

Crosby® S-4338 Pin Latch

WARNING & APPLICATION INSTRUCTIONS

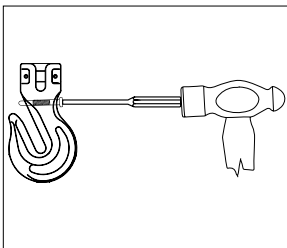


S-4338 Pin Latch

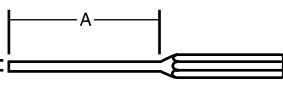
Important Safety Information Read and Follow

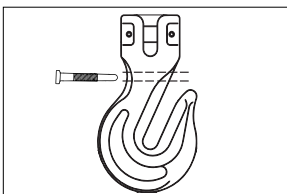
- Always inspect hook and pin latch before using.
- Never use a pin latch that is distorted or bent.
- Always make sure internal spring will force the pin latch forward closing throat opening of grab hook (See Figure 1).
- When a Pin Latch is provided, it is designed to retain loose chain under slack condition.
- Always make sure hook supports the load. The pin latch must never support the load (See Figure 1, 2, 3 and 4).
- Pin latch is not intended to be an anti-fouling device.
- Recommended for use with Crosby L-1338 or L-1358 Grab Hooks.

Important – Instructions for Assembling

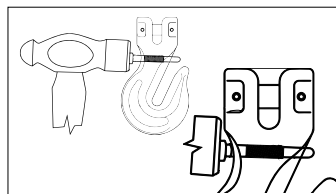


Step 1: Using a hammer and the correct roll-pin punch per chart on the right, drive the old latch pin assembly out of hook.

Dia. 			
Hook Size (in)	Punch Dia. (mm)	Punch Dia. (in)	A (in)
1/4	7	7/32	3
5/16	8	7/32	3
3/8	10	7/32	3
1/2	13	5/16	4
5/8	16	3/8	4



Step 2: Insert new S-4338 pin assembly into hook.



Step 3: Using hammer, tap lightly on latch pin head until guide bushing shoulder touches hook.

⚠ WARNING

- Loads may disengage from hook if proper procedures are not followed.
- A falling load may cause serious injury or death.
- Hook must always support the load. The load must never be supported by the pin latch.
- See OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B). A hook and this style latch must not be used for lifting personnel.
- Read and understand these instructions before using hook and pin latch.

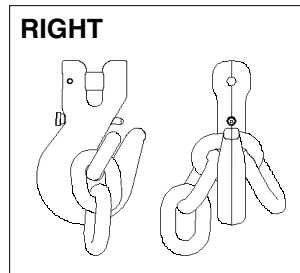


Figure 1

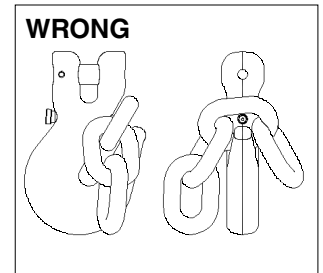


Figure 2

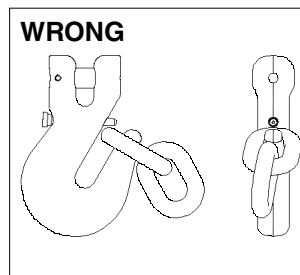


Figure 3

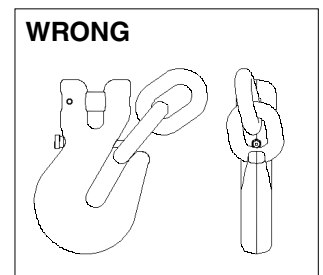


Figure 4

ALLOY STEEL CHAIN SLINGS AND CROSBY ELIMINATOR®

WARNING SELECTION, USE & APPLICATION INFORMATION



⚠ WARNING

- Loads may disengage from sling if proper rigging procedures and inspection are not followed.
- A falling load may cause serious injury or death.
- Inspect sling for damage before each use.
- Do not attempt to use sling above rated load and angle upon which it is based.
- Consult sling load chart for capacity reduction due to sling angle or type of hitch used.
- Read and understand these instructions before using sling.

IMPORTANT SAFETY INFORMATION

Read and Follow

These warnings and instructions are applicable to alloy chain slings produced from Crosby Grade 8 (80) and Grade 10 (100) chain and components.

- Only alloy chain, grade 80 (Crosby Spectrum 8®), or grade 100 (Crosby Spectrum 10®), should be used for overhead lifting applications.
- Working Load Limit (WLL) is the maximum load in pounds which should ever be applied to chain, when the chain is new or in "as new" condition, and when the load is uniformly applied in direct tension to a straight length of chain.
- Working Load Limit (WLL) is the maximum working load for a specific minimum sling angle, measured from the horizontal plane. The minimum sling angle and Working Load Limit is identified on the sling.
- The Working Load Limit or Design factor may be affected by wear, misuse, overloading, corrosion, deformation, intentional alterations, sharp corner cutting action diameter of curvature over which the sling is used (D/d) and other use conditions.
- Shock loading and extraordinary conditions must be taken into account when selecting alloy chain slings.
- See OSHA Regulation for Slings 1910.184, ASME B30.9-"SLINGS", ASME B30.10-"HOOKS", and ASME B30.26 "RIGGING HARDWARE" for additional information.

ASME B30.9 requires a designated person inspect each new sling and attachments prior to initial use, as well as the user or other designated person perform a visual inspection on a sling each day it is used. In addition, a periodic inspection shall be performed by a designated person at least annually, and shall maintain a record of the last inspection. For further inspection information, see Chain Inspection section of this document, or refer to ASME B30.9-1.9.

CAUSE FOR REMOVAL FROM SERVICE

A sling shall be removed from service if any of the following are visible on chain or attachments:

- Wear, nicks, cracks, breaks, gouges, stretch, bend, weld splatter, discoloration from excessive temperature, or throat openings of hooks.

- Chain links and attachments that do not hinge freely to adjacent links.
- Latches on hooks, if present, that do not hinge freely, seat properly or show evidence of permanent distortion.
- Excessive pitting or corrosion.
- Missing or illegible sling identification.
- Makeshift fasteners, hooks, or links formed from bolts, rods, etc.
- Mechanical coupling links in the body of the chain.
- Other damage that would cause a doubt as to the strength of the chain.

OPERATING PRACTICES

- The weight of the load must be known, calculated, estimated or measured. The loading on the slings will depend on where the center of gravity is located.
- Select sling having suitable characteristics for the type of load, hitch and environment.
- Slings shall not be loaded in excess of the rated capacity.
- Consideration shall be given to the sling load angle which affects rated capacity (See load chart Table 4 for Grade 100 (SPECTRUM 10®) and Table 5 for Grade 80 (SPECTRUM 8®)).
- Never rig a sling with an angle less than 30 degrees to horizontal.
- Slings in a basket hitch should have the load balanced to prevent slippage.
- The sling shall be hitched in a manner providing control of the load.
- Never side load, back load, or tip load a hook.
- Always make sure the hook supports the load. The latch must never support the load.
- Read and understand Crosby hook and hook latch Warnings and Application Instructions.
- For two legged slings with angles greater than 90 degrees, use an intermediate link such as a master link or bolt type shackle to collect the legs of the slings. The intermediate link can be placed over the hook to provide an in-line load on the hook. This approach must also be used when using slings with three or more legs.
- When using chain slings in choker applications, the Working Load Limit must be reduced by 20%. Crosby recommends a minimum angle of choke of 120 degrees (see Figure 1). Consult the manufacturer when planning to use an angle of choke less than 120 degrees. If Crosby A-1338 Cradle Grab hooks are used at the minimum angle of choke of 120 degrees, the full sling rated WLL can be utilized.
- When using chain slings in basket applications where the D/d (see figure 2) is less than 6, the rated load must be reduced by the values given in Table 1. This reduction does not eliminate the need to protect chain slings against damage caused by contact with edges, corners, or protrusions. Do not use a chain sling with a D/d that is less than two.



Figure 1

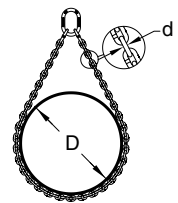


Figure 2

- In shortening applications, a 20% reduction of the Working Load Limit is required except when using the Crosby A-1338 Cradle Grab Hooks, S-1311 Chain Shortener Link, the A-1355 Chain Choker Hook in conjunction with the S-1325 Chain Coupler Link, or the Crosby ELIMINATOR® shortener link. They can be used without any reduction to the Working Load Limit.

- Slings should always be protected from being damaged by sharp corners.
- Slings should not be dragged on the floor or over abrasive surfaces.
- Chain sling links should not be twisted or kinked.
- Slings should not be pulled from under loads if the load is nesting on the sling.
- Slings that appear to be damaged should not be used unless inspected and accepted by designated person.
- All portions of the human body should be kept from between the sling and the load, and from between the sling and the crane hook or hoist hook.
- Personnel shall stand clear of the suspended load.
- Personnel shall not ride the sling.
- Shock loading should be avoided.
- Twisting or kinking the legs (branches) should be avoided.
- During lifting, with or without the load, personnel should be alert for possible snagging.
- When using a basket hitch, the legs of the sling should contain or support the load from the sides, above the center of gravity, so that the load remains under control.
- Sling shall be long enough so that the rated capacity of the sling is adequate when the angle of the legs (branches) is taken into consideration (See Table 4 for Grade 100 Chain and Table 5 for Grade 80 Chain).

General Usage

It must be recognized that certain factors in the usage of chain and attachments can be abusive and lessen the load that the chain or attachments can withstand. Some examples are twisting of the chain; disfigurement; deterioration by straining, usage, weathering and corrosion; rapid application of load or jerking; applying excessive loads; sharp corner cutting, D/d, action and non-symmetrical loading effects.

Environmental Effects

- Excessive high or low temperatures or exposure to chemically active environments such as acid or corrosive liquids or fumes can reduce the performance of the chain and components.
- Extreme temperature will reduce the performance of alloy steel chain slings.
- Normal operating temperature is -40°F to 400°F (-40°C to 200°C).
- Reference temperature exposure chart to determine reduction of WLL due to operating at, and after exposure to, elevated temperatures (see Table 2 for Grade 80 Chain and Table 3 for Grade 100 chain).
- Chemically active environments can have detrimental effects on the performance of chain. The effects can be both visible loss of material and undetectable material degradation causing significant loss of strength.

Special Surface Coating/Plating/Galvanizing

- Chain should not be subjected to galvanizing, or any plating process. If it is suspected the chain has been exposed to chemically active environment, remove from service.

D/d	Reduction of Basket Hitch Rated Load
2	40%
3	30%
4	20%
5	10%
6 and above	none

Temperature of Chain		Temporary Reduction of Rated Load at Elevated Temperature*	Permanent Reduction of Rated Load After Exposure to Temperature**
(F°)	(C°)		
Below 400	Below 200	None	None
400	200	10%	None
500	260	15%	None
600	316	20%	5%
700	371	30%	10%
800	427	40%	15%
900	482	50%	20%
1000	538	60%	25%

Over 1000 Over 538 OSHA 1910.184 requires all slings exposed to temperatures over 1000° F to be removed from service.

* The Crosby Group does not recommend the use of alloy chain slings at temperatures above 800° F.

** When chain slings are used at normal operating temperature after being heated to temperatures shown in the first column.

Temperature		Temporary Reduction of Rated Load at Elevated Temperature*	Permanent Reduction of Rated Load After Exposure to Temperature**
(F°)	(C°)		
Below 400	Below 200	None	None
400	200	15%	None
500	260	25%	5%
600	316	30%	15%
700	371	40%	20%
800	427	50%	25%
900	482	60%	30%
1000	538	70%	35%

Over 1000 Over 538 OSHA 1910.184 requires all slings exposed to temperatures over 1000 F to be removed from service.

* The Crosby Group does not recommend the use of alloy chain slings at temperatures above 800° F.

** When chain slings are used at normal operating temperature after being heated to temperatures shown in the first column.

CHAIN INSPECTION INSPECTION AND REMOVAL FROM SERVICE PER ASME B30.9

Refer to ASME B30.9-1.9 for further information

Frequent Inspection

- A visual inspection for damage shall be performed by the user or designated person each day the sling is used.
- Conditions such as those listed in ASME B30.9-1.9.4 Removal Criteria, or any other condition that may result in a hazard, shall cause the sling to be removed from service. Slings shall not be returned to service until approved by a qualified person.
- Written records are not required for frequent inspections.

Periodic Inspection

- A complete inspection for damage of sling shall be periodically performed by a designated person. Each link and component shall be examined individually, taking care to expose and examine all surfaces including the inner link surface. The sling shall be examined for conditions such as those listed in ASME B30.9-1.9.4 Removal Criteria, and a determination made as to whether they constitute a hazard.
- Periodic Inspection Frequency: Periodic inspection intervals shall not exceed one year. The frequency of periodic inspections should be based on:
 - Frequency of sling use.
 - Severity of service conditions.
 - Nature of lifts being made.
 - Experience gained on the service life of slings used in similar circumstances.

Guidelines for the interval are:

1. Normal Service – yearly
 2. Severe Service – monthly to quarterly
 3. Special Service – as recommended by a qualified person
- c. Written records of the most recent periodic inspection shall be maintained, and shall include the condition of the sling.

Removal Criteria

An alloy sling chain shall be removed from service if conditions such as the following are present:

- a. Missing or illegible sling identification.
- b. Cracks or breaks.
- c. Excessive wear, nicks, or gouges. Minimum thickness on chain link shall not be below the values listed in Table 6.
- d. Stretched chain links or components.
- e. Bent, twisted, or deformed chain links or components
- f. Evidence of heat damage.
- g. Excessive pitting or corrosion.
- h. Lack of ability of chain or components to hinge (articulate) freely.
- i. Weld spatter.
- j. For hooks, removal criteria as stated in ASME B30.10.
- k. Other conditions, including visible damage, that cause doubt as to the continued use of the sling.

Repair

- a. Slings shall be repaired only by the sling manufacturer or a qualified person.
- b. A repaired sling shall be marked to identify the repairing agency per ASME B30.9 Section 9-1.7.

- c. Chain and components used for sling repair shall comply with the provisions of ASME B30.9.
- d. Repair of hooks shall comply with ASME B30.10.
- e. Cracked, broken or bent chain links or components other than hooks shall not be repaired; they shall be replaced.
- f. Mechanical coupling links shall not be used within the body of an alloy chain sling to connect two pieces of chain.
- g. Modifications or alterations to the sling or components shall be considered as repairs and shall conform to all other provisions of ASME B30.9.
- h. All repairs shall comply with the proof test requirements of ASME B30.9 Section 9-1.6.

Table 6			
Minimum Allowable Chain Link Thickness at Any Point			
Nominal Chain Size		Minimum Thickness	
(in)	(mm)	(in)	(mm)
7/32	5.5	0.189	4.80
9/32	7	0.239	6.07
5/16	8	0.273	6.93
3/8	10	0.342	8.69
1/2	13	0.443	11.26
5/8	16	0.546	13.87
3/4	20	0.687	17.45
7/8	22	0.750	19.05
1	26	0.887	22.53
1-1/4	32	1.091	27.71
Refer to ASME B30.9			

Table 4
Grade 100 (Spectrum 10®) Alloy Chain Working Load Limit – 4 to 1 Design Factor

Spectrum 10® Alloy Chain Size		90°	60°	45°	30°	60°	45°	30°
(in)	(mm)	Single Leg	Double Leg / Single Basket		Triple and Quad Leg / Double Basket			
—	6	3200	5500	4500	3200	8300	6800	4800
1/4 (9/32)	7	4300	7400	6100	4300	11200	9100	6400
5/16	8	5700	9900	8100	5700	14800	12100	8500
3/8	10	8800	15200	12400	8800	22900	18700	13200
1/2	13	15000	26000	21200	15000	39000	31800	22500
5/8	16	22600	39100	32000	22600	58700	47900	33900
3/4	20	35300	61100	49900	35300	91700	74900	52950
7/8	22	42700	74000	60400	42700	110900	90600	64000
1	26	59700	103400	84400	59700	155100	12600	89550
1-1/4	32	90400	156600	127800	90400	234900	191700	135600

* For choker applications, the Working Load Limit must be reduced by 20%. The Crosby A-1338 cradle grab hook and S1311N chain shortener link do not require any reduction of the Working Load Limit. The design factor of 4 to 1 on Spectrum® 10 Alloy Chain agrees with the design factor used by the International Standards Organization (I.S.O.) and ANSI B30.9 and is the preferred set of Working Load Limit values to be used. Do not use sling angles of less than 30°.

Table 5
Grade 80 (Spectrum 8®) Alloy Chain Working Load Limit – 4 to 1 Design Factor

Spectrum 8® Alloy Chain Size		90°	60°	45°	30°	60°	45°	30°
(in)	(mm)	Single Leg	Double Leg / Single Basket		Triple and Quad Leg / Double Basket			
—	6	2500	3600	3000	2500	6500	5300	3750
1/4 (9/32)	7	3500	6100	4900	3500	9100	7400	5200
5/16	8	4500	7800	6400	4500	11700	9500	6800
3/8	10	7100	12300	10000	7100	18400	15100	10600
1/2	13	12000	20800	17000	12000	31200	25500	18000
5/8	16	18100	31300	25600	18100	47000	38400	27100
3/4	20	28300	49000	40000	28300	73500	60000	42400
7/8	22	34200	59200	48400	34200	88900	72500	51300
1	26	47700	82600	67400	47700	123900	101200	71500
1-1/4	32	72300	125200	102200	72300	187800	153400	108400

* For choker applications, the Working Load Limit must be reduced by 20%. The Crosby A-1338 cradle grab hook and S1311N chain shortener link do not require any reduction of the Working Load Limit. The design factor of 4 to 1 on Spectrum® 8 Alloy Chain agrees with the design factor used by the International Standards Organization (I.S.O.) and ASME B30.9 and is the preferred set of Working Load Limit values to be used. Do not use sling angles of less than 30°.

Alloy Fittings Application and Information

HOW TO ASSEMBLE AN S-1325 COUPLER LINK ONTO MASTER LINK



1. Slide Coupler Link over Engineered Flat of Master Link.



2. Rotate Coupler Link so that clevis fitting is to the outside of Master Link and attach to chain sling.

HOW TO ASSEMBLE A CROSBY CLEVIS TYPE FITTING



1. Place chain link into clevis of chain coupler. Insert pin fully into the clevis ears.



2. Place the coupler link on its side and using a hammer, drive the locking pin into the clevis ear until it is flush with the outside surface.

HOW TO ASSEMBLE A LOK-A-LOY® CONNECTING LINK



1. Place the locking sleeve between the assembled half link forgings.



2. Drive the pin through the assembled link ends and sleeve until the end of the pin is flush with the outside of the connecting link halves.

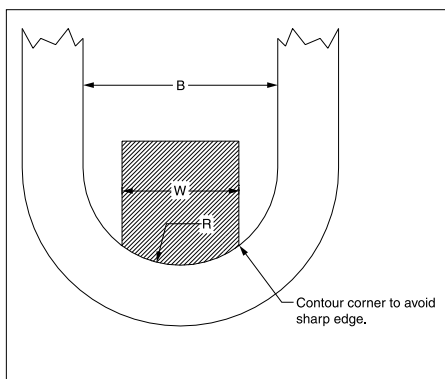


Figure 1

Crosby master links and master link assemblies are proof tested with special fixtures in accordance with ASTM A952 and EN-1677-4. The purpose of the special fixture is to prevent localized point loading during the proof test. Point loading at the proof test load may result in permanent deformation. ASTM A952 allows for a maximum proof test fixture width (W) of 60% of the inside width (B) of the master link. EN 1677-4 allows for a maximum proof test fixture width (W) of 70% of the inside width (B) of the master link. The radius of the fixture (R) is one-half of inside width of the master link. A sketch showing an example of the special fixture is shown in Figure 1. Note that the corner of the fixture should be contoured so that a sharp edge does not make contact with the master link during the loaded condition.

Over the years some master links and master link assemblies have changed dimensions and working load limits. Special consideration should be given to the actual inside width of the master link being tested and its correct allowable proof load value. If the correct allowable proof load value is in question, then Crosby Engineering should be consulted for the appropriate proof load value.

Grade 80 & 100 Alloy Chain

WORKING LOAD LIMIT

The "Working Load Limit" is the maximum load in pounds which should ever be applied to chain, when the chain is new or in as-new condition, and when the load is uniformly applied in direct tension to a straight length of chain.

PROOF TEST

The "Proof Test" is a term designating the tensile test applied to new chain for the sole purpose of detecting injurious defects in the material or manufacture. It is the load that the chain has withstood under a test in which the load has been applied in direct tension to a straight length of chain.

MINIMUM ULTIMATE LOAD

The "Minimum Ultimate Load" is the minimum load at which new chain will break when tested by applying direct tension to a straight length of chain at a uniform rate of speed in a testing machine.

ATTACHMENTS

Any attachments, such as hooks or links, should have a rated "Working Load Limit" at least equal to the chain with which it is used.

SYMMETRICAL LOADING

Rated Working Load Limit assumes symmetrical loading of all sling legs.

SPECIFICATIONS: ASME B30.9 2006

Paragraph 9-1.6.1 "Prior to initial use, all new and repaired chain and components of an alloy steel chain sling, either individually or as an assembly, shall be proof tested by the sling manufacturer or qualified person."

CAUTION

Only Crosby Alloy chain, Spectrum 8® or Spectrum 10®, should be used for overhead lifting applications.

General Usage – It must be recognized that certain factors in the usage of chain and attachments can be abusive and lessen the load that the chain or attachments can withstand. Some examples are twisting of the chain; disfigurement; deterioration by straining, usage, weathering and corrosion; rapid application of load or jerking; applying excessive loads; sharp corner cutting action and non-symmetrical loading effects.

When using chain slings in choker applications, the Working Load Limit must be reduced by 20%. Crosby recommends a minimum angle of choke of 120 degrees. Consult Crosby when planning to use an angle of choke of less than 120 degrees. If Crosby A-1338 cradle grab hooks are used at a minimum angle of choke of 120 degrees, the full sling rated WLL can be utilized.



In shortening applications, a 20% reduction of the Working Load Limit is required except when using the Crosby A-1338 Cradle Grab Hooks, S-1311 Chain Shortener Link, the A-1355 Chain Choker Hook in conjunction with the S-1325 Chain Coupler Link, or the Crosby ELIMINATOR® shortener link. They can be used without any reduction to the Working Load Limit.

Care should be taken to observe these derated applications or chain may fracture or permanently stretch at loads less than the advertised chain ultimate strength and proof load respectively.

Environmental Effects – Excessive high or low temperatures, or exposure to chemically active environments such as acids or corrosive liquids or fumes, can reduce the performance of the chain.

Temperature

- Extreme temperatures will reduce the performance of alloy steel chain slings.
- Normal operating temperature is -40° C to 204° C (-40° F to 400° F).

- See the temperature exposure chart (Table 1) to determine reduction of WLL due to operation at, and exposure to, elevated temperatures.

Chemically Active Environments can have detrimental effects on the performance of chain. The effects can be both visible loss of material and undetectable material degradation causing significant loss of strength.

- **Usage Exposure** – Exposure to chemically active environments such as acids or corrosive liquids or fumes can reduce the performance of the chain.
- **Special Surface Coating/Plating/Galvanizing** – Chain should not be subjected to galvanizing, or any plating process.
- If it is suspected that the chain has been exposed to chemically active environment, remove from service.

TABLE 1

Use of Crosby Alloy Chain at Elevated Temperatures

Temperature of Chain		Grade 8 (80) Chain		Grade 10 (100) Chain	
(F°)	(C°)	Temporary Reduction of Rated Load at Elevated Temperature*	Permanent Reduction of Rated Load After Exposure to Temperature**	Temporary Reduction of Rated Load at Elevated Temperature*	Permanent Reduction of Rated Load After Exposure to Temperature**
Below 400	Below 200	None	None	None	None
400	200	10%	None	15%	None
500	260	15%	None	25%	5%
600	316	20%	5%	30%	15%
700	371	30%	10%	40%	20%
800	427	40%	15%	50%	25%
900	482	50%	20%	60%	30%
1000	538	60%	25%	70%	35%
Over 1000	Over 538	OSHA 1910.184 and ASME B30.9 requires all slings exposed to temperatures over 1000° F to be removed from service.			

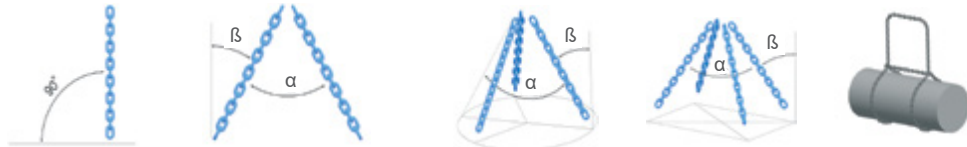
* Crosby does not recommend the use of Alloy Chain at temperatures above 800° F.

** When chain is used at room temperature after being heated to temperatures shown in the first column.

WLL tonnes Grade 10 GrabiQ

Working load limits - Europe

Based on EN 818-4:2008 WLL+25%



Sling type	1-leg	2-leg		3- and 4-leg		Choke Hitch
Condition of use	Straight	β 0-45° α 0-90°	β 45-60° α 90-120°	β 0-45° α 0-90°	β 45-60° α 90-120°	Endless sling in choke hitch
Load factor	1	1.4	1	2.1	1.5	1.6
Chain size						
6	1.4	2	1.4	3	2.12	2.24
7	1.9	2.65	1.9	4	2.8	3
8	2.5	3.55	2.5	5.3	3.75	4
10	4	5.6	4	8	6	6.3
13	6.7	9.5	6.7	14	10	10.6
16	10	14	10	21.2	15	16
18	12.5	18	12.5	26.5	19	20
19	14	20	14	30	21.2	22.4
20	16	22.4	16	33.5	23.6	25
22	19	26.5	19	40	28	30
23	21.2	28	21.2	42.5	31.5	33.5
26	26.2	37.5	26.5	56	40	42.5
28	31.5	42.5	31.5	63	45	50
32	40	56	40	85	60	63

Safety factor 4:1. Working load limits are based upon equally loaded and disposed sling legs.

WLL tonnes Grade 8 Classic

EN 818-4:2008



Sling type	1-leg	2-leg		3- and 4-leg		Choke Hitch
Condition of use	Straight	β 0-45° α 0-90°	β 45-60° α 90-120°	β 0-45° α 0-90°	β 45-60° α 90-120°	Endless sling in choke hitch
Load factor	1	1.4	1	2.1	1.5	1.6
Chain size						
6	1.12	1.6	1.12	2.36	1.7	1.8
7	1.5	2.12	1.5	3.15	2.24	2.5
8	2	2.8	2	4.25	3	3.15
10	3.15	4.25	3.15	6.7	4.75	5
13	5.3	7.5	5.3	11.2	8	8.5
16	8	11.2	8	17	11.8	12.5
18	10	14	10	21.2	15	16
19	11.2	16	11.2	23.6	17	18
20	12.5	17	12.5	26.5	19	20
22	15	21.2	15	31.5	22.4	23.6
23	16	23.6	16	35.5	25	26.5
26	21.2	30.0	21.2	45	31.5	33.5
28	25	33.5	25	50	37.5	40
32	31.5	45.0	31.5	67	47.5	50

Safety factor 4:1. Working load limits are based upon equally loaded and disposed sling legs.

Rules for correct WLL

Where choke hitch is employed, the WLL of the chain sling should be reduced by 20 % (unless the LK choker hook is used).

Asymmetrical loading conditions

For unequally loaded chain slings, the following is recommended:

- A two-legged system is treated as a single-legged system.
- A three- or four-legged system is treated as a two-legged system.

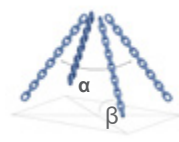
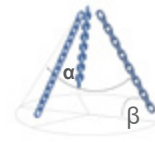
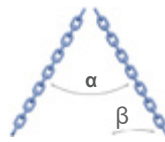
Working Load Limits - United States

WLL lb Grade 10 GrabiQ

Working Load Limits in pounds for chain slings grade 10, according to NACM

Based on A 906/A 906M-2

1-leg	2-leg	3- and 4-leg
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Chain size (mm)	Chain size (in)	WLL (lb)	β 60° α 60°	β 45° α 90°	β 30° α 120°	β 60° α 60°	β 45° α 90°	β 30° α 120°
6	-	3300	5500	4625	3300	8400	6800	4850
7	9/32"	4300	7400	6100	4300	11200	9100	6400
8	5/16"	5700	9900	8100	5700	14800	12100	8500
10	3/8"	8800	15200	12400	8800	22900	18700	13200
13	1/2"	15000	26000	21200	15000	39000	31800	22500
16	5/8"	22600	39100	32000	22600	58700	47900	33900
20	3/4"	35300	61100	49900	35300	91700	74900	52950
22	7/8"	42700	74000	60400	42700	110900	90600	64000
26	1"	59700	103100	84100	59500	155600	126600	89250
32	1-1/4"	88160	152700	124600	88160	229000	186950	132200

Note 1: WLL for 2-leg sling and single leg basket slings = 2 x 1-leg WLL x sin of horizontal angle

Note 2: WLL for 3- and 4-leg sling and 2-leg basket slings = 3 x 1-leg WLL x sin of horizontal angle

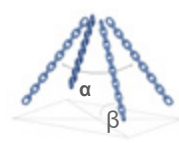
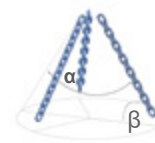
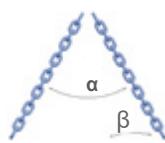
Note 3: WLL based upon equally loaded and disposed sling legs

WLL lb Grade 8 Classic

Working Load Limits in pounds for chain slings grade 8, according to NACM

Based on A 906/A 906M-2

1-leg	2-leg	3- and 4-leg
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Chain size (mm)	Chain size (in)	WLL (lb)	β 60° α 60°	β 45° α 90°	β 30° α 120°	β 60° α 60°	β 45° α 90°	β 30° α 120°
6	-	2450	4200	3300	2425	6400	5050	3525
7	9/32"	3500	6100	4900	3500	9100	7400	5200
8	5/16"	4500	7800	6400	4500	11700	9500	6800
10	3/8"	7100	12300	10000	7100	18400	15100	10600
13	1/2"	12000	20800	17000	12000	31200	25500	18000
16	5/8"	18100	31300	25600	18100	47000	38400	27100
20	3/4"	28300	49000	40000	28300	73500	60000	42400
22	7/8"	34200	59200	48400	34200	88900	72500	51300
26	1"	47700	82600	67400	47700	123900	101200	71500
32	1-1/4"	72300	125200	102200	72300	187800	153400	108400

Note 1: WLL for 2-leg sling and single leg basket slings = 2 x 1-leg WLL x sin of horizontal angle

Note 2: WLL for 3- and 4-leg sling and 2-leg basket slings = 3 x 1-leg WLL x sin of horizontal angle

Note 3: WLL based upon equally loaded and disposed sling legs

Working load limits - Australia

WLL tonnes Grade 10 GrabiQ

Based on AS 3775.2:2014

Sling type	1-leg			2-, 3- and 4-leg				Basket Slings		GrabiQ home pocket loop		
Condition of use	Straight	Adjustable with no deration	Reeved sling (Choke)	Straight 60°	Straight 90°	Straight 120°	Reeved (Choke) Max angle 60°	1-leg	2-leg	1-leg α max 30°	2-,3- and 4-leg 60° α max 30°	2-,3- and 4-leg 90° α max 30°
Load factor	1	1	0.75	1.73	1.41	1	1.3	1.3	2.25	1	1.73	1.41
Chain size												
6	1.4	1.4	1.1	2.4	2	1.4	1.8	1.8	3.4	1.5	2.6	2.1
7	1.9	1.9	1.4	3.3	2.7	1.9	2.5	2.5	4.3	2	3.3	2.7
8	2.5	2.5	1.9	4.3	3.5	2.5	3.3	3.3	5.9	2.6	4.5	3.7
10	4	4	3	6.9	5.6	4	5.2	5.2	9	4	6.9	5.6
13	6.7	6.7	5	11.6	9.4	6.7	8.8	8.8	15.3	6.8	11.8	9.6
16	10	10	7.5	17.3	14.1	10	13	13	23.2	10.3	17.8	14.5
20	16	16	12	27.7	22.6	16	20.8	20.8	36	-	-	-
22	19	19	14.3	32.9	26.8	19	24.7	24.7	45	-	-	-
26	26.5	26.5	19.9	45.8	37.4	26.5	34.5	34.5	60.7	-	-	-
32	40	40	30	69.2	56.4	40	52	52	90	-	-	-

Note 1: Advice regarding the appropriate deration should be sought by the manufacturer

Note 2: The determination of the angle of the multi-leg sling is the largest angle at the apex of the configuration

Note 3: Reeved (choke) slings and basket slings, in a two leg configuration have a maximum angle for us of 60°

Note 4: In the 2-leg basket sling, the master link to be used shall be of an appropriate WLL and with intermediate links. This ensures that the factor 2,25 can be accommodated and that there is no overcrowding with back hooking.

Note 5: For engineered lifts, see Clause 7.2.2 in AS 3775.2:2014

WLL tonnes Grade 8 Classic in Australia

Based on AS 3775.2:2014

Sling type	1-leg			2-, 3- and 4-leg				2-leg
Condition of use	Straight	Adjustable with no deration	Reeved sling (Choke)	Straight β 60°	Straight β 90°	Straight β 120°	Reeved (Choke) Max angle 60°	Basket
Load factor	1	1	0.75	1.73	1.41	1	1.3	2.25
Chain size								
6	1.1	1.1	0.8	1.9	1.6	1.1	1.5	2.5
7	1.5	1.5	1.1	2.6	2.1	1.5	2	3.4
8	2	2	1.5	3.5	2.8	2	2.6	4.5
10	3.2	3.2	2.4	5.5	4.5	3.2	4.1	7.2
13	5.3	5.3	4	9.2	7.5	5.3	6.9	11.9
16	8	8	6	13.8	11.3	8	10.4	18
19	11.2	11.2	8.4	19.4	15.8	11.2	14.6	25.2
20	12.5	12.5	9.4	21.6	17.6	12.5	16.3	28.1
22	15	15	11.3	26	21.2	15	19.5	33.8
26	21.2	21.2	15.9	36.7	29.9	21.2	27.6	47.7
32	31.5	31.5	23.6	54.5	44.4	31.5	41	70.9

Note 1: Advice regarding the appropriate deration should be sought by the manufacturer

Note 2: The determination of the angle of the multi-leg sling is the largest angle at the apex of the configuration

Note 3: Reeved (choke) slings and basket slings, in a two leg configuration have a maximum angle for us of 60°

Note 4: In the 2-leg basket sling, the master link to be used shall be of an appropriate WLL and with intermediate links. This ensures that the factor 2,25 can be accommodated and that there is no overcrowding with back hooking.

Note 5: For engineered lifts, see Clause 7.2.2 in AS 3775.2:2014

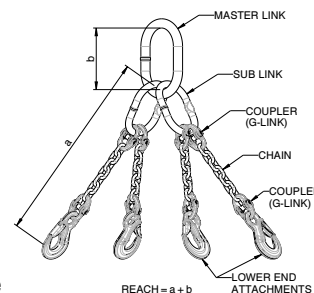
Tips for chain sling assembly

General

1. The reach of the sling is the length measured from the load bearing surface of the master link to the load bearing surface of the hook or lower terminal (as shown in illustrations).
2. A metal ID tag must always be attached to a chain sling, showing serial number, size, reach, Working Load Limit at angle of lift and manufacturer.
3. Each sling manufactured shall have a completed certificate of test provided to user.

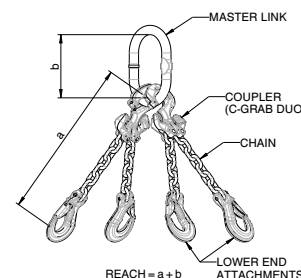
Classic chain slings

4. **Single Leg Sling**
If the required measurement falls in the middle of a link, the next link is cut.
5. **Double Leg Sling (clevis system)**
Cut chain to length and count the links. You must have an even number of links so hooks hang in the correct plane. Hooks should always point out, as shown in diagram.
6. **Triple or Quadruple Leg Sling (clevis system)**
Cut chain to length and count the links. You must have an odd number of links so hooks hang in the correct plane. Hooks should always point out, as shown in diagram. If the measurement falls in the middle of a link, the next link that produce an odd number is cut.



GrabiQ chain slings

7. It is a common practice, when possible, to keep all hooks in the same plane as the master link. This is easily accomplished on 1, 2, & 4 leg slings. It is not possible with 3-leg GrabiQ slings when single and dual fittings are mixed.
8. It is a common practice, when possible, to attach hooks so that latches point away from the master link.
9. **Mixing GrabiQ fittings:** Adding two additional chain links to the CL & CLD gives the same effective reach as CG & CGD. The MG & MGD have the same effective reach.
10. Normally, the master link will have a maximum of two connecting links, CG, CGD, CL, or CLD. The maximum number of connecting links that can ever be mounted on a single master link is three, when constructing a double leg basket.
11. A GrabiQ sling can never have more than four independent legs or two basket legs.
12. **Attaching CG, CGD, CL, & CLD connectors to MF and MFX Master Links:** Insert the connector onto the master link at the engineered flat. C-Connecting links are normally attached to the master link using the Dismountable Connecting Set type CS or the Permanent Connecting Set type CP. Each C-Connector includes one solid retainer pin, 1 larger rolled spring keeper pin and 1 smaller rolled spring keeper pin. When the dismountable connecting set is used the sling can be disassembled for repair. The permanent connecting set cannot be disassembled for repair.
 - a. **CS** – First install the solid retainer pin. Second drive the smaller rolled spring keeper pin through the hole provided at a right angle to the solid retainer pin. The fit should be very snug.
 - b. **CP** – First install the solid retainer pin. Second drive the larger rolled spring keeper pin into the same hole, directly behind solid retainer pin. The fit should be very snug.



Technical Information

Chain Manufacturing - Quality and Strength Requirements

Chains are divided into grades based on minimum nominal breaking stress.

Chain Grade	Surface treatment	Code	Minimum breaking stress N/in ²	Minimum breaking stress N/mm ²	Mean breaking stress "ksi"	Load factors			Typical use
						WLL	MPF	Breaking force	
8	Yellow U Black B	KL	31.50	800	116	1	2.5	4	General lifting (KL), Container lashing (LL). Extra heavy towing (ML), Lashing (KL, LL). Fishing (KL, ML, LL)
		ML	31.50	800	116	-	1	4	
		LL	31.50	800	116	-	1	4	
10	Blue A	KL	39.37	1000	145	1	2.5	4	General lifting

Testing and Quality Control- GrabiQ & Classic Chain (Grade 10 & 8)

In each step of the manufacturing of the chain, our systematic quality monitoring will ensure the highest safety and the longest life span in the product. Here are some especially important aspects of quality:

Material

The incoming material is supplied with test certificates only from qualified manufacturers and according to our stated material specifications.

Manufacturing

During forming and welding, the operators continuously control that the links meet the specified dimensions both before and after welding.

Single link samples are continuously mandrel tested on the weld. Shape, dimensions and deburring are then inspected visually.

Sample lengths are heat treated and then destruction load tested. Following these tests, the chain is heat treated.

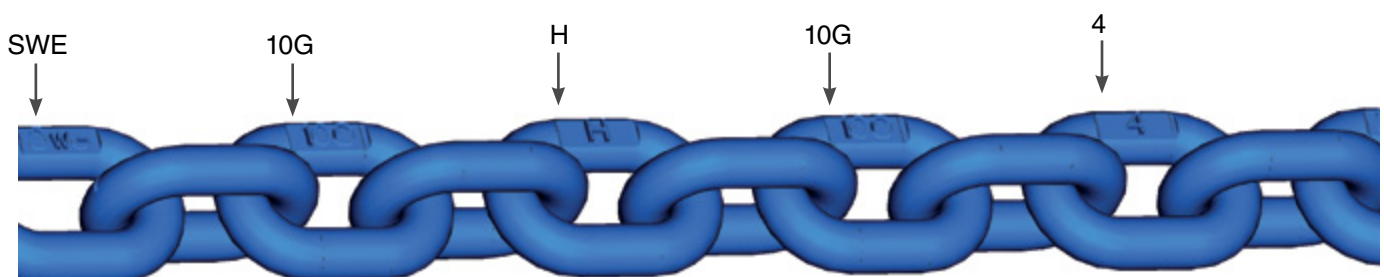
Hardening and tempering is carried out continuously in computer controlled induction furnaces with regular samplings.

Proof Force

The entire chain is test loaded. The manufacturing proof force for short link chain is 2.5 times the permitted working load limit. This gives the chain high safety in use. The chain is then visually inspected and cut into delivery lengths. A sample is taken from every length and tested to destruction. Dimensions and shape are also checked. All results are documented.

Marking and Traceability

The international standards for lifting chain require that the chain is marked with Grade and Manufacturers ID. On our chain we stamp "SWE - 10G - H - 10G - 4", where the "H" and the "4" is the combination for the traceability code. In case of the unlikely event of chain failure, we can trace the specific chain link back to the very batch and raw material as well as the year and place of manufacture. Each individual delivery length also has its unique batch number.



Use

- Never lift with a twisted chain.
- Use shortening hooks, knotting is not allowed.
- Use edge protectors to prevent sharp edges from damaging the chain.

See website or user instructions for assembly instructions.

Meets listed current specifications and standards at time of publication of this catalog.

Maintenance

Periodic thorough examination must be carried out at least every 12 months or more frequently according to local statutory regulations, type of use and past experience.

1. Overloaded chain slings must be taken out of service.
2. Chain and components including load pins which have been damaged, deformed, elongated, bent or showing signs of cracks or gouges shall be replaced. Carefully grind away small nicks and burrs.
3. Additional testing by magnetic particle inspection and/or proof loading at max. 2 x WLL may be carried out. The wear of the chain and component shall in no place exceed 10% of the original dimensions.
4. The chain link wear - max. 10% - is defined as the reduction of the mean diameter measured in two directions.

Severe Environment

Chain and components must not be used in alkaline (>pH10) or acidic conditions (<pH6). Comprehensive and regular examination must be carried out when used in severe or corrosive inducing environments. In uncertain situations consult your Gunnebo Industries dealer.

Extreme Temperature Conditions

The in service temperature effects the WLL as following :

Temperature (°F)	Reduction of WLL			Grade 8 chain & components
	Grade 10 chain (400)	Grade 10 chain (200)	Grade 10 components	
-40 to +392 °F	0 %	0 %	0 %	0 %
+392 to +572 °F	10 %	Not allowed	10 %	10 %
+572 to +752 °F	25 %	Not allowed	25 %	25 %

After short heat exposure, maximum one hour, the sling reverts to its full capacity. Upon return to normal temperature, the sling reverts to its full capacity within the above temperature range. Chain slings should not be used above or below these temperatures. **For chain grade 10(200) the maximum in service temperature is 200° C.**

Definitions

Proof force:

Each individual chain link is tested to the Manufacturing Proof Force (MPF) level before delivery. The MPF level is 2.5 times the WLL, equal to 62.5% of the Minimum Breaking Force.

Breaking force (BF):

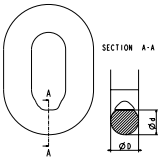
The highest static force a chain is exposed to during test loading before breaking.

Working load limit (WLL):

The maximum permitted load on a lifting chain under normal (vertical) lifting conditions.

Total ultimate elongation:

The elongation of the test item, relative to the original length, at the moment of breaking.



$$\frac{D + d}{2} > 0.9d_n$$