



**Hydrostatic Joint Testing
ASTM C-443 Standard
Lakelands Concrete
Lima, NY
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Abstract

Lakelands Concrete Products, Inc. , Lima NY is a precaster of long standing. Now, they want to produce man-holes for drainage and sanitary lines . Since it is common in the Rochester/Buffalo area to specify “O- ring” type gaskets for manhole joints, Lakelands aims to prove that their preferred gasket, a ConSeal butyl rubber gasket, meets or exceeds the requirements for “O-ring” gaskets. The pertinent specification for drainage structures is ASTM C-443. While the butyl gasket does not match the “recipe” section of C-443, it is tested to the performance requirements of the standard. Hydro-static pressures of 13 psi held for ten minutes with zero leaks is the required performance.

Observations

A four foot diameter manhole section of 24 inches and a 48 inch high base were wet-cast for testing. The two sections were dry-fit to see how well the joints fit without any gasket material. A second dry-fit with short sections of butyl laid across the joints in four locations is called a “bite-wing test”. The bite-wing test gives a visual impression of the fit of the joint where eyes cannot see. Cherne test equipment, consisting of a four foot diameter ring with two inflatable bladders, isolates the joint for testing. An open center portion of the test ring holds water under pressure. By positioning the center over the joint, it is possible to push water under measure pressure against the gaskets from the inside. If the gaskets leak, water will leak as a visible stream on the outside of the manhole. A system of restraining bars and clamps holds the units together while pressure is applied. Without the restraints, the pressure lifts the assembly apart. The restraints simulate the weight of concrete and soil that would naturally bear down on the structure if it were buried the thirty feet under water, necessary to achieve the test pressures. Two rows of butyl gasket, 7/8 inch size, placed one each upon the flat portions of the male portion of the joint, form a continuous bead of sealant. The ends of the butyl are kneaded together by hand to ensure a continuous gasket.

Dry fit procedures, done before testing, reveal a close and even fit. “Bite-wing” testing reveals the same close fit within the joint. Annular space is about 1/4 inch, joint space between mating surfaces is no greater than 1/8 inch.

Once assembled, the lower bladder is inflated to 55 psi. This seals the area below joint so that water is held in the center portion. By a garden hose, water is filled into the center section to about 4 inches above the joint. The upper bladder is inflated to 55psi. This seals the upper area so that water under pressure is held at the joint.



Dry-fit with no gasket material



Prepared for bite-wing test

Air is pumped into the center portion to a regulated pressure of 13.5 psi and held at that level for 10 minutes. Visual inspection of the outside showed zero leakage at the end of the ten minutes. Further, to disassemble the test rig, all restraints were removed and pressure introduced into the center portion. This forced the two sections apart, but it required 25 psi to do it. Up to 25 psi the unrestrained joints held watertight.

The sections are drawn together and held by means of tightening on bars of steel that connect to plates which span top and bottom of the assembly. This simulates the load of concrete and soil that would be present if the structures were buried deep enough to experience a head of water sufficient to create 13.5 psi of hydrostatic pressure against the joint.

Conclusions

Lakeland Concrete manholes, sealed with two rows of 7/8 x 14.5 ft size on ConSeal CS-102 Butyl Gasket, meet and exceed the performance requirements of ASTM C-443.

Photo Observations



Dry-fit without gaskets. A uniform tight fit



The same piece dry-fit on another base.



Talcum powder prevents adhesion during bite-wing



Bite-wing ready for testing



Starting to close



Closed



Disassembled joint



Crushed CS-102 reveals internal fit



The ends are overlapped, film is removed



Kneading the ends to make a continuous gasket



The test ring is positioned to test joint



Ready to test with two strips of 7/8 size CS-102



Gauges indicate pressures



Clamps hold the assembly together



13.5 psi held watertight for 10 minutes



No leaks after 10 minutes= PASS

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