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## European Technical Assessment

**ETA 21/0779  
of 11/09/2022**

### *I General Part*

**Technical Assessment Body issuing the European Technical Assessment:**  
Technical and Test Institute for Construction Prague, SOE

**Trade name of the construction  
product**

BSP KW4 PAS and BSP KW1 and BSP KWE  
substructures systems for assembling ventilated facades

**Product family to which the  
construction product belongs**

Product area code: 09 Curtain walling, cladding, structural  
sealant glazing

**Manufacturer**

BSP Bracket System Polska Sp. z o.o.  
Ul. Prochowa 35 lok. 31, 04-388 Warszawa  
Poland  
[www.bspsystem.com](http://www.bspsystem.com)

**Manufacturing plant(s)**

BSP Bracket System Polska Sp. z o.o.  
Sierakowo 71, 06-300 Przasnysz  
Poland  
[www.bspsystem.com](http://www.bspsystem.com)

**This European Technical  
Assessment contains**

49 pages including 2 Annexes, which form an integral part of this  
assessment.

Annex B contains confidential information and is/are not included  
in the European Technical Assessment when that assessment is  
publicly available.

**This European Technical  
Assessment is issued in  
accordance with regulation (EU) No  
305/2011, on the basis of**

EAD 090034-01-0404  
Kit composed by subframe and fixings for fastening of cladding  
and external wall elements

**This ETA replaces**

ETA 21/0779, issued on 20/09/2021

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## *II Specific part*

### **1. Technical description of the product**

#### **1.1 Definition of products**

The subject of this European Technical Assessment (ETA) are kits composed by subframe and fixings for fastening of cladding and external wall elements. The kits can be specified for application with and/or without thermal insulating layer.

The kit for fastening of skin elements generally consists of:

- Fixing of skin elements (hanging elements) for fastening of skin elements
- Subframe metallic vertical and/or horizontal profiles
- Subframe brackets:
  - Group 1 – purely metallic brackets without perforation, made of aluminium extruded components
  - Group 2 - metallic brackets with thermal barrier (isolator), made of aluminium extruded components with plastic chamber separator
  - Group 4 - metallic rod brackets, made of threaded (stainless steel) steel rods of diameter 8 mm up to 14 mm anchored into the substrate and aluminium extruded components
- Standardized metallic fasteners for connection between the profiles and brackets or profiles each other, as screws, rivets etc.
- Auxiliary components - anchorage to substrate. The fixings between the subframe and the substrate are not scope of this ETA, therefore have not been assessed, even so it is important define type, position and number of anchorage according to the substrate material and the resistance required due to the envisaged actions and when possible, CE marking according to the ETA via EAD 330232-00-0601, 330499-00-0601, 330747-00-0601, 330706-00-0604 (etc.) is recommended.

The subframe and fixing kits do not contribute to the stability of the structure, on which they are installed, therefore they are considered as non-load-bearing construction elements.

The skin elements can be fixed to the subframe by mechanically or gluing. The skin elements are not scope of this ETA.

The kit can be placed or made available on the market in one or more of the following configurations:

- A. Complete subframe and fixing kit, consisting of subframe components (brackets, vertical and/or horizontal profiles and fasteners between them) and fixing of skin elements
- B. Subframe kit, consisting of brackets, vertical and/or horizontal profiles, with or without fasteners. The fixings of skin elements are not a part of this kit
- C. Separate brackets (i.e. without vertical and/or horizontal profiles, with or without specified fasteners for connection of profiles to brackets).

The ETA covers the following type of kits:

#### **BSP KW4 PAS kit**

The kit composed brackets, vertical and/or horizontal aluminium profiles with or without hanging elements. These components fulfil a structural function, transferring the vertical and horizontal loads from the facade to the building structure. There are two types of brackets: load-bearing brackets, transferring both vertical and horizontal loads, mounted usually on two anchors; and wind brackets, transferring only horizontal loads mounted usually on one anchor. The brackets are composed of aluminium extruded components and

a chamber separator made of plastic material (reduction of the 'thermal bridge effect' on the external facade in the thermal insulation layer). The chambers of the separator are located within a thermal insulation layer, creating an unventilated compartment, which also has a positive impact on thermal properties of facade. The separator is clamped in seats of aluminium components, thanks to which they are joined permanently. The brackets feature a specially-designed pocket that makes the mounting of profiles and adjustment of their plane much easier. Holes in the brackets for mounting profiles ensure the possibility of their free thermal expansion. The vertical and/horizontal profiles are fixed to brackets with self-drilling screws.

The minimum recommended width of the ventilated air space is 20 mm.

Type of BSP KW4 PAS kit:

- BSP KW4 PAS kit with BSP KW4 PAS brackets
- BSP KWRW/KWRZ kit with BSP KW4 PAS brackets
- BSP KWRV kit with BSP KW4 PAS brackets
- BSP KCS kit with BSP KW4 PAS brackets

The components used in BSP KW4 PAS kits:

Table 1: The components of BSP KW4 PAS kit with BSP KW4 PAS brackets

| Type of component  |             | Description  | Material   | Dimension   |
|--|-------------|--|--|---|
| Brackets<br>Group 2                                      | BSP KW4 PAS | Load-bearing brackets  | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 120, 150 mm<br>Length of wing: 170 – 280 mm<br>See Figure A.1 |
|  | BSP KW4 PAS | Wind brackets  | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 60, 90 mm<br>Length of wing: 170 – 280 mm<br>See Figure A.2   |
| Vertical profiles  | BSP KWR1    | T- profile (use on junction of skin elements)                    | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (120x70x2,0) mm<br>See Figure A.7   |
|  | BSP KWR8    |  |  | (90x38x1,8) mm<br>See Figure A.8  |
|  | BSP KWR9    |  |  | (100x60x1,75) mm<br>See Figure A.9  |
|  | BSP KWR12   |  |  | (140x70x2,0) mm<br>See Figure A.10  |
|  | BSP KWR2    | L- profile (use as a support of the middle part of skin element) | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (50x70x2,0) mm<br>See Figure A.11   |
|  | BSP KWR5    |  |  | (58x38x2,0) mm<br>See Figure A.12   |
|  | BSP KWR7    |  |  | (40x40x1,75) mm<br>See Figure A.13  |
|  | BSP KWR10   |  |  | (40x60x1,75) mm<br>See Figure A.14  |
|  | BSP KWR11   |  |  | (30x60x1,75) mm<br>See Figure A.15  |
|  | BSP KWRG    |  |  | (160x70x2,2) mm<br>See Figure A.16  |
| Fasteners<br>between vertical<br>profile and<br>brackets | —           | Self-drilling<br>screws  | Stainless steel<br>A2 or A4 or AISI 410                                  | (4,8 x 19) mm<br>See Figure A.32  |

Table 2: The components of BSP KWRW/KWRZ kit with BSP KW4 PAS brackets

| Type of component   |                          | Description  | Material   | Dimension   |
|---|--------------------------|--|--|---|
| Brackets Group 2  | BSP KW4 PAS              | Load-bearing brackets  | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 120, 150 mm<br>Length of wing: 170 – 280 mm<br>See Figure A.1 |
|   | BSP KW4 PAS              | Wind brackets  | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 60, 90 mm<br>Length of wing: 170 – 280 mm<br>See Figure A.2   |
| Vertical profiles   | BSP KWR1                 | T- profile (use on junction of skin elements)                    | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (120x70x2,0) mm<br>See Figure A.7   |
|   | BSP KWR8                 |  |  | (90x38x1,8) mm<br>See Figure A.8  |
|   | BSP KWR9                 |  |  | (100x60x1,75) mm<br>See Figure A.9  |
|   | BSP KWR12                |  |  | (140x70x2,0) mm<br>See Figure A.10  |
|   | BSP KWR2                 | L- profile (use as a support of the middle part of skin element) | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (50x70x2,0) mm<br>See Figure A.11   |
|   | BSP KWR5                 |  |  | (58x38x2,0) mm<br>See Figure A.12   |
|   | BSP KWR7                 |  |  | (40x40x1,75) mm<br>See Figure A.13  |
|   | BSP KWR10                |  |  | (40x60x1,75) mm<br>See Figure A.14  |
|   | BSP KWR11                |  |  | (30x60x1,75) mm<br>See Figure A.15  |
|   | BSP KWRG                 |  |  | (160x70x2,2) mm<br>See Figure A.16  |
| Horizontal profiles   | BSP KWRW                 | —  | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (80/64x24x2,0) mm<br>See Figure A.24  |
|   | BSP KWRZ                 |  | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (82/66x26x4,0) mm<br>See Figure A.25  |
| Hanging element   | BSP KWRW                 | —  | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (80/64x60x24x2,0) mm<br>See Figure A.26   |
|   | BSP KWRZ                 |  | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (82/66x60x26x4,0) mm<br>See Figure A.27   |
|   | Vertical regulation bolt | M6   | Stainless steel A2   | Ø 6 mm<br>See Figure A.26 and 27  |
| Fasteners between vertical and horizontal profiles and between vertical profiles and brackets |                          | Self-drilling screws   | Stainless steel<br>A2 or A4 or AISI 410                                  | (4,8 x 19) mm<br>See Figure A.32  |

Table 3: The components of BSP KWRY kit with BSP KW4 PAS brackets

| Type of component |             | Description           | Material   | Dimension   |
|-------------------|-------------|-----------------------|--|---|
| Brackets Group 2  | BSP KW4 PAS | Load-bearing brackets | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 120, 150 mm<br>Length of wing: 170 – 280 mm<br>See Figure A.1 |
|                   | BSP KW4 PAS | Wind brackets         | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 60, 90 mm<br>Length of wing: 170 – 280 mm<br>See Figure A.2   |
| Vertical profiles | BSP KWRY80  | —                     | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (99x80x2,0) mm<br>See Figure A.18   |
|                   | BSP KWRY50  | —                     | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (99x50x2,0/1,8) mm<br>See Figure A.17   |

| Type of component   |         | Description          | Material   | Dimension                              |
|---|---------|----------------------|--|--|
| Hanging element   | BSP KWZ | —                    | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (99x20x31,1x3,0) mm<br>See Figure A.28 |
| Fasteners between vertical profiles and brackets and between hanging elements and vertical profiles |         | Self-drilling screws | Stainless steel<br>A2 or A4 or AISI 410                                  | (4,8 x 19) mm<br>See Figure A.32       |

Table 4: The components of BSP KCS kit with BSP KW4 PAS brackets

| Type of component  |             | Description                   | Material   | Dimension   |
|--|-------------|-------------------------------|--|---|
| Brackets Group 2   | BSP KW4 PAS | Load-bearing brackets         | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 120, 150 mm<br>Length of wing: 170 – 280 mm<br>See Figure A.1 |
|  | BSP KW4 PAS | Wind brackets                 | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 60, 90 mm<br>Length of wing: 170 – 280 mm<br>See Figure A.2   |
| Vertical profiles  | BSP KCT     | —                             | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (117,4x72x2,5/1,8) mm<br>See Figure A.19  |
|  | BSP KCL     | —                             | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (46,7x72x2,5/1,8) mm<br>See Figure A.20   |
| Hanging element  | BSP KC3     | —                             | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (28x40x13) mm<br>See Figure A.29  |
|  | BSP KC4     | —                             | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (28x62x27) mm<br>See Figure A.30  |
|  | BSP KC5     | —                             | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (23,5x27,5x26) mm<br>See Figure A.31  |
| Fasteners between vertical profile and brackets          |             | Self-drilling screws          | Stainless steel<br>A2 or A4 or AISI 410                                  | (4,8 x 19) mm<br>See Figure A.32  |
| Fasteners between hanging elements and vertical profiles |             | Self-drilling screws or bolts | Stainless steel<br>A2 or A4 or AISI 410                                  | Screws (5,5 x 19) mm<br>Bolt M6 DIN 933   |

### BSP KW1 kit

The kit composed brackets, vertical and/or horizontal aluminium profiles with or without hanging elements. These components fulfil a structural function, transferring the vertical and horizontal loads from the facade to the building structure. There are two types of brackets: load-bearing brackets, transferring both vertical and horizontal loads, mounted usually on two anchors; and wind brackets, transferring only horizontal loads mounted usually on one anchor. The brackets are made of aluminium extruded components. The brackets feature a specially-designed pocket that makes the mounting of profiles and adjustment of their plane much easier. Holes in the brackets for mounting profiles ensure the possibility of their free thermal expansion. The vertical and/horizontal profiles are fixed to brackets with self-drilling screws.

The minimum recommended width of the ventilated air space is 20 mm.

Type of BSP KW1 kit:

- BSP KW1 kit with BSP KW1 brackets
- BSP KWRW/KWRZ kit with BSP KW1 brackets
- BSP KWRV kit with BSP KW1 brackets
- BSP KCS kit with BSP KW1 brackets

The components used in BSP KW1 kits:

Table 5: The components of BSP KW1 kit with BSP KW1 brackets

| Type of component                               |           | Description  | Material   | Dimension  |
|---|-----------|--|--|--|
| Brackets Group 1                                | BSP KW1   | Load-bearing brackets  | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 120, 150 mm<br>Length of wing: 42 – 310 mm<br>See Figure A.3 |
|   | BSP KW1   | Wind brackets  | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 60, 90 mm<br>Length of wing: 42 – 310 mm<br>See Figure A.4   |
| Vertical profiles                               | BSP KWR1  | T- profile (use on junction of skin elements)                    | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (120x70x2,0) mm<br>See Figure A.7  |
|   | BSP KWR8  |  |  | (90x38x1,8) mm<br>See Figure A.8   |
|   | BSP KWR9  |  |  | (100x60x1,75) mm<br>See Figure A.9   |
|   | BSP KWR12 |  |  | (140x70x2,0) mm<br>See Figure A.10   |
|   | BSP KWR2  | L- profile (use as a support of the middle part of skin element) | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (50x70x2,0) mm<br>See Figure A.11  |
|   | BSP KWR5  |  |  | (58x38x2,0) mm<br>See Figure A.12  |
|   | BSP KWR7  |  |  | (40x40x1,75) mm<br>See Figure A.13   |
|   | BSP KWR10 |  |  | (40x60x1,75) mm<br>See Figure A.14   |
|   | BSP KWR11 |  |  | (30x60x1,75) mm<br>See Figure A.15   |
|   | BSP KWRG  |  |  | (160x70x2,2) mm<br>See Figure A.16   |
| Fasteners between vertical profile and brackets | —         | Self-drilling screws   | Stainless steel<br>A2 or A4 or AISI 410                                  | (4,8 x 19) mm<br>See Figure A.32   |

Table 6: The components of BSP KWRW/KWRZ kit with BSP KW1 brackets

| Type of component   |           | Description   | Material   | Dimension  |
|---------------------|-----------|---|--|--|
| Brackets<br>Group 1 | BSP KW1   | Load-bearing<br>brackets  | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 120, 150 mm<br>Length of wing: 42 – 310 mm<br>See Figure A.3 |
|                     | BSP KW1   | Wind brackets   | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 60, 90 mm<br>Length of wing: 42 – 310 mm<br>See Figure A.4   |
| Vertical profiles   | BSP KWR1  | T- profile (use on<br>junction of skin<br>elements)                       | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (120x70x2,0) mm<br>See Figure A.7  |
|                     | BSP KWR8  |   |  | (90x38x1,8) mm<br>See Figure A.8   |
|                     | BSP KWR9  |   |  | (100x60x1,75) mm<br>See Figure A.9   |
|                     | BSP KWR12 |   |  | (140x70x2,0) mm<br>See Figure A.10   |
|                     | BSP KWR2  | L- profile (use as<br>a support of the<br>middle part of<br>skin element) | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (50x70x2,0) mm<br>See Figure A.11  |
|                     | BSP KWR5  |   |  | (58x38x2,0) mm<br>See Figure A.12  |
|                     | BSP KWR7  |   |  | (40x40x1,75) mm<br>See Figure A.13   |
|                     | BSP KWR10 |   |  | (40x60x1,75) mm<br>See Figure A.14   |
|                     | BSP KWR11 |   |  | (30x60x1,75) mm<br>See Figure A.15   |
|                     | BSP KWRG  |   |  | (160x70x2,2) mm<br>See Figure A.16   |

| Type of component   |                          | Description          | Material   | Dimension                               |
|---|--------------------------|----------------------|--|---|
| Horizontal profiles   | BSP KWRW                 | —                    | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (80/64x24x2,0) mm<br>See Figure A.24    |
|   | BSP KWRZ                 |                      | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (82/66x26x4,0) mm<br>See Figure A.25    |
| Hanging element   | BSP KWRW                 | —                    | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (80/64x60x24x2,0) mm<br>See Figure A.26 |
|   | BSP KWRZ                 |                      | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (82/66x60x26x4,0) mm<br>See Figure A.27 |
|   | Vertical regulation bolt | M6                   | Stainless steel A2   | Ø 6 mm<br>See Figure A.26 and 27        |
| Fasteners between vertical and horizontal profiles and between vertical profiles and brackets |                          | Self-drilling screws | Stainless steel<br>A2 or A4 or AISI 410                                  | (4,8 x 19) mm<br>See Figure A.32        |

Table 7: The components of BSP KWRV kit with BSP KW1 brackets

| Type of component   |            | Description           | Material   | Dimension  |
|---|------------|-----------------------|--|--|
| Brackets Group 1  | BSP KW1    | Load-bearing brackets | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 120, 150 mm<br>Length of wing: 42 – 310 mm<br>See Figure A.3 |
|   | BSP KW1    | Wind brackets         | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 60, 90 mm<br>Length of wing: 42 – 310 mm<br>See Figure A.4   |
| Vertical profiles   | BSP KWRV80 | —                     | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (99x80x2,0) mm<br>See Figure A.18  |
|   | BSP KWRV50 | —                     | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (99x50x2,0/1,8) mm<br>See Figure A.17  |
| Hanging element   | BSP KWZ    | —                     | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (99x20x31,1x3,0) mm<br>See Figure A.28   |
| Fasteners between vertical profiles and brackets and between hanging elements and vertical profiles |            | Self-drilling screws  | Stainless steel<br>A2 or A4 or AISI 410                                  | (4,8 x 19) mm<br>See Figure A.32   |

Table 8: The components of BSP KCS kit with BSP KW1 brackets

| Type of component |         | Description           | Material   | Dimension  |
|-------------------|---------|-----------------------|--|--|
| Brackets Group 1  | BSP KW1 | Load-bearing brackets | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 120, 150 mm<br>Length of wing: 42 – 310 mm<br>See Figure A.3 |
|                   | BSP KW1 | Wind brackets         | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | Height of flange: 60, 90 mm<br>Length of wing: 42 – 310 mm<br>See Figure A.4   |
| Vertical profiles | BSP KCT | —                     | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (117,4x72x2,5/1,8) mm<br>See Figure A.19                                       |
|                   | BSP KCL | —                     | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (46,7x72x2,5/1,8) mm<br>See Figure A.20  |
| Hanging element   | BSP KC3 | —                     | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (28x40x13) mm<br>See Figure A.29   |
|                   | BSP KC4 | —                     | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (28x62x27) mm<br>See Figure A.30   |

| Type of component  |         | Description                   | Material   | Dimension                               |
|--|---------|-------------------------------|--|---|
|  | BSP KC5 | –                             | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (23,5x27,5x26) mm<br>See Figure A.31    |
| Fasteners between vertical profile and brackets          |         | Self-drilling screws          | Stainless steel<br>A2 or A4 or AISI 410                                  | (4,8 x 19) mm<br>See Figure A.32        |
| Fasteners between hanging elements and vertical profiles |         | Self-drilling screws or bolts | Stainless steel<br>A2 or A4 or AISI 410                                  | Screws (5,5 x 19) mm<br>Bolt M6 DIN 933 |

### BSP KWE kit

The kit composed metallic rod brackets and vertical aluminium profiles. These components fulfil a structural function, transferring the vertical and horizontal loads from the facade to the building structure. There are two types of metallic rod brackets: load-bearing brackets, transferring both vertical and horizontal loads, mounted on two anchors; and wind brackets, transferring only horizontal forces mounted on one anchor. In case of high vertical loads, one loadbearing rod may be anchored at the angle, which significantly increases resistance of the entire system. The metallic rod brackets is composed of steel threaded rods anchored directly in the substrate, aluminium brackets and aluminium profiles. The bracket is screwed on the rod through two middle walls with threaded holes (ensuring of suitable stiffening of connection of two components). The vertical profiles are fixed to brackets with self-drilling screws.

The minimum recommended width of the ventilated air space is 20 mm.

Type of BSP KWE kit:

- BSP KWE kit with BSP KWE brackets
- BSP KWRCY kit with BSP KWE brackets

The components used in BSP KWE kits:

Table 9: The components of BSP KWE kit with BSP KWE brackets

| Type of component                               |          | Description   | Material   | Dimension                               |
|---|----------|---|--|---|
| Brackets<br>Group 4                             | Rods     | M8 – M14  | Stainless Steel A2 or A4   | Ø 8 – 14 mm<br>See Figure A.5 and A.6   |
|   | BSP KWE  | Load-bearing brackets                                 | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | 2 x (40,8x44,5x75) mm<br>See Figure A.5 |
|   | BSP KWE  | Wind brackets   | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (40,8x44,5x40) mm<br>See Figure A.6     |
|   | Nuts     | M8 – M14  | Stainless Steel A2 or A4   | Ø 8 – 14 mm<br>See Figure A.5 and A.6   |
| Vertical profiles                               | BSP KWRC | (use as a support of the middle part of skin element) | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (40x40x1,7-4,0) mm<br>See Figure A.21   |
|   | BSP KWRP | (use on junction of skin elements)                    | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (120x40x1,8-2,0) mm<br>See Figure A.22  |
| Fasteners between vertical profile and brackets | –        | Self-drilling screws                                  | Stainless steel<br>A2 or A4 or AISI 410                                  | (4,8 x 19) mm<br>See Figure A.32        |



Table 10: The components of BSP KWRCY kit with BSP KWE brackets

| Type of component   |           | Description              | Material   | Dimension                               |
|---|-----------|--------------------------|--|---|
| Brackets<br>Group 4   | Rods      | M8 – M14                 | Stainless Steel A2 or A4   | Ø 8 – 14 mm<br>See Figure A.5 and A.6   |
|   | BSP KWE   | Load-bearing<br>brackets | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | 2 x (40,8x44,5x75) mm<br>See Figure A.5 |
|   | BSP KWE   | Wind brackets            | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (40,8x44,5x40) mm<br>See Figure A.6     |
|   | Nuts      | M8 – M14                 | Stainless Steel A2 or A4   | Ø 8 – 14 mm<br>See Figure A.5 and A.6   |
| Vertical profiles   | BSP KWRCY | –                        | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (99x53x2,0/1,8) mm<br>See Figure A.23   |
| Hanging element   | BSP KWZ   | –                        | Extruded aluminium alloy<br>EN AW 6060 T66 or T6<br>EN AW 6063 T66 or T6 | (99x20x31,1x3,0) mm<br>See Figure A.28  |
| Fasteners<br>between vertical<br>profiles and<br>brackets and<br>between hanging<br>elements and<br>vertical profiles | –         | Self-drilling<br>screws  | Stainless steel<br>A2 or A4 or AISI 410                                  | (4,8 x 19) mm<br>See Figure A.32        |

The drawings and dimensions of individual components of both systems are given in the Annex A.

## **2. Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)**

### **2.1 Intended use**

The substructures systems for assembling ventilated facades BSP KW4 PAS kit, BSP KW1 kit and BSP KWE kit are intended to be used for mechanical or adhesive fastening of skin elements in façade with air space, ventilated or not, which are fixed to the supporting structures defined in Cl. 1.3.4 of EAD 090034-01-0404 in a new or existing buildings (retrofit).

The provisions made in this European Technical Assessment are based on an assumed working life of 25 years as minimum, provided, that the substructures systems for assembling ventilated facades BSP KW4 PAS kit, BSP KW1 kit and BSP KWE kit are subject to appropriate use and maintenance.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

### **2.2 Manufacturing**

The European Technical Assessment is issued for the substructures systems for assembling ventilated facades BSP KW4 PAS kit, BSP KW1 kit and BSP KWE kit on the basis of agreed data/information, deposited with the Technical and Test Institute for Construction Prague, which identifies the kit that has been assessed and judged. Changes to the kit or production process, which could result in this deposited data/information being incorrect, shall be notified to the Technical and Test Institute for Construction Prague before the changes are introduced. The Technical and Test Institute for Construction Prague will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

### **2.3 Design and installation**

It is assumed that the substructures systems for assembling ventilated facades BSP KW4 PAS kit, BSP KW1 kit and BSP KWE kit will be installed according to the manufacturer's instructions or in absence of such instructions according to the usual practice of the building professionals.

### **2.4 Packaging, transport and storage**

The information on packaging, transport and storage is given in the manufacturer's technical documentation. It is the responsibility of the manufacturer(s) to ensure that this information is made know to the concerned people.

### **2.5 Use, maintenance and repair**

The maintenance of the substructures systems for assembling ventilated facades BSP KW4 PAS kit, BSP KW1 kit and BSP KWE kit or kit components includes inspections on site, taking into account the following aspects:

- Regarding the individual components: Appearance of any damage such as cracking, delamination or detachment due to permanent and irreversible deformation
- Regarding metallic components: Presence of corrosion or water accumulation
- Necessary repairs should be done rapidly, using the same kit components and following the repair instructions given by ETA holder

The information on use, maintenance and repair is given in the manufacturer's technical documentation. It is the responsibility of the manufacturer(s) to ensure that this information is made know to the concerned people.

### **3. Performance of the product and references to the methods used for its assessment**

The identification tests and the assessment for the intended use of these substructures systems for assembling ventilated facades BSP KW4 PAS kit, BSP KW1 kit and BSP KWE kit according to the Basic Requirements (BWR) were carried out in compliance with EAD 090034-01-0404. The characteristic of the components shall correspond to the respective values laid down in the technical documentation of this ETA, checked by Technical and Test Institute for Construction Prague

#### **3.1 Mechanical resistance and stability (BWR 1)**

Requirements with respect to the mechanical resistance and stability of non-load bearing parts of the works are not included in this Essential Requirement but are treated under the Essential Requirement Safety in use (See section 3.4).

#### **3.2 Safety in case of fire (BWR 2)**

##### **3.2.1 Reaction to fire**

###### **3.2.1.1 Reaction to fire of BSP KW4 PAS kit**

The reaction to fire was tested in accordance with Cl. 2.2.1 of the EAD 090034-01-0404.

The reaction to fire of BSP KW4 PAS kit is classified as Class B-s3,d0 in accordance with Clause 2.2.1.3 of the EAD 090034-01-0404

This classification is valid only for the following end use application:

- BSP KW4 PAS brackets described in Tables 1 – 4 of this ETA
- Product shall be applied onto any end-use substrate of reaction to fire classes A2-s3,d0 at least according to EN 13501-1

###### **3.2.1.2 Reaction to fire of BSP KW1 kit**

The BSP KW1 kit, which is completely made only of metal material, without any combustible component(s), are considered to satisfy the requirements for performance class A1 of the characteristic reaction to fire in accordance with the Decision 96/602/EC as amended without the need for testing on the basis of it fulfilling the conditions set out in that Decision and its intended use being covered by that Decision.

The reaction to fire of BSP KW1 kit is classified as Class A1 in accordance with Clause 2.2.1.1 of the EAD 090034-01-0404

###### **3.2.1.3 Reaction to fire of BSP KWE kit**

The BSP KWE kit, which is completely made only of metal material, without any combustible component(s), are considered to satisfy the requirements for performance class A1 of the characteristic reaction to fire in accordance with the Decision 96/602/EC as amended without the need for testing on the basis of it fulfilling the conditions set out in that Decision and its intended use being covered by that Decision.

The reaction to fire of BSP KWE kit is classified as Class A1 in accordance with Clause 2.2.1.1 of the EAD 090034-01-0404

### 3.3 Hygiene, health and environment (BWR 3)

#### 3.3.1 Content, emission and/or release of dangerous substances

##### 3.3.1.1 Leachable substances

No performance assessed.

##### 3.3.1.2 Cadmium

The content of cadmium was tested in accordance with Cl. 2.2.2.2 of the EAD 090034-01-0404.

Table 11: Content of cadmium

| Type                                 | Content of cadmium [mg/kg] |
|--------------------------------------|----------------------------|
| Plastic part of BSP KW4 PAS brackets | < 1                        |

### 3.4 Safety and accessibility in use (BWR 4)

#### 3.4.1 Resistance to horizontal load of the assembled kit

The resistance to horizontal load of the assembled kit was tested in accordance with Cl. 2.2.3 of the EAD 090034-01-0404. The mechanically weakest case was tested (one test specimen). The resistance to horizontal load of the individual kits is given in the following clauses.

Description of test specimens:

##### 3.4.1.1 BSP KCS kit with BSP KW4 PAS brackets

- The dimensions of test specimen: (2800x2800) mm
- Cladding element: HPL boards (bending strength: > 90 N/mm<sup>2</sup>, mass per unit area: 12 kg/m<sup>2</sup>). Horizontal gap between cladding elements: 5 mm, vertical gap between cladding element: 10 mm.
- Hanging elements:
  - 6 pcs of BSP KC4 for 1<sup>st</sup> cladding element (1145x1500x8) mm, horizontal distance: 723 mm to 735 mm, vertical distance: 1171 mm;
  - 6 pcs of BSP KC4 for 2<sup>nd</sup> cladding element (800x1500x8) mm, horizontal distance: 723 mm to 735 mm, vertical distance: 805 mm;
  - 3 pcs of BSP KC4 and 3 pcs of BSP KC3 for 3<sup>rd</sup> cladding element (800x1500x8) mm, horizontal distance: 723 mm to 735 mm, vertical distance: 805 mm;
  - 4 pcs of BSP KC4 for 4<sup>th</sup> cladding element (1145x1290x8) mm, horizontal distance: 1248 mm, vertical distance: 1171 mm;
  - 4 pcs of BSP KC4 for 5<sup>th</sup> cladding element (800x1290x8) mm, horizontal distance: 1248 mm, vertical distance: 805 mm;
  - 2 pcs of BSP KC4 and 3 pcs of BSP KC3 for 6<sup>th</sup> cladding element (800x1290x8) mm, horizontal distance: 1248 mm, vertical distance: 805 mm.

The hanging elements (BSP KC4 and BSP KC3) are fixed to the vertical profiles by stainless steel screws M6x20 mm (one screw for each hanging element).

- Vertical profiles:
  - BSP KCT T – profile (117,4x72x2,5/1,8) mm – 2 pcs
  - BSP KCL L – profile (46,7x72x2,5/1,8) mm – 2 pcs
- Fasteners between vertical profiles and brackets: Self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal – 4 pcs for load-bearing bracket and 2 pcs for wind bracket

- Brackets:
  - BSP KW4 PAS bracket - wind (280-60) mm – 8 pcs
  - BSP KW4 PAS bracket - load-bearing (280-120) mm – 4 pcs
- Anchors: (8x80) mm

The load-bearing brackets are used only in upper line and wind brackets are used in other lines. The ventilated air gap: 340 mm (without thermal insulation).

Table 12: Resistance to horizontal load of BSP KCS kit with BSP KW4 PAS brackets

| Characteristic value of maximum load $Q_k$ [kN/m <sup>2</sup> ] | Maximum permanent deformation $\Delta d_{max}$ [mm] | Maximum deformation $d_{max}$ [mm] | Type of failure |
|---|---|------------------------------------|-----------------|
| 2,4   | 0,46  | 14,56                              | Without failure |

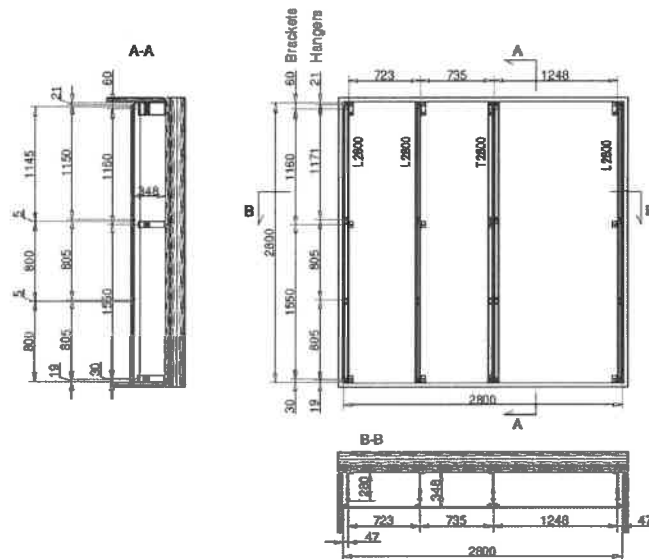


Figure 1: BSP KCS kit with BSP KW4 PAS brackets – arrangement of test sample

#### 3.4.1.2 BSP KWRW kit with BSP KW4 PAS brackets

- The dimensions of test specimen: (2800x2800) mm
- Cladding element: HPL boards (bending strength: > 90 N/mm<sup>2</sup>, mass per unit area: 12 kg/m<sup>2</sup>). Horizontal and vertical gap between cladding elements: 10 mm.
- Hanging elements:
  - 15 pcs of BSP KWRW for 1<sup>st</sup> cladding element (2800x1500x8) mm, vertical distance: 660 mm, horizontal distance: 650 mm;
  - 9 pcs of BSP KWRW for 2<sup>nd</sup> cladding element (1190x1290x8) mm, vertical distance: 370 mm to 660 mm, horizontal distance: 442 mm to 649 mm;
  - 9 pcs of BSP KWRW for 3<sup>rd</sup> cladding element (1600x1290x8) mm, vertical distance: 660 mm, horizontal distance: 442 mm to 649 mm.

Hanging elements (KWRW) are fixed to the horizontal profiles by stainless steel screws M6x20 mm (one screw for each hanging element).

- Vertical and horizontal profiles:
  - BSP KWRW horizontal profile (80/64x24x2,0) mm – 5 pcs



Hanging elements (KWZ) are fixed to the vertical profiles by stainless steel screws M6x20 mm (two screws for each hanging element)

- Vertical profiles:
  - BSP KWR80 profile (99x80x2,0) mm – 4 pcs
- Fasteners between vertical profiles and brackets: Self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal – 4 pcs for load-bearing bracket and 2 pcs for wind bracket
- Brackets: brackets:
  - BSP KW4 PAS bracket - wind (280-60) mm – 8 pcs
  - BSP KW4 PAS bracket - load-bearing (280-120) mm – 4 pcs
- Anchors: (8x80) mm

The load-bearing brackets are used only in upper line and wind brackets are used in other lines. The ventilated air gap: 370 mm (without thermal insulation).

Table 14: Resistance to horizontal load of BSP KWR80 kit with BSP KW4 PAS brackets

| Characteristic value of maximum load $Q_k$ [kN/m <sup>2</sup> ] | Maximum permanent deformation $\Delta d_{max}$ [mm] | Maximum deformation $d_{max}$ [mm] | Type of failure |
|---|---|------------------------------------|-----------------|
| 2,4   | 1,57  | 44,12                              | Without failure |

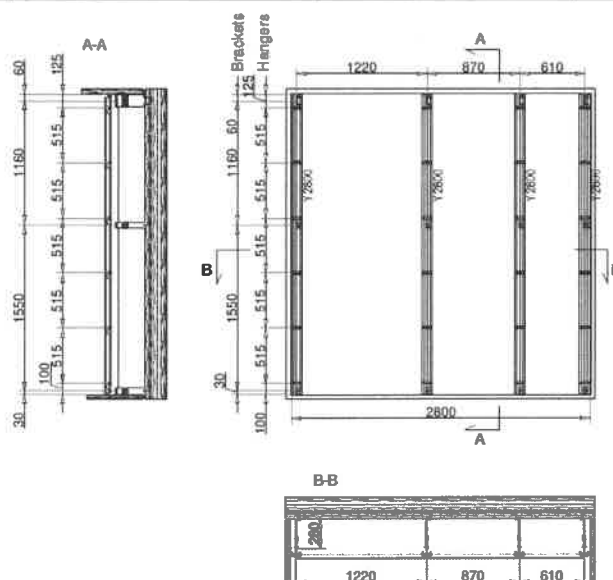


Figure 3: BSP KWR80 kit with BSP KW4 PAS brackets – arrangement of test sample

#### 3.4.1.4 BSP KWE kit with BSP KWE brackets

- The dimensions of test specimen: (2800x2800) mm
- Cladding element: HPL boards (bending strength: > 90 N/mm<sup>2</sup>, mass per unit area: 12 kg/m<sup>2</sup>). Horizontal gap between cladding elements: 10 mm, vertical gap between cladding element: 10 mm.
- Hanging elements:
  - 18 pcs of aluminium rivets with steel core (1 load-bearing and 17 sliding) for 1<sup>st</sup> cladding element (2800x1500x8) mm, vertical distance: 540 mm, horizontal distance: 700 mm;

- 12 pcs of aluminium rivets with steel core (1 load-bearing and 11 sliding) for 2<sup>nd</sup> cladding element (1600x1290x8) mm, vertical distance: 500 mm to 510 mm, horizontal distance: 600 mm;
- 9 pcs of aluminium rivets with steel core (1 load-bearing and 8 sliding) for 3<sup>rd</sup> cladding element (1190x1290x8) mm, vertical distance: 550 mm, horizontal distance: 600 mm.
- Vertical profiles:
  - BSP KWRC profile (40x40x1,7) mm – 4 pcs
  - BSP KWRP profile (120x40x1,8) mm – 1 pcs
- Fasteners between vertical profiles and brackets: Self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal – 4 pcs for load-bearing bracket and 2 pcs for wind bracket
- Brackets: brackets:
  - BSP KWE 40 bracket - wind (rod M14, length 330 mm) mm – 10 pcs
  - BSP KWE 75 bracket - load-bearing (rod M14, length 330 mm) – 14 pcs
- Anchors: Nuts and pads made of stainless steel A2

The load-bearing brackets are used only in upper line and wind brackets are used in other lines. The ventilated air gap: 342 mm (without thermal insulation).

Table 15: Resistance to horizontal load of BSP KWE kit with BSP KWE brackets

| Characteristic value of maximum load $Q_k$ [kN/m <sup>2</sup> ] | Maximum permanent deformation $\Delta d_{max}$ [mm] | Maximum deformation $d_{max}$ [mm] | Type of failure |
|---|---|------------------------------------|-----------------|
| 2,4   | 0,53  | 13,33                              | Without failure |

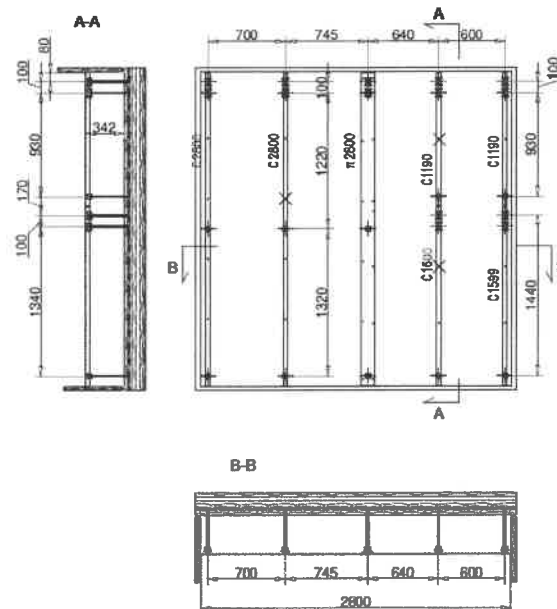


Figure 4: BSP KWE kit with BSP KWE brackets – arrangement of test sample

#### 3.4.1.5 BSP KW4 kit with BSP KW4 PAS brackets

- The dimensions of test specimen: (2700x2700) mm
- Cladding element: HPL boards (bending strength: > 90 N/mm<sup>2</sup>, mass per unit area: 12 kg/m<sup>2</sup>). Horizontal and vertical gap between cladding elements: 10 mm.



- Fixing of skin elements:
  - 1 pc of load-bearing rivet and 17 pcs of sliding rivets for 1<sup>st</sup> cladding element (2700x1240x8) mm, horizontal distance: 528 mm, vertical distance: 700 mm;
  - 1 pc of load-bearing rivet and 8 pcs of sliding rivets for 2<sup>nd</sup> cladding element (1140x1240x8) mm, horizontal distance: 528 mm, vertical distance: 590 to 600 mm;
  - 1 pc of load-bearing rivet and 11 pcs of sliding rivets for 3<sup>rd</sup> cladding element (1550x1240x8) mm, horizontal distance: 528 mm, vertical distance: 590 to 600 mm.
- Vertical profiles:
  - BSP KWR9 T – profile (60x100x1,75) mm – 1 pc
  - BSP KWR10 L – profile (60x40x1,75) mm – 4 pcs
- Fasteners between vertical profiles and brackets: Self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal – 4 pcs for load-bearing bracket and 2 pcs for wind bracket
- Brackets:
  - BSP KW4 PAS bracket - wind (280-60) mm – 10 pcs
  - BSP KW4 PAS bracket - load-bearing (280-120) mm – 5 pcs
- Anchors: (8x80) mm

The load-bearing brackets are used only in upper line and wind brackets are used in other lines. The ventilated air gap: 316 mm (without thermal insulation).

Table 16: Resistance to horizontal load of BSP KW4 kit with BSP KW4 PAS brackets

| Characteristic value of maximum load $Q_k$ [kN/m <sup>2</sup> ] | Maximum permanent deformation $\Delta d_{max}$ [mm] | Maximum deformation $d_{max}$ [mm] | Type of failure  |
|---|---|------------------------------------|--|
| 1,2   | 2,31  | 28,33                              | destruction of mounting elements (rivets), visible deformation of vertical profiles during 1,4 kN/m <sup>2</sup> |

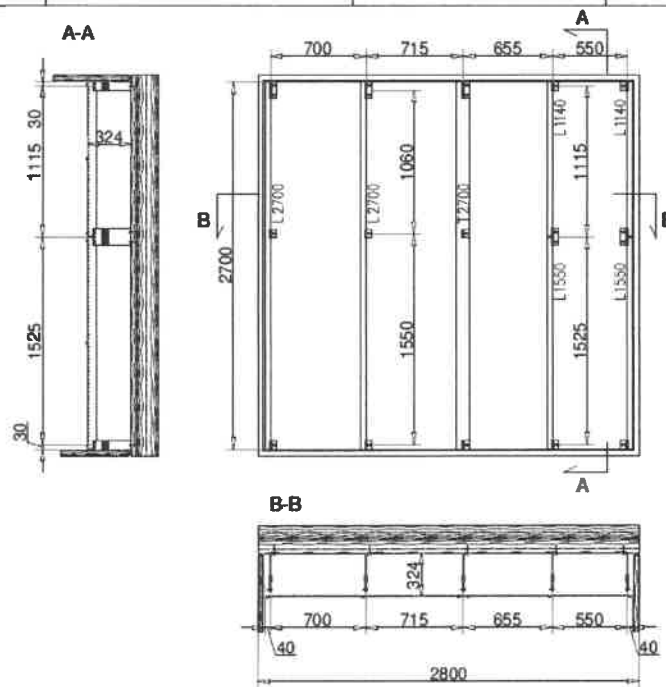


Figure 5: BSP KW4 kit with BSP KW4 PAS brackets – arrangement of test sample

The characteristic resistances to horizontal load determined by test(s) are valid for the same or lower level of wind action determined according to EN 1991-1-4 and:

- the same type of brackets, positioned in lower span in vertical and/or in horizontal position;
- stronger type of bracket, positioned in the same or lower span in vertical and/or in horizontal position;
- profile(s) in vertical and/or horizontal (if used) position with the same or stronger inertia;
- the same type of fixings of skin elements, positioned in lower span in vertical and/or in horizontal position and/or in higher number used on one skin element;
- the same type of fasteners, used in higher number, between bracket and vertical profile, between vertical and horizontal profiles (if used) and/or between profiles and fixings of skin elements;
- stronger type of fasteners, used in the same or higher number, between bracket and vertical profile, between vertical and horizontal profiles (if used) and/or between profiles and fixings of skin elements.

### 3.4.2 Resistance to vertical load of the assembled kit

No performance assessed.

### 3.4.3 Resistance to load of fixing of skin element and/or fasteners

#### 3.4.3.1 Resistance to vertical load of fixing of skin element

The resistance to vertical load of the fixing of skin element was tested in accordance with Cl. 2.2.5.1 of the EAD 090034-01-0404. The mechanically weakest case was tested.

Table 17: Resistance to vertical load of hanging element

| Type of hanging element  | Resistance to vertical load [N] |             |               |             |
|--|---------------------------------|-------------|---------------|-------------|
|  | $F_{m,v,1mm}$                   | $F_{m,v,s}$ | $F_{k,v,1mm}$ | $F_{k,v,s}$ |
| BSP KWRW (80/64x60x24x2,0) mm                                    | 2093                            | 4136        | 1789          | 3942        |
| BSP KWZ (99x20x31,1x3,0) mm + BSP KWRW80 profile (99x80x2,0) mm  | 1510                            | 3746        | 974           | 3356        |
| BSP KC3 (28x40x13) mm + BSP KCL L – profile (46,7x72x2,5/1,8) mm | 2446                            | 2832        | 2126          | 2480        |

The resistance to vertical load determined by test(s) is valid for the following cases:

- fixing of the same type made of material with higher strength;
- fixing of the same type made of material with higher thickness and of the same or higher strength.

#### 3.4.3.2 Resistance to horizontal load of fixing of skin element

The resistance to horizontal load of the fixing of skin element was tested in accordance with Cl. 2.2.5.2 of the EAD 090034-01-0404. The mechanically weakest case was tested.

Table 18: Resistance to horizontal load of hanging element

| Type of hanging element   | Resistance to horizontal load [N] |             |               |             |
|---|-----------------------------------|-------------|---------------|-------------|
|   | $F_{m,h,1mm}$                     | $F_{m,h,s}$ | $F_{k,h,1mm}$ | $F_{k,h,s}$ |
| BSP KWRW (80/64x60x24x2,0) mm   | 764                               | 1892        | 642           | 1521        |
| BSP KWZ (99x20x31,1x3,0) mm + BSP KWRW80 profile (99x80x2,0) mm       | 1217                              | 3141        | 1039          | 2932        |
| BSP KC3 (28x40x13) mm + BSP KCL L – profile (46,7x72x2,5/1,8) mm      | 2250                              | 2478        | 2140          | 2175        |
| BSP KC5 (23,5x27,5x26) mm + BSP KCT T – profile (117,4x72x2,5/1,8) mm | 6460                              | 12260       | 3101          | 11485       |

The resistance to horizontal load determined by test(s) is valid for the following cases:

- fixing of the same type made of material with higher strength;
- fixing of the same type made of material with higher thickness and of the same or higher strength.

### 3.4.3.3 Resistance to pulsating horizontal load of fixing of skin element

The resistance to pulsating horizontal load of the fixing of skin element was tested in accordance with Cl. 2.2.5.3 of the EAD 090034-01-0404. The mechanically weakest case was tested.

Test loads:

- upper load  $H_{max} = 0,25$  (for BSP KWRW, BSP KC3 + BSP KCL, BSP KC5 + BSP KCT T)  $\times F_{k,H,S}$
- upper load  $H_{max} = 0,30$  (for BSP KWZ + BSP KWR780)  $\times F_{k,H,S}$
- lower load  $H_{min} = 0,10 \times F_{k,H,S}$

Table 19: Resistance to pulsating horizontal load of hanging element

| Type of hanging element   | Test load [N] |           | Resistance to pulsating horizontal load<br>$\delta F_{m,fat}$ [-] |
|---|---------------|-----------|---|
|   | $H_{max}$     | $H_{min}$ |   |
| BSP KWRW (80/64x60x24x2,0) mm   | 380           | 152       | 0,73  |
| BSP KWZ (99x20x31,1x3,0) mm + BSP KWR780 profile (99x80x2,0) mm       | 880           | 293       | 1,00  |
| BSP KC3 (28x40x13) mm + BSP KCL L – profile (46,7x72x2,5/1,8) mm      | 544           | 218       | 0,80  |
| BSP KC5 (23,5x27,5x26) mm + BSP KCT T – profile (117,4x72x2,5/1,8) mm | 2871          | 1148      | 1,05  |

The resistance to pulsating horizontal load determined by test(s) is valid for the following cases:

- fixing of the same type made of material with higher strength;
- fixing of the same type made of material with higher thickness and of the same or higher strength.

### 3.4.3.4 Pull-through resistance to fastener

The pull-through resistance of fastener was tested in accordance with Cl. 2.2.5.4 of the EAD 090034-01-0404 like resistance to combined test pull-through and pull-out. The mechanically weakest case was tested.

Table 20: Average and characteristic values of combined tests pull-through and pull-out resistance

| Combined pull-through and pull-out resistance [N]   |                 |                 |
|---|-----------------|-----------------|
| Description of test samples   | $P_{m,thr-out}$ | $P_{k,thr-out}$ |
| BSP KWRC profile (40x40x1,7) mm + BSP KWR7 L-profile (40x40x1,75) mm + Self-drilling screws (4,8 x 19) mm | 1559            | 1508            |
| BSP KWRC profile (40x40x1,7) mm + BSP KWR7 L-profile (40x40x1,75) mm + Bolt and nut M6 A2                 | 3043            | 2771            |
| BSP KWRC profile (40x40x1,7) mm + BSP KWR7 L-profile (40x40x1,75) mm + Rivet 4,8 A/A2                     | 1948            | 1682            |

The combined pull-through and pull-out resistance determined by test(s) is valid for the following cases:

- fastener of the same type and diameter of head, positioned in profile of the same construction and the same material, with higher thickness of wall;
- fastener of the same type but higher diameter of head, positioned in profile of the same construction and the same material, with the same or higher thickness of wall;
- fastener of the same type, with the same or higher diameter of head, positioned in profile of the same or higher moment of inertia in the same position, made of material with higher strength, with the same or higher thickness of wall;
- fastener of the same type and diameter of head, positioned in fixing of skin element made of the same material, with higher thickness of wall;
- fastener of the same type but higher diameter of head, positioned in fixing of skin element made of the same material, with the same or higher thickness of wall

- fastener of the same type, with the same or higher diameter of head, positioned in fixing of skin element, made of material with higher strength, with the same or higher thickness of wall.

### 3.4.3.5 Pull-out resistance to fastener

The pull-out resistance of fastener was tested in accordance with Cl. 2.2.5.5 of the EAD 090034-01-0404 like resistance to combined test pull-through and pull-out .The mechanically weakest case was tested.

Table 21: Average and characteristic values of combined tests pull-through and pull-out resistance

| Combined pull-through and pull-out resistance [N]   |                 |                 |
|---|-----------------|-----------------|
| Description of test samples   | $P_{m,thr-out}$ | $P_{k,thr-out}$ |
| BSP KWRC profile (40x40x1,7) mm + BSP KWR7 L-profile (40x40x1,75) mm + self-drilling screws (4,8 x 19) mm | 1559            | 1508            |
| BSP KWRC profile (40x40x1,7) mm + BSP KWR7 L-profile (40x40x1,75) mm + Bolt and nut M6 A2                 | 3043            | 2771            |
| BSP KWRC profile (40x40x1,7) mm + BSP KWR7 L-profile (40x40x1,75) mm + Rivet 4,8 Al/A2                    | 1948            | 1682            |

The combined pull-through and pull-out resistance determined by test(s) is valid for the following cases:

- fastener of the same type and diameter, positioned in profile of the same material, with the same or higher moment of inertia in the same position, with higher thickness of wall;
- fastener of the same type and higher diameter, positioned in profile of the same material, with the same or higher moment of inertia in the same position, with the same or higher thickness of wall;
- fastener of the same type, of the same or higher diameter, positioned in profile made of material with higher strength, with the same or higher moment of inertia in the same position and with the same or higher thickness of wall.

### 3.4.4 Resistance, dimensions and moment of inertia of the profile

#### 3.4.4.1 Bending resistance of profile

No performance assessed.

#### 3.4.4.2 Dimensions and moment of inertia of profile

The dimensions and moment of inertia of profiles were carried out in accordance with Cl. 2.2.6.2 of the EAD 090034-01-0404. The measurement of dimensions were carried out on the following representatives.

Table 22: Average values of dimensions and moment of inertia of T-profile – KWR1

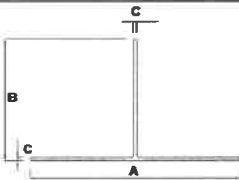
| BSP KWR1 T – profile (120x70x2,0) mm  |        |        |        |                                      |        |
|---|--------|--------|--------|--------------------------------------|--------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |        |
|   |        |        |        | $J_x$                                | $J_y$  |
|  | 119,6  | 69,9   | 1,9    | 15,580                               | 27,096 |

Table 23: Average values of dimensions and moment of inertia of T-profile – KWR8

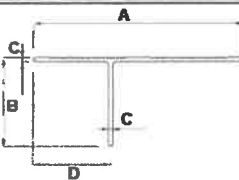
| BSP KWR8 T – profile (90x38x1,8) mm   |        |        |        |        |                                      |        |
|---|--------|--------|--------|--------|--------------------------------------|--------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | D [mm] | Moment of inertia [cm <sup>4</sup> ] |        |
|   |        |        |        |        | $J_x$                                | $J_y$  |
|  | 89,8   | 38,0   | 1,8    | 32,2   | 2,325                                | 10,879 |

Table 24: Average values of dimensions and moment of inertia of T-profile – KWR9

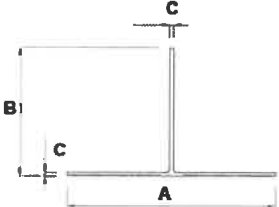
| BSP KWR9 T – profile (100x60x1,75) mm   |        |        |        |                                      |        |
|---|--------|--------|--------|--------------------------------------|--------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |        |
|   |        |        |        | $J_x$                                | $J_y$  |
|  | 99,6   | 59,8   | 1,6    | 8,421                                | 13,179 |

Table 25: Average values of dimensions and moment of inertia of T-profile – KWR12

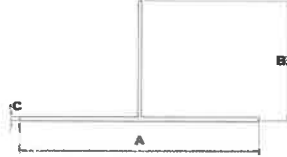
| BSP KWR12 T – profile (140x70x2,0) mm   |        |        |        |                                      |        |
|---|--------|--------|--------|--------------------------------------|--------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |        |
|   |        |        |        | $J_x$                                | $J_y$  |
|  | 139,6  | 68,9   | 2,1    | 16,554                               | 45,957 |

Table 26: Average values of dimensions and moment of inertia of L-profile – KWR2

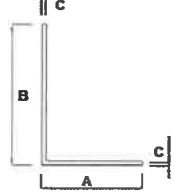
| BSP KWR2 L – profile (50x70x2,0) mm   |        |        |        |                                      |       |
|---|--------|--------|--------|--------------------------------------|-------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |       |
|   |        |        |        | $J_x$                                | $J_y$ |
|  | 50,1   | 70,1   | 2,1    | 12,001                               | 5,154 |

Table 27: Average values of dimensions and moment of inertia of L-profile – KWR5

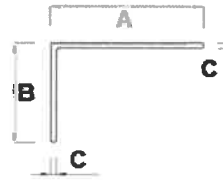
| BSP KWR5 L – profile (58x38x2,0) mm   |        |        |        |                                      |       |
|---|--------|--------|--------|--------------------------------------|-------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |       |
|   |        |        |        | $J_x$                                | $J_y$ |
|  | 57,9   | 38,8   | 1,9    | 2,305                                | 6,454 |

Table 28: Average values of dimensions and moment of inertia of L-profile – KWR7

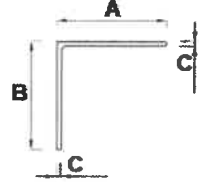
| BSP KWR7 L – profile (40x40x1,75) mm  |        |        |        |                                      |       |
|---|--------|--------|--------|--------------------------------------|-------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |       |
|   |        |        |        | $J_x$                                | $J_y$ |
|  | 40,0   | 40,0   | 1,7    | 2,092                                | 2,027 |

Table 29: Average values of dimensions and moment of inertia of L-profile – KWR10

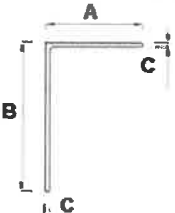
| BSP KWR10 L – profile (40x60x1,75) mm   |        |        |        |                                      |       |
|---|--------|--------|--------|--------------------------------------|-------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |       |
|   |        |        |        | $J_x$                                | $J_y$ |
|  | 39,9   | 59,7   | 1,7    | 6,354                                | 2,266 |

Table 30: Average values of dimensions and moment of inertia of L-profile – KWR11

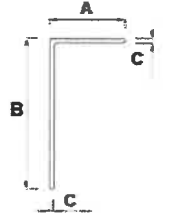
| BSP KWR11 L – profile (30x60x1,75) mm   |        |        |        |                                      |       |
|---|--------|--------|--------|--------------------------------------|-------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |       |
|   |        |        |        | $J_x$                                | $J_y$ |
|  | 29,9   | 59,9   | 1,7    | 5,767                                | 1,003 |

Table 31: Average values of dimensions and moment of inertia of L-profile – KWRG

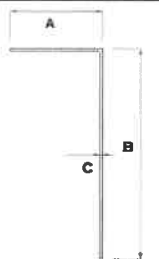
| BSP KWRG L – profile (160x70x2,2) mm  |        |        |        |                                      |        |
|---|--------|--------|--------|--------------------------------------|--------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |        |
|   |        |        |        | $J_x$                                | $J_y$  |
|  | 70,1   | 160,1  | 2,5    | 131,388                              | 17,280 |

Table 32: Average values of dimensions and moment of inertia of BSP KWRW profile

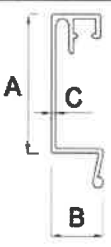
| BSP KWRW profile (80/64x24x2,0) mm  |        |        |        |                                      |       |
|---|--------|--------|--------|--------------------------------------|-------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |       |
|   |        |        |        | $J_x$                                | $J_y$ |
|  | 63,9   | 23,9   | 1,9    | 23,223                               | 2,251 |

Table 33: Average values of dimensions and moment of inertia of BSP KWRZ profile


| BSP KWRZ profile (82/66x26x4,0) mm  |        |        |        |                                      |       |
|---|--------|--------|--------|--------------------------------------|-------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |       |
|   |        |        |        | $J_x$                                | $J_y$ |
|  | 66,1   | 25,9   | 3,9    | 40,294                               | 4,539 |

Table 34: Average values of dimensions and moment of inertia of BSP KWR50 profile

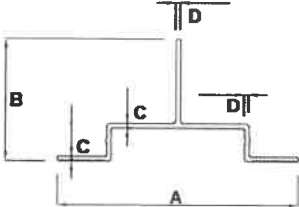
| BSP KWR50 profile (99x50x2,0/1,8) mm  |        |        |        |        |                                      |        |
|---|--------|--------|--------|--------|--------------------------------------|--------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | D [mm] | Moment of inertia [cm <sup>4</sup> ] |        |
|   |        |        |        |        | $J_x$                                | $J_y$  |
|  | 98,9   | 50,2   | 2,0    | 1,8    | 4,342                                | 18,992 |

Table 35: Average values of dimensions and moment of inertia of BSP KWR50 profile

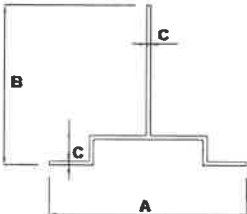
| BSP KWR50 profile (99x80x2,0) mm  |        |        |        |                                      |        |
|---|--------|--------|--------|--------------------------------------|--------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |        |
|   |        |        |        | $J_x$                                | $J_y$  |
|  | 98,9   | 80,1   | 2,0    | 18,639                               | 20,392 |

Table 36: Average values of dimensions and moment of inertia of T – profile - BSP KCT

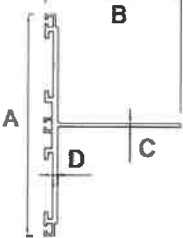
| BSP KCT T – profile (117,4x72x2,5/1,8) mm   |        |        |        |        |                                      |        |
|---|--------|--------|--------|--------|--------------------------------------|--------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | D [mm] | Moment of inertia [cm <sup>4</sup> ] |        |
|   |        |        |        |        | $J_x$                                | $J_y$  |
|  | 117,3  | 72,2   | 1,8    | 2,4    | 15,309                               | 43,667 |

Table 37: Average values of dimensions and moment of inertia of L – profile - BSP KCL

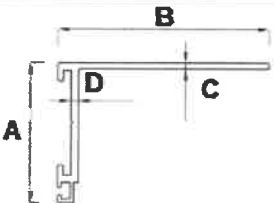
| BSP KCL L – profile (46,7x72x2,5/1,8) mm  |        |        |        |        |                                      |       |
|---|--------|--------|--------|--------|--------------------------------------|-------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | D [mm] | Moment of inertia [cm <sup>4</sup> ] |       |
|   |        |        |        |        | $J_x$                                | $J_y$ |
|  | 46,6   | 71,9   | 1,9    | 2,4    | 12,288                               | 6,472 |

Table 38: Average values of dimensions and moment of inertia of BSP KWRC profile

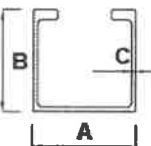
| BSP KWRC profile (40x40x1,7) mm   |        |        |        |                                      |       |
|---|--------|--------|--------|--------------------------------------|-------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |       |
|   |        |        |        | $J_x$                                | $J_y$ |
|  | 40,0   | 40,0   | 1,7    | 6,200                                | 6,770 |

Table 39: Average values of dimensions and moment of inertia of BSP KWRP profile

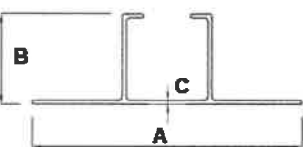

| BSP KWRP profile (120x40x1,8) mm  |        |        |        |                                      |        |
|---|--------|--------|--------|--------------------------------------|--------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | Moment of inertia [cm <sup>4</sup> ] |        |
|   |        |        |        | $J_x$                                | $J_y$  |
|  | 119,7  | 39,9   | 1,7    | 7,230                                | 29,680 |

Table 40: Average values of dimensions and moment of inertia of BSP KWRCY profile

| BSP KWRCY profile (99x53x1,8/2,0) mm  |        |        |        |        |                                      |        |
|---|--------|--------|--------|--------|--------------------------------------|--------|
| Cross section of profile  | A [mm] | B [mm] | C [mm] | D [mm] | Moment of inertia [cm <sup>4</sup> ] |        |
|   |        |        |        |        | $J_x$                                | $J_y$  |
|  | 99,0*  | 53,0*  | 1,8*   | 2,0*   | 11,180                               | 24,732 |

\*Declared value

### 3.4.5 Resistance to load and dimensions and moment of inertia of the bracket

#### 3.4.5.1 Resistance of bracket to vertical load

The resistance of bracket to vertical load was tested in accordance with Cl. 2.2.7.1 of the EAD 090034-01-0404. The lengths of wing of BSP KW4 PAS brackets 280 mm (maximal) and 220 mm were tested and lengths of wing of BSP KW1 brackets 310 mm (maximal) were tested.



Table 41: Average values of resistance to vertical load of BSP KW4 PAS brackets

| BSP KW4 PAS brackets (group 2) |                 |                           |                           |                         |                             |                    |
|--------------------------------|-----------------|---------------------------|---------------------------|-------------------------|-----------------------------|--------------------|
| Type of bracket                | $R_{m,v,r}$ [N] | $R_{m,v,1\text{ mm}}$ [N] | $R_{m,v,3\text{ mm}}$ [N] | $R_{m,v,s}$ [N] (10 mm) | $\delta R_{m,v,s,cond}$ [N] | $\delta R_{m,v,s}$ |
| In as-delivered state          |                 |                           |                           |                         |                             |                    |
| Load-bearing (280-120) mm      | 614             | 102                       | 356                       | 1068                    | —                           | —                  |
| Load-bearing (220-120) mm      | 1070            | 247                       | 780                       | 1875                    | —                           | —                  |
| Freeze-thaw cycles             |                 |                           |                           |                         |                             |                    |
| Load-bearing (280-120) mm      | 625             | 104                       | 388                       | 1089                    | 1,02                        | 1,03               |
| Load-bearing (220-120) mm      | 999             | 225                       | 718                       | 1799                    | 0,96                        | 0,98               |
| Immersion in water             |                 |                           |                           |                         |                             |                    |
| Load-bearing (280-120) mm      | 616             | 115                       | 368                       | 1079                    | 1,01                        | 1,03               |
| Load-bearing (220-120) mm      | 999             | 205                       | 732                       | 1831                    | 0,98                        | 0,98               |
| Thermal ageing                 |                 |                           |                           |                         |                             |                    |
| Load-bearing (280-120) mm      | 642             | 111                       | 381                       | 1137                    | 1,06                        | 1,03               |
| Load-bearing (220-120) mm      | 1066            | 238                       | 772                       | 1894                    | 1,01                        | 0,98               |

Table 42: Characteristic values of resistance to vertical load of BSP KW4 PAS brackets

| BSP KW4 PAS brackets (group 2) |                 |                           |                           |                         |
|--------------------------------|-----------------|---------------------------|---------------------------|-------------------------|
| Type of conditioning           | $R_{k,v,r}$ [N] | $R_{k,v,1\text{ mm}}$ [N] | $R_{k,v,3\text{ mm}}$ [N] | $R_{k,v,s}$ [N] (10 mm) |
| In as-delivered state          |                 |                           |                           |                         |
| Load-bearing (280-120) mm      | 502             | 81                        | 307                       | 1001                    |
| Load-bearing (220-120) mm      | 829             | 174                       | 589                       | 1534                    |
| Freeze-thaw cycles             |                 |                           |                           |                         |
| Load-bearing (280-120) mm      | 541             | 63                        | 349                       | 1070                    |
| Load-bearing (220-120) mm      | 998             | 196                       | 646                       | 1752                    |
| Immersion in water             |                 |                           |                           |                         |
| Load-bearing (280-120) mm      | 565             | 65                        | 311                       | 990                     |
| Load-bearing (220-120) mm      | 813             | 159                       | 617                       | 1610                    |
| Thermal ageing                 |                 |                           |                           |                         |
| Load-bearing (280-120) mm      | 512             | 59                        | 356                       | 1105                    |
| Load-bearing (220-120) mm      | 969             | 203                       | 625                       | 1667                    |

Table 43: Average values of resistance to vertical load of BSP KW1 brackets

| BSP KW1 brackets (group 1) |                 |                           |                           |                         |
|----------------------------|-----------------|---------------------------|---------------------------|-------------------------|
| Type of bracket            | $R_{m,v,r}$ [N] | $R_{m,v,1\text{ mm}}$ [N] | $R_{m,v,3\text{ mm}}$ [N] | $R_{m,v,s}$ [N] (30 mm) |
| In as-delivered state      |                 |                           |                           |                         |
| Load-bearing (310-150) mm  | 780             | 217                       | 602                       | 3246                    |
| Load-bearing (310-120) mm  | 477             | 178                       | 470                       | 2461                    |
| Wind (310-90) mm           | 129             | 100                       | 189                       | 1202                    |
| Wind (310-60) mm           | 103             | 72                        | 150                       | 642                     |

Table 44: Characteristic values of resistance to vertical load of BSP KW1 brackets

| BSP KW1 brackets (group 1) |                 |                           |                           |                         |
|----------------------------|-----------------|---------------------------|---------------------------|-------------------------|
| Type of conditioning       | $R_{k,v,r}$ [N] | $R_{k,v,1\text{ mm}}$ [N] | $R_{k,v,3\text{ mm}}$ [N] | $R_{k,v,s}$ [N] (30 mm) |
| In as-delivered state      |                 |                           |                           |                         |
| Load-bearing (310-150) mm  | 719             | 192                       | 540                       | 3034                    |
| Load-bearing (310-120) mm  | 359             | 162                       | 412                       | 2374                    |
| Wind (310-90) mm           | 106             | 83                        | 144                       | 1043                    |
| Wind (310-60) mm           | 95              | 63                        | 135                       | 603                     |

Table 45: Average values of resistance to vertical load of BSP KWE brackets

| BSP KWE brackets (group 4)     |                 |                           |                           |                         |
|--------------------------------|-----------------|---------------------------|---------------------------|-------------------------|
| Type of bracket                | $R_{m,v,r}$ [N] | $R_{m,v,1\text{ mm}}$ [N] | $R_{m,v,3\text{ mm}}$ [N] | $R_{m,v,s}$ [N] (10 mm) |
| In as-delivered state          |                 |                           |                           |                         |
| Load-bearing (rod M10, 200 mm) | 624             | 174                       | 523                       | 1382                    |
| Load-bearing (rod M12, 250 mm) | 605             | 162                       | 447                       | 1309                    |
| Load-bearing (rod M14, 350 mm) | 485             | 113                       | 292                       | 854                     |

Table 46: Characteristic values of resistance to vertical load of BSP KWE brackets

| BSP KWE brackets (group 4)     |                 |                           |                           |                         |
|--------------------------------|-----------------|---------------------------|---------------------------|-------------------------|
| Type of bracket                | $R_{m,v,r}$ [N] | $R_{m,v,1\text{ mm}}$ [N] | $R_{m,v,3\text{ mm}}$ [N] | $R_{m,v,s}$ [N] (10 mm) |
| In as-delivered state          |                 |                           |                           |                         |
| Load-bearing (rod M10, 200 mm) | 430             | 128                       | 470                       | 1217                    |
| Load-bearing (rod M12, 250 mm) | 400             | 119                       | 386                       | 1173                    |
| Load-bearing (rod M14, 350 mm) | 313             | 95                        | 263                       | 772                     |

The characteristic resistance of bracket to vertical load determined by test(s) is valid for the following cases:

- bracket made of the same material, of the same construction itself, of the same construction of thermal isolator, with higher thickness of wing and flange, with higher height of wing and flange; with smaller length of wing, with the same thermo-stop pad or without it;
- bracket made of material with higher strength, of the same construction itself, of the same construction of thermal isolator, with the same or higher thickness of wing and flange, with the same or higher height of wing and flange, with smaller length of wing, with the same thermo-stop pad or without it.

### 3.4.5.2 Resistance of bracket to horizontal load

The resistance of bracket to horizontal load was tested in accordance with Cl. 2.2.7.2 of the EAD 090034-01-0404. The length of wing of bracket 280 mm (maximal) was tested and lengths of wing of BSP KW1 brackets 310 mm (maximal) were tested.

Table 47: Average values of resistance to horizontal load of BSP KW4 PAS brackets

| BSP KW4 PAS brackets (group 2) |                           |                         |                             |                    |
|--------------------------------|---------------------------|-------------------------|-----------------------------|--------------------|
| Type of bracket                | $R_{m,H,1\text{ mm}}$ [N] | $R_{m,H,s}$ [N] (10 mm) | $\delta R_{m,H,s,cond}$ [N] | $\delta R_{m,H,s}$ |
| In as-delivered state          |                           |                         |                             |                    |
| Load-bearing (280-120) mm      | 3860                      | 6215                    | —                           | —                  |
| Wind (280-60) mm               | 2180                      | 3400                    | —                           | —                  |

| BSP KW4 PAS brackets (group 2) |                           |                         |                             |                    |
|--------------------------------|---------------------------|-------------------------|-----------------------------|--------------------|
| Type of bracket                | $R_{m,H,1\text{ mm}}$ [N] | $R_{m,H,S}$ [N] (10 mm) | $\delta R_{m,H,S,cond}$ [N] | $\delta R_{m,H,S}$ |
| Freeze-thaw cycles             |                           |                         |                             |                    |
| Load-bearing (280-120) mm      | 3188                      | 6250                    | 1,01                        | 0,96               |
| Wind (280-60) mm               | 2188                      | 3394                    | 1,00                        | 0,98               |
| Immersion in water             |                           |                         |                             |                    |
| Load-bearing (280-120) mm      | 3684                      | 6259                    | 1,01                        | 0,96               |
| Wind (280-60) mm               | 2113                      | 3394                    | 1,00                        | 0,98               |
| Thermal ageing                 |                           |                         |                             |                    |
| Load-bearing (280-120) mm      | 4217                      | 5241                    | 0,84                        | 0,96               |
| Wind (280-60) mm               | 2125                      | 3401                    | 1,00                        | 0,98               |
| Pulsating load (fatigue)       |                           |                         |                             |                    |
| Load-bearing (280-120) mm      | —                         | 6085                    | 0,98                        | 0,96               |
| Wind (280-60) mm               | —                         | 3162                    | 0,93                        | 0,98               |

Table 48: Characteristic values of resistance to horizontal load of BSP KW4 PAS brackets

| BSP KW4 PAS brackets (group 2) |                           |                         |
|--------------------------------|---------------------------|-------------------------|
| Type of bracket                | $R_{k,H,1\text{ mm}}$ [N] | $R_{k,H,S}$ [N] (10 mm) |
| In as-delivered state          |                           |                         |
| Load-bearing (280-120) mm      | 3595                      | 5999                    |
| Wind (280-60) mm               | 1953                      | 3359                    |
| Freeze-thaw cycles             |                           |                         |
| Load-bearing (280-120) mm      | 2795                      | 5758                    |
| Wind (280-60) mm               | 2062                      | 3311                    |
| Immersion in water             |                           |                         |
| Load-bearing (280-120) mm      | 3429                      | 6047                    |
| Wind (280-60) mm               | 1870                      | 3311                    |
| Thermal ageing                 |                           |                         |
| Load-bearing (280-120) mm      | 3702                      | 3967                    |
| Wind (280-60) mm               | 1994                      | 3284                    |
| Pulsating load (fatigue)       |                           |                         |
| Load-bearing (280-120) mm      | —                         | 5692                    |
| Wind (280-60) mm               | —                         | 2498                    |

Table 49: Average values of resistance to horizontal load of BSP KW1 brackets

| BSP KW1 brackets (group 1) |                           |                 |
|----------------------------|---------------------------|-----------------|
| Type of bracket            | $R_{m,H,1\text{ mm}}$ [N] | $R_{m,H,S}$ [N] |
| In as-delivered state      |                           |                 |
| Load-bearing (310-150) mm  | 5027                      | 11975 (21 mm)   |
| Load-bearing (310-120) mm  | 5031                      | 11283 (22 mm)   |

| BSP KW1 brackets (group 1) |                           |                 |
|----------------------------|---------------------------|-----------------|
| Type of bracket            | $R_{m,H,1\text{ mm}}$ [N] | $R_{m,H,s}$ [N] |
| Wind<br>(310-90) mm        | 2932                      | 9547 (30 mm)    |
| Wind<br>(310-60) mm        | 2602                      | 7093 (25 mm)    |

Table 50: Characteristic values of resistance to horizontal load of BSP KW1 brackets

| BSP KW1 brackets (group 1)   |                           |                         |
|------------------------------|---------------------------|-------------------------|
| Type of bracket              | $R_{k,H,1\text{ mm}}$ [N] | $R_{k,H,s}$ [N] (20 mm) |
| In as-delivered state        |                           |                         |
| Load-bearing<br>(310-150) mm | 4554                      | 11916 (21 mm)           |
| Load-bearing<br>(310-120) mm | 3835                      | 9975 (22 mm)            |
| Wind<br>(310-90) mm          | 2627                      | 9301 (30 mm)            |
| Wind<br>(310-60) mm          | 2514                      | 5761 (25 mm)            |

Table 51: Average values of resistance to horizontal load of BSP KWE brackets

| BSP KWE brackets (group 4) |                           |                              |
|----------------------------|---------------------------|------------------------------|
| Type of bracket            | $R_{m,H,1\text{ mm}}$ [N] | $R_{m,H,s}$ [N] (in failure) |
| In as-delivered state      |                           |                              |
| Wind<br>(rod M8, 250 mm)   | 1752                      | 3469                         |
| Wind<br>(rod M12, 350 mm)  | 1760                      | 3414                         |
| Pulsating load (fatigue)   |                           |                              |
| Wind<br>(rod M8, 250 mm)   | —                         | 1719                         |
| Wind<br>(rod M12, 350 mm)  | —                         | 1962                         |

Table 52: Characteristic values of resistance to horizontal load of BSP KWE brackets

| BSP KWE brackets (group 4) |                           |                              |
|----------------------------|---------------------------|------------------------------|
| Type of bracket            | $R_{m,H,1\text{ mm}}$ [N] | $R_{m,H,s}$ [N] (in failure) |
| In as-delivered state      |                           |                              |
| Wind<br>(rod M8, 250 mm)   | 1685                      | 3290                         |
| Wind<br>(rod M12, 350 mm)  | 1701                      | 3104                         |
| Pulsating load (fatigue)   |                           |                              |
| Wind<br>(rod M8, 250 mm)   | —                         | 1410                         |
| Wind<br>(rod M12, 350 mm)  | —                         | 1514                         |

The characteristic resistance of bracket to horizontal load determined by test(s) is valid for the following cases:

- bracket made of the same material, of the same construction itself, of the same construction of thermal isolator, with higher thickness of wing and flange, with higher height of wing and flange, with different length of wing, with the same thermo-stop pad or without it;
- bracket made of material with higher strength, of the same construction itself, with the same construction of thermal isolator, with the same or higher thickness of wing and flange, with the same or higher height of wing and flange, with different length of wing, with the same thermo-stop pad or without it.

### 3.4.5.3 Resistance of bracket to pulsating horizontal load

The resistance of bracket to pulsating horizontal load was tested in accordance with Cl. 2.2.7.3 of the EAD 090034-01-0404. The maximal length of wing of brackets was tested.

#### BSP KW4 PAS brackets (load-bearing bracket (120x280) mm)

Test loads:

- upper load  $H_{max} = 0,50 \times R_{k,H,S} = 5760 \text{ N}$
- lower load  $H_{min} = 0,20 \times R_{k,H,S} = 2500 \text{ N}$

Table 53: Average value of resistance to pulsating horizontal load of BSP KW4 PAS brackets (load-bearing bracket (120x280) mm)

| BSP KW4 PAS brackets (load-bearing bracket (280-120) mm) |           |      |
|--|-----------|------|
| $R_{m,H,S,fat} [\text{N}]$ (after 50 000 cycles)         |           | 6085 |
| $d_{m,1c} [\text{mm}]$                                   | $H_{min}$ | 2,0  |
|  | $H_{max}$ | 3,4  |
| $d_{m,10c} [\text{mm}]$                                  | $H_{min}$ | 2,1  |
|  | $H_{max}$ | 3,4  |
| $d_{m,100c} [\text{mm}]$                                 | $H_{min}$ | 2,1  |
|  | $H_{max}$ | 3,5  |
| $d_{m,1000c} [\text{mm}]$                                | $H_{min}$ | 2,1  |
|  | $H_{max}$ | 3,5  |
| $d_{m,5000c} [\text{mm}]$                                | $H_{min}$ | 2,1  |
|  | $H_{max}$ | 3,5  |
| $d_{m,10000c} [\text{mm}]$                               | $H_{min}$ | 2,1  |
|  | $H_{max}$ | 3,5  |
| $d_{m,25000c} [\text{mm}]$                               | $H_{min}$ | 2,1  |
|  | $H_{max}$ | 3,5  |
| $d_{m,50000c} [\text{mm}]$                               | $H_{min}$ | 2,2  |
|  | $H_{max}$ | 3,7  |
| Average value of residual deformation [mm]               |           | 0,30 |

The characteristic resistance of bracket to pulsating horizontal load determined by test(s) is valid for the following cases:

- bracket made of the same material, of the same construction itself, of the same construction of thermal isolator, with the same or higher thickness of wing and flange, with the same or higher height of wing and flange, with different length of wing;
- bracket made of material with higher strength, of the same construction itself and of the same construction of thermal isolator, with the same or higher height of wing and flange, with the same or higher thickness of wing and flange, with different length of wing.

#### BSP KW4 PAS brackets (wind bracket (60x280) mm)

Test loads:

- upper load  $H_{max} = 0,50 \times R_{k,H,S} = 3000 \text{ N}$
- lower load  $H_{min} = 0,20 \times R_{k,H,S} = 1300 \text{ N}$

Table 54: Average value of resistance to pulsating horizontal load of BSP KW4 PAS brackets (wind bracket (60x280) mm)

| BSP KW4 PAS brackets (wind bracket (280-60) mm)  |           |      |
|--|-----------|------|
| $R_{m,H,S,fat} [\text{N}]$ (after 50 000 cycles) |           | 3162 |
| $d_{m,1c} [\text{mm}]$                           | $H_{min}$ | 1,5  |
|  | $H_{max}$ | 2,3  |
| $d_{m,10c} [\text{mm}]$                          | $H_{min}$ | 1,6  |
|  | $H_{max}$ | 2,4  |

| BSP KW4 PAS brackets (wind bracket (280-60) mm) |           |      |
|---|-----------|------|
| $d_{m,100c}$ [mm]                               | $H_{min}$ | 1,5  |
|   | $H_{max}$ | 2,6  |
| $d_{m,1000c}$ [mm]                              | $H_{min}$ | 1,5  |
|   | $H_{max}$ | 2,6  |
| $d_{m,5000c}$ [mm]                              | $H_{min}$ | 1,5  |
|   | $H_{max}$ | 2,6  |
| $d_{m,10000c}$ [mm]                             | $H_{min}$ | 1,5  |
|   | $H_{max}$ | 2,6  |
| $d_{m,25000c}$ [mm]                             | $H_{min}$ | 1,6  |
|   | $H_{max}$ | 2,6  |
| $d_{m,50000c}$ [mm]                             | $H_{min}$ | 1,8  |
|   | $H_{max}$ | 3,0  |
| Average value of residual deformation [mm]      |           | 0,78 |

The characteristic resistance of bracket to pulsating horizontal load determined by test(s) is valid for the following cases:

- bracket made of the same material, of the same construction itself, of the same construction of thermal isolator, with the same or higher thickness of wing and flange, with the same or higher height of wing and flange, with different length of wing;
- bracket made of material with higher strength, of the same construction itself and of the same construction of thermal isolator, with the same or higher height of wing and flange, with the same or higher thickness of wing and flange, with different length of wing.

#### BSP KWE brackets (wind bracket - rod M8, length 250 mm)

Test loads:

- upper load  $H_{max} = 0,30 \times R_{k,H,S} = 987$  N
- lower load  $H_{min} = 0,10 \times R_{k,H,S} = 329$  N

Table 55: Average value of resistance to pulsating horizontal load of BSP KWE brackets (wind bracket – rod M8, length 250 mm)

| BSP KWE brackets (wind bracket – rod M8, length 250 mm) |           |      |
|---|-----------|------|
| $R_{m,H,S,fat}$ [N] (after 50 000 cycles)               |           | 1719 |
| $d_{m,1c}$ [mm]   | $H_{min}$ | 0,7  |
|   | $H_{max}$ | 1,3  |
| $d_{m,10c}$ [mm]  | $H_{min}$ | 0,7  |
|   | $H_{max}$ | 1,3  |
| $d_{m,100c}$ [mm]                                       | $H_{min}$ | 0,7  |
|   | $H_{max}$ | 1,3  |
| $d_{m,1000c}$ [mm]                                      | $H_{min}$ | 0,7  |
|   | $H_{max}$ | 1,3  |
| $d_{m,5000c}$ [mm]                                      | $H_{min}$ | 0,7  |
|   | $H_{max}$ | 1,3  |
| $d_{m,10000c}$ [mm]                                     | $H_{min}$ | 0,8  |
|   | $H_{max}$ | 1,4  |
| $d_{m,25000c}$ [mm]                                     | $H_{min}$ | 1,0  |
|   | $H_{max}$ | 1,9  |
| $d_{m,50000c}$ [mm]                                     | $H_{min}$ | 1,3  |
|   | $H_{max}$ | 2,4  |
| Average value of residual deformation [mm]              |           | 0,80 |

The characteristic resistance of bracket to pulsating horizontal load determined by test(s) is valid for the following cases:

- bracket made of the same material, of the same construction itself, of the same construction of thermal isolator, with the same or higher thickness of wing and flange, with the same or higher height of wing and flange, with different length of wing;
- bracket made of material with higher strength, of the same construction itself and of the same construction of thermal isolator, with the same or higher height of wing and flange, with the same or higher thickness of wing and flange, with different length of wing.

#### BSP KWE brackets (wind bracket - rod M12, length 350 mm)

Test loads:

- upper load  $H_{max} = 0,30 \times R_{k,H,S} = 931 \text{ N}$
- lower load  $H_{min} = 0,10 \times R_{k,H,S} = 310 \text{ N}$

Table 56: Average value of resistance to pulsating horizontal load of BSP KWE brackets (wind bracket – rod M12, length 350 mm)

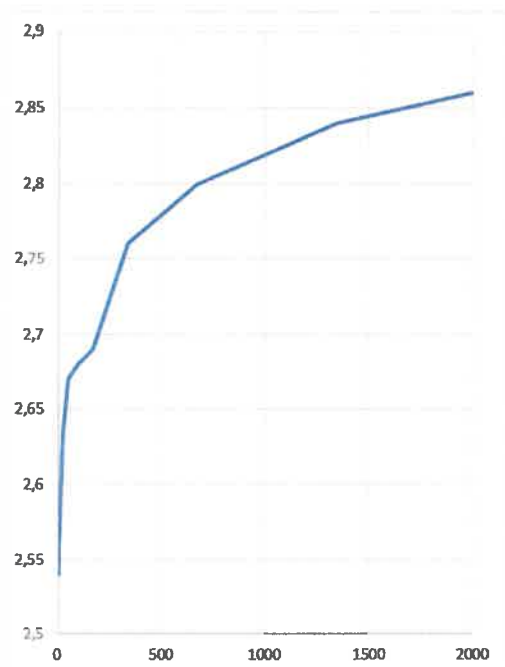
| BSP KWE brackets (wind bracket – rod M12, length 350 mm) |           |      |
|--|-----------|------|
| $R_{m,H,S,fat} \text{ [N] (after 50 000 cycles)}$        |           | 1962 |
| $d_{m,1c} \text{ [mm]}$                                  | $H_{min}$ | 0,7  |
|  | $H_{max}$ | 1,2  |
| $d_{m,10c} \text{ [mm]}$                                 | $H_{min}$ | 0,7  |
|  | $H_{max}$ | 1,2  |
| $d_{m,100c} \text{ [mm]}$                                | $H_{min}$ | 0,7  |
|  | $H_{max}$ | 1,2  |
| $d_{m,1000c} \text{ [mm]}$                               | $H_{min}$ | 0,7  |
|  | $H_{max}$ | 1,2  |
| $d_{m,5000c} \text{ [mm]}$                               | $H_{min}$ | 0,7  |
|  | $H_{max}$ | 1,3  |
| $d_{m,10000c} \text{ [mm]}$                              | $H_{min}$ | 0,8  |
|  | $H_{max}$ | 1,3  |
| $d_{m,25000c} \text{ [mm]}$                              | $H_{min}$ | 0,9  |
|  | $H_{max}$ | 1,6  |
| $d_{m,50000c} \text{ [mm]}$                              | $H_{min}$ | 1,1  |
|  | $H_{max}$ | 1,9  |
| Average value of residual deformation [mm]               |           | 0,56 |

The characteristic resistance of bracket to pulsating horizontal load determined by test(s) is valid for the following cases:

- bracket made of the same material, of the same construction itself, of the same construction of thermal isolator, with the same or higher thickness of wing and flange, with the same or higher height of wing and flange, with different length of wing;
- bracket made of material with higher strength, of the same construction itself and of the same construction of thermal isolator, with the same or higher height of wing and flange, with the same or higher thickness of wing and flange, with different length of wing.

#### 3.4.5.4 Resistance of bracket to sustained vertical load

The resistance of bracket to sustained vertical load was tested in accordance with Cl. 2.2.7.4 of the EAD 090034-01-0404. The maximal length of wing of load-bearing BSP KW4 PAS bracket was tested. Only one test specimen was tested.



Working diagram of relation of deflection  $d_{m,1h}$  up to  $d_{m,2000h}$  to time

The test specimen was without presence any damage (e.g. cracks, twist, delamination etc.). The permanent deformation is according to Table below.

Table 57: Permanent deformation

| BSP KW4 PAS brackets      |  |
|---------------------------|--|
| Type of bracket           | Permanent deformation $\Delta d_{l,sust}$ [mm] |
| Load-bearing (280-120) mm | 0,25   |

The characteristic resistance of bracket to sustained vertical load determined by test(s) is valid for the following cases:

- bracket made of the same material, of the same construction itself, of the same construction of thermal isolator, with higher thickness of wing and flange, with the same or higher height of wing and flange, with the same or shorter wing;
- bracket made of material with higher strength, of the same construction itself, of the same construction of thermal isolator, with the same or higher height of wing and flange, with the same or higher thickness of wing and flange, with the same or shorter wing.

#### 3.4.5.5 Resistance of bracket to freeze-thaw cycles

The resistance of bracket to freeze-thaw cycles was tested in accordance with Cl. 2.2.7.5 of the EAD 090034-01-0404. The maximal length of wing of BSP KW4 PAS bracket was tested.

Table 58: Resistance of bracket to freeze-thaw cycles

| BSP KW4 PAS brackets (group 2) |   |
|--------------------------------|---|
| Type of bracket                | Type of damage after freeze-thaw cycles |
| Load-bearing (280-120) mm      | No defects were observed                |
| Load-bearing (220-120) mm      | No defects were observed                |
| Wind (280-60) mm               | No defects were observed                |



The tests of resistance to vertical and horizontal load of brackets were carried out on these test samples after freeze-thaw cycles. The test results are given in Clause 3.4.5.1 and 3.4.5.2.

The characteristic resistance of bracket to freeze-thaw cycles determined by test(s) is valid for the following cases:

- bracket made of the same material, of the same construction itself, of the same construction of thermal isolator, with higher thickness of wing and flange, with the same or higher height of wing and flange, with any length of wing;
- bracket made of material with higher strength, of the same construction itself, of the same construction of thermal isolator, with the same or higher height of wing and flange, with the same or higher thickness of wing and flange, with any length of wing

#### 3.4.5.6 Resistance of bracket to immersion in water

The resistance of bracket to immersion in water was tested in accordance with Cl. 2.2.7.6 of the EAD 090034-01-0404. The maximal length of wing of BSP KW4 PAS bracket was tested.

Table 59: Resistance of bracket to immersion in water

| BSP KW4 PAS brackets (group 2) |   |
|--------------------------------|---|
| Type of bracket                | Type of damage after immersion in water |
| Load-bearing (280-120) mm      | No defects were observed                |
| Load-bearing (220-120) mm      | No defects were observed                |
| Wind (280-60) mm               | No defects were observed                |

The tests of resistance to vertical and horizontal load of brackets were carried out on these test samples after immersion in water. The test results are given in Clause 3.4.5.1 and 3.4.5.2.

The characteristic resistance of bracket to immersion in water determined by test(s) is valid for the following cases:

- bracket made of the same material, of the same construction itself, of the same construction of thermal isolator, with higher thickness of wing and flange, with the same or higher height of wing and flange, with any length of wing;
- bracket made of material with higher strength, of the same construction itself, of the same construction of thermal isolator, with the same or higher height of wing and flange, with the same or higher thickness of wing and flange, with any length of wing

#### 3.4.5.7 Resistance of bracket to thermal ageing

The resistance of bracket to thermal ageing was tested in accordance with Cl. 2.2.7.7 of the EAD 090034-01-0404. The maximal length of wing of BSP KW4 PAS bracket was tested.

Table 60: Resistance of bracket to thermal ageing

| BSP KW4 PAS brackets (group 2) |                                     |
|--------------------------------|-------------------------------------|
| Type of bracket                | Type of damage after thermal ageing |
| Load-bearing (280-120) mm      | No defects were observed            |
| Load-bearing (220-120) mm      | No defects were observed            |
| Wind (280-60) mm               | No defects were observed            |

The tests of resistance to vertical and horizontal load of brackets were carried out on these test samples after thermal ageing. The test results are given in Clause 3.4.5.1 and 3.4.5.2.

The characteristic resistance of bracket to thermal ageing determined by test(s) is valid for the following cases:

- bracket made of the same material, of the same construction itself, of the same construction of thermal isolator, with higher thickness of wing and flange, with the same or higher height of wing and flange, with any length of wing;

- bracket made of material with higher strength, of the same construction itself, of the same construction of thermal isolator, with the same or higher height of wing and flange, with the same or higher thickness of wing and flange, with any length of wing

### 3.4.5.8 Resistance of bracket to soft body impact

The resistance of bracket to soft body impact was tested in accordance with Cl. 2.2.7.8 of the EAD 090034-01-0404. The mechanically weakest case was tested.

Table 61: Impact Categories of kit

| Type of kit     | Description of tested kit  | Impact Categories according to EAD 090034-01-0404, Table G.2         |
|-----------------|--|--|
| BSP KWE kit     | BSP KWE brackets: <ul style="list-style-type: none"> <li>• wind – rod M12, length 350 mm, BSP KWE40 – 3 pcs</li> <li>• load-bearing – rod M14, length 350 mm, BSP KWE75 – 6 pcs</li> </ul> Vertical profile <ul style="list-style-type: none"> <li>• BSP KWRC profile (40x40x1,7) mm</li> </ul> Fasteners <ul style="list-style-type: none"> <li>• self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal</li> </ul>  | II <sub>kit</sub>  |
| BSP KWRCY kit   | BSP KWE brackets: <ul style="list-style-type: none"> <li>• wind – rod M12, length 350 mm, BSP KWE40 – 3 pcs</li> <li>• load-bearing – rod M14, length 350 mm, BSP KWE75 – 6 pcs</li> </ul> BSP hanging elements: <ul style="list-style-type: none"> <li>• BSP KWZ profile (99x18,5x3,0) mm</li> </ul> Vertical profile <ul style="list-style-type: none"> <li>• BSP KWRCY profile (40x40x1,7) mm</li> </ul> Fasteners <ul style="list-style-type: none"> <li>• self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal</li> </ul>  | II <sub>kit</sub> <sup>1)</sup> and III <sub>kit</sub> <sup>2)</sup> |
| BSP KW4 PAS kit | BSP KW4 PAS brackets: <ul style="list-style-type: none"> <li>• wind (280-60) mm – 3 pcs</li> <li>• load-bearing (280-120) mm – 3 pcs</li> </ul> Vertical profile <ul style="list-style-type: none"> <li>• BSP KWR10 profile (40x60x1,75) mm</li> </ul> Fasteners <ul style="list-style-type: none"> <li>• self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal</li> </ul>   | II <sub>kit</sub> <sup>1)</sup> and III <sub>kit</sub> <sup>2)</sup> |
| BSP KWRW kit    | BSP KW4 PAS brackets: <ul style="list-style-type: none"> <li>• wind (280-60) mm – 3 pcs</li> <li>• load-bearing (280-120) mm mm – 3 pcs</li> </ul> BSP hanging elements: <ul style="list-style-type: none"> <li>• BSP KWRW (64x24x2) mm – 6 pcs</li> </ul> Vertical profile <ul style="list-style-type: none"> <li>• BSP KWR10 profile (40x60x1,75) mm</li> </ul> Horizontal profile <ul style="list-style-type: none"> <li>• BSP KWRW profile (64x24x2) mm</li> </ul> Fasteners <ul style="list-style-type: none"> <li>• self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal</li> </ul> | II <sub>kit</sub> <sup>1)</sup> and III <sub>kit</sub> <sup>2)</sup> |
| BSP KWRY kit    | BSP KW4 PAS brackets: <ul style="list-style-type: none"> <li>• wind (280-60) mm – 3 pcs</li> <li>• load-bearing (280-120) mm – 3 pcs</li> </ul> BSP hanging elements: <ul style="list-style-type: none"> <li>• BSP KWZ (99x18,5x3) mm – 6 pcs</li> </ul> Vertical profile <ul style="list-style-type: none"> <li>• BSP KWRY80 profile (99x80x2,0) mm</li> </ul> Fasteners <ul style="list-style-type: none"> <li>• self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal</li> </ul>  | II <sub>kit</sub> <sup>1)</sup> and III <sub>kit</sub> <sup>2)</sup> |

| Type of kit   | Description of tested kit  | Impact Categories according to EAD 090034-01-0404, Table G.2         |
|---|--|--|
| BSP KCS kit   | BSP KW4 PAS brackets: <ul style="list-style-type: none"> <li>• wind (280-60) mm – 2 pcs</li> <li>• load-bearing (280-120) mm – 2 pcs</li> </ul> BSP hanging elements: <ul style="list-style-type: none"> <li>• BSP KC3 (40x28x13) mm – 2 pcs</li> <li>• BSP KC4 (62x28x27) mm – 2 pcs</li> </ul> Vertical profile <ul style="list-style-type: none"> <li>• BSP KCL profile (46,7x72x2,5/1,8) mm</li> </ul> Fasteners <ul style="list-style-type: none"> <li>• self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal</li> </ul> | II <sub>kit</sub> <sup>1)</sup> and III <sub>kit</sub> <sup>2)</sup> |
| <sup>1)</sup> This Impact category is valid for kit where the only load-bearing brackets are used.<br><sup>2)</sup> This Impact category is valid for kit where the combination of wind and load-bearing brackets are used. |  |  |

The characteristic resistance of bracket to soft body impact determined by test(s) is valid for the following cases:

- bracket made of the same material, of the same construction itself, of the same construction of thermal isolator, with higher thickness of wing and flange, with the same or higher height of wing and flange, with the same or shorter wing;
- bracket made of material with higher strength, of the same construction itself, of the same construction of thermal isolator, with the same or higher height of wing and flange, with the same or higher thickness of wing and flange, with the same or shorter wing.

#### 3.4.5.9 Dimension and moment of inertia of bracket

The dimensions and moment of inertia of brackets were carried out in accordance with Cl. 2.2.7.9 of the EAD 090034-01-0404. The measurement of dimensions were carried out on the following representatives.

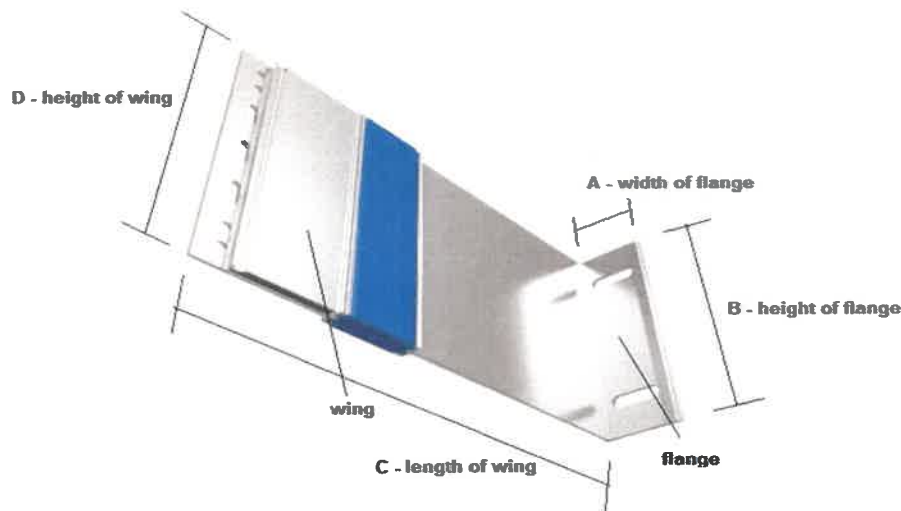


Figure 6: Description of bracket

Table 62: Average values of dimensions and moment of inertia of BSP KW4 PAS brackets

| BSP KW4 PAS brackets, load-bearing (280-120) mm |        |       |           |       |       |           |                |          |              |          |
|---|--------|-------|-----------|-------|-------|-----------|----------------|----------|--------------|----------|
| Part of bracket                                 | Flange |       |           | Wing  |       |           | Flange opening |          | Wing opening |          |
| Average value [mm]                              | A      | B     | Thickness | C     | D     | Thickness | Length         | Diameter | Length       | Diameter |
|   | 49,9   | 119,3 | 3,9       | 279,1 | 119,4 | 3,0       | 30,1           | 9,0      | 15,0         | 4,9      |
| Moment of inertia $J_x$ [mm <sup>4</sup> ]      | 432000 |       |           |       |       |           |                |          |              |          |

Table 63: Average values of dimensions and moment of inertia of BSP KW4 PAS brackets

| BSP KW4 PAS brackets, load-bearing (220-120) mm |        |       |           |       |       |           |                |          |              |          |
|---|--------|-------|-----------|-------|-------|-----------|----------------|----------|--------------|----------|
| Part of bracket                                 | Flange |       |           | Wing  |       |           | Flange opening |          | Wing opening |          |
| Average value [mm]                              | A      | B     | Thickness | C     | D     | Thickness | Length         | Diameter | Length       | Diameter |
|   | 50,0   | 120,4 | 3,9       | 218,6 | 120,2 | 3,1       | 30,0           | 9,0      | 15,0         | 4,9      |
| Moment of inertia $J_x$ [mm <sup>4</sup> ]      | 432000 |       |           |       |       |           |                |          |              |          |

Table 64: Average values of dimensions and moment of inertia of BSP KW4 PAS brackets

| BSP KW4 PAS brackets, wind (280-60) mm     |        |      |           |       |      |           |                |          |              |          |
|--|--------|------|-----------|-------|------|-----------|----------------|----------|--------------|----------|
| Part of bracket                            | Flange |      |           | Wing  |      |           | Flange opening |          | Wing opening |          |
| Average value [mm]                         | A      | B    | Thickness | C     | D    | Thickness | Length         | Diameter | Length       | Diameter |
|  | 49,9   | 59,1 | 3,9       | 279,0 | 59,5 | 3,0       | 30,0           | 9,0      | 14,9         | 5,0      |
| Moment of inertia $J_x$ [mm <sup>4</sup> ] | 54000  |      |           |       |      |           |                |          |              |          |

Table 65: Average values of dimensions and moment of inertia of BSP KW4 PAS brackets

| BSP KW4 PAS brackets, wind (220-60) mm     |        |      |           |       |      |           |                |          |              |          |
|--|--------|------|-----------|-------|------|-----------|----------------|----------|--------------|----------|
| Part of bracket                            | Flange |      |           | Wing  |      |           | Flange opening |          | Wing opening |          |
| Average value [mm]                         | A      | B    | Thickness | C     | D    | Thickness | Length         | Diameter | Length       | Diameter |
|  | 50,0   | 59,9 | 3,9       | 217,9 | 59,7 | 3,1       | 30,0           | 9,0      | 15,0         | 5,0      |
| Moment of inertia $J_x$ [mm <sup>4</sup> ] | 54000  |      |           |       |      |           |                |          |              |          |

Table 66: Average values of diameter of BSP KWE brackets

| BSP KWE brackets               |                                |
|--------------------------------|--------------------------------|
| Type of bracket                | Average value of diameter [mm] |
|                                | Horizontal                     |
| Load-bearing (rod M10, 200 mm) | 9,8                            |
| Load-bearing (rod M12, 250 mm) | 11,7                           |
| Load-bearing (rod M14, 350 mm) | 13,7                           |
| Wind (rod M8, 250 mm)          | 7,8                            |
| Wind (rod M12, 350 mm)         | 11,7                           |

### 3.4.6 Characteristic of the plastic or the composite material

#### 3.4.6.1 Fibre content in composite material

No performance assessed.

#### 3.4.6.2 Vicat softening temperature

The Vicat softening temperature was carried out in accordance with Cl. 2.2.8.2 of the EAD 090034-01-0404.

Table 67: Vicat softening temperature

| Type                     | Vicat softening temperature [°C] |
|--------------------------|----------------------------------|
| Plastic part of brackets | 119                              |

#### 3.4.6.3 Modulus of elasticity in tension of composite bracket

No performance assessed.

### 3.4.7 Shear resistance to load of connection of profile to bracket or to profile

#### 3.4.7.1 Shear resistance to vertical load

The shear resistance to vertical load was tested in accordance with Cl. 2.2.9.1 of the EAD 090034-01-0404.

The description of test specimens:

- BSP KW4 PAS brackets, load-bearing (280-120) mm, self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal – 2 pcs

Table 68: Average and characteristic values of shear resistance to vertical load – BSP KW4 PAS brackets

| BSP passive bracket type KW4 PAS (group 2) |               |               |
|--|---------------|---------------|
| Type of bracket                            | $V_{m,v}$ [N] | $V_{k,v}$ [N] |
| Load-bearing (280-120) mm                  | 2136          | 1896          |

- BSP KWE brackets, load-bearing (rod M10, length 200 mm) self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal – 8 pcs

Table 69: Average and characteristic values of shear resistance to vertical load – BSP bracket type KWE

| BSP KWE brackets (group 4)            |               |               |
|---------------------------------------|---------------|---------------|
| Type of bracket                       | $V_{m,v}$ [N] | $V_{k,v}$ [N] |
| Load-bearing (rod M10, length 200 mm) | 3615          | 3140          |

The characteristic shear resistance to vertical load determined by test(s) is valid for the following cases:

- combination of the same bracket and the same profile, with higher number of the same type of fasteners;
- combination of stronger bracket (e.g. higher thickness of wall of wing or bracket made of material with higher strength) and of the same profile, with the same or higher number of the same type of fasteners;
- combination of the same bracket and of stronger profile (e.g. with higher thickness of wall or profile made of material with higher strength), with the same or higher number of the same type of fasteners;
- combination bracket(s) and profile(s) mentioned above, with the same or higher number of stronger type of fasteners (i.e. made of the same material, but with higher diameter).

#### 3.4.7.2 Shear resistance to horizontal load

The shear resistance to horizontal load was tested in accordance with Cl. 2.2.9.2 of the EAD 090034-01-0404. The maximal length of wing brackets was tested.

The description of test specimens:

- BSP KW4 PAS brackets, wind (280-60) mm, self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal – 2 pcs, aluminium T-profile KWR1 (120x70x2) mm

Table 70: Average and characteristic values of shear resistance to horizontal load – BSP KW4 PAS brackets

| BSP KW4 PAS brackets (group 2) |               |               |
|--------------------------------|---------------|---------------|
| Type of bracket                | $V_{m,h}$ [N] | $V_{k,h}$ [N] |
| Load-bearing (280-120) mm      | 8475          | 7947          |

- BSP KW4 PAS brackets, wind (280-60) mm, self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal – 2 pcs, aluminium T-profile KWR1 (120x70x2) mm

Table 71: Average and characteristic values of shear resistance to horizontal load – BSP KW4 PAS brackets

| <b>BSP KW4 PAS brackets (group 2)</b> |                                 |                                 |
|---------------------------------------|---------------------------------|---------------------------------|
| <b>Type of bracket</b>                | <b><math>V_{m,H}</math> [N]</b> | <b><math>V_{k,H}</math> [N]</b> |
| Wind (280-60) mm                      | 4446                            | 4072                            |

- BSP KWE brackets, wind (rod M8, length 250 mm) mm, self-drilling stainless steel screws (4,8 x 19) mm with stainless steel washer with EPDM seal – 2 pcs

Table 72: Average and characteristic values of shear resistance to horizontal load – BSP bracket type KWE

| <b>BSP KWE brackets (group 4)</b> |                                 |                                 |
|-----------------------------------|---------------------------------|---------------------------------|
| <b>Type of bracket</b>            | <b><math>V_{m,H}</math> [N]</b> | <b><math>V_{k,H}</math> [N]</b> |
| Wind (rod M8, length 250 mm)      | 3589                            | 3374                            |

The characteristic shear resistance to horizontal load determined by test(s) is valid for the following cases:

- combination of the same bracket and the same profile, with higher number of the same type of fasteners;
- combination of stronger bracket (e.g. higher thickness of wall of wing or bracket made of material with higher strength) and of the same profile, with the same or higher number of the same type of fasteners;
- combination of the same bracket and of stronger profile (e.g. profile of the same or higher moment of inertia and with higher thickness of wall or profile of same or higher moment of inertia made of material with higher strength), with the same or higher number of the same type of fasteners;
- combination bracket(s) and profile(s) mentioned above, with the same or higher number of stronger type of fasteners (i.e. made of the same material, but with higher diameter).

### 3.4.8 Resistance to the corrosion

#### 3.4.8.1 Resistance of metallic parts, based on choice of material

The resistance of metallic parts, based on choice of material was determined in accordance with Cl. 2.2.10.1 of the EAD 090034-01-0404.

The field of application of purely metal subframe as category of corrosivity of atmosphere according to EN ISO 9223, Annex C are C1, C2, C3, C4 and C5.

Stainless steel or aluminium grade of individual components are given in Tables 1 – 10 and Annex A.

In extended application, resistance to corrosion of metallic parts, based on choice of material, is valid for the all metallic materials with the same or better standardized specification of corrosion resistance.

#### 3.4.8.2 Resistance of metallic parts, based on their additional coating

No performance assessed.

### 3.5 Protection against noise (BWR 5)

No performance assessed.

### 3.6 Energy economy and heat retention (BWR 6)

No performance assessed.

### 3.7 Sustainable use of natural resources (BWR 7)

No performance assessed

#### **4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base**

According to the European Commission decision 2003/640/EC, the **AVPC system 2+** (further described in Annex V to Regulation (EU) No. 305/2011 as amended) applies.

#### **5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD**

The manufacturer shall perform a permanent internal factory production control based on the control plan. The Control Plan specifies the type, test method, criteria and frequency of tests conducted on the final product.

The control plan for the manufacturer/corner stones (factory production control) is specified in Cl. 3.2 of EAD 090034-01-0404 Kit composed by subframe and fixings for fastening of cladding and external wall elements. Manufacturer and Technical and Test Institute for Construction Prague have agreed a control plan which is deposited with the Technical and Test Institute for Construction Prague in documentation which accompanies the ETA.

Issued in Prague on 11.09.2022

**Ing. Jiří Studnička, Ph.D.**

Head of the Technical Assessment Body



Annexes:

Annex A: Drawings and dimensions of individual components of system

Annex B: Quality control of components of kits manufactured by suppliers or holder

## Annex A: Description and characteristics of individual components of system

### Brackets

The load-bearing or wind brackets are elements used as load transmission between the subframe and the substrate wall. The brackets are made of:

- BSP KW4 PAS bracket – aluminium alloy, type EN AW 6060 T66 or T6 or EN AW 6063 T66 or T6 and plastic chamber separator is made of polycarbonate mixed with Acrylonitrile Butadiene Styrene (PC-ABS).
- BSP KW1 bracket – aluminium alloy, type EN AW 6060 T66 or T6 or EN AW 6063 T66 or T6
- BSP KWE bracket – stainless steel rods and nuts, type AISI304 or AISI 316 and aluminium profiles and brackets, type EN AW 6060 T66 or T6 or EN AW 6063 T66 or T6

| Format BSP KW4 PAS bracket [mm] |       |
|---------------------------------|-------|
| Length of bracket               | ≤ 280 |
| Height of wind bracket          | ≥ 60  |
| Height of load-bearing bracket  | ≥ 120 |
| Thickness                       | ≥ 3   |
| Width of flange                 | 50    |

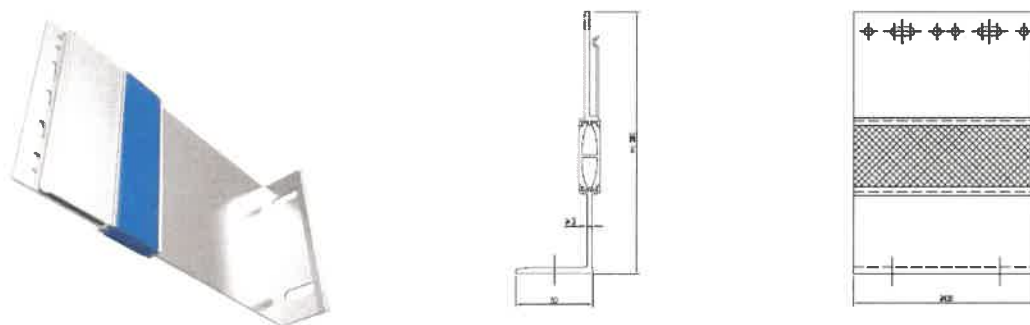


Figure A.1: BSP KW4 PAS bracket – load-bearing

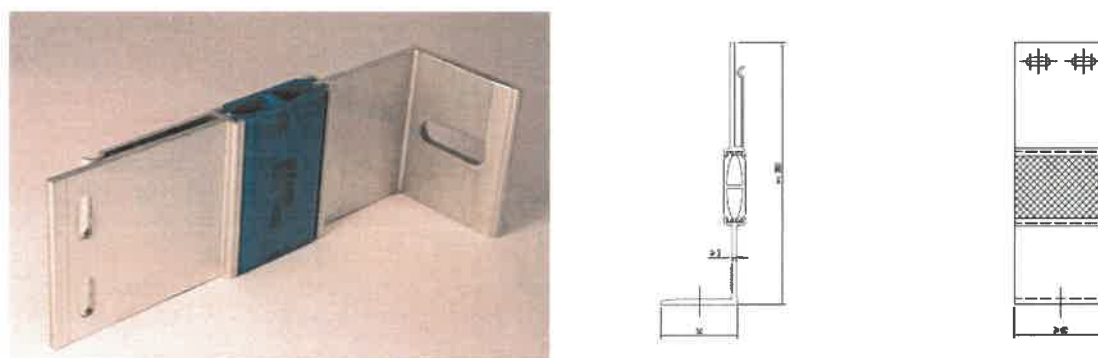


Figure A.2: BSP KW4 PAS bracket – wind

| Format BSP KW1 bracket [mm]    |       |
|--------------------------------|-------|
| Length of bracket              | ≤ 310 |
| Height of wind bracket         | ≥ 60  |
| Height of load-bearing bracket | ≥ 120 |
| Thickness                      | ≥ 4   |
| Width of flange                | 59    |



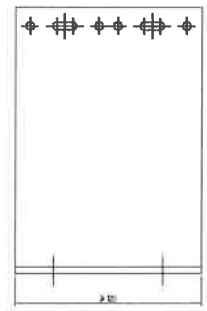
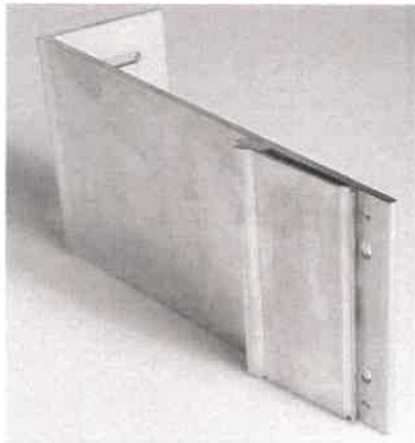


Figure A.3: BSP KW1 bracket – load-bearing



Figure A.4: BSP KW1 bracket – wind

| Format of BSP KWE bracket [mm] |  |       |
|--------------------------------|--|-------|
| Length of bracket              |  | ≤ 350 |
| Diameter of rod                |  | ≥ M 8 |
| Height of wind bracket         |  | ≥ 40  |
| Height of load-bearing bracket |  | ≥ 75  |
| Thickness                      |  | ≥ 2   |
| Width of flange                |  | 44,5  |

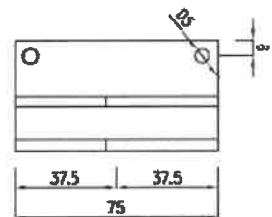
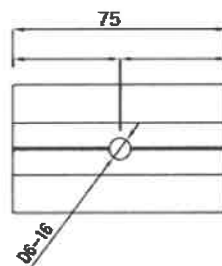
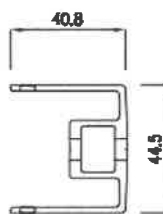


Figure A.5: BSP KWE bracket - load-bearing

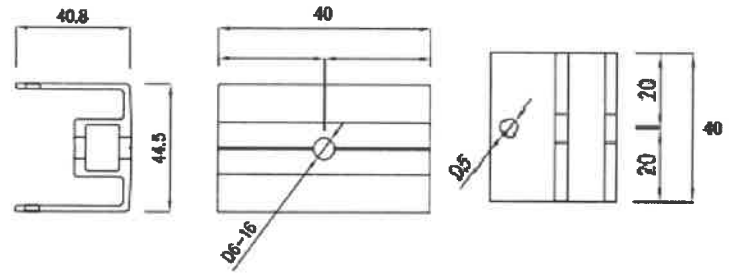
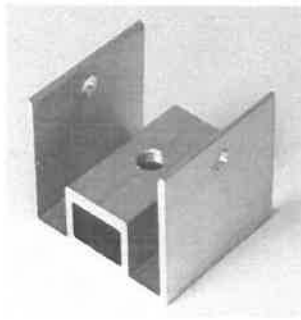


Figure A.6: BSP KWE bracket - wind

### Vertical and horizontal profile

The vertical and horizontal profiles are used to fix cladding elements by means fixing devices. The vertical and horizontal profiles are made of extruded aluminium alloy EN AW 6060 T66 or T6 or EN AW 6063 T66 or T6.

Type of vertical and horizontal profiles:

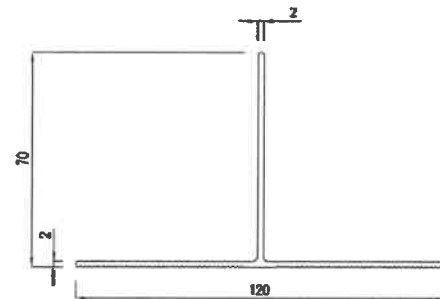
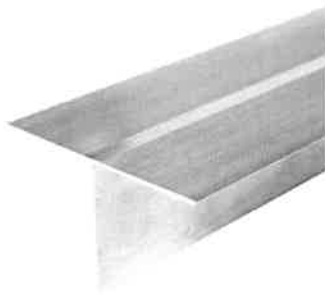


Figure A.7: Vertical T-profile BSP KWR1

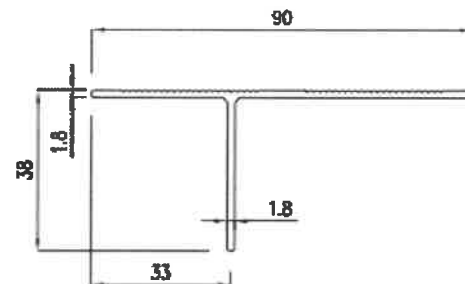


Figure A.8: Vertical T-profile BSP KWR8

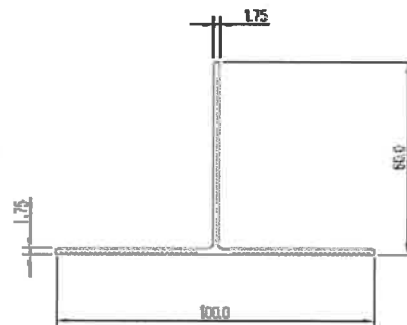
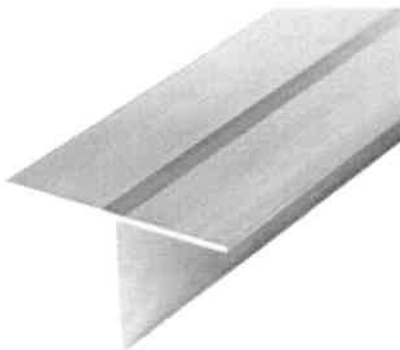


Figure A.9: Vertical T-profile BSP KWR9

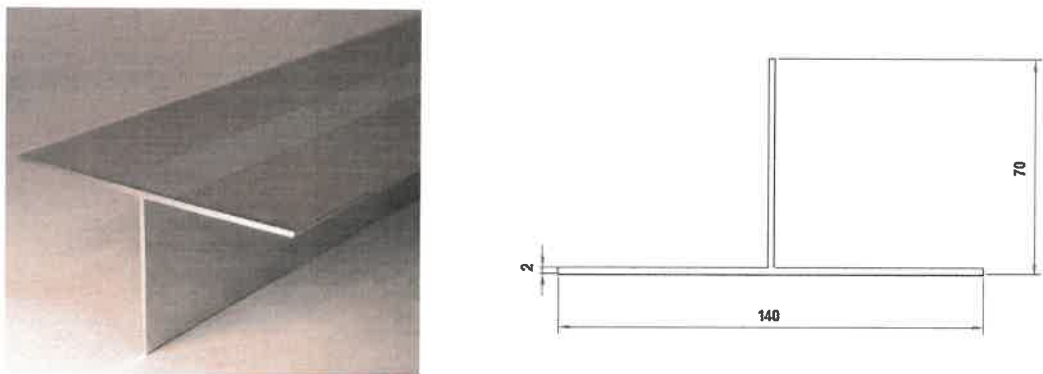


Figure A.10: Vertical T-profile BSP KWR12

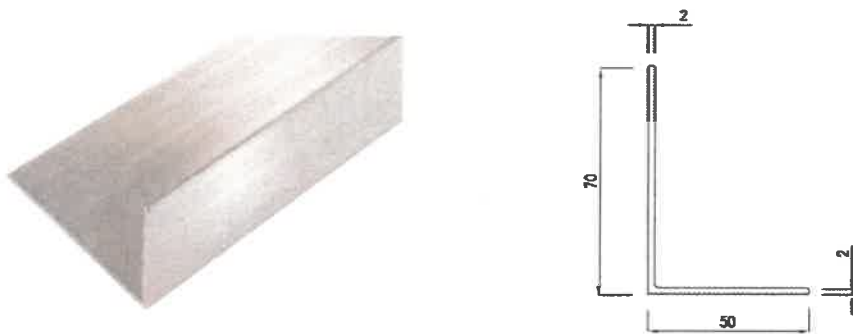


Figure A.11: Vertical L-profile BSP KWR2

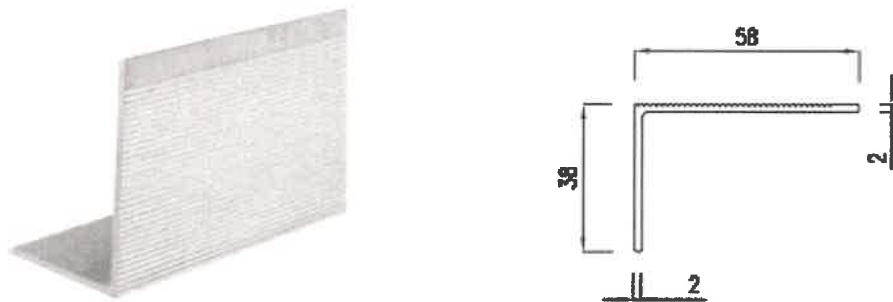


Figure A.12: Vertical L-profile BSP KWR5



Figure A.13: Vertical L-profile BSP KWR7

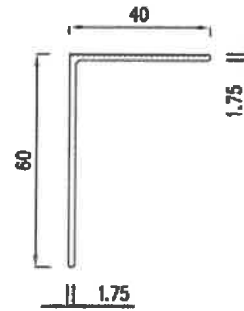


Figure A.14: Vertical L-profile BSP KWR10

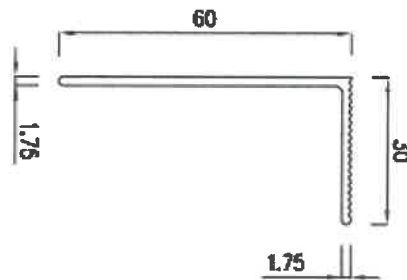


Figure A.15: Vertical L-profile BSP KWR11

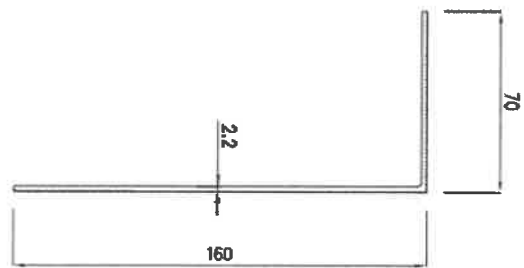


Figure A.16: Vertical L-profile BSP KWRG

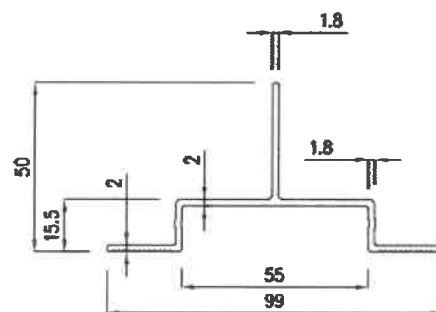
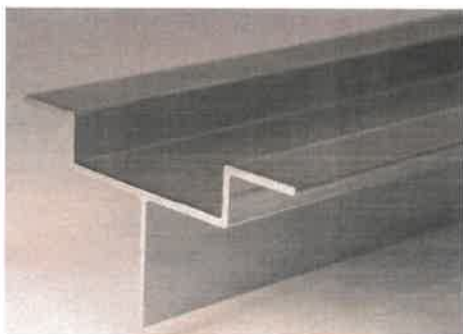


Figure A.17: Vertical profile BSP KWR50

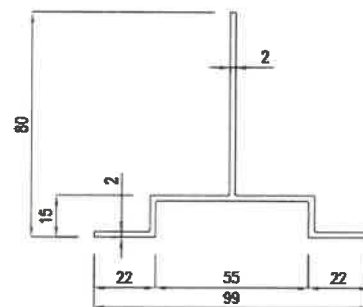
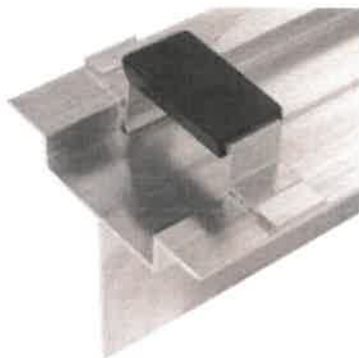


Figure A.18: Vertical profile BSP KWR80

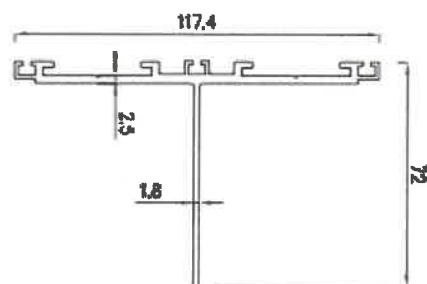
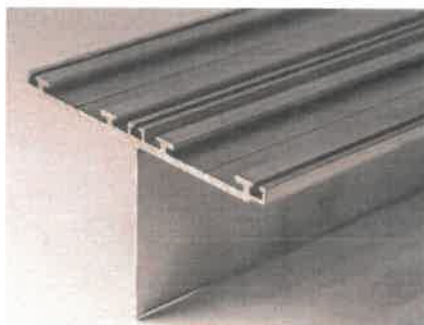


Figure A.19: Vertical profile BSP KCT

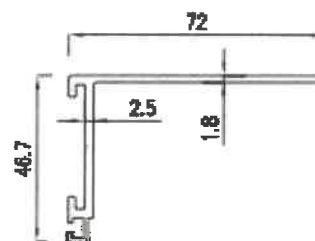


Figure A.20: Vertical profile BSP KCL

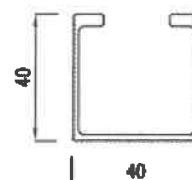
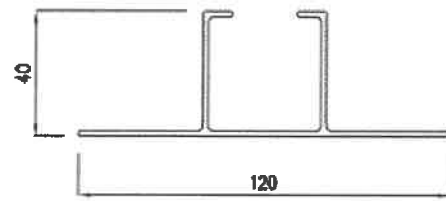
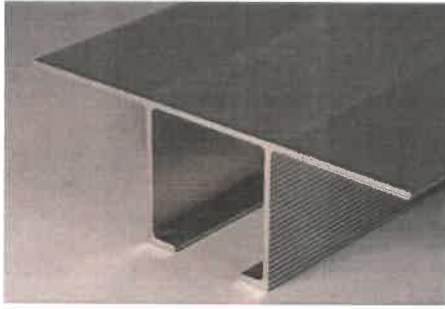
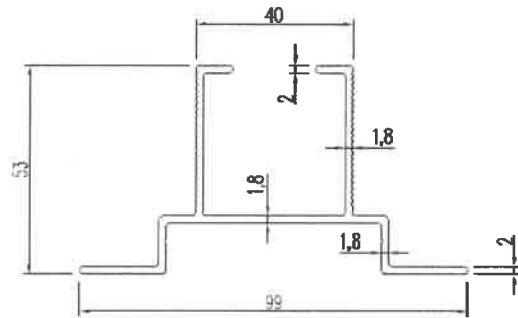
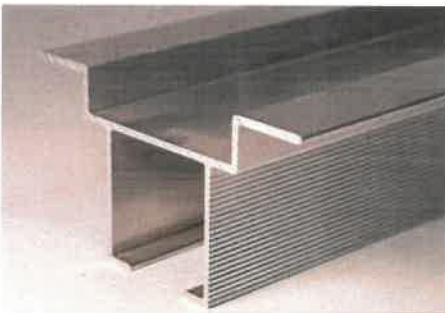


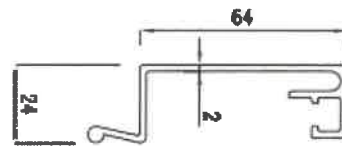
Figure A.21: Vertical profile BSP KWRC



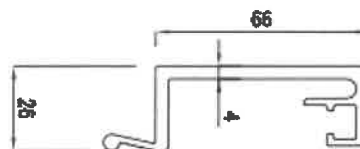
**Figure A.22: Vertical profile BSP KWRP**



**Figure A.23: Vertical profile BSP KWRCY**



**Figure A.24: Horizontal profile BSP KWRW**



**Figure A.25: Horizontal profile BSP KWRZ**

### Hanging element

The hanging element are profiles, which fix skin elements to the subframe specifically to the horizontal or vertical profiles. The hanging elements are made of extruded aluminium alloy EN AW 6060 T66 or T6 or EN AW 6063 T66 or T6.

Type of hanging element:

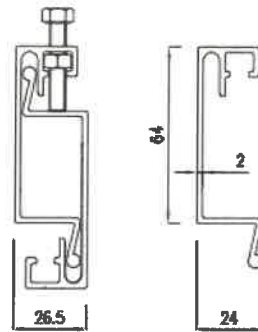


Figure A.26: Hanging element – BSP KWRW

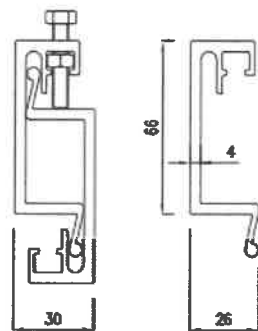


Figure A.27: Hanging element – BSP KWRZ

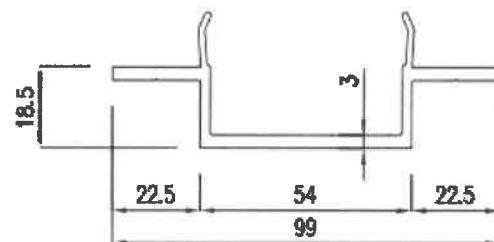


Figure A.28: Hanging element – BSP KWZ

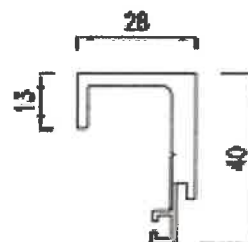


Figure A.29: Hanging element – BSP KC3

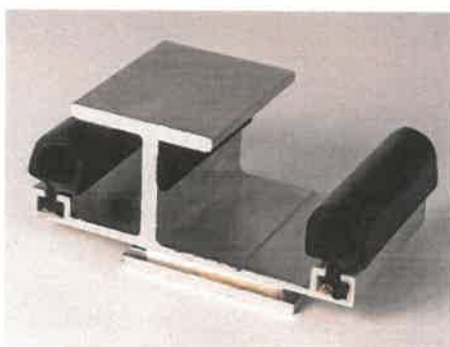


Figure A.30: Hanging element – BSP KC4

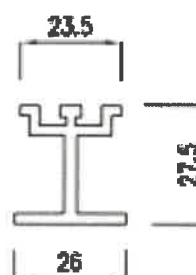


Figure A.31: Hanging element – BSP KC5

#### **Fasteners between vertical or horizontal profile, brackets and hanging element**

The vertical or horizontal profiles are fixed to bracket by fasteners – self-drilling screws, type (4,8x19) mm made of stainless steel A2 or A4 or AISI 410 steel, fitted with hexagonal head with stainless steel washer with or without EPDM seal. These fasteners can be used for fixing of hanging elements to the vertical or horizontal profiles too.



Figure A.32 Self-drilling screws, type (4,8x19) mm with stainless steel washer with EPDM seal



**Annex B: Quality control of components of kits manufactured by suppliers or holder**

This confidential information is not included in the ETA when that assessment is publicly available.