VACUUM TESTING ON LADTECH'S CONFINED, HIGH DENSITY POLYETHYLENE MANHOLE ADJUSTING RINGS

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1.0 INTRODUCTION

LadTech, Inc. (LadTech) designs and manufactures High Density Polyethylene (HDPE) manhole risers. LadTech asked AET to perform vacuum testing on a typical configuration of HDPE risers sealed with ConSeal CS-1500 Concrete Sealant.

2.0 METHODOLOGY

LadTech provided American Engineering Testing (AET) with two 2-inch-high HDPE risers, two 4-inch-high HDPE risers, two 1 ½-inch-high risers, and two ¼-inch-thick spacer rings. The risers were tested in two configurations. The first configuration was a 4-inch ring with the bottom lip removed followed by a 2-inch ring and a 1 ½-inch ring. The second configuration was two ¼-inch spacer rings followed by a 4-inch ring, then a 2-inch ring and then a 1 ½-inch ring. These risers and rings are referred to as the *riser assembly* or the *assembly* throughout this document. The nominal diameter of the riser assembly was 36 inches outside diameter and 27 inches inside diameter. LadTech provided a box of 10 oz. tubes of ConSeal CS-1500 Concrete Sealants, and this material will be referred to in this report (hereby referred to as CS-1500 or sealant). The vacuum test was done in general accordance with ASTM C1244 Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test. The vacuum tests occurred during the week of March 16, 2026, at AET's lab in Saint Paul, MN.

The manhole and rings were assembled on a piece of 3/16-inch thick steel plate, which was supported by a concrete panel. Each HDPE riser has a ½-inch lip edge that protrudes below the bottom of the flat surface for the purpose of guiding and locking it into either the manhole opening or another riser. In the first test the lip of the 4-inch ring was removed allowing the 4-inch ring to sit flat on the steel plate. For the second test, to account for the ½-inch lip, two, ¼-inch HDPE rings were placed on top of the steel plate and below the bottom poly riser allowing the lip to not be the load bearing surface. The riser assembly was centered within the steel plate. Figure 2.1 shows the riser rings, and steel plates. AET placed a 3/8-inch bead of CS-1500, supplied by LadTech, between the HDPE risers. Two 3/8-inch beads of CS-1500 sealant were also placed between the steel support plate, bottom riser, and between the top riser and the top steel plate.

Figure 2.1: HDPE riser rings and steel plates

Preparation of the rings for testing involved removing the bottom lip from one of the 4-inch rings and grinding the ring surface smooth and flush with the bottom surface of the ring. Additionally, each ring was wiped clean with a damp cloth and allowed to dry. Next, two beads of sealant that were a minimum of 3/8-inch in diameter, were applied continuously all the way around to the flat bottom surface of the 4-inch ring and then the ring was placed on the center of the clean bottom steel plate. Or, in the case of the spacer rings, two beads of sealant that were a minimum of 3/8-inch in diameter, were applied continuously all the way around to the flat bottom surface of the spacer rings and then the rings were placed on the center of the clean bottom steel plate Figure 2.2 shows the 4-inch riser ring with the lip removed and two beads of sealant applied.

Figure 2.2: The bottom of the 4-inch ring with the lip removed and sealant applied

Then a minimum of a 3/8-inch in diameter bead of sealant was applied to the where the lip meets the bottom side of the two-inch-ring and in a continuous bead around the ring, this ring was then placed on top of the first ring, Figure 2.3.

Figure 2.3: 2-inch riser ring with sealant

Subsequently a minimum of a 3/8-inch in diameter bead of sealant was applied to where the lip meets the bottom side of the 1 ½-inch-ring and in a continuous bead around the ring. This ring was then placed on top of the 2-inch ring. A series of wood blocking was positioned into the center of the riser ring and extended up to approximately the same height as the riser rings. The purpose of the wood blocks was to prevent deflection of the top steel plate with a vacuum inside the assembly. Two, A minimum of 3/8-inch diameter beads of sealant, were applied to the top of the ring assembly, and a second 3/16-inch-thick steel plate was placed on top of the rings. The top plate has a port toward the

center of the plate that is drilled and tapped to allow the gauge and vacuum pump to be attached to the assembly and remove air from the enclosed center portion of the assembly. The assembly was allowed to cure in the lab 24 hours prior to the beginning of the vacuum test. Figure 2.4 shows the components of the test.

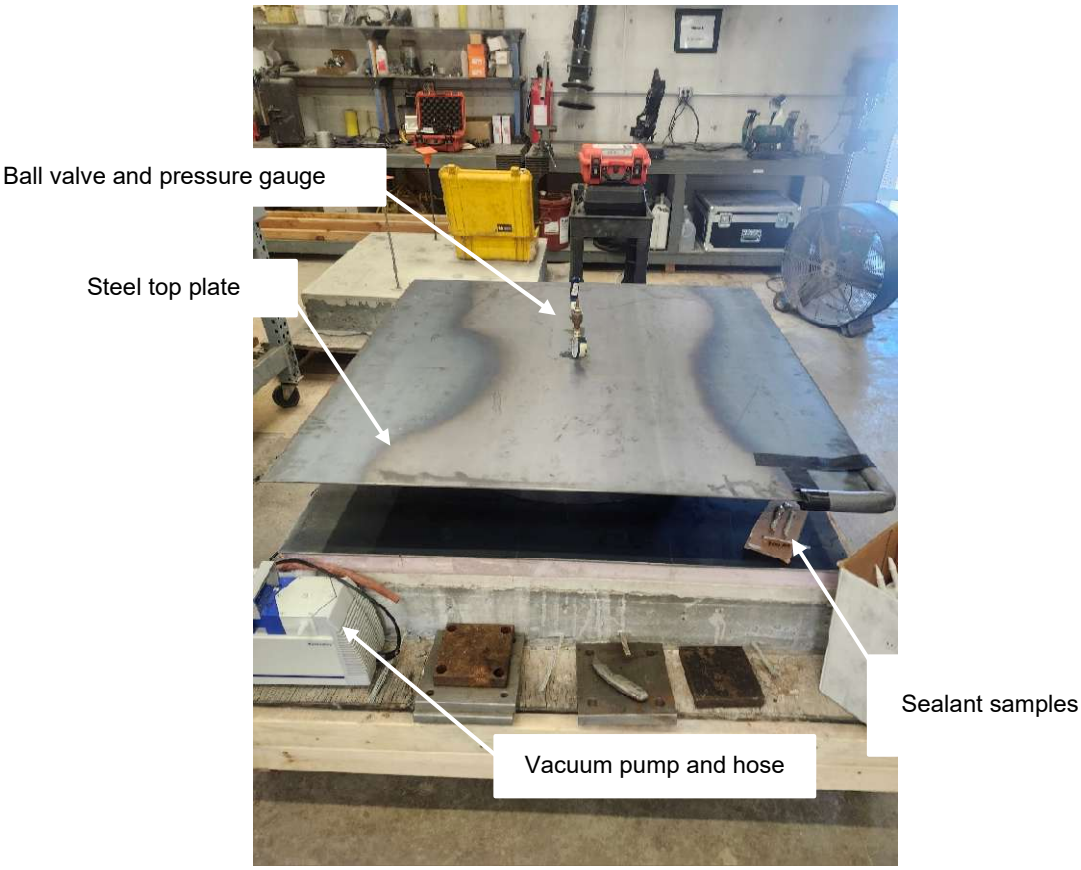

Figure 2.4: Riser ring assembly

The pressure gauge and ball valve assembly allowed the pressure inside the chamber to be observed while locking off the vacuum pump from the chamber. The vacuum pump was activated and used to pull a negative pressure inside the assembly equivalent to 10-inches of mercury and then the ball valve was closed. The assembly was required to hold the vacuum with less than 10 percent loss for 90 seconds, in general conformance with ASTM C1244.

3.0 RESULTS

Configuration 1 with the lip removed slowly leaked air, however this configuration held over 90 percent of the required 10-inches of mercury vacuum pressure for more than 2 minutes, passing the test. Configuration 2 with the spacer rings incorporated at the bottom was still holding the negative pressure of 10-inches of mercury more than 5 hours later when the pressure was manually released.

4.0 CONCLUSION

AET vacuum tested two assemblies of LadTech HDPE riser rings sealed with CS-1500 sealant. Both combinations of the riser rings met the required specifications of holding a vacuum pressure of 10-inches of mercury for more than 90 seconds.