BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENTS ONLY

भारतीय मानक **मसौदा**

इस्पात जंजीर स्लिंग — विशिष्टि

(आई एस 2760 का *दूसरा पुनरीक्षण*)

Draft *Indian Standard*

STEEL CHAIN SLINGS – SPECIFICATION

(*Second Revision* of IS 2760)

ICS 61.080

Cranes, Lifting Chains and Related Equipment Sectional Committee, MED 14	Last date for receipt of comments is **21st August 2025**

FOREWORD
(*Formal clause will be added later*)

This standard was first published in 1972 and subsequently revised in 1980. This standard has been brought out to keep pace with the latest technological developments and international practices. Also, in this revision, the standard has been brought into the latest style and format of Indian Standards, and references, wherever applicable have been updated. BIS certification marking clause has been modified to align with the revised *Bureau of Indian Standards Act*, 2016. The following major modifications have been incorporated in this revision of the standard:

a) Amendment 1, amendment 2 and amendment 3 have been incorporated in this revision;
b) This standard is being revised to incorporate the amendments issued and the suggestions received from time to time; and
c) Removal of lower Grades in line with industry standards and updated ISO specifications.

Safety recommendations for the use, care and maintenance of chain slings have been covered under IS 8324: 1988 ‘Code of practice for safe use and maintenance on non - Calibrated round steel link lifting chains and chain slings (First Revision)’.

In the preparation of this standard considerable assistance has been derived from ISO/DIS 4778 ‘Round steel short link chains for lifting purposes — Chain slings of welded construction — Grade 8’ 'Chain slings of welded construction — Grades M and T’ issued by International Organization for Standardization (ISO).

Chain slings in Grade T (8) can also be assembled by Mechanical Joining Devices as per IS 15191: 2002 ‘Forged steel components for use with grade T (8) chain and chain slings — Specification’.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Draft *Indian Standard*

STEEL CHAIN SLINGS – SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This standard specifies the requirements, methods of rating and testing of single, two, three and four-leg or branch welded chain slings of Grades L (3), M (4), S (6) and T (8) using chains conforming to IS 2429 (Part 1), IS 3109 (Part 1), IS 6217 and IS 6215 respectively and eye hooks conforming to IS 3822 together with the appropriate range of components.

1.1.1 This standard does not apply to mechanically joined slings or welded slings having legs of unequal nominal reach.

2 REFERENCES

The standards listed in Annex B contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed in Annex B.

3TERMINOLOGY

For the purpose of this standard the following terms and definitions shall apply.

3.1 Chain Slings — An assembly consisting of chain or chains joined suitably to upper and lower terminal fittings according to the provisions of this standard for attaching loads to be lifted to the hook of a crane or other lifting machine (*see* Fig. 1 to Fig. 4).

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 (*A*). In cases where the master link is a circular ring it is termed as suspension O-ring.

3.3 Intermediate Master Link — A single link used to connect two or more legs to a master link (*B*3 and *B*4).

3.4 Joining Link — A link fitted to the end of a chain to connect it either directly or through an intermediate joining link to an upper or lower terminal fitting (*B*1).

3.5 Intermediate Joining Link — A joining link used to form a connection between the terminal fitting and the joining link fitted to the chain (*B*2).

3.6 Proof Load — A load to which the chain sling shall be subjected to, in the finished condition or a load applied as a test to a section of a sling. The test is to be carried out in accordance with **12**.

3.7 Working Load Limit — The maximum mass which a sling is designed to support in general service.

3.8 Working Load — The maximum mass which a sling should be used to support in a particular stated service.

3.9 Lower Terminal — A link, hook or other device fitted at the end of a branch remote from the master link or upper terminal.

3.10 Competent Person — The person who is approved and declared as such under the relevant statutory provisions.

3.11 Inspector — Representative of the purchaser.

4 DESIGNATION

4.1 The following designations shall be used in specifying slings conforming to this standard.

4.2 Nominal Size

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

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

4.3 Nominal Reach of Sling (L)

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* Fig. 4).

4.4 The Grade of a Sling

The grade of a sling shall be the same as the grade of the chain used, that is *M* or *T* corresponding to Grades 40 and 80 chains respectively. All components used in the construction of a sling shall be made from the same grade.

4.5 Rating

The rating of the chain sling shall be as specified in **11**.

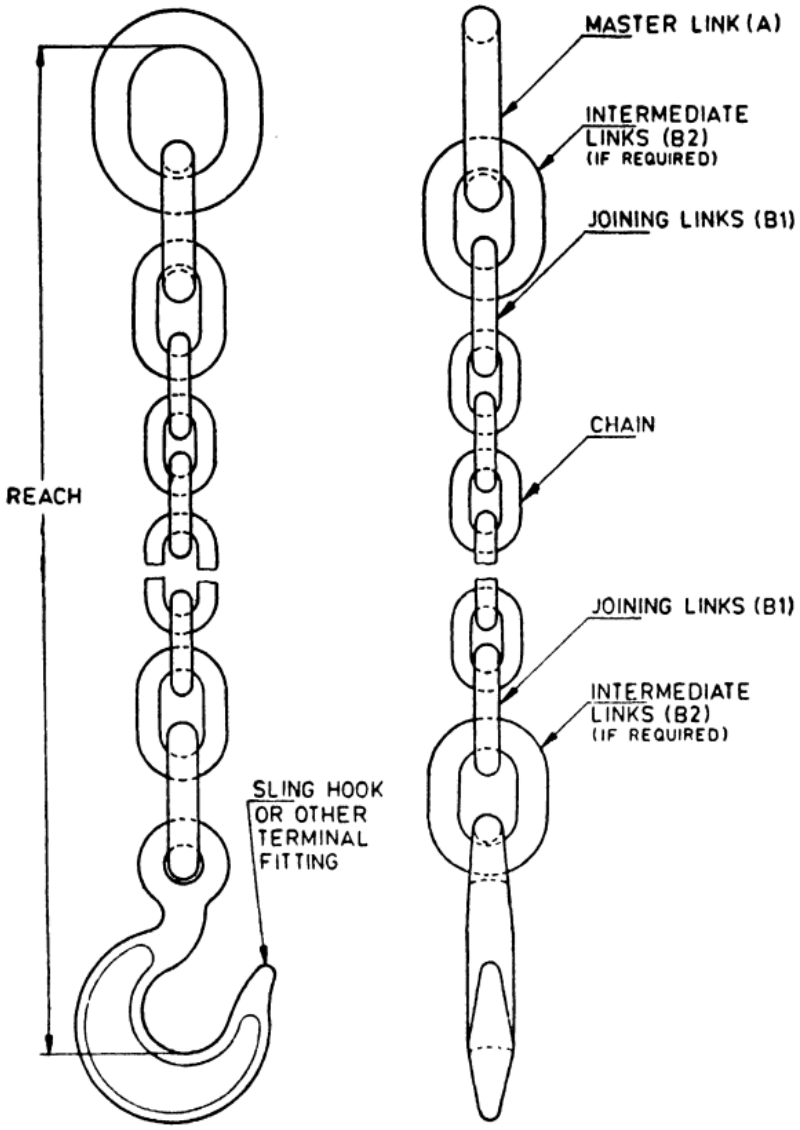


FIG. 1 SINGLE-LEO SLING

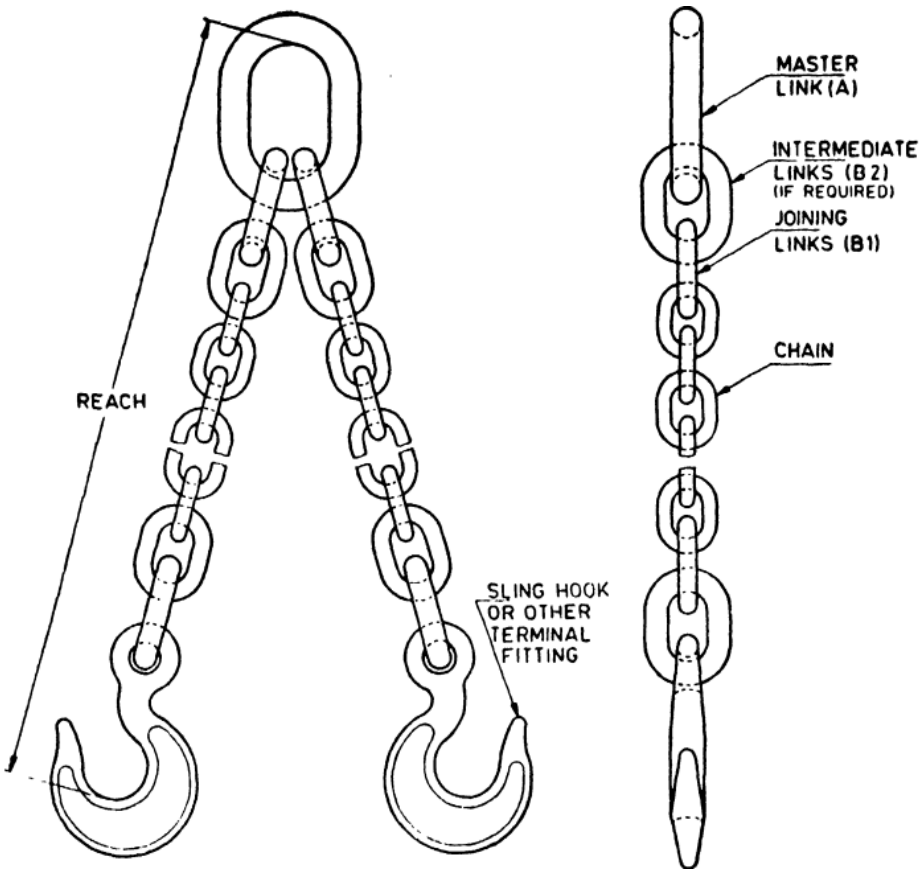


FIG. 2 TWO-LEO SLING

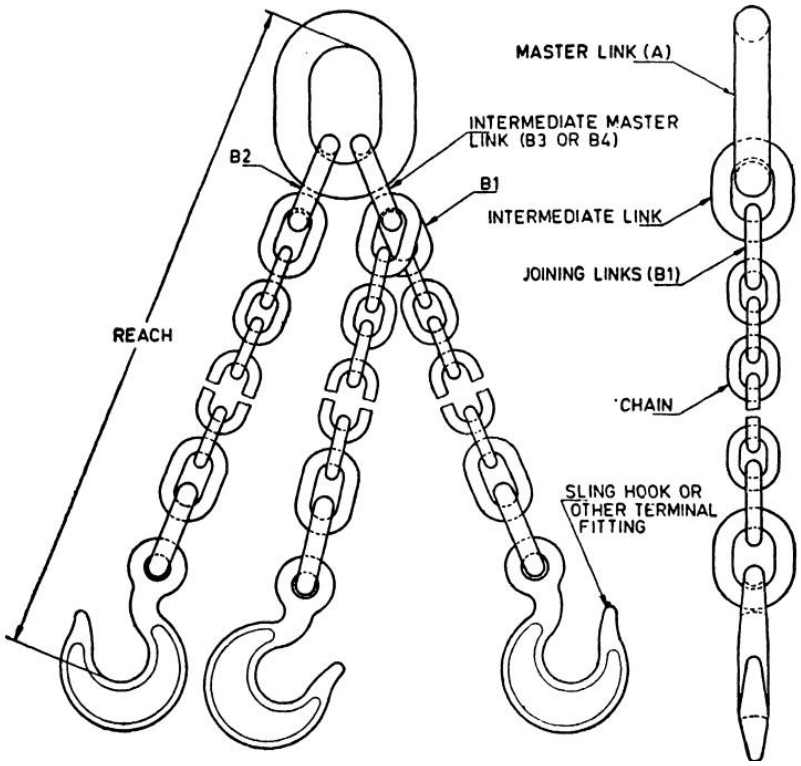
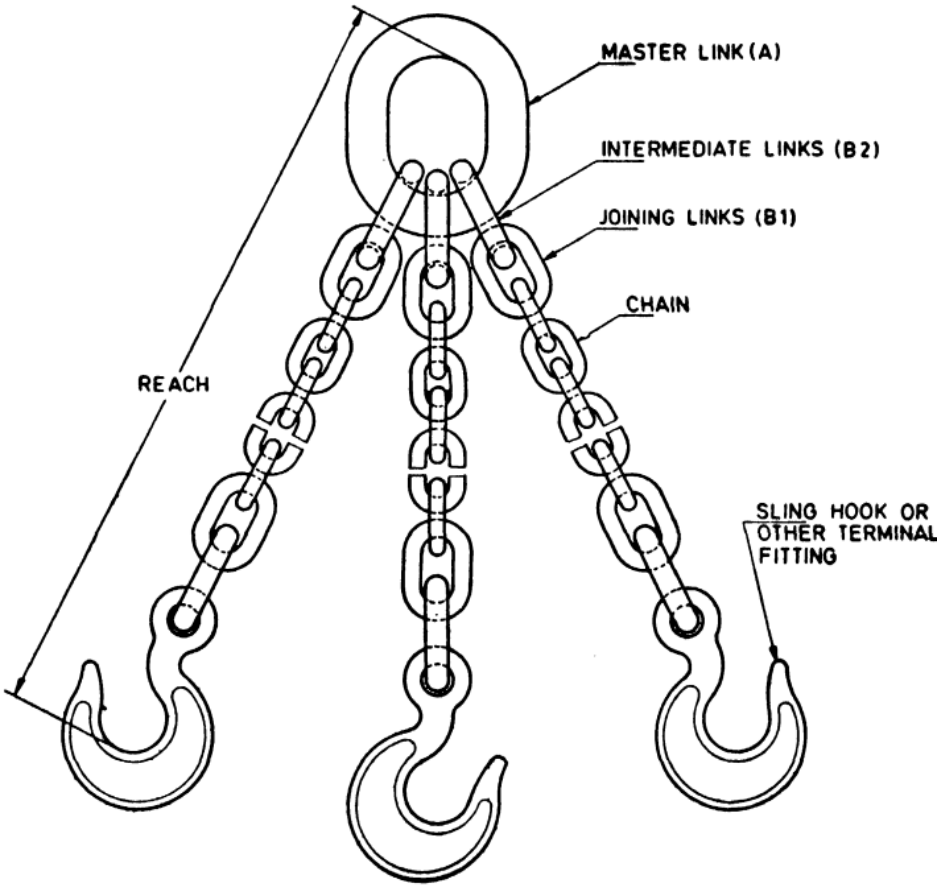


FIG. 3 THREE-LEO SLING



Alternative Construction

FIG. 3A THREE-LEG SLING

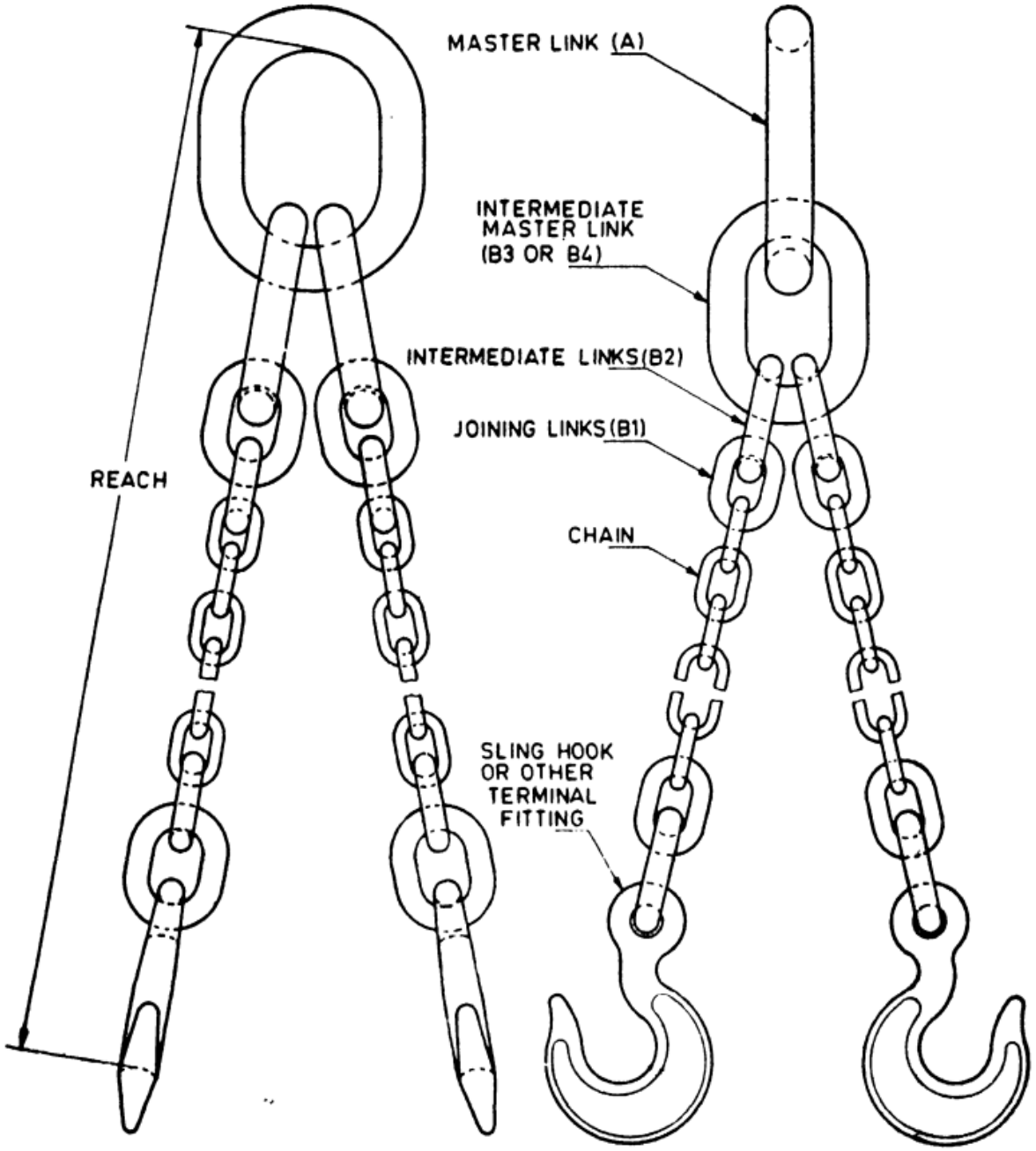


FIG. 4 FOUR-LEO SLING

5 CONSTRUCTION

Some examples of chain slings conforming to this standard are shown in Fig. 1 to Fig. 4.

6 DIMENSIONS

6.1 Material diameters of the master link A, joining link *B*1 and intermediate links *B*2 and *B*3 for three- and four-leg slings shall be as given in Table 1.

6.2 Material dimensions for slings with O-rings as master link shall be as given in Table 2.

6.3 Nominal size, pitch and width of master link and O-rings shall be as given in Table 3.

6.4 Material diameters of joining link *B*1 and intermediate links *B*2 and *B*3 for three and four-legged slings as given in Table 1 and Table 2; and nominal size, pitch and width of these links as given in Table 3 are for guidance only.

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

7 TOLERANCES

7.1 Material Diameter

The size of the material in finished master and intermediate links shall nowhere differ from the nominal diameter up to and including 18 mm by more than + 2 percent and - 6 percent except at the weld and for nominal diameter above 18 mm by more than ± 5 percent except at the weld. The diameter at the weld shall be in no case less than the diameter of the steel from which the link is made or exceed it by more than the tolerances given in individual standards on chains for different grades (*see* **1.1**).

7.2 The dimensions of the master, joining and intermediate links and O-rings shall not vary from the dimensions given in Table 3 by more than ± 5 percent.

7.3 When constructing the sling a tolerance of – 0 +2 pitch links is permissible on the nominal reach ordered by the purchaser. However, after proof loading, the difference between the longest and shortest legs of a multi-leg sling when measured under a tension of 1/5 WLL, shall not exceed 6 mm for legs up to 2 meter in length. For slings in excess of 2 meter, the difference between the longest and shortest legs may be increased by 3 mm per metre.

7.4 It is important that the manufacturer ensures that all mating parts move freely into each other.

TABLE 1 MATERIAL DIMENSIONS OF MASTER, JOINING AND INTERMEDIATE LINKS

(*Clause* 6.1 and 6.4)

Sl No.	**Nominal Size**	**Working Load Limit on Single Leo**				**Master Link** d_1			**Joining Link**	**Intermediate Link for**
		L	*M*	*S*	*T*	Single Leg	Double Leg	Three and Four Leg	B1 d_2	Three and Four Legs Legs d_2
	mm				tonne	mm	mm	mm	mm	mm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
i)	6	0.5	0.63	1.0	1.25	14	16	18	8	12
ii)	7.1	0.63	0.80	1.25	1.6	14	16	18	8	12
iii)	8.0	0.80	1.0	1.6	2.0	16	18	22	10	14
iv)	9.0	1.0	1.25	2.0	2.5	16	20	25	10	16
v)	10.0	1.25	1.6	2.5	3.2	18	22	28	12	16
vi)	11	1.6	2.0	3.2	4.0	22	25	32	14	20
vii)	12	2.0	2.5	4.0	5.0	25	28	32	14	20

viii)	14	2.5	3.2	5.0	6.3	25	32	36	16	22
ix)	16	3.2	4.0	6.3	8.0	28	32	40	18	25
x)	18	4.0	5.0	8.0	10.0	32	36	45	20	28
xi)	20	5.0	6.3	10.0	12.5	36	40	50	22	32
xii)	22	6.3	8.0	12.5	16.0	40	45	56	25	32
xiii)	25	8.0	10.0	16.0	20.0	45	50	63	28	36
xiv)	28	10.0	12.5	20.0	25.0	50	56	71	32	40
xv)	32	12.5	16.0	25.0	32.0	56	63	80	36	45
xvi)	36	16.0	20.0	32.0	40.0	56	71	90	40	50
xvii)	40	20.0	25.0	40.0	50.0	63	80	100	45	56
xviii)	45	25.0	32.0	50.0	63.0	71	90	—	50	—

NOTE — For chain sizes 6, 7.1, 8.0 and 9.0 single and double leg slings intermediate links will have to be used, the intermediate link diameter being 12 mm for 6 and 7.1 chain sixes and 14 mm for 8.0 and 9.0 chain sizes.

Table 2 Dimensions of O-Rings (Master Link) and Joining and Intermediate Links

(*Clauses* 6.2 *and* 6.4)

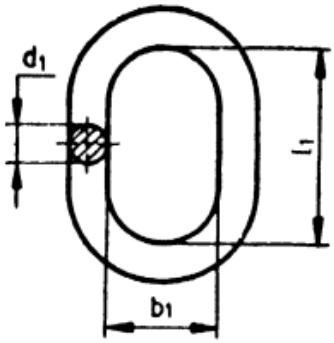
Sl No.	**Nominal Size**	**Working Load Limit on Single Leo**				**Master Link** d_1			**Joining Link**	**Intermediate Link For Multi-Leo Sling** d_2	
		L	*MM*	*S*	*TT*	Single Leg	Double Leg	Three and Four Leg	*B*1 d_2	Double Leg	Three and Four Leg
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	6	0.5	0.63	1.0	1.25	16	18	20	8	12	12
ii)	7.1	0.63	0.80	1.25	1.6	16	18	20	8	12	12
iii)	8.0	0.8	1.0	1.6	2.0	18	20	25	10	14	16
iv)	9.0	1.0	1.25	2.0	2.5	18	25	28	10	14	16
v)	10.0	1.25	1.6	2.5	3.2	20	25	32	12	14	20
vi)	11	1.6	2.0	3.2	4.0	25	28	36	14	16	20
vii)	12	2.0	2.5	4.0	5.0	28	32	36	14	18	22
viii)	14	2.5	3.2	5.0	6.3	28	36	40	16	22	22
ix)	16	3.2	4.0	6.3	8.0	32	36	45	18	22	25
x)	18	4.0	5.0	8.0	10.0	36	40	50	20	25	28
xi)	20	5.0	6.3	10.0	12.5	40	50	56	22	28	32
xii)	22	6.3	8.0	12.5	16.0	45	56	63	25	32	36
xiii)	25	8.0	10.0	16.0	20.0	50	56	71	28	32	40
xiv)	28	10.0	12.5	20.0	25.0	56	63	80	32	36	45
xv)	32	12.5	16.0	25.0	32.0	63	71	90	36	40	50
xvi)	36	16.0	20.0	32.0	40.0	63	80	100	40	45	56
xvii)	40	20.0	25.0	40.0	50.0	71	90	—	45	50	—
xviii)	45	25.0	32.0	50.0	63.0	80	100	—	50	56	—

NOTE — For chain sizes 6, 7.1, 8.0 and 9.0 single and double leg slings, intermediate links will have to be used, the intermediate link diameter being 12 mm for 6 and 7.1 chain sizes and 14 mm for 8.0 and 9.0 chain sizes.

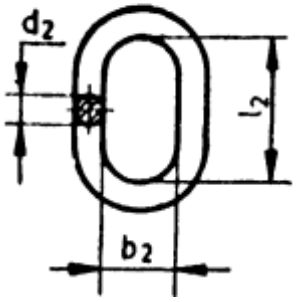
Table 3 Nominal Size, Pitch and Width of Links and Diameters of O-Rings

(*Clauses* 6.3 and 6.4)

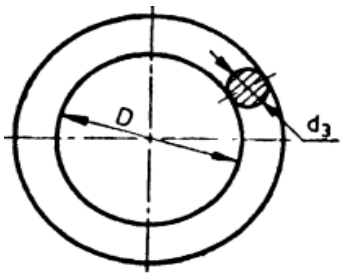
All dimensions are in millimetres.



MASTER LINK A



JOINING LINK B1



SUSPENSION O-RING

Sl No.	Master Link *A*			Joining or Intermediate Links *B*1, *B*2, *B*3 and *B*4			O-Ring	
	Nominal Size d_1	Pitch l_1	Width b_1	Nominal Size d_2	Pitch l_2	Width b_2	Nominal Size d_3	Inside Dia D
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	14	95	54	8	30	16	16	95
ii)	16	95	54	10	40	20	18	95
iii)	18	95	54	12	50	30	20	95
iv)	20	135	75	14	60	35	25	135
v)	22	135	75	16	70	40	28	135
vi)	25	135	75	18	75	40	32	160
vii)	28	160	90	20	80	45	36	160
viii)	32	160	90	22	90	50	40	160
ix)	36	200	110	25	100	55	45	200
x)	40	200	110	28	110	60	50	200
xi)	45	250	125	32	130	70	56	250
xii)	50	250	125	36	150	75	63	275
xiii)	56	275	140	40	160	85	71	325
xiv)	63	325	165	45	180	95	80	325
xv)	71	325	165	50	200	110	90	365
xvi)	80	360	200	56	225	120	100	385
xvii)	90	380	220	—	—	—	—	—
xviii)	100	410	240	—	—	—	—	—

Note: The sizes mentioned in the table are recommended sizes. As per user and crane Hook requirements a manufacturer may supply custom sizes as long as they are subjected to all Proof & Break Load Tests detailed in this specification.

8 MATERIALS

8.1 The steel shall be produced by the open hearth or electric process by an oxygen blown process. In its finished state as supplied to the Sling maker it shall meet the following requirements as determined by check analysis on the rod, wire or finished component. It shall be fully killed, shall possess reliable welding quality and shall contain alloying elements in sufficient quantities to ensure the mechanical properties of the component after appropriate heat treatment.

The Alloy Steel used shall contain Nickel and at least one of the following alloying elements:

a) Chromium; and
b) molybdenum.

8.2 The material used in the manufacture of different components shall meet the condition laid down in the respective Indian Standard on chains:

Sl No.	*Material*	*Cast Analysis (Percent)*	*Check Analysis (Percent)*
(1)	(2)	(3)	(4)
i)	Sulphur, Max	0.035 %	0.040 %
ii)	Phosphorus, Max	0.035 %	0.040 %

9 HEAT TREATMENT

9.1 The master, joining and intermediate links and O-rings shall be heat treated in a manner so as to have similar properties as the chains used in the sling, before being subjected to the proof load test.

9.2 Details of heat treatment given to the chain sling shall be endorsed on the makers' test certificate.

10 WORKMANSHIP

The master, joining and intermediate links shall only be welded by any one of the following methods:

a) Electric resistance butt welding;
b) Electric flash butt welding;
c) Atomic hydrogen welding;
d) Gas shielded arc welding (using argon and/or carbon dioxide as shielding gas); and
e) Electric arc welding may also be used for sizes above 50 mm only. Where used, the weld shall be radio graphically examined to ensure penetration and fusion throughout.

11 RATING

11.1 Single Branch Sling

Single branch slings shall have a working load limit equal to that of the Chain used in their construction.

11.2 Multi-Branch Slings

Multi-branch slings shall be rated at a uniform working load limit for any angle between branches of 0° to 90° (0° to 45° to the vertical) or additionally at a uniform working load limit for any angle between branches of 90° to 120° (45° to 60° to the vertical).

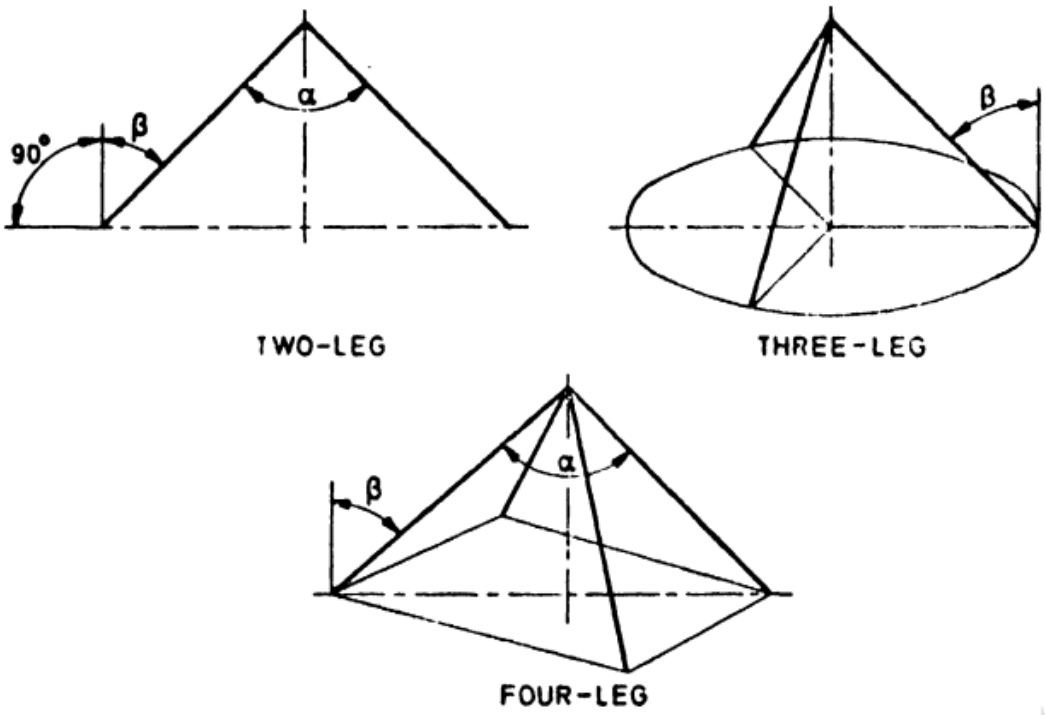


FIG. 5 INCLINATION OF SLING LEGS

11.2.1 *Uniform Load Method*

a) *Double branch slings*

For all angles between branches from 0° to 90° (0°to 45° to the vertical)

WLL = 1.4 × *WLL* of a single branch made from similar chain.

When additionally marked for angles between branches of 90° to 120° (45° to 60° to the vertical)

WLL = 1 × *WLL* of a single branch made from similar chain.

b) *Three and four branch slings*

For all angles between branches from 0° to 90° (0° to 45° to the vertical)

WLL = 2.1 × *WLL* of a single branch made from similar chain.

When additionally marked for angles between branches of 90° to 120° (45° to 60° to the vertical)

WLL = 1.5 × *WLL* of a single branch made from similar chain.

NOTES —

1. In the case of a three branch sling the angle between branches shall be taken as twice the angle to the vertical, that is, 2 ×.

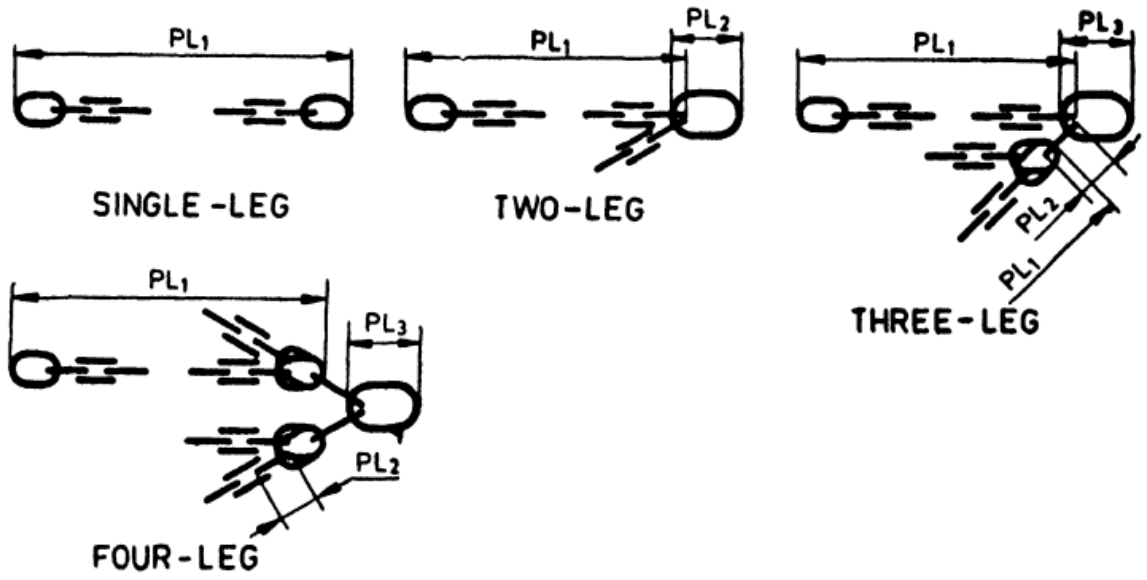
2. In the case of a four branch sling the angle between branches shall be that between diagonally opposite branches.

11.3 Nominal Rating

The nominal rating of any multi-branch sling whether rated by the uniform load method shall be the *WLL* for that sling when used at an angle of 90° between the branches (45° to the vertical).

12 PROOF LOAD TESTING

12.1 After final heat treatment slings with accessories shall be tested as an assembly; multi-leg chain slings shall be tested in sections. Individual sections of the chain slings shall be subjected to 2.0 times the load to which the section will be subjected when the assembly is subjected to its working load limit in accordance with the following plan:



FACTORS FOR			
Working load limit	PL_1	PL_2	PL_3
	1	1.4	2.1
Proof load (2 × *WLL)*	2.0	2.8	4.2

NOTE — For working load limits over 25t, it is permissible to apply proof loads to the links *PL2* and *PL*3 reduced in accordance with ILO recommendations.

12.2 The testing machine shall conform to the requirements of IS 1828 (Part 1).

13 OTHER TESTS

The chains and hooks used in the manufacture of slings covered by this standard shall have been separately tested to show strict compliance to their respective standards. Manufacturer's

test certificate on an appropriate Performa shall be made available if so required by the purchaser. If any further destructive test on samples of chains and hooks or connecting links are required, it will be a matter of special agreement between the purchaser and the manufacturer, and shall be mentioned in enquiry and order.

14 MARKING

14.1 The identification number and working load limit of the sling shall be marked on the master link. In addition, the following information shall be marked on a metal tag or label (*see* Fig. 6) permanently attached to the master link or a link immediately adjacent to it:

a) *For Single Branch Slings*

i) Working load limit in kg or tonne;
ii) Individual identification numbers;
iii) Grade M or T;
iv) Manufacturer's name or symbol;
v) Year of Manufacture;
vi) Size of chain (optional);
vii) Reach of the sling; and
viii) Other information as agreed to between the user and the manufacturer.

b) For Multi-Branch Slings Rated Uniformly for Use with Angles 0 to 90° Between the Lags

i) Working load limit in kg or tonne;
ii) Individual identification number or symbols;
iii) Grade M or T;
iv) Manufacturer's name or symbol;
v) Year of manufacture;
vi) Size of chain (optional);
vii) Number of legs;
viii) Reach of the sling; and
ix) Other information as agreed to between the user and the manufacturer.

14.2 If a tag or label described in **14.1** becomes detached, the chain slings may be used only in accordance with the rating shown on a remaining tag or label. If no tag or label remains, the chain slings shall be taken out of service.

14.3 BIS Certification Marking.

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

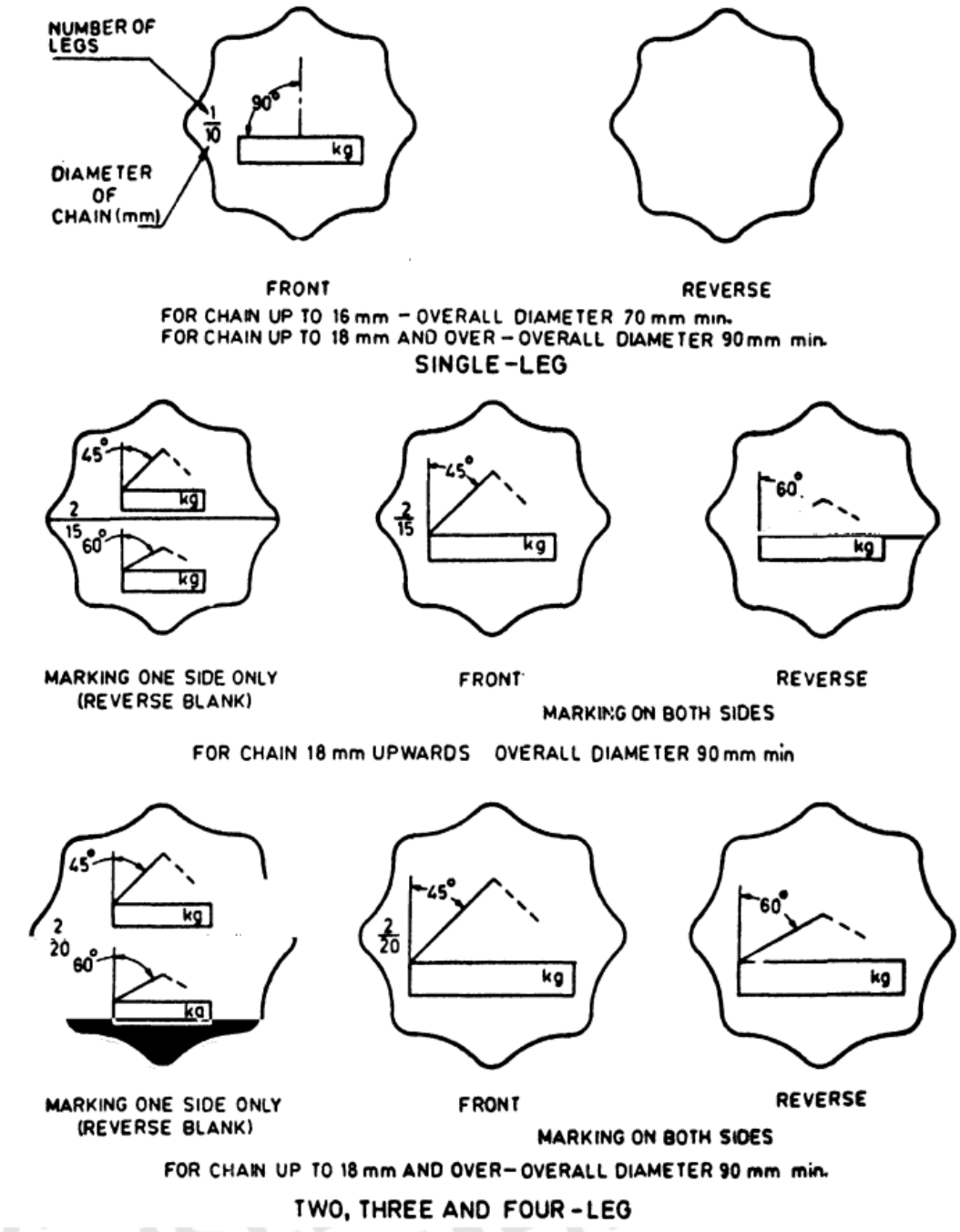


FIG. 6 EXAMPLES OF MARKING TAGS

15 CERTIFICATION

15.1 Every chain sling shall be provided with a certificate giving the following information:

a) Name and address of the manufacturer;
b) Date of issue of the certificate;
c) Distinguishing mark;
d) Number of chain leg(s);
e) Nominal diameter;

f) Grade;
g) Working load limit for single leg chain sling only (kg or t);
h) Working load limit for multi-leg sling at inclination angle (kg or t);
j) Proof Load applied;
k) Heat Treatment details; and
m) Nominal reach15.1 Every sling shall be provided with a dated test certificate in the form shown in Annex A with every supply of chain sling.

15.1.1 For the purpose of this standard, the test certificate in Form V of the *Indian Dock Labourers Regulation*, 1948, is acceptable provided that it is endorsed in col 2 by the maker or supplier, that the slings or sling components comply, in all respects, with this Indian Standard, that it states the material of which the components (other than common links) are made, the heat treatment to which the common links and components have been subjected.

ANNEX A

(Clause 15.1)

PROFORMA FOR THE CERTIFICATE OF TEST AND EXAMINATION

Distinguishing Mark	Description* Number Tested		Proof Load Applied, kN	Sals Working Load, T

The materials of which the components of the sling (other than the common links) are made, comply with the following specification (s);

……

……

Particulars of heat treatment to which the common links and sling components have been subjected stating temperatures and method of cooling, are as follows:

……

We hereby certify that the slings and sling components described above comply in all respects with IS 2760 and that they were subjected to the appropriate proof load at …… and subsequently examined by a competent person.

NOTE — For normal conditions of use the maximum permissible load (safe working load) of any component shall not exceed one half its proof load.

Signature……

Dated……..

* State type, size and length of sling, or type and size of components.

ANNEX B

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS/ISO No.	*Title*
IS 1828 (Part 1) : 2022	Metallic Materials - Calibration and Verification of Static Uniaxial Testing Machines - Part 1: Tension/Compression Testing Machines - Calibration and Verification of The Force-Measuring System (*fifth revision*)
IS 2429: Part 1 : 1987	Specification for round steel short link chains (Electric Butt Welded), grade L(3): Part 1 Non - Calibrated load chain for lifting purposes (*third revision*)
IS 3109 Part 1 : 1982	Specification for short link chain, grade M (4): Part 1 non - Calibrated load chain for lifting purposes (*second revision*)
IS 3822 : 2002	Eye hooks for use with chains - Specification (*second revision*)
IS 6215 : 1982	Short Link Chain, Grade t (8) Non-Calibrated for Lifting Purposes (Withdrawn)
IS 6217 : 1982	Specification for short link chain, grade S (6), non - Calibrated for lifting purposes (*first revision*)
IS 8324 : 1988	Code of practice for safe use and maintenance on non - Calibrated round steel link lifting chains and chain slings (*first revision*)
IS 15191 : 2002	Forged steel components for use with grade T (8) chain and chain slings – Specification
IS/ISO 3076 : 2012	Round steel short link chains for general lifting purposes - Medium tolerance sling chains for chain slings - Grade 8 (*first revision*)