Professional Service Industries, Inc.
A & H Engineering Division

TESTED FOR: Press-Seal Gasket Corp.
P. O. Box 10482
Fort Wayne, IN 46852

PROJECT: Verification of ASTM Designation C-923-89

DATE: May 20, 1993

OUR REPORT NO.: 003-30017-1

REMARKS: As requested, a representative of Professional Services Industries, Inc. reported to Press-Seal Gasket Corporation on May 18, 1993, to witness a test series at your facility in Fort Wayne, IN. The testing was performed in accordance with ASTM C-923-89, Section 7. Materials used were: an ASTM C-478 4-foot-high reinforced concrete manhole base section; two sections of SDR 35 PVC pipe conforming to ASTM D-3034 and having an outside diameter of 8.4 inches; two flexible connectors known as PRESS-BOOT, one of which was for a twelve inch opening vertically centered in the manhole wall, and the other for an eleven inch opening placed at the same height, directly opposite. A specially-designed reinforced concrete flat-top section (equipped with a water inlet/valve assembly, a pressure/outlet valve assembly, and a 0-30 PSI gauge) was used to create a seal and allow for controlled pressurization and monitoring of the manhole base.

The PRESS-BOOT assemblies were installed into the two openings in the manhole wall by means of a hydraulic installation tool with on-line gauge. The installation tool expanded the sealing sleeves until gauge pressure achieved the recommended usage (3400 PSI), thereby leaving the connector securely sealed against the manhole opening. The test pipes were inserted from outside the manhole and were connected together within the manhole by means of a flexible rubber coupling. Each PRESS-BOOT was then securely sealed to the pipe by means of a stainless steel hose clamp which was tightened with a torque rachet to 55 lbs/in torque. An O-ring gasket was installed an the manhole base spigot and the top section was then securely fastened to the base by means of a steel frame and threaded rods, preventing separation of the base and top during pressure testing.

The manhole was filled with water until all air was evacuated from the assembly. The relief valve was then closed and hydrostatic pressure in the test manhole was increased to 10 PSI and maintained for a period of ten minutes. No leakage was observed from either PRESS-BOOT. Pressure was then further increased to 13 PSI and maintained for a period of ten minutes. Again, no leakage was noted from either PRESS-BOOT.

Next, pressure was relieved and the pipe in the 11 inch PRESS-BOOT was deflected vertically 7 degrees and blocked in place. Pressure was then re-established at 10 PSI for a period of ten minutes. No leakage was observed. The hydrostatic pressure was then increased to 13 PSI and maintained for ten minutes. Again, no leakage was observed.

Pressure was relieved and the pipe in the 11 inch PRESS-BOOT was returned to horizontal. The pipe in the 12 inch PRESS-BOOT was then deflected 7 degrees vertically and hydrostatic pressure was re-established at 10 PSI and maintained for a period of ten minutes. No leakage was observed. Pressure was then increased to 13 PSI and maintained for a period of ten minutes. Again, no leakage was observed.

Finally, pressure was relieved and the manhole test apparatus was drained and disassembled to confirm the presence and condition of the components as stated above.

Respectfully submitted,

PROFESSIONAL SERVICE INDUSTRIES, Inc.

Gary W. Woodson

Gary W. Woodson

2631 Duncan Road ◦ Lafayette, IN 47904 ◦ Phone: 317/742-8068 ◦ Fax: 317/742-4773

PRESS-SEAL GASKET CORPORATION
CONCRETE PRODUCTS SUPPLY COMPANY
(219) 436-0521

EVALUATION SUMMARY

12" ADJ:Expansion Ring

for

PRESS-BOOT

August 3, 1993

M. R. Miller

Purpose: This evaluation was designed to measure the performance and characteristics of the 12" plastic power sleeve. Tests and evaluations included were:

1. Installation in various hole sizes ranging from 11.50 to 12.375 inches in diameter.
2. Calculation of maximum and minimum hole sizes by measurement of interlocked sleeve dimension and extrapolation of hole size.
3. Installation of sleeve in test fixture to measure its performance in air pressure differential (vacuum) testing.
4. Installation of sleeve in manhole to measure its performance IAW ASTM C-923 tests (including Canadian standard).

Please note that the 12" plastic sleeve is somewhat different in appearance from the 11" sleeve. These differences include:

a. An additional end-mount installation lug from which installations are to be made.
b. An expanded range of adjustment teeth.
c. The inclusion of five (rather than three) installation teeth. These teeth also have a more rounded profile than those on the 11" sleeve.
d. Two larger and stronger retention lugs.
e. A filled-in tail section.

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Installation: A steel installation fixture was fabricated which has three different opening sizes: 11.50", 11.90", and 12.375" so that the full range of installation sizes could be evaluated. In addition, installations were also made in 3 existing manhole openings of undetermined (12") size. Each installation was made using the end-mount lug. Every installation must be made from this lug. Installations were made using the self-contained hydraulic tool.

At the 11.50" size, all five installation teeth were engaged. With this sleeve design, only four teeth need to be engaged, so a slightly smaller hole size could be accommodated. Installation was made until the gauge needle reached the clear window, as is done with the 11" sleeve. Due to the larger diameter of the 12" sleeve, the needle should be moved to the high pressure side of the window to ensure the best compression of the sleeve. At the 11.90" size, the sleeve was a tooth or two smaller than the exact mid-point of its adjustment range. At the 12.375" size, the sleeve still had four more adjustment teeth available, so its range appears to be well beyond 12.5".

Calculation of Minimum and Maximum hole sizes: A 12" sleeve was assembled in its minimum and maximum positions and its external circumference was measured by PI tape. From these measurements, minimum and maximum hole sizes were extrapolated. The minimum opening position is where one installation tooth is outside the adjustment tooth area. The maximum position is where all five teeth are engaged at the extreme end of the adjustment tooth area. The sleeve measurements and corresponding hole sizes are:

	Sleeve Dia.	Sleeve Circum.	Hole Size
Min.	10.710"	85.47 cm	11.40"
Max.	12.030"	96.00 cm	12.70"

Differential Air Pressure (Vacuum) Testing: Three samples of 12" plastic sleeves were installed in the boot test fixture and differential air pressure (equivalent to vacuum) was applied. This test corresponds directly to conventional vacuum testing as would be performed on manholes. Typical manhole vacuum tests require application of 10 In Hg, which is equivalent to 5 PSID (differential). The following results were obtained in this testing:

Pressure Differential (Vacuum) Test Results

Sample No.	5 PSID (10 In Hg)	10 PSID (20 In Hg)	15 PSID (30 In Hg)	Fail PSID
1	Pass	Pass	---	13 PSID
2	Pass	Pass	Pass	16 PSID
3	Pass	Pass	Pass	18 PSID

ASTM C-923 Water Pressure Test: In accordance with the test requirements of ASTM Specification C 923-89 for Flexible Pipe-to-Manhole Connectors, a 12" plastic sleeve was installed in a 12-08 PRESS-BOOT in one side of a test manhole. An 11-08 Press-Boot was installed in the opposing side. A section of 8" PVC pipe was then passed into the manhole through each boot and connected in the center with a flexible coupler. The take-up clamps on the boots were tightened around the pipe sections and a sealed cap was installed on the top of the manhole. The manhole was then filled with water and a hydrostatic pressure of 13 PSI was established. This pressure was maintained for 15 minutes and the boot was inspected carefully for leakage. No leaks were observed.

While the hydrostatic pressure was **maintained** at 13 PSI, the pipe section extending through the 12" boot was deflected downward at a seven degree angle. This deflection was maintained for ten minutes and the boot was inspected carefully for leakage. No leaks were observed.

As a result of these tests, the 12" Press-Boot has demonstrated its performance to the required standards of both the United States and Canadian markets.

Respectfully submitted,

Michael R. Miller
Research & Development

93AUG03
Date