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Test Report No. 411.081

Date: 2013-10-22

**Plastic spacers –
Test of chemical stability**

Submitted by: Nevoga GmbH
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Object: 'Oktagon PLUS plastic spacers

Content: Test of chemical stability

Date of submission: 2013-01-07

Date of sample: -----

Samples taken from: Samples not taken by **ofi** employees
Samples to be submitted by client

Samples received: 2013-01-07

Ref. Nov

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1 ASSIGNMENT

The assignment called for testing of chemical stability against aggressive media to be performed on the test specimens described below:

2 SCOPE

The results contained in the present test report were obtained under the specific conditions pertaining to the respective test. As a rule, they do not constitute the only criterion by which to assess the product and its suitability for the specific field of application. The purpose of the test report is for the client's internal information.

3 SAMPLE MATERIAL

Spacers with the designation 'Oktagon PLUS' made from plastic (grey) were provided by the client for testing.

4 PERFORMANCE OF THE TESTS

The tests were performed in the period from 2013-07-18 to 2013-10-22 in the technically responsible departments within the competence of the authorised signatory in accordance with the **ofi** QM manual.

The chemical stability test was conducted with due consideration of the planned use of the spacers in containers for aggressive media, such as in sewage treatment plants or in agricultural applications (manure, biogas).

To allow the assessment of any changes occurring in the behaviour of the spacers as a result of storage, the following characteristics were selected:

- Modulus of elasticity
- Flexural strength
- Hardness
- Weight

To determine the modulus of elasticity and flexural strength, a three-point flexural test was conducted as per ÖNORM EN ISO 178 (accredited method). The hardness was determined as per ÖNORM EN ISO 2039-1 (ball indentation test, accredited method).

Test specimens in strip form were obtained from the spacers for the three-point flexural test and hardness determination test.

The test specimens were stored in the following media for a period of three months:

- 7% diammonium hydrogen phosphate solution
- Aqueous solution of 3% lactic acid, 1.5% acetic acid and 0.5% butyric acid

5 RESULTS

The results of the tests are given in Table 1. The values of the modulus of elasticity, flexural strength and ball indentation hardness are mean values taken respectively from five individual measurements.

Table 1: Test results

Parameter	Before storage		After storage	
7% diammonium hydrogen phosphate solution				
	Mean	Std. dev.	Mean	Std. dev.
Flexural strength (Mpa)	39.53	5.05	40.84	4.76
Modulus of elasticity (Gpa)	1.49	0.24	1.55	0.28
Ball indentation hardness (N/mm ²)	41	1.82	41	1.73
Weight (g)	13.04		13.02	
Aqueous acid mixture				
	Mean	Std. dev.	Mean	Std. dev.
Flexural strength (Mpa)	39.53	5.05	41.45	7.04
Modulus of elasticity (Gpa)	1.49	0.24	1.52	0.39
Ball indentation hardness (N/mm ²)	41	1.82	41	1.21
Weight (g)	12.35		12.32	

A comparison of the determined characteristic data before and after storage shows no significant changes in the behaviour of the spacers. The slight weight reduction of the test specimens is attributable to migration processes. When assessing the results of the three-point flexural tests, it should be taken into consideration that this is a destructive test. Therefore, the test specimens examined following storage were not in the same state as the test specimens examined prior to storage, which naturally results in slight deviations in the test values.^{411.081}



The present test report No. 411.081

Comprises 4 pages 1 table(s) 0 illustration(s) 0 annex(es)

Test administrator

(Unterschrift)

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(Stempel) **ofi** Technologie & Innovation GmbH

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