



# SLOVENSKI STANDARD

## SIST EN 818-3:2001

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Short link chain for lifting purposes - Safety - Part 3: Medium tolerance chain for chain slings - Grade 4

Short link chain for lifting purposes - Safety - Part 3: Medium tolerance chain for chain slings - Grade 4

Kurzgliedrige Rundstahlketten für Hebezwecke - Sicherheit - Teil 3: Mitteltolerierte Rundstahlketten für Anschlagketten - Güteklasse 4

Chaînes de levage a maillons courts - Sécurité - Partie 3: Chaînes de tolérance moyenne pour élingues en chaînes - Classe 4

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English version

Short link chain for lifting purposes - Safety - Part 3: Medium  
tolerance chain for chain slings - Grade 4

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Kurzgliedrige Rundstahlketten für Hebezwecke - Sicherheit  
-Teil 3: Mitteltolerierte Rundstahlketten für Anschlagketten -  
Güteklasse 4

This European Standard was approved by CEN on 16 April 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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## Foreword

This European Standard 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 November 1999, and conflicting national standards shall be withdrawn at the latest by November 1999.

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).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

The other Parts of EN 818 are:

- Part 1 : General conditions of acceptance
- Part 2 : Medium tolerance chain for chain slings - Grade 8
- Part 4 : Chain slings - Grade 8
- Part 5 : Chain slings - Grade 4
- Part 6 : Chain slings - Specification for information for use and maintenance to be provided by the manufacturer
- Part 7 : Fine tolerance chains for hoists, Grade T (types T, DAT, DT).

This is the first edition of this Part of EN 818.

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## 0 Introduction

This European Standard has been prepared to be a harmonised standard to provide one means of complying with the essential safety requirements of the Machinery Directive and associated EFTA regulations.

The Directive stipulates that, where chain with welded links is used for lifting accessories it is to be of short link type and for the purposes of this standard this is chain having a ratio of nominal pitch to nominal size of 3:1.

The extent to which hazards are covered is indicated in the scope. In addition, lifting equipment shall conform as appropriate to EN 292 for hazards which are not covered by this standard.

## 1 Scope

This Part of EN 818 specifies the requirements related to safety for short link lifting chains, Grade 4, of medium tolerance for use in chain slings and for general lifting purposes. The standard is applicable to electrically welded round steel short link chains, conforming to EN 818-1, which are intended for lifting objects, materials or goods.

The range of nominal sizes of chain covered by this Part of EN 818 is from 7 mm to 45 mm.

The hazards covered by this Part of EN 818 are identified in clause 4.

Annex A contains the bases for calculation of tabulated values for dimensions, working load limits and mechanical properties.

Annex B gives information on the mass/metre of chain.

Annex C gives an example of a designation system for chains of grade 4.

Annex ZA gives the relationship with EU-Directives

## 2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at 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.

EN 292-1	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
EN 292-2:1991 +A1:1995	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications
EN 818-1:1996	Short link chain for lifting purposes - Safety - Part 1: General conditions of acceptance
prEN 818-6	Short link chain for lifting purposes - Safety - Part 6: Chain slings - Specification for information for use and maintenance to be provided by the manufacturer
EN 1050:1996	Safety of machinery - Principles for risk assessment

EN 10025:1990/A1:1993	Hot rolled products of non-alloy structural steels - Technical delivery conditions (includes amendment A1:1993)
ISO 643	Steels - Micrographic determination of the ferritic or austenitic grain size

### 3 Terms and definitions

For the purposes of this Part of EN 818 the terms, definitions and symbols given in EN 818-1:1996 apply.

### 4 Hazards

The release of a load due to failure of lifting accessories such as chain slings or their component parts puts at risk either directly or indirectly the safety or health of those persons within the danger zone of lifting equipment.

In order to provide the necessary strength and durability of lifting accessories this Part of EN 818 lays down requirements for the design, manufacture and testing to ensure that specified levels of performance are met.

Fatigue failure has not been identified as being a hazard when chain, having the specified levels of performance given in this Part of EN 818, is used in general lifting service.

Since failure can be caused by the incorrect choice of grade and specification of lifting accessories this Part of EN 818 also gives the requirements for marking and the manufacturer's certificate.

Those aspects of safe use associated with good practice are given in prEN 818-6.

Table 1 contains those hazards, which require action to reduce risk identified by risk assessment as being specific and significant for short link chain (medium tolerance) grade 4.

**Table 1: Hazards and associated requirements**

Hazards identified in annex A of EN 1050: 1996		Relevant clause of annex A of EN 292-2: 1991+A1: 1995	Relevant clause/subclause of this Part of EN 818
1 e)	Mechanical hazard due to inadequacy of strength	1.3.2	5
		4.1.2.3	5
		4.1.2.5	5
		4.2.4	6
		1.7.3	7
		4.2.4	8
		1.7.4	9

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## 5 Safety requirements

### 5.1 General

The chain shall also conform to the appropriate requirements of EN 818-1:1996.

### 5.2 Dimensions

#### 5.2.1 Nominal size of chain, $d_n$

The nominal size of chain shall be one of the sizes listed in table 2, column 1.

#### 5.2.2 Tolerance on material diameter (except at the weld)

The tolerance on material diameter for each nominal size of chain shall be in accordance with table 2, column 2.

#### 5.2.3 Weld diameter

The maximum diameter at the weld for each nominal size of chain shall be in accordance with table 2, column 3.

The thickness of the steel at the weld shall nowhere be less than the actual diameter of the steel adjacent to the weld.

#### 5.2.4 Length dimensionally affected by welding

The length dimensionally affected by welding  $e$  (see figure 1 of EN 818-1:1996) shall not extend by more than  $0,6 d_n$  to either side of the centre of the link.

#### 5.2.5 Pitch and widths

The dimensions of the pitch and widths of the individual links and chain shall be as specified in table 2, columns 4 to 8, and illustrated in figure 1. of EN 818-1:1996.

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Table 2: Dimensions

Dimensions in millimetres							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Nominal size $d_n$	Material diameter tolerance	Weld diameter $d_s$ max.	Pitch			Internal width away from the weld $w_1$ min.	External width over the weld $w_2$ max.
			$p_n$	$p_{max}$	$p_{min}$		
7	± 0,28	7,7	21	21,6	20,4	9,1	25,9
8	± 0,32	8,8	24	24,7	23,3	10,4	29,6
10	± 0,4	11	30	30,9	29,1	13	37
13	± 0,52	14,3	39	40,2	37,8	16,9	48,1
16	± 0,64	17,6	48	49,4	46,6	20,8	59,2
18	± 0,9	19,8	54	55,6	52,4	23,4	66,6
19	± 1	20,9	57	58,7	55,3	24,7	70,3
20	± 1	22	60	61,8	58,2	26	74
22	± 1,1	24,2	66	68	64	28,6	81,4
23	± 1,2	25,3	69	71,1	66,9	29,9	85,1
25	± 1,3	27,5	75	77,3	72,8	32,5	92,5
26	± 1,3	28,6	78	80,3	75,7	33,8	96,2
28	± 1,4	30,8	84	86,5	81,5	36,4	104
32	± 1,6	35,2	96	98,9	93,1	41,6	118
36	± 1,8	39,6	108	111	105	46,8	133
40	± 2	44	120	124	116	52	148
45	± 2,3	49,5	135	139	131	58,5	167

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**5.3 Materials and heat treatment**

**5.3.1 Quality of material**

**5.3.1.1 General**

Within the limitations given in 5.3.1.2 to 5.3.1.4 the chain manufacturer shall select the type of steel to be used so that the finished chain, when suitably heat-treated meets the mechanical properties specified in this Part of EN 818.

**5.3.1.2 Type of steel**

The steel used shall be produced by an electric process or by an oxygen blown process.

**5.3.1.3 Deoxidation**

The steel shall be fully killed as defined in EN 10025:1990+A1:1993, be stabilized against strain age embrittlement and have an austenitic grain size of 5 or finer when tested in accordance with ISO 643.

**5.3.1.4 Chemical composition**

To ensure that chain is stabilized against strain age embrittlement during service the steel shall contain at least 0,025 % aluminium.

The steel shall contain no more sulfur and phosphorus content than the limits given in table 3.

**Table 3: Sulfur and phosphorus content**

Element	Maximum mass content % as determined by	
	Cast analysis	Check analysis
Sulfur	0,025	0,030
Phosphorus	0,025	0,030

The silicon content shall be as specified in table 4

NOTE: The purpose of this requirement is to limit the detrimental effect when the chain is used in a galvanizing bath.

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**Table 4: Silicon content**  
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Element	Mass content % as determined by	
	Cast analysis	Check analysis
Silicon	0,12 to 0,30	0,15 to 0,35

### 5.3.2 Heat treatment

All the chain shall be heat treated in accordance with a) or b) before being subjected to the manufacturing proof force.

- a) Chain shall be hardened from a temperature above the AC3 point and tempered. The tempering temperature shall be at least 475 °C.

The tempering conditions shall be at least as effective as a temperature of 475 °C maintained for a period of 1 h.

NOTE: A method of verification is to test sample chains after they have been reheated to and maintained for 1 h at 475 °C and then cooled to room temperature; following which they should conform in the finished condition to the requirements of 5.4.2 and 5.4.3.

- b) Alternatively the chain shall be normalised from a temperature above the AC3 point.

## 5.4 Mechanical properties

### 5.4.1 Manufacturing proof force (MPF)

All the chain shall be subjected to the manufacturing proof force specified in table 5, column 3 for the appropriate nominal size of chain.

### 5.4.2 Breaking force (BF) and total ultimate elongation (A)

Samples of chain in the finished condition shall have a breaking force at least equal to that specified in table 5, column 4 for the appropriate nominal size of chain. On completion of the static tensile test the total ultimate elongation as defined in EN 818-1:1996 shall be not less than 25 %.

### 5.4.3 Bend deflection

Single link samples shall withstand the minimum deflection specified in table 5, column 5 for the appropriate nominal size of chain and shall be free from visible defects.

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