
**Round steel short link chains for
lifting purposes — Fine tolerance
hoist chains for hand operated chain
hoists — Grade TH**

*Chaînes de levage en acier de section ronde à maillons courts — Chaînes
de levage de tolérance fine pour palans manuels — Classe de qualité TH*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary information](#).

The committee responsible for this document is ISO/TC 111, *Round steel link chains, chain slings, components and accessories*, Subcommittee SC 1, *Chains and chain slings*.

This second edition cancels and replaces the first edition (ISO 16877:2008). Subclause 6.4.5 "Toughness" has been technically revised.

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Round steel short link chains for lifting purposes — Fine tolerance hoist chains for hand operated chain hoists — Grade TH

1 Scope

This International Standard specifies the requirements for fine-tolerance hoist chains of grade TH for use as load chains in hand operated chain hoists for lifting purposes. They are round steel short link chains, electrically welded, heat treated, and tested; they comply with the general conditions of acceptance of ISO 1834.

NOTE 1 The letter “T” expresses the grade in accordance with ISO 1834.

NOTE 2 The letter “H” expresses that these hoist chains are for hand operated hoists only.

NOTE 3 Resistance butt welding and flash welding are listed in ISO 4063.

The range of nominal sizes covered by this International Standard is from 3 mm to 13 mm. Fine-tolerance hoist chains, according to this International Standard, are for use in the temperature range $-10\text{ }^{\circ}\text{C}$ to $200\text{ }^{\circ}\text{C}$.

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.

ISO 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

ISO 497, *Guide to the choice of series of preferred numbers and of series containing more rounded values of preferred numbers*

ISO 643, *Steels — Micrographic determination of the apparent grain size*

ISO 1834, *Short link chain for lifting purposes — General conditions of acceptance*

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

ISO 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system*

ISO 14556, *Steel — Charpy V-notch pendulum impact test — Instrumented test method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1834 and the following apply.

3.1

standard gauge length

multiple pitch length based on 11 chain links

4 General conditions of acceptance

The hoist chains shall comply with the requirements of ISO 1834, as well as those of this International Standard.

5 Dimensions

5.1 Nominal size, d_n

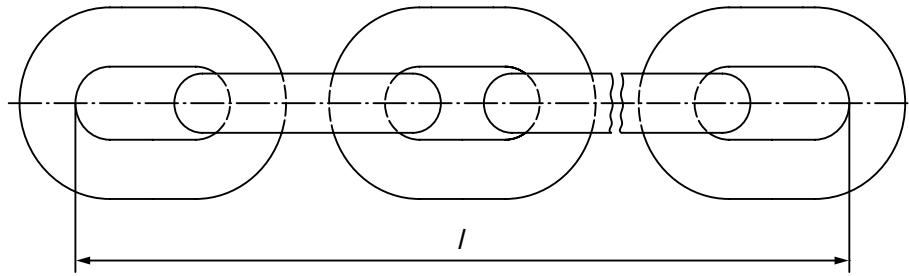
A selection of nominal sizes, d_n , of hoist chains is presented in [Table 1](#), column 1. Other nominal sizes may be used, provided that the dimensions and tolerances are calculated in accordance with [Annex A](#).

Table 1 — Typical dimensions (see [Figure 1](#))

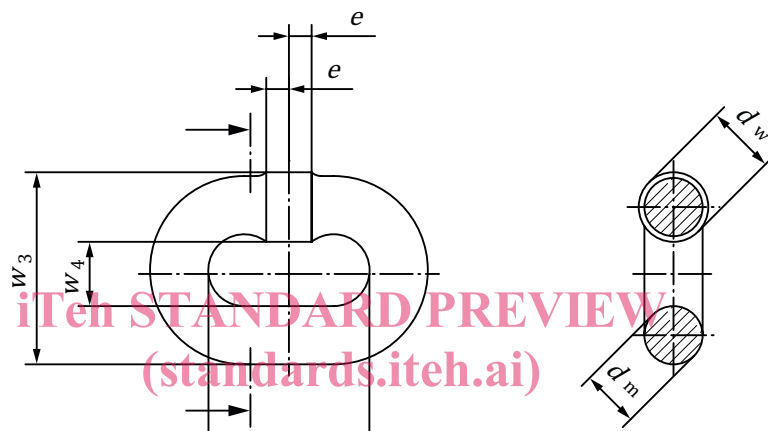
Dimensions in millimetres

1	2	3	4	5	6	7	8	9	10	11
Nominal size	Diameter tolerance	Pitch		Width			Standard gauge length		Weld diameter	
		Nominal	Tolerance	Internal Type 2	External Types 1 and 2	Internal Type 1	Nominal	Tolerance	Types 1 and 2	Type 2
d_n		p_n		w_1 min.	w_3 max.	w_4 min.	l_n		d_w max.	G max.
3	±0,2	9,0	0,2	3,8	10,7	3,6	99	0,5	3,3	3,8
4	±0,2	12,0	0,3	5,0	14,3	4,8	132	0,6	4,3	5,0
5	±0,2	15,0	0,3	6,3	17,9	6,0	165	0,8	5,4	6,3
6,3	±0,3	18,9	0,4	7,9	22,6	7,6	208	1,0	6,8	7,9
7,1	±0,3	21,3	0,4	8,9	25,4	8,5	234	1,1	7,7	8,9
8	±0,3	24,0	0,5	10,0	28,6	9,6	264	1,3	8,6	10,0
9	±0,4	27,0	0,5	11,3	32,2	10,8	297	1,4	9,8	11,3
10	±0,4	30,0	0,6	12,5	35,8	12,0	330	1,6	10,8	12,5
11,2	±0,4	33,6	0,7	14,0	40,1	13,4	370	1,8	12,1	14,0
12,5	±0,5	37,5	0,7	15,6	44,8	15,0	413	2,0	13,5	15,6
13	±0,5	39,0	0,8	16,3	46,6	15,6	429	2,1	14,1	16,3

NOTE Typical dimensions for the selected nominal sizes are given, calculated, and rounded in this table, in accordance with the formulae specified in [Annex A](#), based upon a nominal pitch of $3d_n$.

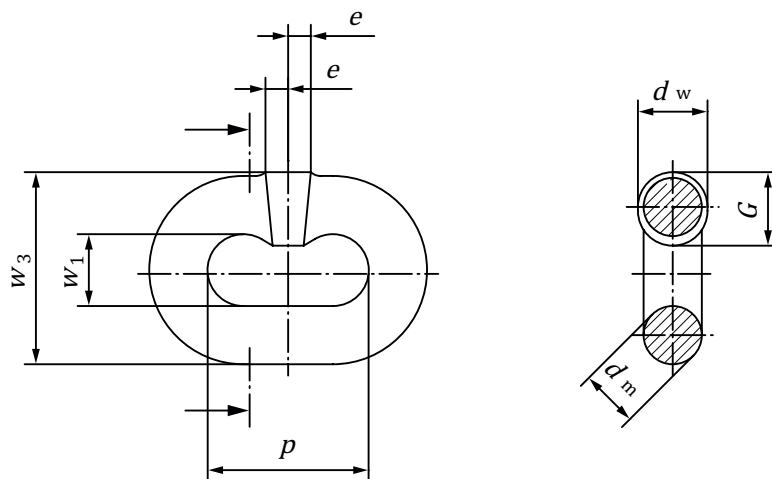


a) Multiple pitch length



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b) Dimensions of chain link — Type 1



c) Dimensions of chain link — Type 2

Key

- l multiple pitch length
- p pitch (internal link length)
- d_m measured diameter of material, except at the weld
- d_w measured diameter of material at the weld (type 1) or weld dimension perpendicular to the plane of the chain link (type 2)
- G dimension in other planes (type 2)
- e length affected by welding, on either side of the centre of the chain link
- w_1 internal width away from the weld (type 2)
- w_3 external width over the weld (type 1 and type 2)
- w_4 internal width at the weld (type 1)

Figure 1 — Chain link and chain dimensions

5.2 Diameter tolerance

The definition of the material diameter and method of measurement shall be in accordance with ISO 1834. The diameter tolerance of the selected nominal sizes shall be as listed in [Table 1](#), column 2 and shall be calculated in accordance with [Annex A](#).

5.3 Pitch

The dimensions and tolerances of the pitch for the selected nominal sizes shall be as listed in [Table 1](#), column 3 and column 4, as shown in [Figure 1](#), and calculated in accordance with [Annex A](#).

The nominal pitch, p_n , is based upon $3d_n$ (where d_n is the nominal size of the hoist chain). This formula can be varied up to a maximum of $3,3d_n$ subject also to the tolerances specified in [Annex A](#).

5.4 Width

The dimensions of the width for the selected nominal sizes shall be as listed in [Table 1](#), column 5, column 6, and column 7, as shown in [Figure 1](#), and calculated in accordance with [Annex A](#).

5.5 Standard gauge length

The dimensions and tolerances of the standard gauge length for the selected nominal sizes shall be as listed in [Table 1](#), column 8 and column 9 and calculated in accordance with [Annex A](#).

5.6 Weld diameter

The maximum diameter at the weld for the selected nominal sizes shall be as listed in [Table 1](#), column 10 and column 11, as shown in [Figure 1](#), and shall not exceed the following:

- type 1: the maximum diameter at the weld shall not be in excess of 8 % above the nominal size in any direction;
- type 2: the maximum diameter at the weld shall not be in excess of 8 % above the nominal size in any direction perpendicular to the plane of the chain link and 25 % in the other planes;
- the diameter of the steel at the weld shall nowhere be less than the actual diameter of the steel adjacent to the weld.

5.7 Length dimensionally affected by welding

The length dimensionally affected by welding, e , shall not extend by more than $0,6d_n$ to either side of the centre of the chain link (see [Figure 1](#)).

6 Material and manufacture

6.1 Quality of material

6.1.1 General

Within the limitations given in [6.1.2](#) to [6.1.5](#), it is the responsibility of the manufacturer of the hoist chain to select the type of steel to be used so that the finished hoist chain, when suitably heat treated, complies with the mechanical properties specified in this International Standard and also possesses adequate low-temperature ductility and toughness to provide resistance against impact loading.

The low-temperature ductility and toughness shall be achieved by complying with the toughness-testing requirements specified in [6.4.6](#).

6.1.2 Type of steel

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

6.1.3 Deoxidation

The steel shall be fully killed and shall be made in conformity with a suitable deoxidation process in order to obtain an austenitic grain size of five or finer when tested in accordance with ISO 643.

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

6.1.4 Weldability

The steel shall be of reliable weldable quality.

6.1.5 Chemical composition

The steel shall contain alloying elements in sufficient quantities so that the finished hoist chain, when heat treated in accordance with [6.2](#), complies with the mechanical properties specified in this International Standard.

The steel shall contain no more sulfur and phosphorus than the limits given in [Table 2](#).

Table 2 — Sulfur and phosphorus content

Element	Max. content (% by mass) as determined by	
	Cast analysis	Check analysis
Sulfur (S)	0,025	0,030
Phosphorus (P)	0,025	0,030
Sum of S + P	0,045	0,055

6.1.6 Finished condition

In its finished condition, as supplied to the manufacturer of the hoist chain, the steel shall comply with the requirements of [6.1.2](#) to [6.1.5](#) as determined by check analysis on the rod, wire, or finished chain link.