

### WIRE ROPE, ROLLED EYES

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#### 1. GENERAL

**1.01** Wire rope used as winch line is subject to severe service in normal construction work. Wire rope or eyes found defective, as outlined in Section 649-310-011, Wire Rope General, must be cut out and discarded. If inspection shows that the remainder of the wire rope is free of defects and is in serviceable condition, it may be necessary to reform a standard eye on the end of the wire rope. This section describes the proper method of forming an eye.

**1.02** This section is reissued to include forming a rolled eye on H-type wire rope and to change the serving tool illustrations. Since this is a general revision, arrows normally used to indicate changes are omitted.

**1.03** This section describes the proper method of forming an eye and applies to the types and grades listed below in the sizes most commonly used, 3/16 inch to 1/2 inch, inclusive.

- (a) Preformed, improved plow steel grade, types B and F with a fibre core.

- (b) Preformed, improved or extra improved plow steel grade, types E and G with an independent wire rope core.

- (c) Preformed, extra improved plow steel grade, type H, coreless.

**1.04** Wire rope varies in structure according to manufacturer, size, type, and grade. The make up of the types most generally used in the Bell System consist of six strands, such as types, B, E, F, and G with a fibre core or independent wire core and type H which has three strands and no center core.

**1.05** The illustrations shown in this section depict the proper method for rolling an eye when using B, E, F, or G wire rope. The method to be used with H-type wire rope is the same except for the number of strands and the absence of a core.

**1.06** Eyes rolled on the end of a wire rope, in accordance with this section, will develop approximately the full strength of the wire rope.

**1.07** Bell System Practice 649-310-011, Wire Rope General should be considered a supplement to this section.

#### 2. SAFETY PRECAUTIONS

**2.01** Safety glasses must be worn while cutting or working with wire rope.

**2.02** Leather gloves should be worn when handling wire rope to reduce the possibility of gashes or puncture wounds from wire ends or broken wires.

**2.03** Before rolling an eye, inspect the rope for damaged or worn sections as outlined in Section 649-310-011, Wire Rope General. Cut off and discard any defective or questionable sections.

#### NOTICE

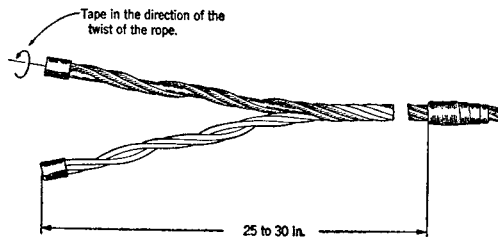
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**3. PREPARING THE ROPE**

**3.01** Serve the wire rope at a point 25 to 30 inches from the end with friction tape.

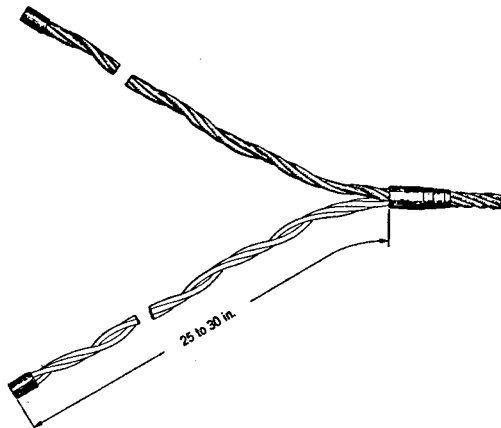
**3.02** Separate the rope into two parts. Core-type rope will have three adjacent strands in each part with the core left in place in one of the

parts. Coreless-type rope will have two strands in one part and a single strand in the other part. If the strands have become unwound in this process they should be twisted back into their proper positions before taping. Tape the ends of each part in the direction of the twist of the rope; this tends to tighten and hold the strands and wires in their original position. (See Fig. 1.)



**Fig. 1**

**3.03** Separate the rope for the entire length to the tape. (See Fig. 2.)



**Fig. 2**

#### 4. FORMING THE LOOP

**4.01** Holding the two parts of the rope, one in each hand, start the eye by making a simple overhand knot. The eye shall be started in such a way that the finished eye shall be at least 7 pitches in length. A 7-pitch eye is one which has 7 spirals of the strands entirely around the loop of the eye or 3-1/2 pitches to the center of the loop as shown in Fig. 3.

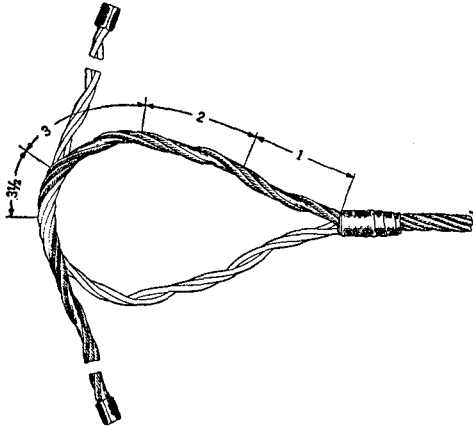


Fig. 3

**4.02** If the loop first formed is not of the desired number of pitches, it may be changed by loosening, but not untying the knot. Apply a downward pressure on the rope ends, bending them toward the crotch of the eye and push or pull these ends until the knot moves to the proper number of pitches.

**4.03** Wrap each part around the loop in such a manner that the strands will take the original form of the rope with each turn. Continue until the eye is completely formed, as shown in Fig. 4.

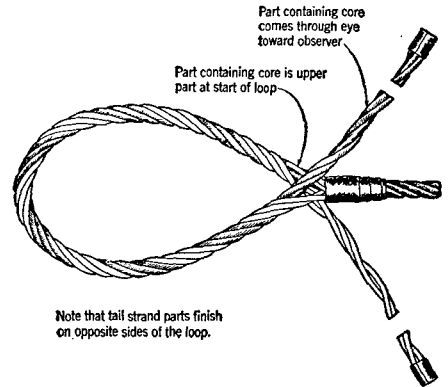


Fig. 4

**4.04** In a correctly formed eye, with the proper number of pitches, the tail strands will finish on opposite sides of the loop. In core-type rope, if the core was in the upper part of the rope at the start, the core will be on the opposite side of the rope towards the observer, as shown in Fig. 4, in the finished eye.

**4.05** Remove the tape from the rope at the crotch of the eye under the tail strands.

#### 5. PREPARING THE TAIL STRANDS

**5.01** Two methods of preparing the tail strands are satisfactory and either may be used. The strands may be distributed evenly around the rope or may be reformed into the original rope structure.

**5.02** When the strands are distributed evenly around the rope and served, the resulting eye tapers smoothly.

**5.03** When the strands are reformed into a rope, the resulting eye holds its shape better and is stronger, particularly in rope having an independent wire rope core, because the strength of the core is utilized. However, there will be a protrusion on one side under the serving formed by the tail rope which in service may catch on obstructions if not carefully taped.

**Tail Strands Evenly Distributed**

**5.04** Tail strands of 4 inches or more are required to develop the full strength of the eye. Mark the strands at a point at least 4 inches from the crotch of the eye and cut off the excess. If core-type rope, cut the core out about 1 inch below the crotch of the eye. Separate the tail strands and distribute them equidistantly around the rope as shown in Fig. 5.

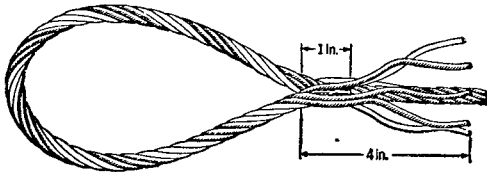


Fig. 5

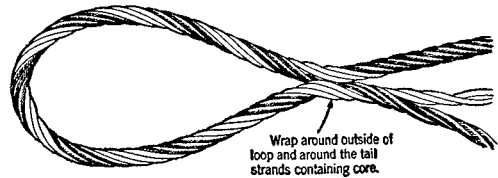


Fig. 6

**5.07** Continue to lay the tail strands together so they assume the original form of the rope.

**5.08** Tail strands of 4 inches or more are required to develop the full strength of the rope. Measure down 4 inches from the point where the tail strands are joined and cut off the excess as shown in Fig. 7.

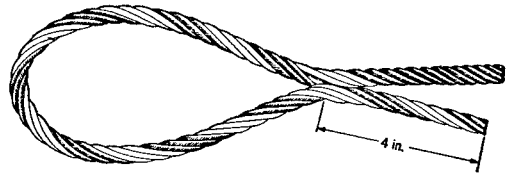


Fig. 7

**Tail Strands Reformed Into Rope**

**5.05** When reforming core-type rope tail strands into the original form of the rope, pass the part not containing the core around the outside of the crotch of the eye and around the tail strands containing the core.

**5.06** When reforming coreless-type rope, the single strand is passed around the crotch of the eye and formed into the tail section containing the two strands as shown in Fig. 6.

**6. SERVING THE EYE**

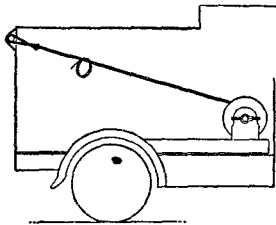
**6.01** The importance of a tightly wound serving can not be overemphasized. A loose or improperly made serving may reduce the strength of the eye by as much as 40 percent.

**6.02** When serving the eye use 0.065C steel lashing wire. This wire is strong and yet flexible enough to provide good serving. If this wire is not available, either 0.091B steel lashing wire or 0.109 steel construction wire may be used. These wires are quite stiff and, therefore, more difficult to apply. However, if applied carefully to insure a tightly wound serving, they are just as satisfactory for developing the full strength of the eye as the 0.065C wire.

**6.03** A tool is required for serving. The serving tool can be constructed of hard wood

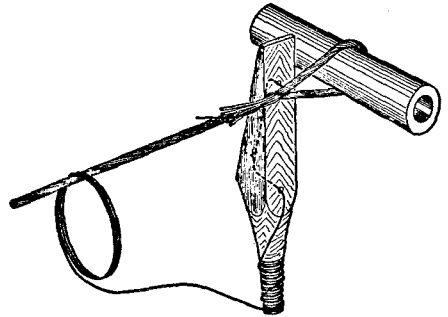
approximately 1 by 2 by 12 inches long with two 3/16-inch diameter holes 4 inches apart at one end. Using the serving tool will result in about 100 pounds tension in the serving wire, assuring a tightly wound serving. If they are available, a modified wooden pole bracket makes an excellent serving tool.

**6.04** Place the coil of serving wire over the eye and onto the rope and put the eye under tension. Tension is best applied to the line by placing the eye over the spindle bar in the upper rear position and placing a slight strain on it with the winch. In this position, the eye is readily accessible for serving. Care must be taken not to apply too much winch load, as it might damage the body of the vehicle. (See Fig. 8.)



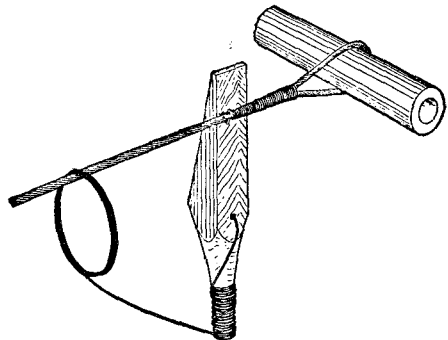
**Fig. 8**

**6.05** Thread the serving wire through the holes in the serving tool and wind it twice around the handle end. The free end of the serving wire is passed through the crotch of the eye and wound loosely around the tails and down to solid rope. (See Fig. 9.)



**Fig. 9**

**6.06** Begin serving by rotating the serving tool in the direction of the twist in the rope. Maintain a constant pressure on the wraps of serving wire on the tool handle to provide sufficient snubbing for a tight serving. (See Fig. 10.)



**Fig. 10**

**6.07** Continue placing the serving wire over the tails in close, tightly wound coils to a point about 1/2 inch short of the ends of the strand tails. Spiral the wire down to solid rope and finish the serving with about 10 wraps on the rope. Pigtail the ends of the serving wire. (See Fig. 11.)

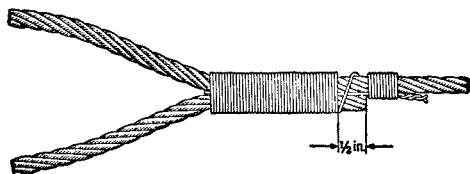


Fig. 11

**6.08** Leaving the last 1/2 inch of tails unserved helps keep the serving wire from slipping off the tails and loosening when the line is under tension. It is advisable to tape over the unserved portion of the tails and the final serving on the solid rope only. This protects the workmen from the tail strands, gives a fairly smooth taper at this point and still leaves the majority of the serving exposed for observation. (See Fig. 12.)

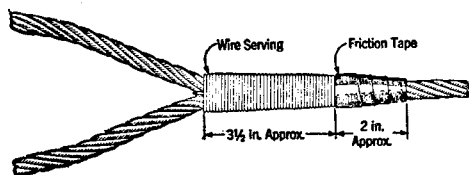


Fig. 12

**6.09** Under no circumstances shall friction tape be used in place of the wire serving. The use of friction tape under the wire serving will weaken the eye and should not be used.

## 7. FINISHING THE EYE

**7.01** After the eye has been served as described in Part 6, form it so that it will take a permanent shape with the dimensions as shown in Fig. 13.

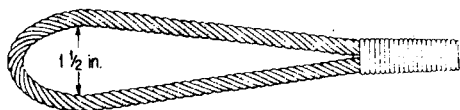


Fig. 13

**7.02** This can most easily be done by placing the eye in a vise so that it is parallel with the jaws and the loop end projects about 1-1/2 to 2 inches beyond the end of the jaws. Then, close the eye by squeezing it between the jaws. When squeezing the eye, it will be necessary to hold it securely at the crotch in order to prevent it from twisting out of the vise as the jaws are closed. If no vise is available, the eye can be hammered into the required shape. (See Fig. 14.)

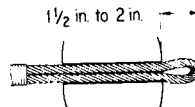


Fig. 14