

Making Tight Joints in Vitrified Clay Sewer Lines

Editor MUNICIPAL ENGINEERING:

Sir—Better joints for vitrified clay pipe are now being made by pouring the joint material than is possible by the old hand-troweling method. Proof of this fact, together with the development of more satisfactory equipment for the pouring method, makes it advisable that all vitrified pipe lines, where lightness is requisite, should be installed with poured joints.

The permanence of vitrified clay pipe, due to its resistance to chemical and electrolytic attack, coupled with its high tensile strength, has inspired a vast amount of search for joining methods that would be worthy of the pipe. The answer is the poured joint.

Joint Materials

Either cement grout or bituminous joint materials may be used with entire satisfaction for the construction of poured joints. The choice must depend upon conditions. The bituminous materials (such as G. K. compound, made by the Atlas Company, or Filite, made by the Pacific Flush Tank Company) provide a quick setting joint that permits backfilling within a few minutes after the material is applied, while cement takes 24 hours or more to set. The bituminous joint has a certain amount of elasticity and is better for that reason wherever pipe is laid over refilled earth or wherever the pipe line is subjected to strains that tend to break it.

Poured vs. Troweled Joints

In comparing the two forms of cement joint, the poured and the troweled, the former will be found to have the following advantages:

1. Greater certainty of filling the pipe bell with joint material.
2. A denser cement when set.
3. More rapid operation.
4. Saving in joint material.
5. Less need for working space in trench.
6. A neater and more workmanlike job.
7. A cleaner operation from the workman's standpoint.

Of these advantages, Nos. 1 and 2 relate to the efficiency of the joint and Nos. 3, 4 and 5 to its economy. Nos. 6 and 7 may be regarded as sentimental advantages, but they are not so. Vitrified pipe installations have suffered in the past from ineffectual efforts of laborers and helpers, who were assigned to the task partly because it was dirty work.

The Form or Runner

Pouring of joints necessitates a form to retain the fluid joint material. For pouring bituminous materials, heated to fluidity, it has been customary to use the familiar asbestos runner, sometimes called a "snake runner."

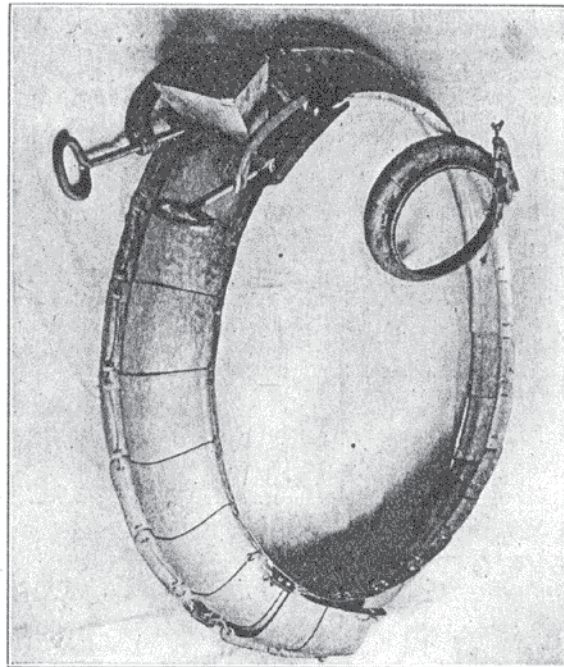
It has the shape of a section of asbestos rope, and is coupled around the spigot end of one pipe and pressed tightly against the bell of the pipe to be connected with it, after the bell has been caulked sufficiently to prevent the compound from entering the interior of the pipe line. Before pouring the heated compound, it is usually necessary to make a clay dam or funnel from excavated earth, surrounding the upper point of the joint where the compound is poured. The run-

ner retains the compound in the bell. It may be removed in a few minutes, when the material has hardened.

The latest device for retaining fluid joint materials is the Flex-Form mold here illustrated, invented by the writer and manufactured by the Wyatt Engineering Company, of Columbus, Ohio.

The Flex-Form

The Flex-Form consists of a series of overlapping sheet



VIEWS OF 24-IN. ADJUSTABLE AND 6-IN. FLEX-FORM MOLDS FOR POURED JOINTS IN CLAY PIPE SEWERS.

metal plates or "scales" strung on two steel cables of small diameter and provided with a clamp and a funnel. The clamp is so adjusted that three different sizes of Flex-Form are a sufficient equipment for all of the different sizes of vitrified pipe from 3 in. to 24 in. The funnel divides in two parts when the forms are uncoupled for removal.

When clamped in position for use the Flex-Form holds the spigot end of one pipe centered in the bell of the pipe next to it and retains the grout that is poured in the funnel. During the period of setting it protects the bond of cement against any moderate shock or strain.

Making Grout Joints

The process of making grout joints with the Flex-Form mold may be briefly described as follows:

Mix equal parts of Portland cement and clean, sharp sand in their dry state. After thorough mixing, add water to produce a consistency of thick cream. Satisfactory grout cannot be secured if water is added before the dry ingredients are thoroughly mixed. One per cent. of water-proofing compound adds a factor of safety, but is usually not regarded as necessary.

After due precautions with regard to bedding and alignment of the pipe, insert spigot in bell as far as it will go and caulk lightly with oakum that has been dipped in the grout. Use just enough oakum to prevent the joint material from entering the interior of the line. More than this may weaken the joint.

Dip the Flex-Form in oil to prevent adherence of grout. Before applying, make certain that there is enough space beneath the bell in the trench to permit free passage of the Flex-

Form under and around the bell. Clamp the Flex-Form in place and make certain of an even grip all around the bell.

Pour a little water into the funnel to promote free flow of grout. Then stir and pour grout until funnel is full. There will be a slight leakage between the leaves of the Flex-Form, which is a safeguard against air pockets or accumulation of water.

Removing Forms—Testing

Forms should not be removed for 24 hours, when the trench may be backfilled, unless it is desired to test the line, as required generally by sanitary codes. In the latter case, the setting period should be 48 hours, after which the joint should be impervious under any prescribed water or smoke test.

Use of Compounds with Flex-Form

The Flex-Form mold is also well adapted to bituminous joints. It has two advantages over the asbestos runner, a dependable funnel and a shape which insures a bevel of joint material outside the bell. In cold weather, bituminous compounds sometimes chill in the bell of the pipe and fail to fill it. The greater volume of material used in the Flex-Form tends to maintain temperature and fluidity until penetration is complete.

Contrast of Methods

In contrast with the foregoing methods, the hand-troweled joint depends for tightness upon the care with which cement is rammed into every portion of the bell. In a cramped posi-

tion in dark trenches liability to faulty workmanship is great. There is further liability on the part of the troweled joint material to run or sag during setting. Even where troweled joints are constructed with greatest care it is almost a certainty that the cement will be disturbed by manipulation of the pipe in making the next joint.

In the poured joint, gravity insures penetration of the joint material to the farthest recesses of the bell. The Flex-Form safeguards against running or sagging. Disturbance is avoided by placing all the Flex-Forms for the job (or day's work) before pouring the first one. They are then poured in succession and left to set.

Further, it is proven that a comparatively thin grout makes a denser joint substance, when set, than the relatively stiff mortar used in the troweling process.

Joints in Vertical Pipe

In vertical pipe lines the bell end of the pipe is placed uppermost, the spigot of the next pipe inserted and caulked and the joint material poured into the bell, which retains it during setting, without the aid of a runner.

In joining horizontal lines of small diameter pipe with a bituminous compound, it is common to join the pipe in couples or threes by this method and leave them standing upright until the material is cold. The two or three sections are then treated as single sections of longer pipe and joined to each other in the trench with the aid of a Flex-Form or asbestos runner.

Very truly yours,

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