CHARLOTTE
PIPE AND FOUNDRY COMPANY

Requested by:	Date:	ID#:
Biscayne Landing HOA	December 18, 2024	11074

Subject: 1” PVC schedule 40 pressure elbow evaluation

Background:

On December 2, 2024, Charlotte Pipe and Foundry (“CPF”) received five 1" PVC schedule 40 pressure elbow assemblies to examine with a total of six elbows (figure 1). The assemblies were installed underground outside of multiple residences. Five of the six elbow fittings have cracked causing leaks to occur with homeowners experiencing higher than normal water bills. CPF has been asked to determine why the fittings have failed.

Figure 1

The six 1” PVC schedule 40 pressure elbows were produced from mold #31-1079 and we could only identify four cavities (C, D, HH, and K). Each assembly is solvent welded to pipe using a purple primer and clear cement. Five of the six elbows have similar cracks running across the back. Sand and debris were visible inside the cracks.

The information and conclusions in this report are based upon a preliminary evaluation of the product sample returned to Charlotte Pipe and described more specifically in this report. Charlotte Pipe reserves the right to modify or change this report and its conclusions as additional information becomes available.

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The body wall thickness for 1” PVC fittings need to measure a minimum of 0.166” per ASTM D 2466. The six 1” PVC schedule 40 pressure elbows met the dimensional requirements for body wall thickness.

Size	Wall Thickness, min.	Cavity	Measured
1"	0.166"	C	0.171" -0.177"
		D	0.170" - 0.175"
		HH	0.169" - 0.178"
		K	0.169" - 0.179"
		n/a	0.169" - 0.177"

Observed in all six elbows were either excessive puddled cement, puddled primer, or a combination of the two (figures 2-3). Figure 4 shows puddled primer in the pipe of one assembly. This puddling penetrated into the pipe wall.

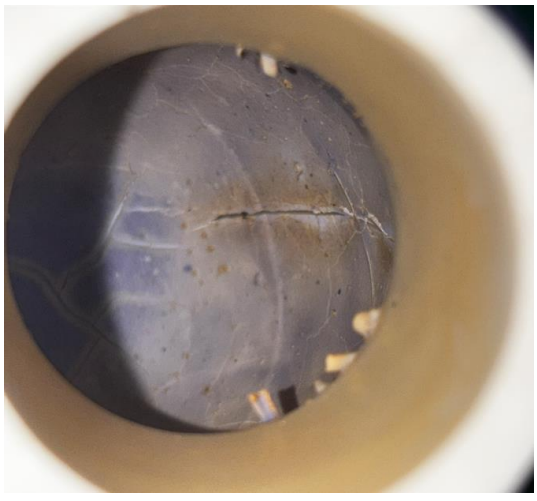

Figure 2

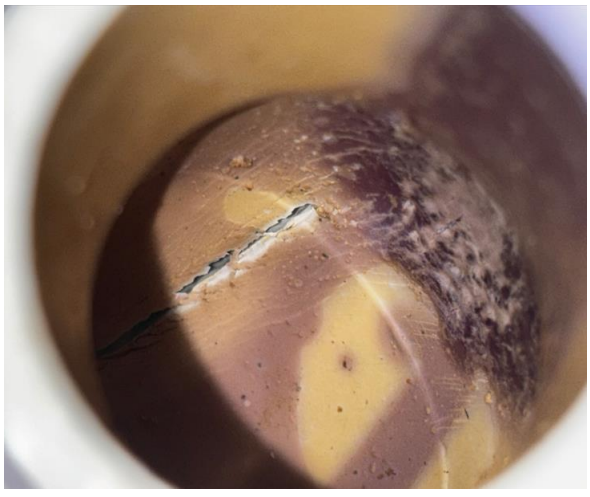

Figure 3

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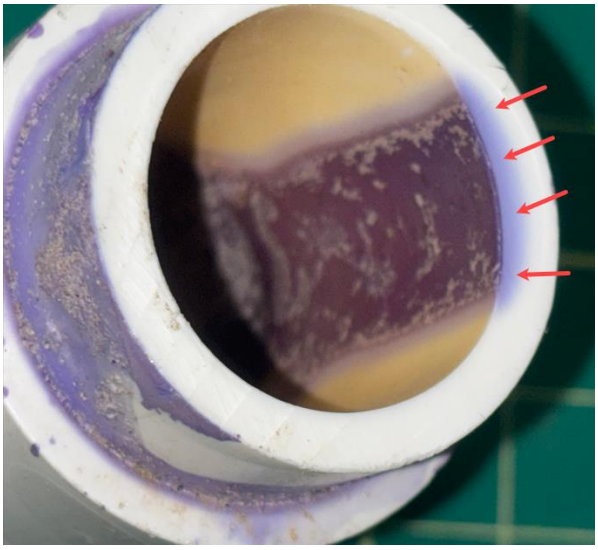

Figure 4

When examining the unidentifiable cavitation with the pipe stubs that had the blue print line and the assembly with cavity HH, we observed the pipe had not been fully inserted into the socket bottom.

No manufacturing defects were observed in any of the CPF 1" PVC schedule 40 pressure elbows. The leak locations (cracks) correspond with areas of excess solvent cement and primer, which can induce environmental stress cracking ("ESC") in PVC systems. Solvent cement and primers are routinely used during the installation of PVC piping systems and permanently join components together. When too liberally applied, the excess inhibits complete and efficient evaporation of active solvent.