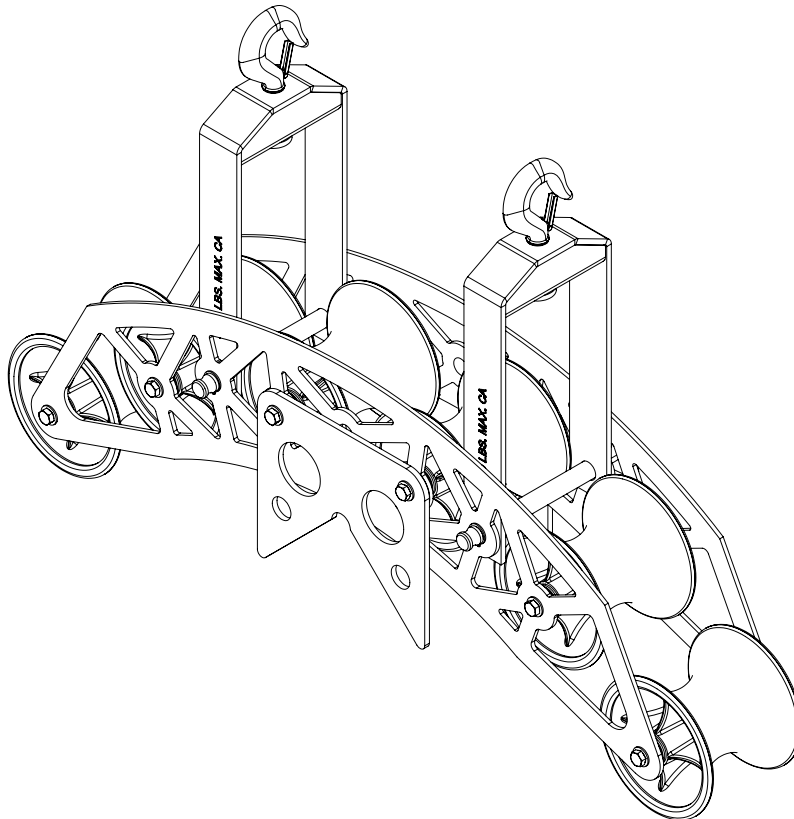


INSTRUCTION MANUAL



Conveyor Sheaves 4024, 4036, and 4048



Read and understand all of the instructions and safety information in this manual before operating or servicing this tool.

Register this product at www.v.com

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Description

Greenlee Conveyor Sheaves are used to change the direction of a rope or cable while installing cable in conduit or raceway.

They may also be used to change the direction of the cable puller tailing rope to allow the operator to stand away from the line of the high tension pulling rope approaching the puller.

Safety

Safety is essential in the use and maintenance of Greenlee tools and equipment. This instruction manual and any markings on the tool provide information for avoiding hazards and unsafe practices related to the use of this tool. Observe all of the safety information provided.

Purpose of this Manual

This manual is intended to familiarize all personnel with the safe operation and maintenance procedures for the following Greenlee tools:

4024, 4036, and 4048 Conveyor Sheaves

Keep this manual available to all personnel.

Replacement manuals are available upon request at no charge at www.greenlee.com.

All specifications are nominal and may change as design improvements occur. Greenlee Tools, Inc. shall not be liable for damages resulting from misapplication or misuse of its products. Tugger is a registered trademark of Greenlee Tools, Inc.

KEEP THIS MANUAL

IMPORTANT SAFETY INFORMATION



SAFETY ALERT SYMBOL

This symbol is used to call your attention to hazards or unsafe practices which could result in an injury or property damage. The signal word, defined below, indicates the severity of the hazard. The message after the signal word provides information for preventing or avoiding the hazard.

⚠ DANGER

Immediate hazards which, if not avoided, **WILL** result in severe injury or death.

⚠ WARNING

Hazards which, if not avoided, **COULD** result in severe injury or death.

⚠ CAUTION

Hazards or unsafe practices which, if not avoided, **MAY** result in injury or property damage.



⚠ WARNING

Inspect all anchorings, structural supports and hook sheaves. Verify that they will safely withstand up to **twice** the cable puller's maximum pulling capacity.

Any component that cannot withstand this much force could break and strike nearby personnel, causing severe injury or death.

⚠ WARNING

The maximum force the cable puller will exert is twice its capacity. Assume that twice the cable puller's capacity will be exerted on every hook sheave and structural support.

Failure to observe this warning could result in severe injury or death.

⚠ CAUTION

Consult the cable manufacturer's specifications for minimum bending radius and other information. Using sheaves that are too small can damage the cable.

Failure to observe this precaution may result in property damage.



⚠ WARNING

Read and understand all of the instructions and safety information in this manual as well as the manual supplied with the cable puller before operating or servicing this tool.

Failure to observe this warning could result in severe injury or death.



⚠ WARNING

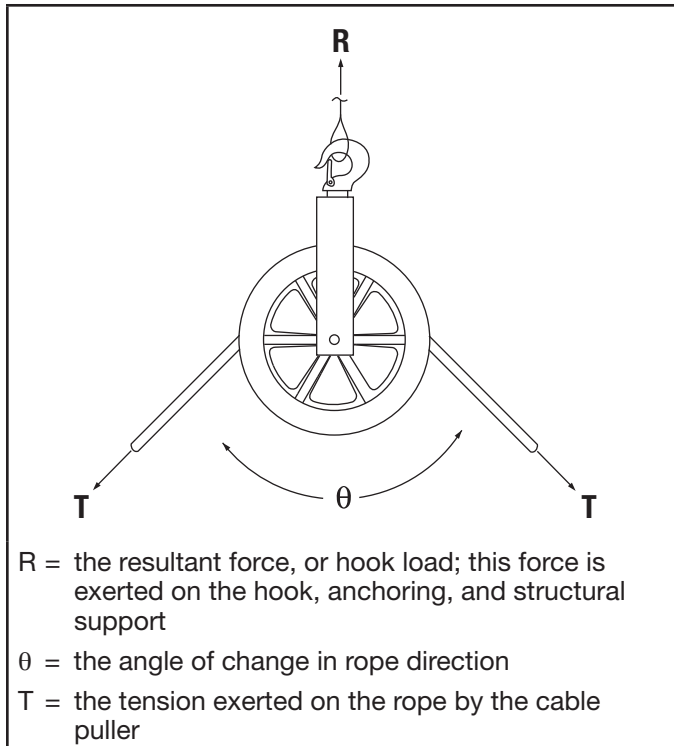
Wear eye protection when operating this tool.

Failure to wear eye protection could result in serious eye injury from flying debris.

Note: Keep all decals clean and legible, and replace when necessary.

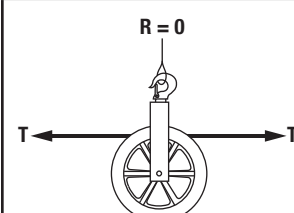
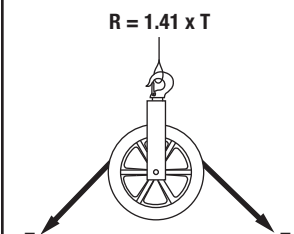
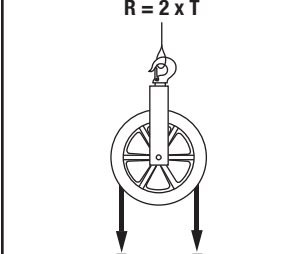
Hook Load

Two variables interact with the sheave to produce a resultant (total) force, or hook load. This load, represented by **R** in the formulas and illustrations, is exerted on the hook, anchoring, and structural support.



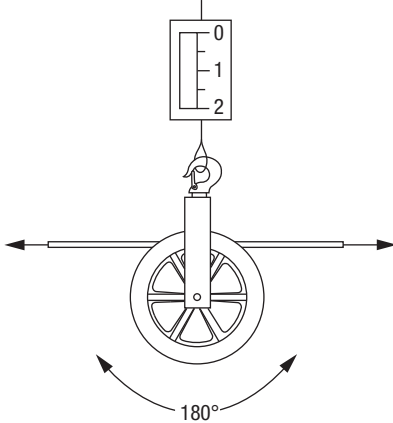
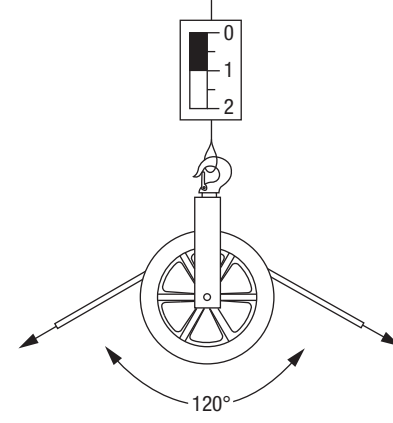
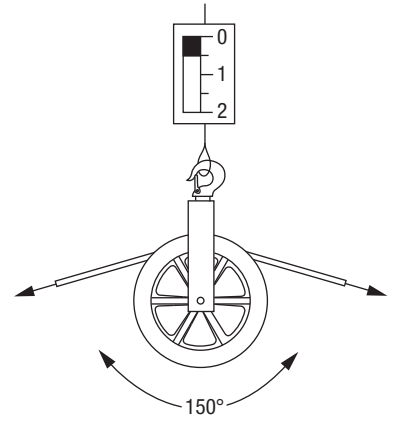
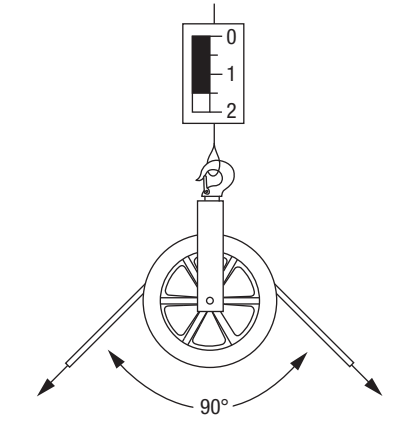
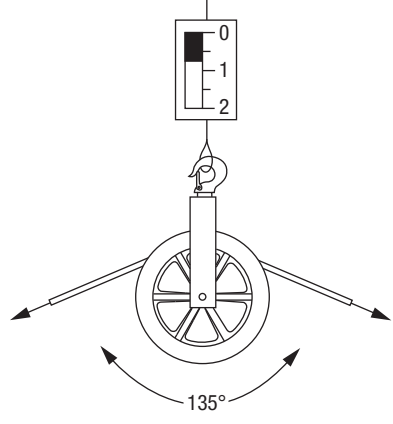
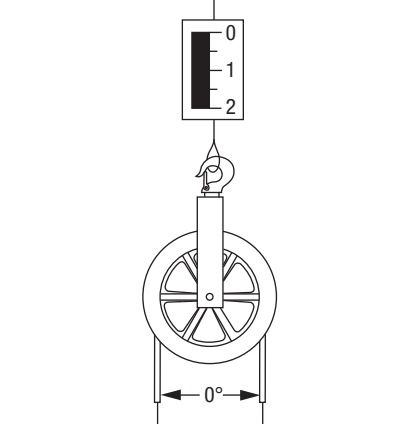
Sheave Forces

Reference Table

Illustration	θ	R
 <p>R = 0</p>	180°	0
	150°	$0.52 \times T$
	135°	$0.77 \times T$
	120°	$1 \times T$
 <p>R = 1.41 x T</p>	90°	$1.41 \times T$
	60°	$1.73 \times T$
	45°	$1.85 \times T$
	30°	$1.93 \times T$
 <p>R = 2 x T</p>	0°	$2 \times T$

Hook Load (cont'd)

Some Hook Loads Illustrated

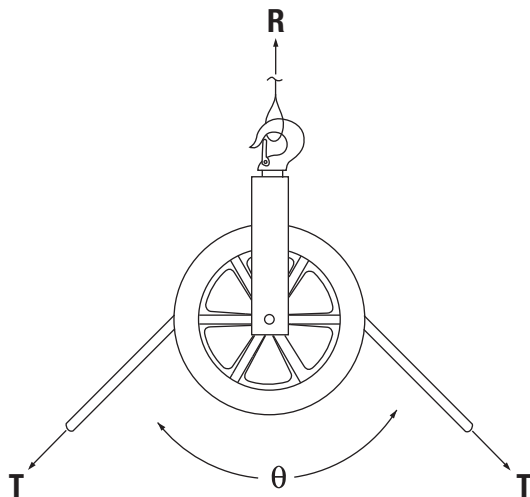
<p style="text-align: center;">Hook Load</p>  <p style="text-align: center;">180°</p> <p>A straight rope exerts no load on the hook and structure.</p>	<p style="text-align: center;">Hook Load = Total Pulling Force</p>  <p style="text-align: center;">120°</p> <p>A rope that makes a 120° angle exerts the total pulling force on the hook and structure.</p>
<p style="text-align: center;">Hook Load = 1/2 of the Pulling Force</p>  <p style="text-align: center;">150°</p> <p>A rope that makes a 150° angle exerts 1/2 of the pulling force on the hook and structure.</p>	<p style="text-align: center;">Hook Load = 1-1/2 Times the Pulling Force</p>  <p style="text-align: center;">90°</p> <p>A rope that makes a 90° angle exerts 1-1/2 times the pulling force on the hook and structure.</p>
<p style="text-align: center;">Hook Load = 3/4 of the Pulling Force</p>  <p style="text-align: center;">135°</p> <p>A rope that makes a 135° angle exerts 3/4 of the pulling force on the hook and structure.</p>	<p style="text-align: center;">Hook Load = 2 Times the Pulling Force</p>  <p style="text-align: center;">0°</p> <p>A rope that makes a 0° angle exerts 2 times the pulling force on the hook and structure.</p>

Hook Load (cont'd)

Calculating the Hook Load

One Attachment Point

To calculate the hook load exerted at one attachment point, use the Reference Table and Formula 1.



Sheave with One Attachment Point

Formula 1:

$$R = 2 \times T \times \sin [(180 - \theta) / 2]$$

R = the resultant force, or hook load; this force is exerted on the hook, anchoring and structural support

θ = the angle of change in rope direction

T = the tension exerted on the rope by the cable puller

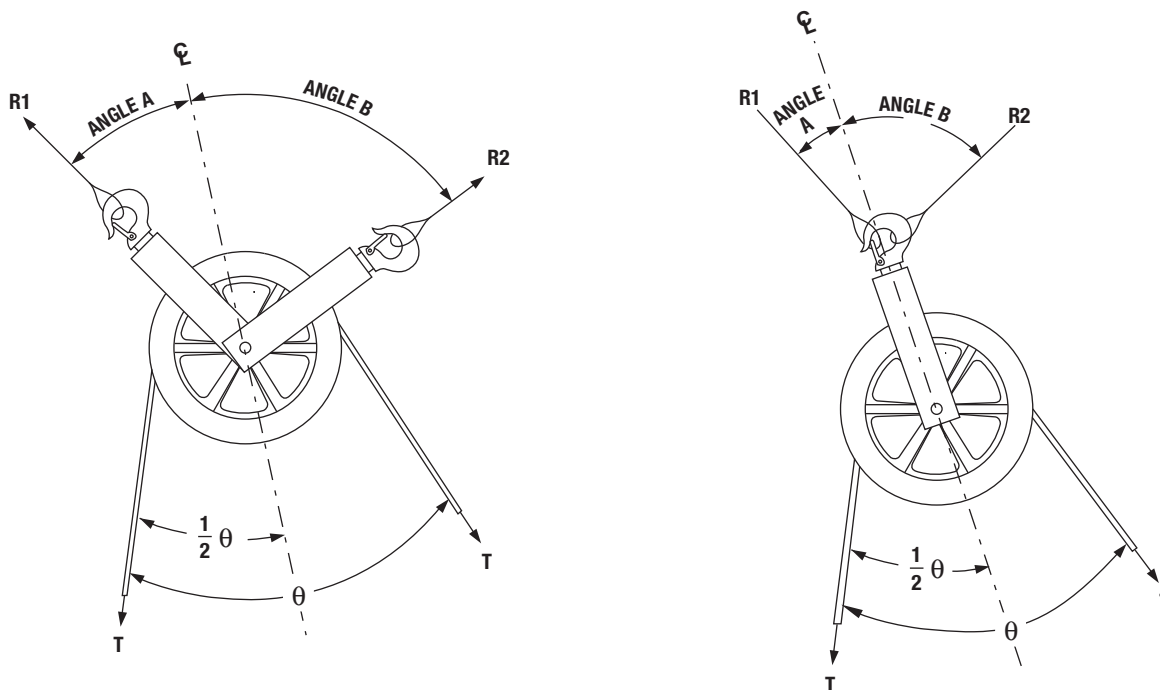
Note: The total load on the support structure = R + the weight of the sheave.

Hook Load (cont'd)

Calculating the Hook Load (cont'd)

Two Attachment Points

To calculate the hook loads exerted at two attachment points, use the Reference Table and Formulas 1, 2, and 3.



Sheave with Two Attachment Points

Formula 2:

$$R_1 = \frac{R}{\cos A + \sin A / \tan B}$$

Formula 3:

$$R_2 = \frac{R}{\cos B + \sin B / \tan A}$$

R_1 = resultant force on left hook, anchoring and support structure

R_2 = resultant force on right hook, anchoring and support structure

A = angle between the left mounting and the centerline of the two legs of the rope

B = angle between the right mounting and the centerline of the two legs of the rope

R = the resultant force, or hook load; this force is exerted on the hook, anchoring and structural support

θ = the angle of change in rope direction

T = the tension exerted on the rope by the cable puller

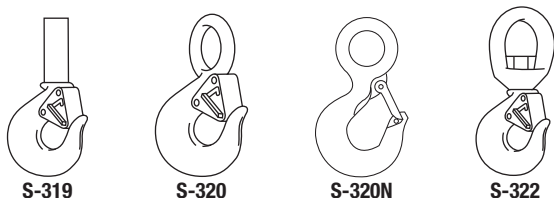
Notes: The total load on the left support structure = R_1 + the weight of the sheave.

The total load on the right support structure = R_2 + the weight of the sheave.

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Crosby Hoist Hook

Warnings and Application Instructions



Important Safety Information – Read and Follow

- A visual periodic inspection for cracks, nicks, wear, gouges and deformation as part of a comprehensive documented inspection program, should be conducted by trained personnel in compliance with the schedule in ANSI B30.10.
- For hooks used in frequent load cycles or pulsating loads, the hook and threads should be periodically inspected by Magnetic Particle or Dye Penetrant. (Note: Some disassembly may be required.)
- Never use a hook whose throat opening has been increased, or whose tip has been bent more than 10 degrees out of plane from the hook body, or is in any other way distorted or bent. **Note: A latch will not work properly on a hook with a bent or worn tip.**
- Never use a hook that is worn beyond the limits shown in Figure 1.
- Remove from service any hook with a crack, nick, or gouge. Hooks with a crack, nick, or gouge shall be repaired by grinding lengthwise, following the contour of the hook, provided that the reduced dimension is within the limits shown in Figure 1.
- Never repair, alter, rework, or reshape a hook by welding, heating, burning, or bending.
- Never side load, back load, or tip load a hook. (See Figure 2).
- Eye hooks, shank hooks and swivel hooks are designed to be used with wire rope or chain. Efficiency of assembly may be reduced when used with synthetic material.
- Do not swivel the S-322 swivel hook while it is supporting a load.
- The use of a latch may be mandatory by regulations or safety codes; e.g., OSHA, MSHA, ANSI/ASME B30, Insurance, etc. (Note: When using latches, see instructions in “Understanding: The Crosby Group Warnings” for further information.)
- Always make sure the hook supports the load. (See Figure 3). The latch must never support the load (see Figure 4).
- When placing two (2) sling legs in hook, make sure the angle from the vertical to the outermost leg is not greater than 45 degrees, and the included angle between the legs does not exceed 90 degrees* (see Figure 5).
- See ANSI/ASME B30.10 “Hooks” for additional information.
- For angles greater than 90 degrees, or more than two (2) legs, a master link or bolt type anchor shackle should be used to attach the legs of the sling to the hook.

⚠ WARNING

- Loads may disengage from hook if proper procedures are not followed.
- A falling load may cause serious injury or death.
- See OSHA Rule 1926.550(g) for personnel hoisting by cranes or derricks. A Crosby 319, 320, or 322 hook with a PL Latch attached (when secured with the bolt, nut and pin) may be used for lifting personnel. A Crosby S-320N Hook with a S-4320 Latch attached (when secured with cotter pin or bolt, nut and pin) may be used for lifting personnel.
- Threads may corrode and/or strip and drop the load.
- Hook must always support the load. The load must never be supported by the latch.
- Never apply more force than the hook’s assigned Working Load Limit (WLL) rating.
- Read and understand these instructions before using hook.

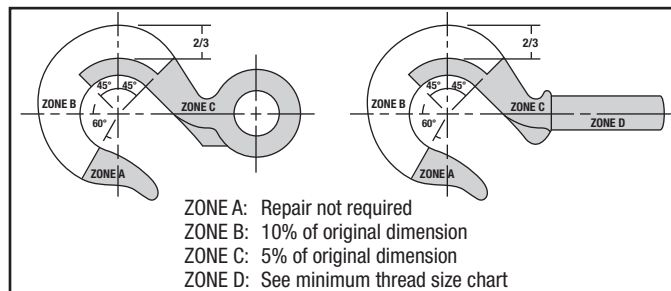


Figure 1

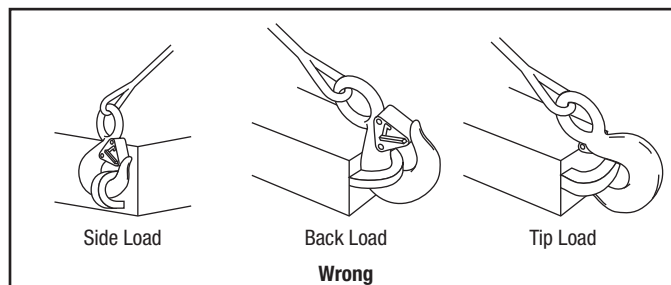


Figure 2

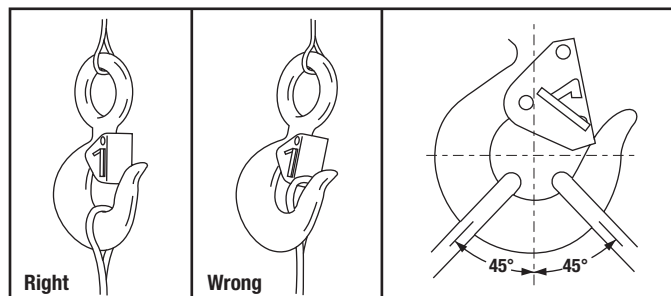


Figure 3

Figure 4

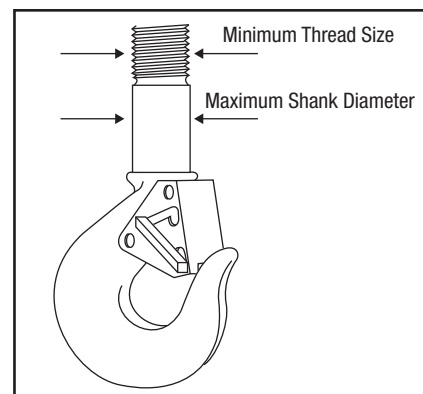
Figure 5

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Read and Understand These Instructions Before Using Hooks

Important — Basic Machining and Thread Information – Read and Follow

- Wrong thread and/or shank size can cause stripping and loss of load.
- The maximum diameter is the largest diameter, after cleanup, that could be expected after allowing for straightness, pits, etc.
- All threads must be Class 2 or better.
- The minimum thread length engaged in the nut should not be less than one (1) thread diameter.
- Hook shanks are not intended to be swaged on wire rope or rod.
- Hook shanks are not intended to be drilled and internally threaded.
- Crosby cannot assume responsibility for: (A) the quality of machining, (B) the type of application, or (C) the means of attachment to the power source or load.
- Consult the Crosby Hook Identification & Working Load Limit Chart (see below) for the minimum thread size for assigned Working Load Limits (WLL).†
- Remove from service any Hook which has threads corroded more than 20% of the nut engaged length.



Crosby Hook Identification & Working Load Limit Chart†

Hook Identification			Working Load Limit (tons)			Maximum Shank Diameter after Machining (in)	Minimum Thread Size	
319-C 319-CN 320-C 320-CN 322-C	319-A 319-AN 320-A 320-AN 322-A	319BN	319-C 319-CN 320-C 320-CN 322-C	319-A 319-AN 320-A 320-AN 322-A	319BN		319-C 319-CN (carbon)	319-A 319-AN (alloy) 319-BN (bronze)
DC	DA	DB	0.75	1	0.5	0.53	1/2-13 unc	1/2-13 unc
FC	FA	FB	1	1.5	0.6	0.62	5/8-11 unc	5/8-11 unc
GC	GA	GB	1.5	2	1	0.66	5/8-11 unc	5/8-11 unc
HC	HA	HB	2	3	1.4	0.81	3/4-10 unc	3/4-10 unc
IC	IA	IB	3	*4.5/5	2.0	1.03	7/8-9 unc	7/8-9 unc
JC	JA	JB	5	7	3.5	1.27	1-1/8-7 unc	1-1/8-7 unc
KC	KA	KB	7.5	11	5.0	1.52	1-1/4-7 unc	1-3/8-6 unc
LC	LA	LB	10	15	6.5	1.75	1-5/8-8 un	1-5/8-8 un
NC	NA	NB	15	22	10	2.00	2-8 un	2-8 un
OC	OA	—	20	30	—	2.50	2-1/4-8 un	2-1/4-8 un
PC	PA	—	25	37	—	3.50	2-3/4-8 un	2-3/4-8 un
SC	SA	—	30	45	—	3.50	3-8 un	3-8 un
TC	TA	—	40	60	—	4.00	3-1/4-8 un	3-1/2-8 un
UC	UA	—	50	75	—	4.50	3-3/4-8 un	4-4 un
—	WA	—	—	100	—	6.12	—	4-1/2-8 un
—	XA	—	—	150	—	6.38	—	5-1/2-8 un
—	YA	—	—	200	—	7.00	—	6-1/4-8 un
—	ZA	—	—	300	—	8.62	—	7-1/2-8 un

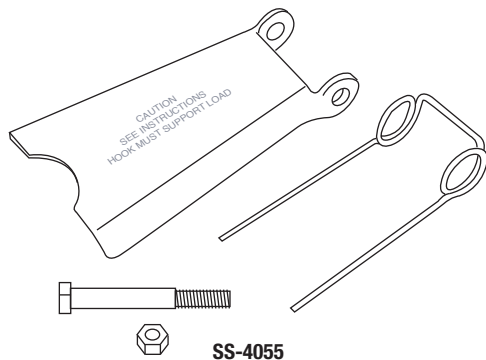
* 319AN and 320-AN are rated at 5 tons.

† Working Load Limit – The maximum mass or force which the product is authorized to support in general service when the pull is applied in-line, unless noted otherwise, with respect to the centerline of the product. This term is used interchangeably with the following terms:
1. WLL 2. Rated Load Value 3. SWL 4. Safe Working Load 5. Resultant Safe Working Load.

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Hook Latch Kit

Warnings and Application Instructions



Important Safety Information – Read and Follow

- Always inspect hook and latch before using.
- Never use a latch that is distorted or bent.
- Always make sure spring will force the latch against the tip of the hook.
- Always make sure hook supports the load. The latch must never support the load. (See Figures 1 and 2.)
- When placing two (2) sling legs in hook, make sure the angle between legs is small enough and the legs are not tilted so that nothing bears against the bottom of the latch. (See Figures 3 and 4.)
- Latches are intended to retain loose sling or devices under slack conditions.
- Latches are not intended to be an anti-fouling device.

⚠ WARNING

- Loads may disengage from hook if proper procedures are not followed.
- A falling load may cause serious injury or death.
- See OSHA Rule 1926.550(g)(4)(iv)(B). A hook and this style latch must not be used for lifting personnel.
- Hook must always support the load. The load must never be supported by the latch.
- Read and understand these instructions before using hook.

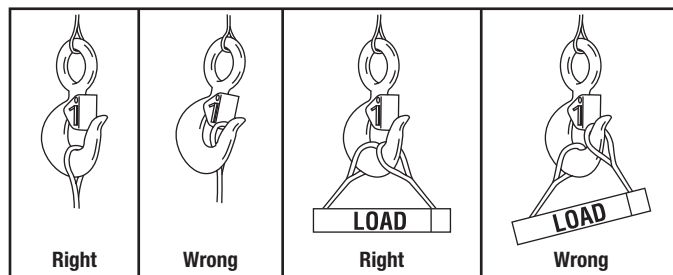


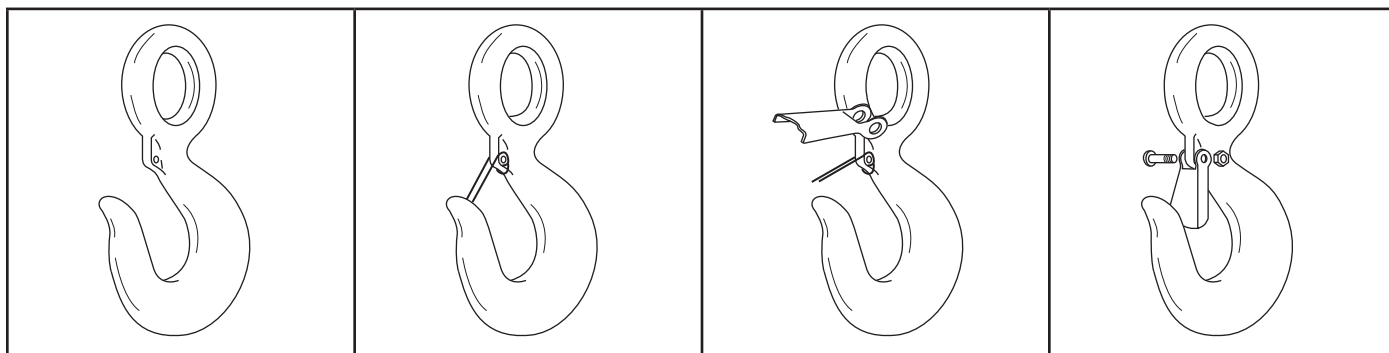
Figure 1

Figure 2

Figure 3

Figure 4

IMPORTANT — Instructions for Assembling SS-4055 Latch on Crosby Hooks



Step 1

Place hook at approximately a 45-degree angle with the cam up.

Step 2

Position coils of spring over cam with tines of spring pointing toward point of hook and loop of spring positioned down and lying against the hook.

Step 3

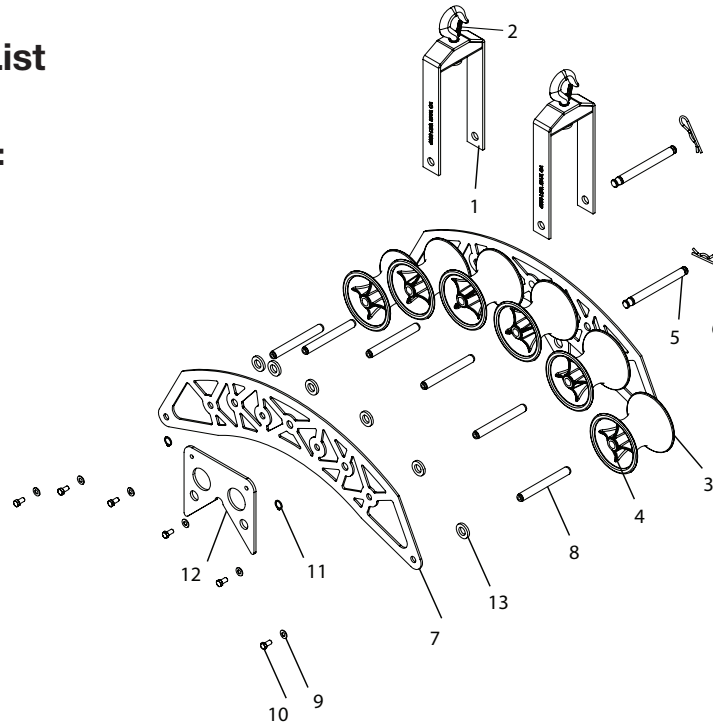
Position latch over tines of spring with ears partially over hook cam. Swing latch to one side of hook, point and depress latch and spring until latch clears point of hook.

Steps 4, 5, and 6

4. Line up holes in latch with hook cam.
5. Insert bolt through latch, spring, and cam.
6. Tighten self-locking nut on one end of bolt.

Illustration and Parts List

Maximum Pulling Force:
17.8 kN (4000 lb)



4024

Key	Part No.	Description	Qty
1	16800	Yoke frame	2
2	90541847	Latch unit, small hook.....	1
3	50153625	Sheave (includes qty. 2 of item 4)	4
4	50167987	Bearing.....	8
5	52055248	Sheave pin	2
6	90503023	Hitch pin clip, #8.....	8
7	52042996	Frame, 24"	2
8	50315730	Shaft.....	6
9	90514343	Washer.....	12
10	90530918	Hex screw, 3/8"	12
11	90515285	Retaining ring.....	2
12	52045548	Support edge.....	2
13	52047027	Washer.....	12

4036

Key	Part No.	Description	Qty
1	16800	Yoke frame	2
2	90541847	Latch unit, small hook.....	1
3	50153625	Sheave (includes qty. 2 of item 4)	6
4	50167987	Bearing.....	12
5	52055248	Sheave pin	6
6	90503023	Hitch pin clip, #8.....	12
7	52042997	Frame, 36"	2
8	50315730	Shaft.....	8
9	90514343	Washer.....	16
10	90530918	Hex screw, 3/8"	16
11	90515285	Retaining ring.....	2
13	52047027	Washer.....	16

4048

Key	Part No.	Description	Qty
1	16800	Yoke frame	2
2	90541847	Latch unit, small hook.....	1
3	50153625	Sheave (includes qty. 2 of item 4)	8
4	50167987	Bearing.....	16
5		Sheave pin (includes qty. 2 of item 6)	8
6	90503023	Hitch pin clip, #8.....	16
7	52042998	Frame, 48"	2
8	50315730	Shaft.....	10
9	90514343	Washer.....	20
10	90530918	Hex screw, 3/8"	20
11	90515285	Retaining ring.....	2
13	52047027	Washer.....	20

Specifications	4024		4036		4048	
	cm	in	cm	in	cm	in
Outside width	19.7	7.75	19.7	7.75	19.7	7.75
Total height (to hook)	64.7	25.48	61.8	24.33	75.1	29.56
Inside width	15.3	6.03	15.3	6.03	15.3	6.03
Cable clearance to sheave outside diameter	22.0	8.67	22.0	8.67	22.0	8.67
Cable clearance to bottom of groove	19.5	7.67	19.5	7.67	19.5	7.67
Sheave inside width	11.4	4.50	11.4	4.50	11.4	4.50
Sheave groove diameter	7.6	3.00	7.6	3.00	7.6	3.00
Sheave outside diameter	15.2	6.00	15.2	6.00	15.2	6.00
Sheave groove depth	3.8	1.50	3.8	1.50	3.8	1.50
Mass/weight	20 kg (50 lb)		30 kg (60 lb)		40 kg (90 lb)	



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