

Specification for

Chain slings of welded construction: grades M(4), S(6) and T(8)

[ISO title: Chain slings of welded construction — Grades M(4), S(6) and T(8)]

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British Chain Manufacturers' Association	Federation of Wire Rope Manufacturers of Great Britain
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Chain Testers' Association of Great Britain	National Association of Port Employers
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National foreword

This British Standard, prepared under the direction of the Mechanical Engineering Standards Committee, is identical with ISO 4778 “*Chain slings of welded construction — Grades M (4), S (6) and T (8)*”, published in 1981 by the International Organization for Standardization (ISO).

The United Kingdom has taken part in the preparation of the International Standard through Subcommittee 1 of Technical Committee ISO/TC 111, Round steel link chains, lifting hooks and accessories.

Whereas this standard is in metric units and is based on chain with a factor of safety of 4 to 1, the following British Standards also cover specifications for welded chain slings but are dimensioned in imperial units and use a factor of safety of 5 to 1:

BS 2902, *Higher tensile steel chain slings and rings, links alternative to rings, egg links and intermediate links*.

BS 3458, *Alloy steel chain slings*.

Chain slings assembled by methods other than welding are the subject of a separate International Standard (in course of preparation).

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is especially drawn to the following.

The comma has been used throughout as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Wherever the words “International Standard” appear referring to this standard, they should be read as “British Standard”.

Cross-references

International Standard	Corresponding British Standard
ISO 1834:1980	BS 4942 <i>Short link chain for lifting purposes</i> Part 1:1981 <i>Specification for general conditions of acceptance</i> (Identical)
ISO 1835:1980	Part 2:1981 <i>Specification for grade M(4) non-calibrated chain</i> (Identical)
ISO 3075:1980	BS 4942 <i>Short link chain for lifting purposes</i> Part 4:1981 <i>Specification for grade S (6) non-calibrated chain</i> (Identical)
ISO 3076:1980	Part 5:1981 <i>Specification for grade T (8) non-calibrated chain</i> (Identical)

The Technical Committee has reviewed the provisions of ISO 2766, to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

A related British Standard to ISO 2766:1973 is BS 2903:1980 “*Specification for higher tensile steel hooks for chains, slings, blocks and general engineering purposes*”.

Additional information

Rating. Attention is drawn to the two alternative methods of rating detailed in clause 9 of this standard and to the fact that three and four branch slings are rated as three branch slings in both methods. These matters are discussed in more detail in BS 6166¹⁾.

Marking. BS 6166¹⁾ recommends that lifting gear should be marked with its safe working load (SWL) and not the working load limit (WLL) as required by clause 11 of ISO 4778. WLL has never been recognized as a marking in the UK and is not acceptable as a marking on lifting gear subject to the Factories Act 1961 and related legislation. For such gear, the term safe working load (SWL) should therefore be substituted for working load limit (WLL) throughout clause 11.

It will be noted that clause 11 requires a quality grade mark to be shown on a metal tag or label permanently attached to the sling. Manufacturers are recommended to adopt the appropriate letters M, S or T as the quality grade marks in preference to the alternative numbers, 4, 6 or 8, in order to align with other materials and components.

Test certificate. Clause 12 of this standard specifies the details to be included in the test certificate. It should be noted that for chain slings used in premises subject to the Factories Act 1961, there is a legal requirement that specific information be contained in the test certificate. F97 is the usual form of certificate used for this purpose and should be endorsed by the manufacturer or supplier certifying that tests made on the sling comply in all respects with BS 6304.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 16, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

¹⁾ BS 6166, *Recommendations for rating of lifting gear for general purposes*

1 Scope and field of application

This International Standard specifies the requirements, methods of rating and testing of single, two, three and four branch²⁾ welded chain slings of grades M (4), S (6) and T (8) using chain conforming to ISO 1834, ISO 1835, ISO 3075 and ISO 3076 together with the appropriate range of components.

This International Standard does not apply to mechanically joined slings or welded slings having branches of unequal nominal reach.

2 References

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

ISO 1835, *Short link chain for lifting purposes — Grade M (4) non-calibrated, for chain slings, etc.*

ISO 2766, *Single lifting hooks with shank — Capacity up to 25 tonnes — Grades M, P, S (T, V) — Hammer and drop forged hooks.*

ISO 3075, *Short link chain for lifting purposes — Grade S (6), non-calibrated, for chain slings, etc.*

ISO 3076, *Short link chain for lifting purposes — Grade T (8), non-calibrated, for chain slings, etc.*

3 Definitions

3.1

chain sling

an assembly consisting of chain or chains joined to upper and lower terminal fittings suitable according to the requirements of this International Standard for attaching loads to be lifted to the hook of a crane or other lifting machine (see Figure 2 to Figure 5)

3.2

master link

a parallel-sided link forming the upper terminal fitting of a chain sling by means of which it is attached to the hook of a crane or other lifting machine (see Figure 2 to Figure 5)

3.3

intermediate master link

a link used to connect two or more branches to a master link (see Figure 2 to Figure 5)

3.4

joining link

a link fitted to the end of a chain to connect it either directly or through an intermediate link to an upper or lower terminal fitting (see Figure 2 to Figure 5)

3.5

intermediate link

a link used to form a connection between the terminal fitting and the joining link fitted to the chain (see Figure 2 to Figure 5)

3.6

lower terminal

a link, hook or other device fitted at the end of a branch remote from the master link or upper terminal

3.7

proof force

a force applied as a test to the whole sling, or a force applied as a test to a section of a sling (see clause 10)

3.8

working load limit

the maximum mass which a sling is designed to support in general service

3.9

working load

the maximum mass which a sling should be used to support in a particular stated service

4 Designations

The following designations should be used in specifying slings to this International Standard.

4.1 Nominal size

The nominal size of a chain sling is the nominal size of the short link chain used in its manufacture.

The nominal size of each individual master link, joining or intermediate link where it is of round section is the nominal diameter of the material from which it is made.

4.2 Nominal reach of sling

The nominal reach of the finished sling is the effective length from the inside of the lower terminal fitting to the inside of the upper terminal fitting. (See Figure 2 to Figure 5.)

4.3 Grade of a sling

The nominal grade of a sling, for the purpose of its designation under this International Standard, shall be the same as the grade of the chain used, i.e. M (4), S (6) or T (8) (see clause 1).

4.4 Rating

The rating of the chain sling shall be as specified in clause 9.

²⁾ The term “branch” or “leg” may be used.

5 Construction

Some examples of chain slings conforming to this International Standard are shown in Figure 2 to Figure 5.

Joining links and intermediate links may be

- a) parallel sided links or
- b) egg-shaped links, these being links with differing radii at either end, i.e. pear-shaped.

Egg- or pear-shaped links shall not be used as master links or as lower terminals in any situation where the link could be inverted, leading to a wedging action and subsequent distortion of the link.

6 Dimensions and tolerances

The dimensions and tolerances of the chain, master links, joining links and intermediate links used in the construction of chain slings conforming to this International Standard shall be as follows:

6.1 Chain

The dimensions and tolerances of the chain shall be in accordance with the appropriate International Standards listed in clause 1.

6.2 Master links and intermediate master links

6.2.1 The inside dimension and the section of the material shall be such that:

- a) the master link fits on an ISO grade M hook two sizes larger than the rating of the sling (see Table 1 and Table 2);
- b) the inside width of the master link is not less than 1,2 times the maximum width (L_h) of the hook section defined in a);
- c) for slings with hooks as lower terminals, unless another means of securing the hooks when not loaded is provided, the inside dimensions and section are such as to allow the lower terminals to be hooked into the master link while it is on a hook as defined in a).

6.2.2 Master links and intermediate master links may be of round or other suitable section but the section of the material shall be chosen so that:

- a) after proof loading (see clause 10) the master link and intermediate master links do not show any significant permanent deformation (see also 8.1);
- b) the minimum elongation at breaking is at least that of the corresponding grade of chain.

6.3 Lower terminal links, joining links and intermediate links

6.3.1 The number and internal dimensions of lower terminal, joining and intermediate links shall be such as to ensure free articulation of the links.

6.3.2 The section of the material shall be such that:

- a) after proof loading (see clause 10) the lower terminal, joining and intermediate links do not show any significant permanent deformation (see also 8.1);
- b) the minimum elongation at breaking is at least that of the corresponding grade of chain.

NOTE A method of calculating the sections of master links and intermediate links is given in the Annex.

6.4 Eyehooks

Eyehooks shall be compatible with the chain (see 6.1). (An International Standard covering eyehooks is in preparation.)

6.5 Tolerances

When constructing the sling, a tolerance of $^{+2}_0$ links is permissible on the nominal reach ordered by the purchaser. After proof loading, the difference between the longest and shortest branches of a multi-branch sling, when measured under a tension of 1/5 of the working load limit, shall not exceed 6 mm for branches up to 2 m in length. For slings in excess of 2 m, the difference between the longest and shortest branches may be increased by 3 mm/m.

7 Materials

The materials used in the manufacture of components shall meet the conditions laid down in the International Standard for the appropriate grade of chain.

8 Manufacturing methods and workmanship

8.1 Master links and intermediate master links

Welding methods (where applicable), workmanship, materials, form and heat treatment of master links shall be such as to ensure that the ratio between the breaking force and the appropriate proof force is not less than 2 : 1 up to working load limits of 25 t (see Figure 1).

8.2 Lower terminal links, joining links and intermediate links

Welding methods (where applicable), workmanship, materials, form and heat treatment of links shall be such as to ensure that the breaking force is not less than the minimum breaking force of the chain.

8.3 Heat treatment

All master links, intermediate master links, joining links, intermediate links, lower terminals and chain shall, before application of the proof force, be heat treated in such a way as to ensure that they have the required mechanical and metallurgical properties.