

Test Report

Sorp 10[®]

7.3/27080 | 25.11.2010 | english

Execution of a fire test with flame application based on the
standard temperature-time

Tested by: BAM, Berlin

Note: This is a translation of the German original document not examined by BAM, Berlin

Reference number: 7.3 / 27080

**This document is only a translated version;
not legally attested**

Federal Institute for
Materials Research
and Testing

12200 Berlin
Phone: 030 8104-0
Fax: 030 8112029

Sponsor: Max Frank GmbH & Co. KG
Mitterweg 1
94339 Leiblfing

Content of the order: Consulting services within the scope of approval procedures:
Execution of a fire test with flame application based on the standard temperature-time curve for determining the temporal temperature profile of reinforcement used with the sound-absorbing spacer Sorp10.

Reference: Dipl.-Ing. M. Michel

Test date: 25-11-2010

Product/name: Sound-absorbing spacer Sorp10

Results: Temperature-time profile of reinforcement equipped with the sound-absorbing spacer Sorp10 for a period of 90 minutes with flame application based on the standard temperature-time curve

Certificate of suitability: This test report serves as documentation regarding the impact of the sound-absorbing spacer Sorp10 on the temporal temperature profile of concrete reinforcement with flame application based on the standard temperature-time curve and is not intended as an official certificate of suitability issued by the building inspection authorities.

This test report consists of page 1 to 5 and annex 1 to 5.

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✘ Safety in technology and chemistry

TEST REPORT

1 Subject

1.1 Description of the test specimen

Table 1:

General	
Product	
Manufacturer	Max Frank GmbH & Co. KG
Date of manufacturing	Pouring of the reinforced concrete slab: 26-07-2010
Product name	Sound-absorbing spacer Sorp10 (70x35) in reinforced concrete slab
Particularity	Spacer made of fibre-reinforced concrete with insert of sound-absorbing material "Reapor"
Exposed side	Flame application by means of standard temperature-time curve according to DIN 4102-2:1977-09 to the slab soffit
Supporting structure	Reinforced concrete slab with a thickness of 160 mm with reinforcement BSt 500 S, Ø 8 mm with a concrete cover of 35 mm in the area of temperature measurement

1.1.1 Sound-absorbing spacer Sorp10 (70x35)

The sound-absorbing spacer Sorp10 (70x35) is a spacer for use in steel reinforced concrete elements in order to achieve a specified cover to the concrete surface. The spacer cross section has a rectangular shape with edge lengths of 70 mm x 35 mm and generates a concrete cover of 35 mm in this particular case. The section comprises a U-shaped shell made of fibre-reinforced concrete which holds an insert of a sound-absorbing material called "Reapor". The spacer is installed in such a way that the sound-absorbing material constitutes a part of the surface of the finished reinforced concrete component, allowing it to take full effect (see annex 1).

1.1.2 Reinforced concrete slab

The sound-absorbing spacer Sorp10 (70x35) was installed into a 160mm thick reinforced concrete slab. The slab consists of a C 20/25 concrete with BSt 500 S reinforcement (8 mm diameter bars). At the time of the fire test, the concrete was 122 days old.

In addition to the testing of the sound-absorbing spacer Sorp10, the reinforced concrete slab with a floor area of 4190 mm x 2885 mm was used to accommodate and test various other built-in components which will not be addressed any further in this test report.

1.1.3 Test specimen and construction material data

At the time of the test, the strength and moisture content of the test specimen roughly corresponds to the conditions which would have to be expected in the case of normal use.

1.2 Test specimen illustration

An illustration of the test specimen and the installation situation in the reinforced concrete slab can be found in annex 1.

The drawing and data with respect to the test material were established on the basis of data provided by the sponsor and verified by BAM upon delivery.

2 Execution

2.1 Sampling

The selection of the test specimen is carried out by the sponsor. We are not aware of any official sampling.

Type and number	1 sound-absorbing spacer Sorp10 (70x35), 300 mm long, and 1 sound-absorbing spacer Sorp10 (70x35) approx. 100 mm long.
Delivery	14 July 2010 by the applicant
Designation	Sound-absorbing spacer Sorp10 (70x35)
Preparation of the test structure (concreting)	26 July 2010 by BAM

The temperature measuring points (thermocouples) were applied to the reinforcement of the test structure in the period from 13 to 23 July 2010 by the BAM employees. The positions of the measuring points M1 and M2 relevant in the case at hand are shown in annex 1.

The test structure is placed onto the furnace containment as horizontal room barrier of the northern chamber of the BAM slab test stand (clear opening dimensions L x W = 4000 mm x 1920 mm).

Test date: 25 November 2010

Test location: Federal Institute for Materials Research and Testing
Unter den Eichen 87
12205 Berlin

2.2 Method

2.2.1 Bases

DIN EN 1363-1:1999-10 Fire resistance tests – Part 1: General requirements

DIN EN 1365-2:2000-02 Fire resistance tests for load-bearing elements – Part 2: Floors and roofs

DIN EN 4102-2:1977-09 Fire Behaviour of Building Materials and Building Components; Building Components; Definitions, Requirements and Tests

2.2.2 Boundary conditions and deviations

The boundary conditions correspond to the standard requirements; there are no deviations from the test method or the test conditions.

Between preparation of the test specimen and the date of the test, there was sufficient time for conditioning to the indoor climate prevailing in the test hall which corresponds to the standard requirements of DIN EN 1363-1:1999. It was therefore possible to abstain from any further conditioning of the supporting structure and the test specimen.

2.2.4 Testing of the test specimen according to DIN EN 1363-1, DIN EN 1365-2 and DIN 4102-2

The test specimen was tested on 25 November 2010 according to DIN EN 1363-1, DIN EN 1365-2 and DIN 4102-2 in the northern chamber of the BAM slab test stand. The flame was applied to the underside (slab soffit).

The changes of the test specimens on the side facing the fire and the side facing away from the fire which were observed during testing were recorded and are shown in Table 3.

The pressure conditions on the fire-facing side were adjusted and monitored during testing according to DIN EN 1363-1:1999, section 5.2.

The ambient temperature in the test hall at the beginning of and during the test were measured and recorded according to DIN EN 1363-1:1999, section 5.6.

The position of the two measuring points for the temperature in the reinforcement is shown in annex 1.

The temperature on the fire-facing side was increased by means of 8 fuel oil burners using EL fuel oil according to DIN 51603 in correspondence with the standard temperature-time curve according to DIN EN 1363-1:1999, section 5.1. The temperature profile at the 4 measuring points on the fire-facing side is specified in annex 2.

2.2.5 Test equipment

The test furnace and the related measuring devices are described in detail in the “ceiling test furnaces” equipment folder of BAM Division 7.3.

2.2.6. Test execution

The test was prepared and executed by Messrs Hothan, Korzen, Klemmstein, Huismann, Buchner, Uzelac and Klaffke.

3. Test results

3.1 Experimental observations

Table 3: Observations during testing

Test minute	Test specimen side ¹⁾	Observations
17	A	Water beginning to escape from the concrete surface at a scattering of points
98		End of test

¹⁾ A = side facing fire, Z = fire facing away from fire

Annex 5 shows the cooled-down test specimen after the fire test.

3.5 Summary and evaluation of the test conditions and test results

Annex 4 shows the temporal temperature development in the reinforcement. Measuring point M1 is located above the sound-absorbing spacer Sorp10 70/35. Measuring point M2 is located on the same rebar with the same concrete cover but with sufficient distance to the spacer.

The illustration shows that – throughout the entire test period – the steel temperatures in the area of the sound-absorbing spacer (M1) are lower than those in the area of the equitable concrete cover without the sound-absorbing spacer (M2).

An adverse influence of the sound-absorbing spacer on temperature development and, thus, the load bearing capacity of the reinforcement can therefore be ruled out for the present application for a flame application period of up to 90 minutes based on the standard temperature-time curve.

4 Special notes

4.1 This test report contains a detailed description of the mounting procedure, test conditions and results which have been obtained by means of the specific component described herein after testing it according to the procedures specified in DIN EN 1363-1 and, if applicable, DIN EN 1363-2. Any material deviations regarding size, structural details, loads, stress conditions, boundary conditions, apart from the deviations admissible in the relevant test method for the specific area of application, are not covered by this test report.

- 4.2** Due to the special nature of the tests for the fire resistance time and the resulting difficulties regarding the quantification of uncertainties in the measurement of the fire resistance time, it is not possible to indicate a specific degree of accuracy for the result.

**Federal Institute for Materials Research and Testing (BAM)
12200 Berlin, 15 April 2011**

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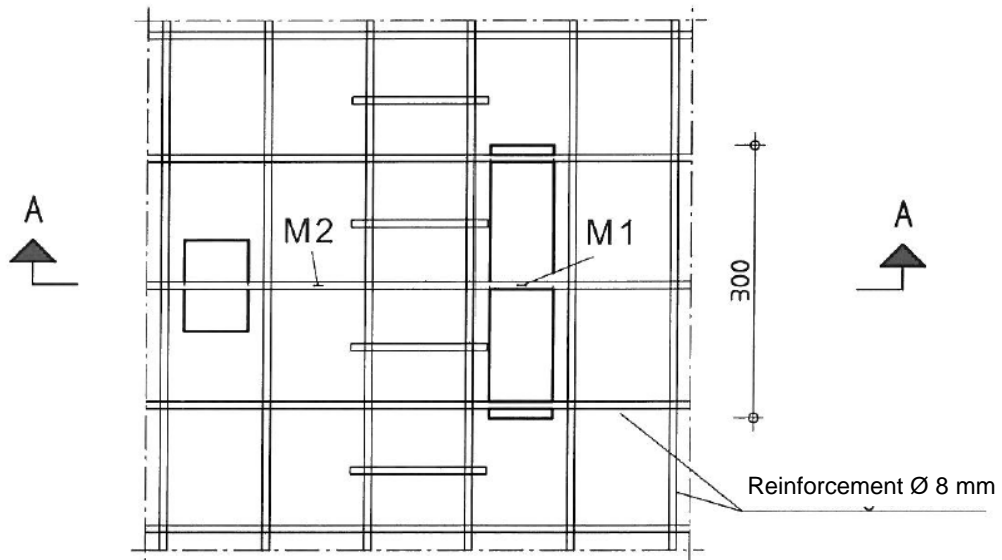


Division VII.3 is involved in tests and conformity assessment procedures within the BAM certification body (amongst others, notified body for the Construction Products Directive, ID no. 0589) and accredited product certification body (DGA-ZE-3998.00) and holds the approvals required for the relevant procedures.

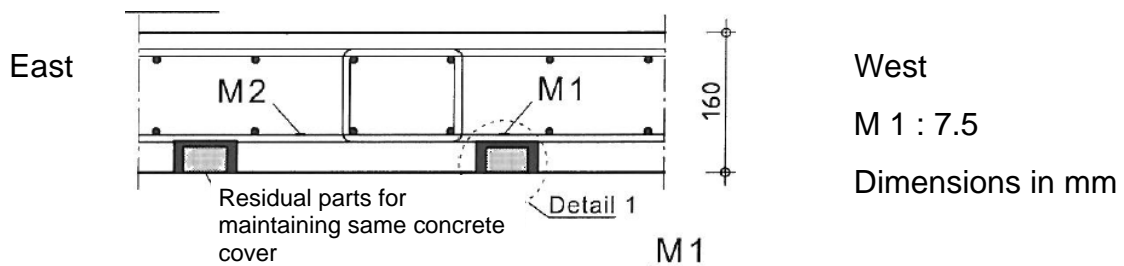


Top view

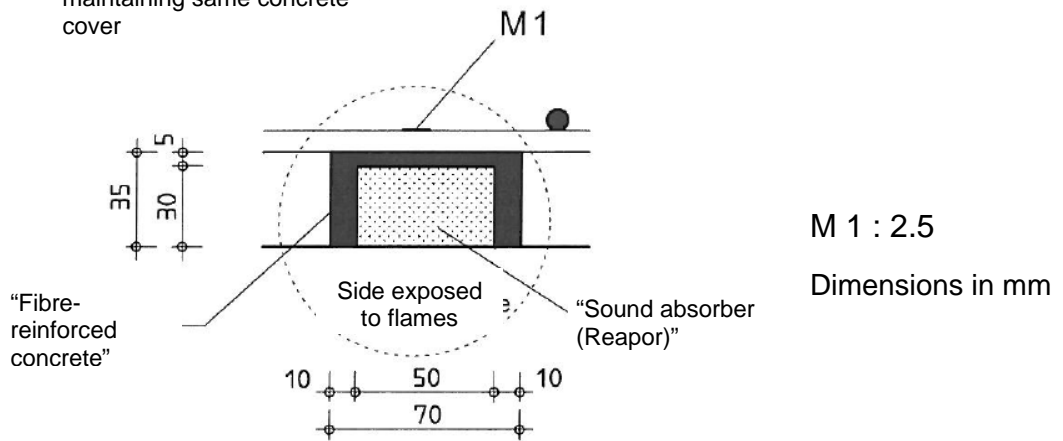
Reinforcement with spacer



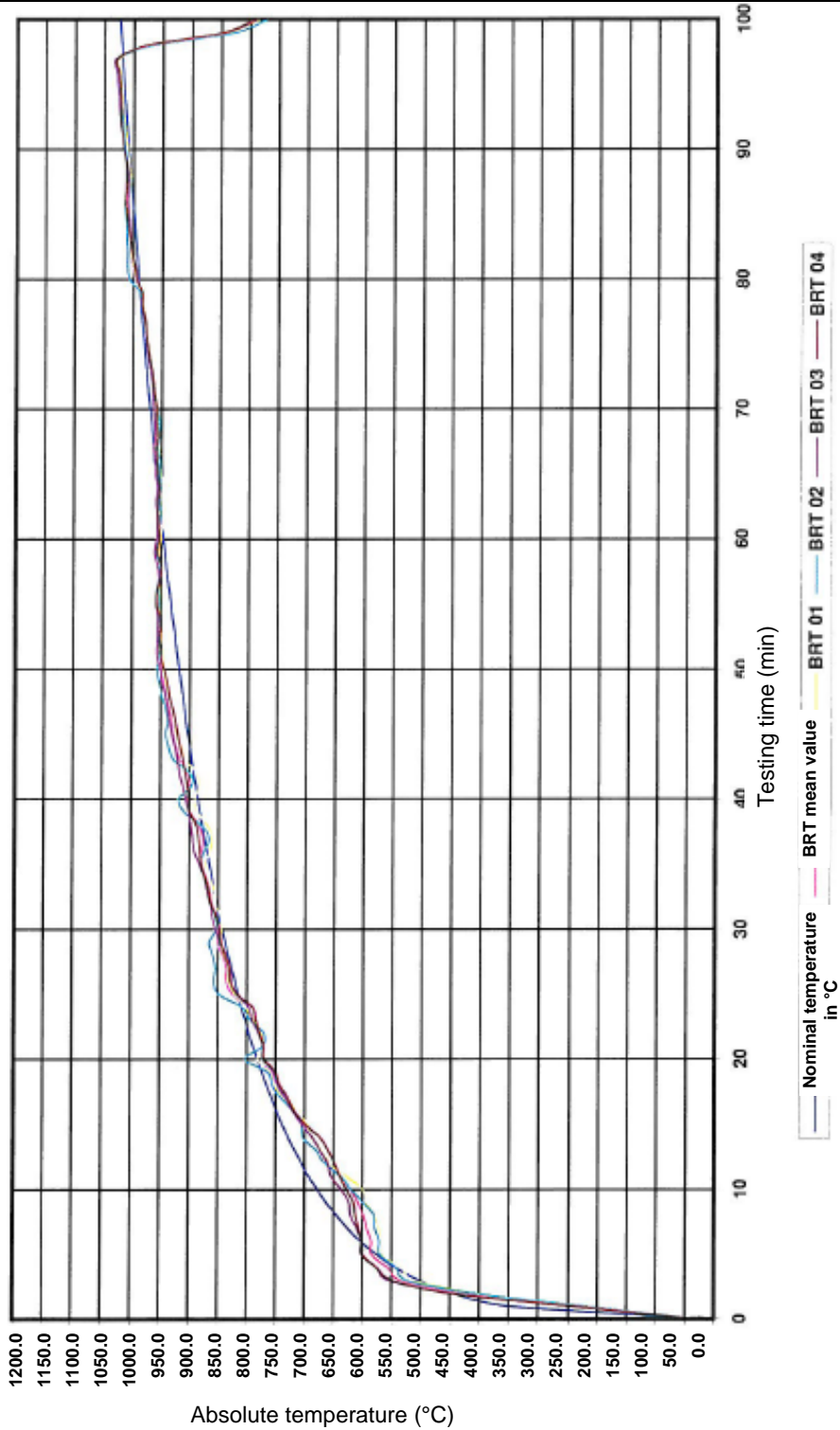
Section A-A



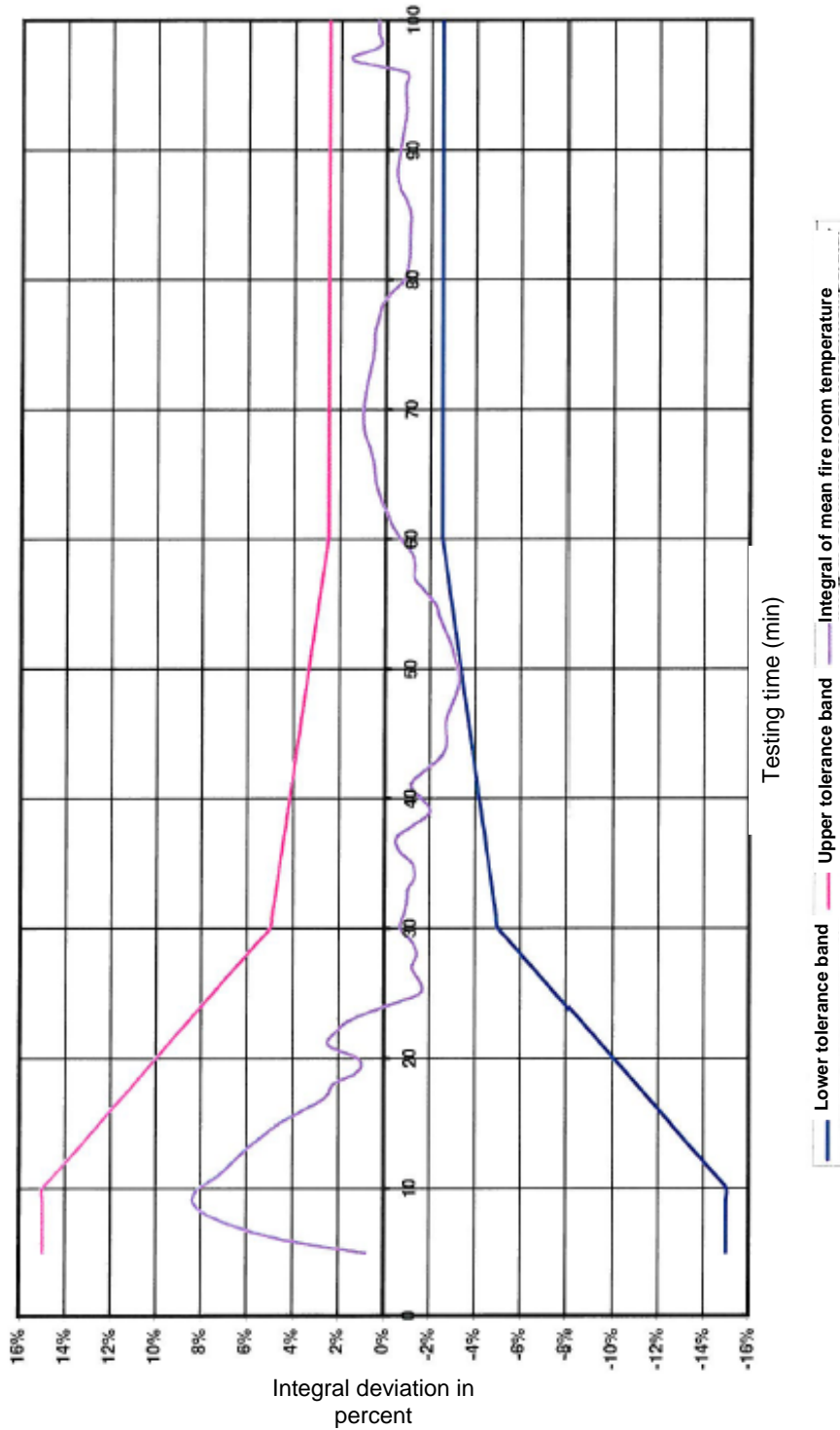
Detail 1



Fire room temperatures (BRT01 – BRT014)
mean fire room temperature value (BRT Mean) and nominal temperature



Deviation of the integral of the mean fire room temperature from the nominal value integral according to DIN EN 1363-1, section 5.1.2

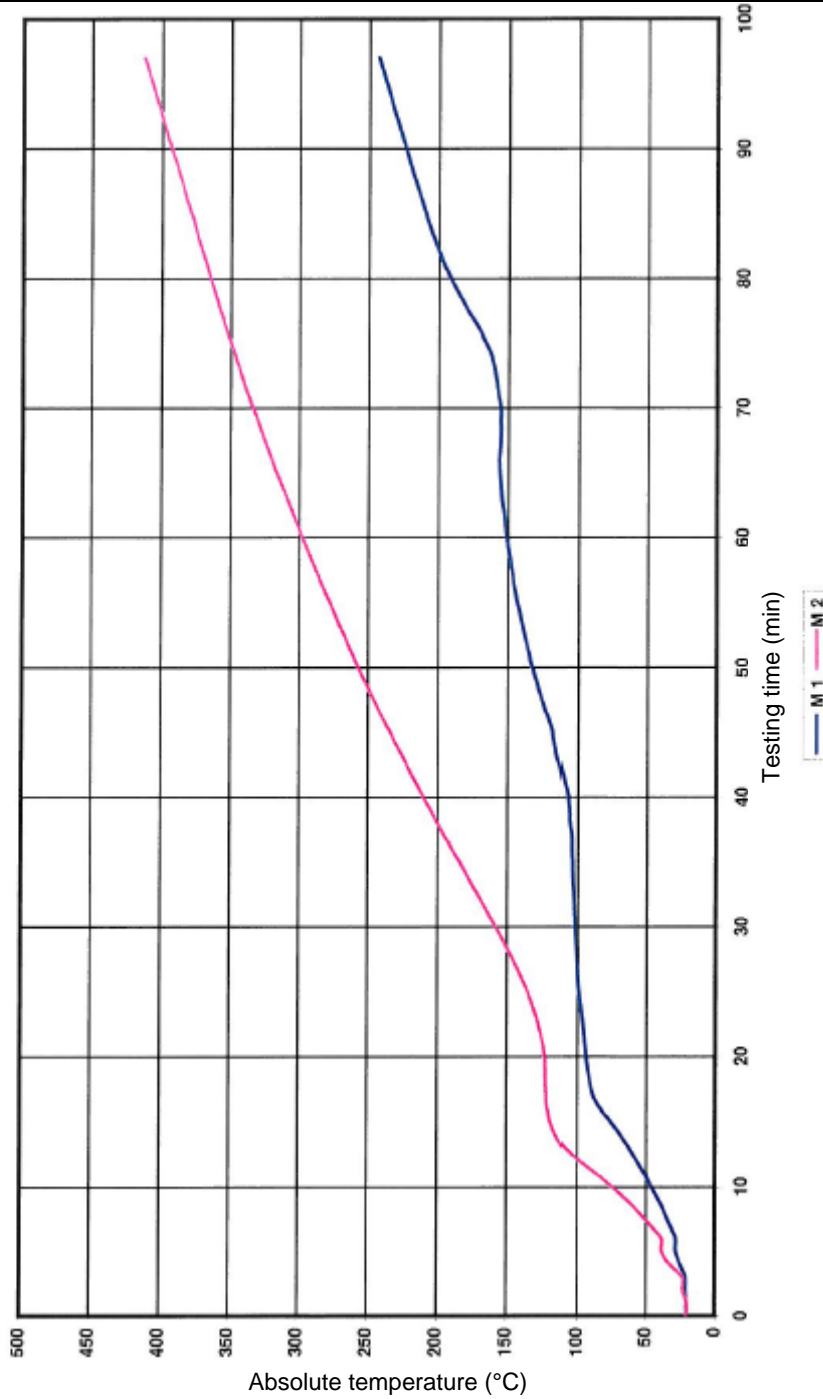


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Sound-absorbing spacer Sorp10
Deviation of the integral of the mean fire room
temperature to the nominal value integral according
to DIN EN 1363-1, section 5.1.2

Annex 3

Thermocouples M1 and M2 on rebar in the reinforced concrete slab
M1 above spacer; M2 on an undisturbed bar



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Sound-absorbing spacer Sorp10
Absolute temperatures at the measuring points M1
(on reinforcement above sound-absorbing spacer)
and M2 (on reinforcement in in-situ concrete)

Annex 4

