

## 4123:1-3-08 Ropes, chains, and slings.

(A) Reserved.

(B) Reserved.

(C) General requirements.

(1) Working loads.

Ropes, chains, and slings shall not be used in excess of their safe working load.

(2) Factor of safety – for component parts.

All connections, fittings, fastenings, and parts, ~~etc.~~, used in connection with manila ropes, wire ropes, or chains shall be of such quality and strength and so attached, connected, or fastened, ~~etc.~~, as to provide a factor of safety of no less than the carrying agent for which they are designed.

(3) Limitation on wire rope.

Haulage rope shall not be provided for use as a hoisting rope.

(4) Clearance.

The ratio between the rope diameter and the block, sheave, or pulley tread diameter shall be such as to allow the rope strands to slide past each other and adjust themselves to the bend. In no case shall the sheave diameter be less than that recommended in the manufacturer's specifications for corresponding block, sheave, and pulley diameters. Sheaves or pulleys with eccentric bores, or with cracked hubs, spokes, or flanges, shall be repaired or removed from service.

(5) Protection.

Where manila rope or wire rope is used to support equipment and is brought over a sharp corner of steel, stone, or other material liable to cut or cause undue abrasion to the manila rope or wire rope, ~~it~~ the manila rope or wire rope shall be protected at such points by the use of bagging, wooden blocks, or other protective padding.

(6) Manila rope prohibited.

Manila rope slings shall not be used for handling known acid-contaminated or caustic- contaminated material or objects.

(7) Use of chain prohibited.

The use of chain as a sling or choker in erection of steel is prohibited.

(D) Alloy steel chains.

- (1) Welded alloy steel chain slings shall have permanently affixed durable identification stating size, grade, rated capacity, and sling manufacturer.
- (2) Hooks, rings, oblong links, pear-shaped links, welded or mechanical coupling links, or other attachments, when used with alloy steel chains, shall have a rated capacity at least equal to that of the chain.
- (3) Job or shop hooks and links, makeshift fasteners, such as made from bolts, and rods, ~~etc.~~, or other such attachments shall not be used.
- (4) Whenever wear at any point of any chain link exceeds that shown in "Table 8-1," the assembly shall be removed from service.

TABLE 8-1

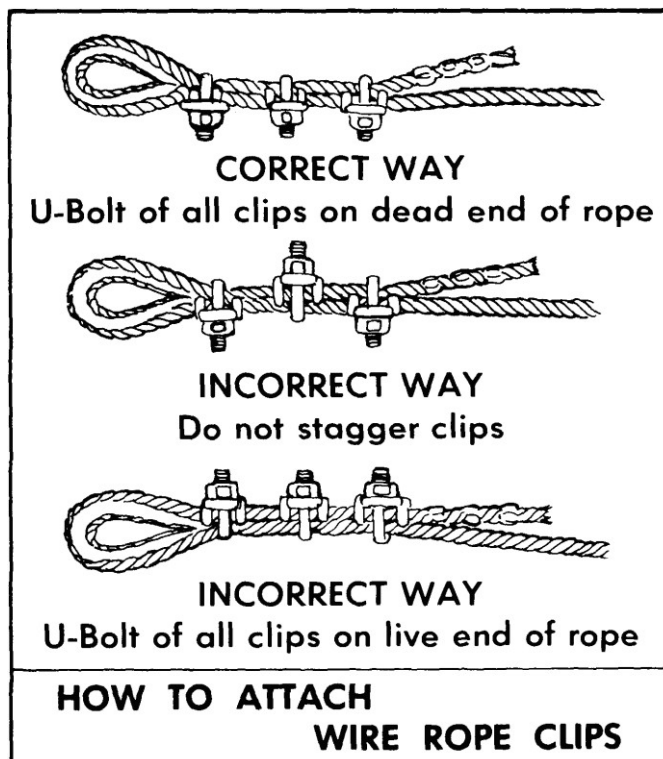
MAXIMUM ALLOWABLE WEAR AT ANY POINT OF LINK

Chain size (inches)	Maximum allowable wear (inch)	Chain size (inches)	Maximum allowable wear (inch)
1/4	3/64	1	3/16
3/8	5/64	1 1/8	7/32
1/2	7/64	1 1/4	1/4
5/8	9/64	1 3/8	3/32
3/4	5/32	1 1/2	5/16
7/8	11/64	1 3/4	11/32

(E) Wire rope.

- (1) Employers must not use improved plow-steel wire rope and ~~wire-rope~~ wire rope slings with loads in excess of the rated capacities, ~~(i.e., working load limits.)~~ indicated on the sling by permanently affixed and legible identification markings prescribed by the manufacturer.
- (2) Protruding ends of strands in splices on slings and bridles shall be covered or blunted.
- (3) Wire rope shall not be secured by knots, except on haul-back lines of scrapers.

- (4) The following limitations shall apply to the use of wire rope:
- (a) An eye splice made in any wire rope shall have no less than three full tucks. However, this requirement shall not operate to preclude the use of another form of splice or connection which can be shown to be as safe and ~~which~~ is not otherwise prohibited.
  - (b) Except for eye splices in the ends of wires and for endless rope slings, each wire rope used in hoisting or lowering, or in pulling loads, shall consist of one continuous piece without knot or splice.
  - (c) Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire rope clips or knots.
  - (d) Wire rope shall not be used if, in any length of eight diameters, the total number of visible broken wires exceeds ten per cent of the total number of wires, or if the rope shows other signs of excessive wear, corrosion or defect.
- (5) When U-bolt wire rope clips are used to form eyes, ~~"Table 8-2"~~ ["Figure 8-1"](#) shall be used to determine the number of clips and the amount of rope to turn back. Spacing of clips shall be uniform between the loop and the dead end. When used for eye splices, the U-bolt shall be applied so that the "U" section is in contact with the dead end of the rope.



[Figure 8-1](#)

(F) Natural rope, and synthetic fiber.

(1) General.

Employers must not use natural-fiber and synthetic-fiber rope slings with loads in excess of the rated capacities, (i.e., working load limits,) indicated on the sling by permanently affixed and legible identification markings prescribed by the manufacturer.

(2) All splices in rope slings provided by the employer shall be made in accordance with fiber rope manufacturers' recommendations.

(a) In manila rope, eye splices shall contain no less than three full tucks, and short splices shall contain no less than six full tucks, (with at least three full tucks on each side of the centerline of the splice).

(b) In layed synthetic fiber rope, eye splices shall contain no less than four full tucks, and short splices shall contain no less than eight full tucks, (with at least four full tucks on each side of the centerline of the splice).

(c) Strand end tails shall not be trimmed short, i.e., (flush with the surface of the rope,) immediately adjacent to the full tucks. This precaution applies to both eye and short splices and all types of fiber rope. For fiber ropes under ~~one-inch~~ one inch (2.5 centimeters) in diameter, the tails shall project no less than six rope diameters beyond the last full tuck. For fiber ropes ~~one-inch~~ one inch (2.5 centimeters) in diameter and larger, the tails shall project no less than six inches (15.2 centimeters) beyond the last full tuck. In applications where the projecting tails may be objectionable, the tails shall be tapered and spliced into the body of the rope using no less than two additional tucks, (which will require a tail length of approximately six rope diameters beyond the last full tuck).

(d) For all eye splices, the eye shall be sufficiently large to provide an included angle of no greater than sixty degrees at the splice when the eye is placed over the load or support.

(e) Knots shall not be used in lieu of splices.

(G) Synthetic webbing, (such as nylon, polyester, and polypropylene).

(1) The employer shall have each synthetic web sling marked or coded to show:

(a) Name or trademark of manufacturer;

(b) Rated capacities for the type of hitch;

(c) Type of material; and

(2) Rated capacity shall not be exceeded.

(H) Shackles and hooks.

- (1) Employers must not use shackles with loads in excess of the rated capacities, (i.e., working load limits) indicated on the shackle by permanently affixed and legible identification markings prescribed by the manufacturer.
- (2) The manufacturer's recommendations shall be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks. All hooks for which no applicable manufacturer's recommendations are available shall be tested to twice the intended safe working load before they are initially put into use.