

Materials Handling

Materials Handling - Lifting With Eye Bolts

On this page

[What are eye bolts?](#)

[How should you use eye bolts safely?](#)

[What should be considered when selecting the right bolt?](#)

[What should you avoid when using eye bolts?](#)

What are eye bolts?

Eye bolts are pieces of hardware that can be used for lifting and rigging. These metal bolts have threading on one end and a loop or "eye" at the other end. The threaded end attaches the bolt to the object to be moved, while the eye allows the attachment of cables or slings to move the load. There are different types of eye bolts, each with different intended uses:

- Regular eye bolts: designed for vertical loading. It comes with a nut
- Shoulder eye bolts: have a "shoulder" under the eye which allows some angle loading. It comes with a nut
- Lag eye bolts (screw eye bolts): designed with a pointy-ended shank to be screwed into the object for lifting. It does not use a nut
- Machinery eye bolts: designed to be screwed into equipment for lifting. It does not use a nut

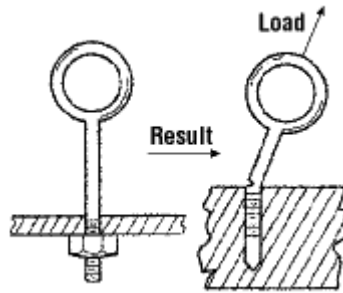
Always select the eye bolt suitable for the lifting operation and only use as designed.

What should be considered when selecting the right bolt?

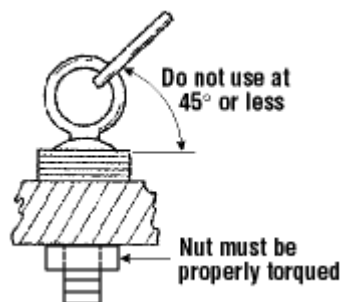
Use the eye bolt that is stamped with its rated weight. Some eye bolts are marked with their thread size NOT with their rated capacities. Make sure you select the correct eyebolt based on its type and capacity for the lift you are conducting.

- Use plain or regular eye bolts (non-shoulder) or ring bolts for vertical loading only. Angle loading on non-shoulder bolts will bend or break them.

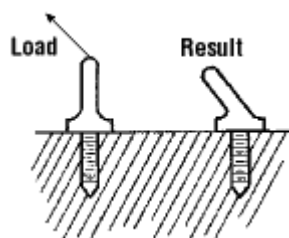
- Use shoulder eye bolts for vertical or angle loading. Be aware that lifting eye bolts at an angle reduces the safe load.
- Follow the manufacturer's recommended method for angle loading.
- If lifting at an angle, the attached sling or cable needs to be at an angle from the centre of the eye (as shown in the first 2 images below). A sling or cable that pulls to the front or back of the eye may bend or break the bolt (as shown in the third image below)
- Use an eye bolt that is made of materials that can withstand the environment it is being used in (such as corrosion, extreme weather, etc.)



Incorrect use of a regular eye bolt



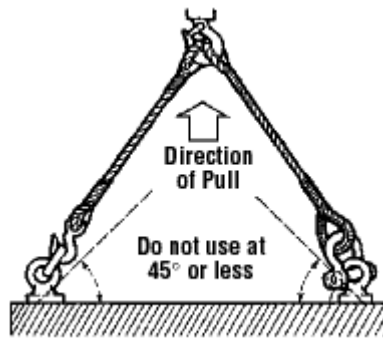
Shoulder eye bolt with load correctly applied



Incorrect way of applying angle load

How should you use eye bolts safely?

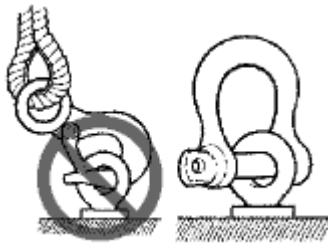
- Orient the eye bolt in line with the slings. If the load is applied sideways (that is, if the load pulls to the front or back of the eye), the eye bolt may bend.
- Pack washers between the shoulder and the load surface to ensure that the eye bolt firmly contacts the surface. Make sure that the nut is properly torqued. The nut needs to make contact with the surface.
- Engage at least 90% of threads in a receiving hole when using shims or washers.
- Attach only one sling leg to each eye bolt.



- Inspect and clean the eye bolt threads and the hole. Check for bends, cracks, or worn threads.
- Screw the eye bolt on all the way down and properly seat.
- Ensure that a tapped hole is required for a machinery or screw (lag) eye bolt, it has a minimum depth of one and a half times the length of the shank plus half the diameter of the shank.
- Install the shoulder at right angles to the axis of the hole. The shoulder should be in full contact with the surface of the object being lifted.
- Use a spreader bar with regular (non-shoulder) eye bolts to keep the lift angle at 90° to the horizontal.
 - Use eye bolts at a horizontal angle greater than 45°. Sling strength at 45° is 71% of vertical sling capacity. Eye bolt strength at 45° horizontal angle drops down to 30% of vertical lifting capacity.
 - Use a swivel hoist ring for angled lifts. The swivel hoist ring rotates around the bolt and adjusts to any sling angle, and the hoisting eye pivots 180°.
- Ensure that the load does not exceed the capacity of the sling(s) and eye bolts. Always follow the manufacturer's recommendations, and calculate the reduction in the rated capacities when slings are used at angles less than 90°.

What should you avoid when using eye bolts?

- Do not run a sling through a pair of eye bolts—this will reduce the effective angle of lift and put more strain on the rigging.
- Do not force the slings through eye bolts. This force may alter the load and the angle of loading.
- Do not use eye bolts that have been ground, machined, or stamped.
- Do not overtighten eye bolts.
- Do not paint an eye bolt. The paint could cover up flaws.
- Do not force hooks or other fittings into the eye; they must fit freely.
- Do not shock load eye bolts.
- Do not use a single eye bolt to lift a load that is free to rotate.
- Do not use eye bolts that have worn threads or other flaws.
- Do not insert the point of a hook in an eye bolt. Use a shackle.
- Do not use a shackle that is capable of lifting more than the eye bolt – the eye bolt may become overloaded.



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