



Designation: A906/A906M – 02

# Standard Specification for Grade 80 and Grade 100 Alloy Steel Chain Slings for Overhead Lifting<sup>1</sup>

This standard is issued under the fixed designation A906/A906M; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

## 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 A391/A391M for Grade 80 chain, A973/A973M for Grade 100 chain, and A952/A952M 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:<sup>2</sup>

A391/A391M Specification for Grade 80 Alloy Steel Chain

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A952/A952M Specification for Forged Grade 80 and Grade 100 Steel Lifting Components and Welded Attachment Links<sup>2</sup>

A973/A973M Specification for Grade 100 Alloy Steel Chain

### 2.2 Other Standards:

OSHA 1910.184<sup>3</sup>

ASME B30.9 Slings<sup>4</sup>

ASME B30.10 Hooks<sup>4</sup>

## 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.

<sup>1</sup> 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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<sup>2</sup> Annual Book of ASTM Standards, Vol 01.05.

<sup>3</sup> Available from Occupational Safety and Health Administration (OSHA), Office of the Federal Register National Archives and Records Administration, Washington, DC.

<sup>4</sup> 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.

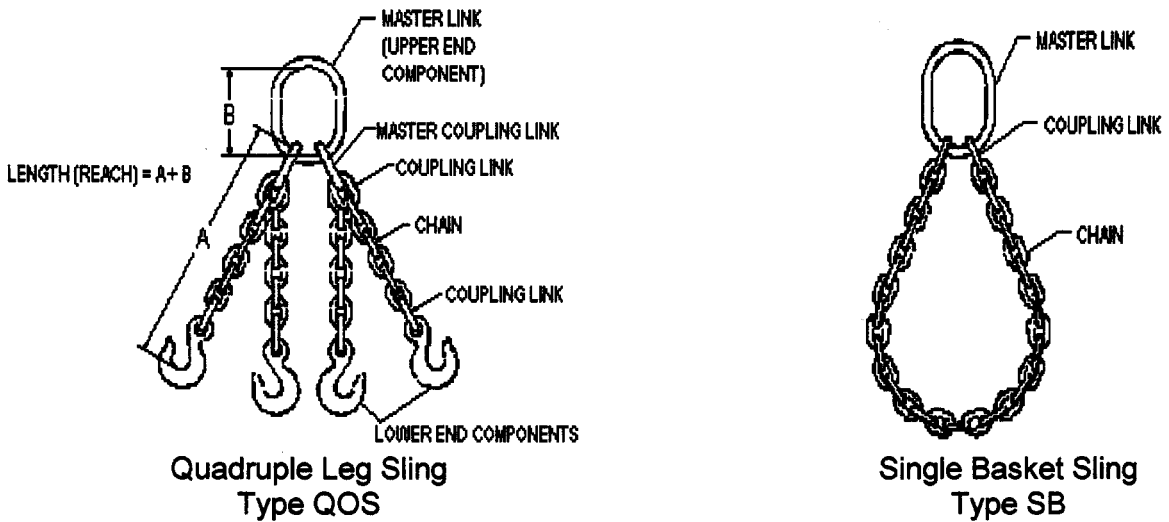
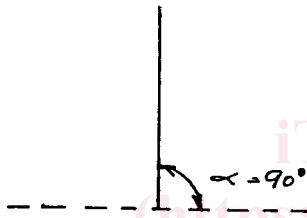


FIG. 1 Chain Sling Major Components

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
1 1/4	32	72 300	32 800

**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.

- 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 A906 or A906M 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:*

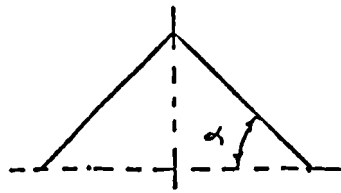
- 7.1.1 All components of a sling, either individually or as an assembly, shall be proof tested as required in 7.1.2-7.1.4.
- 7.1.2 The proof test load for single leg slings and components attached to single legs shall be twice the working load limit for the size and grade chain.
- 7.1.3 The proof test 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

**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]

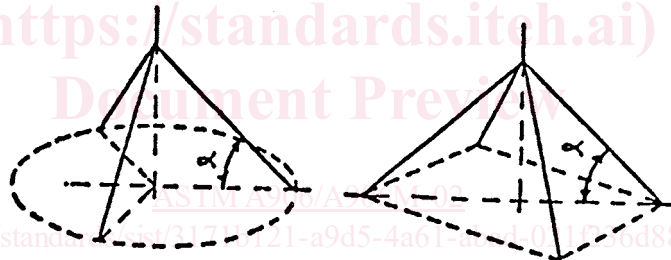


**DOUBLE LEG**

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
1 1/4	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
1 1/4	32	187 800	85 200	153 400	69 600	108 400	49 200

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 6 1/2 ft (2 m) in length. For slings in excess of 6 1/2 ft (2 m), the difference between the longest and shortest legs may be increased by 5/32 in. (4 mm) for each additional 3/4 ft (1 m).

**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.