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MA 39 – VFA 2013-0044.02

Vienna, 3 July 2013

(Stempel) MUNICIPAL DEPARTMENT 39
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Inspection Report

Plastic Spacers (R40 Circular Spacers)

Client: Nevoga GmbH

Assignment date: 4 April 2013

Test material: Plastic Spacers (R40 Circular Spacers); the test material was supplied by the client

Test routine: In accordance with the DBV leaflet: 'Spacers acc. to Eurocode 2' [*Abstandhalter nach Eurocode 2*] (wording from January 2011).

Frost/thaw testing
Determination of water penetration depth
Thermal cycling stress test

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This report comprises 4 pages and 1 annex (4 pages).

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1 General

1.1 Assignment

Nevoga GmbH assigned MA 39 with the inspection of plastic spacers (R40 Circular Spacers) in accordance with the DBV leaflet: 'Spacers acc. to Eurocode 2' [*Abstandhalter nach Eurocode 2*] (wording from January 2011).

1.2 Test material

On 4 April 2013, the client supplied plastic spacers (R40 Circular Spacers) to MA 39.

The spacers had a laying dimension of 40 mm.

For information regarding the appearance of the supplied test material, see the photographs in the attached annex.

1.3 Sample preparation

On 8 May 2013, nine sample cubes were produced in the MA 39 laboratory, with a side length of 20 cm in accordance with Section A3.1 of the DBV leaflet: 'Spacers acc. to Eurocode 2'.

In deviation to the leaflet, polystyrene sheets were used in the cube moulds in place of plywood panels, and a reinforcement rod with a diameter of 8 mm with a spacer was placed inside (see Fig. No. 2013-0044-02-2).

The cube moulds were then filled with concrete with the quality C35/45/B4/F45/GK22.

Furthermore, one sample cube with a side length of 15 cm and one sample panel with the dimensions 20 cm x 20 cm x 10 cm were made for the purpose of determining the concrete compressive strength and water penetration depth.

The following values were obtained:

Concrete compressive strength: 55.5 N/mm² (test date 5 June 2013)

Water penetration depth: 8 mm (test period 10-24 June 2013)

The test objects used for determining the water penetration depth were stored under water until the test. The remaining test objects were stripped after 24 hours and then stored under water until the seventh day, and afterwards under room conditions.

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2 Performance of the test

2.1 Alternating freeze/thaw testing

Three test objects containing concrete-embedded spacers were subjected to alternating freeze/thaw testing, commencing on 5 June 2013, in accordance with Section A3.2 of the DBV leaflet: 'Spacers acc. to Eurocode 2'.

The 56 freeze/thaw cycles were performed within 28 days at temperatures between +20°C and –20°C in accordance with ONR 23303 Issue 1, September 2010, Section 9.10 (Frost Class XF3), whereby in accordance with the DBV leaflet, the cube surface with the embedded spacer was submerged in deionised water to a depth of 10 mm during the test.

2.2 Determination of water penetration depth

Three test objects containing concrete-embedded spacers were subjected to water penetration depth testing in accordance with Section A3.3 of the DBV leaflet: 'Spacers acc. to Eurocode 2'.

The test was performed in accordance with DIN 1048-5, whereby the test objects were subjected to a water pressure of 5 bar over 3 days.

Test period: 10-13 June 2013.

2.3 Thermal cycling stress test

The thermal cycling stress test was performed on three test objects with concrete-embedded spacers.

The test body surfaces with the embedded spacers were subjected to ten thermal stress cycles in the period 5-19 June 2013 in accordance with Section A3.4 (temperatures between +60°C and –10°C). The respective cube surface was heated by radiant heat for a period of eight hours up to a temperature of 60°C. The cube was then placed in a cooling trough at –10°C for 16 hours.

The temperature curve was recorded with a data logger during the ten test cycles and is retained at MA 39 as evidence.

3 Test results

3.1 Alternating freeze/thaw testing

Upon conclusion of the 56 freeze/thaw cycles, the test surfaces with the embedded spacers were subjected to a visual check.

No cracking of any kind was determined, only a slight amount of flaking.

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Please see the photographs in the annex for the appearance of the test surfaces.

3.2 Determination of water penetration depth

After splitting the test objects, a water penetration depth of between 17 mm and 20 mm was determined.

Please see the photographs in the annex for the appearance of the split surfaces.

3.3 Thermal cycling stress test

Upon conclusion of the ten thermal cycles, the cube surface was subjected to a visual check.

No flaking or cracking of any kind could be determined in the vicinity of the test surfaces.

Please see the photographs in the annex for the appearance of the test surfaces.

Testing officer	Head of laboratory	Head of the Inspections, Monitoring and Certifications Dept.
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<i>(Unterschrift)</i>	<i>(Unterschrift)</i>	<i>(Unterschrift)</i>
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Ing. Herbert Kurz	Dipl. Ing. Andreas Tichy	Dipl. Ing. Georg Pommer
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Techn. Amtsrat	Oberstadtbaurat	Senatsrat
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(Stempel)

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Photo No. 2013-0044-02-1

Plastic spacer (R40
Circular Spacer)

Condition upon delivery

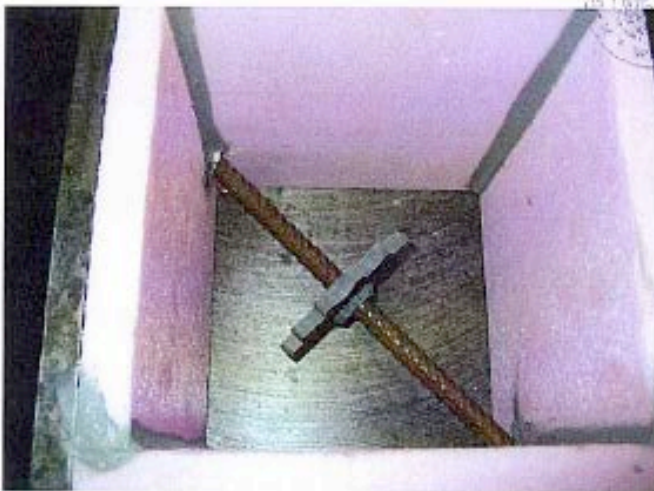


Photo No. 2013-0044-02-2

Cube mould with
reinforcement rod and
spacer placed inside



Photo No. 2013-0044-02-3

Freeze/thaw cycle testing

Sample 4 – after 56
freeze/thaw cycles

Slight flaking of the surface
can be determined, no
cracking.

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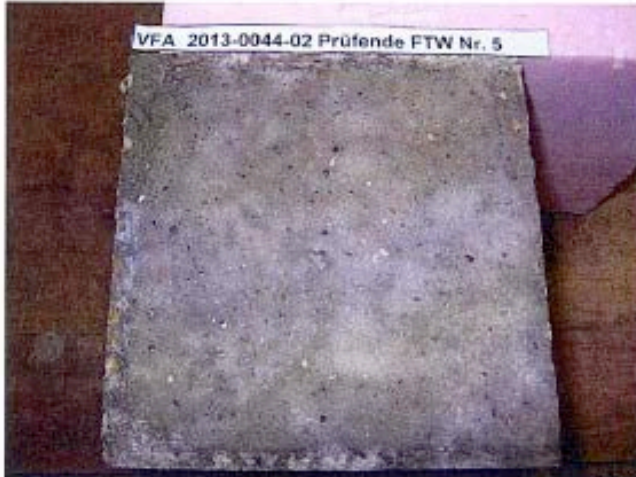


Photo No. 2013-0044-02-4

Freeze/thaw cycle testing

Sample 5 – after 56
freeze/thaw cycles

Slight flaking of the surface
can be determined, no
cracking.



Photo No. 2013-0044-02-5

Freeze/thaw cycle testing

Sample 6 – after 56
freeze/thaw cycles

Slight flaking of the surface
can be determined, no
cracking.



Photo No. 2013-0044-02-6

Test of water penetration
depth

Sample No. 1 –
Water penetration depth: 17
mm

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Photo No. 2013-0044-02-7

Test of water penetration depth

Sample No. 2 –
Water penetration depth: 18 mm



Photo No. 2013-0044-02-8

Test of water penetration depth

Sample No. 3 –
Water penetration depth: 20 mm



Photo No. 2013-0044-02-9

Thermal cycling stress test

Sample 7 – after 10 cycles

No flaking or cracking of the surface determined

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Photo No. 2013-0044-02-10

Thermal cycling stress test

Sample 8 – after 10 cycles

No flaking or cracking of the surface determined

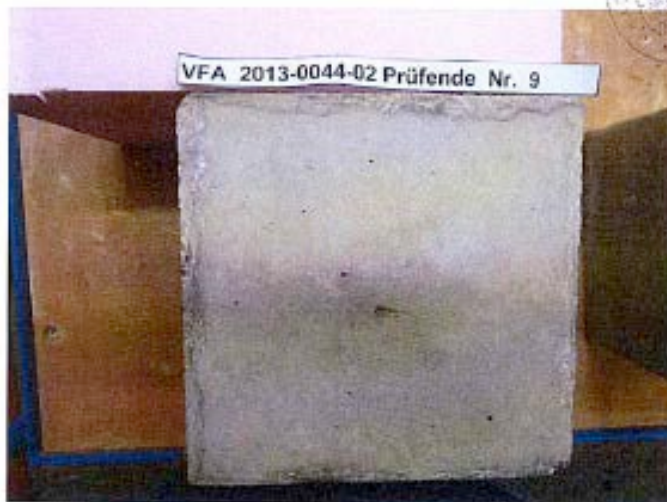


Photo No. 2013-0044-02-11

Thermal cycling stress test

Sample 9 – after 10 cycles

No flaking or cracking of the surface determined