CORE VALUES | QUALITY PRODUCTS | SUPERIOR SERVICE

CORE LIFTING PRODUCTS

Basic Information Required to Safely Use Wire Rope and Wire Rope Slings

1. Wire rope will fail if worn out, overloaded, misused, damaged or improperly maintained.

2. In service, wire rope loses strength and work capability. Abuse and misuse increase the rate of loss.

3. The minimum breaking force, the published catalog strength, of a wire rope applies only to a new, unused rope.

4. The minimum breaking force (published catalog strength) of a wire rope should be considered the straight line pull which will actually break a new, unused rope. The published catalog strength of a wire rope should never be used at its working load.

5. To determine the working load of a wire rope, the minimum breaking force must be reduced by design factor (formerly called a safety factor). The design factor will vary depending upon the type of machine and installation and the work performed. You must determine the applicable design factor for your use.

   For example, a design factor of "5" means that the minimum breaking force of the wire rope must be divided by five to determine the maximum load that can be applied to the rope system.

   Design factors have been established by OSHA, ANSI, ASME and similar government and industrial organizations.

   No wire rope or wire rope sling should ever be installed or used without full knowledge and consideration of the design factor for the application.

6. Wire ropes wear out. The strength of a wire rope begins to decrease when the rope is put in use and continues to decrease with each use.

7. Never overload a wire rope. This means never use a rope when the load applied to it is greater than the working load, determined by dividing the minimum breaking force of the rope by the appropriate design factor.

8. Never "shock load" a wire rope. A sudden application of force or load can cause both visible external damage and internal damage. There is no practical way to estimate the force applied by shock loading a rope. The sudden release of a load can also damage a wire rope.

9. Lubricant is applied to the wires and strands of a wire rope when it is manufactured. This lubricant is depleted when the rope is in service and should be replaced periodically.

10. Regular, periodic inspections of the wire rope, and keeping of permanent records signed by a qualified person, are required by OSHA for almost every wire rope installation. The purpose of inspection is to determine whether or not a wire rope or wire rope sling may continue to be safely used on that application. Inspection criteria, including number and location of broken wires, wear and elongation, have been established by OSHA, ANSI, ASME and similar organizations.

    If in doubt, replace the rope.

    An inspection should include verification that none of the specified removal criteria for this usage are met by checking tor such things as:

    - surface wear: normal and unusual
    - broken wires: number and location
    - reduction in diameter
    - rope stretch (elongation)
    - integrity of end attachments
    - evidence of abuse or contact with another object
    - heat damage
    - corrosion

    In addition, an inspection should include the condition of sheaves, drums and other apparatus with which the rope makes contact.

11. When a wire rope has been removed from service because it is no longer suitable for use, it must not be re-used on another application.

12. Every wire rope user should be aware each type of fitting attached to a wire rope has a specific efficiency rating, which can reduce the working load of the rope assembly or rope system. This must be given due consideration in determining the capacity of a wire rope system.

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13. Some conditions that can lead to problems in a wire rope system include:

    - sheaves that are too small, worn or corrugated cause damage to a wire rope.
    - broken wires mean a loss of strength.
    - kinks permanently damage a wire rope and must be avoided.
    - wire ropes are damaged by knots, and wire ropes with knots must never be used.
    - environmental factors, such as corrosive conditions and heat can damage a wire rope.
    - lack of lubrification can significantly shorten the useful service life of a wire rope.
    - contact with electrical wires and the resulting arcing will damage a wire rope.

    Every lift uses 1 of 3 basic hitches:

    1. Vertical, a simple straight attachment connecting a lifting hook or other device to a load. Full rated load of the sling may be used, but never exceeded. A tagline should be used on such a lift to prevent rotation which can damage the sling. A sling with a hand-tucked splice can unlay and fail if the sling is allowed to rotate.

    2. Choker hitches reduce lifting capability of a sling, since this method of rigging affects the ability of the wire rope components to adjust during the lift, places angular loading on the body of the sling, and creates a small diameter bend in the sling body at the choke point.

    3. Basket hitches distribute a load equally between the two legs of a sling, within limitations imposed by the angles at which legs are rigged to the load.

Basic Factors Concerning Use of Wire Rope Slings

1. Rated load (rated capacity) of a wire rope sling is based upon the minimum breaking force, or published catalog strength, of the wire rope used in the sling and factors which affect the overall strength of the sling. These factors include attachment or splicing efficiency, the number of parts of rope in the sling, type of hitch (e.g., straight pull, choker hitch, basket hitch), diameter around which the body of the sling is bent and the diameter of pin (or hook) over which the eye of the sling is rigged.

2. Rated load of a sling is different for each of the three basic methods of rigging. These rated loads are available from your wire rope sling supplier and may be indicated on the tag attached to the sling at the time it is fabricated (if requested by the user).

3. Warning: a hand-tucked eye splice can unlay (unravel) and fail if the sling is allowed to rotate during use.

4. Never "shock load" a sling. There is no practical way to estimate the actual force applied by shock loading. The rated load of a wire rope sling can easily be exceeded buy a sudden application of force, and damage can occur to the sling. The sudden release of a load can also damage a sling.

5. The body of a wire rope sling should be protected with corner protectors, blocking or padding against damage by sharp edges or corners of a load being lifted. Sharp bends that distort the sling body damage the wire rope and reduce its strength.

6. Any angle other than vertical at which a sling is rigged increases the loading on the sling.

7. A sling should be given a visual inspection before each lift or usage to determine if it is capable of safely making the intended lift.

   An inspection should include looking for such things as:

   - broken wires
   - kinks or distortions of the sling body
   - conditions of eyes and splices, and any attached hardware
   - reduction in diameter of the rope
   - any damage
   - corrosion

8. Whenever a sling is found to be deficient, the eyes must be cut, or other end attachments or fittings removed to prevent further use, and the sling body discarded.

9. A sling eye should never be used over a hook or pin with a body diameter larger than the natural width of the eye. Never force an eye onto a hook. The eye should always be used on a hook or pin with at least the diameter of the rope.

   Sling angles affect the load on the legs of a sling.

   Sling angle (also called angle of loading) is the angle measured between a horizontal line and the sling leg or body. This angle is very important and can have a dramatic effect on the rated load of the sling. As illustrated here, when this angle decreases, the load on each leg increases. This principle applies whether on sling is used with legs at an angle in a basket hitch, or for multi-leg bridle slings. Horizontal sling angles of less than 30 degrees shall not be used.