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Zanke jeklenih vrvi za splošne namene - Značilnosti in specifikacije

Wire rope slings for general purposes -- Characteristics and specifications

Élingues de câbles en acier pour usages courants -- Caractéristiques et spécifications

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Wire rope slings for general purposes — Characteristics and specifications

Élingues de câbles en acier pour usages courants — Caractéristiques et spécifications

Reference number
ISO 7531 : 1987 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 7531 was prepared by Technical Committee ISO/TC 105, *Steel wire ropes*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Wire rope slings for general purposes — Characteristics and specifications

1 Scope and field of application

This International Standard specifies a series of wire rope slings for general purposes. It covers the type of sling, the working load limit, and the manufacture of slings and sling assemblies.

The multilegged slings covered by this International Standard are constructed with legs of equal nominal length.

NOTE — Slings of unequal leg length may also be constructed generally in accordance with this International Standard, but the rating of such slings requires special consideration by a competent person.

2 References

ISO 2408, *Steel wire ropes for general purposes — Characteristics.*

ISO 8793, *Steel wire ropes — Ferrule-secured eye terminations.*

ISO 8794, *Steel wire ropes — Spliced eye terminations for slings.*

3 Definition

working load limit (WLL) : The maximum load which the sling is rated to raise, lower or suspend in straight pull.

In the case of a single-leg sling, this load is applied vertically. In the case of a multilegged sling, this load is applied at a maximum included angle of 90° or 120° (see clause 5).

4 Single-leg slings

4.1 Types of sling

Single-leg slings shall be of one of the types shown in figure 1, with or without additional terminal fittings such as links or hooks. If a terminal fitting is used, the eye shall always be fitted with a thimble.

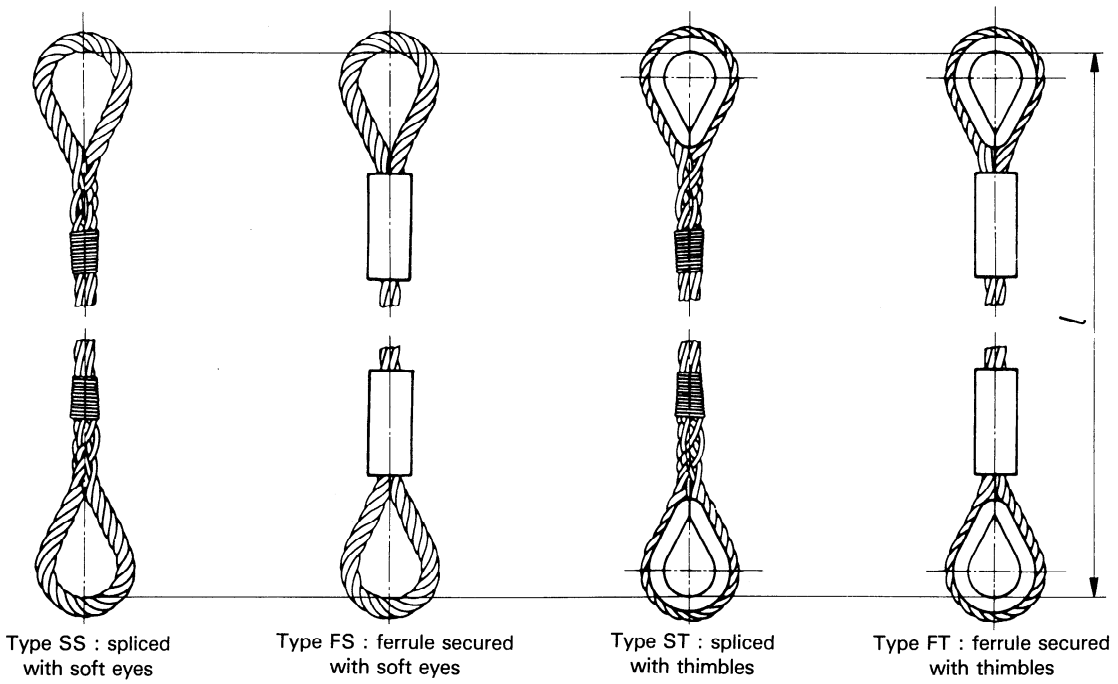


Figure 1 — Types of slings

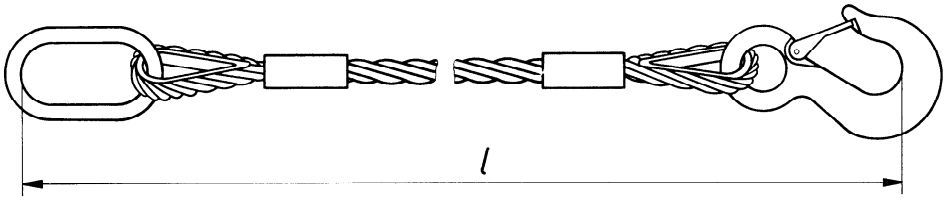


Figure 2 — Length of a single-leg sling with two terminal fittings

4.2 Nominal length of sling

The nominal length of a single leg sling, l, shall be the length between the bearing points of each terminal whether they are soft eyes, thimbles, or hooks or links, as appropriate (see figures 1 and 2). The tolerance shall not exceed ± 2 times the rope diameter or ± 0,5 % of the desired length, whichever is the greater.

The length shall be measured under no load.

4.3 Information to be specified when ordering the sling

A single-leg sling shall be identified by

a) a reference to this International Standard;

b) the type of sling (see figure 1);

c) the nominal length, in metres (see figure 2);

d) the terminal fittings (if any) at each end (see 4.7);

e) the maximum load to be lifted (also, if applicable, the maximum load to be applied to the sling);

f) the slinging method;

g) the type of rope.

NOTE — The user is reminded that the way a sling is used may change its working load limit considerably.

4.4 Working load limit (WLL)

The working load limit as defined in clause 3 shall be calculated as follows :

$$\text{WLL} = \frac{F_o \times k_e}{k_m \times k_u}$$

where

WLL is the working load limit of the sling, in tonnes;

F_o is the minimum breaking force of the rope, in kilonewtons, as defined in ISO 2408;

k_e is a factor which allows for the efficiency of the form of eye (spliced or ferrule-secured);

k_u is a factor which allows for circumstances of use;

k_m is a factor relating mass to force.

For the purposes of this International Standard, the following values are assigned to the factors :

— k_e : 0,8

— k_u : 5

— k_m : 10

If a different value for k_e or k_u is required by national or international standards or by legislation or by customer requirements, the customer shall inform the supplier of the exact value. In the case of a customer requirement, the value of k_u shall be not lower than 5.

NOTE — Although different types of rope construction and different values for factors k_e and k_u may be used (see 4.5), it is recommended that the working load limit of single-leg slings be in accordance with table 1.

Table 1 — Recommended working load limit of single-leg slings

Rope diameter mm	WLL[1] t
9	0,7
10	0,9
11	1,1
12	1,3
13	1,5
14	1,8
16	2,4
18	3
20	3,7
22	4,5
24	5,4
26	6,3
28	7,3
32	9,6
36	12,1
40	15
44	18,1
48	21,6
52	25,5
56	29,3
60	33,5

1) The WLL values are derived from the formula given in 4.4 and the minimum breaking force is assumed to be that of the 6 × 37 fibre core group in 1 770 N/mm^2 (1 770 MPa) nominal tensile grade, as given in ISO 2408.

4.5 Type of rope

The type of rope used shall be one of those fibre- or steel-cored ropes of ordinary lay given in ISO 2408 having a minimum mass factor of

0,36 for natural fibre cored ropes;

0,35 for polypropylene cored ropes; and

0,4 for steel cored ropes;

but excluding multistrand ropes as designated in ISO 2408.

The tensile grade of the wires shall be 1 770 N/mm^2 (1 770 MPa).

4.6 Formation of terminal eyes

4.6.1 General

Normally, the eyes of sling legs should be formed by using the ferrule-secured system (see 4.6.1).

NOTE — If splicing is required, it will need to be specifically requested.

4.6.2 Ferrule-secured eyes

Ferrule-secured eyes shall comply with ISO 8793.

The minimum distance between the inside ends of ferrules terminating a sling leg shall be 10 times the nominal rope diameter.

4.6.3 Spliced eyes

Spliced eyes shall comply with ISO 8794.

The minimum distance between the tails of splices at each end of a sling leg shall be 10 times the nominal rope diameter.

4.7 Hooks and links

The working load limit (WLL) or rating of a hook or link shall be at least equal to that of the leg to which it is fitted.

5 Multilegged slings

5.1 Formation of sling assemblies

The sling assembly shall comprise two, three or four single legs of the type given in clause 4.

The legs of two-legged or three-legged slings shall be joined at their upper ends by a link [see figures 3a) and b)]. In a four-legged sling each of the two pairs of legs shall be joined by an intermediate link to the master link [see figure 3c)]. If a terminal fitting is used, the eye shall always be fitted with a thimble.

NOTE — The length of the sling assembly can be measured using figure 2 as a guide.

5.2 Tolerance of length of sling assemblies

The discrepancy in length between the individual legs of any multilegged sling under no load shall not exceed ± 2 times the rope diameter or ± 0,5 % of the desired length, whichever is the greater.

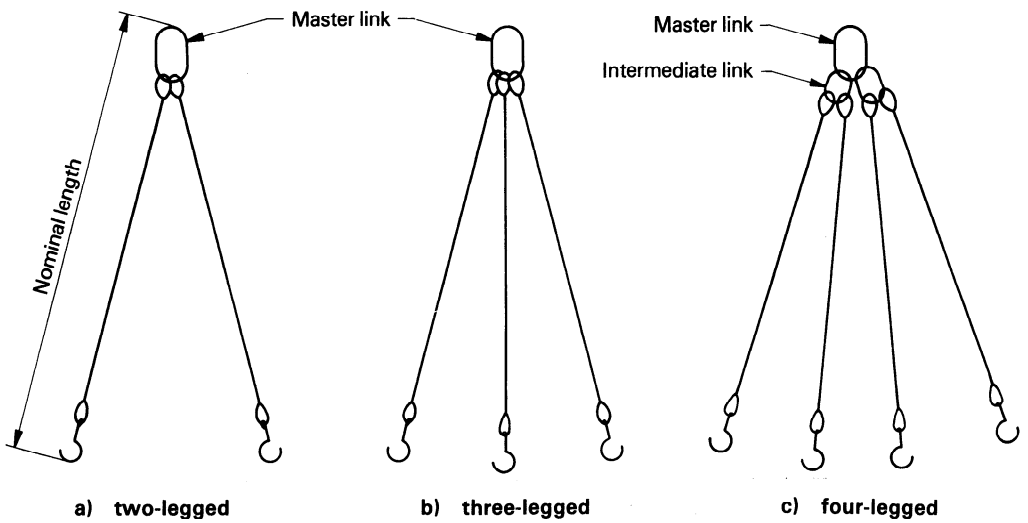


Figure 3 — Formation of typical sling assemblies

5.3 Information to be specified when ordering the sling

Multilegged slings shall be identified by

a) a reference to this International Standard;

b) the type of sling (see figure 1);

c) the number of legs (see figure 3);

d) the nominal length, in metres (see figure 3);

e) the terminal fittings (if any) at the lower end;

f) the maximum load to be lifted at the maximum angle of usage α or β (see figure 4 and table 2).

g) the type of rope.

5.4 Working load limit of multilegged slings

The working load limit shall be calculated by multiplying the working load limit of the single leg given in table 1 by the factors given in table 2. Table 3 shows the working load limit values of multilegged slings calculated accordingly.

The angle to the vertical, β, shall in no case exceed 60°. The angle between opposite legs, α, shall in no case exceed 120°.

NOTES

1 The factors and WLL values given in tables 2 and 3 are correct only if the load is equally distributed between all the legs.

2 Master and intermediate links are designed to withstand the rated load marked on the sling only within the range of included angle specified, e.g. 0° to 90°; they are not designed to withstand heavier loads at included angles less than 90°.

Table 2 — Factors for calculation of WLL

Angle between opposite legs[1)] α	Angle to the vertical (angle of inclination) β	Factors for calculation of WLL		
		Number of legs		
		two	three	four
$\alpha \leqslant 90°$	$\beta \leqslant 45°$	1,4	2,1	2,1
$90° < \alpha \leqslant 120°$	$45° < \beta \leqslant 60°$	1	1,5	1,5

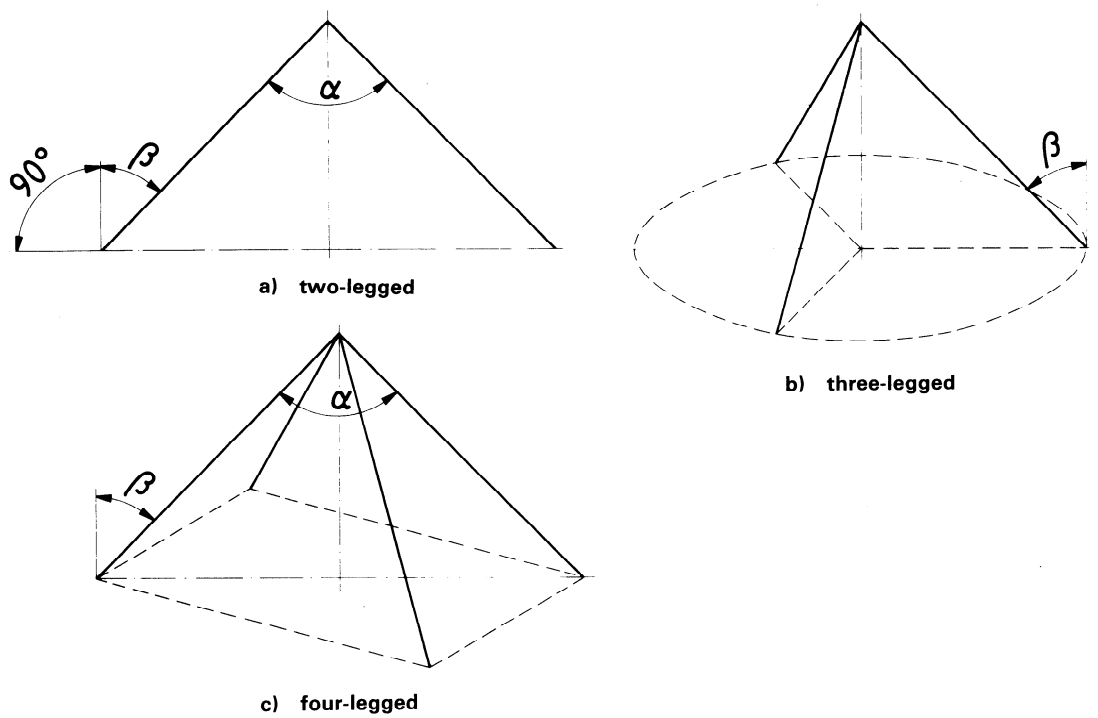
1) Not applicable for three-legged slings.

5.5 Hooks and links

The working load limit of each hook shall be at least equal to that of the leg to which it is fitted.

The working load limit of the master link shall be at least equal to the working load limit of the sling.

Unless otherwise requested by the customer the size of the master link shall be such as to fit on a grade M hook two sizes larger than the rating of the sling.



a) two-legged

b) three-legged

c) four-legged

Figure 4 — Inclination of sling legs