Designation: A 906/A 906M – 02

An American National Standard

Standard Specification for Grade 80 and Grade 100 Alloy Steel Chain Slings for Overhead Lifting[1]

This standard is issued under the fixed designation A 906/A 906M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope *

1.1 This specification covers the requirements and method of rating and testing for alloy chain slings. Slings shall be assembled using components manufactured in accordance with Specification A 391/A 391M for Grade 80 chain, A 973/A 973M for Grade 100 chain, and A 952/A 952M for other components. This specification covers welded and mechanically assembled slings.

1.2 This specification does not cover slings used at elevated temperatures (above 400°F [200°C]), in harmful or corrosive environmental conditions or for applications such as nonsymmetrical legs or loading.

1.3 This specification is a performance and assembly specification. Other standards, such as OSHA 1910.184, ASME B30.9, and ASME B30.10, apply to the use of the products in this specification.

1.4 The values stated in either inch-pound units or SI units shall be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore each system shall be used independently of the other, without combining values in any way.

2. Referenced Documents

2.1 *ASTM Standards:*

A 391/A 391M Specification for Alloy Steel Chain[2]

A 952/A 952M Specification for Forged Grade 80 and Grade 100 Steel Lifting Components and Welded Attachment Links[2]

A 973/A 973M Specification for Grade 100 Alloy Steel Chain[2]

2.2 *Other Standards:*

OSHA 1910.184 [3]

ASME B30.9 Slings[4]

ASME B30.10 Hooks[4]

3. Terminology

3.1 *Definitions:*

3.1.1 *chain sling*—an assembly consisting of alloy steel chain or chains joined to suitable upper and lower fittings, according to the provisions of this specification, for attaching loads to be lifted by a crane or lifting machine.

3.1.2 *coupling link*—a link fitted to the end of the chain to connect to another component of the sling. See Fig. 1.

3.1.3 *master coupling link (secondary or intermediate link)*—a link used on three and four leg slings to connect the legs to a master link. See Fig. 1.

3.1.4 *master link*—a link used as the upper end component of a chain sling and by means of which the sling is attached to a crane or other lifting machine. See Fig. 1.

3.1.5 *overhead lifting*—that process of lifting which would elevate a freely suspended load to such a position that dropping the load would present a possibility of bodily injury or property damage.

3.1.6 *proof test*—a term designating a quality control test applied to a sling or to components of a sling. It is the minimum force in pounds or newtons which the sling and components have withstood under a test in which a constantly increasing force has been applied in direct tension.

3.1.7 *length (reach)*—the distance from the bearing point of the upper end fitting to the bearing point of the lower end fitting. See Fig. 1.

3.1.8 *sling angle*—that angle measured between the horizontal plane and the leg (legs) of the sling. See Tables 1-3.

3.1.9 *working load limit (WLL)*—the maximum load which a sling is designed to support in direct tension without shock loading at a designated sling angle of lift.

4. Classification

4.1 There are two grades of chain slings covered under this specification. The size of a sling is denoted by the size of the chain used in its manufacture. The grade of a sling is denoted by the lowest grade component used in its manufacture.

[1] This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.27 on Steel Chain.

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[2] *Annual Book of ASTM Standards*, Vol 01.05.

[3] Available from Occupational Safety and Health Administration (OSHA), Office of the Federal Register National Archives and Records Administration, Washington, DC.

[4] Available from American Society of Mechanical Engineers (ASME), 3 Park Ave., New York, NY 10016–5990.

***A Summary of Changes section appears at the end of this standard.**

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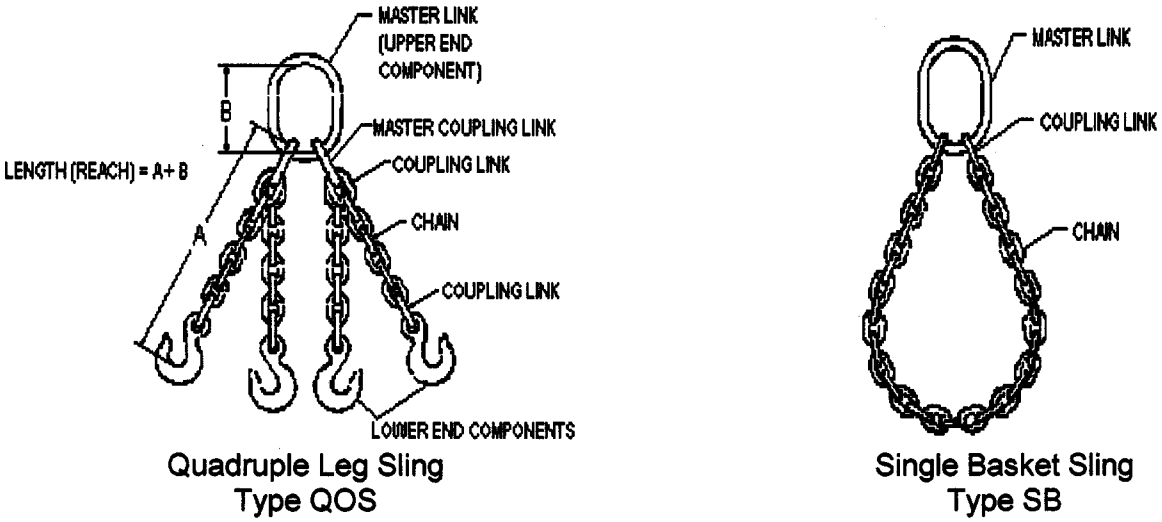
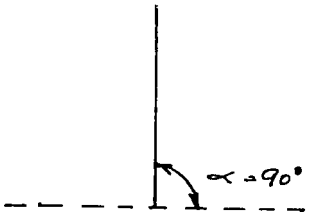


FIG. 1 Chain Sling Major Components

TABLE 1 Chain and Single Leg Grade 80 Sling WLL Data



Grade 80 Chain Size		Single Leg WLL (max)	
in.	mm	lb	kg
7/32	5.5	2100	950
9/32	7	3500	1600
5/16	8	4500	2000
3/8	10	7100	3200
1/2	13	12 000	5400
5/8	16	18 100	8200
3/4	20	28 300	12 800
7/8	22	34 200	15 500
1	26	47 700	21 600
1¼	32	72 300	32 800

4.1.1 Grade 80.
4.1.2 Grade 100.

5. Ordering Information

5.1 It shall be the responsibility of the purchaser to specify all requirements that are necessary for material ordered under this specification. Such requirements to be considered include, but are not limited to, the following:

5.1.1 Conformance to ASTM designation A 906 or A 906M and year of issue,

5.1.2 Size of sling in inches [millimetres],

5.1.3 Grade of sling,

5.1.4 Type of sling(s) as designated by the symbols depicted in Table 7, if possible,

5.1.5 Quantity ordered,

5.1.6 Reach of sling(s),

5.1.7 Sling angle, and

5.1.8 Certification of proof test(s), if required.

6. Manufacture

6.1 *Assembly*:

6.1.1 Only component parts compatible with alloy chain shall be used.

6.1.2 Slings assembled by welding shall be fabricated by the electric or gas welding process, or both.

6.1.3 Mechanically assembled slings shall be assembled in accordance with component manufacturer's recommendations.

6.1.4 Components shall be assembled so as to ensure free articulation of the sling.

7. Mechanical Requirements

7.1 *Proof Test*:

7.1.1 All components of a sling, either individually or as an assembly, shall be proof tested as required in 7.1.2-7.1.4.

7.1.2 The proof test load for single leg slings and components attached to single legs shall be twice the working load limit for the size and grade chain.

7.1.3 The proof test load for components attached to two legs of a sling shall be four times the working load limit for the size and grade chain.

7.1.4 The proof test load for components attached to three or four legs of a sling shall be six times the working load limit for the size and grade chain.

7.1.5 All sling components shall withstand the proof test load without loss of integrity or detrimental dimensional changes. Components that do not withstand the proof test shall be discarded.

8. Tolerances

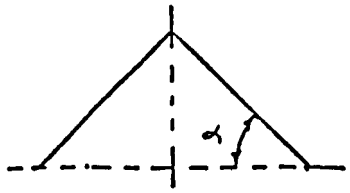
8.1 When constructing the sling, a tolerance of −0 + 2 links is permissible on the nominal reach ordered by a purchaser. In the completed sling, the difference between the longest and shortest legs of a multi-leg sling shall not exceed 5/16 in. (8 mm) for legs up to 6½ ft (2 m) in length. For slings in excess of 6½ ft (2 m), the difference between the longest and shortest legs may be increased by 5/32 in. (4 mm) for each additional 3¼ ft (1 m).

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TABLE 2 Double Leg and Single Basket Grade 80 Alloy Chain Sling WLL Data at 60°, 45°, and 30° Sling Angles

NOTE 1—[WLL (double leg) = 2 x WLL (single leg) x sin α]

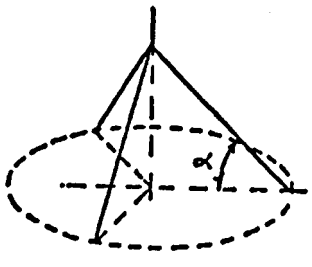


DOUBLE LEG

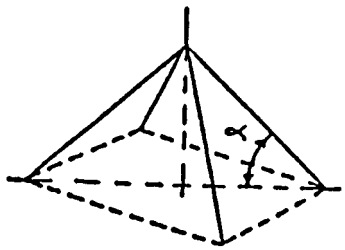
Grade 80 Chain Size		WLL at Sling Angle α of					
		60°		45°		30°	
in.	mm	lb	kg	lb	kg	lb	kg
7/32	5.5	3600	1650	3000	1350	2100	950
9/32	7	6100	2750	4900	2250	3500	1600
5/16	8	7800	3550	6400	2900	4500	2000
3/8	10	12 300	5500	10 000	4500	7100	3200
1/2	13	20 800	9450	17 000	7700	12 000	5400
5/8	16	31 300	14 200	25 600	11 600	18 100	8200
3/4	20	49 000	22 250	40 000	18 150	28 300	12 800
7/8	22	59 200	26 850	48 400	21 900	34 200	15 500
1	26	82 600	37 500	67 400	30 600	47 700	21 600
1¼	32	125 200	56 800	102 200	46 400	72 300	32 800

TABLE 3 Triple and Quadruple Leg and Double Basket Grade 80 Alloy Chain Sling WLL Data at 60°, 45°, and 30° Sling Angles

NOTE 1— [WLL (3 or 4 leg) = 3 x WLL (single leg) x sin α]



THREE LEG



FOUR LEG

Grade 80 Chain Size		WLL at Sling Angle α of					
		60°		45°		30°	
in.	mm	lb	kg	lb	kg	lb	kg
7/32	5.5	5500	2450	4400	2000	3200	1450
9/32	7	9100	4150	7400	3400	5200	2400
5/16	8	11 700	5350	9500	4350	6800	3100
3/8	10	18 400	8300	15 100	6800	10 600	4800
1/2	13	31 200	14 150	25 500	11 550	18 000	8200
5/8	16	47 000	21 300	38 400	17 400	27 100	12 300
3/4	20	73 500	33 400	60 000	27 250	42 400	19 300
7/8	22	88 900	40 250	72 500	32 900	51 300	23 250
1	26	123 900	56 250	101 200	45 950	71 500	32 500
1¼	32	187 800	85 200	153 400	69 600	108 400	49 200

9. Working Load Limit (WLL)

9.1 *Working Load Limit*—The working load limits given in Tables 1-6 are for symmetrically loaded slings manufactured with components of equal or higher working load limits than the chain.

9.2 Slings containing any Grade 80 component shall be rated at Grade 80 working load limits.

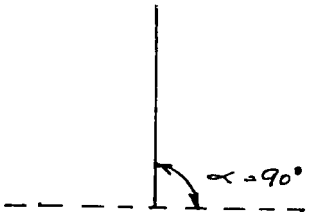
9.3 Working load limits shall conform to the values shown in Tables 1-3 for Grade 80 slings and Tables 4-6 for Grade 100 slings.

NOTE 1—The working load limit values in Tables 1-6 have been rounded to the nearest 100 lb [50 kg].

NOTE 2—Rigging and hitch conditions may lower the working load limit of the sling.

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TABLE 4 Chain and Single Leg Grade 100 Sling WLL Data



Grade 100 Chain Size		Single Leg WLL (max)	
in.	mm	lb	kg
7/32	5.5	2700	1200
9/32	7	4300	1950
5/16	8	5700	2600
3/8	10	8800	4000
1/2	13	15 000	6800
5/8	16	22 600	10 300
3/4	20	35 300	16 000
7/8	22	42 700	19 400

9.4 Working load limits for sling angles not listed in Tables 1-6 shall be calculated as follows:

9.4.1 The working load limit for double leg and single basket slings = 2 × single leg sling working load limit × sine of horizontal angle.

9.4.2 The working load limit for triple and quadruple leg and double basket slings = 3 × chain single leg sling working load limit × sine of horizontal angle.

9.4.3 *Nominal Rating*—The nominal rating of any multi-branch sling shall be the working load limit for that sling when applied at an angle of 60° from the horizontal.

10. Workmanship, Finish, and Appearance

10.1 The manufacturer may apply a surface treatment or coating of his own choice for identification or corrosion resistance unless the customer specifies otherwise.

11. Certification

11.1 A manufacturer's certification of proof test shall be furnished, if requested. The certificate shall include the information on the tag, the proof load, and date of issue.

11.2 For mechanically assembled slings, the appropriate certification of sling component parts shall be made available to the user if requested.

12. Product Marking

12.1 *Identification Tag*—There shall be an identification tag permanently affixed to each sling chain bearing the following information:

12.1.1 Size,

12.1.2 Length (reach),

12.1.3 Working load limit and angle upon which it is based,

12.1.4 Serial number,

12.1.5 Manufacturer's name or symbol, and chain grade, and

12.1.6 Sling type (number of legs) as described in Table 7.

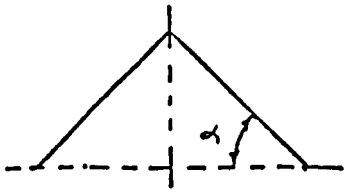
13. Keywords

13.1 chain; steel chain

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TABLE 5 Double Leg and Single Basket Grade 100 Alloy Chain Sling WLL Data at 60°, 45°, and 30° Sling Angles

NOTE—[WLL (double leg) = 2 × WLL (single leg) × sin α].

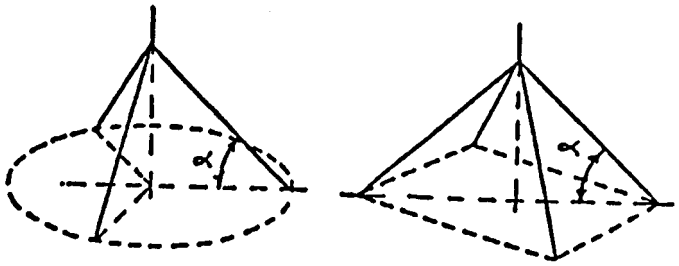


DOUBLE LEG

Grade 100 Chain Size		WLL at Sling Angle α of					
		60°		45°		30°	
in.	mm	lb	kg	lb	kg	lb	kg
7/32	5.5	4700	2150	3800	1750	2700	1200
9/32	7	7400	3400	6100	2750	4300	1950
5/16	8	9900	4500	8100	3700	5700	2600
3/8	10	15 200	6950	12 400	5650	8800	4000
1/2	13	26 000	11 800	21 200	9600	15 000	6800
5/8	16	39 100	17 750	32 000	14 500	22 600	10 300
3/4	20	61 100	27 700	49 900	22 650	35 300	16 000
7/8	22	74 000	33 500	60 400	27 350	42 700	19 400

TABLE 6 Triple and Quadruple Leg and Double Basket Grade 100 Alloy Chain Sling WLL Data at 60°, 45°, and 30° Sling Angles

NOTE—[WLL (3 or 4 leg) = 3 × WLL (single leg) × sin α].



THREE LEG FOUR LEG

Grade 100 Chain Size		WLL at Sling Angle α of					
		60°		45°		30°	
in.	mm	lb	kg	lb	kg	lb	kg
7/32	5.5	7000	3250	5700	2650	4000	1900
9/32	7	11 200	5050	9100	4150	6400	2950
5/16	8	14 800	6750	12 100	5500	8500	3900
3/8	10	22 900	10 400	18 700	8500	13 200	6000
1/2	13	39 000	17 650	31 800	14 450	22 500	10 200
5/8	16	58 700	26 650	47 900	21 750	33 900	15 400
3/4	20	91 700	41 550	74 900	33 950	53 000	24 000
7/8	22	110 900	50 250	90 600	41 050	64 000	29 050

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TABLE 7 Sling Designation

NOTE 1—This table is not complete in that manufacturers employ special designations for special, miscellaneous, and adjustable sling styles.

First Symbol (Basic Sling Type)		Second Symbol (Upper End Fitting)[A]	
Symbol	Description	Symbol	Description
S	Single Leg	O	Oblong Master Link
C	Single Choker with Master Links—no hooks	P	Pear Shaped Master Link
D	Double Leg	S	Sling Hook
T	Triple Leg	G	Grab Hook
Q	Quadruple Leg	F	Foundry Hook
SB	Single Basket		
DB	Double Basket		

Third Symbol (End (Terminal) Fitting(s))	
Symbol	Description
S	Sling Hook
G	Grab Hook
F	Foundry Hook

[A] The absence of a designation in the second symbol position indicates no top fitting present. Such would be the case in a single leg with grab hook at one end designated SG.

SUMMARY OF CHANGES

(1) Revised 1.1.
(2) Global throughout standard: changed “fitting” to “component,” “fittings” to “components” and “reach” to “length.”
(3) Revised definition 3.1.2 for “coupling link,” deleted definitions for “end fitting” and “qualified person,” and renamed defintion 3.1.5 “reach” to “length (reach).”
(4) Added Note 2 under 9.3.
(5) Revised standard to include single and double basket slings (Revised 1, Tables 2, 3, 5, 6, and 7).
(6) Removed prior Note on 30° sling angle in Tables 2, 3, 5, and 6.

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