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Load restraint assemblies on road vehicles - Safety - Part 4: Lashing steel wire ropes

Ladungssicherungseinrichtungen auf Straßenfahrzeugen - Sicherheit - Teil 4: Zurrdrahtseile

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Load restraint assemblies on road vehicles - Safety - Part 4: Lashing steel wire ropes

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 12195-4:2003) has been prepared by Technical Committee CEN/TC 168 "Chains, ropes, webbing, slings and accessories — Safety", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

The annexes A and B are normative.

The parts of EN 12195 "Load restraint assemblies on road vehicles — Safety" are:

Part 1: Calculation of lashing forces

Part 2: Web lashing made from man-made fibres

Part 3: Lashing chains

Part 4: Lashing steel wire ropes

This document includes a bibliography.

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

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Introduction

This European Standard has been prepared to provide one means of conforming with the safety requirements on lashing steel wire ropes in the Common European Market and thus enabling the free movement of goods.

The extent to which hazards are covered is indicated in the scope of this standard. In addition, lashing steel wire ropes and flat lashing steel wire ropes for securing of loads on vehicles should conform as appropriate to EN 292 for hazards which are not covered by this standard.

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1 Scope

This Part 4 of EN 12195

— specifies safety requirements for lashing steel wire ropes and flat lashing steel wire ropes and lashing combinations with lashing steel wire ropes for the safe surface transport of loads on load carriers, e.g. trucks and trailers which are used on roads or located on vessels or on rail wagons and/or combinations thereof;

— stipulates procedures for testing lashing steel wire ropes and flat lashing steel wire ropes;

— deals with hazards which could occur when lashing steel wire ropes and flat lashing steel wire ropes are in use as intended and under conditions foreseen by the manufacturer (see clause 4 and annex A).

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

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

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EN 292-2:1991, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles and specifications.*

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EN 1677-1, *Components for slings — Safety — Part 1: Forged steel components, Grade 8.*

EN 1677-2, *Components for slings — Safety — Part 2: Forged steel lifting hooks with latch, Grade 8.*

EN 1677-4, *Components for slings — Safety — Part 4: Links, Grade 8.*

EN 1677-5, *Components for slings — Safety — Part 5: Forged steel lifting hooks with latch, Grade 4.*

EN 1677-6, *Components for slings — Safety — Part 6: Links, Grade 4.*

EN 12195-1, *Load restraint assemblies on road vehicles — Safety — Part 1: Calculation of lashing forces.*

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

EN 13411-1, *Terminations for steel wire ropes — Safety — Part 1: Thimbles for steel wire rope slings.*

EN 13411-2, *Terminations for steel wire ropes — Safety — Part 2: Splicing of eyes for wire rope slings.*

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

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

3 Terms and definitions

For the purposes of this European Standard the following terms and definitions apply (examples are given in Figure 1):

3.1
load restraint assembly
systems and devices for the securing of loads [EN 12195-1]

3.2
lashing equipment
device designed to be attached to the lashing points in order to secure the cargo on a road vehicle. The lashing equipment consists of tensioning elements (e.g. webbing, chain, steel wire rope), tensioning devices and connecting components, if required (e.g. hook, terminal link)

3.3
lashing steel wire rope
device for securing the load, consisting of a steel wire rope with or without connecting components and a tensioning device

3.4
flat lashing steel wire rope
device for securing the load, consisting of a flat rope consisting of several steel wire ropes that are arranged side by side and are interconnected and a tensioning device

3.5
tensioning device
device for tensioning (e.g. rope winch, ratchet lever hoist, spindle loadbinder) (see C in Figure 1)

3.6
combined lashing
device for securing a load, consisting of a steel wire rope or a flat steel wire rope combined with web lashings or lashing chains, with or without connecting components and a tensioning device

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3.7
connecting component
device between the lashing steel wire rope or flat lashing steel wire rope and/or the tensioning device and the lashing point and/or the load (see D1 to D4 in Figure 1)

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3.8
tension force indicator
device which indicates the force in the lashing (see E1 in Figure 1)

3.9
lashing point
securing device on a load carrier to which a lashing may be directly attached. A lashing point can be e.g. an oval link, a hook, a D-ring, a lashing rail [EN 12195-1]

3.10
lashing capacity (*LC*)
maximum force for use in straight pull that a lashing is designed to sustain in use [EN 12195-1]

3.11
breaking force (*BF*)
maximum force that the lashing can withstand, when tested in the form of a representative lashing, i.e. complete with connecting components and tensioning device

3.12
coefficient of utilization
ratio of breaking force to lashing capacity (*BF*/*LC*)

3.13
tension force
force in the lashing created by tensioning of a tensioning device [EN 12195-1]

3.14
standard tension force (S_{TF})
residual force after physical release of the handle of the tensioning device

3.15
hand-operating force (H_F)
force applied to the handle which creates the tension force in the lashing system

3.16
standard hand force (S_{HF})
residual force at a standard hand force of 500 N or the maximal force at the labelled hand force given on the tensioning device

3.17
competent person
designated person, suitably trained qualified by knowledge and practical experience and with the necessary instructions to enable the required tests and examinations to be carried out [EN 1677-1]

3.18
traceability code
series of letters and/or numbers marked on a component which enables its manufacturing history, including identity of the cast steel used, to be traced [EN 1677-1]

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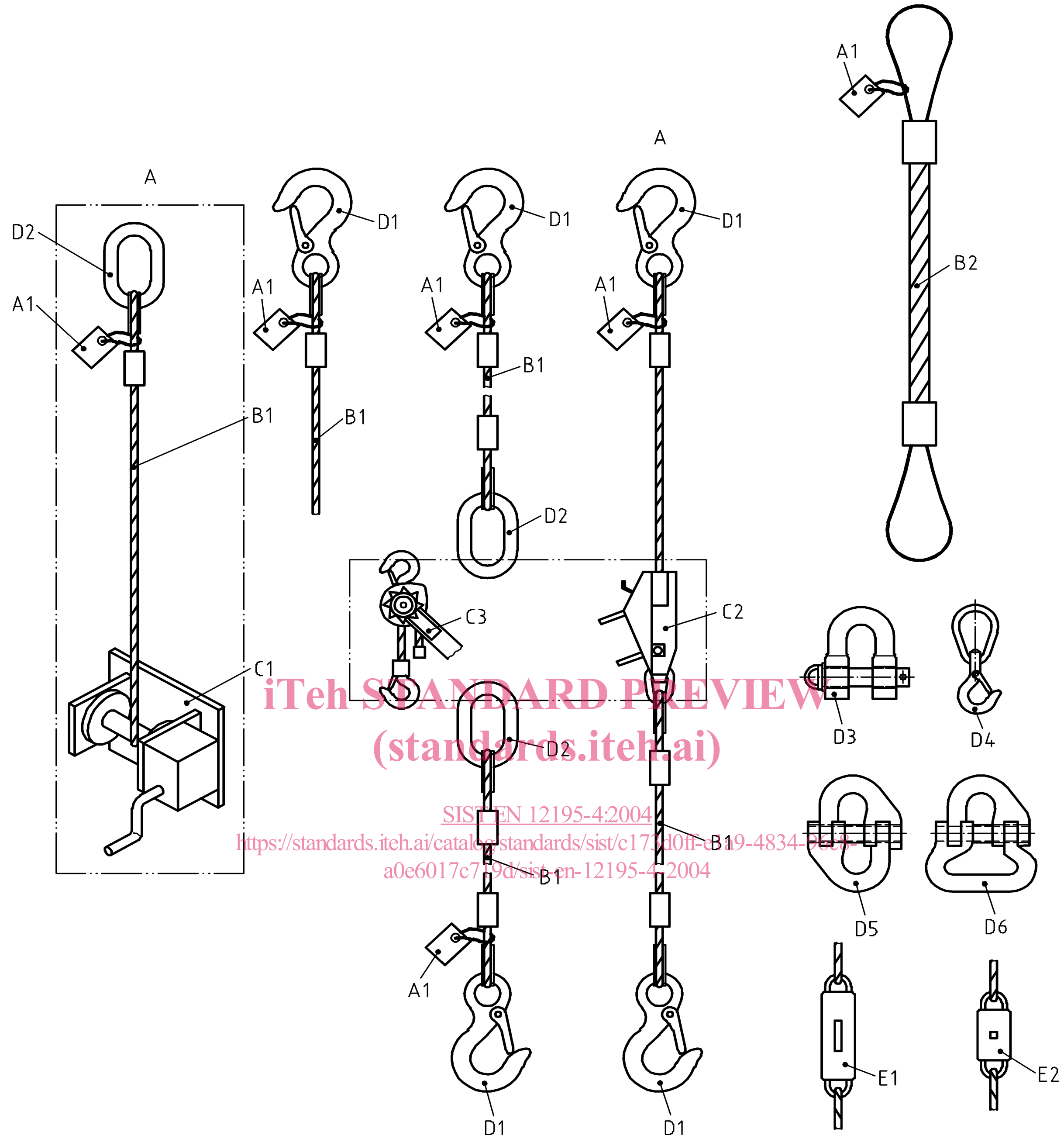

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A **Lashing equipment:**
A1 Marking
B **Tensioning element:**
B1 Steel wire rope
B2 Flat wire rope
C **Tensioning devices:**
C1 Rope winch
C2 Rope pulley
C3 Multi-purpose lever hoist

D **Connecting components:**
D1 Lashing hook
D2 Terminal link
D3 Shackle with split-pin
D4 Swivel hook with latch against unintended unhooking
D5/D6 Combination element: lashing steel wire rope — lashing chains (and lashing steel wire rope — web lashing)
E1 Tension force indicator
E2 Overload indicator

Figure 1 — Examples of lashing steel wire ropes and flat lashing steel wire ropes, including tensioning devices C, connecting components D and tension force indicators E

4 Hazards

The general hazards caused by the load or parts of load during improper use of lashing steel wire ropes and flat lashing steel wire ropes or the non-use of load securing devices are given in annex A.

Hazards described in the following refer to persons, who can be endangered directly when handling the lashing steel wire ropes and flat lashing steel wire ropes, e.g. during tensioning and unloading.

The evaluation of hazards is carried out according to EN 292-1.

The scope of EN 292-1 recommends the application of EN 292-1 also for other technical products having similar hazards. This is applicable, since malfunctions lead to substantial general hazards (see annex A) and the tension in the lashing steel wire rope used with hand operated lashing equipment leads to similar or more severe hazards as with mechanically operated lashing winches.

The requirements of clause 5, the test in clause 6 and the user's instruction in annex B have been specified such that lashing steel wire ropes and flat lashing steel wire ropes and tensioning devices conforming to this standard take the following hazards into account, provided that they are properly used:

a) hazards of being hit, losing one's balance or falling during application of force, due to defective equipment, sudden breakage or malfunction of the tensioning leading to the sudden absence of the hand reaction force;

b) injuries by pinching and shearing, hand and arm injuries during manipulation of tensioning devices due to sharp edges;

c) hazards to the unloading personnel due loads having moved during transport, because of inadequate securing, malfunction like recoil or breakage of equipment or defective equipment and then may fall onto the personnel, especially when opening the side-panels;

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d) hazards due to wrong combinations made up by the operator.

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The ergonomic requirements are taken into account by the fact that the maximum hand force has been defined in 5.3. Some persons, however, are able to apply with both hands or unpermitted levers considerably higher forces. Accordingly reference is made in the user's instruction to the hand force having a value of $\leq$ 500 N, see B.11.

Table A.1 gives a survey of all hazards and the corresponding requirements.

5 Safety requirements

5.1 General

After loading with 1,25 *LC*

a) all load bearing parts of the lashing steel wire rope or flat lashing steel wire rope shall show no evidence of deformation that affects the function;

b) the tensioning device and all components with moving parts shall fully retain its function;

c) no deformation of the thimbles, if used, shall occur;

d) the lashing steel wire rope or flat lashing steel wire rope shall not have started to slip within the ferrules.

After loading with 1,25 *LC*, all components shall withstand a force of at least 0,5 $\times$ minimum breaking force of the rope, corresponding to a coefficient of utilization of 2. This coefficient of utilization of 2 applies also to combined lashings, e.g. lashing steel wire rope combined with a lashing chain or a web lashing of man-made fibre, which are arranged one after another using combination elements (see D5/D6 in Figure 1). Such lashing combinations are dimensioned according to the lashing with the lowest lashing capacity. No slipping of the lashing steel wire ropes or flat lashing steel wire ropes out of the ferrules shall occur.