User Instructions

Shackles

Full details and safety information about our range of Shackles

Applications

Shackles are used in lifting and static systems as removable links to connect (steel) wire rope, chain and other fittings. Screw pin shackles are used mainly for non-permanent applications. Safety bolt shackles are used for long-term or permanent applications or where the load may slide on the pin causing rotation of the pin. Chain or dee shackles are mainly used on one-leg systems whereas anchor or bow shackles are mainly used on multi-leg systems.

Always:

- Store and handle shackles correctly.
- Inspect shackles before use and before placing into storage.
- Select the correct pattern of shackle and pin for the application.
- Allow for the full resultant imposed load.
- Fully tighten the pin.
- Ensure the load acts through the centre line of the shackle using spacers if necessary to meet this requirement.

Never:

- Use shackles with bent pins or deformed bodies.
- Force, hammer or wedge shackles into position.
- Eccentrically load shackles.
- Replace the pin with a bolt.
- Fit pins in contact with moving parts which may loosen or unscrew them.
- Shock load shackles.

Range

George Taylor offers a wide range of bow and dee shackles, depending on the application on which the shackle is going to be used; the range stretches from Working Load Limit (WLL) 0.33 tons to 1500 tons. Therefore, our customers have a very extensive range to choose the shackle exactly suitable for the application.

Most of the shackles are directly available from stock. Furthermore, shackles can be supplied to many standards such as the US Federal Specification RR-C-271, EN 13889, British Standard 3032, DIN 82101, DIN 82016 etc. Polar shackles are for use in extreme climatic conditions with material properties guaranteed up to temperatures of -40°C, and furthermore we offer a wide range of general commercial shackles, which are not suitable for lifting but merely for fixing purposes.

Selecting the Correct Shackle

Shackles are available in a range of material grades, sizes, and designs. Select the shackle to be used and plan the lift taking the following into account:

- Type of shackle to be used - dee or bow, high tensile or alloy.
- Type of pin - screwed with collar and eye are suitable for general purposes; with countersunk head for where clearance is limited; bolt and nut for where the pin may be out of sight or subject to movement. Fixed nut for situations with high vibrations.
- Full resultant imposed load - when using shackles with multi-leg slings remember that as the included angle increases and so does the load on the leg and any attachment to the leg. When used to suspend pulley blocks, accounts must be taken of the imposed load due to operating effort.

CAUTION: Commonly available types are designed and rated for the load to be evenly distributed over the full width of the pin. Unless the basis for rating is clearly stated it should be assumed that the jaw must be fully filled and the load evenly spread across the shackle pin width.

Storing and Handling Shackles

Never return damaged shackles to storage. They should be dry, clean and protected from corrosion.

Do not alter, modify or repair shackles and never replace missing pins with unidentified pins, bolts etc, but refer such matters to a Competent Person.

Never galvanise or subject a shackle to other plating processes without the approval of the supplier.

Using Shackles Safely

Do not attempt lifting operations unless you understand the use of the equipment, the slinging procedures and the mode factors to be applied.

Do not use defective shackles or unidentified pins. Shackles should be fitted so that the body takes the load along its centre line and is not subjected to side bending loads. When connecting a number of sling legs, and similar applications, position them so that they do not impose a side load on the shackle jaws. Use spaces to position them if necessary.

Ensure the pin is correctly screwed into the shackle eye. Tighten by hand, use a small bar to lock the collar to the shackle eye. Check that the thread is fully engaged with the body but is not too long so that tightening causes the body to deform.

With bolt and nut pins ensure the nut jams on the inner end of the thread and not on the eye of the shackle. The bolt should be free to rotate with minimal side float. The split cotter pin must be fitted before making a lift.

When using shackles with slings in choke hitch, or in other applications where there may be movement, place the pin through the eye or link of the sling and never in contact with the bight of the choke or moving parts which may cause the pin to unscrew.

In-service Inspection and Maintenance

Maintenance requirements are minimal. Keep shackles clean, the threads free of debris and protect from corrosion.

Regularly inspect shackles and, in the event of the following defects, refer the shackle to a Competent Person for thorough examination; illegible markings; distorted, worn, stretched or bent body; bent pin; damaged or incomplete thread forms; nicks, gouges, cracks or corrosion; incorrect pin; any other defect.

It is required that the shackles are regularly inspected and that the inspection should take place in accordance with the safety standards given in the country of use. This is required because the products in use may be affected by wear, misuse, overloading etc. with a consequence of deformation and alteration of the material structure. Inspection should take place at least every six months and even more frequently when the shackles are used in severe operating conditions.

Design

All shackles supplied by GT have a specific design for a specific application. Examples are the ‘Super’ shackles which are made out of grade 8 steel enabling the dimensions of the shackles to be minimised for use in limited space conditions, without loss of functionality or Working Load Limit. Or sling shackles for use with large slings, to provide a better radius to the sling being used. Another example of functional design is the use of shackles where the pin has a square sunken hole so as not to obstruct the use of fishing nets. These are all examples of a highly functional design, to optimise the use of shackles supplied by GT in daily use.

Furthermore, shackles used for lifting applications are stamped with the following marks, to specify the quality and safety of use of the shackles:

- Working Load Limit (i.e. WLL 25 T).
- Manufacturer’s identification symbol (i.e. GT indicating George Taylor).
- Traceability code (i.e. H pertaining to a particular batch).
- Steel grade (i.e. 4, 6, 8).
- CE conformity code (i.e. CE, Conformité Européen indicating that the product is suitable for lifting purposes).

Finish

Shackles supplied by George Taylor can be either hot dipped galvanised, electro-galvanised, painted or self coloured, depending on the type of shackle and its application. Please consult the product section further on for each type of shackle what finish the product has.

Certification

Upon request at time of order, all load rated shackles can be supplied with any of the following documents or certificates:

- Works certificate in accordance with EN 10204 - 2.1, 2.2.
- Basic raw material certificate in accordance with EN 10204 - 3.1.
- Manufacturer test certificate.
- EC Declaration of Conformity in accordance with annex IIA of the machine directive 98/37/EC.
- Proof load test certificate.
- Certificate with the actual breaking load experienced on tested samples.
- Test report of Magnetic Particle Inspection (M.P.I.).
- Test report of Ultrasonic Inspection (U.S.).

The first four of the above mentioned certificates can be supplied at no extra charge. For all other certificates, additional costs will be charged. The test certificates can be surveyed by all official classification societies, such as Lloyd’s, Det Norske Veritas, British Standards Bureau, American Bureau of Shipping, Germanischer Lloyd’s or any other officially certified inspection body.
Green Pin Standard Shackles and Green Pin Polar Shackles are DNV type approved to certification Note 2.7-1, lifting sets for offshore containers.

Instructions for use

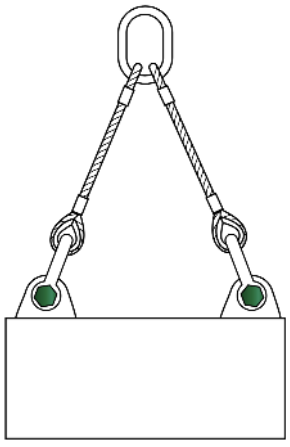
Shackles should be inspected before use to ensure that:

- All markings are legible.
- The body and pin are both identifiable as being of the same size, type and make.
- The threads of the pin and the body are undamaged.
- Never use a safety bolt type shackle without using the split cotter pin.
- The body and the pin are not distorted or unduly worn.
- The body and pin are free from nicks, gouges, cracks and corrosion.
- Shackles may not be heat treated as this may affect their Working Load Limit.
- Never modify, repair or reshape a shackle by welding, heating or bending as this will affect the Working Load Limit.

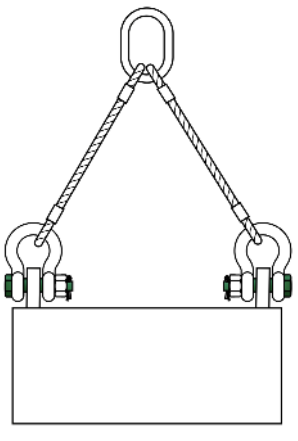
Assembly

Ensure that the pin is correctly screwed into the shackle eye, i.e. tighten hand-tight, then secure using a wrench or other suitable tool so that the collar of the pin is fully seated on the shackle eye. Ensure that the pin is of the correct length so that it penetrates the full depth of the screwed eye and allows the collar of the pin to sit on the surface of the shackle eye. Incorrect seating of the pin may be due to a bent pin, too tight fitting thread or misalignment of the pin holes. Do not use the shackle under these circumstances. Never replace a shackle pin except with one of the same size, type and make as it may not be suitable for the loads imposed.

Select the correct type of shackle and its Working Load Limit for the particular application. Should extreme circumstances or shock loading be applicable, this must be well taken into account on selecting the correct shackle. Please note that commercial shackles are not to be used for lifting applications. Make sure that the shackle is supporting the load correctly, i.e. along the axis of the shackle body centreline, avoid introduction of bending loads, unstable loads and do not apply overloads.



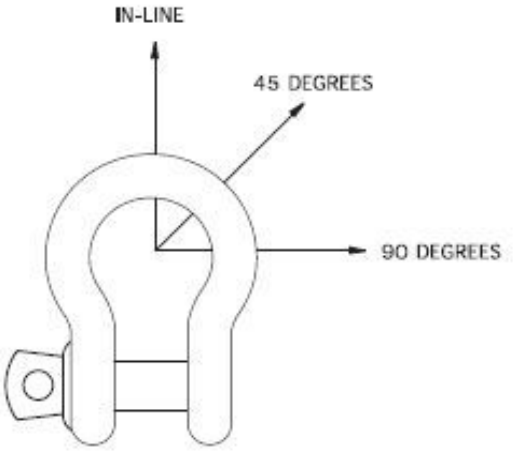
Right



Wrong

Side Loads

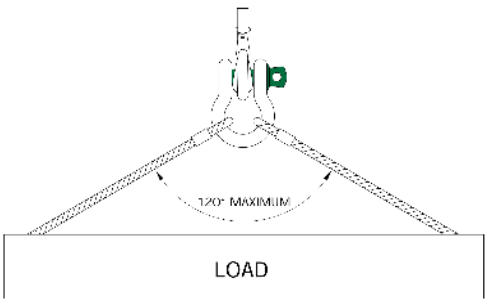
Side loads should be avoided as well, as the products are not designed for this purpose. If side loads cannot be avoided, the following reduction factors must be taken into account:

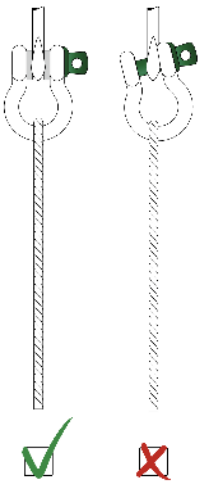


Load angle	Reduction for side loading
0º	100% of original W.L.L.
45º	70% of original W.L.L.
90º	50% of original W.L.L.

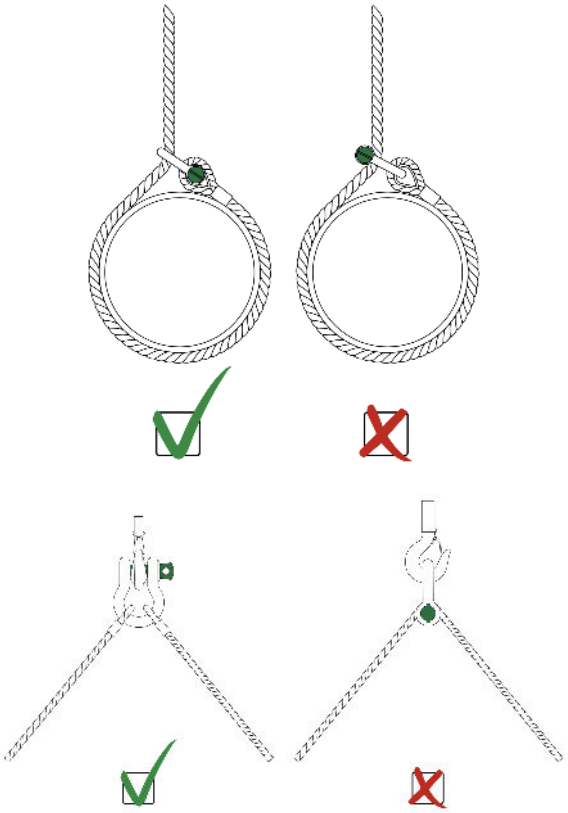
In-line loading is considered to be a load perpendicular to the pin and in the plane of the bow. Load angles in the table are the deviating angles from the in line loads. When using shackles in connection with multi-leg slings, due consideration should be given to the effect of the angle between the legs of the sling. As the angle increases, so does the load in the sling leg and consequently in any shackle attached to that leg.

When a shackle is used to connect two slings to the hook of a lifting device, a bow type shackle must be assembled with the slings in the shackle body and the hook engaged with the shackle pin. The angle between the slings should not exceed 120°. To avoid eccentric loading of the shackle a loose spacer may be used on either end of the shackle pin. Do not reduce the width between the shackle jaws by welding washers or spacers to the inside faces of the eyes or by closing the jaws, as this will affect the properties of the shackle. When a shackle is used to secure the top block of a set of wire rope blocks the load on this shackle is increased by the value of the hoisting effect.





Avoid applications where due to movement (e.g. of the load or the rope) the shackle pin can rotate and possibly be unscrewed . If such an application is necessary or when the shackle is to be left in place for a prolonged period or where maximum pin security is required, use a shackle with a safety bolt, nut and split cotter pin. Shackles should not be immersed in acidic solutions or exposed to acid fumes or other chemicals that are potentially harmful for the shackle. Please be aware that these types of chemicals are used in certain production processes.



Point Loading

Most of the time the load bearing component that is in connection with a shackle is of a rounded shape. Point loading of shackles is allowed but the minimum diameter of a rounded component should be equal or bigger than the bow size of the shackle being used.

Bigger diameters and or flat parts (at shackle pin side) to increase the contact area can be beneficial. Sharp edges should be avoided.

Temperature

If extreme temperature situations are applicable, the following load reduction must be taken into account:

Temperature	Reduction for side loading
Up to 200°C	100% of original W.L.L.
200 - 300°C	90% of original W.L.L.
300 - 400°C	75% of original W.L.L.
> 400°C	Not allowed

The rating of shackles to BS EN 13889 assumes the absence of exceptionally hazardous conditions. Exceptionally hazardous conditions include offshore activities, the lifting of persons and the lifting of potentially dangerous loads such as molten metals, corrosive materials or fissile materials. In such cases a competent person should assess the degree of hazard and the safe working load should be reduced accordingly from the Working Load Limit.

Inspection

Shackles must be regularly inspected in accordance with the safety standards given in the country of use. This is required because the products in use may be affected by wear, misuse, overloading etc. Which may lead to deformation and alteration of the material structure.

Inspection should take place at least every six months and more frequently when the shackles are used in severe operating conditions.

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