

PRESSURE TESTING

ASPHALT-FILLED VERTICAL PLUGS

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1. GENERAL

1.01 This section describes the methods of constructing various types of vertical asphalt-filled pressure testing plugs in paper-insulated cables for aerial or underground installation. This section replaces Section G50.671.1, Issue 1, which is cancelled.

1.02 This issue replaces Issue 1 in which the wrong drawing had been included on page 2.

1.03 The plugs described herein are not applicable to use on coaxial cables, cables containing video pairs, nor on disc-insulated spiral-four cables.

2. PREPARATION OF MATERIALS

2.01 **The Precautions** pertaining to the heating of asphalt and wax discussed in Section G73.150.1 should be observed in carrying on the operations outlined herein.

2.02 **The Cotton Sleeving, Houseline and Muslin** called for in these practices should be prepared as outlined in Section G73.150.1.

3. CABLES ENTERING VERTICAL SLEEVE FROM BOTH ENDS—PRESSURE FROM BELOW

Plugs for Cables Up to 1-1/4 Inches Diameter—Made Horizontally

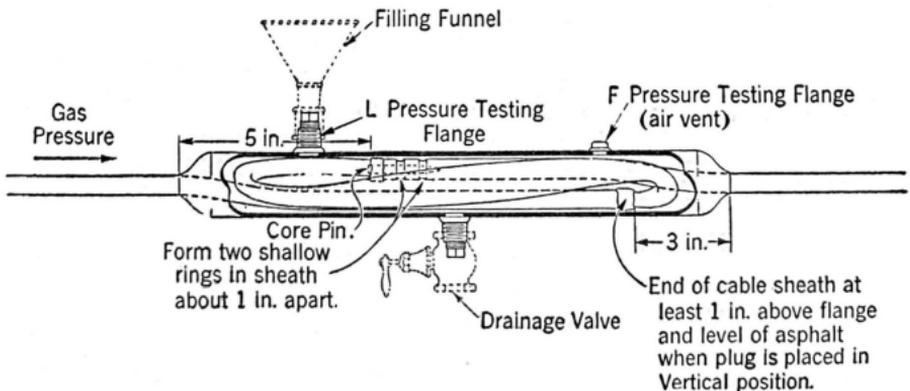
3.01 The vertical plug described herein (made horizontally as illustrated under Paragraph 3.03) is designed to be effective where the pressure is applied from below. It is suitable for lead cables up to about 1-1/4 inches diameter and may be used where an adequate length of cable is available to permit folding the core in the sleeve as shown. This type plug is not suitable for use on polyethylene sheath cables.

3.02 **Preparation of Cables:** Approximately 16 inches of sheath should be removed, the ends of the sheath wrapped with cotton tape, the core wrapping paper removed and the conductors ballooned. Core pins of the sizes shown below should be inserted in the cables ends, as specified.

TABLE I

Diameter of Cable	Lead Sleeve		Core Pin		Depth of Rings
	Diam.	Length	Diam.	Length	
1/2 in. to 3/4 in.	2 in.	15 in.	1/8 in.	4 in.	1/32 in.
over 3/4 in. to 1 in.	3 in.	15 in.	3/16 in.	4 in.	1/16 in.
over 1 in. to 1-1/4 in.	3-1/2 in.	15 in.	1/4 in.	4 in.	3/32 in.

3.03 Two rings of the depth indicated above should be formed in the sheath at the low pressure end using the cable sheath constrictor. The rings should be spaced 1 inch apart. The exposed core should then be loosely served with cotton sleeving with the turns about 1/2 inch apart, using a lock stitch to keep the turns in place.



3.04 **Preparation of Sleeve:** A lead sleeve of the diameter and length indicated in Table I should be prepared and equipped with pressure testing flanges as shown in the illustration. The sheath at the high pressure end should project about 1 inch beyond the F flange.

3.05 **Impregnating Core:** After wiping the sleeve in place, attach a drainage valve to the bottom flange and fill the sleeve with No. 1 Pressure Plug Wax heated to a temperature of 350°F. It is desirable to start impregnating the core as soon as possible after the joints have been wiped. The sleeve should be kept filled until the temperature of the wax as measured by a thermometer through the filling hole has dropped to 200°F. The valve should then be opened allowing the wax to drain.

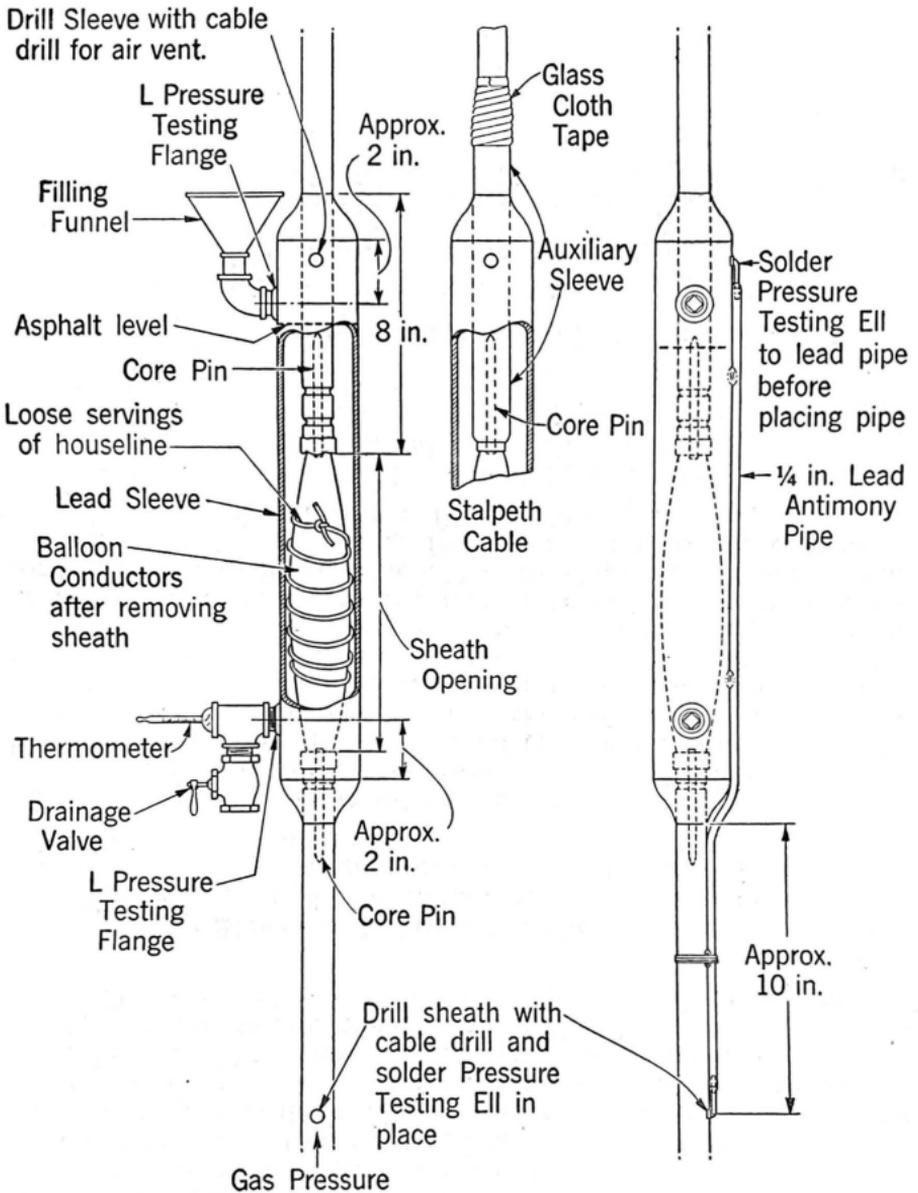
3.06 **Filling Sleeve with Asphalt:** When the sleeve has completely drained, the threads of the bottom flange should be cleaned and the flange closed with an L flange plug coated with pipe joint compound.

3.07 Approximately 15 minutes after draining the sleeve (12 minutes at 32°F.; 9 minutes at 0°F.) fill the sleeve with No. 1 Pressure Plug Asphalt heated to a temperature of 200°F. to 220°F. While pouring asphalt in the funnel the wiped joints should be tapped with a cable dresser to force out any air that may be trapped in the ends of the sleeve. Pouring should be continued slowly, keeping the funnel full until the flow from the funnel into the sleeve has almost ceased at which time no more asphalt should be added. At this stage the funnel should be removed without waiting for the asphalt to settle further and this flange closed with a flange plug.

3.08 The sleeve should be placed in a vertical position as soon as practicable, allowing the asphalt above the F flange to drain, after which the flange should be closed in the usual way.

Plugs for Cables of Any Diameter—Made Vertically

3.09 The plug illustrated on the following page is intended for installation in a vertical section of cable where the pressure is from below and the cable cannot be rearranged to permit making the plug in a horizontal position. This type of plug is suitable for use in either lead or polyethylene sheath cable.



3.10 The length of sheath to be removed is indicated in the following table. The ends of the sheath should be prepared as described in the following paragraphs, and then brought toward each other until the length of the opening is as indicated in the table.

TABLE II

Diameter of Cable	Length of Sheath to be Removed		Length of Opening After Ballooning Core	
	Lead Cable	Alpeth and Stalpeth Cable	Lead Cable	Alpeth and Stalpeth Cable
1/2 in. to 3/4 in.	9	11	8	10
over 3/4 in. to 1-1/2 in.	10	12	9	11
over 1-1/2 in. to 3 in.	11	13	10	12
over 3 in.	13	15	11	13

3.11 **Preparing Sheath Ends of Lead Cable:** The sheath ends of lead cable should be flared to prevent damage to the paper insulation on the conductors. Freshly boiled tape should be placed around the core of the cable at both ends of the opening, extending it under the sheath. The core wrapping paper should then be removed up to the cotton tape binding.

3.12 **Preparing Sheath Ends of Alpeth Cable:** Follow the instructions given in Section G50.616.3 on preparing alpeth sheath ends. Then place two half-lapped layers of glass cloth tape extending over a 5-inch length of the sheath measured from the sheath end at each end of the opening. The bonding ribbon should be formed over the glass cloth wrapping.

3.13 Place an auxiliary sleeve and construct a wrapped joint between the outer end of the auxiliary sleeve and the sheath at each end of the opening as described in Section G50.679.3. Use a 12-inch length auxiliary sleeve at the top of the plug to provide sufficient length for the cable to extend 8 inches inside the main sleeve as shown in the illustration in Paragraph 3.09. At the inside end of the auxiliary sleeves, cover the exposed wrapping of DR tape and 1 inch of sleeve with two 1/2-lapped layers of DR tape. Then cover the DR tape with one half-lapped layer of glass cloth tape.

3.14 **Preparing Sheath Ends of Stalpeth Cable:** Follow the instructions given in Section G50.616.4 on preparing stalpeth sheath ends. Then place two 1/2-lapped layers of glass cloth tape extending over a 5-inch length of the sheath measured from the sheath ends at each end of the opening.

3.15 Place an auxiliary sleeve and construct a wrapped joint between the outer end of the auxiliary sleeve and the sheath at each end of the opening as described in Section G50.679.7. Use a 12-inch length auxiliary sleeve at the top of the plug. A wiped joint should be used between the terne plate and the inside end of the auxiliary sleeve instead of a soldered joint.

3.16 **Core Pins** of the sizes indicated in Table III are required in lead and stalpeth sheath cable. For alpeth cable use pins one size larger in diameter. The pins should be prepared and inserted in the usual way. Two rings should be

formed in the sheath of lead cable at each end in the same manner as described for horizontal type plugs in Section G73.151.1. Then serve the core with boiled houseline as shown in the sketch in Paragraph 3.09.

TABLE III

Diameter of Cable	Diameter of Pin		Length of Pin	Depth of Rings
	Lead and Stalpeth Cable	Alpeth Cable		
1/2 in. to 3/4 in.	1/8 in.	3/16 in.	4 in.	1/32 in.
over 3/4 in. to 1 in.	3/16 in.	1/4 in.	4 in.	1/16 in.
over 1 in. to 1-1/4 in.	1/4 in.	5/16 in.	4 in.	3/32 in.
over 1-1/4 in. to 1-1/2 in.	5/16 in.	3/8 in.	6 in.	1/8 in.
over 1-1/2 in. to 1-3/4 in.	3/8 in.	1/2 in.	6 in.	5/32 in.
over 1-3/4 in. to 2 in.	3/8 in.	1/2 in.	6 in.	3/16 in.
over 2 in. to 2-1/2 in.	1/2 in.	5/8 in.	6 in.	7/32 in.
over 2-1/2 in. to 3 in.	5/8 in.	3/4 in.	6 in.	1/4 in.
over 3 in.	3/4 in.	7/8 in.	6 in.	5/16 in.

3.17 A lead sleeve of the size shown in Table IV should be prepared and equipped with L flanges as shown in the sketch. A vent hole should also be drilled in the sleeve as shown. The sleeve should then be placed as shown and the joints wiped.

TABLE IV

Diameter of Cable	Inside Diameter of Sleeve	Length of Sleeve	
		Lead Cable	Alpeth or Stalpeth Cable
1/2 in. to 3/4 in.	2 in.	20 in.	20 in.
over 3/4 in. to 1 in.	2-1/2 in.	22 in.	20 in.
over 1 in. to 1-1/4 in.	3 in.	22 in.	20 in.
over 1-1/4 in. to 1-1/2 in.	4 in.	22 in.	20 in.
over 1-1/2 in. to 1-3/4 in.	4-1/2 in.	24 in.	22 in.
over 1-3/4 in. to 2 in.	*5 in.	24 in.	22 in.
over 2 in. to 2-1/2 in.	*5-1/2 in.	24 in.	22 in.
over 2-1/2 in. to 3 in.	*6 in.	24 in.	22 in.
over 3 in.	*7 in.	26 in.	24 in.

* Use Extra Strength Lead Sleeve

3.18 The filling and drainage flanges should be equipped with the fittings and tools as indicated.

3.19 **To impregnate the core of lead cable** pour three or four dippers of wax heated to a temperature of 350°F. (25° higher at 32°F. air temperature; 40° higher at 0°F. air temperature) through the plug with the drain valve open, allowing the wax to drain from the valve into a pot. Then the valve

should be partially closed and adjusted so that a thin stream of wax flows into the pot. Hot wax (350°F.) should now be poured in rapidly enough to fill the sleeve, after which the pouring should be continued keeping the sleeve full and the rate of drainage adjusted to a point where a reading of 265°F. (or above) is obtained on the thermometer. The drain valve should then be closed.

3.20 The temperature of the wax should then be kept within the range of 250° to 265°F. for a period of 15 minutes, by opening the drainage valve as necessary and adding sufficient hot wax to the sleeve to keep it filled. Then, with the drain closed, the temperature should be permitted to drop as rapidly as it will, the sleeve being kept full by the addition of hot wax.

3.21 When the thermometer reaches 200°F. or slightly below, the valve should be opened until all the wax has drained out of the sleeve. Then the thermometer and drainage valve should be removed. The flange at the bottom should be sealed with an L flange plug having the threads coated with pipe joint compound or its equivalent.

3.22 **To impregnate the core of polyethylene sheath cable** the same procedure as outlined in Paragraphs 3.19 to 3.21 is followed except that a lower temperature is used. Heat the wax to a temperature of 300°F. (25° higher at air temperatures of 32°F. or lower). The temperature of the wax in the sleeve should be maintained within a range of 225°F. to 240°F. for the same period of impregnation.

3.23 **Filling Sleeve with Asphalt:** Approximately 15 minutes (12 minutes at 32°; 9 minutes at 0°F. air temperature) after the sleeve is drained it should be filled with No. 1 Pressure Plug Asphalt heated to a temperature of 200° to 220°F. Approximately 12 to 15 pounds of asphalt are required for filling a 6-inch diameter by 22-inch plug sleeve. This material will flow into the sleeve very slowly due to its consistency at the specified temperature. Under no condition should the asphalt be admitted to the sleeve at a temperature above the 220°F. specified.

3.24 Asphalt should be poured into the funnel to the level of the air vent. During the operation the lower wiped joint should be tapped with a cable dresser to force out any air that may be trapped at the end of the sleeve. Then the pouring should be continued slowly, maintaining the asphalt level indicated until the flow from the funnel into the sleeve has almost ceased at which time no more asphalt should be added.

3.25 The flange should then be sealed in the usual manner.

3.26 Install a 1/4-inch lead pipe from the air vent hole near the top of the sleeve to a hole drilled in the sheath approximately 10 inches below the sleeve, connecting the lead

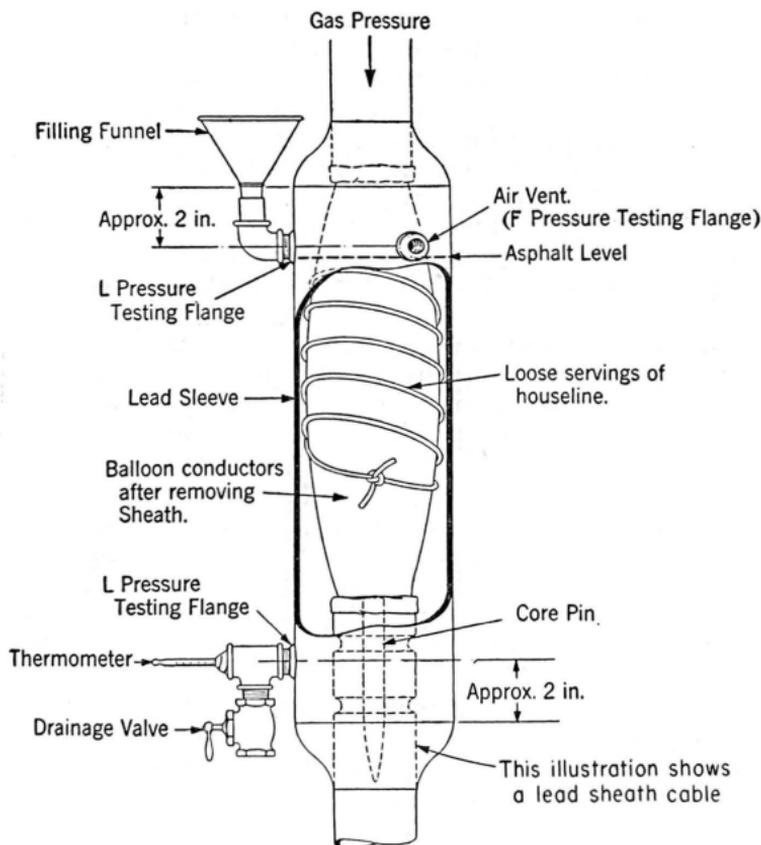
pipe to the drilled holes by means of copper ells. This pipe will allow the pressure in the cable and in the top of the lead sleeve to become equalized.

3.27 Where polyethylene sheath cable is involved, complete the auxiliary sleeve splice on alpeh cable as described in Section G50.680.3, and on stalpeh cable as described in Section G50.680.1.

4. CABLES ENTERING VERTICAL SLEEVE FROM BOTH ENDS—PRESSURE FROM ABOVE

Plugs for Cables of Any Diameter—Made Vertically

4.01 The plug illustrated in the following is intended for installation in a cable where the pressure is from above and the cable cannot be rearranged to permit making the plug in a horizontal position. This type of plug is suitable for use in either lead or polyethylene sheath cable.



4.02 The length of sheath to be removed is indicated in Table II, Paragraph 3.10. The ends of the sheath should be prepared as described in Paragraphs 3.11 to 3.15 and then brought toward each other until the length of the opening is as indicated in Table II.

4.03 A core pin of the diameter and length indicated in Table III, Paragraph 3.16, should be prepared and inserted in the usual way at the lower end of the plug. In lead sheath cable form two rings over the core pin in the usual manner. Then wrap the core with houseline as shown in the preceding sketch.

4.04 A lead sleeve of the size shown in Table V should be prepared and equipped with F and L flanges, as shown in the above sketch. The sleeve should be placed as shown and the joints wiped.

TABLE V

<u>Diameter of Cable</u>	<u>Diameter of Sleeve</u>	<u>Length of Sleeve</u>	
		<u>Lead Cable</u>	<u>Alpeth or Stalpeth Cable</u>
1/2 in. to 3/4 in.	2 in.	15 in.	12 in.
over 3/4 in. to 1 in.	2-1/2 in.	17 in.	13 in.
over 1 in. to 1-1/4 in.	3 in.	17 in.	13 in.
over 1-1/4 in. to 1-1/2 in.	4 in.	17 in.	13 in.
over 1-1/2 in. to 1-3/4 in.	4-1/2 in.	20 in.	15 in.
over 1-3/4 in. to 2 in.	*5 in.	20 in.	15 in.
over 2 in. to 2-1/2 in.	*5-1/2 in.	20 in.	15 in.
over 2-1/2 in. to 3 in.	*6 in.	20 in.	15 in.
over 3 in.	*7 in.	22 in.	17 in.

* Use Extra Strength Lead Sleeve

4.05 The filling and drainage flanges should be equipped with the fittings and tools indicated.

4.06 The plug should be impregnated with wax and filled with asphalt in the same manner as outlined in Paragraphs 3.19 to 3.26, inclusive.

Plugs for Cables of Any Diameter—Made Horizontally

4.07 The plug illustrated in the following sketch is intended for installation in a cable where the pressure is from above and the cable can be arranged in a horizontal position while the plug is being made. Except for the position of the cable and the flanges on the sleeve, the plug is made in the same manner as that described in Paragraphs 4.01 to 4.06.

