



SLOVENSKI STANDARD
SIST EN 818-7:2002+A1:2008
01-julij-2008

Short link chain for lifting purposes - Safety - Part 7: Fine tolerance hoist chain, Grade T (Types T, DAT and DT)

Short link chain for lifting purposes - Safety - Part 7: Fine tolerance hoist chain, Grade T (Types T, DAT and DT)

Kurzgliedrige Rundstahlketten für Hebezwecke - Sicherheit - Teil 7: Feintolerierte Hebezeugketten - Güteklasse T (Ausführung T, DAT und DT)

Chaînes de levage à maillons courts - Sécurité - Partie 7: Chaînes de tolérance serrée pour les palans à chaînes, Classe T (Types T, DAT et DT)

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English Version

Short link chain for lifting purposes - Safety - Part 7: Fine tolerance hoist chain, Grade T (Types T, DAT and DT)

Chaînes de levage à maillons courts - Sécurité - Partie 7:
Chaînes de tolérance serrée pour les palans à chaînes,
Classe T (Types T, DAT et DT)

Kurzgliedrige Rundstahlketten für Hebezwecke - Sicherheit
- Teil 7: Feintolerierte Rundstahlketten für Hebezeuge,
Güteklasse T (Ausführung T, DAT und DT)

This European Standard was approved by CEN on 8 November 2001 and includes Amendment 1 approved by CEN on 14 February 2008.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 818-7:2002+A1:2008) has been prepared by Technical Committee CEN/TC 168 "Chains, ropes, webbings, slings and accessories", the secretariat of which is held by BSI.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2008 and conflicting national standards shall be withdrawn at the latest by September 2008.

This document includes Amendment 1, approved by CEN on 2008-02-14.

This document supersedes EN 818-7:2002.

The start and finish of text introduced or altered by amendment is indicated in the text by tags $\boxed{A_1}$ $\boxed{A_1}$.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

For relationship with EC Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document.

The other parts of EN 818 are:

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Part 1: General conditions of acceptance

Part 2: Medium tolerance chain for chain slings - Grade 8

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Part 3: Medium tolerance chain for chain slings - Grade 4

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.

The annexes A and B are normative. The annexes C, D, E, ZA and ZB are informative.

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

Introduction

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

These chains are intended for use in serial hoists. The multiple pitch is fine toleranced.

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

Annex A is normative and gives the bases for the calculation of the dimensions and the mechanical properties of hoist chains.

Annex B is normative and gives selection criteria for the nominal size of hoist chains, Grade T, types T, DAT and DT for serial hoists.

Annex C is informative and gives a designation system for recording the identifying features of fine tolerance short link chain Grade T. Since this system is not widely used it has been included in this first edition of this standard as an informative annex; however, should its use become more generally accepted then the status of the information would need to be reviewed.

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1 Scope

This European Standard specifies the requirements related to safety for hoist chain, Grade T (type T quenched and tempered and types DAT and DT case hardened), for use in serial chain hoists manual and power driven.

Type DAT and type DT hoist chains possess surface hardnesses greater than core hardness and are used for power driven chain hoists to offer greater resistance to wear.

Type DT hoist chain differs from DAT hoist chain in having higher surface hardness and/or greater case depth to optimise wear resistance.

The standard is applicable to electrically welded round steel short link hoist chains conforming to EN 818-1.

The range of nominal size of hoist chains covered by this European Standard is from 4 mm to 22 mm.

The hazards covered by this European Standard are identified in clause 4.

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.*

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.*

EN 1050:1996, *Safety of machinery – Principles for risk assessment.*

EN ISO 7500-1, *Metallic materials - Verification of static uniaxial testing machines - Part 1: Tension/compression testing machines (ISO 7500-1:1999).*

EN 10025, *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.*

ISO 4301-1, *Cranes and lifting appliances – Classification – Part 1: General.*

ISO 6507-1, *Metallic materials – Vickers hardness test – Part 1: Test method.*

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ISO 4965, *Axial load fatigue testing machines – Dynamic force calibration - Strain gauge technique.*

3 Terms and definitions

For the purposes of this European Standard the terms, definitions and symbols given in EN 818-1 apply.

4 Hazards

The release of a load due to failure of hoist chain 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 hoist chain, this European Standard lays down requirements for the design, selection of materials of construction and testing to ensure that specified levels of performance are met.

Fatigue failure has not been identified as a hazard for type T chain when hoist chain selected according to annex B and having the specified levels of performance and design given in this European Standard is used in serial hoists.

Fatigue failure has been identified as a hazard for hoist chains types DAT and DT used in power driven hoists. Therefore this European Standard specifies levels of design and performance, with particular reference to fatigue resistance.

Since failure can be caused by the incorrect choice of grades and specification of lifting hoist chain this European Standard also gives the requirements for marking and the manufacturers certificate.

Dimensional incompatibility between the hoist chain and mating parts of the hoist (chain wheel, chain guide and loading device) may lead to premature failure and this European Standard contains dimensional requirements for correct assembly and fit.

Table 1 lists those hazards, which require action to reduce risk identified by risk assessment as being specific and significant for hoist chain of Grade T Types T, DAT, DT.

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 standard
1.e	Mechanical hazard due to inadequacy of strength	1.3.2 } 4.1.2.3 } 4.1.2.4 } 4.2.4 1.7.3 } 4.3.1 }	5 6 7
1.5	(Types DAT, DT only) Fatigue failure	-	5.5.6 and 6.2.7

5 Safety requirements

5.1 General

The hoist chains shall conform to the requirements of EN 818-1.

5.2 Dimensions

5.2.1 General

A selection of nominal sizes and dimensions is given in 5.2.2 and 5.2.4. Other nominal sizes may be used, provided that nominal sizes shall not exceed the range specified in 5.2.2 and that the dimensions and tolerances are calculated in accordance with annex A.

Whilst the nominal link pitch p_n is based upon $3 d_n$ (where d_n is the nominal size of the hoist chains) this may be varied but shall not exceed the limits $2,6 d_n$ to $3,2 d_n$. The nominal link pitch p_n shall be subject to the tolerances specified in annex A.

NOTE Compatibility between the hoist chain and the mating parts of the hoist requires agreement on the nominal size and dimensions and on the distribution of tolerances between the chain manufacturer and the hoist manufacturer.

5.2.2 Nominal size d_n

The nominal size shall not be below 4 mm or above 22 mm, a selection of nominal sizes is listed in Table 2.

5.2.3 Tolerances on material diameter

The tolerances on material diameter for the selected nominal sizes shall be as listed in Table 2. These and all other nominal size material diameter tolerances shall be calculated in accordance with A.1.

5.2.4 Pitch and widths

The dimensions and tolerances of the $3 d_n$ pitch and the width for the selected nominal sizes shall be as listed in Table 2. The dimensions and tolerances of the pitch and width shall be calculated in accordance with A.1.

These dimensions and tolerances and all other nominal size and pitch ranges and tolerances of multiple pitch lengths, shall be calculated in accordance with A.1.

The tolerances of multiple pitch lengths shall be calculated in accordance with A.1.

Table 2 — Selected dimensions

Dimensions in millimetres

Nominal size d_n	Material diameter tolerance	Pitch		Width		Gauge length of $11 \times p_n$ tolerance ¹⁾		Weld diameter d_s max.
		p_n	tolerance ¹⁾	internal w_3 min.	external w_2 max.			
4	± 0,2	12	0,25	4,8	13,6	132	0,6	4,3
5	± 0,2	15	0,3	6,0	17,0	165	0,8	5,4
6	± 0,2	18	0,35	7,2	20,4	198	1,0	6,5
7	± 0,3	21	0,4	8,4	23,8	231	1,1	7,6
8	± 0,3	24	0,5	9,6	27,2	264	1,3	8,6
9	± 0,4	27	0,5	10,8	30,6	297	1,4	9,7
10	± 0,4	30	0,6	12,0	34,0	330	1,6	10,8
11	± 0,4	33	0,6	13,2	37,4	363	1,7	11,9
12	± 0,5	36	0,7	14,4	40,8	396	1,9	13,0
13	± 0,5	39	0,8	15,6	44,2	429	2,1	14,0
14	± 0,6	42	0,8	16,8	47,6	462	2,2	15,1
16	± 0,6	48	0,9	19,2	54,4	528	2,5	17,3
18	± 0,9	54	1,0	21,6	61,2	594	2,9	19,4
20	± 1,0	60	1,2	24,0	68,0	660	3,2	21,6
22	± 1,1	66	1,3	26,4	74,8	726	3,5	23,8

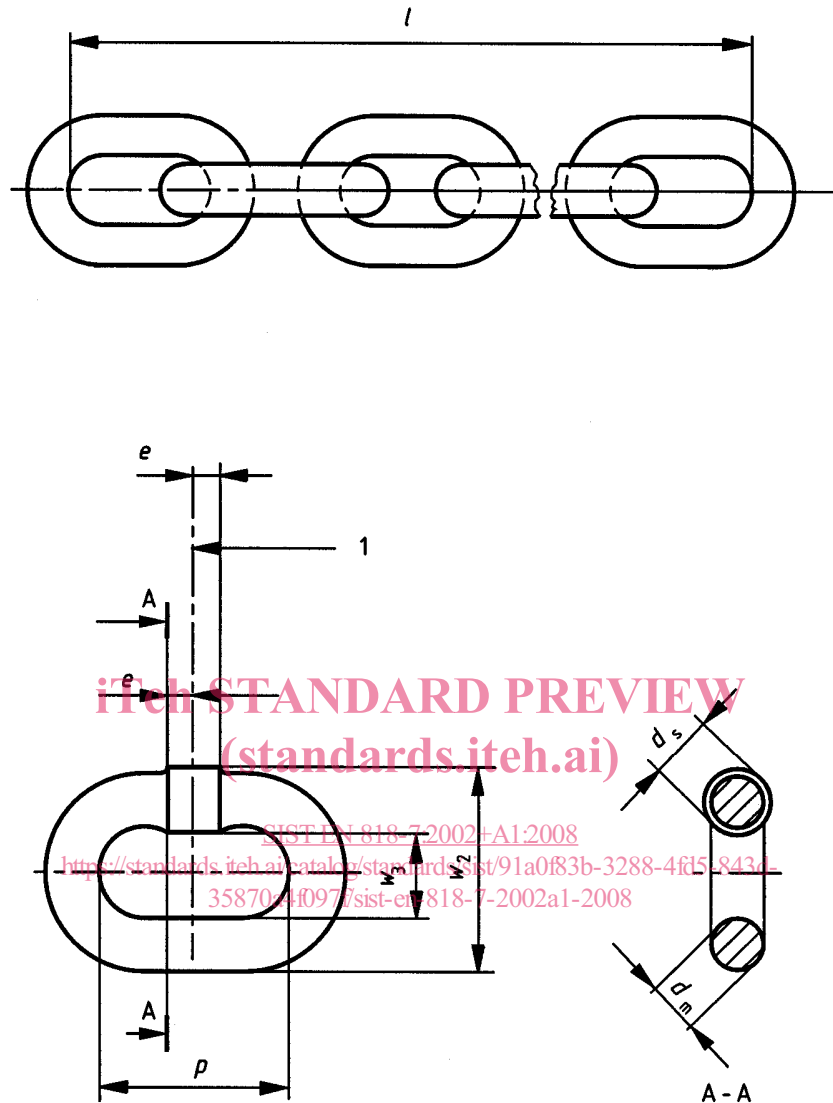
¹⁾ These tolerances are usually divided into + 2/3 and – 1/3 for both the individual link and the standard gauge length.

5.2.5 Weld diameter

The maximum diameter at the weld for the selected nominal sizes shall be as in Table 2 and shall be calculated in accordance with annex A. The maximum diameter at the weld shall not be in excess of 8 % above the nominal size in any direction. The thickness of the steel at the weld shall nowhere be less than the actual diameter of the steel adjacent to the weld.

5.2.6 Length dimensionally affected by welding

The length dimensionally affected by welding e shall not extend by more than $0.6 d_n$ to either side of the centre of the link (see Figure 1).



Key

- 1 Traverse centre line of the link
- l is the multiple pitch length
- p is the pitch
- d_m is the material diameter as measured
- d_s is the weld diameter
- e is the length dimensionally affected by welding
- w_3 is the internal width at the weld
- w_2 is the external width over the weld

Figure 1 — Link and hoist chains dimensions

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 hoist chain manufacturer shall select the type of steel to be used so that the finished hoist chain, when heat-treated, meets the mechanical properties specified in this European Standard.

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 and shall be stabilized against strain age embrittlement and shall have an austenitic grain size of 5 or finer when tested in accordance with ISO 643.

5.3.1.4 Chemical composition

The steel shall contain alloying elements in sufficient quantities so that the finished hoist chain, when heat treated in accordance with 5.3.2, not only conforms to the mechanical properties specified in this European Standard but also possesses adequate low temperature ductility and toughness to provide resistance to impact loading. The hoist chain shall not be adversely affected by temperatures down to those listed for each hoist chain type in Table 9.

The steel shall contain nickel and at least one of the other elements in the minimum percentages shown in Table 3.

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Table 3 — Chemical composition - alloying elements

Element	Minimum mass content % as determined by cast analysis for		
	type T	type DAT	type DT
Nickel	0,40	0,7	0,9 ¹⁾
Chromium	0,40	0,40	0,40
Molybdenum	0,15	0,15	0,15

¹⁾ The higher surface hardness and/or greater case depth requires a higher nickel content to avoid brittleness.

To ensure that hoist 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 than the limits given in Table 4.

Table 4 — Sulfur and phosphorus content

Element	Maximum mass content % as determined by	
	Cast analysis	Check analysis
Sulfur	0,020	0,025
Phosphorus	0,020	0,025
Sum of Sulfur + Phosphorus	0,035	0,045