

SPLICES FOR HIGH TENSILE SMOOTH FENCING WIRE

Are you splicing high tensile smooth wire effectively?

The double loop knot commonly used for soft (low tensile), double-stranded barbed wire is not effective for single-strand 2.5 mm (12-1/2 ga.) high tensile wire. The best knot for tying 12-1/2 ga. high tensile wire is the figure '8', which breaks at only two thirds of the wire's strength (reference No. 1 and No. 2). To maximize the benefits of the stronger, high tensile wire, several mechanical splices can be used to obtain up to 100% of the wire's breaking strength. Strength tests were carried out at the British Columbia Institute of Technology (B.C.I.T) and by Ministry of Agriculture staff. The results show that there is a wide variation in splice strengths. Only splices which are manufactured specifically for use with high tensile, galvanized steel wire should be used. If you wish to use a splice or wire that was not intended for high tensile, smooth wire fencing, it should be submitted to a laboratory for a breaking strength test.

MECHANICAL SPLICES AND FASTENERS

Several in-line wire splices were tested at B.C.I.T. (see Table No. 1). Three commercially available mechanical splices for high tensile, smooth wire appeared suitable, including the Nicropress, Wirelink and Vineline, as each splice failed because the wire broke. (See Figure 1(a), (b) and (c), respectively). Be sure to specify the fence wire diameter and tensile strength (high or low) when ordering a mechanical splice.

Be sure to obtain and follow the manufacturer's directions. Footnotes to Table No. 1 indicate the various catalogue numbers for the wire splices used with the 12-1/2 gauge wire tested at B.C.I.T.

Although dead end splices were not tested, the three companies also have dead end wire fasteners (see Figure 2) which they claim are effective up to 100% of the wire's breaking strength.

WIRE KNOTS

Because all knots are weaker than an unjoined length of wire, the strength of the knot will determine the effective strength of any strained wire. Australian Wire Industries Pty. Limited (reference No. 1) carried out an investigation into the performance of the various knots commonly used in fencing. Some of the conclusions were:

The double loop knot cannot be recommended for use with smooth wire.

For all smooth fencing wire, the figure '8' knot decreases the wire breaking strength less than other knots and tends to be the most consistent.

The higher the tensile strength of the wire, the less reliable the knot is and the greater the tendency is to lower the strength of the wire.

Knots in barbed wire, both 2.5 mm Iowa and 1.57 mm high tensile, do not vary sufficiently to justify a recommendation for a particular knot. Ease of tying becomes the deciding factor.

Table No. 2, shows the efficiency of the figure '8' knot and the double loop knot expressed as a percentage of the breaking strength of the wire. Figure 3, shows the figure '8' double loop and tie-off knot. The tie-off knot is reported to be effective up to 60% of the breaking strength of high tensile wire (reference No. 2).

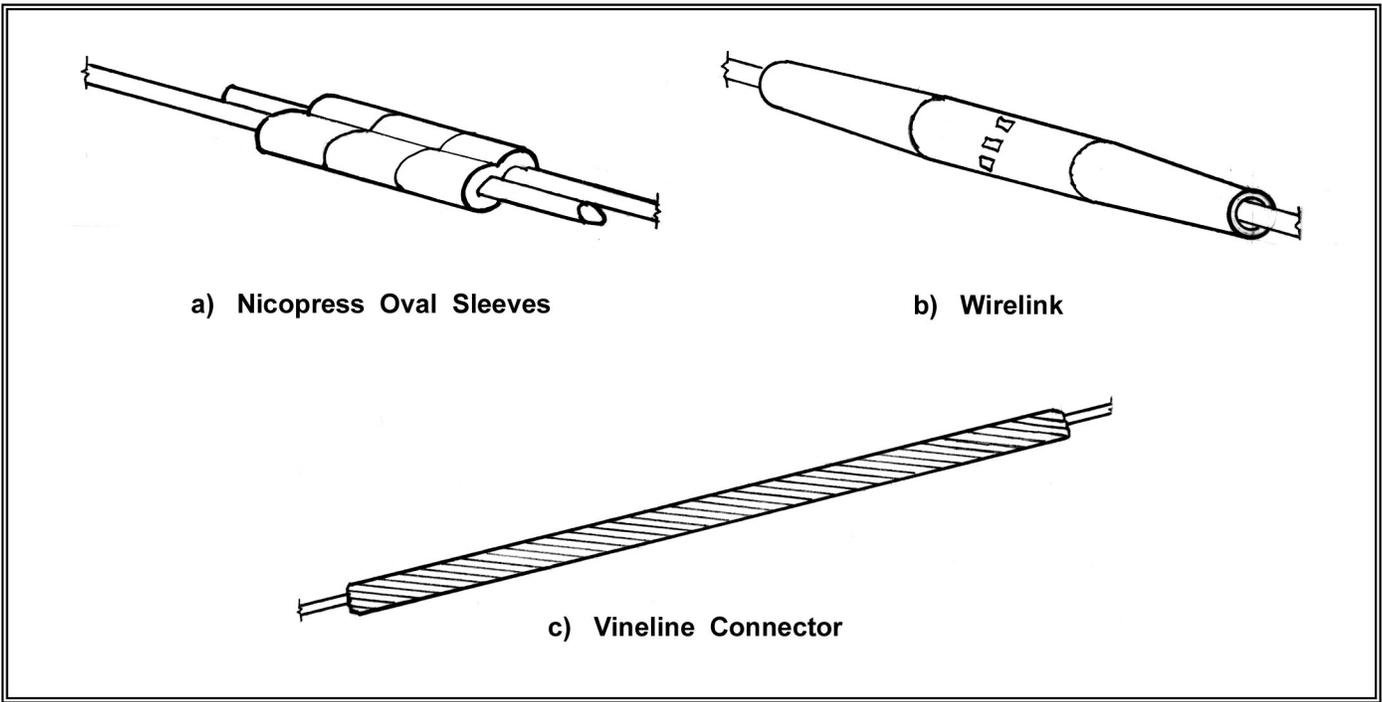


Figure 1

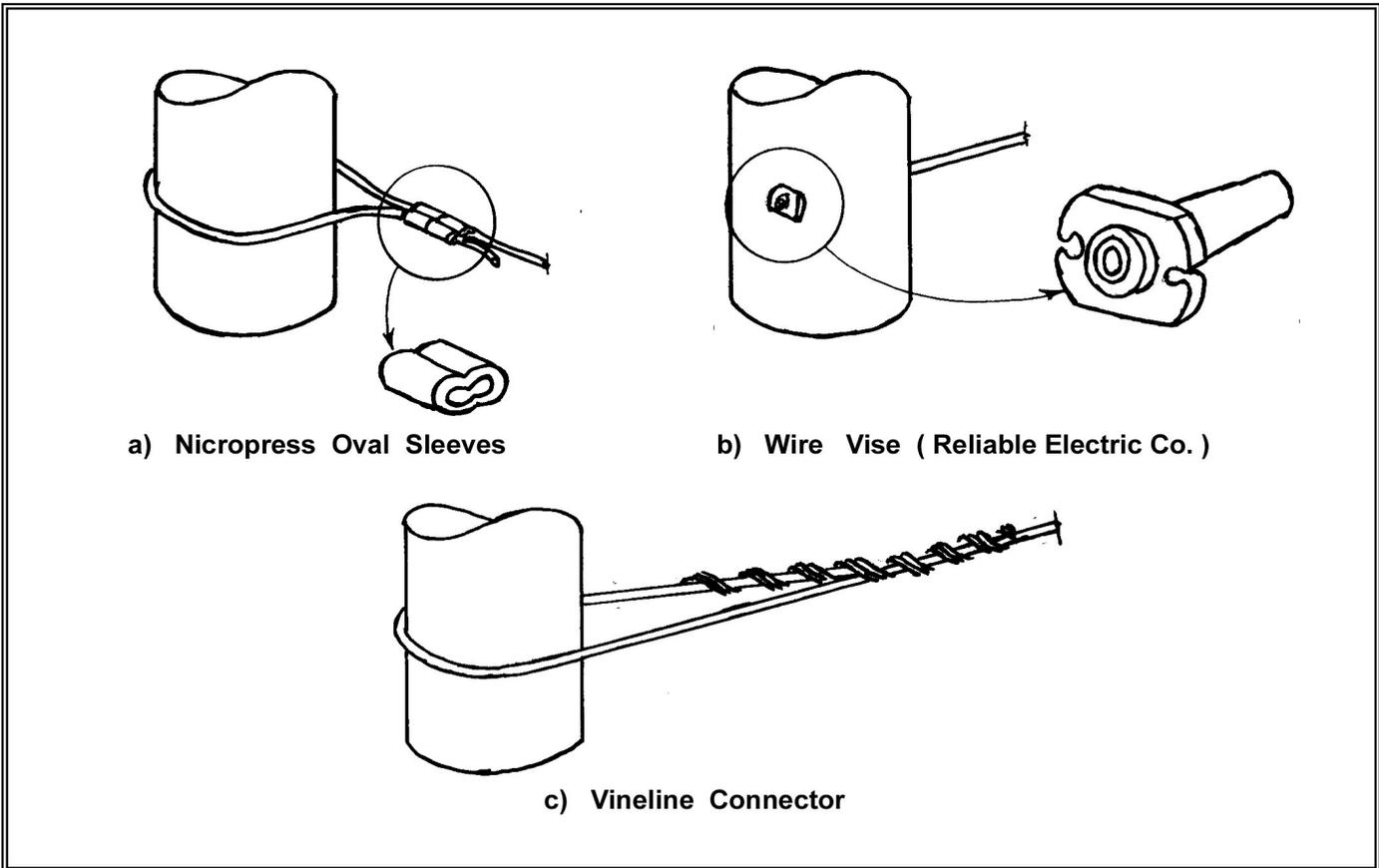


Figure 2

TABLE No. 1

| WIRE | CONNECTOR | BREAKING STRENGTH | % OF WIRE STRENGTH |
|-----------------------|---------------------------------|--------------------------|---------------------------|
| Sample A ¹ | None | 6090 N (1370 lb) | 100 |
| Sample B | None | 6890 N (1550 lb) | 100 |
| Sample C | None | 8320 N (1870 lb) | 100 |
| Sample D | None | 7340 N (1650 lb) | 100 |
| Sample D | 1 FW2-3 sleeve ² | 3650 N (820 lb) | 50 * |
| Sample D | 2 FW2-3 sleeves ² | 6850 N (1540 lb) | 93 * |
| Sample D | 3 FW2-3 sleeves ² | 7340 N (1650 lb) | 100 ** |
| Sample D | Wirelink ³ | 7160 N (1610 lb) | 98 ** |
| Sample D | Vine-Line ⁴ | 7290 N (1640 lb) | 99 ** |
| Sample C | 3 FW2-3 sleeves ² | 8320 N (1870 lb) | 100 * |
| Sample C | 3 aluminum sleeves ⁵ | 3510 N (970 lb) | 42 * |
| Sample D | 3 copper sleeves ⁶ | 2200 N (490 lb) | 30 * |

1. Many of the wire manufacturers are willing to manufacture wire to a tensile strength specified by their customer. Samples A, B, C and D were all sold as 12-1/2 gauge, high tensile, smooth fencing wire.
2. The FW2-3 is a Nicropress (™ National Telephone Supply Co.) oval sleeve for lap splicing 12-1/2 gauge (2.5 mm wire diameter) wire that is crimped with a Nicropress tool No. 64-2345 or FT-2345. Nicropress recommends for regular strength fence wire, both single and double strand barbed wire, use one oval sleeve for a lap splice and one oval sleeve for an eye splice (dead-end). For high strength fence wire, use three sleeves for a lap splice and two sleeves for an eye splice. Sleeves are available for many gauges of single-strand wire and two-strand barbed wire for use with the same Nicropress tool.
3. The Wirelink (™ Reliable Electric Company) is a butt splice; catalogue No 5059 is intended for wire diameters 2.6 – 2.9 mm (.102 - .114 in).
4. The Vine-Line (™ Performed Line Products Company) connector; Catalogue No. 2602-102.
5. Aluminum oval sleeves by an unknown manufacturer crimped with a home-made crimping tool (hole filed in both cutters).
6. Copper oval sleeve: same size as Nicropress FW2-3 sleeve crimped with Nicropress tool No. 64-2345.
 - * These in-line splices failed at the strength indicated because the wire slipped through the splice.
 - ** These in-line splices failed at the strength indicated because the wire broke.

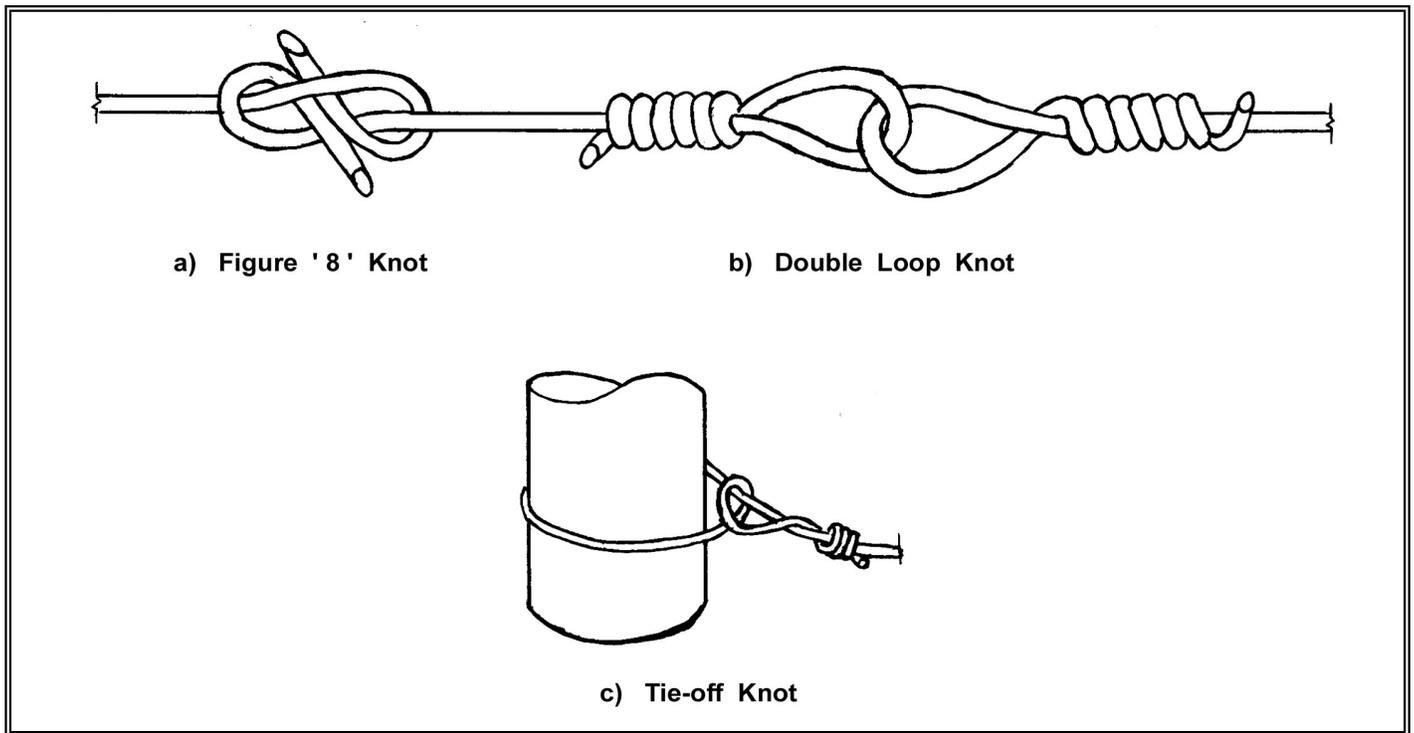


Figure 3

TABLE No. 1
(From Reference 2)

| KNOT | WIRE TYPE | | | | | |
|-----------------|-----------|---------|------------------------|--------|---------------------|---------------------|
| | .4 mm | .315 mm | H.T. Ty-Easy 2.8 mm | 2.5 mm | Iowa Barbed Wire | H.T. Barbed Wire |
| Figure '8' Loop | 80% | 74% | 66% | 68% | 74% | 66% |
| Double Loop | 69% | 63% | 46% | 48% | 88% | 61% |

REFERENCES

- (1) *Waratah Fence Manual*. 1981. Australian Wire Industries Pty. Limited.
- (2) *How to Build Fences with U.S.S. MAX-TEN 200 High Tensile Fence Wire*. May 1980. United States Steel Corporation, Pittsburgh, Pennsylvania 1530. U.S.S. Catalogue No. T-111575.

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