Utilux Full Tension Overhead Sleeve

TE connectivity

ENERGY

Some Notes on Jointing Wires

A satisfactory joint is one which should approach perfection in assuming the characteristics of a continuous conductor.

The requirements of an ideal joint are:—

(a) Speed and simplicity.

(b) Should not affect, by increase or decrease, the resistance of the line.

(c) Should not reduce the strength of the wire. (d) Should not differ in mass from the wire,
otherwise it is liable to form a reflecting point for aeolian vibrations, and fatigue conditions will set up, ultimately causing wire breakage.

Many methods of jointing wires have been devised in an endeavor to attain these qualities, three prominent ones being:

THE PRESS-TYPE JOINT consists of a length of single copper tube indented at the centre so that the wires can be inserted only so far. The interior is coated with a granular deposit of Monel Metal applied by the Metalspraying process.

The wires are inserted up to the centre stop. The Sleeve is then squeezed four or more times between the jaws of a special tool exerting a pressure of some 2,000 lbs. This compression causes the hard granules to bite into the sleeve and wire thus forming a friction joint.

THE PRESS-TYPE SLEEVE

ISUSTRATION PRESS-TYPE SLEEVE JOINT

Investigation has revealed that approximately 60 per cent of copper line-wire faults are due to failure by tensions the direct result of wire fatigue.

Three important causes of wire fatigue are:-

(a) Frequent bending stresses through continuous vibration, sometimes referred to as "inter- crystalline fracture."

(b) "Corrosion fatigue" whereby corrosive action combined with repeated cycles of stress causes pitting of the wire.

(c) "Aeolian vibrations" these have been proved to be one of the principle causes of fatigue failure.

The loss of cross-sectional area by cracking or pitting due to the above reduces the tensile of the wire and consequent fracture. Tensile reliability and ability to resist fatigue is of primary importance in the matter of wire jointing, and the method
employed equally so. Some comparison of the types of joint mentioned provide some strong factors for consideration of the best for telecommunication purposes.

TE Connectivity Full Tension Copper Sleeves.

Tensile tests on this type of joint gives an average breaking strain of 97 per cent, with a minimum of 95 per cent. In mechanical strength, therefore, the press type sleeve approaches perfection. Vibration tests show equally satisfactory results, with no harmful effects resulting from the motion of the wire in service.

The electrical resistance is more constant, due to the high compression effecting intimate contact between wire and sleeve. Also there is less possibility of corrosion owing to the sleeve being tightly squeezed around the wire, thereby preventing
the ingress of moisture and air.

The mass of the sleeve is less, with a corresponding reduction in the likelihood of fatigue failure, and more easily drawn over cross-arms.

The wire ends butt together instead of overlapping. Hence in jointing broken wire it is not necessary to piece the line wire, only one joint being required, instead of two with the twist type sleeve.

This is the most modern type of joint and consists of a circular copper tube, **the bore of which is lined by the metalspraying process, with a granular coating of Nichrome or Monel Metal** to a thickness which allows the appropriate conductor to be inserted with moderate ease. The wire ends are pushed firmly up to an indented stop at mid-sleeve and the sleeve is then compressed in several places with a special tool exerting a pressure of some 2,000 lbs.

This compression causes the hard granules in the sleeve bore to bite into the sleeve and wire thus forming a friction grip capable of a strength almost equal to the tensile of the conductor.

A typical M-S Press Type Joint showing Compression points.

Some advantages of the Press Type Sleeve over earlier methods are: –

1. Superior tensile strength.
2. Considerable reduction in the mass of the made joint.
3. Greater constancy of electrical resistance, practically equal to that of the conductor.
4. Elimination of corrosion because the sleeve ends are tightly pressed around the complete periphery of the wire.
5. The wire ends butt together thus removing the necessity to piece the line when effecting repairs.
6. The joint is simple and speedy to make under all conditions and ensures a maximum of electrical efficiency and mechanical strength.

The TE Connectivity Method of Jointing Full Tension Overhead Copper Conductors

TE Connectivity appreciates that in jointing power distribution lines you have certain specific requirements, for instance: –

- It is necessary that under all conditions the actual job of making the joints be easily and quickly done, either in the air or on the ground.
  That all completed joints exceed the rated breaking strength of the wire itself.
- That the joints be so tight that the conductors cannot pull out.
- That the joints equal the conductivity of the wire.
- That provision be made to joint wires of different sizes.

That the METHOD OF JOINTING has completely and fully met all these requirements has been proven by many exacting laboratory and field tests made by and a number of the leading power supply companies.

All joints are easily made, they are neat in appearance and not much larger in diameter than the wire and, most essential- they have great strength and tightness.

The sleeves are sprayed, on the inside, with molten metal alloys that are harder than the metal of either sleeves or conductors, for the purpose of providing a simple and effective method of anchoring the conductors.

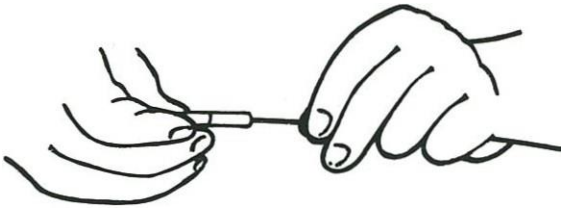
Then the sleeves are compressed with the tool, which easily exerts the required pressure, the hard alloy is forced into the softer metals of both sleeve and conductors, forming a tight, durable bond stronger than the rated breaking strength of the wire.

In making the joint, the wires go straight into the sleeve, meeting end to end, without bending or overlapping. In addition to increasing efficiency, this feature conserves material and permits jointing a broken line without changing the sag.

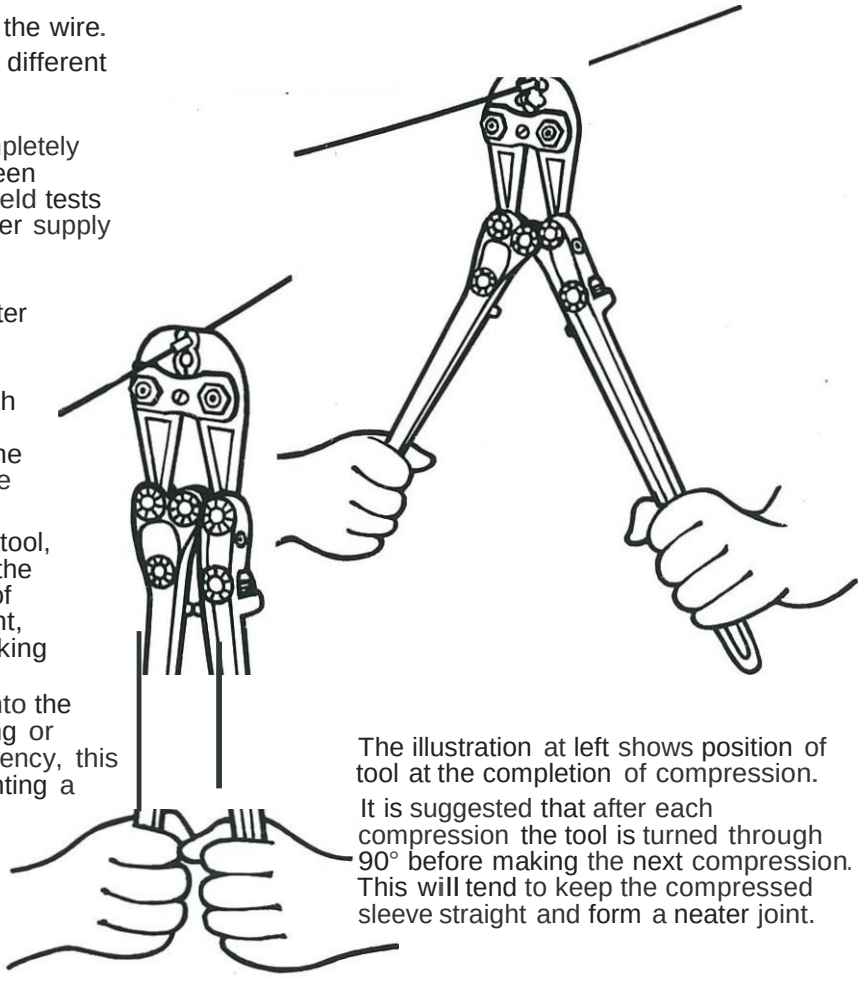
The jointing sleeves are invaluable aids in reclaiming the short lengths of wire that are often discarded. Not only is this true with bare wire but also with insulated wire, because the joint is only slightly larger than the diameter of the wire itself so that when taped the joint has a neat appearance and is hardly noticeable.

HOW THE IN LINE JOINT IS MADE

The making of joints is simple and easy. One end of cleaned conductor is pushed into the sleeve. The sleeve is made with a groove that automatically stops the conductor at the centre of the sleeve.



The sleeve is placed in proper tool die groove and compressions are made by pressing tool handles together until the handle bumpers meet. Illustration below shows position of tool at start of compression.



The illustration at left shows position of tool at the completion of compression.

It is suggested that after each compression the tool is turned through 90° before making the next compression. This will tend to keep the compressed sleeve straight and form a neater joint.

READ CAREFULLY

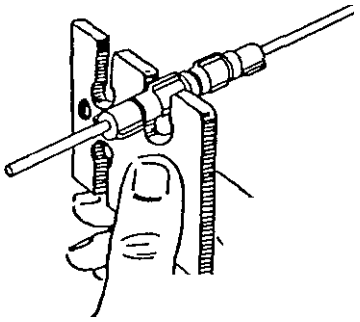
The correct setting of the tool is a main essential In the making of satisfactory joints,an adequate provision has been made for accurate adjustment.

First check the tool for good working order and correct adjustment. (See instructions.)

Periodic inspection is advised in order to check wear and make re-adjustment, cleaning and lubrication.

An empty tool should work freely, with a slight spring at the final closing.

During use occasional checking of compressions should be made, using the appropriate apertures in the GO/NO GO gauge. Use Gouge so that the aperture contacts the compressed portion of the sleeve at right angles to the finish.



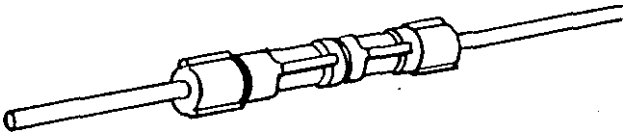
For the initial adjustment of the tool the compressed portion
If the sleeve should NOT ENTER the NO GO aperture, but pass freely THROUGH the GO aperture. When, after long use, the tool wears to such an extent that the compressed portion does NOT ENTER the GO aperture, re-adjustment becomes necessary.

Each tool is correctly adjusted before leaving the Factory. A certain amount of "wearing-in" of the movable parts is inevitable whilst in the new state, therefore it is advisable that more frequent checking of the adjustment be made during early use.

KEEP THE TOOL CLEAN AND LUBRICATED.
All grooves in the Tools are size branded; these sizes correspond with the outside diameter of the sleeves approriate to each groove, and care must be taken to associate correct groove and sleeve.
Likewise when compressions are checked with the GO/NO GO gauge the gauge slot size must correspond with the sleeve diameter and tool groove size.

To MAKE A JOINT.
Ensure that the end of the wire for insertion is absolutely clean, straight, and free from burs. Insert wire, making sure that it is pushed into contact with centre stop

Operate Press Tool by opening handles fully and closing until handle bumpers meet. Make inner compressions first and allow about 1/16 inch between inner and outer compressions.



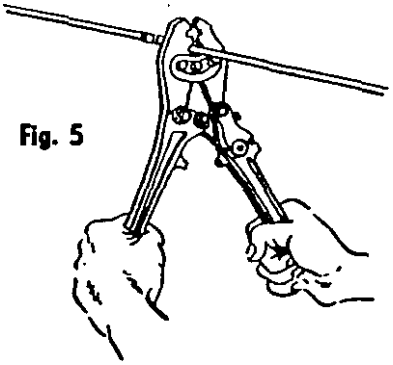


Fig. 5