

CertainTeed 

Technical Bulletin

September 10, 1974

TO: VF P&PG MARKETING & SALES PERSONNEL
DISTRICT MANAGERS
TERRITORY MANAGERS
ADMINISTRATIVE ASSISTANTS
A-C PRODUCT MANAGERS
A-C FIELD SERVICE MANAGERS
SALES ENGINEERS

FM: T. A. SWITALSKI *T. Switalski*

RE: FLEXURAL STRENGTH OF ASBESTOS-CEMENT SEWER PIPE

Our competition has for many years been selling A-C sewer pipe in 10 ft. lengths. Occasionally, we still encounter claims that our 13 ft. lengths of A-C sewer pipe are more likely to result in flexural failures. No flexural failures have occurred when our pipe was installed in accordance with our installation instructions. This bulletin is being issued to show some of the merits of 13 ft. lengths vs. 10 ft. lengths of A-C sewer pipe.

Flexural strength of pipe is not only a function of the pipe's diameter and wall thickness, it is also dependent upon the quantity and quality of the fibrous re-enforcement.

The flexural strength requirements for A-C sewer pipe are specified in ASTM C 428-73d. It specifies that an 8 inch Class 2400 sewer pipe of 13 ft. length will be able to support at least 2250 pounds (third point load on a 12 ft. span) and that a 10 ft. length will be able to support at least 3000 pounds (third point load on a 9 ft. span). In effect, the same pipe or one of equal flexural strength will support 75 percent of the load on a 12 ft. span that it will on a 9 ft. span. The previous ASTM 428-67 had been based on a 12 ft. span supporting 133 percent that of a 9 ft. span, thereby requiring a 13 ft. pipe to have a unit strength of 75 percent more than that of a 10 ft. pipe. Hence, the 13 ft. pipe length by the previous ASTM had considerably higher strength than was necessary.

The flexural requirement for 13 ft. pipe of 2250 pound minimum is adequate for pipe that is properly bedded. With bell holes dug out in the trench bottom so as to allow the pipe to rest evenly on its barrel along the flat trench bottom, or with pipe laid on earth mounds and then packed in tightly between the pipe bottom and the trench bottom to give the pipe adequate support, the pipe made according to ASTM C 428-73d will not break in flexure.

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The 10 ft. pipe, when placed in the ground as a loaded beam, will not bend as much as a 13 ft. pipe before breaking. For example, a 10 ft. pipe supported only on its couplings will break under an earth load of about 525 pounds, (a depth of cover of about 40") and will have a mid-point deflection of 0.17". A 13 ft. pipe so supported will break under an earth load of around 325 pounds (a depth of cover of about 26") but will have a mid-point deflection of 0.33". If the clearance under the pipe is less than 0.33" but more than 0.17"--a not unlikely possibility--than the 10 ft. pipe would break under a 40" depth of cover (525 pound load), but the 13 ft. pipe would not.

Another possibility for flex break can occur with an uneven trench bottom. As an example, say the pipe was laying over an unsupported span of 6 ft. Then the pipe would break in flex under an earth load of about 1190 pound/ft. (a depth of cover of about 8 ft.), and this would occur whether the pipe were 10 ft. long or 13 ft. long.

To further support the fact that the minimum flexural load on a 13 ft. pipe is adequate when it is 75 percent that of a 10 ft. pipe, refer to ASTM C 296, A-C Pressure Pipe. As an example with 6" Class 150 pipe, the minimum third point load on a 12 ft. span is 2100 pounds, whereas that on a 9 ft. span is 2800 pounds.

On July 16, 1973, the City of Broken Arrow, Oklahoma enacted a resolution to allow 4" and 6" A-C pipe not to exceed 10 ft. joints. In the case of Utility Supply vs. Broken Arrow, a judgement was rendered in the district court in and for Tulsa County, Oklahoma to the effect that the defendants be restrained and enjoined from enforcing the ordinance adopted by the City of Broken Arrow on July 16, 1973. The Judge in his ruling, pointed out "The court finds that the City has authority to prescribe how waterline pipe shall be laid, but the principle reason given by Defendants for not offering the 13 ft. section pipe was that the City had inadequate inspection capabilities. The court finds that when the City passes an ordinance requiring affirmative action (inspection) on its part, said City must supply that action and its failure or refusal to do so cannot form a valid basis for discriminatory practice attempted herein".

Certain-tyed, from experience, has built into the pipe enough strength to take care of a certain amount of improper bedding and installation. However, such additional strength will not protect against gross mishandling or complete disregard for good bedding.

If installation is done carefully and correctly, the pipe should not be exposed to flexural stresses of unsafe magnitude. If not, then beam action causing flexural stresses will exist regardless of the length of pipe. It is unreasonable to suggest that these few improper installations will all result in 12 ft. unsupported spans.

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