling gear or parts of it shall not feature any sharp edges, sharp angles or protruding parts that can cause injuries. This can typically be achieved by deburring, flanging, cutting or sand blasting. Eyelets of forestal sling gear shall be designed in a way to protect the rope runing through such an eyelet so that damage to the rope e.g. kinks are avoided.

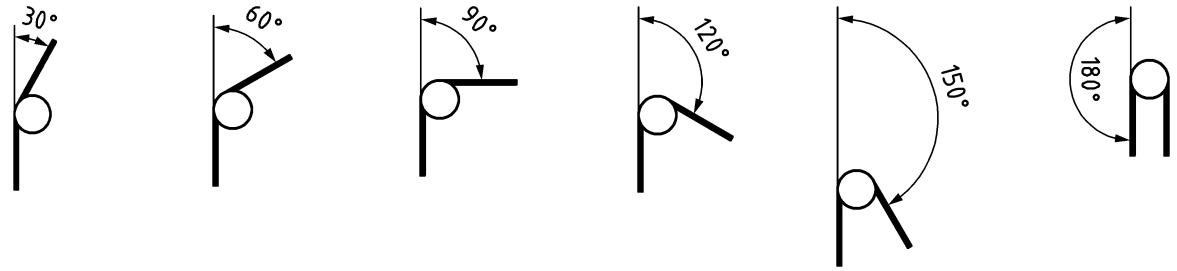
Connections and individual components of sling gear shall be secured against self-loosening and opening under tension.

4.2 Deflection pulleys

Rope pulleys in deflection pulleys (see Annex B) shall correspond to EN 14492-1:2006+A1:2009, 5.7.4. The diameter of the rope pulleys – measured at the centre of the rope – shall correspond to at least 10 times the rope diameter.

Deflection pulleys shall exhibit an operating coefficient according to the test requirements in 5.2 when used for forestal hauling operations.

The operating coefficient for deflection pulleys shall be determined at the greatest possible load impact. Twice the maximum permissible rope force with which the deflection pulley may be operated (i.e. TL) shall be assumed as the greatest possible load impact.



a) f: 0,5 **b) f: 1,0** **c) f: 1,4** **d) f: 1,7** **e) f: 1,9** **f) f: 2,0**

Figure 1 — Rope deflection and associated load factor f

Unfolding deflection pulleys shall be secured against unintentional opening.

Deflection pulleys should be easily mountable. Any suspension shall be secured against automatic unhooking. To prevent the rope from being crushed, the side clearance between the rope pulley and housing shall not be greater than 0,2 times the maximum rope diameter.