Proper application of shackles is critical in any material handling situation. The following are some of the most common best practices for shackle applications. While these general practices are a good start, always be sure to check with your manufacturer for the full list of application recommendations and training procedures.

- Always use a bolt-type shackle for permanent/long-term connections
- Never expose shackles to forces greater than the Working Load Limit
- Screw pins shall be tightened and fully engaged before each lift
- If shackle is designed for a cotter pin, it shall be sued and maintained
- Applied load should be centered in the bow to prevent side loading
- Multiple sling legs should not be applied to the pin
- Inspect shackles regularly for damage due to excessive heat, deformation, wear, modifications, cracks, nicks or gouges

SHACKLES APPLICATION INSTRUCTIONS

Shackles

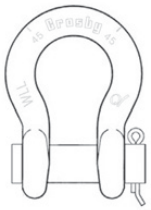
RIGGING PRACTICE SHACKLES

Screw pin shall be fully engaged. If designed for a cotter pin, it shall be used and maintained. Applied load should be centered in the blow to prevent side loading. Multiple sling legs should not be applied to the pin. If side loaded, the rated load shall be reduced according to Table 1.

Screw Pin Shackles Pin Security

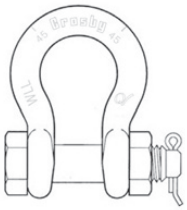
MOUSE SCREW PIN WHEN USED IN LONG-TERM OR HIGH VIBRATION APPLICATIONS.
Mouse or Mousing (screw pin shackle) is a secondary securement method used to secure screw pin from rotation or loosening. Annealed iron wire is looped through hole in collar of pin and around adjacent leg of shackle body with wire ends securely twisted together.

Shackles



Round Pin
Do not side load, do not use as a collector ring, always use cotter pin.

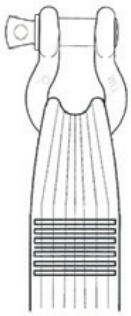
Screw Pin
Use when picking and placing a load, tighten pin prior to each lift.



Bolt Type
Use in permanent or long-term installations, always use nut and cotter.

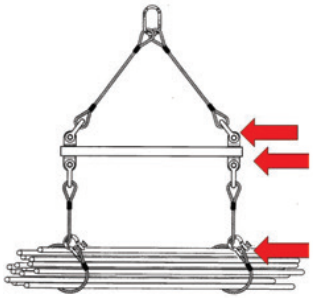
Connection of Slings to Shackles

Diameter of shackle must be greater than wire rope diameter if no thimble in eye.



Shackle must be large enough to avoid pinching of synthetic slings.

Bolt-Type Shackles



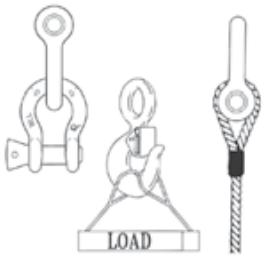
Use Bolt-Type Shackle when a permanent or long-term connection

Use a screw pin shackle when it will be a temporary connection.

the carpenter group

Crosby®

WIRE ROPE SLINGS AND CONNECTIONS TO FITTINGS

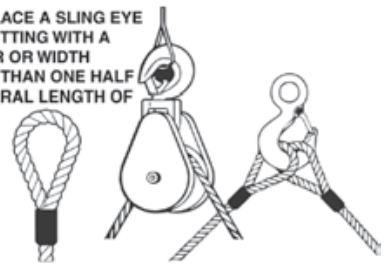


USE A THIMBLE TO PROTECT SLING AND TO INCREASE D/d

NEVER PLACE EYE OVER A FITTING SMALLER DIAMETER OR WIDTH THAN THE ROPE'S DIAMETER

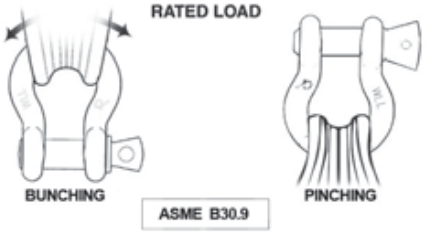
WIRE ROPE SLINGS AND CONNECTIONS TO FITTINGS

NEVER PLACE A SLING EYE OVER A FITTING WITH A DIAMETER OR WIDTH GREATER THAN ONE HALF THE NATURAL LENGTH OF THE EYE

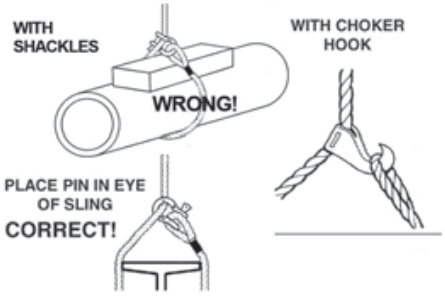


SYNTHETIC SLINGS RATED LOAD

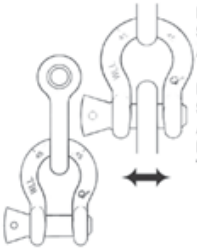
FOLDING, BUNCHING OR PINCHING OF SYNTHETIC SLINGS, WHICH OCCURS WHEN USED WITH SHACKLES, HOOKS OR OTHER APPLICATIONS.WILL REDUCE THE RATED LOAD



CHOKER HITCH FORMED



CROSBY SHACKLES POINT LOADING



POINT LOADING OF CROSBY SHACKLE BOWS IS ACCEPTABLE

POINT LOADING OF CROSBY SHACKLE PINS IS ACCEPTABLE AS LONG AS LOAD IS REASONABLY CENTERED ON THE PIN

ALTHOUGH POINT LOADING IS ACCEPTABLE, A PAD EYE WIDTH OF 80% OR MORE OF SHACKLE SPREAD IS BEST PRACTICE

POINT LOADING OF CROSBY® SHACKLES

It has been determined that all Crosby® shackles can be point-to-point loaded to the Working Load Limit without bending of the pin/bolt. This loading can be bow-to-bow, bow-to-pin, or pin-to-pin (if there is not interference between the diameter of the shackle ears). However, caution should be given to maintain the load at the center of the span by spacers so the load will not slide over to one side, and overload that ear. See “Off Center Loading Of Crosby® Screw Pin & Bolt Type Shackles – 3/16” to 3” Sizes”

ANGULAR LOADING OF CROSBY® SCREW PIN & BOLT TYPE SHACKLES

Crosby® has made representative tests with smaller size shackles with the load applied at 90 degrees to the normal plane of loading (ie. in-line). The test results indicated that in order to maintain a proof load of 2 times the Working Load Limit (2 x WLL), the Working Load Limit should be reduced to 50% (ie. one-half the catalog working load rating). DO NOT SIDE LOAD G/S-213 OR G/S-215 ROUND PIN SHACKLES. Calculations based on the above test indicates the Working Load Limit should be reduced as shown below for loads applied at various angles to the normal plane of loading:

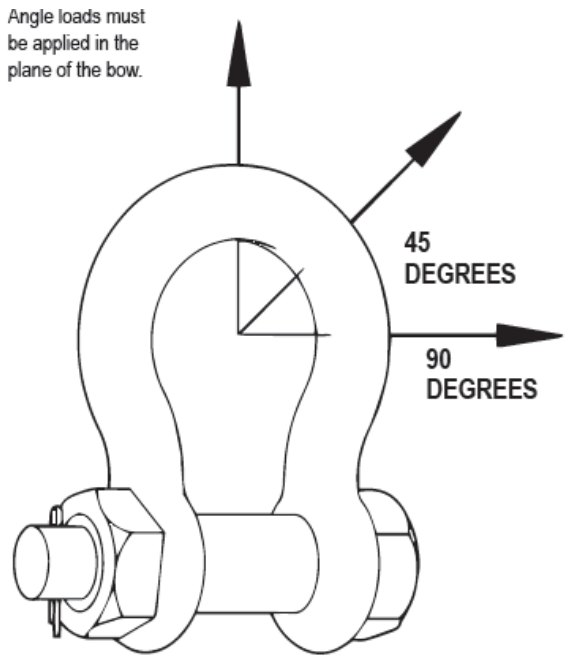


Table 1

Side Loading Reduction Chart for Screw Pin and Bolt Type Shackles Only	
Angle of Side Load from Vertical In-Line of Shackle	Adjusted Working Load Limit
0° - 10° In-Line+	0% of Rated Working Load Limit
11° - 20° In-Line+	15% of Rated Working Load Limit
21° - 30° In-Line+	25% of Rated Working Load Limit
31° - 45° In-Line+	30% of Rated Working Load Limit
46° - 55° In-Line+	40% of Rated Working Load Limit
56° - 70° In-Line+	45% of Rated Working Load Limit
71° - 90° In-Line+	50% of Rated Working Load Limit

+ In-Line load is applied perpendicular to pin. * DO NOT SIDE LOAD ROUND PIN SHACKLE.

Table 1

Side Loading Reduction Chart for Screw Pin and Bolt Type Shackles Only	
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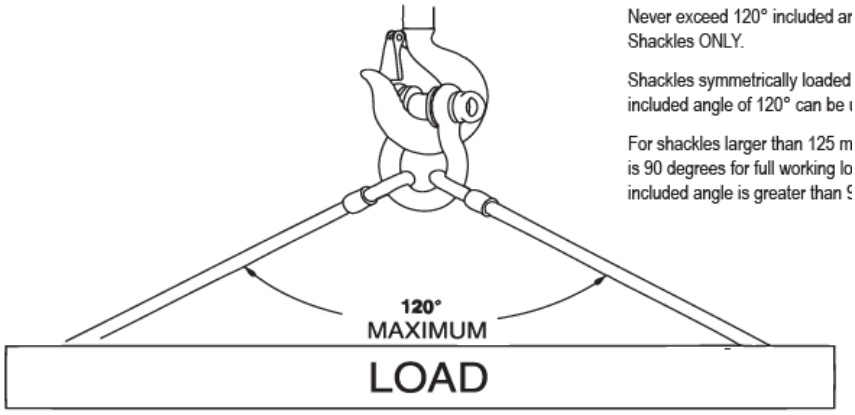
46° - 55° In-Line+	40% of Rated Working Load Limit
56° - 70° In-Line+	45% of Rated Working Load Limit
71° - 90° In-Line+	50% of Rated Working Load Limit

For shackles larger than 125 metric tons, where the angle of the side load is greater than 5 degrees, contact your sales rep.

INCLUDED ANGLES - SHACKLES



Never exceed 120° included angle. Use Bolt Type and Screw Pin Shackles ONLY.

Shackles symmetrically loaded with two leg slings having a maximum included angle of 120° can be utilized to full Working Load Limit.

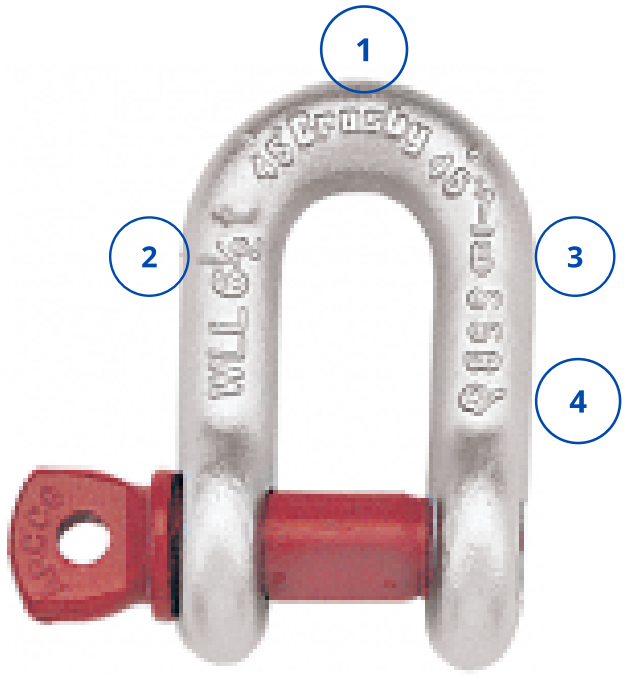
For shackles larger than 125 metric tons, the maximum included angle is 90 degrees for full working load limit. Contact Crosby Engineering if included angle is greater than 90 degrees.

TAKE A CLOSER LOOK

It is imperative that shackles be inspected on a regular basis to ensure that they are suitable for continued use. Shackles must be removed from service if any of the items listed below are visibly found. These include, but are not limited to, the following*:

- Incomplete shackle pin engagement
- Wear or metal loss that exceeds 10 percent of the shackle bow's or pin's original dimension
- Evidence of heat damage or weld splatter
- Excessive pitting or corrosion
- Any signs of deformation
- Any signs of cracks, nicks and gouges
- If 20 percent or more of the threads are damaged
- Evidence of modification of any kind
- Missing or illegible manufacturing identification

*see ASME B30.26 for additional information



ID & APPLICATION INFORMATION

The proper application of shackles requires that the correct type and size of shackle be used. Look closely for the shackle's working load limit, its size, a traceability code, and the manufacturer's name - these should be clearly and boldly marked in the bow.

1. Manufacturer's Name
2. Working Load Limit (WLL)
3. Size
4. Traceability Code