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Short link chains for lifting purposes — Grade VH, fine tolerance for manually operated chain hoists

Chaînes de levage à maillons courts — Classe VH, tolérance fine pour palans manuels à chaînes

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 16872 was prepared by Technical Committee ISO/TC 111, *Round steel link chains, chain slings, components and accessories*, Subcommittee SC 1, *Chains and chain slings*.

Short link chains for lifting purposes — Grade VH, fine tolerance for manually operated chain hoists

1 Scope

This International Standard specifies the requirements for Grade VH, fine-tolerance hoist chains, for use as load chains in manually operated chain hoists and consisting of round steel short link chains, electrically welded and heat treated, tested to and compliant with the ISO 1834 general conditions of acceptance.

NOTE Butt welding and flash butt welding are defined in ISO 4063.

The range of nominal sizes of hoist chains covered by this International Standard is from 3 mm to 13 mm, for use in the temperature range −10 °C to 150 °C.

2 Normative references

The following referenced documents are indispensable for the application 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.

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

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 7500-1:2004, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system*

3 Terms and definitions

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

3.1
gauge length
specified multiple pitch length of chain

4 General conditions of acceptance

The hoist chain 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 is presented in Table 1. Other nominal sizes may be used provided that the dimensions and tolerances are calculated in accordance with Annex A.

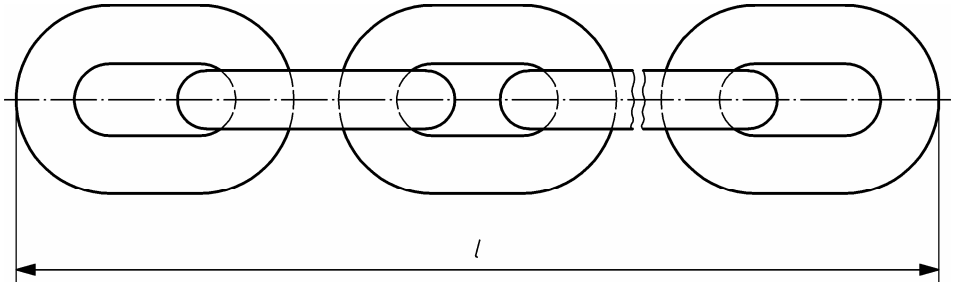
Table 1 — Typical dimensions (see Figure 1)

Dimensions in millimetres

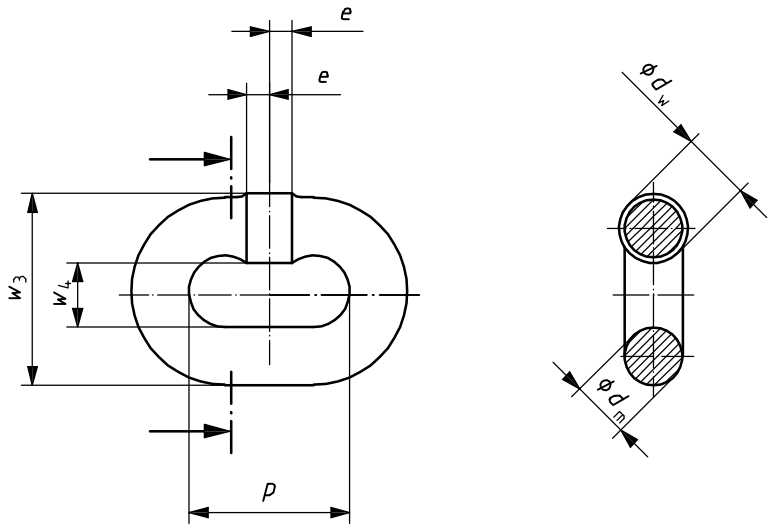
1	2	3	4	5	6	7	8	9	10	11
Nominal size	Diameter tolerance	Nominal pitch		Width			Gauge length		Weld diameter	
				Internal	External	Internal				
				Type 2	Types 1 and 2	Type 1			Types 1 and 2	Type 2
d_n		p_n	Tolerance	w_1	w_3	w_4	$11 \times p_n$	Tolerance	d_w	G
				min.	max.	min.			max.	max.
3	± 0,2	9	0,18	3,8	10,7	3,6	99	0,5	3,3	3,8
4	± 0,2	12	0,25	5	14,3	4,8	132	0,6	4,3	5
5	± 0,2	15	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	0,5	10	28,6	9,6	264	1,3	8,6	10
9	± 0,4	27	0,5	11,3	32,2	10,8	297	1,4	9,8	11,3
10	± 0,4	30	0,6	12,5	35,8	12,0	330	1,6	10,8	12,5
11,2	± 0,4	33,6	0,7	14	40,1	13,4	370	1,8	12,1	14
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	0,8	16,3	46,6	15,6	429	2,1	14,1	16,3

Typical dimensions for a range of nominal sizes are given here, calculated and rounded in accordance with the formulae specified in Annex A, based upon a nominal pitch of $3d_n$. Other nominal sizes may be used, provided that the dimensions and tolerances are calculated in accordance with Annex A. While the nominal link pitch is based upon $3d_n$, this may be varied up to a maximum of $3{,}3d_n$, subject also to the tolerances specified in Annex A.

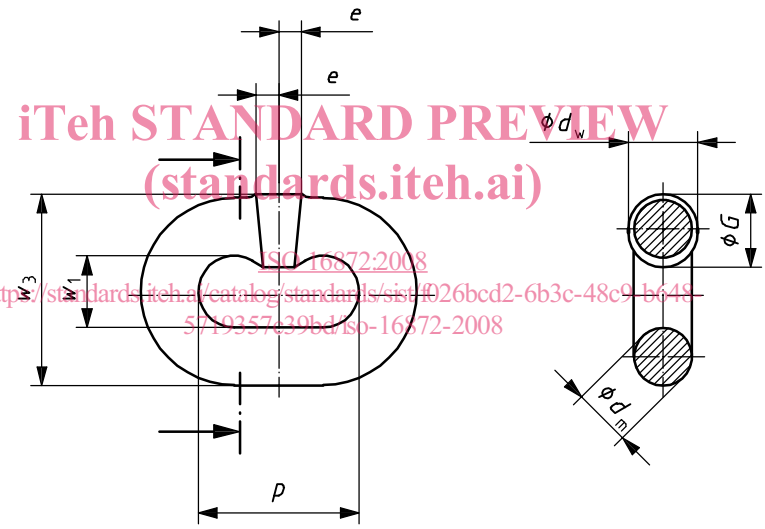
NOTE Tolerances are usually divided into +2/3 and −1/3 for both the pitch (column 4) and the standard gauge length (column 9).



a) Multiple pitch length



b) Type 1 — Link dimensions



c) Type 2 — Link dimensions

Key

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

Figure 1 — Link and chain dimensions

5.2 Material diameter and tolerance

The definition of material diameter and method of measurement shall be in accordance with ISO 1834. The tolerances of the diameter are given in A.1.

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

5.3 Pitch and widths

The dimensions and tolerances of the pitch and widths of the individual links as shown in Figure 1 shall be calculated in accordance with A.2.

The tolerances of multiple pitch lengths shall be calculated in accordance with A.2 and based on a gauge length of 11 links.

The dimensions and tolerances for the selected nominal sizes shall be as listed in Table 1.

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

5.4 Weld diameter

The maximum diameter at the weld shall not exceed the following:

— for Type 1 welded hoist chain, the maximum diameter at the weld shall not be in excess of 8 % above the nominal size in any direction;

— for Type 2 welded hoist chain, 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 link, and 25 % in the other planes;

— the maximum diameter at the weld for the selected nominal sizes shall be as listed in Table 1, columns 10 and 11;

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

5.5 Length dimensionally affected by welding

The length dimensionally affected by welding shall not extend by more than 0,6d_n to either side of the centre of the 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 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.

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 6 or finer when tested in accordance with ISO 643.

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

6.1.4 Chemical composition

The steel shall contain alloying elements in sufficient quantities so that the finished hoist chain, when heat treated in accordance with 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)	0,020	0,025
Phosphorus (P)	0,020	0,025
Sum of S + P	0,035	0,045

6.1.5 Finished condition

In its finished condition as supplied to the manufacturer of the chain, the steel shall comply with the requirements of 6.1.2 to 6.1.4 as determined by check analysis on the rod, wire or finished link.

6.2 Heat treatment

Fine-tolerance hoist chains shall be hardened from a temperature above the Ac_3 point and tempered before being subjected to the manufacturing proof force.

6.3 Working load limits (WLL)

Table 3 gives values for the WLL, calculated on the bases given in Annex A for selected nominal sizes.

For nominal sizes not included in Table 3, the values for the working load limit shall be calculated in accordance with Annex A.