PLASTIC JOINTS
END PLATE KITS
COAXIAL CABLE SYSTEMS

CONTENTS PAGE

1. GENERAL

1.01 This section describes the tools, materials, and methods for making Plastic Steel® joints used to close splices in repeater manholes of the Coaxial Carrier Systems.

1.02 This section is reissued to include information pertaining to the newly designed R, S, T, and U end plate kits.

1.03 Plastic steel joints are used where multiple cables entering a splice make the use of wiped joints impractical. The seal is made by injecting a thoroughly mixed two-part Plastic Steel compound (epoxy resin and steel powder) into a cavity in the splice sleeve between a lead end plate and a temporary cap placed over the end of the sleeve.

*Plastic Steel manufactured by Devcon Corp., Danvers, Mass.

2. TOOLS AND MATERIALS

2.01 Tools and materials required to make a Plastic Steel joint are listed in Table A.

3. PRECAUTIONS

3.01 ***The chemicals in Plastic Steel may have an irritating effect on the user. Exercise care to keep the material away from the eyes and avoid inhaling the vapors as much as possible. Plastic Steel may produce skin irritation similar to that caused by creosote. Follow the precautions outlined in Section 637-241-011 on plugging compounds when using Plastic Steel.***

3.02 After the Plastic Steel (Type A) has been injected, do not disturb the joint or apply pressure for 12 hours. This permits the plastic steel to cure and assures a gastight seal.

3.03 Store Plastic Steel in a heated space for 24 hours before use when outside temperatures are below freezing.

3.04 ***Heat from a heat lamp or similar source shall be applied to the sleeve before injecting the Plastic Steel and to the joint during the initial 2 hours of the 12 hour curing period when the ambient temperature is below 60°F. Plastic Steel Type A will not cure properly at temperatures below 55°F.***

4. PREPARATION OF CABLES AND LEAD SLEEVES

4.01 With a D cable drill, drill two holes in the lead sleeve approximately 150 degrees apart (12 o'clock and 5 o'clock positions) and 1 inch from one end of the lead sleeve, as shown in Fig. 1.

4.02 Screw a D pressure flange into each hole and solder in place.

Note: The holes may be drilled and flanges placed at any convenient work location outside the manhole.

TABLE A

TOOLS AND MATERIALS FOR MAKING
PLASTIC STEEL JOINTS

TOOL OR MATERIAL	DESCRIPTION
Caulking Gun	Open frame type of caulking gun suitable for handling bulk materials, and using a disposable cartridge. May be obtained locally.
Cartridge	Disposable plastic or cardboard with plastic tip.
Mixing Paddle	Steel paint paddle (one quart size) or steel bar approximately 1 inch wide by 1/16 inch thick by 12 inches long. Obtain locally.
D Cable Drill	For drilling hole through lead sleeve for D pressure flange.
Plastic Steel®, Type A	Available in 1- or 4-pound containers as a 2-part compound with hardening agent in a separate container. Requires thorough mixing just prior to use. Manufactured by Devcon Corp.
Plastic Steel®, Type SF	Fast setting for leak repairs in Plastic Steel joints. Each pack contains 1 pound of Plastic Steel SF and proper amount of hardening agent.
D Pressure Flange	Tinned brass flange sealed with a C pressure flange plug.
C Pressure Flange Plug	For sealing D pressure flange.
End Plate Kit, B through U (except I and O)	End plate kits consist of a lead end plate, a rubber disc, a cloth disc, and a C split sleeve clamp. See Table B for sizes and application. A typical end plate kit is illustrated in Fig. 2.
Soldering Iron	For tack soldering Cable sheaths to lead end plates.

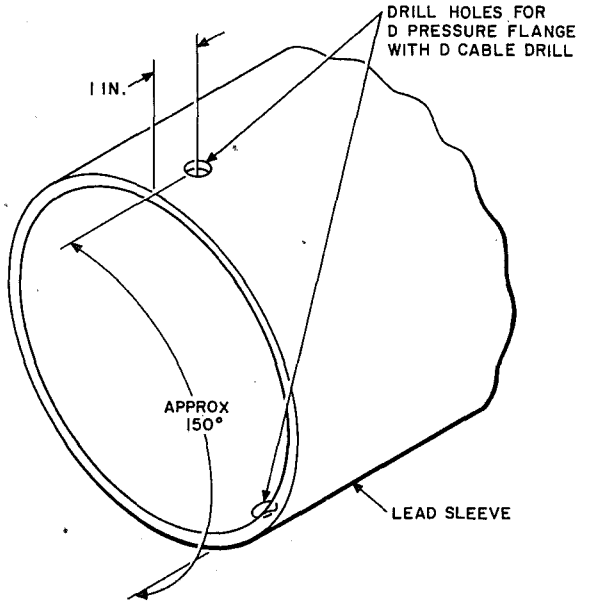

Fig. 1—Location of Holes for D Pressure Flange in Lead Sleeve

4.03 Place a lead disc over the main cable end of the splice opposite the end where the plastic steel joint is to be made and slide the disc back from the splice area. Place the prepared lead sleeve over the cable(s) and slide the sleeve back from the splice area away from where the plastic steel joint will be made. Where sufficient room is not available to slide the sleeve, a split sleeve must be used.

4.04 Select the proper end plate kit from those listed in Table B. Form the ends of the cables where the plastic steel joint is to be made so that they fit the holes in the lead end plate.

Following is the order in which the items of the end plate kit should be placed on the cables where the plastic steel joint is to be made:

1. C split sleeve clamp
2. Cloth disc
3. Rubber disc
4. Lead end plate

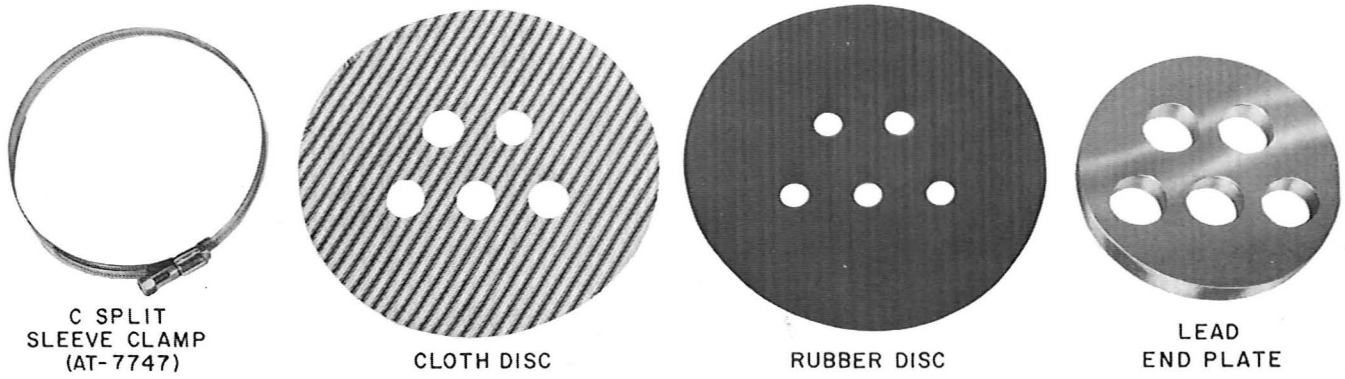

Fig. 2—End Plate Kit—Typical

TABLE B

END PLATE KITS AT-8392

SYSTEM	MAIN CABLE TUBES	END PLATE KIT	END PLATE DIAMETER (INCHES)	APPLICATION
BASIC MANHOLE				
L4/L5	12	Wiped Joint		3—66A2-4 Cable Terminals
L4/L5	18	R	7	4—66A2-4 & 1—66A2-2 Cable Terminals
L4/L5	20	B	7	5—66A2-4 Cable Terminals
L4/L5	22	H	7	5—66A2-4 & 1—66A2-2 Cable Terminals
L4/L5	12	Wiped Joint		3—100A1-4 & 1—100B1-4 Cable Terminals
L4/L5	18	Wiped Joint		5—100A1-4 & 1—100B1-4 Cable Terminals
L4/L5	20	Wiped Joint		5—100A1-4 & 1—100B1-4 Cable Terminals
L4/L5	22	Wiped Joint		6—100A1-4 & 1—100B1-4 Cable Terminals
REGULATING MANHOLE				
L4/L5	12	F	6.5	6—66A2-2 Cable Terminals
L4/L5	18	S	7	9—66A2-2 Cable Terminals
L4/L5	20	C	7	10—66A2-2 Cable Terminals
L4/L5	22	M	7	11—66A2-2 Cable Terminals
L4/L5	12	G*	5	1—100B1-4 & 6—100A1-4 Cable Terminals
L4/L5	18	T	5	9—100A1-4 Cable Terminals
L4	20	E	5	10—100A1-12 Cable Terminals
L5	20	U	5	10—100A1-4 Cable Terminals
L4/L5	22	J	5	11—100A1-4 Cable Terminals

* Early G end plate kits had six holes of 0.68 inch diameter to accommodate 100A1-12 cable terminal stubs.

TABLE B (CONTINUED)

SYSTEM	MAIN CABLE TUBES	END PLATE KIT	END PLATE DIAMETER (INCHES)	APPLICATION
EQUALIZING MANHOLE				
L4/L5	12	P	7	12—66A2-1 Cable Terminals
L4/L5	18	D	7 (Note 1)	9—66A2-1 Cable Terminals
L4/L5	20	D	7	10—66A2-1 Cable Terminals
L4/L5	22	L	7	11—66A2-1 Cable Terminals
L4	12	—	—	12—100A1-12 Cable Terminals (Note 2)
L5	12	N	5	12—100A1-4 Cable Terminals
L4	18	E	5 (Note 1)	9—100A1-12 Cable Terminals
L5	18	E	5 (Note 1)	9—100A1-4 Cable Terminals
L4	20	E	5	10—100A1-12 Cable Terminals
L5	20	U	5	10—100A1-4 Cable Terminals
L4	22	K	5	11—100A1-12 Cable Terminals
L5	22	J	5	11—100A1-4 Cable Terminals
T4M MANHOLES				
T4M	8	Wiped Joint		2—66A2-4 Cable Terminals
T4M	12	Wiped Joint		3—66A2-4 Cable Terminals
T4M	18	R	7	4—66A2-4 & 1—66A2-2 Cable Terminals
T4M	22	H	7	5—66A2-4 & 1—66A2-2 Cable Terminals
T4M	8	Wiped Joint		2—100A1-4 & 1—100B1-4 Cable Terminals
T4M	12	Wiped Joint		3—100A1-4 & 1—100B1-4 Cable Terminals
T4M	18	Wiped Joint or G (Note 1)		5—100A1-4 & 1—100B1-4 Cable Terminals
T4M	22	Wiped Joint or G		6—100A1-4 & 1—100B1-4 Cable Terminals

Note 1: Plug one hole.

Note 2: End plate kit not available.

In slipping the rubber disc over the stub cables, exercise care to prevent tearing. Slide the end plate kit items back on the cables to where they will not interfere with making the splice (Fig. 3).

4.05 Place C or D coaxial markers on each coaxial tube. Prepare and splice the coaxial tubes and the voice-frequency pairs.

4.06 After the splicing is completed, slide the lead end plate to within 1 inch of the end of the stub cable sheaths, then tack-solder each cable sheath to the lead end plate. The end plate must be perpendicular to the cables before tack-soldering (Fig. 4). Using B cleaning fluid and a clean cloth, thoroughly clean the lead end plate and the cable sheath ends in the area where

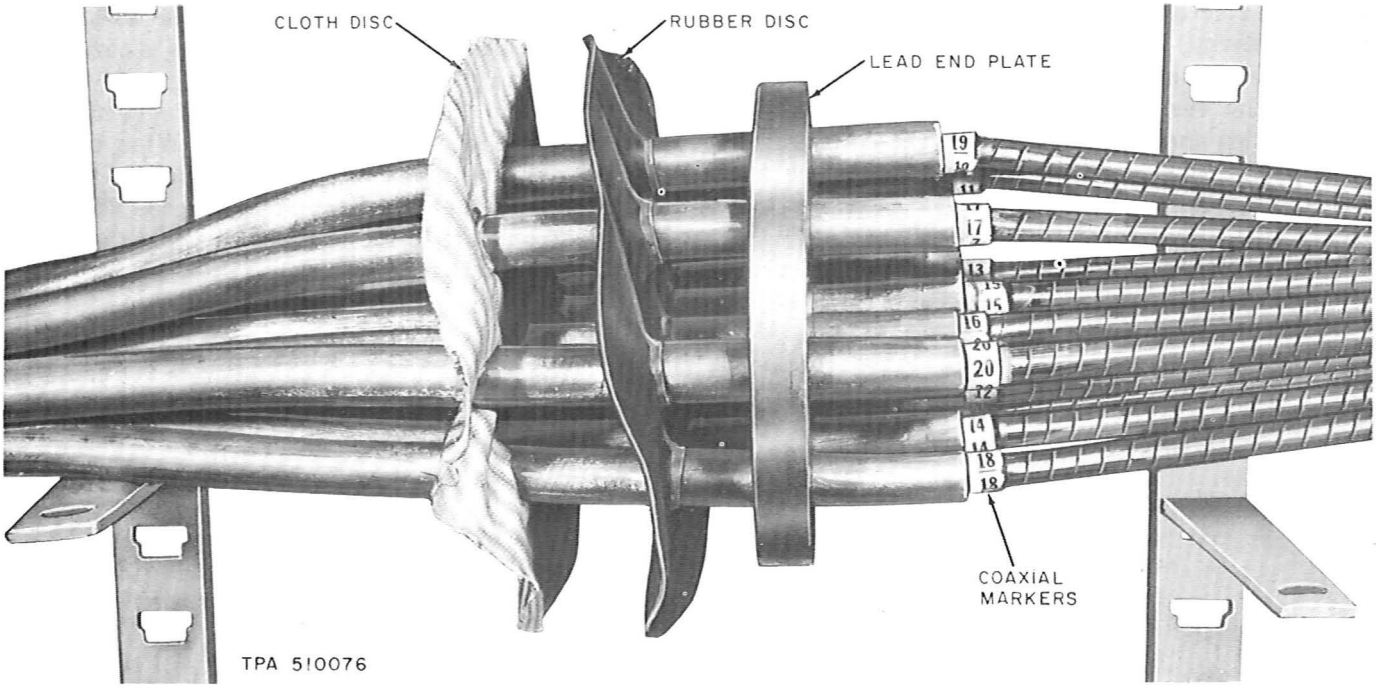

Fig. 3—End Plate Kit Items Placed on Cables

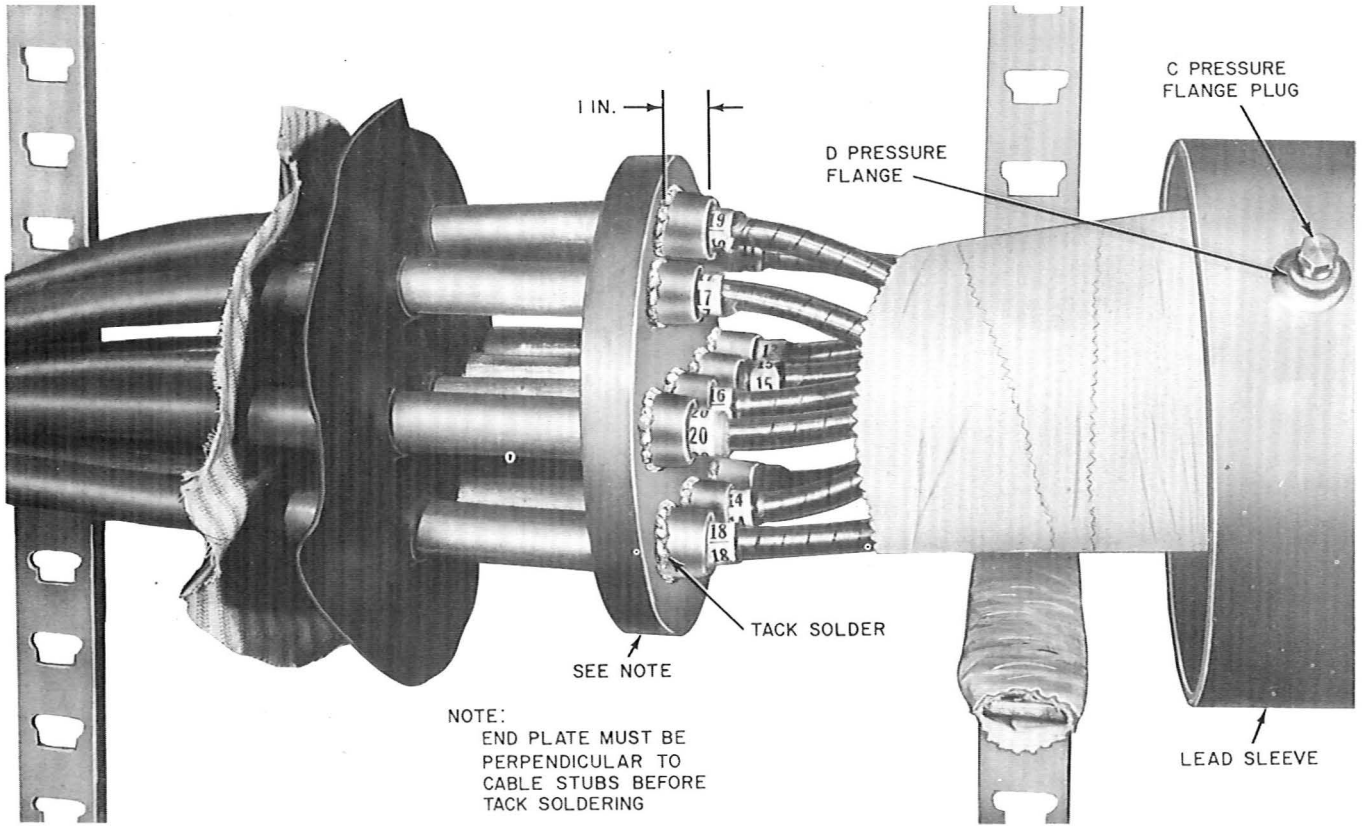

Fig. 4—Cable Sheaths Tack-Soldered to End Plate

the plastic steel joint is to be made. After tack-soldering and cleaning, place a turn of B sealing cord over the end of each stub cable sheath (Fig. 5). Press the cord into the space between the end plate holes and the stub cables. The cord prevents the plastic steel from running into the splice when it is injected.

4.07 Slide the lead sleeve over the splice and over the plastic joint lead end plate so that the outer face of the lead end plate is 1-3/8 inches inside the lead sleeve. Beat the lead sleeve down on the end plate with a cable dresser. On the end opposite the plastic steel joint, slide the lead disc into the end of the sleeve. Wipe the end plate, sleeve, and cable as described in the 633 Division of the Bell System Practices. This will provide support to the lead sleeve while the plastic joint is being made.

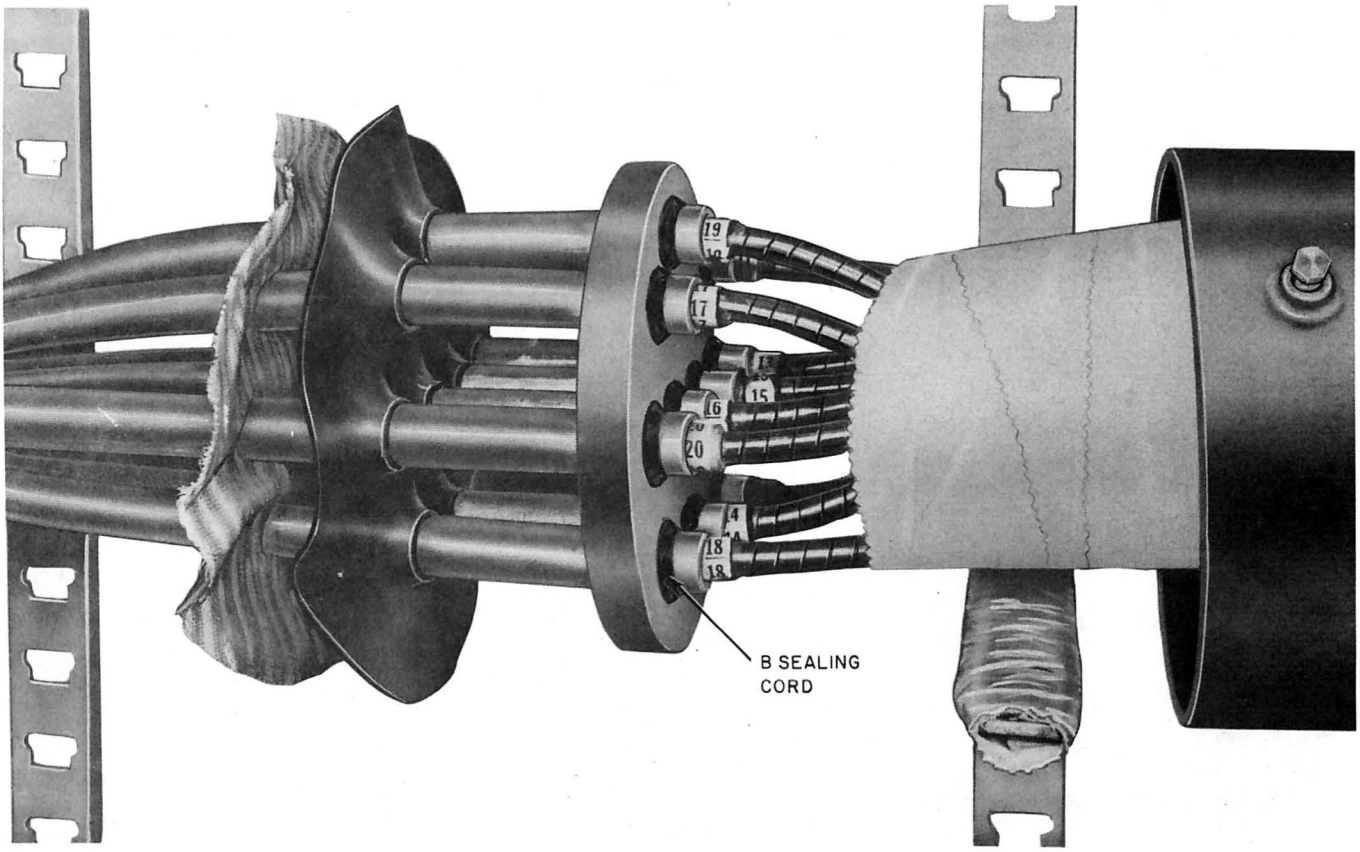

Fig. 5—B Sealing Tape Applied to Stub Cables

4.08 Slide the rubber disc into the end of the lead sleeve, then slide the disc back out flush with the end of the lead sleeve so that the lip of the rubber disc around each cable is pointing toward the lead end plate (Fig. 6). This prevents the plastic steel from flowing out when it is injected.

Caution: Move the rubber disc carefully, gradually working it forward on the cables. Keep the disc at right angles to the cables to prevent tearing.

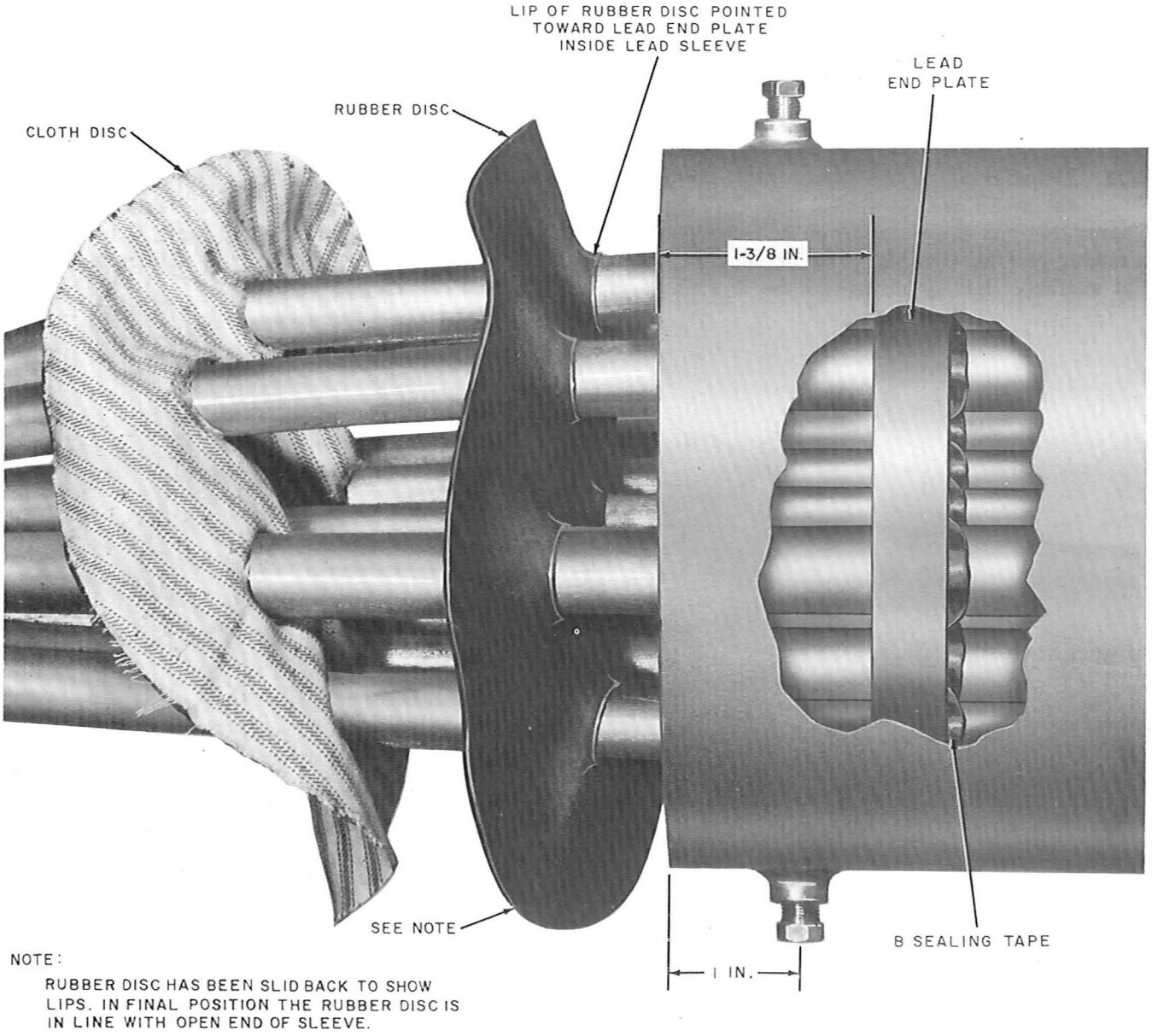

Fig. 6—Lip of Rubber Disc Pointed Toward Lead End Plate

4.09 Slide the cloth disc up against the rubber disc, being careful not to disturb the position of the rubber disc. Slide the C split sleeve clamp over the rubber and cloth discs and tighten with the screw provided in the clamp (Fig. 7). Firmly anchor the lead sleeve with a strap or by other suitable means.

5. MAKING THE SEAL

5.01 ▶Be sure that sufficient plastic steel material is available to fill the joint. Two 4-pound containers are required to seal joints with a B, C, D, F, H, L, M, N, P, R, or S end plate kit. One 4-pound container is required to seal joints with E, G, J, K, N, U or T end plate kits. At least 10 disposable cartridges should be on hand ready for filling.◀

5.02 Transfer all of the plastic steel material in the small can (hardener) into the large can. Thoroughly mix the materials in the large can using a mixing paddle, or mixing may be done on a clean flat surface. Mixing must be done in an ambient temperature between 60 and 85°F. The plastic steel should not be exposed to below freezing temperatures for the 24 hours prior to its use. Use a heat lamp, if necessary, to obtain this temperature. The heat lamp should also be used to preheat the lead sleeve when the manhole air temperature is below 60°F. Higher temperatures result in shorter hardening times. Mixing Plastic Steel at temperatures below 60°F will probably result in a leaking joint. Mix until there are no lumps or evidence of unmixed hardening agent. In transferring and mixing the materials, frequently scrape the material from the walls of the can to ensure thorough mixing.

5.03 Fill the caulking gun cartridge with plastic steel using the mixing paddle. A clean stick or narrow putty knife may be used to push the plastic steel into the caulking gun cartridge and to release trapped air. The mixed plastic steel must be used in accordance with Table C to prevent hardening in the caulking gun. ***Do not attempt to refil cartridges.***

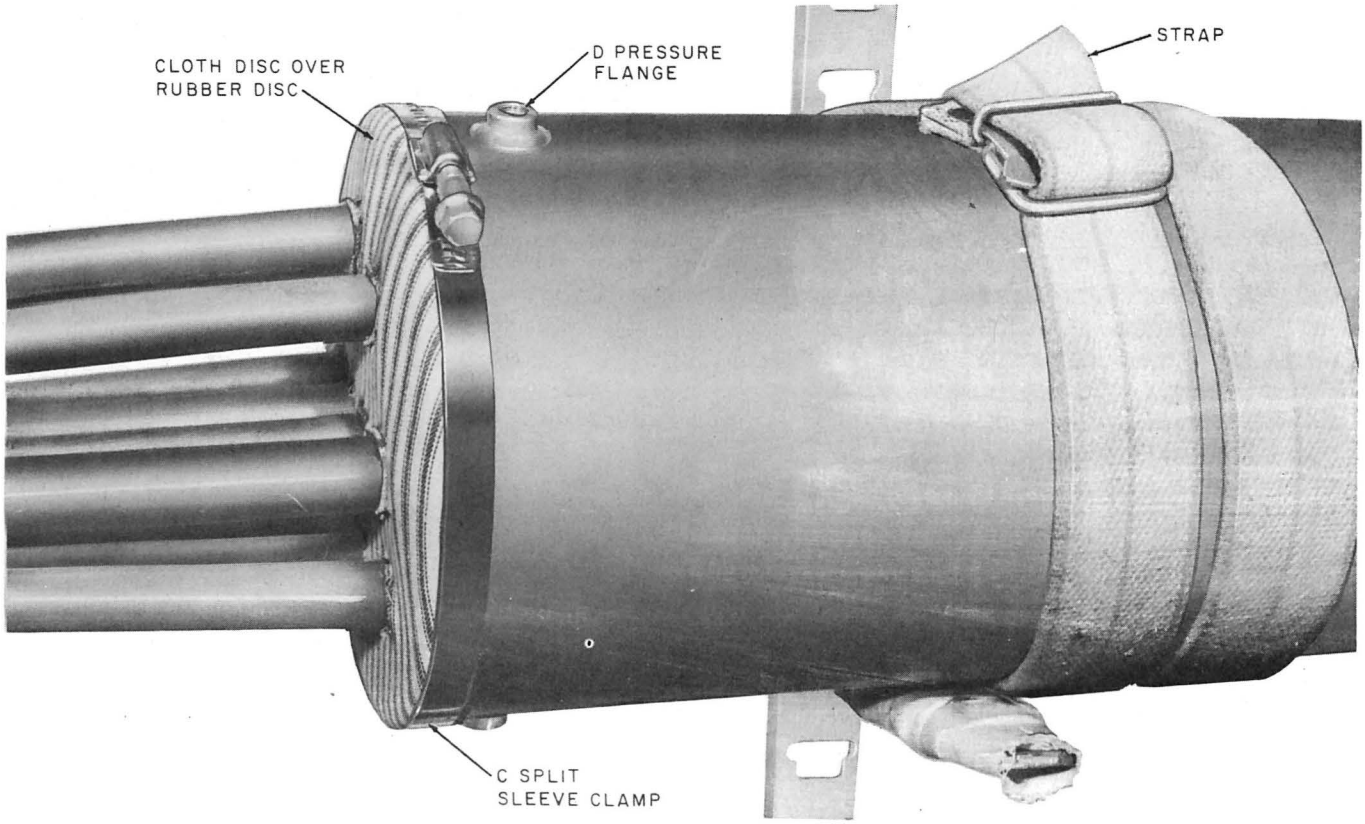

Fig. 7—Lead Sleeve Prepared for Injection of Plastic Steel

TABLE C

POT LIFE FOR MIXED PLASTIC STEEL	
TEMPERATURE DEGREES	POT LIFE (MIN.)
65	60
75	30-35
85	20

5.04 Screw the nozzle of the gun into the flange at the bottom of the lead sleeve (Fig. 8). Inject the plastic steel into the cavity between the lead disc and the rubber disc. After the second cartridge of plastic steel has been injected, gently knead the area around the cables through the cloth and rubber discs to assist the flow of plastic steel around the cables and to displace trapped air. Continue to knead the area around the cables as successive cartridges of plastic steel are injected into the cavity. Continue to inject until at least 1 inch of plastic steel appears at the flange at the top of the lead sleeve (Fig. 9).

5.05 Place a C pressure flange plug in the flange at the bottom of the lead sleeve. Wipe off the plastic steel that overflowed at the upper flange. Inject additional plastic steel into the upper flange until there is considerable resistance to the injection. Continue to knead the area (Fig. 10). Place a C pressure flange plug in the flange at the top of the lead sleeve.

5.06 ***Do not disturb the joint for 12 hours.*** At ambient temperatures below 60°F, direct two heat lamps at the joint (one from above and one from below) for a period of at least 12 hours. ***Do not pressurize the splice for the first 12 hours after injecting plastic steel.***

5.07 After a minimum of 12 hours, remove the C split sleeve clamp, the cloth disc, and the rubber disc. The completed plastic steel joint is shown in Fig. 11.

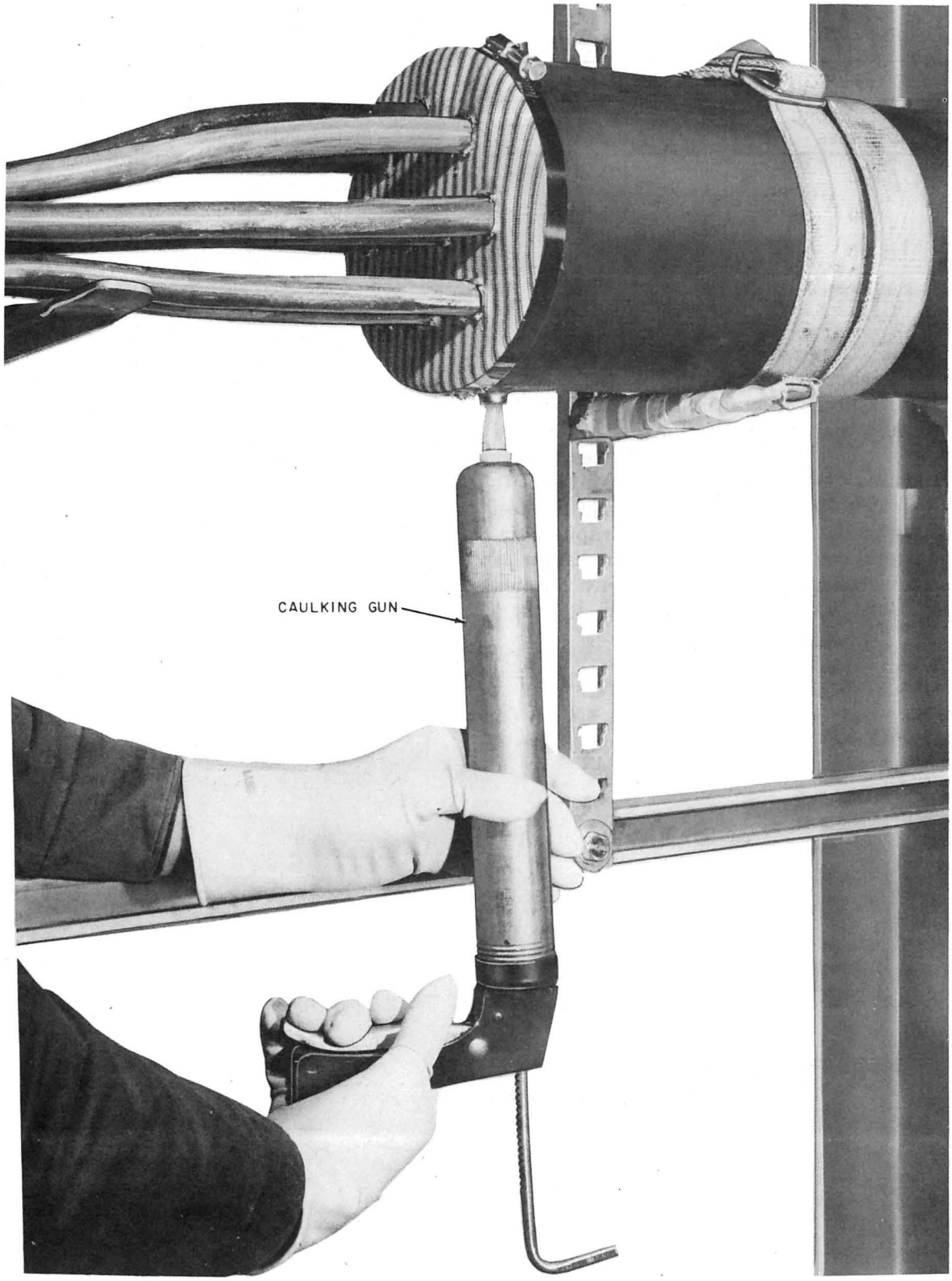

Fig. 8—Injecting Plastic Steel Into Bottom Flange

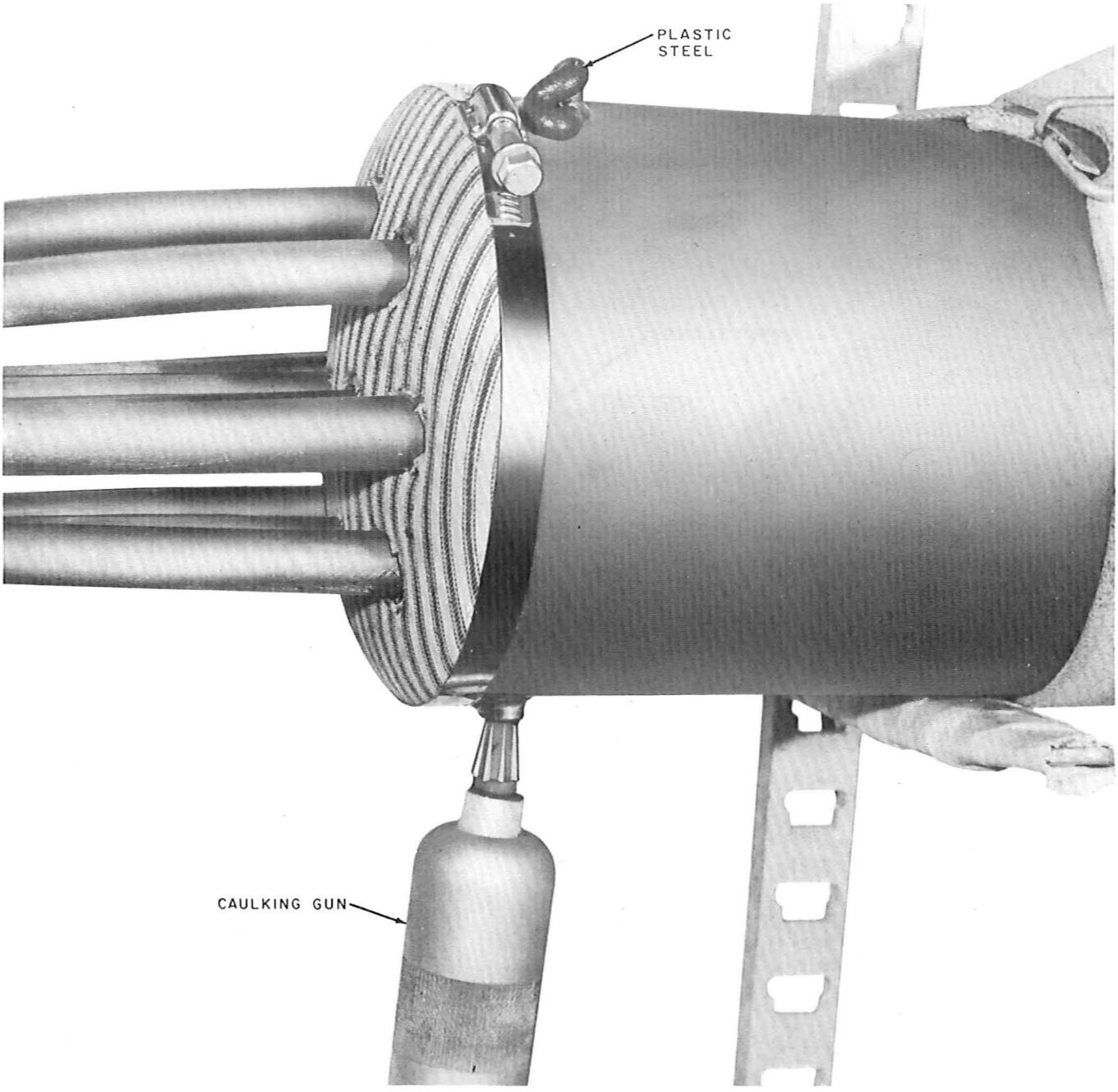

Fig. 9—Plastic Steel Appearing at Upper Flange

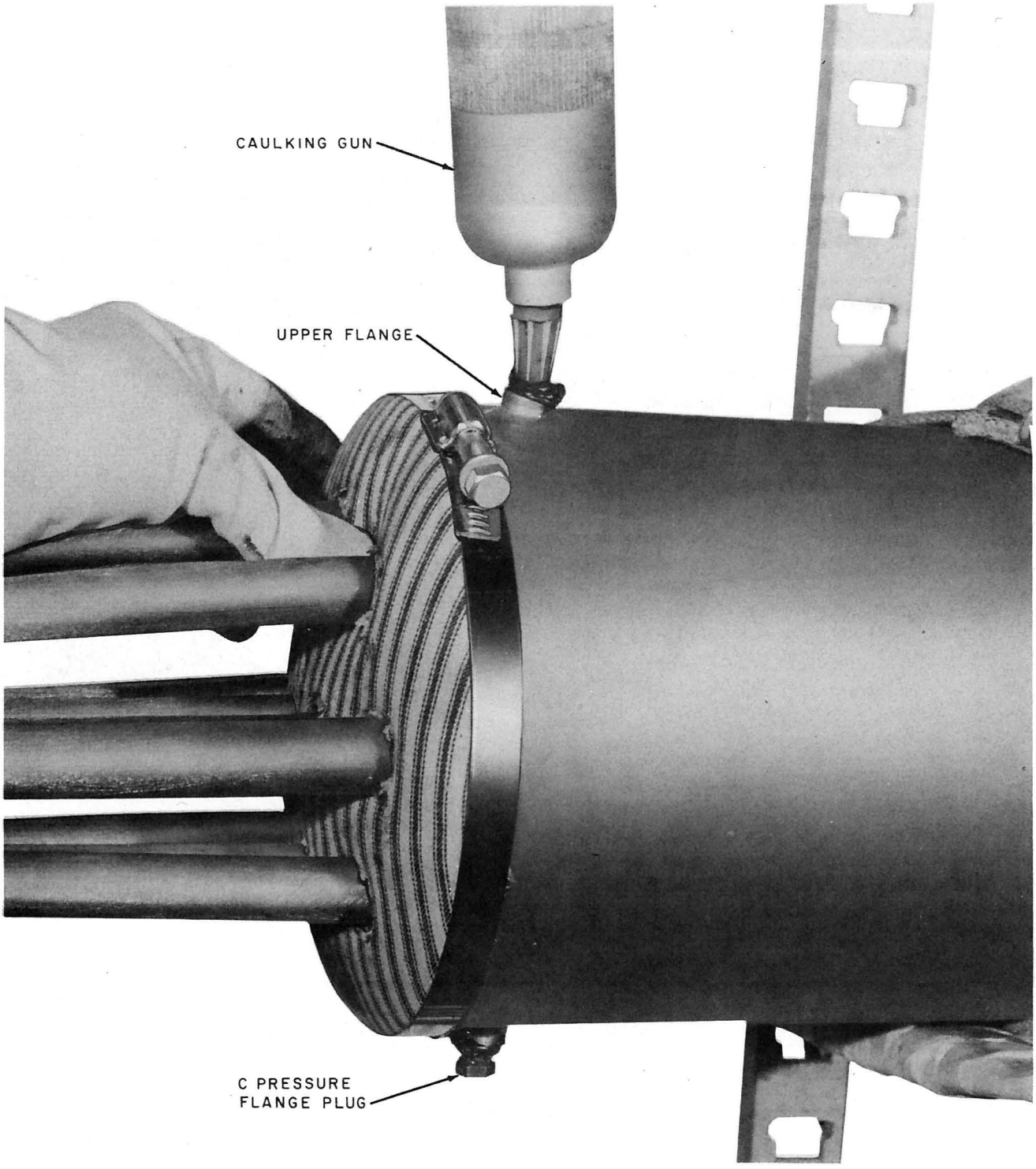

Fig. 10—Injecting Plastic Steel Into Upper Flange

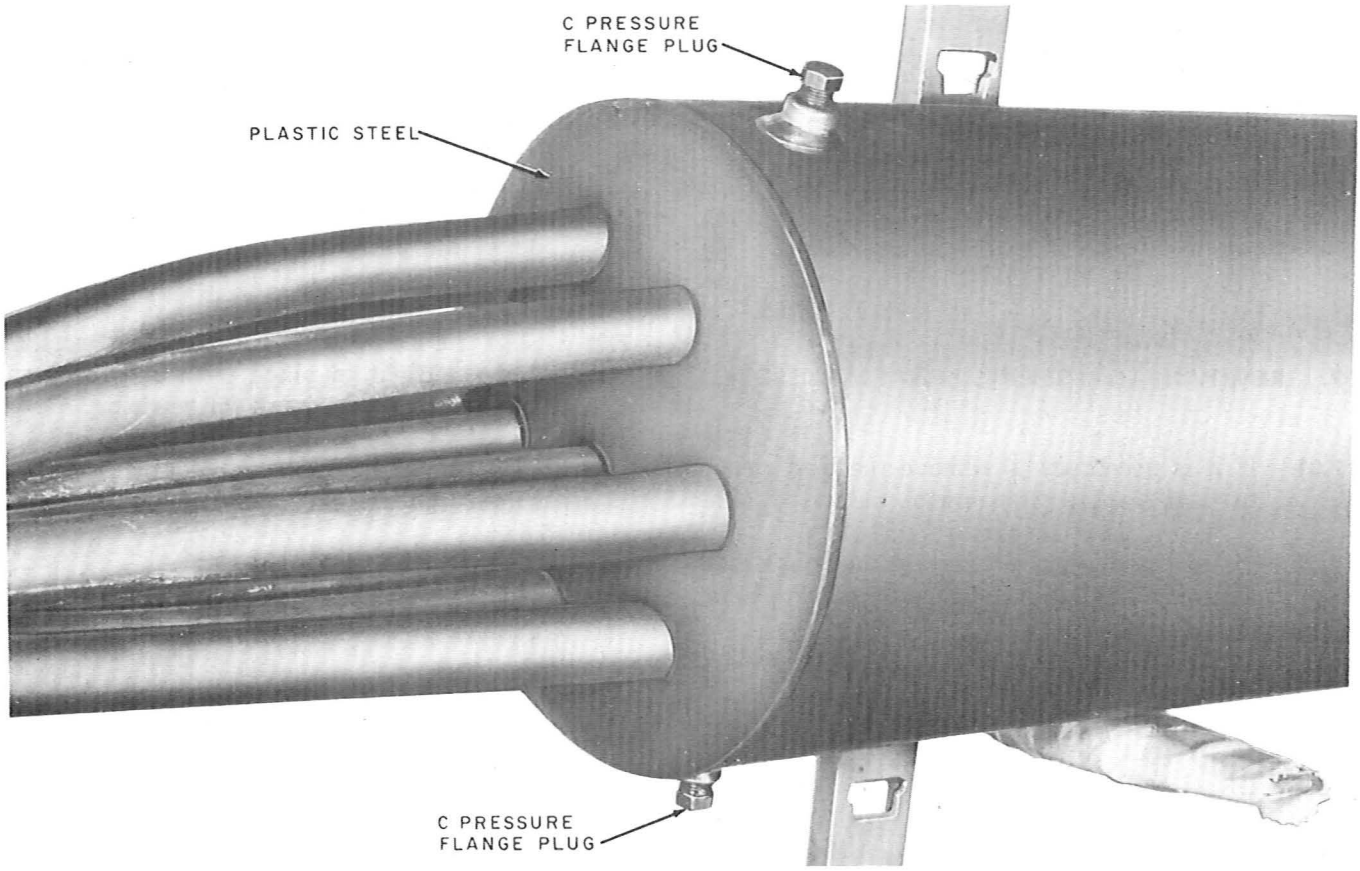

Fig. 11—Completed Plastic Steel Joint

6. FLASH TESTING AND REPAIR

6.01 After the plastic joint has cured for at least 12 hours, flash test the closure by applying pressure of 15 pounds until a back pressure of 9 to 10 pounds is obtained.

> ***Caution: D pressure transducers shall not be exposed to operating pressures over 10 pounds to prevent damage to the pressure sensing element. (Refer to Section 637-080-200 of the Bell System Practices.)***

6.02 Apply E pressure testing solution to the wiped and plastic joints. Check for leaks as indicated by bubbles.

6.03 If a leak occurs in the wiped end, release the pressure by removing the gas pressure fitting in the sleeve. Maintain pressure on all other sleeves and apparatus cases in the manhole. (See Section 637-305-303.) Rewipe the joint and repeat the flash test.

6.04 If a leak occurs in the plastic joint, release the pressure as in 6.03. Using a hand drill, drill out the area surrounding the leak to a depth of at least 1 inch. Remove all dust and plastic steel compound by blowing out with nitrogen. Thoroughly clean out the exposed void area with B cleaning fluid.

6.05 Mix a sufficient quantity of Plastic Steel (Type SF) as described in 5.02 to fill the void. The exact amount of hardener required by volume is: 1 part of hardener to 1 1/2 parts of Plastic Steel Type SF. Two measuring spoons are included with every package to assure the ***exact*** measurement of small quantities. Do not mix more than can be used in ***three minutes.*** Patch the void by applying the plastic steel with a putty knife or other suitable tool. Force the compound into the void until it fills all recesses. Working life is approximately 3 minutes at 70°F.

6.06 Plastic Steel Type SF will cure or harden at temperatures as low as 0°F and attains

full strength in about 4 hours at 70°F. However, 30 minutes after application, the joint can be flash tested and when leak free, pressure can then be restored.

6.07 Any rough areas on the patch can be smoothed out with sandpaper after the joint has cured.

7. REMOVING LEAD SLEEVES FROM PLASTIC JOINTS

7.01 If it is necessary to remove the lead sleeve to clear trouble, first unwipe the wiped joint.

7.02 Make a peripheral cut around the lead sleeve approximately 3 to 4 inches from the plastic joint end of the sleeve.

7.03 Slide the free length of lead sleeve clear of the splice opening while leaving the remaining short length of sleeve and plastic joint in place.

7.04 Clear the trouble and wrap the splice.

7.05 With the lead sleeve still clear of the splice, bevel the peripheral cut on both sides to prepare it for wiping.

7.06 Slide the sleeve back to its original position and secure it in place with a web strap. Prepare the original wiped end for rewiping.

7.07 First wipe the main cable end and then solder the peripheral seam with stearine core solder.

7.08 Flash test all joints and seams in the normal manner.