Manufacturer:

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User manual for Crosby 2160 Wide Body Shackles

Original Instructions

Table of contents:

1. Introduction and EC declaration

This manual is an original instruction in accordance with Directive 2006/42/EC on machinery section 1.7.4 Instructions and Annex II Declarations.

This manual is valid for the following product:
2160 Wide Body Shackles

This manual is valid in addition to Crosby catalog instruction for shackles.

Both manuals are continuously updated and are only valid in its latest version, which can be downloaded from the Crosby website.

For maximum safety and efficiency, lifting systems must be properly designed, used, and maintained. You must understand the use of lifting components in the system. The responsibility for the use and application of products rests with the user. Read this manual carefully and completely. Some parts of these instructions must use technical words and detailed explanations.

NOTE: If you do not understand all words, diagrams, and definitions – A block and system must be designed by a qualified person. For further assistance, call:

In US – Crosby Engineering at 1-800-777-1555

In Canada – 877-462-7672

In Europe – +32 0 15 75 71 25

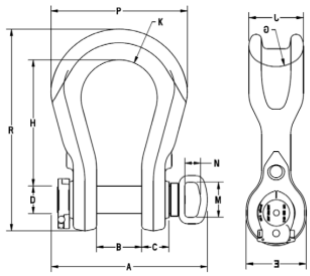
As you read instructions, pay particular attention to safety information in bold print. KEEP INSTRUCTIONS FOR FUTURE USE – DO NOT THROW AWAY!

EC declaration of conformity and incorporation

With the below signature by composer of the technical file for above mentioned CE marked product, we hereby declare compliance with the applicable essential Health and Safety requirements of EU Machinery Directive 2006/42/EC.

2. General description

The 2160 Wide Body Shackle is a lifting shackle consisting of an omega shaped bow and bolt. The bolt is secured with a nut and a safety cotter pin or an engineering approved alternative such as the Easy-Loc collar.



The 2160 Wide Body Shackle is designed, manufactured, and tested for lifting especially with wire ropes or synthetic slings. Type tests include deformation test, static tensile test, and fatigue test. Kito Crosby manufacturing test regime includes proof loading 100% of the lot.

2160 Wide Body Shackle static test coefficients:

For shackles with Working Load Limit of 7 through 300 metric tons the Maximum Proof Load is 2 times. (except for 125 metric tons which is proof tested to 1.6 times the Working Load Limit).

Maximum Proof Load is 1.5 times the Working Load Limit on 400 through 2000 metric tons.

The 2160 Wide Body Shackle is marked as follows:

On the bow:
- Manufacturer Identification
- Country of Origin
- CE mark
- WLL[1] in tonnes
- Batch/Traceability Code[2]
- Serial Number
- DNV stamp

On the bolt:
- material grade and/or WLL
- batch/traceability code
- Serial Number
- Manufacturer Identification
- DNV stamp

Detailed technical data as dimensions, working load limits (WLL) etc. are available in the Crosby catalog and on the Crosby website.

The user is obliged to keep a valid Test Certificate for any shackle being used in a lifting operation. Kito Crosby issues a 3.1 material certificate acc. to EN 10204. Authorized resellers

[1] The maximum working load a lifting accessory or lifting assembly can be subjected to. For the 2160 shackle the stated WLL is valid when the shackle is loaded in a straight direction.

[2] The traceability code consists of letters and numbers that identifies exactly which plant the product was made in, the year and the batch. This gives the ability to trace the product back through the manufacturing process, all the way back to the specific raw material.

may provide their own documentation but are able to provide the original certificates upon request.

3. Intended use and restrictions

Intended use

Bolt, nut, and cotter pin type shackles like the 2160 Wide Body Shackle provide the most secure pin (bolt) arrangement. They may be used for permanent, long term or short-term installations.

The 2160 Wide Body Shackle can be used as a connecting component in many different assemblies, provided that the necessary technical calculations have been taken, especially with regards to load and environmental factors.

General limitations in the use of the 2160 Wide Body Shackle

- Never modify, repair, or reshape the product by welding, heating or bending as this will affect the nominal WLL.
- Never heat treat the product as this may affect the WLL.
- The product must not be galvanized or subject to any plating process without the approval of the manufacturer.
- The product must not be used in alkaline or acidic conditions.
- The product must not be exposed to aggressive chemicals, acids, and vapors.

Use in exceptionally hazardous conditions

The load rating of lifting accessories assumes the absence of exceptionally hazardous conditions. Exceptionally hazardous conditions include dynamic loading, caustic environments, the lifting of persons and lifting of potentially dangerous loads such as molten metals, corrosive materials, or fissile materials. In such cases the degree of hazard should be assessed by a competent person and the working load limit adjusted accordingly.

Service Temperatures

The general service temperature is -40 °C to +200 °C. (-40°F to +392°F)

Side loading

The 2160 Wide Body Shackle is designed to carry the load at the center/bottom of the bow, and evenly distributed on the shackle bolt.

Fatigue

It is important to realize that fatigue failure can occur even if the shackle's WLL has not been exceeded. Scenarios, in which the shackle is subjected to variable load over a prolonged period, will carry the risk of inducing fatigue. Consider this when dimensioning and deciding service intervals.

Additional marking

If markings such as project code, serial number etc. are added it must be done in a way that does not reduce the shackles strength, corrosion resistance or the legibility of the manufacturer's own marking. Provided these conditions are met, we recommend the following methods of marking: Use low stress stamps, such as round face full character, or dot faced stamps, of appropriate size in a low stress area. Indications no deeper than 1/32".

4. Assembly

When assembling the 2160 Wide Body Shackle observe the following:

- Verify that all markings are readable and that all parts of the shackle are of the correct type and size.
- The nut should not be tightened in a way that prevents the bolt from rotating freely. In most cases, hand tightening will be sufficient. (not applicable to anti-rotation style bolts)
- Ensure that the bolt and nut are properly secured with the safety cotter pin attached. A poor fitting between the shackle bow and bolt may be due to the bolt being bent, damaged threads or misalignment of the bolt holes. Under these circumstances the shackle must not be used.

5. User instructions

The 2160 Wide Body Shackle is only to be used after reading and understanding this manual.

Verification prior to first use

Before first use ensure that:

- all markings in the body and the pin of the shackle are legible and in compliance with the relevant Test Certificate.
- the shackle pin is of the correct type.
- the body and pin are not distorted or unduly worn.
- the body and pin are free from nicks, cracks, grooves, and corrosion

If there is any doubt with regards to the above criteria being met, the shackle should not be used for a lifting operation.

Inspection prior to each use

Before each use, the 2160 Wide Body Shackle must be inspected for obvious damage or deterioration.

The inspection should be done in accordance with local regulations, but the guidance in Section 6 Inspection should as a minimum always be followed. If there is any doubt with regards to these criteria being met, the shackle must not be used for a lifting operation.

Before loading

- Know the weight of the load and the center of gravity.
- Check the conformity of the load with the WLL of the lifting equipment for the specific working configuration.
- Ensure that the 2160 Wide Body Shackle has been correctly assembled in accordance with section 4.
- Ensure that no obstacles will obstruct the lift and prepare the landing site.

General instructions for safe use

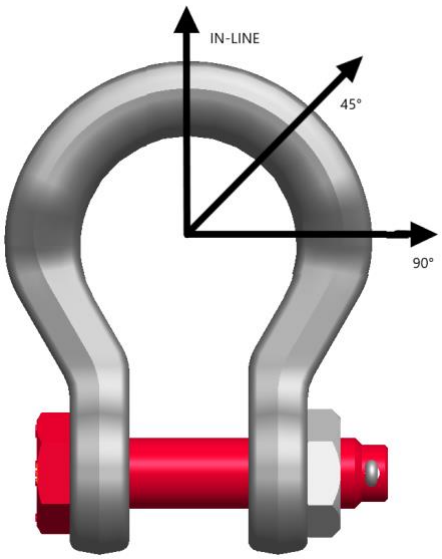
- Side Loading

  The 2160 Wide Body Shackle should be fitted to the load in a manner that allows the shackle body to take the load in a true line along its centerline to avoid undue bending stresses which will reduce the load capacity of the shackle.

  Never apply an out of plane side load.

  Side loads should be avoided as the products are not designed for this purpose. If side loads cannot be avoided, the following reduction factors must be considered.
  For 2160 shackles less than 125t:

Angle of Side Load from Vertical In-Line of Shackle	Adjusted Working Load Limit
0° - 10° In-Line*	100% of Rated Working Load L
11°- 20° from In-Line*	85% of Rated Working Load L
21°- 30° from In-Line*	75% of Rated Working Load L
31°- 45° from In-Line*	70% of Rated Working Load L
46°- 55° from In-Line*	60% of Rated Working Load L
56°- 70° from In-Line*	55% of Rated Working Load L
71°- 90° from In-Line*	50% of Rated Working Load L



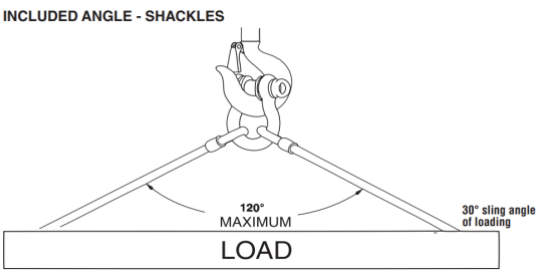
For 125t 2160's:

Angle of Side Load from Vertical In-Line of Shackle	Adjusted Working Load Limit
0 ° - 5° In-Line	100% Rated Working Load Limit
6° - 10° from In-Line	85% Rated Working Load Limit
>10° from In-Line	ANALYSIS REQUIRED

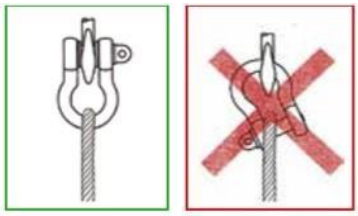
For shackles with WLL larger than 125 metric tons, where the angle of the side load is greater than 5 degrees, contact Crosby Engineering.

- Included Sling Angles

  Shackles symmetrically loaded with two leg slings having a maximum included angle of 120° can be utilized to full Working Load Limit. For 2160 shackles with WLL less than 125 metric tons never exceed 120° included angle.
  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.



- Avoid eccentric load distribution:
  It is recommended to distribute the load evenly across the total length of the shackle bolt with the center of gravity of the load directly below the centerline of the shackle. Washers/spacers may be used on both ends of the bolt so the load will not slide over to one side, and overload that ear. However, under no circumstances should the opening be forced together, or parts be welded onto the bolt to facilitate centering of the load Such actions have a negative impact on the shackle's mechanical properties.



- Avoid unstable loads

Swinging loads or swinging rigging equipment is a hazard. Loads and equipment should be always under control.

- Avoid contact with sharp edges that could damage the shackle.

- Use of two connecting shackles:
  If two shackles are fitted together, it is generally recommended to connect the bows, provided there is adequate clearance to prevent binding or improper loading.

- Use of shackle with fiber and textile slings:
  When fitting shackles together with fiber and textile lifting slings, ensure that the contact diameter is according to the sling manufacturer's recommendations. If necessary, use a bushing on the shackle bolt to achieve the necessary contact diameter. Shackle must be large enough to prevent pinching of synthetic slings.

- Hoisting effect:
  When a shackle is used to secure the top block of a set of rope blocks the load on this shackle is increased by the value of the hoisting effect.

- Sling Efficiency:
  Wire ropes and soft slings require an efficiency be determined to derate the capacity of the sling based on the diameter of the shackle. A qualified person should determine this efficiency using the "effective diameter" dimension in the catalog.

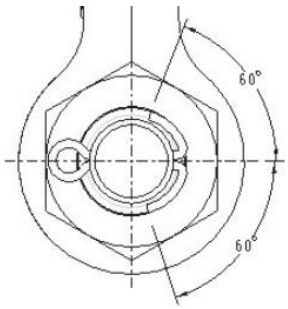
- Bow to Bow fitment
  For bow-to-bow loading, the load shall be inline, and the shackles shall be of the same type and size.

- Secondary Lifting Points
  Some 2160 shackles that have eyebolts affixed to the bolt and a shackle at the top of the bow. These attached lifting devices should only be used by adequately trained personnel to lift and position the 2160 shackle. Do not use to attach secondary loads to the shackle.

- Cotter Pins

  Extended prong cotter pins should be inserted into hole until the head is tangent to the bolt/pin, and oriented so the axis of the eye is parallel to the shank of the bolt/pin.

  The prongs are to be bent in opposite directions around the bolt or pin as shown in the figure below.



  The prongs may be bent with pliers or by gently tapping with a hammer.

  *Note: Avoid bending the prongs over sharp radii which may promote breakage. If a prong breaks off or becomes damaged during installation, replace the cotter pin.

  The ends of the prongs may be curled to form a small loop to reduce the potential for snagging or puncture wounds.

End of use/Disposal

The 2160 shackle bow and pin are produced of alloy steel, and can be sorted/scrapped as general steel scrap.

6. Inspection/Maintenance

Inspection

Shackles must be regularly inspected and maintained to ensure the equipment is suitable for continued use.

Inspection, inspection frequency, and removal criteria shall be according to ASME B30.26-1.8.

The 2160 Wide Body Shackle should be withdrawn from service and referred to a competent person for thorough examination if any of the following are observed:

- The shackle markings are illegible, i.e., information about the identification and/or the working load limit.
- More than 10% reduction of the original bow or bolt diameter dimension at any point.
- Incomplete bolt engagement.
- The threads of the bolt and/or the shackle body are damaged.
- Cuts, nicks, gouges, cracks, excessive pitting or corrosion, heat discoloration, bent, deposits which cannot be removed or distorted components or any other defects.

Records of examinations should be maintained. Prior to the examination the 2160 Wide Body Shackle should be cleaned so it is free from oil, dirt, and rust. Any cleaning method which does not damage the parent metal is acceptable.

Methods to avoid are those using acids, overheating, removal of metal or movement of metal which may cover cracks or surface defects.

Repair

Repairs must only be done by a competent person who has the knowledge and technical skills. The shackle shall only be returned to service after approval by a qualified person.

Records of repairs should be maintained. Any replacement component or part of the chain sling should be in accordance with the appropriate standard for that component or part. Use only genuine Crosby replacement parts.

Minor damage such as nicks and gouges may be removed by careful grinding or filing. The surface should blend smoothly into the adjacent material without abrupt change of section. The complete removal of the damage should not reduce the thickness of the section at that point to less than the manufacturer's specified minimum dimensions or by more than 10% of nominal thickness of the section.

Training

Kito Crosby offers online and in-person training for all products. Learn more at **kitocrosby.com/training**

⚠ WARNING

Manual Adherence
Strictly adhere to the manufacturer's manual for wide body shackles. Failure to use this shackle properly may result in serious injury or even death to you or others.

Wear Proper PPE
Always wear appropriate personal protective equipment when handling wide body shackles and engaging in lifting or rigging activities. This may include gloves, safety goggles, hard hats, and steel-toed boots to protect against potential hazards such as sharp edges, falling objects, and crushing injuries.

Altered or Damaged Products
Ratings shown in Crosby literature are applicable only to new or “as new” condition products. Please note that Crosby Limited Warranty and Product Instructions apply only to new and unaltered products. Kito Crosby neither recommends or approves any customer system designs or product alterations. Products of Kito Crosby that are altered in any way voids the Crosby Limited Warranty. Parties who alter Crosby products assume all responsibility for workmanship, design, application, warranty, and liability.

Avoid Pinch Points
Be cautious of pinch points when using wide body shackles, especially during installation or removal. Keep hands and fingers clear of moving parts to prevent pinching or crushing injuries.

Mind Your Back
Lift and move wide body shackles and associated loads using proper lifting techniques to avoid back strain and injury. Bend at the knees, keep your back straight, and lift with your legs to reduce the risk of back injuries.

Use Gear That Fits Together
Never force another shackle or other object into a shackle’s clevis or loading area. Wedging or loading ill-fitting shackles can lead to premature failure or damage of the devices.

Falling Objects
Secondary lifting points and bolt securement (nut, cotter, Easy-loc collar) should be securely attached prior to lift to avoid falling objects.

Loading
Do not load the shackle beyond its rated working load limit. Overloading can lead to loss of load, damage to shackle, and great bodily harm.

Training and Awareness
Ensure all personnel involved in using wide body shackles are adequately trained in proper safety procedures and are aware of potential hazards and risks associated with their use. By adhering to these warnings and safety precautions, workers can minimize the risk of accidents and injuries when using wide body shackles in lifting and rigging operations.

All products manufactured by Kito Crosby are sold with the express understanding that the purchaser is thoroughly familiar with the safe and proper use and application of product. Responsibility for the use and application of the products rests with the user.

These general instructions deal with the normal installation, operation, inspection, and maintenance situations encountered with the equipment described herein. The instructions should not be interpreted to anticipate every possible contingency or to anticipate the final system, crane, or configuration that uses this equipment