

TEST REPORT: P07104-T02

Gelsenkirchen, May 6, 2019

Customer: Obduramus Umwelttechnik GmbH
Brückenäckerstraße 2
75328 Schöenberg

Test order no.: P07104

Name of the test order: Leak test for interior pipe sleeve Circum MINI
per DIN 4060

Name of customer: -


Date of order: 22/05/2018

This test report comprises nine pages.

The test results pertain exclusively to the test objects. The test report may be duplicated in part only with written approval from the IKT – Institute for Underground Infrastructure GmbH.



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Samples

Name of sample		Entered on	Sample produced by	Description of test body
Con-secu-tive no.	IKT (test facility)	AG		
1	Circum-MINI DN 150	06/12/2018	AG	Interior pipe sleeve Circum-MINI DN 150 of EPDM with stainless steel sleeve
2	Circum-MINI DN 400	06/12/2018	AG	Interior pipe sleeve Circum-MINI DN 400 of EPDM with stainless steel sleeve

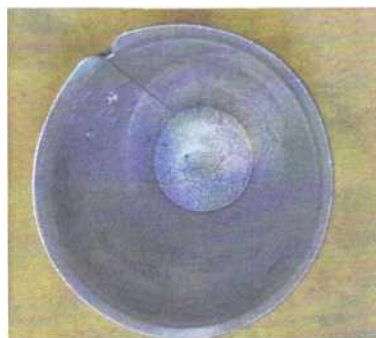
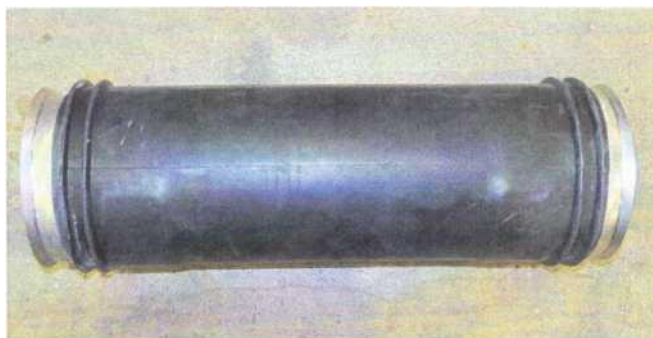


Figure 1: Interior pipe sleeve Circum-MINI DN 150



Figure 2: Interior pipe sleeve Circum-MINI DN 400

Tests implemented

No.	Test type	Test specification	Test body no.
1	Leakage testing with water with angular deflection and shear load influence	DIN 4060	Interior pipe sleeve Circum-MINI DN 150 of EPDM with stainless steel sleeve trial segment 1 and 2
2	Leakage testing with water with angular deflection and shear load influence	DIN 4060	Interior pipe sleeve Circum-MINI DN 400 of EPDM with stainless steel sleeve trial segment 3 and 4

1. Reason for test and test object

On May 22, 2018 the Obduramus Umwelttechnik GmbH ordered IKT to implement leakage tests per DIN 4060 on the internal pipe sleeves of the type Circum-MINI (abbreviated C-MINI).

The Circum-MINI comprises an EPDM seal and a stainless steel sleeve with external closure. Clamping the stainless steel sleeve by means of a packer presses the EPDM seal to the pipe's interior wall, so that the sealing lips at the ends seal the sleeves to the sewer in accord with the principle of compression sealing. Retightening the sleeve is possible at anytime.

The object of this test report is leakage testing with water as the test medium per DIN 4060 on the straight pipe line, with angular deflection and with shear load influence at the pipe connections in the following trial segments:

- Trial segment 1: PVC-PVC, DN 150
- Trial segment 2: Stoneware-stoneware, DN 150
- Trial segment 3: PVC-PVC, DN 400
- Trial segment 4: Concrete-concrete, DN 400

Before setting-up the trial segments, leaks were created in the pipe connections of these segments through the partial or complete removal of seals. The installation of the Circum-MINI over the pipe connections then resealed these again.

Test results

Subsequently, the results of the leakage testing with water as the test medium were illustrated according to DIN 4060:2016-07 [1] for the respective pressure level and the load condition. Moreover, the seal of the Circum-MINI in all trial segments and in each load condition was tested with a water internal pressure of 0.5 bar for 30 minutes.

Trail segment 1: Circum-MINI, DN150, PVC-PVC

No.	Load condition	Test type	Result
1	Unloaded	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
2	Angular deflection (50 mm(/m)	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
3	Shear load influence – short term (1,500 N) immediately after load introduction	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
4	Shear load influence – long term (1,500N) with a load duration of three months	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed

Test segment 2: Circum-MINI, DN150, stoneware-stoneware

No.	Load condition	Test type	Result
1	Unloaded (straight pipe line)	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
2	Angular deflection (50 mm/m)	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
3	Shear load influence – short term (1,500 N) immediately after load introduction	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
4	Shear load influence – long term (1,500N) with a load duration of three months	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed

The leak tests per DIN 4060 on the straight pipe line, with angular deflection and with shear load influence (short term and long term), showed no water exiting visually. In the test per DIN 4060, the interior pipe sleeve Circum-MINI DN 150 in the trial segment PVC-PVC and stoneware-stoneware is sealed

Test segment 3: Circum-MINI, DN400, PVC-PVC

No.	Load condition	Test type	Result
1	Unloaded	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
2	Angular deflection (30 mm/m)	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
3	Shear load influence – short term (4,000 N) immediately after load introduction	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
4	Shear load influence – long term (4,000 N) with a load duration of three months.	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed

Trial segment 4: Circum-MINI, DN400, concrete-concrete

No.	Load condition	Test type	Result
1	Unloaded	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
2	Angular deflection (50 mm/m)	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
3	Shear load influence – short term (1,500 N) immediately after load introduction	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed
4	Shear load influence – long term (1,500N) with a load duration of three months	Water internal pressure 0.00 bar, 5 min	sealed
		Water internal pressure 0.05 bar, 5 min	sealed
		Water internal pressure 0.50 bar, 15 min	sealed
		Water internal pressure 0.50 bar, 30 min	sealed

Leak tests per DIN 4060 on the straight pipe line, with angular deflection and with shear load influence (short term and long term), showed no water exiting visually. In the test per DIN 4060, the interior pipe sleeve Circum-MINI DN 400 in the trial segments PVC-PVC and stoneware-stoneware is sealed.



Figure 3: Leakage testing with shear load, Trial segment 1: PVC-PVC, DN150



Figure 4: Shear load influence on trial segments 1 and 2, DN 150



Figure 5: Shear load influence on trial segment 3: PCV-PVC, DN 400



Figure 6: Shear load influence on trial segment 4: Concrete-concrete, DN 400



Figure 7: Leakage testing with shear load, trial segment 4: Concrete-concrete, DN 400



Figure 8: Leak testing, test segment 3: PVC-PVC, DN 400

Literature

- [1] DIN 4060:2016-07, pipe connections for sewers and pipelines with elastomer seals – requirements and tests on pipe connections that include elastomer seals.