



Building Research Institute

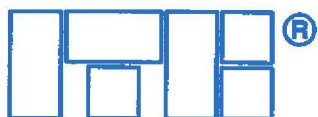
Scientific Research | Development Work | Accredited Group of Laboratories |  
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## **TECHNICAL OPINION**

Concerning the evaluation in the scope of the fire safety of the passive brackets from BSP Bracket System Polska Sp. z o.o. used in ventilated façade systems at a height above 25 m and fire separation zones.

**1746/17/Z00NZZ**

**Warsaw, September 2017**



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A technical opinion, concerning an evaluation of the fire safety of the passive brackets from BSP Bracket System Polska Sp. z o.o. used in ventilated façade systems ,at a height above 25 m and in fire separation zones.

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## **Contents**

<b>1. FORMAL GROUNDS .....</b>	<b>4</b>
<b>2. SUBJECT AND SCOPE OF THE STUDY .....</b>	<b>4</b>
<b>3. SUBSTANTIAL BASIS .....</b>	<b>4</b>
<b>4. DESCRIPTION OF THE SUBJECT MATTER OF THE OPINION .....</b>	<b>4</b>
<b>5. EVALUATION OF THE DEGREE OF FLAMMABILITY AND FIRE PROPAGATION.....</b>	<b>5</b>

## **1. Legal basis**

- 1.1. **Order dated 19th July 2017**
- 1.2. **Agreement No. 01746/17/Z00NZZP dated 3rd august 2017**

## **2. Subject and scope of the study**

The opinion concerns the evaluation in respect of the fire safety of the passive brackets from BSP Bracket System Polska Sp. z o.o. used in ventilated façade systems, at a height above 25 m and in fire separation zones.

## **3. Substantial basis**

- 3.1. Regulation of the Minister of Infrastructure dated 12th April 2002 on technical conditions that must be fulfilled by buildings and their location (Journal of Laws No. 75, item 690, as amended).
- 3.2. PN-EN 13501-1:2010 –  
Fire classification of construction products and building elements – Part 1:  
Classification based on reaction to fire tests.
- 3.3. Decisions of the European Commission:  
96/603/EC dated 4th October 1996  
2000/605/EC dated 26th September 2000  
2003/424/EC dated 6th June 2003
- 3.4. Technical documentation and description of passive brackets from BSP Bracket System Polska Sp. z o.o.
- 3.5. Test reports and classification of passive brackets from BSP Bracket System Polska Sp. z o.o., according to PN-EN 13501-1 LZP01-3037/16/Z00NZZP, LZP02-3037/16/Z00NZZP and 3037.1/16/Z00NZZP
- 3.6. A test reports and classification of passive brackets from BSP Bracket System Polska Sp. z o.o., in accordance with PN-90/B-02867:1990+Az1:2001 LZP03-3037/16/Z00NZZP i 3037.2/16/Z00NZZP
- 3.7. A report on the heat of combustion for the laminate used in the passive brackets from BSP Bracket System Polska Sp. z o.o., issued by the IGNIS REACTION TO FIRE laboratory Piotr Antonowicz, Marek Łuciuk, a general partnership from Biała Podlaska, No.
- 3.8. A Technical Opinion No. 01045/15/Z00NP, concerning the BSP System substructure, in light of the requirements of art. 225 of the Regulation of the Minister of Infrastructure.

## **4. Description of the subject matter of the opinion**

The subject of the opinion are passive brackets manufactured by BSP Bracket System Polska Sp. z o.o., used for performing external wall claddings in a ventilated façade system with mineral wool insulation.

The passive brackets manufactured by BSP Bracket System Polska Sp. z o.o. come in three versions, designated as KW 1 PAS, KW 2 PAS and KW 3 PAS, featuring different sizes,

depending on the designed ventilated façade.

The main structural components of the brackets are made of EN AW-AMgSi aluminium alloy. Aluminium components of the brackets are interconnected by a thermal insulator made of laminate comprised of epoxy resin reinforced with layers of glass fabric. The thickness of the thermal insulator applied in the passive brackets from BSP Bracket System Polska Sp. z o.o. is nominally 4 mm. The structure of a passive bracket from BSP Bracket System Polska Sp. z o.o. is shown in Figure 1.

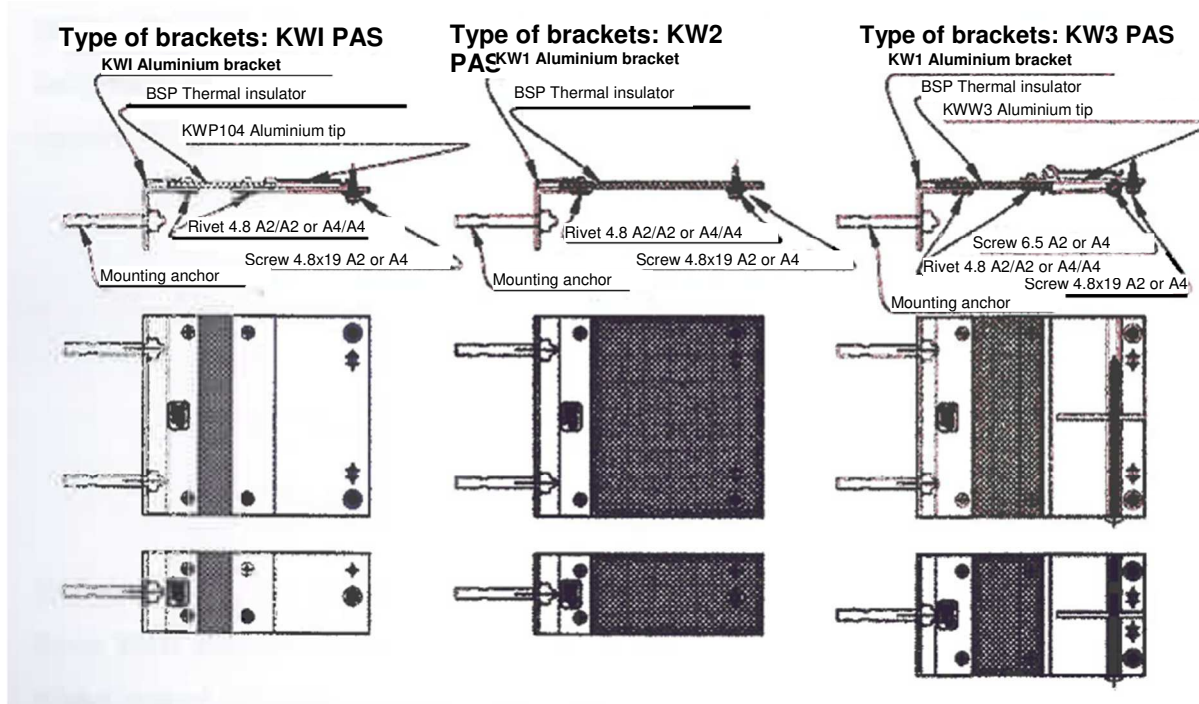


Fig.1 A passive bracket from BSP Bracket System Polska Sp. z o.o.  
(drawing delivered by the Ordering Party)

The purpose of the thermal insulator used in the passive brackets from BSP Bracket System Sp. z o.o. is to eliminate the “thermal bridge” phenomenon occurring between components of a façade cladding and the wall to which the cladding is fastened. The heat transfer coefficient for the insulator’s material, as per the Ordering Party’s declaration, is below 0.5 W / mK.

## 5. Evaluation in respect of the fire safety of the passive brackets from BSP Bracket System Polska Sp. z o.o.

The passive brackets from BSP Bracket System Polska Sp. z o.o. are made of aluminium and a plastic material, the latter of which is also used to manufacture the “thermal insulator”. In accordance with the decisions of the European Commission [3.3], aluminium is classified as class A1, regarding its reaction to fire, acc. to [3.2], without the need to perform any tests. The

insulator made of plastic (laminate consisting of epoxy resin reinforced with layers of glass fabric) and constitutes a combustible element of the bracket. The Party ordering the opinion, i.e. BSP Bracket System Polska Sp. z o.o., provided a report on the combustion heat test of the laminate [3.7], according to which the laminate heat of combustion is 11.07 MJ / kg. Since the component under evaluation contains a combustible component, the passive brackets manufactured by BSP Bracket System Polska Sp. z o.o., underwent tests of reaction to fire and assessment in this respect, according to the criteria included in the standard [3.2]. The test results and the criteria have been summarised in table 1.

Table 1. The results of the fire reaction tests performed for the passive bracket from BSP Bracket System Polska Sp. z o.o.

Parameter	value	Criterion according to
FIGRA <sub>0.2MJ</sub> [W/s]	47.2	≤ 120W/S
LFS < edge [m]	0,1 m	≤ 1 m
THR <sub>600s</sub> [MJ]	1.9	≤ 5 m
SMOGRA [m <sup>2</sup> /s <sup>2</sup> ]	47.4	≤ 180
TSP <sub>600s</sub> [m <sup>2</sup> ]	223.5	≤ 200
Burning	Have not	Have not

The obtained results demonstrated in Table 1 allow for classifying the passive brackets from BSP Bracket System Polska Sp. z o.o. as class B-s3,d0, acc. to [3.2]. The obtained reaction to fire class allows, according to the Regulation [3.1], for evaluating the product as not propagating fire inside the building. The results given in Table 1 also meet the criteria for class A2. However, to meet the criteria of this class, it is required to perform an additional test to determine the heat of combustion for the combustible components. In this case, the combustible component is the laminate use to make the insulator. However, according to the report on combustion heat tests obtained during tests and provided by BSP Bracket System Polska Sp. z o.o., the value of this parameter (11.07 MJ / kg) far exceeds the criterion for class A2, which is 3.0 MJ / kg. Since too high a value of the heat of combustion of the laminate does not allow to classify it as class A2, according to [3.2,] and thus to assess it as a non-combustible product not propagating fire outside of buildings, the passive brackets from BSP Bracket System Polska Sp. z o.o. were tested for fire propagation through external walls, according to PN-90/B- 02867:1990+Az1:2001. The examination was carried out for uncovered brackets exposed to direct fire. During the examination, it was not observed that the brackets propagated fire between one another, and only those directly exposed to the source of fire were destroyed. During the test, none of the fastened brackets fell off the wall. On the basis of observing the product's behaviour during the test and the results obtained for the brackets, according to N-90/B-02867:1990+Az1:2001, the elements have been classified as not

propagating fire through the external walls of buildings.

For the purpose of this study, BSP Bracket System Polska Sp. z o.o. also provided the opinion [3.8] regarding the BSP System aluminium substructures, in light of the requirements of art. 225 of the Regulation [3.1]. The subject matter of the opinion [3.8] was aluminium substructures featuring the passive brackets manufactured by BSP Bracket System Polska Sp. z o.o. The opinion [3.8] states that the aluminium substructures from the BSP System meet the requirements of art. 225 of the Regulation [3.1], in the event of a fire lasting 60 minutes. Picture 1 shows a passive bracket after the test carried out for the purpose of the opinion [3.8].



Picture 1 A passive bracket after the test carried out for the purpose of the opinion [3.8] (ITB archive).

On the basis of the tests of reaction to fire and fire propagation conducted for the passive brackets and the behaviour of these elements, during the test carried out for the purpose of the opinion [3.8], the Fire Testing Laboratory of the Building Research Institute states that the use of the passive brackets manufactured by BSP Bracket System Polska Sp. z o.o., as described in item 4 of this opinion, on the external walls of buildings, at a height above 25 m, and in fire separation zones, does not pose a threat to the fire safety of buildings, provided that the insulator being part of the passive brackets manufactured by BSP Bracket System Polska Sp. z o.o. is embedded in the insulating material with a reaction to fire class A1, acc. to [3.2] to a depth equal to the outreach of the insulator (laminare) plus 30 mm.

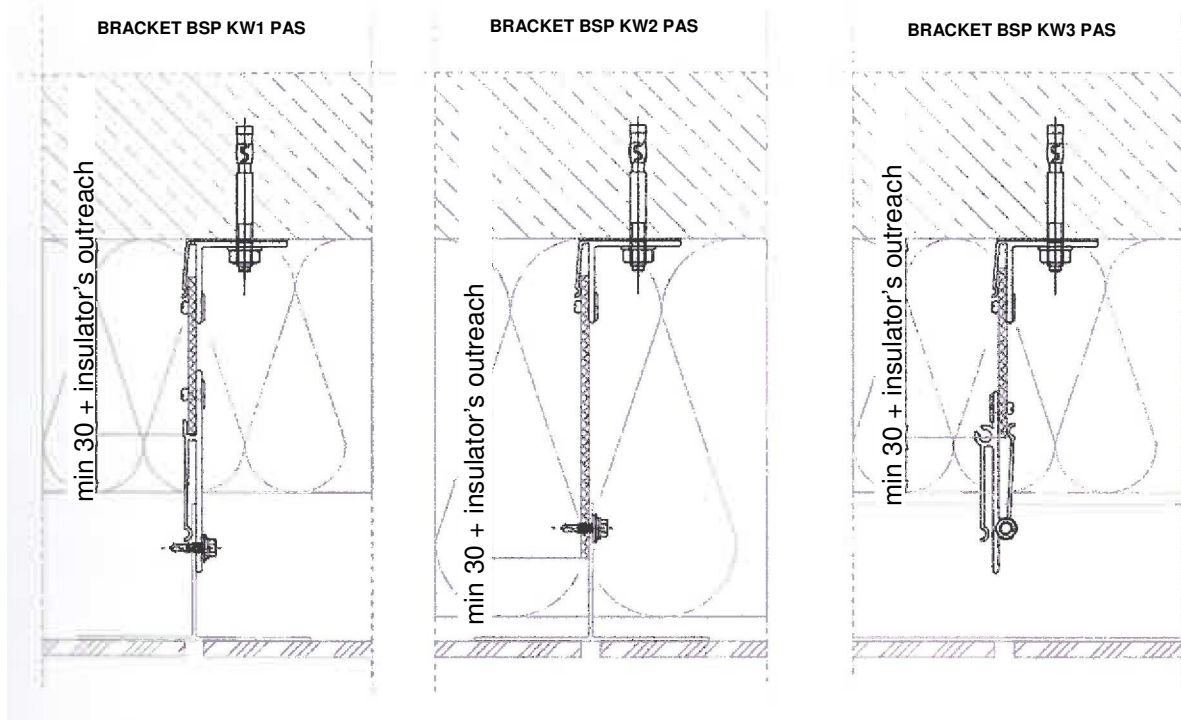


Fig.2. Laminate embedded in thermal insulation, in a passive bracket from BSP Bracket System Polska Sp. z o.o. (drawing delivered by the Ordering Party)

The opinion was prepared by:

Warsaw, 22nd September 2017