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Leipzig Institute for Materials Research and Testing Business Division III – Structural Fire Protection

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Work Group 3.2 – Fire Behaviour of Building Components

Classification Report

Report on the classification of fire behavior
according to DIN EN 13501-2

KB 3.2/10-052-2

Subject matter:	Classification of solid walls with installed „ <i>Polyurethane foam</i> “ joint sealant to be applied in linear butt joints according to DIN EN 13501-2
Client:	Debratec GmbH Industriestrasse 1-7 D-01936 Schwepnitz
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This classification report covers 9 sheets.

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1 Introduction

This classification report defines the classification assigned to solid walls with installed „Polyurethane foam“ joint sealants in accordance with the methods specified in (DIN EN 13501-2: 2008/1^{*)}).

2 Details of the classified product

2.1 Type of function

The „Polyurethane foam“ joint sealants are defined as vertical construction joints. Their function is to resist the fire according to the characteristic fire behavior according to section 5.2.2 and 5.2.3 of DIN EN 13501-2: 2008/1.

2.2 Product description

The „Polyurethane foam“ joint sealants consist of polyurethane foam of the versions B1 gun foam and B1 polyurethane fitting foam.

The information given in Table 1 in terms of joint widths, bulk densities as well as building material classification shall be applicable to the joint sealants.

Table 1 Polyurethane foam joint sealants

Building material designation	Manufacturer	Joint widths [mm]	Bulk density [kg/m ³]	Building material classification Test symbol
B1 gun foam	Debratec GmbH	10-50	16	Building material class B1
B1 polyurethane fitting foam	Debratec GmbH	10-50	26	Building material class B1

The „Polyurethane foam“ joint sealants shall be installed in the vertical construction joints without mechanically induced deformation.

The joint systems described in the following sections are covered by the carried out test of “Polyurethane foam” joint sealants in accordance with the test report PB 3.2/10-052-1 of 18/06/2010 of MFPA Leipzig GmbH.

2.2.1 Joint system 1

Debratec “B1 gun foam” was installed in the joints of the vertical supporting structure with $d = 200$ mm at the far fire space side and the side facing the fire space up to approx. 100 mm into the joint depth and cut flush with the surface of the specimen after the given curing time. Then a gypsum fiberboard fire protection panel with the dimensions $W \times L \times D = 250 \text{ mm} \times 1400 \text{ mm} \times 12.5 \text{ mm}$ was attached per joint at the side facing the fire space. Fastening was by means of screws Suki $\varnothing 8 \times 60$ mm and washers 8.4×20 mm, where seven screws were used per side for fastening. Metal spike grids with the designation 100 x MKD 8/38 were used as dowels.

^{*)} References to norms and codes refer to the version valid at the time of issue of this classification report including the relevant modifications and amendments.

2.2.2 Joint system 2

Debratec "B1 gun foam" was installed in the joints of the vertical supporting structure with $d = 200$ mm at the far fire space side and the side facing the fire space up to approx. 100 mm into the joint depth and cut flush with the surface of the specimen after the given curing time. Then a galvanized thin sheet with the dimensions $W \times L \times D = 230$ mm \times 1500 mm \times 0.60 mm for the 10 mm wide joint and the dimensions $BW \times L \times D = 270$ mm \times 1500 mm \times 0.60 mm for the 50 mm wide joint was attached. Fastening was by means of screws Suki $\varnothing 8 \times 60$ mm and washers 8.4 \times 20 mm, where eight screws were used per side for fastening. Metal spike grids with the designation 100 \times MKD 8/38 were used as dowels.

2.2.3 Joint system 3

Compressed mineral wool was inserted in the joints of the vertical supporting structure with $d = 200$ mm up to $t = 100$ mm in the joint depth at the side facing the fire space. Debratec "B1 polyurethane fitting foam" was installed at the far fire space side up to $t = 100$ mm in the joint depth and cut flush with the surface of the specimen after the given curing time.

2.2.4 Joint system 4

Debratec "B1 gun foam" was installed in the joints of the vertical supporting structure with $d = 200$ mm at the far fire space side and the side facing the fire space up to approx. 100 mm into the joint depth and cut flush with the surface of the specimen after the given curing time. Then a gypsum fiberboard fire protection panel with the dimensions $W \times L \times D = 250$ mm \times 1400 mm \times 12.5 mm was attached per joint at the side facing the fire space. Fastening was by means of screws Suki $\varnothing 8 \times 60$ mm and washers 8.4 \times 20 mm, where seven screws were used per side for fastening. Metal spike grids with the designation 100 \times MKD 8/38 were used as dowels.

2.2.5 Joint system 5

Compressed mineral wool was inserted in the joints of the vertical supporting structure with $d = 200$ mm up to $t = 100$ mm in the joint depth at the side facing the fire space. Debratec "B1 polyurethane fitting foam" was installed at the far fire space side up to $t = 100$ mm in the joint depth and cut flush with the surface of the specimen after the given curing time.



3 Test reports and test results to support this classification

3.1 Test reports

Organization which carried out the test	Client	Number of test reports	Test norm
MFPA Leipzig GmbH Hans-Weigel-Str. 2b 04319 Leipzig	Debratec GmbH	PB 3.2/10-052-1 of 18.06.2010	DIN EN 1366-4, in association with DIN EN 1363-1

3.2 Test results

Table 2 Joint sealant in joint system 1 (covered by gypsum fiberboard panel at the fire side)

Test method	Parameters	Test results after 120 minutes
DIN EN 1366-4 in association with DIN EN 1363-1	Spatial enclosure (E)	
	Ignition of cotton swab	No ignition
	Occurrence of fissures	No fissures
	Flame formation at the far fire side	No continuous flame leakage
	Heat insulation (I) – Temperature increase at the non-flamed side	
	Mean value > 140 K	Not exceeded during the whole period of testing
	max. individual value > 180 K	Not exceeded during the whole period of testing

Table 3 Joint sealant in joint system 2 (covered by sheet metal at the fire side)

Test method	Parameters	Test results after 60 minutes
DIN EN 1366-4 in association with DIN EN 1363-1	Spatial enclosure (E)	
	Ignition of cotton swab	No ignition
	Occurrence of fissures	No fissures
	Flame formation at the far fire side	No continuous flame leakage
	Heat insulation (I) – Temperature increase at the non-flamed side	
	Mean value > 140 K	Not exceeded during the whole period of testing
	max. individual value > 180 K	Not exceeded during the whole period of testing

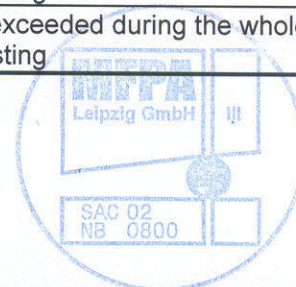


Table 4 Joint sealant in joint system 3 (joint filled by mineral wool and B1 gun foam)

Test method	Parameters	Test results after 180 minutes
DIN EN 1366-4 in association with DIN EN 1363-1	Spatial enclosure (E)	
	Ignition of cotton swab	No ignition
	Occurrence of fissures	No fissures
	Flame formation at the far fire side	No continuous flame leakage
	Heat insulation (I) – Temperature increase at the non-flamed side	
	Mean value > 140 K	Not exceeded during the whole period of testing
	max. individual value > 180 K	Not exceeded during the whole period of testing

Table 5 Joint sealant in joint system 4 (covered by gypsum fiberboard panel at the fire)

Test method	Parameters	Test results after 120 minutes
DIN EN 1366-4 in association with DIN EN 1363-1	Spatial enclosure (E)	
	Ignition of cotton swab	No ignition
	Occurrence of fissures	No fissures
	Flame formation at the far fire side	No continuous flame leakage
	Heat insulation (I) – Temperature increase at the non-flamed side	
	Mean value > 140 K	Not exceeded during the whole period of testing
	max. individual value > 180 K	Not exceeded during the whole period of testing

Table 6 Joint sealant in joint system 5 (joint filled by mineral wool and B1 polyurethane fitting foam)

Test method	Parameters	Test results after 180 minutes
DIN EN 1366-4 in association with DIN EN 1363-1	Spatial enclosure (E)	
	Ignition of cotton swab	No ignition
	Occurrence of fissures	No fissures
	Flame formation at the far fire side	No continuous flame leakage
	Heat insulation (I) – Temperature increase at the non-flamed side	
	Mean value > 140 K	Not exceeded during the whole period of testing
	max. individual value > 180 K	Not exceeded during the whole period of testing



4 Classification and direct field of application

4.1 Reference for classification

This classification was carried out in accordance with section 7.5.9 „Classification of vertical construction joints“ of EN 13501-2: 2008-01.

4.2 Classification

The solid walls with installed “Polyurethane foam” joint sealants according to section 2.2 are classified on the basis of the following combinations of performance parameters and classes. No other classifications shall be permitted.

4.2.1 Classification of joint sealant in joint system 1

R	E	I	W	-	t	-	M	S	C	IncSlow	sn	ef	r
-	E	I	-	-	120	-	-	-	-	-	-	-	-

Table 7 Classification of vertical construction joints according to EN 13501-2, section 7.5.9.4

Test conditions	Joint widths 10 mm to 50 mm
Orientation of specimen <ul style="list-style-type: none"> - horizontal supporting structure - vertical supporting structure – vertical joints - vertical supporting structure – horizontal joints 	-- V --
Movability – lateral <ul style="list-style-type: none"> - no movability - movement imposed (%) 	X --
Type of butt joints <ul style="list-style-type: none"> - prefabricated - prepared in situ - both prefabricated and prepared in situ 	-- F --
Range of widths of joints (in mm)	W 10 to 50

Test parameter spatial enclosure and insulation:

Fire resistance class: EI 120-V-X-F-W 10 to 50

4.2.2 Classification of joint sealant in joint system 2

R	E	I	W	-	t	-	M	S	C	IncSlow	sn	ef	r
-	E	I	-	-	60	-	-	-	-	-	-	-	-

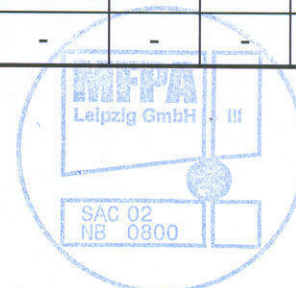


Table 8 Classification of vertical construction joints according to EN 13501-2, section 7.5.9.4

Test conditions	Joint widths 10 mm to 50 mm
Orientation of specimen <ul style="list-style-type: none"> - horizontal supporting structure - vertical supporting structure – vertical joints - vertical supporting structure – horizontal joints 	-- V --
Movability – lateral <ul style="list-style-type: none"> - no movability - movement imposed (%) 	X --
Type of butt joints <ul style="list-style-type: none"> - prefabricated - prepared in situ - both prefabricated and prepared in situ 	-- F --
Range of widths of joints (in mm)	W 10 to 50

Test parameter spatial enclosure and insulation:

Fire resistance class: EI 60-V-X-F-W 10 to 50

4.2.3 Classification of joint sealant in joint system 3

R	E	I	W	-	t	-	M	S	C	IncSlow	sn	ef	r
-	E	I	-	-	180	-	-	-	-	-	-	-	-

Table 9 Classification of vertical construction joints according to EN 13501-2, section 7.5.9.4

Test conditions	Joint widths 10 mm to 50 mm
Orientation of specimen <ul style="list-style-type: none"> - horizontal supporting structure - vertical supporting structure – vertical joints - vertical supporting structure – horizontal joints 	-- V --
Movability – lateral <ul style="list-style-type: none"> - no movability - movement imposed (%) 	X --
Type of butt joints <ul style="list-style-type: none"> - prefabricated - prepared in situ - both prefabricated and prepared in situ 	-- F --
Range of widths of joints (in mm)	W 10 to 50

Test parameter spatial enclosure and insulation:

Fire resistance class: EI 180-V-X-F-W 10 to 50



4.2.4 Classification of joint sealant in joint system 4

R	E	I	W	-	t	-	M	S	C	IncSlow	sn	ef	r
-	E	I	-	-	120	-	-	-	-	-	-	-	-

Table 10 Classification of vertical construction joints according to EN 13501-2, section 7.5.9.4

Test conditions	Joint widths 10 mm to 50 mm
Orientation of specimen <ul style="list-style-type: none"> - horizontal supporting structure - vertical supporting structure – vertical joints - vertical supporting structure – horizontal joints 	-- V --
Movability – lateral <ul style="list-style-type: none"> - no movability - movement imposed (%) 	X --
Type of butt joints <ul style="list-style-type: none"> - prefabricated - prepared in situ - both prefabricated and prepared in situ 	-- F --
Range of widths of joints (in mm)	W 10 to 50

Test parameter spatial enclosure and insulation:

Fire resistance class: EI 120-V-X-F-W 10 to 50

4.2.5 Classification of joint sealant in joint system 5

R	E	I	W	-	t	-	M	S	C	IncSlow	sn	ef	r
-	E	I	-	-	180	-	-	-	-	-	-	-	-

Table 11 Classification of vertical construction joints according to EN 13501-2, section 7.5.9.4

Test conditions	Joint widths 10 mm to 50 mm
Orientation of specimen <ul style="list-style-type: none"> - horizontal supporting structure - vertical supporting structure – vertical joints - vertical supporting structure – horizontal joints 	-- V --
Movability – lateral <ul style="list-style-type: none"> - no movability - movement imposed (%) 	X --
Type of butt joints <ul style="list-style-type: none"> - prefabricated - prepared in situ - both prefabricated and prepared in situ 	-- F --
Range of widths of joints (in mm)	W 10 to 50

Test parameter spatial enclosure and insulation:

Fire resistance class: EI 180-V-X-F-W 10 to 50



4.3 Direct field of application

This classification shall be applicable to the following conditions of use:


- The joint sealants in the vertically tested wall structure shall be applicable to vertical joints in walls with a joint width from 10 mm to 50 mm.
- Joint sealants of Debratex „B1 gun foam“ with a bulk density of minimum 16 kg/m³ or of Debratex „B1 polyurethane fitting foam“ with a bulk density of minimum 26 kg/m³ shall be used only.
- The joint sealants may be used in room enclosing components of aerated concrete, normal concrete, hollow blocks and brickwork with a minimum bulk density of 600 kg/m³.
- Vertical supporting structures shall have a minimum thickness of $d \geq 200$ mm or higher depending on the polyurethane foam joint sealant used.
- When using mineral wool as filling for parts of the joint, they have to be installed in compressed state for a supporting structure of $d \geq 200$ mm at least $t = 100$ mm from the side facing the fire.
- For joint covers by gypsum fiberboards of $d \geq 12.5$ mm at one side, screw spacing of ≤ 223 mm shall be kept.
- For joint covers by thin plate of $d \geq 0.60$ mm at one side, screw spacing of ≤ 205 mm shall be kept.
- For joint covers by gypsum fiberboards and/or thin plate, external screw spacing to the plate edge of ≤ 30 mm shall be kept.
- The joint sealants shall not be subject to shear movements higher than 7.5 % of the component thickness.
- The joints shall not be subject to lateral expansion higher than 7.5 % of the joint width.


5 Restrictions

This classification report will expire on 16.08.2015.

This classification document shall not be deemed a type approval or product certification.

Leipzig 16.08.2010


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