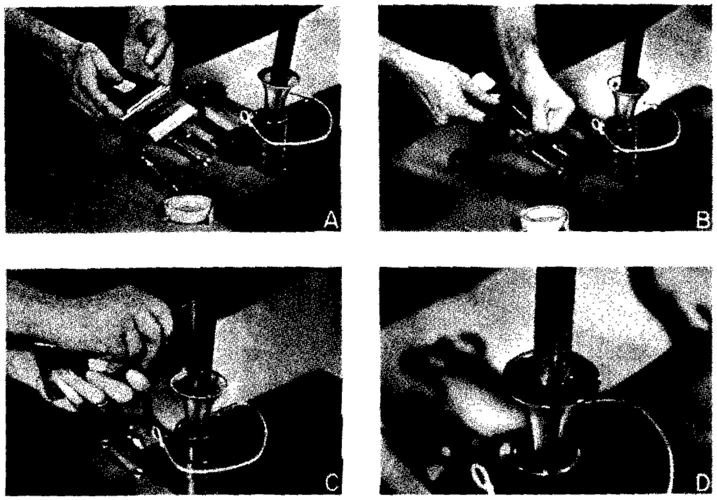


3. Sealing the termination

A. Remove the clip which separates the two parts of the plastic bag by pulling it off to one side.

Caution: Do not tear or cut the plastic bag.

B. Mix the two materials in the bag by kneading or squeezing it from one end of the bag to the other until it is a consistent uniform color.

Caution: Do not delay after mixing is started. The filler will begin to harden in about ½ hour.

C. Cut off one corner of the bag to make an opening about ½ inch long. Pour the contents of the bag into the upper end of the Wescone until the housing is completely filled. The cable should be supported so that it will hold its position for at least 2 hours so that the epoxy filler will have time to harden completely. This can be accomplished by clamping the end of the cable to the high voltage bushing terminal.

D. After a few minutes, settling and possible slight leakage may cause a shrinkage in the cone, and if necessary the rest of the epoxy filler in the bag may be used to fill the Wescone.

After the filler has hardened, the cable termination is complete.

Westinghouse Electric Corporation
Transformer Division • Sharon, Pa.

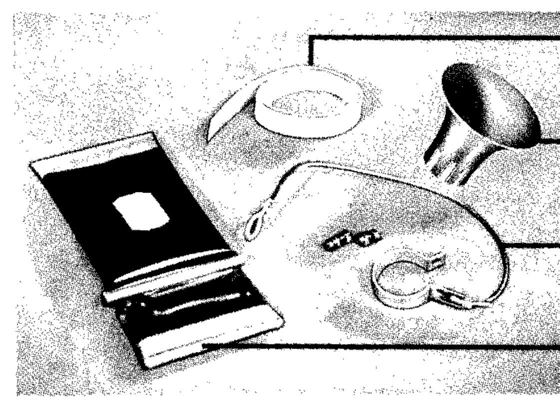
Instructions for Wescone® Westinghouse Prefabricated Stress Cone for Cable Termination

I.T. 10142-C

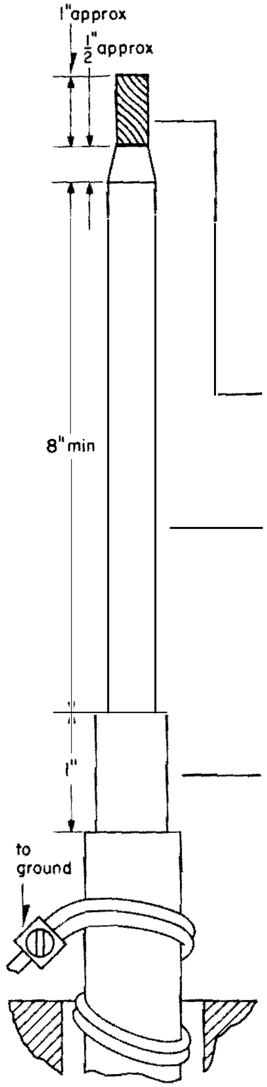
The Wescone is a prefabricated stress cone designed to eliminate the conventional method of building up a stress cone by hand taping.

It consists of a tinned copper shield designed to slip over the end of the cable. The tinned copper strap can be used to build up small diameter cables to fit the Wescone. The hose clamp uniformly compresses the slotted end of the Wescone to the cable shield or conducting surface. An epoxy filler provides the insulation between the cone and the cable.

The Wescone can be used on any rubber or polyethylene insulated cable, with either the copper shield or concentric neutral. It can be applied on systems with voltages up to 15 Kv (95 Kv BIL). The maximum size cable on which the Wescone can be used is determined by the inside diameter of the Wescone which is available in three sizes with inside diameters of 1⅛ inches, 1⅝ inches, and 2⅛ inches. The size of the Wescone would determine the diameter over the cable shield or the semi-conducting surface.



Effective April 1, 1965
supersedes I.T.10142-B dated April 7, 1964



Assembly of the Wescone

The assembly of the Wescone for proper cable termination consists of three separate steps:

1. Preparing the cable.

2. Fitting the Wescone in place.

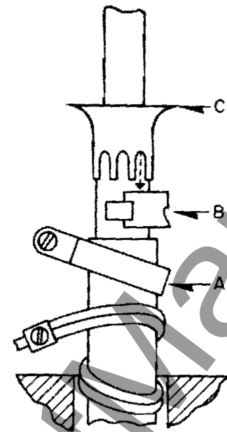
3. Sealing the termination with an epoxy resin filler.

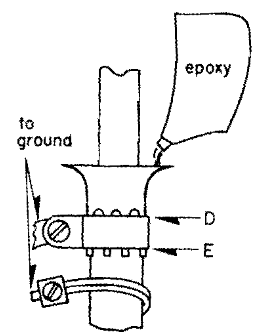
1. Preparing the cable

A. Strip about 1 inch of the cable insulation from the conductor to provide a place for attaching to the terminal connector. Chamfer the insulation adjacent to the bare conductor.

B. Below the bare wire, remove the shielding, jacket, semi-conductor, or any other overlaid conducting material, for a distance of at least 8 inches, leaving only the insulating material on the conductor. *Caution:* Be sure that the remaining insulation is free from all residue, but do not cut or nick the insulating material.

C. Below the bare insulation there must be at least 1 inch of the shield exposed to provide a smooth conducting surface. This may be foil, metal tape, a conducting rubber surface, or a lead surface. It must NOT be the concentric neutral wires. On concentric neutral cables, the outside wires must be bent back approximately 1 inch below the conducting surface, secured in a normal manner, and later grounded.





2. Fitting the Wescone in place

A. Slide the hose clamp over the cable and let it rest freely at the lower end of the cable.

B. Attach one end of the copper strap with an adhesive tab at about the center of the 1 inch conducting surface on the shield.

C. Wind the copper strap tightly around the shield until it fits snugly inside of the Wescone.

Note: This operation can be made easier by dropping the Wescone down when the copper strap is built up to the approximate inside diameter of the Wescone. One of the slots of the Wescone will fit over the copper strap. The Wescone can then be turned to continue the process. Wind in the copper strap to fill the Wescone completely. When it is snug, cut off the rest of the copper strap near the Wescone and turn the cone slightly to enclose the loose end.

D. Bring the hose clamp up over the Wescone and fasten it by means of the nut and bolt provided. Place it so that the opening under the screw is midway between two slots on the Wescone. This will help to seal off the joint around the bottom and reduce the amount of leakage of the epoxy.

E. Tape the bottom end of the Wescone and the grounding strap to avoid leakage of the epoxy filler at this point.

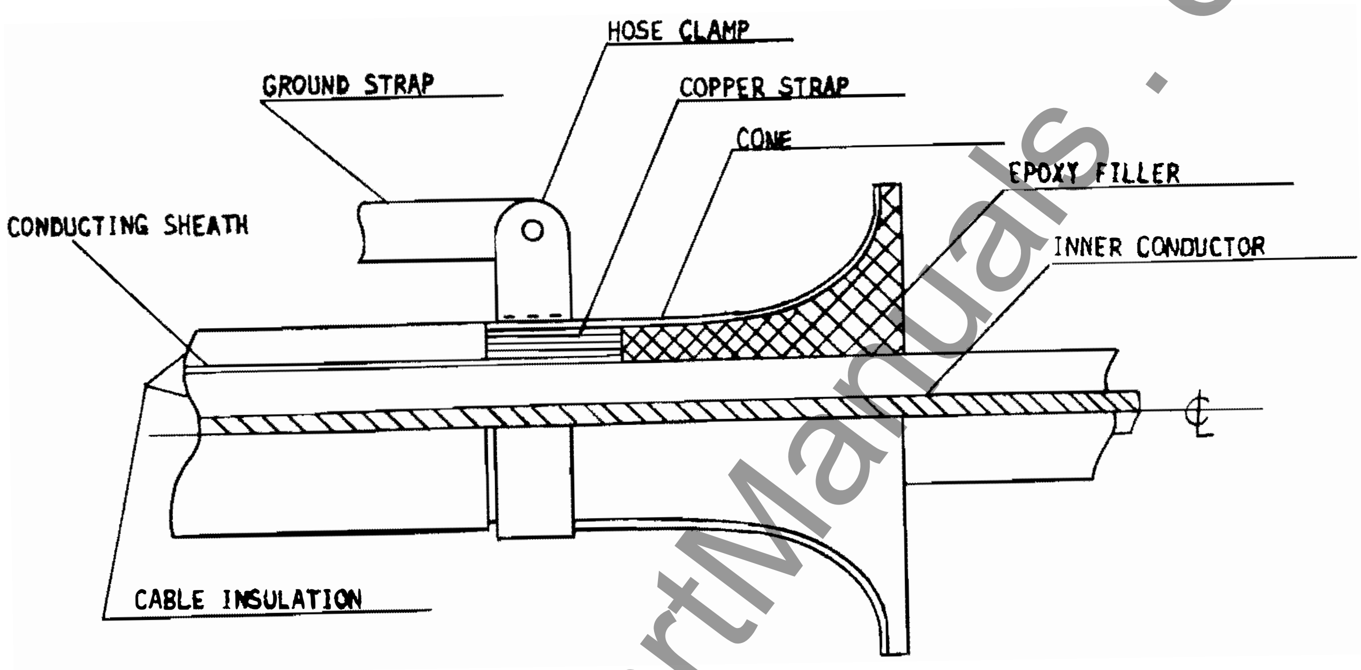
W E S C O N E

A Prefabricated Stress Cone for Cable Termination by Westinghouse

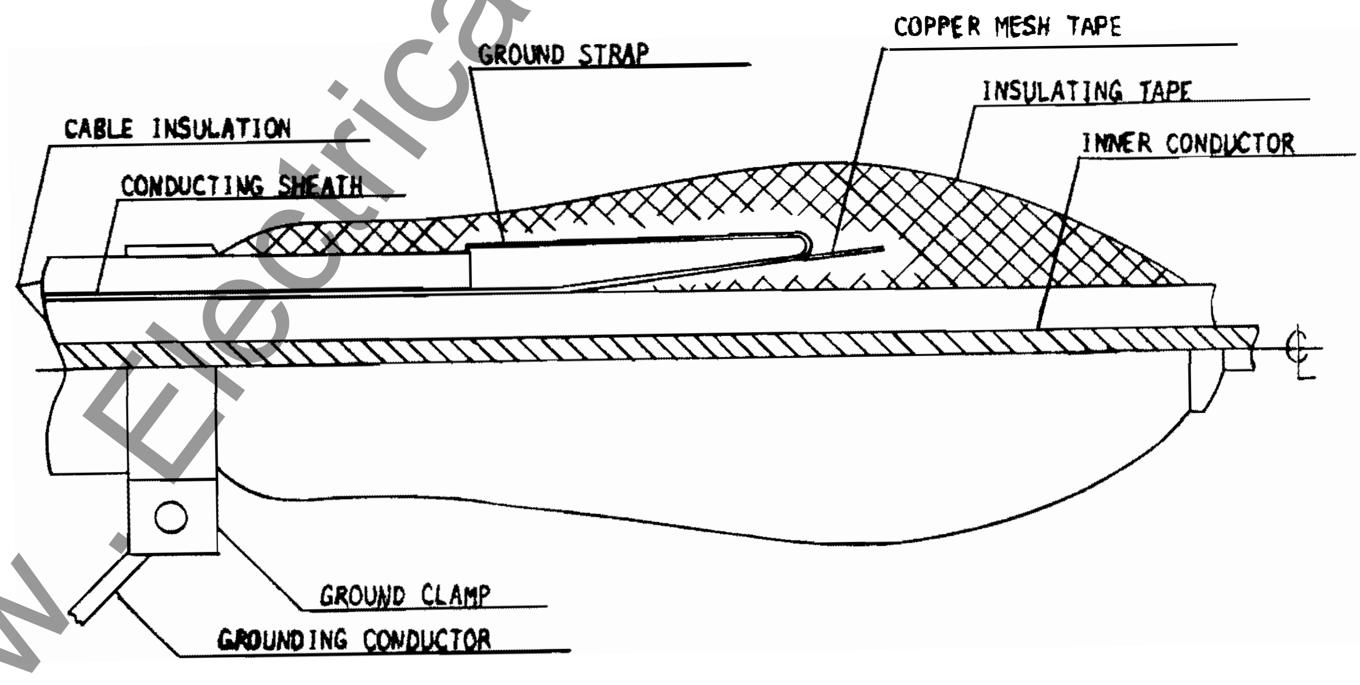
A growing demand for underground distribution has led to increased usage of shielded cable. This type of cable, either rubber or polyethylene-insulated, must be terminated with some sort of "cone" to prevent insulation failure or corona. Conventional hand-made stress cones - even those made with specially prepared "kits" - require careful, time consuming taping with both conducting and insulating tapes. The Wescone was developed by Westinghouse to provide a quick and effective method of shielded cable termination. It shapes the electric field to put minimum voltage stress on the cable insulation; it requires the smallest possible space for application and installation of the cone.

The entire installation can be made in a few minutes with simple hand tools and is ready for service immediately. A funnel-shaped shield is designed to slip over the end of the cable. A hose-type clamp is used to hold this shield in place against the cable. Then a special epoxy compound is poured into the funnel-shaped piece to complete the stress cone. For smaller cables a conducting strap is provided to build up the cable diameter to fit the Wescone. All conducting parts are tin-plated copper to eliminate corrosion and provide a low resistance ground path. The epoxy filler provides rigidity as well as homogenous insulation between the cone and cable. Figure 1 shows cross-sections of both the Wescone and a conventional taped stress cone. The significant difference between the two is the shape of the conducting cone. Comparison of the two flux plots

FIGURE 1



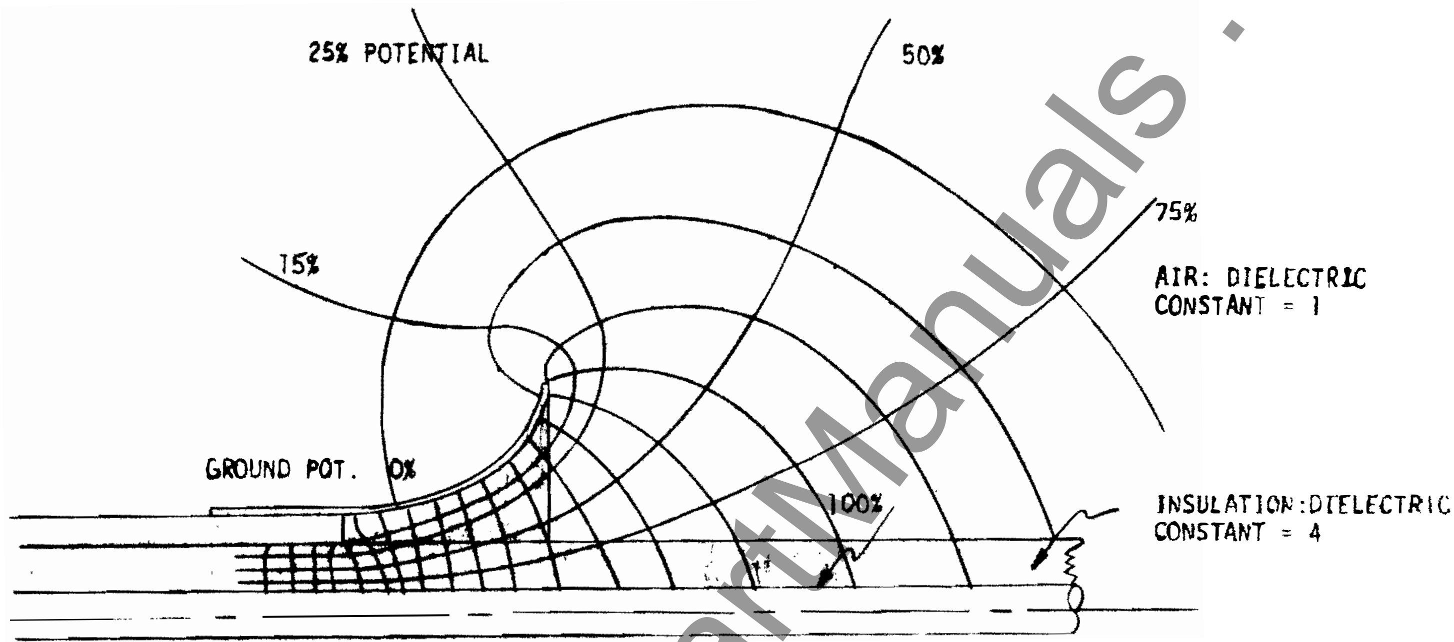
WESCONE STRESS CONE



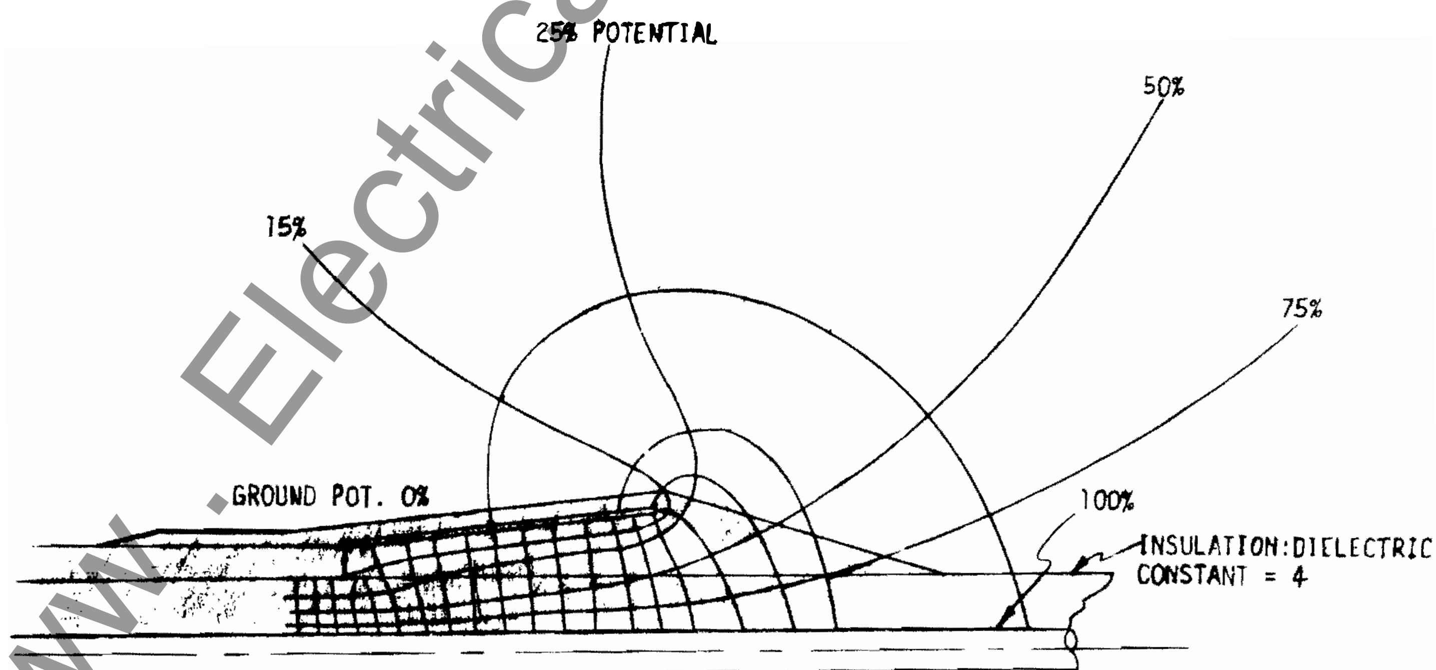
CONVENTIONAL STRESS CONE

FIGURE 2

ELECTROSTATIC FIELD - WESCONE



ELECTROSTATIC FIELD - TAPED STRESS CONE



(Figure 2) reveals severe "crowding" of equipotential lines at the outer rim of the taped cone. It is at this point of highest potential gradient that the conventional cone is subjected to the greatest voltage stress. Insulation failure and corona damage are much less likely with the Wescone's inherently better shape. This ideal shape can not be attained with the conventional taping method.

There are also some differences in the actual field that do not appear in the flux plot. These exist in extremely small areas, and are impossible to describe graphically. Stresses are increased at points on the conducting cone that are not smooth. Thus, the overlapping conducting tape of the conventional cone is more likely to produce localized stress points than the one-piece cone of the Wescone. Also, the insulating tape used in the conventional stess cone is likely to have many small air pockets between layers. At these pockets the field stress abruptly increases in inverse ratio to the dielectric constants of the two materials. Thus, the stress is many times greater in the air pocket than in nearby insulation. This could lead to corona formation in the air pockets. Although the short-time strength of an insulation structure may not be affected by the presence of corona, its life may be drastically reduced by the effects of corona discharges.

The validity of the electric field comparisons is confirmed by the results of the following tests:

I. Corona (Table I)

A Biddle Corona Test Set was used for measuring the Corona Starting Voltage, which is the lowest applied voltage that will cause corona discharge. Measurements were made on the Wescone and fabricated stress cone, using the same type and size cable.

TABLE I

Corona Starting Voltage Measurements

Cable with No Stress Cone	4.5 KV
Cable with Fabricated Stress Cone	9.0 KV
Cable with Westinghouse Stress Cone	14.5 KV

II. Radio Interference (Table II)

R.I.V. measurements were made according to ASA-NEMA Standards with a Ferris Radio Noise and Field Strength Meter. In addition to giving a measure of radio interference, R.I.V. measurements also give an indication of the relative magnitude of the corona discharge.

TABLE II

R.I.V. Measurements

Applied Voltage (K.V.)	R.I.V. (Micro-Volts) Westinghouse Stress Cone	R.I.V. (Micro-Volts) Fabricated Stress Cone
8.0	0	0
9.0	0	7
12.0	0	7-10
14.5	0-5	10-12
16.0	5-10	15-20
17.0	10-20	40-50
18.0	20-40	50-100
20.0	40-50	100-200

III. Overvoltage (Table III)

The Wescone was subjected to a series of high voltage tests by the Union Electric Company of St. Louis, Missouri. The cable used was #2 AWG Polyethylene Insulated 12 KV concentric cable, 7 strand uncoated copper conductor with semi-conducting tape, 220 mils of HMW polyethylene insulation, 30 mils of semi-conducting polyethylene jacket for ten #12 AWG tinned copper wires concentrically applied.

TABLE III

Test Result	Result
44 KV, 60 cps	No failure after 800 hours.
80 KV, 60 cps	Flashed to ground, no failure.
44 KV, 60 cps	No failure after 400 hours.

The test was discontinured after a total of 1200 hours at 44 KV with no failures.

The advantages of the Wescone may be summarized as follows:

1. It is easier to assemble and requires less time and labor.
2. It has a more uniform insulation structure, less subject to faults of workmanship.
3. It requires less skilled labor.
4. In comparison with even the best of hand-built stress cones, it has an inherently lower electrostatic stress, a lower corona or R.I.V. level at its normal operation voltage.