

# Testrapport brandbedrag

## **MBK-Plus 22 (Oktagon Plus)** **Waterdichte bekistingsafstandhouder**

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MA 39 - VFA 2020-0613.01

Vienna, 27 July  
2020  
Total pages: 16

## Test Report

on the fire resistance of formwork spacers with the designation “Oktagon” and “Oktagon-PLUS” (test conducted on 19 June 2020)

Client	Nevoga GmbH
Date of order	14 April 2020
Test object	3 formwork spacers with the designation “Oktagon” and 3 formwork spacers with the designation “Oktagon-PLUS”, each manufactured with a length of 200 mm, and two plugs for Oktagon and Oktagon-PLUS, cast in a concrete block with the dimensions 1000 mm x 1000 mm x 200 mm (L x H x W)
Test program	Test of these formwork spacers in terms of their fire resistance and based on ÖNORM EN 1363-1.
Test	During the fire resistance test of the formwork spacers provided, the fire resistance was tested based on ÖNORM EN 1363-1 for a test period of 180 minutes, whereby the maximum temperature increase, measured on the outside of the formwork spacer, was 75 K (observations can be found in chapter 6).

## 1 General information

In the letter dated 14 April 2020, MA 39 was contracted by the client for the testing of the fire resistance of formwork spacers.

When the order was placed, an agreement (selection of the test specimens) was made with MA 39 on the design to be tested.

## 2 Test conditions

The test method used for the determination of the fire resistance duration is stated in EN 1363-1, whereby the test specimens were subjected to the temperatures in the standard time-temperature curves. In the case at hand, the assessment was based on the maximum temperatures reached on the surface of the test specimen facing away from the fire.

## 3 Test specimens

The client provided the test specimens, and they were built into the opening of the test furnace on 18 June 2020.

The following parts of the formwork spacers were built into the furnace for the test:

- 3 x:
- Oktagon-PLUS with
  - plugs for the Oktagon and Oktagon-PLUS

- 3 x:
- Oktagon with
  - plugs for the Oktagon and Oktagon-PLUS

Description of test specimen:

- Oktagon-PLUS and Oktagon:

The formwork spacer is manufactured from polyolefine (PO, PVC-free) from one piece.

Length 200 mm

- Plugs for the Oktagon and Oktagon-PLUS:

The plug is manufactured from polyolefine (PO, PVC-free).

Concrete class	C30/37 B7 FaB/BBG GK16 F52
Composition:	Cement CEM III / A-M (S-L)
	Strength class 42.5 N
	SikaFiber PPM-12 / polymer fibers 2 kg/m <sup>3</sup>

The plugs for the Oktagon and Oktagon-PLUS were hammered into the plastic pipe using a hammer.

The distance between the formwork spacers was 30 cm and 60 cm, respectively.

Overall dimensions of the test specimen: 1000 mm x 1000 mm x 200 mm

Data sheets of the sample specimen can be found from page 5 to page 8.

## **4 Test setup**

The test specimen was placed vertically in the test frame of the fire chamber with a clear test opening measuring 1005 mm x 1005 mm (W x H). The gaps between the test specimens and the test opening were sealed with strips of mineral wool.

The test specimen was conditioned according to ÖNORM EN 1363-1.

## **5 Test procedure**

The fire chamber was heated using two gas burners (town gas). The temperature in the furnace was regulated based on the average value of the furnace temperature measuring points according to the standard time-temperature curve.

The test was conducted on 19 June 2020.

The temperature in the test facility before the test began was 23°C.

The pressure in the furnace was monitored and regulated according to ÖNORM EN 1363-1.

To measure the temperatures in the furnace 3 plate thermometers were mounted in the furnace at a distance of approx. 10 cm from the test specimen and in the center of the furnace (see page 9). Eight thermocouples were mounted on the surface of the test specimen facing away from the fire (see page 10).

## **6 Results**

Observations during the test:

- 30 minutes. Thermal insulation and integrity provided
- 60 minutes: Thermal insulation and integrity provided
- 90 minutes: Thermal insulation and integrity provided
- 120 minutes: Thermal insulation and integrity provided
- 180 minutes: Thermal insulation and flame barrier provided –  
End of test (on request of the client)

Pages 11 to 14 summarize the temperatures measured during the test (furnace temperatures, temperatures on the side of the test specimen facing away from the fire) and the pressure measurement data recorded.

The photographic documentation can be found on page 15 and page 16.

## 7 Assessing the results of the tests

The design provided was subjected for a duration of 180 minutes to the temperatures of the standard time-temperature curve, and the maximum temperature increase measured on the side of the test specimen facing away from the fire was 75 K, and thus remained below the maximum permissible temperature increase of 180 K according to ÖNORM EN 1363-1.

Based on the test results, the formwork spacers tested with the designation “Okatagon” and “Okatagon-PLUS” fulfill the thermal insulation and integrity criteria for a test duration of 180 minutes according to ÖNORM EN 1363-1.

Case manager  
Dipl.-HTL-Ing. Kurt Danzinger, MSc  
Senior Technical Civil Servant

Head of Lab  
Dipl.-Ing. Dieter Werner, MSc  
Senior Town Planning Councillor

Head of the Testing, Inspection,  
and Certification Body  
Dipl.-Ing. Georg Pommer  
Senate Councillor

DATA SHEET

**OKTAGON®**



**TEST CERTIFICATE  
AVAILABLE ON  
REQUEST**

**Application:**

One-piece formwork spacer in an especially large design with a contact surface of approx. 48 mm to the form. Due to the one-piece design, tasks such as cutting the spacer tubes to length and placing the cones are unnecessary.

**Processing:**

The Oktagon formwork spacer is used together with the tie rods when installing the wall forms. Additional specifications on the arrangement and the installation spacing can be found in the leaflet of the German Society for Concrete and Construction Technology (DBV).

**Material:**

- Polyolefine (PO), polyvinyl chloride (PVC)
- Free of CFC, HFC
- No substances of very high concern according to the candidate list of the ECHA (REACH Regulation)

**Packaging:**

Free of compounds containing halogens, azo dyes, flame retardants.

**\* PVC-FREE**

**Order information:**

Item No.	Wall mm	Pcs/Sack	Pcs/Pallet
*O15	150	100	2.400
O175/3T	175	100	2.400
*O18	180	100	2.400
*O20	200	100	2.400
O22/3T	220	100	2.400
*O24	240	100	2.400
*O25	250	100	2.400
*O30	300	100	2.400
*O35	350	100	1.500
O36/3T	360	100	1.500
*O365	365	100	1.500
*O40	400	100	1.500
O45/3T	450	50	800
O50/3T	500	50	800
O55/3T	550	50	800
O60/3T	600	50	800

Oktagon, 1-piece

Oktagon, 3-piece

**The following test certificates are available:**

- 1) Water leak test**
- 2) Fire behavior F180**
- 3) Airborne sound insulation**
- 4) Suitability for drinking water**

\* manufactured from one piece (PVC-free)

*Delivered as a set: Every formwork spacer includes 2 OKTAGON® plugs*

*Special lengths can be manufactured on request, the OKTAGON® cone is placed on a cut pipe.*

**Important:**

*Guidelines for the selection and application of the spacers are regulated by the following DBV leaflets (German Society for Concrete and Construction Technology)*

- *Spacers, support, and concrete coverage and reinforcement*

**INFORMATION:**

All information was prepared according to the current state of the art in technology and to the best of our knowledge. Installation manuals can only be considered recommendations, and they are not a replacement for the knowledge required for installation.

Nevoga does not guarantee the accuracy or completeness of the information provided. Subject to major changes, errors, and printing errors.

## DATA SHEET

**OKTAGON®-PLUS 22**
**TEST CERTIFICATE  
AVAILABLE ON  
REQUEST**
**PRODUCT VIDEO  
WWW.NEVOGA.COM**
**Application:**

Formwork spacers with permanently mounted spreader cones for exposed concrete. Optionally available with sealing discs already glued on. This prevents fine mortar from minor inaccuracies in the forms.

requirements.  
leaking out due to

**Processing:**

The OKTAGON-PLUS 22 formwork spacer is used together with the tie rod when assembling the wall forms.

Additional specifications on the arrangement and the installation spacing can be found in the leaflet of the German Society for Concrete and Construction Technology (DBV).

**Material:**

- Polyolefine (PO), polyvinyl chloride (PVC)
- Free of CFC, HFC
- No substances of very high concern according to the candidate list of the ECHA (REACH Regulation)

**Packaging:**

Free of compounds containing halogens, azo dyes, flame retardants.

**\* PVC-FREE**

**Order information:**

Item No.	Wall mm	Pcs/ Sack	Pcs/ Pallet
*OP15	150	100	2.400
OP175/3T	175	100	2.400
*OP18	180	100	2.400
*OP20	200	100	2.400
OP22/3T	220	100	2.400
*OP24	240	100	2.400
*OP25	250	100	2.400
*OP30	300	100	2.400
*OP35	350	100	1.500
OP36/3T	360	100	1.500
*OP365	365	100	1.500
*OP40	400	100	1.500
OP45/3T	450	50	800
OP50/3T	500	50	800
OP55/3T	550	50	800
OP60/3T	600	50	800

OKTAGON-PLUS 22, 1-piece

OKTAGON-PLUS 22, 3-piece

The following test certificates are available:

- 1) Water leak test
- 2) Fire behavior F180
- 3) Airborne sound insulation
- 4) Suitability for drinking water
- 5) Aggressive water

*\* Manufactured from one piece (PVC-free); delivered as a set;  
Every formwork spacer includes 2 OKTAGON® plugs  
Special lengths can be manufactured on request.*

**Important:**

Guidelines for the selection and application of the spacers are regulated by the following DBV leaflets (German Society for Concrete and Construction Technology)

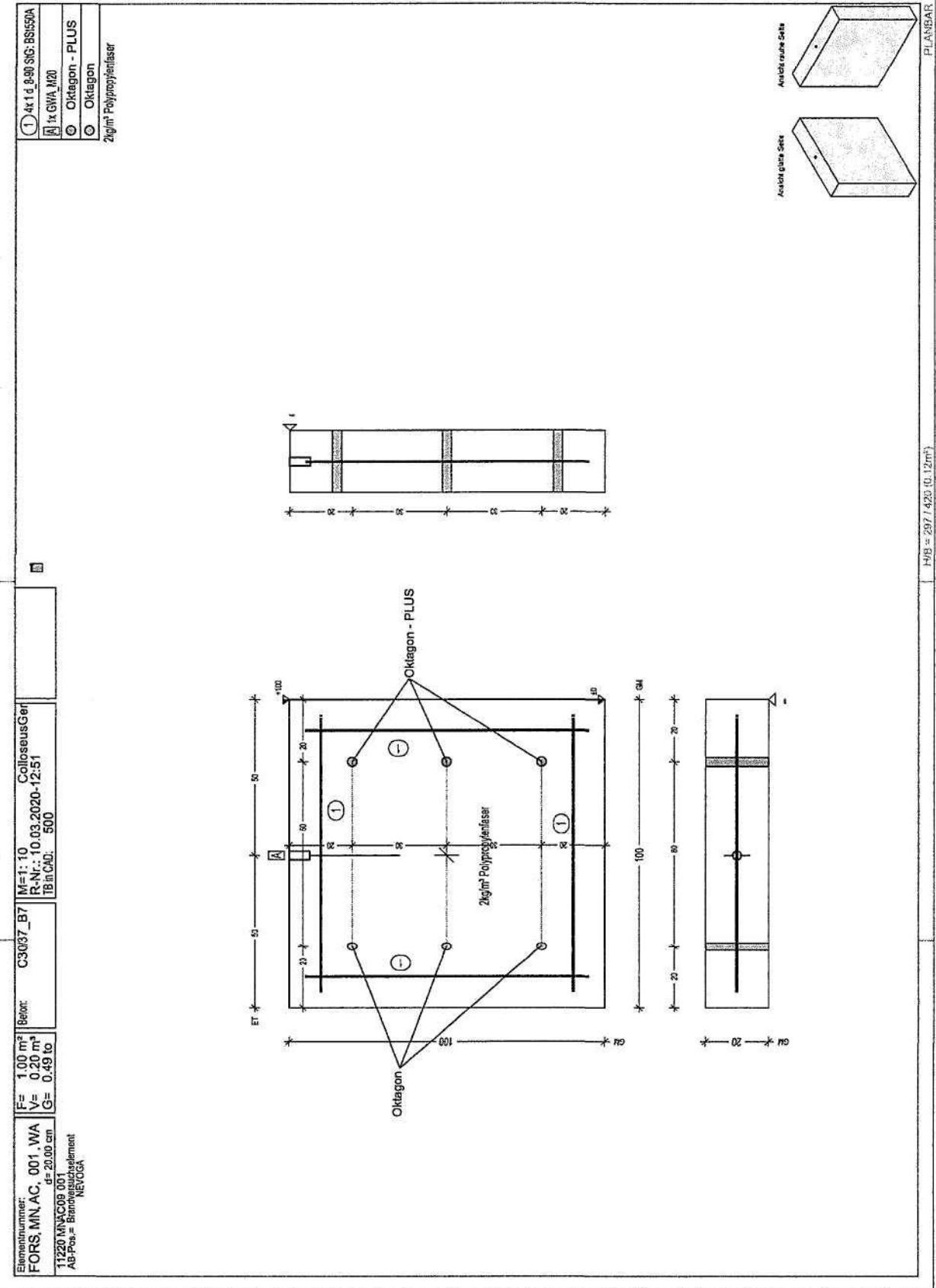
- Spacers, support, and concrete coverage and reinforcement

**INFORMATION:**

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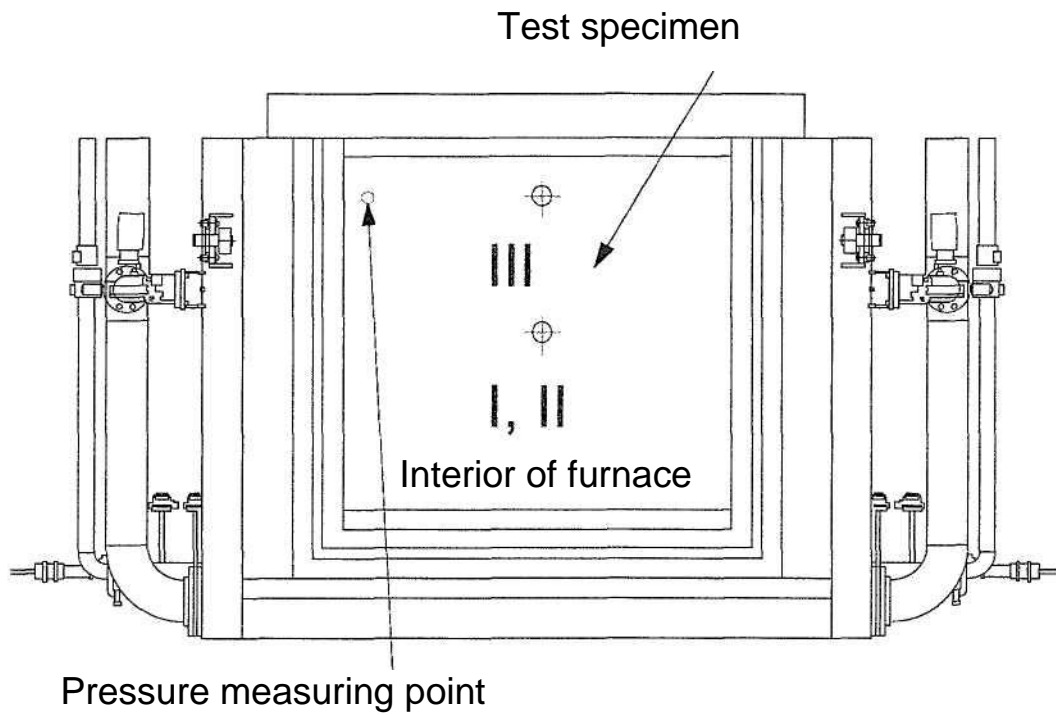
<b>ÖNORM B 4710-1</b> <b>Concrete Testing</b> <b>Form 1-2</b>	Concrete manufacturer: <b>Mischek Systembau GmbH</b>		Certificate of conformity	Page 1 of 1
	Plant: <b>Prefabricated part plant in Gerasdorf</b>			<b>Comment</b>
	<b>Concrete Constituents,</b> <b>Information on the Suitability Test</b>			
	Applies to concrete classes: <b>C30/37 B7 FaB/BBG GK18 F82</b>			
Aggregate No.1	Designation Manufacturer, pit CE number for in-house	GK 0/4-GF85-f10-F1 Riedmüller 1139-CPR-0434/13		
Aggregate No.2	Designation Manufacturer, pit CE number for in-house	GK 4/16-Gc90/15-f1,5-F1 Riedmüller 1139-CPR-0434/13		
Aggregate No.3	Designation Manufacturer, pit CE number for in-house			
Aggregate No.4	Designation Manufacturer, pit CE number for in-house			
Cement No. 1	Manufacturing plant CE number Cement type Strength class Additional requirements acc. to binder UA number			
Cement No. 2	Manufacturing plant CE number Cement type Strength class Additional requirements acc. to binder UA number	Mannersdorf 2523-CPR-0036 CEM II/A-M (S-L) 42.5 N WT38 R-1.1.1-18-1280		
Additive No. 1	Manufacturer UA number, CE number Type (effect) Product description	Sika Österreich GmbH LE 70273376 SikaFiber PPM-12 / polymer fibers 100% Class 1a polypropylene monofilament acc. to EN 14889-2		
Admixture No. 1	Manufacturer CE number for in-house production control Description	BASF 1139-CPR-0028/03 Plasticizer for concrete MasterGlenium ACE 397		
Admixture No. 2	Manufacturer CE number for in-house production control Description	BASF 1139-CPR-0028/03 Air-entraining agent for concrete MasterAir 9060		
Admixture No. 3	Manufacturer CE number for in-house production control Description			
Admixture No. 4	Manufacturer CE number for in-house production control Description			
For the conformity assessment body:		Date:	Signature:	
For the manufacturer:		Date:		
a. In particular, information on the compatibility when using admixtures b. All necessary requirements according to Table 14 and/or Table 15, and see Table 13 for the grading curve variation c. The end of the validity period must be specified in the Comment column				





## Furnace temperature measuring points

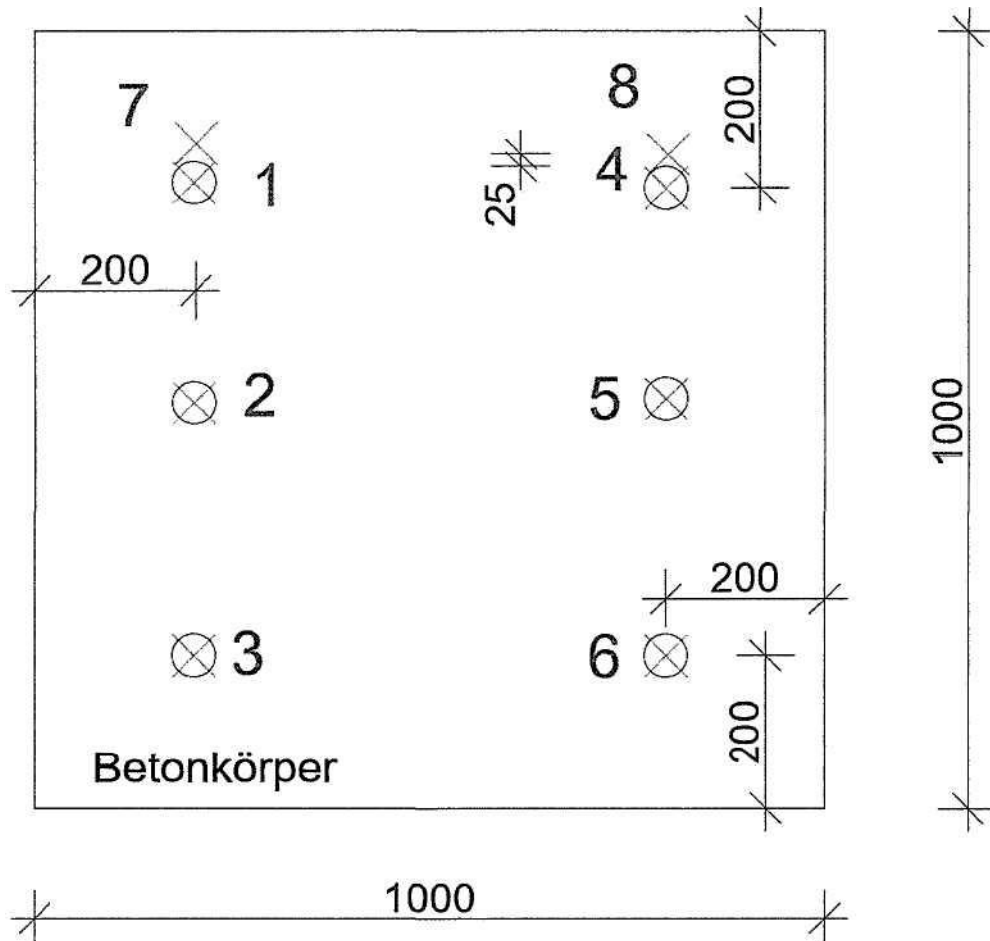
Section:



I to III Furnace temperature measuring points

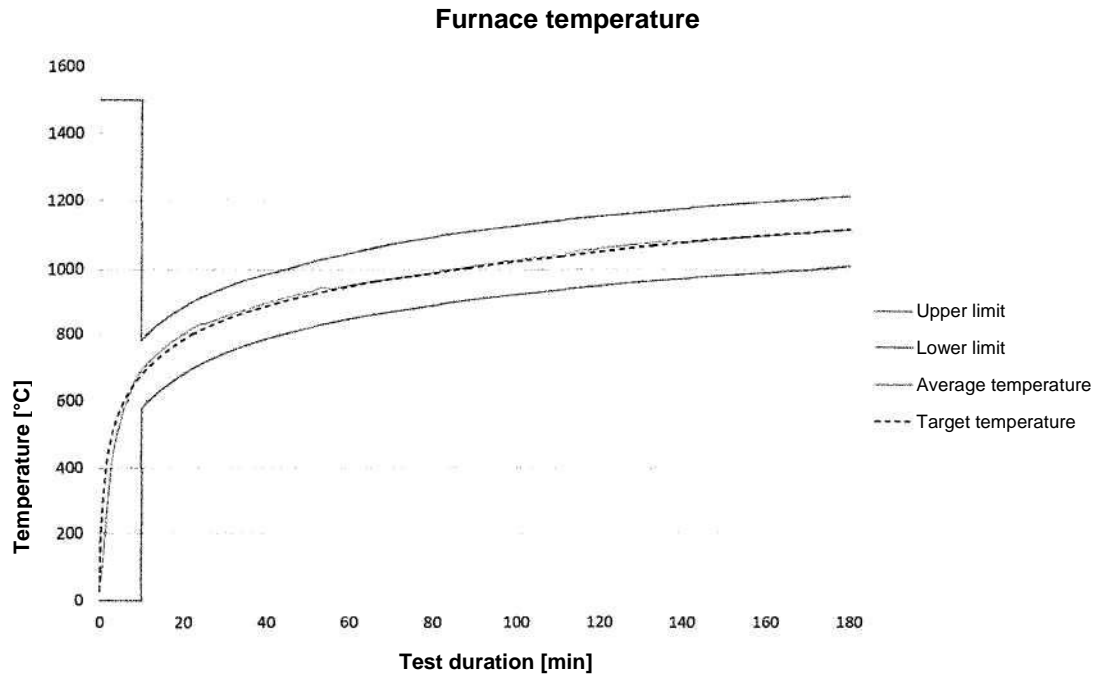
## Location of the thermocouples on the surface facing away from the fire

Test specimen, view of side facing away from the fire:



× ..... Temperature measuring point

Average furnace temperature in degrees Celsius, measured with the thermocouples specified in ÖNORM EN 1363-1:



Average temperature at the start of the test on the surface of the test specimen: 23°C

Time [min]	Average furnace [°C]	UTTC [°C]	Difference [°C]	UTTC+100 [°C]	UTTC-100 [°C]
2	332	445	-113	1500	0
4	494	544	-50	1500	0
6	587	603	-16	1500	0
8	653	646	8	1500	0
10	694	678	16	778	578
12	721	705	16	805	605
14	745	728	17	828	628
16	766	748	17	848	648
18	783	766	17	866	666
20	800	781	19	881	681
22	814	796	19	896	696
24	829	809	21	909	709
26	834	820	13	920	720
28	842	832	11	932	732
30	853	842	11	942	742
32	861	851	10	951	751
34	869	860	9	960	760
36	878	869	9	969	769
38	887	877	10	977	777
40	894	885	10	985	785
42	902	892	10	992	792
44	910	899	11	999	799
46	917	906	11	1006	806
48	925	912	13	1012	812
50	931	918	13	1018	818
52	937	924	14	1024	824
54	941	930	12	1030	830
56	940	935	5	1035	835
58	945	940	4	1040	840
60	950	945	4	1045	845

Average temperature at the start of the test on the surface of the test specimen: 23°C

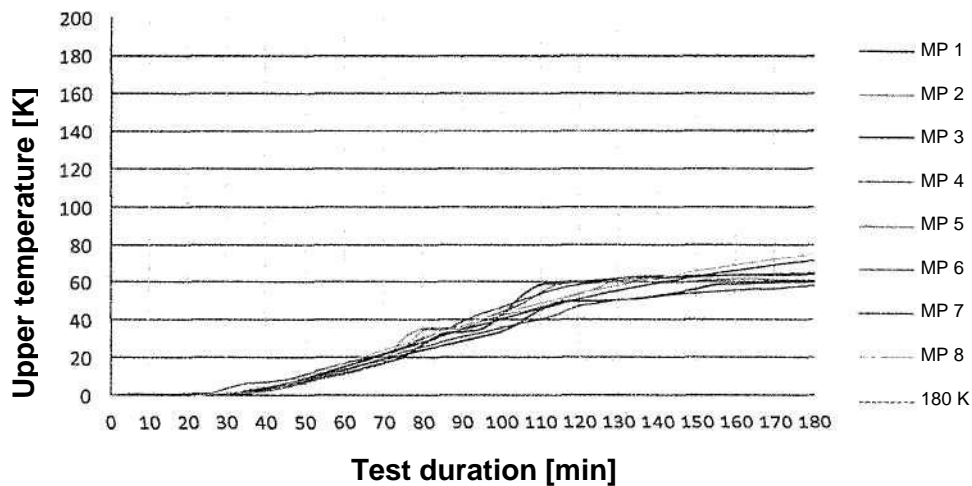
Time	Average furnace temp.	UTTC	Difference	UTTC+100	UTTC-100
[min]	[°C]	[°C]	[°C]	[°C]	[°C]
62	954	950	4	1050	850
64	959	955	4	1055	855
66	964	960	5	1060	860
68	968	964	4	1064	864
70	971	968	3	1068	868
72	976	973	3	1073	873
74	980	977	3	1077	877
76	985	981	4	1081	881
78	989	985	4	1085	885
80	993	988	4	1088	888
82	997	992	5	1092	892
84	1000	996	4	1096	896
86	1003	999	4	1099	899
88	1008	1003	5	1103	903
90	1011	1006	5	1106	906
92	1014	1009	5	1109	909
94	1018	1013	5	1112	912
96	1021	1016	5	1116	916
98	1024	1019	6	1119	919
100	1028	1022	6	1122	922
102	1031	1025	6	1125	925
104	1035	1028	8	1128	928
105	1038	1030	7	1130	930
108	1041	1033	8	1133	933
110	1043	1036	7	1136	936
112	1047	1039	8	1139	939
114	1049	1041	8	1141	941
116	1052	1044	8	1144	944
118	1055	1047	8	1147	947
120	1058	1049	9	1149	949
122	1060	1052	8	1152	952
124	1063	1054	9	1154	954
126	1066	1056	9	1156	956
128	1068	1059	9	1159	959
130	1070	1061	9	1161	961
132	1073	1063	9	1163	963
134	1076	1066	10	1166	966
136	1077	1068	9	1168	968
138	1076	1070	6	1170	970
140	1075	1072	3	1172	972
142	1075	1074	1	1174	974
144	1076	1076	0	1176	976
146	1078	1078	0	1178	978
148	1082	1080	1	1180	980
150	1084	1082	1	1182	982
152	1086	1084	1	1184	984
154	1087	1086	1	1186	986
156	1089	1088	1	1188	988
158	1091	1090	1	1190	990
160	1093	1092	0	1192	992
162	1094	1094	0	1194	994
164	1097	1096	1	1196	996
166	1098	1098	0	1198	998
168	1100	1099	1	1199	999
170	1102	1101	0	1201	1001
172	1104	1103	1	1203	1003
174	1105	1105	1	1205	1005
176	1107	1106	0	1206	1006
178	1108	1108	0	1208	1008
180	1110	1110	0	1210	1010

**Temperatures on the side of the test specimen facing away from the fire**  
as upper temperatures in [K]

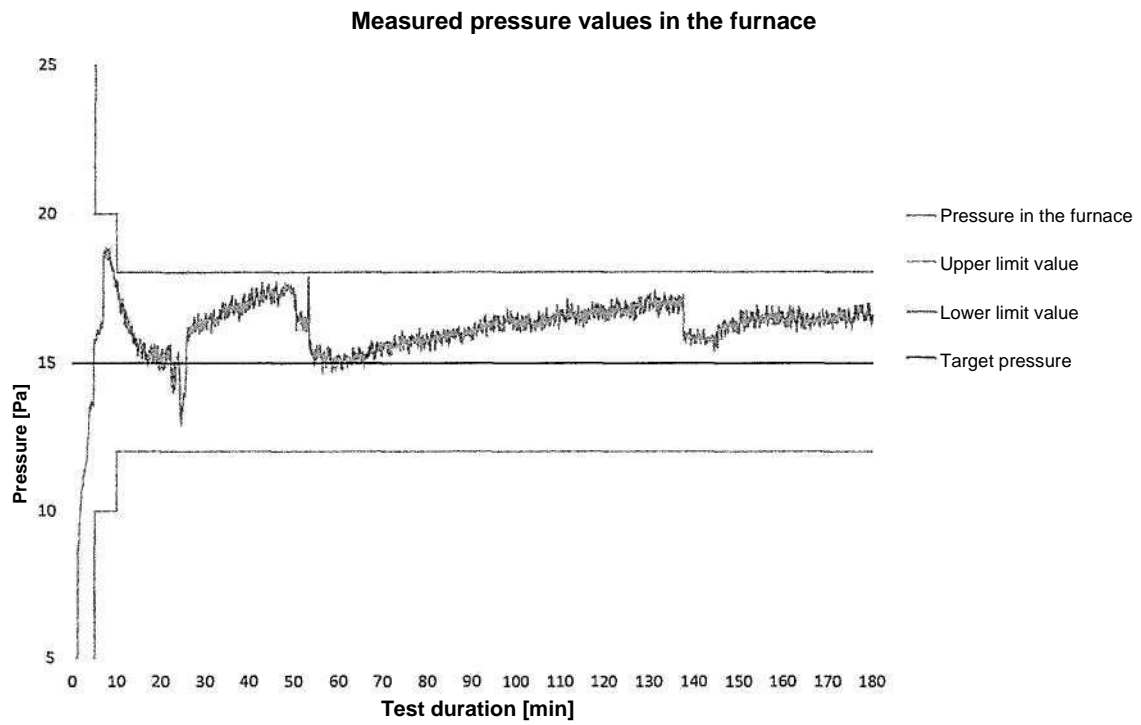
Temperature at start of test: 23°C

Test duration [min]	Thermocouple No.							
	MP 1	MP 2	MP 3	MP 4	MP 5	MP 6	MP 7	MP 8
5	1	1	0	0	1	1	0	0
10	1	1	1	0	1	1	0	0
15	1	1	0	0	1	1	0	0
20	1	1	1	0	1	1	1	0
25	1	1	1	1	1	1	0	1
30	1	1	1	4	1	1	2	1
35	2	2	2	7	2	1	2	3
40	4	4	4	7	3	3	4	5
45	6	6	6	9	5	6	6	7
50	8	9	9	11	7	8	9	11
55	10	12	11	14	9	11	12	14
60	12	15	14	17	12	13	15	17
65	15	19	17	20	14	17	18	21
70	18	21	19	22	18	20	22	24
75	21	25	22	26	31	23	25	27
80	27	34	24	30	36	26	28	31
85	33	34	26	34	36	28	32	34
90	34	36	29	39	37	31	35	37
95	35	39	31	43	40	33	38	41
100	43	42	34	47	45	36	40	44
105	53	44	39	50	49	38	43	46
110	59	47	45	54	55	40	46	49
115	59	50	50	57	60	43	49	51
120	60	54	50	59	60	48	51	54
125	61	57	50	60	60	49	53	56
130	62	62	51	61	60	51	56	58
135	63	63	51	61	60	51	57	60
140	63	64	53	62	60	53	59	62
145	63	64	54	63	60	54	61	64
150	64	64	56	63	61	54	63	66
155	64	64	59	63	62	55	65	68
160	64	64	59	64	62	56	66	69
165	64	64	60	64	62	56	68	71
170	64	64	60	65	62	56	69	73
175	65	64	60	65	61	58	71	74
180	65	64	60	65	61	58	72	75

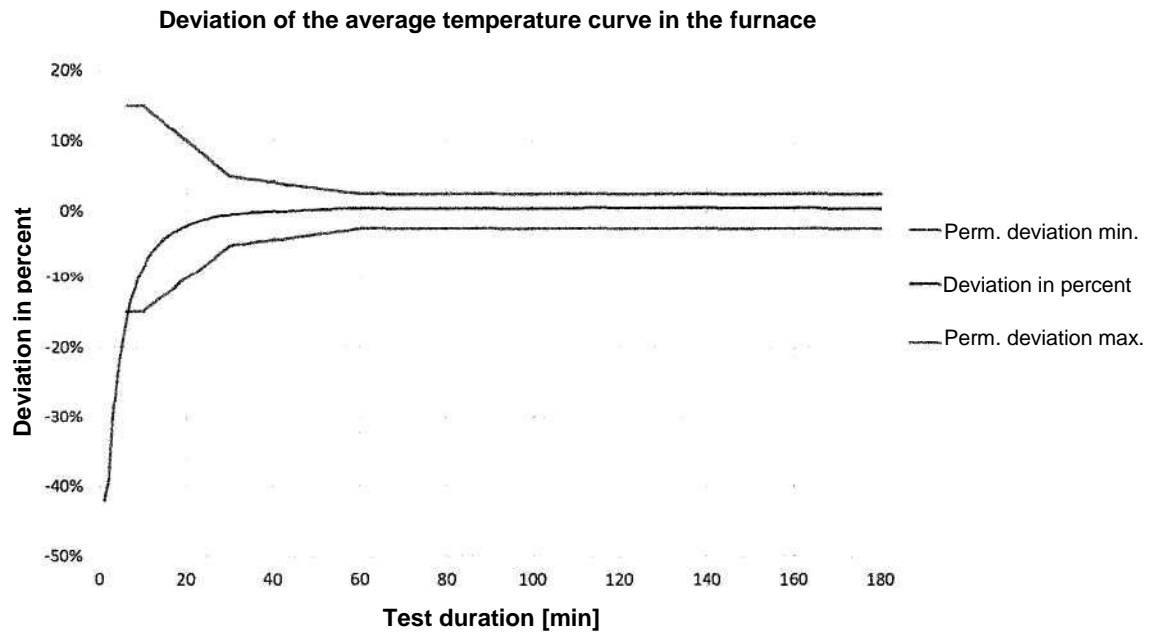
**Temperatures on the side facing away from the fire**



Pressure curve in the furnace, measured in Pa in the center of the furnace:



Tolerances according to EN 1363-1:2012, section 5.1.2 (deviation in percent of the average temperature curve compared to the uniform temperature-time curve):



Photographic documentation of the fire test conducted on 19 June 2019:

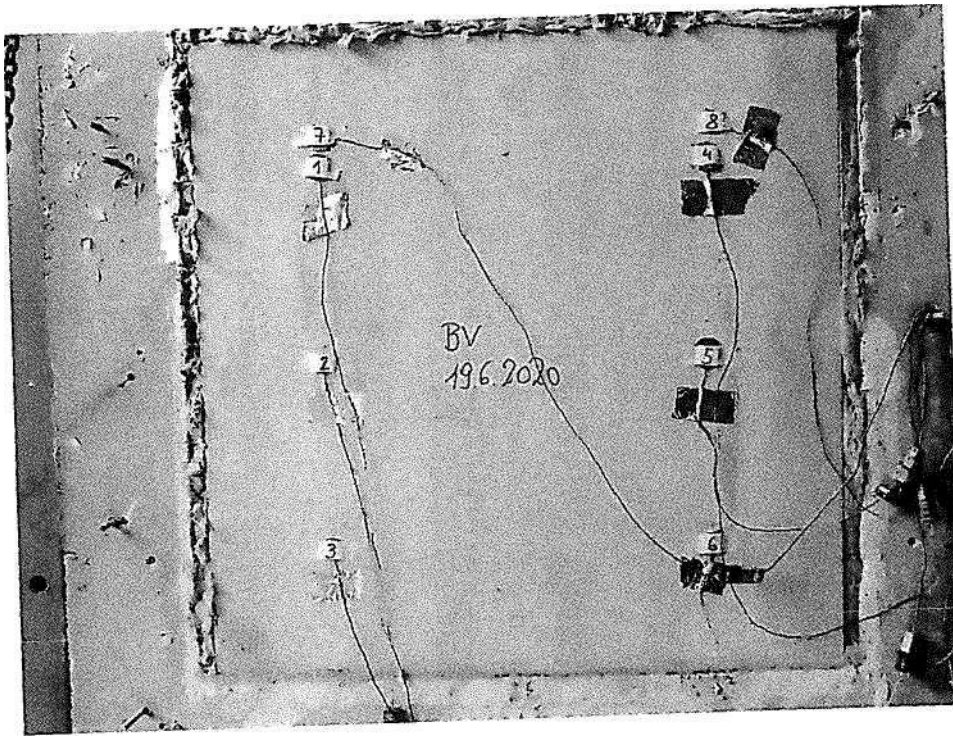


Figure 1  
(No. P1020182.jpg):

Built-in test specimen  
before the fire test  
(side facing away  
from fire)

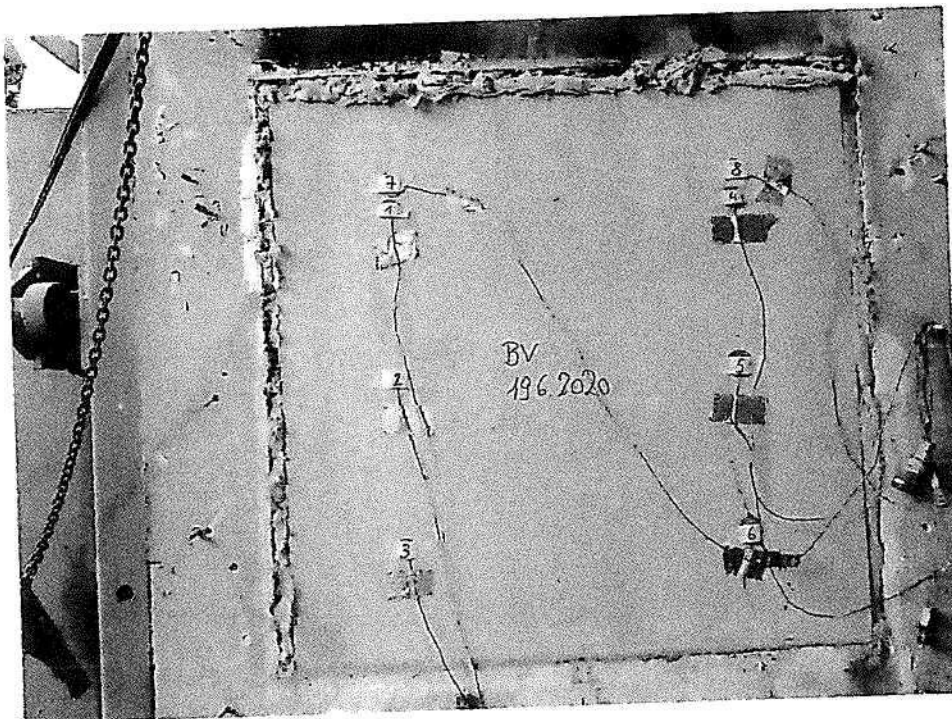


Figure 2  
(No. P1020183.jpg):

Test specimen during  
the fire test  
(side facing away  
from fire)



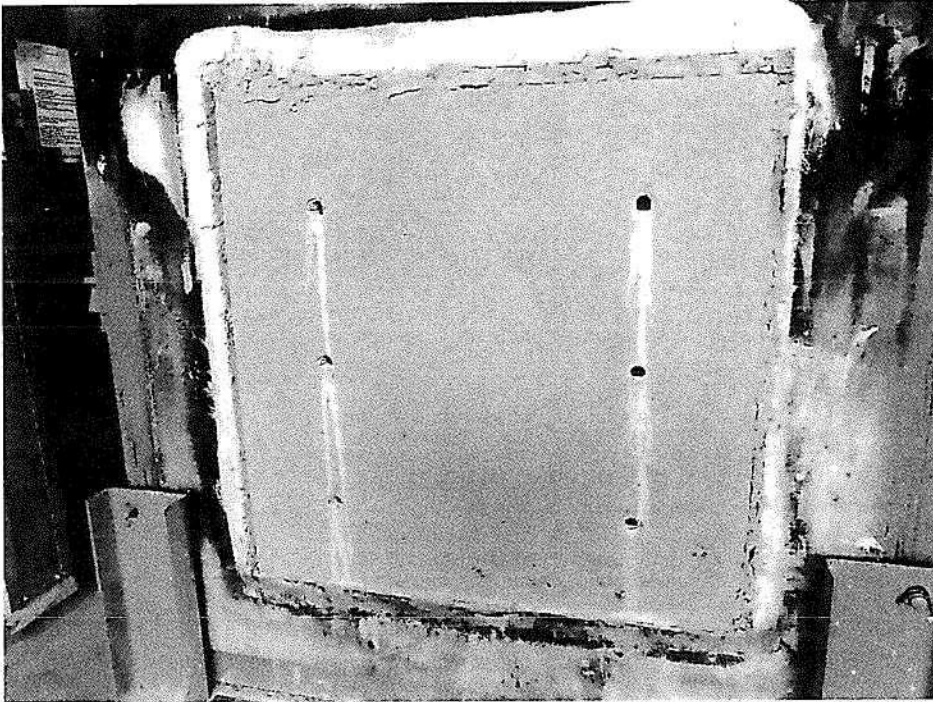


Figure 3  
(No. P1020185.jpg):

Test specimen after  
the fire test  
(side facing fire)

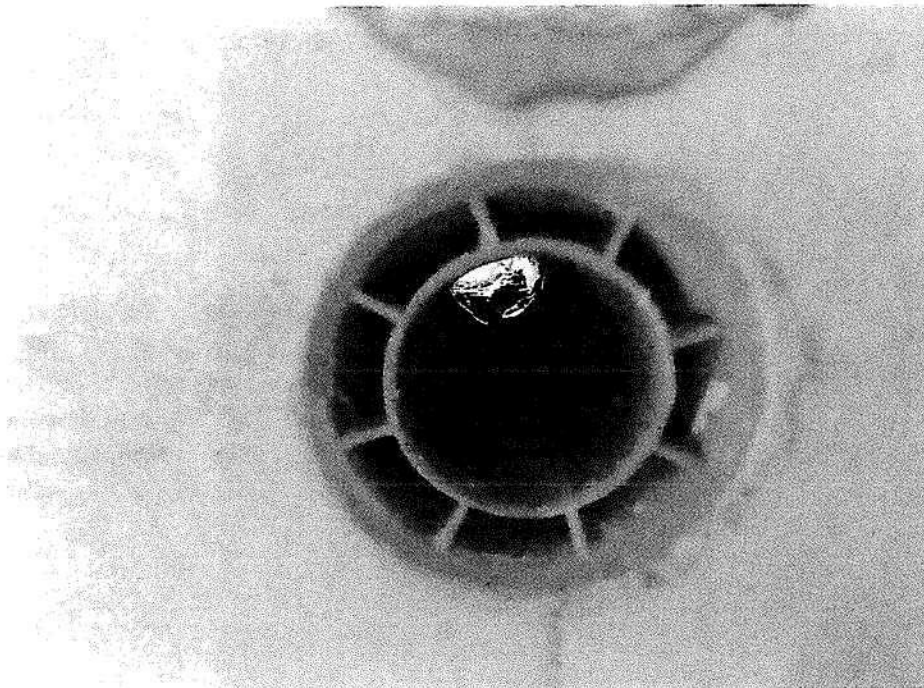


Figure 4  
(No. P1020228.jpg):

Test specimen after  
the fire test  
(side facing away from fire)