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ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 1836

SHORT LINK CHAIN FOR LIFTING PURPOSES

GRADE 40 CALIBRATED LOAD CHAIN

FOR PULLEY BLOCKS AND OTHER LIFTING APPLIANCES

1st EDITION

March 1971

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BRIEF HISTORY

The ISO Recommendation R 1836, *Short link chain for lifting purposes – Grade 40 calibrated load chain for pulley blocks and other lifting appliances,* was drawn up by Technical Committee ISO/TC 111, *Round steel link chains, chain wheels, lifting hooks and accessories,* the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of Draft ISO Recommendation No. 1836, which was circulated to all the ISO Member Bodies for enquiry in May 1969. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Italy	Sweden
Brazil	Netherlands	Thailand
France	New Zealand	Turkey
Greece	Norway	U.A.R.
India	Peru	United Kingdom
Israel	South Africa, Rep. of	

The following Member Bodies opposed the approval of the Draft :

Belgium
Germany
Japan
U.S.A.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

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SHORT LINK CHAIN FOR LIFTING PURPOSES

GRADE 40 CALIBRATED LOAD CHAIN

FOR PULLEY BLOCKS AND OTHER LIFTING APPLIANCES

1. GENERAL

1.1 Scope

This ISO Recommendation covers requirements for lifting chains, Grade 40, accurately calibrated and polished for use as load chains in pulley blocks and similar appliances. These are electrically welded steel short link chains fully tested and heat treated, and comply with the general conditions of acceptance of ISO Recommendation R 1834(1).

This ISO Recommendation does not apply to surface-hardened chain.

1.2 Definitions

For the purpose of this ISO Recommendation, the definitions given in ISO Recommendation R 1834(1) apply.

1.3 General conditions of acceptance

The chain shall comply fully with the requirements of ISO Recommendation R 1834(1), as well as with those of this ISO Recommendation.

The size of the chain shall be one of the sizes listed in Table 1, column 1, which correspond to dimensions given in ISO Recommendations R 388(2) for wire and R 1035/I(3) for bar material.(4)

2. DIMENSIONS

2.1 Material diameter

2.1.1 *Measurement.* Material diameter is defined, and a suitable measuring instrument described, in ISO Recommendation R 1834(1).

2.1.2 *Tolerances*(5)

2.1.2.1 TOLERANCES ON DIAMETER OF THE MATERIAL IN THE LINK. For sizes up to and including 16 mm, the diameter d of the material in the finished link shall nowhere differ from the nominal diameter by more than + 2 % or − 6 %, except at the weld.

For sizes 18 mm and over, the diameter d of the material in the finished link shall nowhere differ from the nominal diameter by more than ± 5 %, except at the weld.

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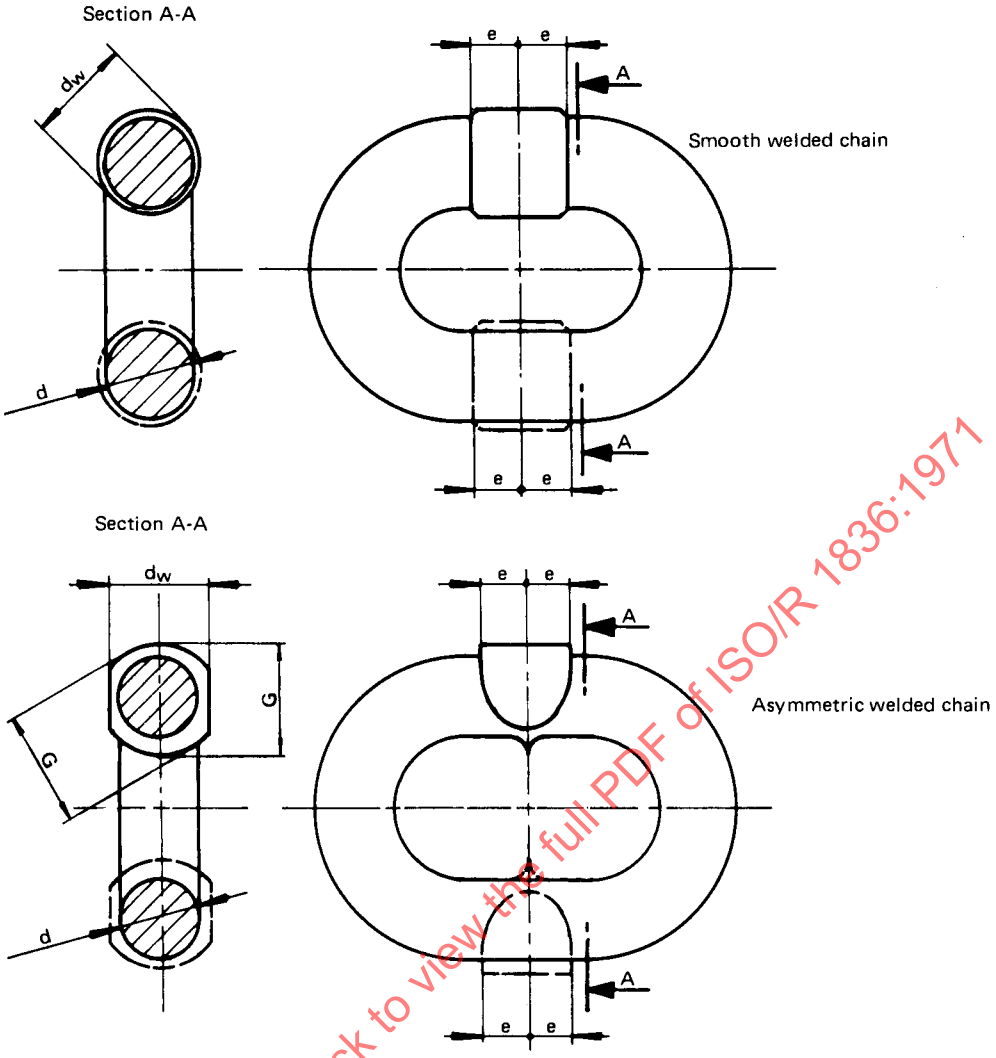
(1) ISO/R 1834, *Short link chain for lifting purposes – General conditions of acceptance.*

(2) ISO/R 388, *ISO metric series for basic thicknesses of sheet and diameter of wire.*

(3) ISO/R 1035/I, *Dimensions of hot-rolled steel bars – Round bars – Metric series.*

(4) The temporary addition of ten further sizes based on inch units for use in those countries still using this system of measurement is being considered.

(5) Control over the size of the material (bar or wire) from which the chain is made is important, but this ISO Recommendation concerns finished chain, and must assume that the inspector may not have the opportunity of retrospective measurement of the original material. The chain manufacturer will realize the need for the size of the material to be maintained within accepted tolerances.



d_n is the size (nominal diameter of the material).

d is the measured diameter of the material except at the weld.

d_w is the measured diameter of the material at the weld (smooth welded chain) or the weld dimension perpendicular to the plane of the link (asymmetric welded chain).

G is the dimension in other planes (asymmetric welded chain).

e is the length affected by welding on either side of the link.

For $d_n \leqslant 16$ mm, $d = d_n {}^{+2\,\%}_{-6\,\%}$

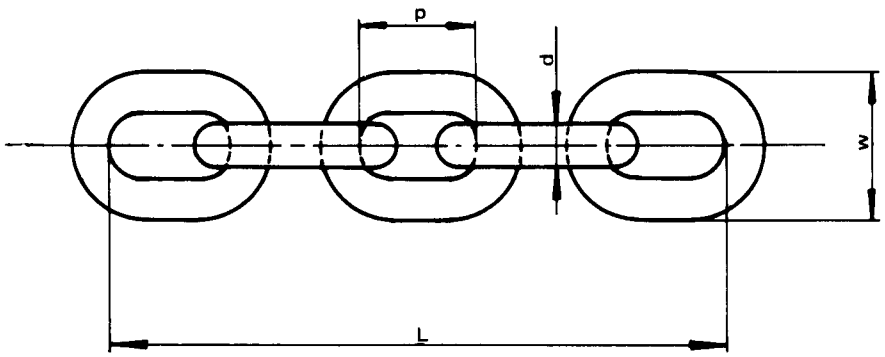
For $d_n \geqslant 18$ mm, $d = d_n \pm 5\,\%$

$d_w = d {}^{+8\,\%}_{0}$

$G = d {}^{+17\,\%}_{0}$

$e \leqslant 0.6\, d_n$

FIG. 1 – **Material and weld dimensions**



p is the pitch (inside link length).

w is the outside link width.

L is the sum of the inside lengths of any number of links N.

$p = 3\,d_n$

$w = 3.25\,d_n$

For tolerances, see clause 2.2.2.

FIG. 2 – **Chain and link dimensions**

2.1.2.2 TOLERANCES AT THE WELD. The dimension of the steel at the weld shall nowhere be less than the diameter of the steel adjacent to the weld, or exceed it by more than the following tolerances :

Asymmetric welded chain of the pattern shown in Fig. 1 :

8 % in the direction normal to the plane of the link;
17 % in any other plane.

Smooth welded chain :

The diameter at the weld will not normally exceed that of the steel adjacent by more than 8 %.

2.1.2.3 AREA AFFECTED DIMENSIONALLY BY WELDING. The weld, or welds, are positioned in the centre of one or both legs of the link. The area affected dimensionally by welding shall not extend by more than 0.6 of the material diameter to either side of the link.

2.2 Length and width

2.2.1 *Nominal dimensions.* Preferred nominal dimensions are as follows :

– pitch p (i.e. inside length) : 3 times the size;

– outside width w : 3.25 times the size.

Where the chain has to fit a load wheel designed for different dimensions, the nominal pitch (inside length) and the nominal outside width shall be clearly specified at the time of the enquiry and order.

2.2.2 *Tolerances*

2.2.2.1 OUTSIDE WIDTH w (measured on the chain in the finished condition).

Measured clear of the weld zone :

w = nominal outside width $^{+0.075\,d_n}_{0}$

Measured at the weld :

$w \leqslant$ 1.05 times the width adjacent.

2.2.2.2 LENGTH (measured on the chain in the finished condition).

The inside length of one link (pitch p) or the sum L of the inside lengths of any number of links N measured bearing to bearing under a load not greater than half the specified proof load of the chain, shall not vary from the nominal length (Np) by more than the following percentage tolerance :

$$\frac{\Delta L}{Np} \times 100 = \pm \left(\frac{1.15}{N} + 0.17 + C \right) \%$$

For sizes 10 mm and above, $C = 0$.

For sizes below 10 mm, $C = \frac{2.3}{d_n} - 0.23$.

Examples :

Chain size d_n	Number of links in chain N	Tolerance %	Tolerance mm
6.3 mm	1	1.455	0.280
	5	0.533	0.505
	21	0.360	1.43
10 mm	1	1.32	0.400
	5	0.400	0.600
	21	0.225	1.42
25 mm	1	1.32	0.990
	5	0.400	1.50
	21	0.225	3.55

3. MATERIAL AND MANUFACTURE

3.1 Quality of material

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

In its finished state as supplied to the chain maker, the steel shall meet the following requirements as determined by check analysis on the rod, wire or finished link :

– it shall be fully killed, shall possess reliable welding quality and shall contain not less than 0.020 % of aluminium;

– it shall contain no more than 0.050 % of sulphur
and no more than 0.045 % of phosphorus.(1)

Within the above limitations it is the responsibility of the chain manufacturer to select a steel so that the finished chain, suitably heat treated, meets the specified mechanical properties.

3.2 Heat treatment

All chain shall be hardened and tempered before proof loading.(2)

3.3 Workmanship

The fins caused by welding shall be removed, and the weld shall be smoothly finished all round a smooth weld and on the outside of the link surface of an asymmetric weld, leaving the projection on the inside of the link.

3.4 Quality marking

The quality marking for the chains is as follows :

"4" in a circle. i.e. (4)

The quality mark shall be applied as recommended in ISO Recommendation R 1834.(3)

3.5 Proof loading

The proof load for the chain as given in Table 3, column 2, shall be applied as recommended in ISO Recommendation R 1834(3). After calibrated chain has been proof loaded, the pitch of the chain, adjusted where necessary, shall be verified by trying the chain in an appropriate mould or by running it over an actual sheave. The links shall fall smoothly into the pockets of the mould or sheave and shall be a working fit.

NOTE. – Adjustment of pitch by shortening the links is not permitted.

(1) Sulphur and phosphorus tend to segregate, and the proportions found in millings from a finished link may be in excess of those in the cast analysis.

(2) Repairs on hardened and tempered chain should be performed by the original chain manufacturer or by another qualified chain manufacturer or chain tester according to the instructions of the original manufacturer.

(3) ISO/R 1834, *Short link chain for lifting purposes – General conditions of acceptance.*

4. TEST REQUIREMENTS

4.1 Mechanical properties and test loads

The mechanical properties required of this grade of chain are summarized in Table 2. The actual test loads for each size are given in Table 3.

4.2 Selection of samples

Samples shall be selected as recommended in ISO Recommendation R 1834.* The length of the lot from which the inspector selects the sample(s) shall be 200 m or less.

4.3 Static tensile test

4.3.1 *Testing machine and method of test.* The testing machine and method of testing are specified in ISO Recommendation R 1834.(1)

4.3.2 *Breaking load.* The breaking load shall be not less than that specified in Table 3, column 3.

4.3.3 *Elongation at fracture.* The permanent elongation at fracture as defined in ISO Recommendation R 1834* shall be not less than 14.4 %, i.e. 14.4 cm on a gauge length of 1 m.

4.3.4 *Energy absorption factor.* The energy absorption factor as defined in ISO Recommendation R 1834* shall be not less than that specified in Table 3, column 4.

5. INSPECTION

5.1 Acceptance

The acceptance procedure specified in ISO Recommendation R 1834* applies.

5.2 Marking

5.2.1 *Identification marking.* The identification marking specified in ISO Recommendation R 1834* applies.

5.2.2 *Inspection marking.* The inspection marking specified in ISO Recommendation R 1834* applies.

5.3 Test certificate

The manufacturer shall supply a certificate of test and examination in the appropriate statutory form with every supply of chain. The certificate shall give the results of all the tests. A typical form is given in ISO Recommendation R 1834*, Annex A.

5.4 Provision for inspection

The provision for inspection specified in ISO Recommendation R 1834* applies.

(1) ISO/R 1834, *Short link chain for lifting purposes – General conditions of acceptance.*