

26—Ropes, Chains, and Slings

sling should bear a tag indicating its vertical safe load limit

Allowances also are recommended for different types of hitches. For example, a decrease of 25 percent in safe load limit for a single-leg vertical sling is made when a choker hitch is used. The suitable load for a basket hitch is based on the angle of the legs.

Special clamps are used in the handling of steel plate, flanged castings, and similar shaped products. The horizontal type and the vertical type clamps have the same safe load limit as do the other bridle slings.

If loads that have sharp edges or sharp corners must be lifted, pads or saddles should be used to protect the ropes or chains.

For wire rope, the radius of bend should not be smaller than ten times the diameter of the rope. For braided, cable-laid, and multi-part slings, the radius should not be smaller than twenty times the diameter of the rope. If the radius of bend is smaller, a choker hitch rating should be used.

Thimbles spliced in the ends of slings will materially reduce wear.

Inspection

Employees should be trained to check slings daily and whenever they may suspect damage after a lift, to report promptly any questionable conditions of the equipment or assembly. A thorough inspection by a trained man should be made at least every 6 months.

Slings that do not meet standard requirements should be promptly withdrawn from service and either discarded or reconditioned in accordance with the recommendations of the manufacturer.

Chains and Chain Slings

Materials

Alloy steel chain has become the standard material for slings because it is at least twice as strong, size for size, as wrought iron chain. Alloy steel chain has high resistance to abrasion and is practically immune to failure from the cold-working of the metal.

Wrought iron chain (commonly called iron crane or dredge chain) used to be the accepted material for slings, hoists, cranes,

power shovels, and marine purposes where human life or property would be endangered by failure. However, since the introduction of alloy chain in 1933, the use of wrought iron has declined steadily and has nearly disappeared. Because of this lack of commercial importance, it is not considered here.

Heat-treated carbon steel is sometimes used for sling chains. It has high strength, high impact resistance, and good abrasion resistance.

Special-purpose alloy chains are made from stainless steel, monel metal, bronze, and other materials. They are designed for use where resistance to corrosive substances is required, or where other special properties are desirable.

Proof coil chain (also known as common or hardware chain) is used for miscellaneous purposes where failure of the chain would not endanger human life or result in serious damage to property or equipment. Proof coil chain should never be used for slings.

Properties of alloy chain

Alloy chain is produced from heat-treatable alloy steel in conformance with ASTM specifications A391-65. Types and amounts of the alloying elements may vary according to requirements of the individual chain manufacturer. Chain after heat treatment has typical mechanical properties as follows:

Tensile Strength	125,000 psi minimum
Elongation	15 percent minimum

Table 26-J shows the recommended working load limits, proof test loads, and the minimum breaking strengths of alloy steel chain.

The working load limit (safe load strength) is arrived at by dividing the breaking strength (ultimate strength) by a specified safety factor.

The values, shown in Table 26-J, represent the maximum loads that should ever be applied in direct tension to a length of alloy chain. All alloy chain is tested in direct tension under the proof test loads shown, prior to final inspection and shipment. The data for other types of chain may be obtained from the National Association of Chain Manufacturers' Specification No. 3001.

Stress on each leg of a multi-branch sling is increased appreciably when the angle be-