



**INSTYTUT TECHNIKI BUDOWLANEJ**  
PL 00-611 WARSZAWA  
ul. Filtrowa 1  
tel.: (+48 22) 825-04-71  
(+48 22) 825-76-55  
fax: (+48 22) 825-52-86  
[www.itb.pl](http://www.itb.pl)



## European Technical Assessment

**ETA-16/0716  
of 29/09/2016**

### General Part

**Technical Assessment Body issuing the European Technical Assessment**

Instytut Techniki Budowlanej

**Trade name of the construction product**

MRP<sup>®</sup> types: KW, KB, KK, KS, KM, KL, KR, KP, WB, LK, PS, PSP

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

Three-dimensional nailing plates

**Manufacturer**

MARCOPOL Sp. z o.o. Producent Śrub  
ul. Oliwska 100, 80-209 Chwaszczyno,  
Poland

**Manufacturing plant**

MARCOPOL Sp. z o.o. Producent Śrub  
Oliwska 100, 80-209 Chwaszczyno,  
Poland

**This European Technical Assessment contains**

23 pages including 2 Annexes which form an integral part of this Assessment

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

Guideline for European Technical Approval ETAG 015, Edition November 2012 "Three-dimensional nailing plates", used as European Assessment Document (EAD)

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## Specific Part

### 1 Technical description of the product

The three-dimensional nailing plates MRP<sup>®</sup> are one-piece, non-welded elements (KW, KB, KK, KS, KM, KL, KR, KP, WB, LK), made of hot-dip zinc coated steel sheet grade DX51D+Z275 or S250GD+Z275 according to EN 10346 (minimum yield strength  $R_e = 250$  MPa, minimum tensile strength  $R_m = 330$  MPa) and welded elements (PS, PSP), made of steel grade S235JR according to EN 10025-2 (minimum yield strength  $R_e = 235$  MPa, minimum tensile strength  $R_m = 360$  MPa) with minimum 40  $\mu\text{m}$  of zinc layer.

The range of the MRP<sup>®</sup> three-dimensional nailing plates is given in Annex A. The characteristic material values, dimensions and tolerances of the three-dimensional nailing plates not indicated in that Annex shall correspond to the respective values laid down in the technical documentation of this European Technical Assessment. The dimension tolerances shall meet the requirements of EN 22768-1.

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

The MRP<sup>®</sup> three-dimensional nailing plates are intended to be used for connecting the mutually perpendicular, load-bearing, solid timber elements, in side-grain to side-grain configurations, in joints for which requirements for mechanical resistance and stability in the sense of the basic work requirement 1 of Regulation (EU) No 305/2011 shall be fulfilled.

Ring shank nails according to EN 14592 with the diameter of 4 mm and characteristic axial withdrawal capacity  $F_{ax,Rk}$  not less than 1,70 kN shall be used for connections made with the MRP<sup>®</sup> three-dimensional nailing plates.

In respect of the requirements concerning corrosion resistance, MRP<sup>®</sup> three-dimensional nailing plates can be used in timber structures subject to the internal conditions defined by service classes 1 and 2 according to EN 1995-1-1 (Eurocode 5).

The provisions made in this European Technical Assessment are based on an assumed working life of the three-dimensional nailing plates of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer or the Technical Assessment Body, but should only be regarded as means for choosing the right products in relation to the expected economically reasonable working life of the works.

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

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

##### **3.1.1 Strength**

The characteristic load-carrying capacities of joints loaded according to static diagrams (see Annex B), determined by tests carried out according to ETAG 015, clause 5.1.3, are given in Annex B. The characteristic load-carrying capacities of joints for other load directions shall be calculated on the basis of EN 1995-1-1 (Eurocode 5) or according to national regulations. The design values shall be determined according to EN 1995-1-1 (Eurocode 5).

##### **3.1.2 Stiffness**

No performance assessed.

##### **3.1.3 Ductility in cyclic testing**

No performance assessed.

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

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

The steel elements are classified as class A1 of reaction to fire (non-combustible products) in accordance with EN 13501-1 and to European Commission Decision 96/603/EC amended by European Commission Decision 2000/605/EC.

##### **3.2.2 Resistance to fire**

No performance assessed.

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

Regarding the dangerous substances, there may be requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

#### **3.4 Sustainable use of natural resources (BWR 7)**

No performance assessed.

#### **3.5 General aspects**

The MRP® three-dimensional nailing plates durability and serviceability have been assessed satisfactory when used in conditions defined by service classes 1 and 2 according to EN 1995-1-1 (Eurocode 5).

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

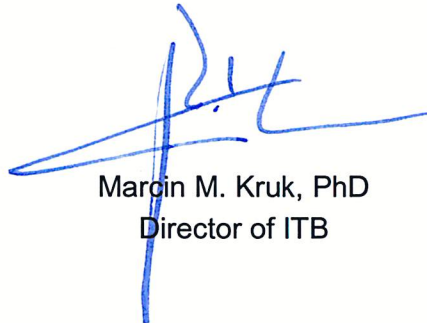
According to Decision 97/638/EC of the European Commission the system 2+ of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) applies.

**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document (EAD)**

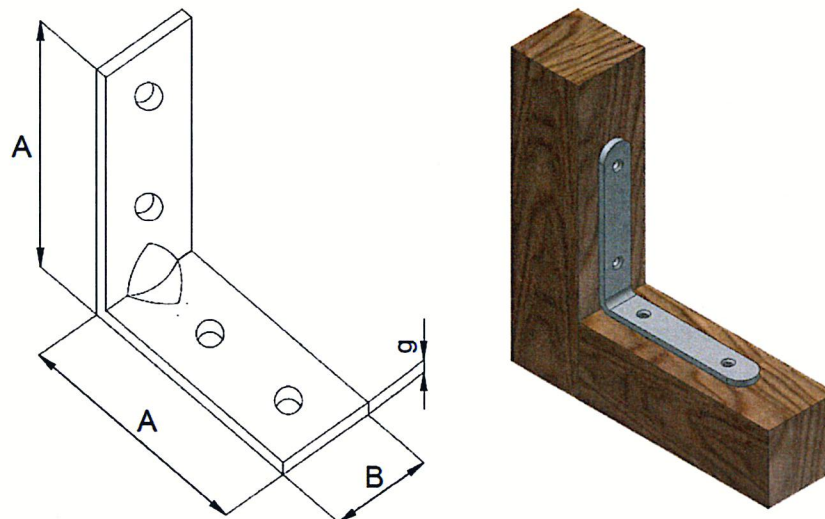
Technical details necessary for the implementation of the AVCP system are laid down in the control plan which is deposited at Instytut Techniki Budowlanej.

For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 29/09/2016 by Instytut Techniki Budowlanej



Marcin M. Kruk, PhD  
Director of ITB

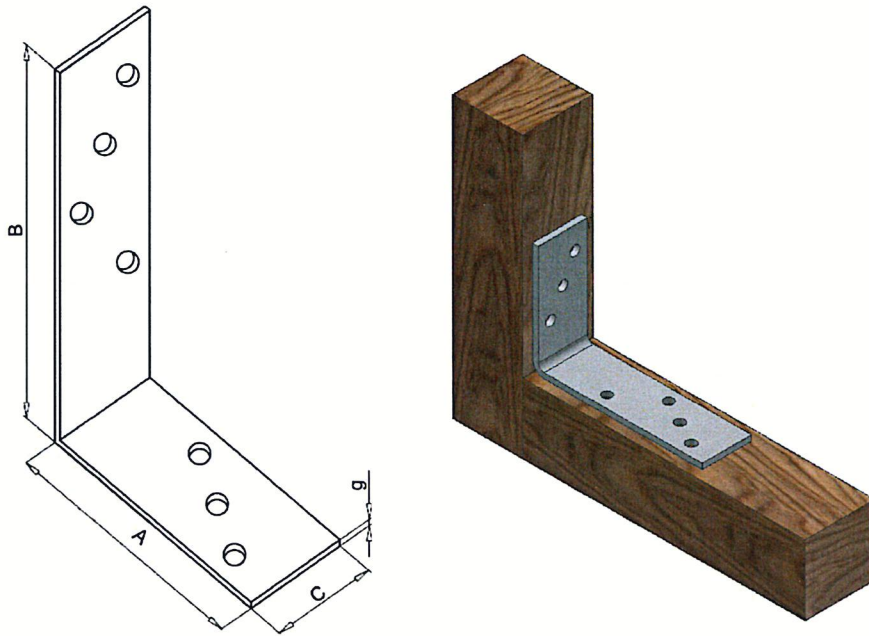


Symbol	A, mm ( $\pm 1,0$ mm)	B, mm ( $\pm 1,0$ mm)	g, mm ( $\pm 0,05$ mm)	Number of holes, $\varnothing 5,0 \pm 0,5$ mm
KW1	25	17	2,0	4 x $\varnothing 5,0$
KW2	40	17	2,0	4 x $\varnothing 5,0$
KW3	50	17	2,0	4 x $\varnothing 5,0$
KW4	75	17	2,0	4 x $\varnothing 5,0$
KW5	100	20	4,0	4 x $\varnothing 5,0$
KW6	125	20	4,0	4 x $\varnothing 5,0$
KW7	150	25	5,0	4 x $\varnothing 5,0$
KW2/A	30	15	2,0	4 x $\varnothing 5,0$
KW4/A	80	15	2,5	4 x $\varnothing 5,0$
KW5/A	60	17	2,0	4 x $\varnothing 5,0$

**MRP®**

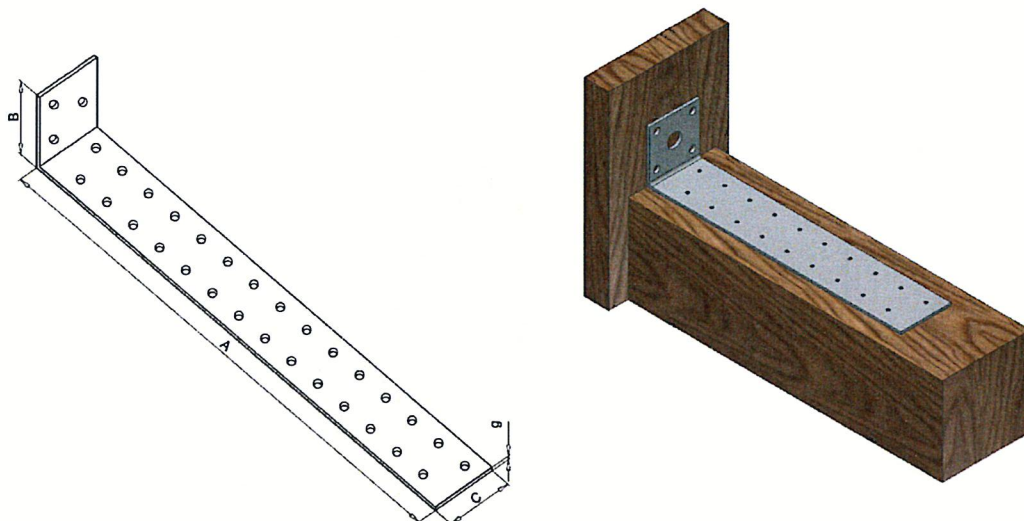
**Product description**  
KW1 ÷ KW7, KW2/A, KW4/A, KW5/A

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Symbol	A, mm (± 1,0 mm)	B, mm (± 1,0 mm)	C, mm (± 1,0 mm)	g, mm (± 0,05 mm)	Number of holes, Ø 4,5 ± 0,5 mm
KB1	100	75	30	3,0	5 x Ø 4,5
KB2	120	80	35	3,5	7 x Ø 4,5
KB3	180	120	40	5,0	8 x Ø 4,5

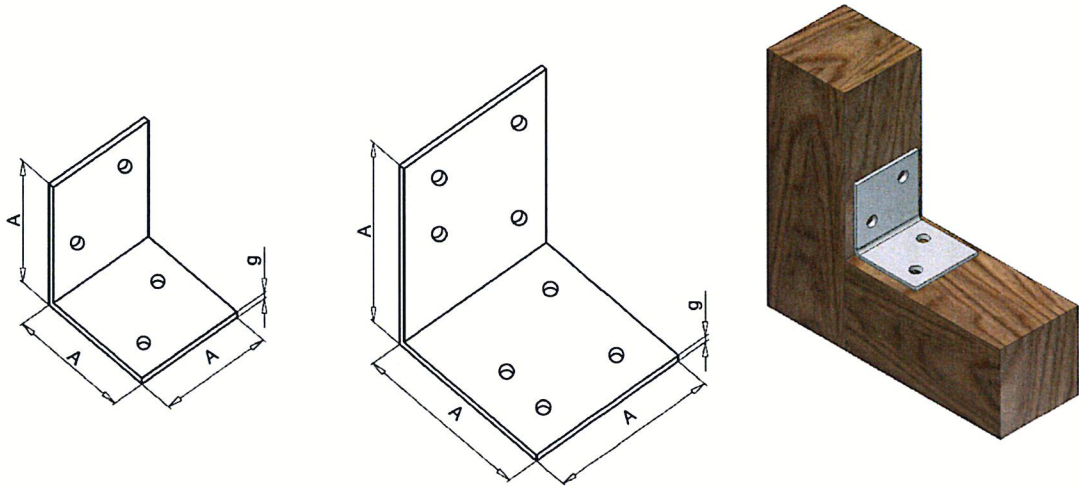
<b>MRP®</b>	<b>Annex A2</b> of European Technical Assessment ETA-16/0716
<b>Product description</b> KB1, KB2, KB3	



Symbol	A, mm (± 1,0 mm)	B, mm (± 1,0 mm)	C, mm (± 1,0 mm)	g, mm (± 0,05 mm)	Number of holes, Ø 5,0 ± 0,5 mm
KK1	200	40	40	2,0	22 x Ø 5,0
KK2	300	40	40	2,0	32 x Ø 5,0
KK3	400	40	40	2,0	42 x Ø 5,0

<b>MRP®</b>	<b>Annex A3</b> of European Technical Assessment ETA-16/0716
<b>Product description</b> KK1, KK2, KK3	



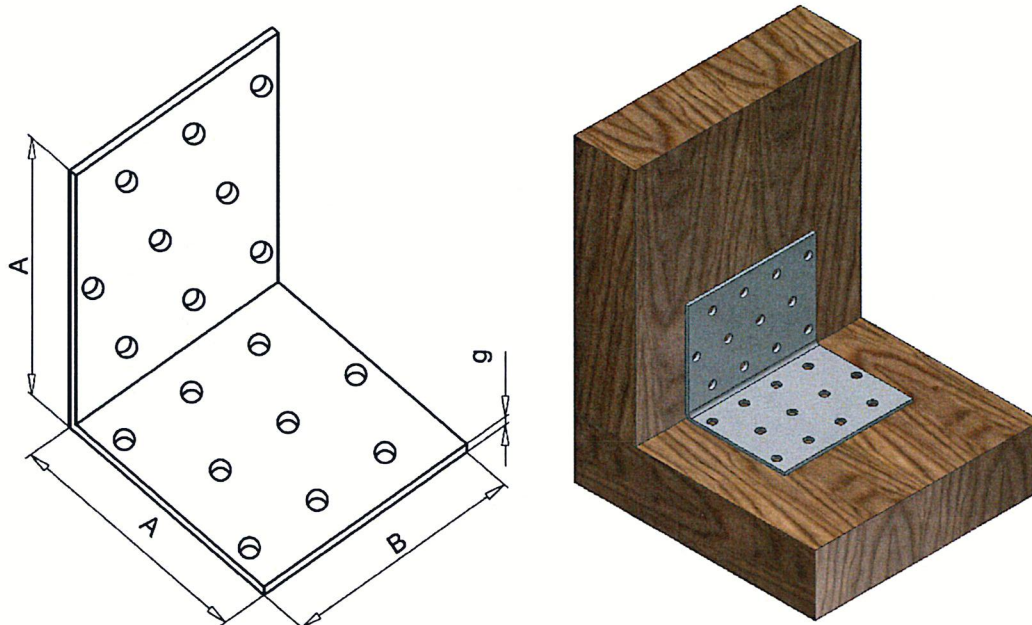


Symbol	A, mm (± 1,0 mm)	g, mm (± 0,05 mm)	Number of holes, Ø 4,5 ± 0,5 mm Ø 6,5 ± 0,5 mm
KS1	30	2,0	4 x Ø 4,5 / Ø 6,5
KS2	40	2,0	4 x Ø 4,5 / Ø 6,5
KS3	60	2,0	8 x Ø 4,5 / Ø 6,5

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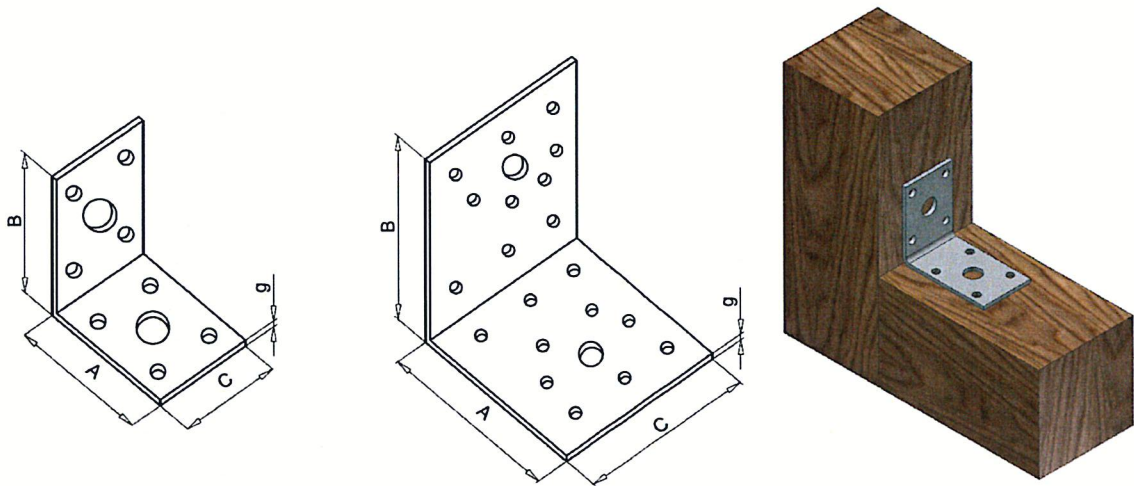
**Product description**  
KS1, KS2, KS3

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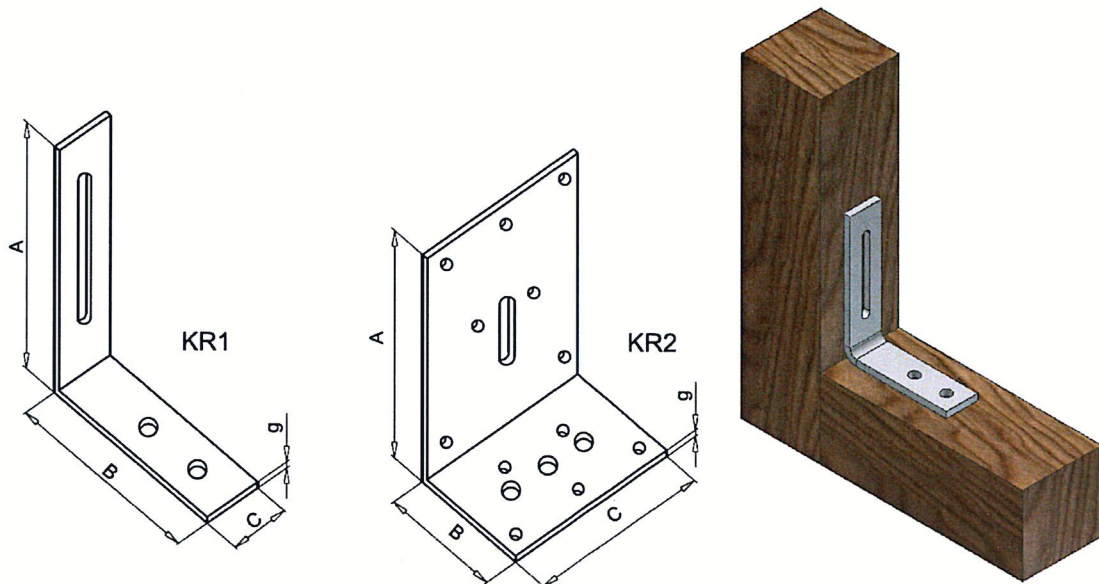
Symbol	A, mm (± 1,0 mm)	B, mm (± 1,0 mm)	g, mm (± 0,05 mm)	Number of holes, Ø 5,0 ± 0,5 mm
KM1	40	40	2,0	8 x Ø 5,0
KM2	40	60	2,0	12 x Ø 5,0
KM3	60	40	2,0	12 x Ø 5,0
KM4	60	60	2,0	18 x Ø 5,0
KM5	60	80	2,0	24 x Ø 5,0
KM6	60	100	2,0	30 x Ø 5,0
KM7	80	40	2,0	16 x Ø 5,0
KM8	80	60	2,0	24 x Ø 5,0
KM9	80	80	2,0	32 x Ø 5,0
KM10	80	100	2,0	40 x Ø 5,0
KM11	100	60	2,0	30 x Ø 5,0
KM12	100	80	2,0	40 x Ø 5,0
KM13	100	100	2,0	50 x Ø 5,0
KM14	40	100	2,0	20 x Ø 5,0
KM15	40	200	2,0	40 x Ø 5,0
KM16	90	40	2,0	16 x Ø 5,0
KM17	60	160	2,0	48 x Ø 5,0

<b>MRP®</b>	<b>Annex A5</b> of European Technical Assessment ETA-16/0716
<b>Product description</b> KM1 ÷ KM17	



Symbol	A, mm (± 1,0 mm)	B, mm (± 1,0 mm)	C, mm (± 1,0 mm)	g, mm (± 0,05 mm)	Number of holes, Ø 5,0 ± 0,5 mm Ø 10,5 ± 0,5 mm	Number of holes, Ø 6,5 ± 0,5 mm Ø 14,0 ± 0,5 mm
KL1	50	50	35	2,5	8 x Ø 5,0; 2 x Ø 10,5	-
KL2	70	70	55	2,5	20 x Ø 5,0; 2 x Ø 10,5	-
KL3	50	150	35	2,5	16 x Ø 5,0; 4 x Ø 10,5	-
KL4	90	90	65	2,5	16 x Ø 5,0; 2 x Ø 10,5	12 x Ø 6,5
KL5	105	105	90	2,5	36 x Ø 5,0	2 x Ø 14,0
KL6	50	160	40	2,5	16 x Ø 5,0; 4 x Ø 10,5	-
KL7	90	90	40	2,5	16 x Ø 5,0; 4 x Ø 10,5	-

<b>MRP®</b>	<b>Annex A6</b> of European Technical Assessment ETA-16/0716
<b>Product description</b> KL1 ÷ KL7	

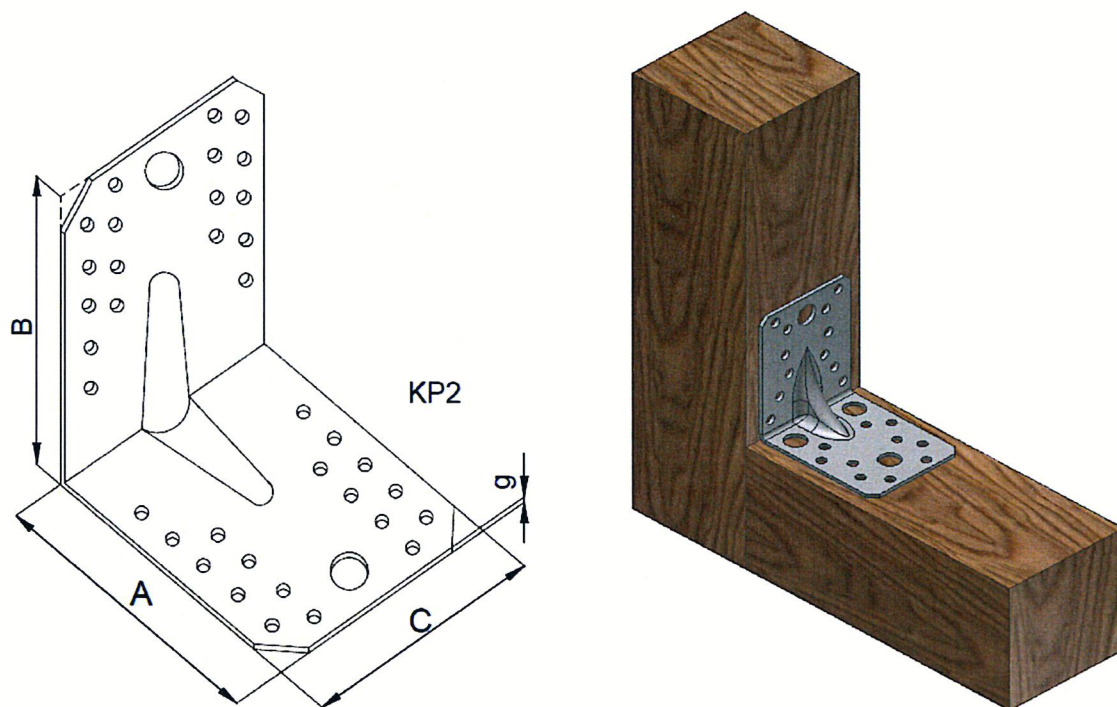


Symbol	A, mm (±1,0 mm)	B, mm (± 1,0 mm)	C, mm (± 1,0 mm)	g, mm (± 0,05 mm)	Number of holes Ø 5,0 ± 0,5 mm Ø 6,5 ± 0,5 mm Ø 9,0 ± 0,5 mm Ø 10,5 ± 0,5 mm	Hole size, mm (± 0,05 mm)
KR1	80	65	20	4,0	2 x Ø 6,5	1 x (5,0 x 40)
KR2	60	40	60	2,5	12 x Ø 5,0; 2 x Ø 9,0 1 x Ø 10,5	1x (11 x 30)
KR3	70	50	60	2,5	10 x Ø 5,0	1 x (12 x 20) 1 x (10 x 40)
KR4	135	65	85	4,0	10 x Ø 5,0	1 x (12 x 20) 1 x (10 x 40)

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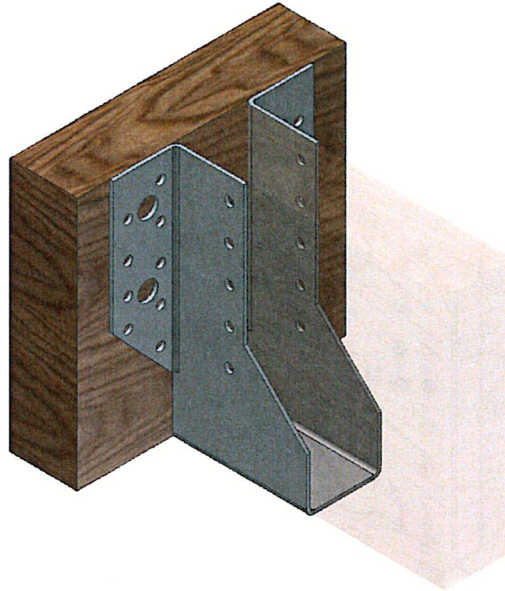
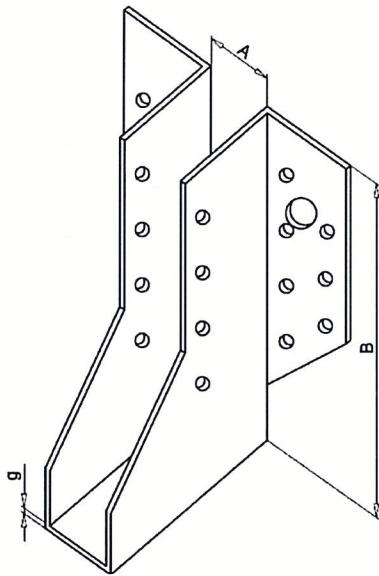
Product description  
KR1 ÷ KR4

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Symbol	A, mm (± 1,0 mm)	B, mm (± 1,0 mm)	C, mm (± 1,0 mm)	g, mm (± 0,05 mm)	Number of holes Ø 5,0 ± 0,5 mm Ø 6,5 ± 0,5 mm	Number of holes Ø 8,5 ± 0,5 mm Ø 10,5 ± 0,5 mm Ø 14,0 ± 0,5 mm
KP1	90	90	65	2,5	12 x Ø 5,0 12 x Ø 6,5	4 x Ø 10,5
KP2	105	105	90	2,5	36 x Ø 5,0	2 x Ø 14,0
KP3	90	50	55	2,5	20 x Ø 5,0	2 x Ø 10,5
KP4	70	70	55	2,5	20 x Ø 5,0	2 x Ø 10,5
KP5	150	100	90	2,5	20 x Ø 5,0 4 x Ø 6,5	2 x Ø 8,5 5 x Ø 10,5
KP8	150	150	65	2,5	28 x Ø 5,0	3 x Ø 10,5 + 1 x (11 x 31)

<b>MRP®</b>	<b>Annex A8</b> of European Technical Assessment ETA-16/0716
<b>Product description</b> KP1 ÷ KP8	



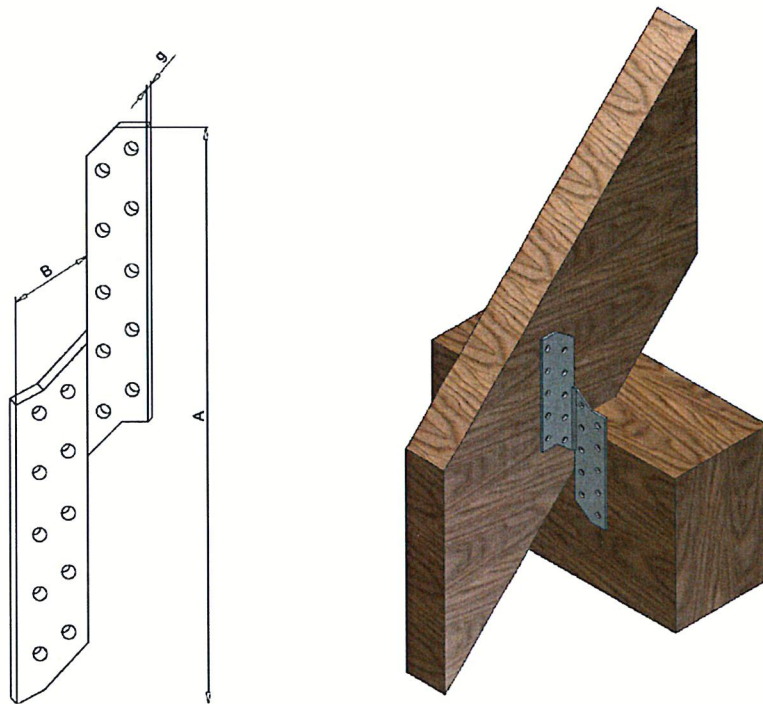
Symbol	A, mm (± 1,0 mm)	B, mm (± 2,0 mm)	g, mm (± 0,05 mm)	Number of holes Ø 5,0 ± 0,5 mm Ø 10,5 ± 0,5 mm
WB1	25	120	2,0	22 x Ø 5,0; 2 x Ø 10,5
WB2	38	110	2,0	22 x Ø 5,0; 2 x Ø 10,5
WB3	38	140	2,0	28 x Ø 5,0; 4 x Ø 10,5
WB4	38	170	2,0	34 x Ø 5,0; 4 x Ø 10,5
WB5	40	110	2,0	24 x Ø 5,0; 2 x Ø 10,5
WB6	40	140	2,0	28 x Ø 5,0; 4 x Ø 10,5
WB7	40	170	2,0	34 x Ø 5,0; 4 x Ø 10,5
WB8	45	110	2,0	22 x Ø 5,0; 2 x Ø 10,5
WB9	45	140	2,0	28 x Ø 5,0; 4 x Ø 10,5
WB10	50	105	2,0	22 x Ø 5,0; 2 x Ø 10,5
WB11	50	135	2,0	28 x Ø 5,0; 4 x Ø 10,5
WB12	50	165	2,0	34 x Ø 5,0; 4 x Ø 10,5
WB13	50	195	2,0	40 x Ø 5,0; 6 x Ø 10,5
WB14	60	100	2,0	22 x Ø 5,0; 2 x Ø 10,5
WB15	60	130	2,0	28 x Ø 5,0; 4 x Ø 10,5
WB16	60	160	2,0	34 x Ø 5,0; 4 x Ø 10,5
WB17	60	190	2,0	40 x Ø 5,0; 6 x Ø 10,5
WB18	60	220	2,0	46 x Ø 5,0; 6 x Ø 10,5
WB19	65	100	2,0	22 x Ø 5,0; 2 x Ø 10,5

Symbol	A, mm (± 1,0 mm)	B, mm (± 2,0 mm)	g, mm (± 0,05 mm)	Number of holes Ø 5,0 ± 0,5 mm Ø 10,5 ± 0,5 mm
WB20	65	130	2,0	28 x Ø 5,0; 4 x Ø 10,5
WB21	70	125	2,0	28 x Ø 5,0; 4 x Ø 10,5
WB22	70	155	2,0	34 x Ø 5,0; 4 x Ø 10,5
WB23	75	120	2,0	28 x Ø 5,0; 4 x Ø 10,5
WB24	75	150	2,0	34 x Ø 5,0; 4 x Ø 10,5
WB25	75	180	2,0	40 x Ø 5,0; 6 x Ø 10,5
WB26	80	120	2,0	28 x Ø 5,0; 4 x Ø 10,5
WB27	80	150	2,0	34 x Ø 5,0; 4 x Ø 10,5
WB28	80	180	2,0	40 x Ø 5,0; 6 x Ø 10,5
WB29	80	210	2,0	46 x Ø 5,0; 6 x Ø 10,5
WB30	100	140	2,0	34 x Ø 5,0; 4 x Ø 10,5
WB31	100	170	2,0	40 x Ø 5,0; 4 x Ø 10,5
WB32	100	200	2,0	46 x Ø 5,0; 6 x Ø 10,5
WB33	115	165	2,0	40 x Ø 5,0; 6 x Ø 10,5
WB34	115	195	2,0	46 x Ø 5,0; 6 x Ø 10,5
WB35	120	160	2,0	40 x Ø 5,0; 6 x Ø 10,5
WB36	120	190	2,0	46 x Ø 5,0; 6 x Ø 10,5
WB37	140	180	2,0	46 x Ø 5,0; 6 x Ø 10,5
WB38	160	170	2,0	46 x Ø 5,0; 6 x Ø 10,5

MRP®

Product description  
WB1 ÷ WB38

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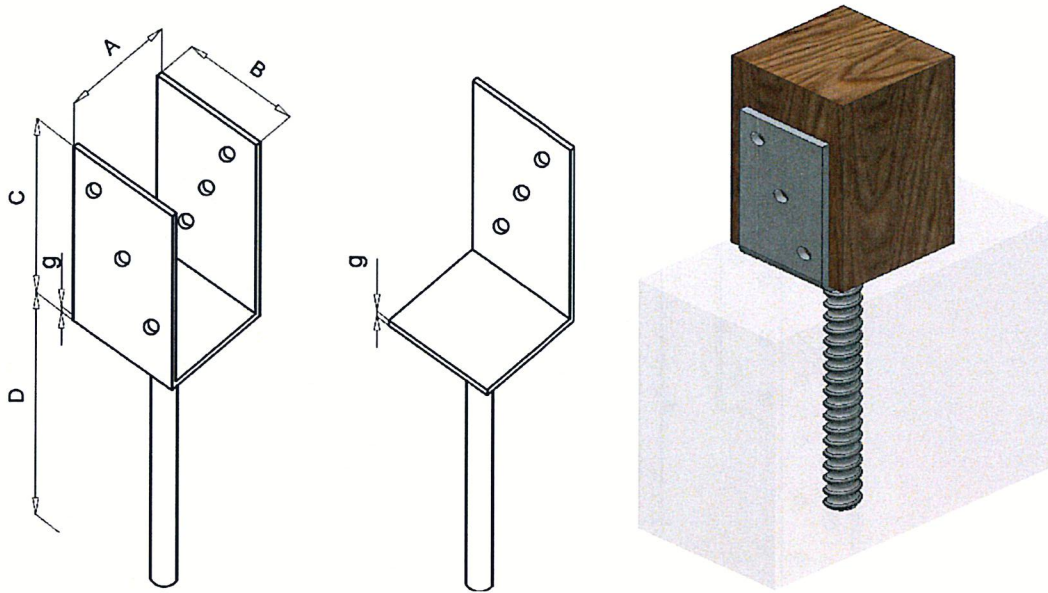


Symbol	A, mm ( $\pm 2,0$ mm)	B, mm ( $\pm 2,0$ mm)	g, mm ( $\pm 0,05$ mm)	Orientation	Number of holes, $\varnothing 5,0 \pm 0,5$ mm
LK1	170	33	2,0	left	20 x $\varnothing 5,0$
LK2	170	33	2,0	right	20 x $\varnothing 5,0$
LK3	210	33	2,0	left	28 x $\varnothing 5,0$
LK4	210	33	2,0	right	28 x $\varnothing 5,0$
LK5	250	33	2,0	left	36 x $\varnothing 5,0$
LK6	250	33	2,0	right	36 x $\varnothing 5,0$
LK7	290	33	2,0	left	44 x $\varnothing 5,0$
LK8	290	33	2,0	right	44 x $\varnothing 5,0$
LK9	200	63	2,0	left	30 x $\varnothing 5,0$
LK10	200	63	2,0	right	30 x $\varnothing 5,0$

MRP®

**Product description**  
LK1 ÷ LK10

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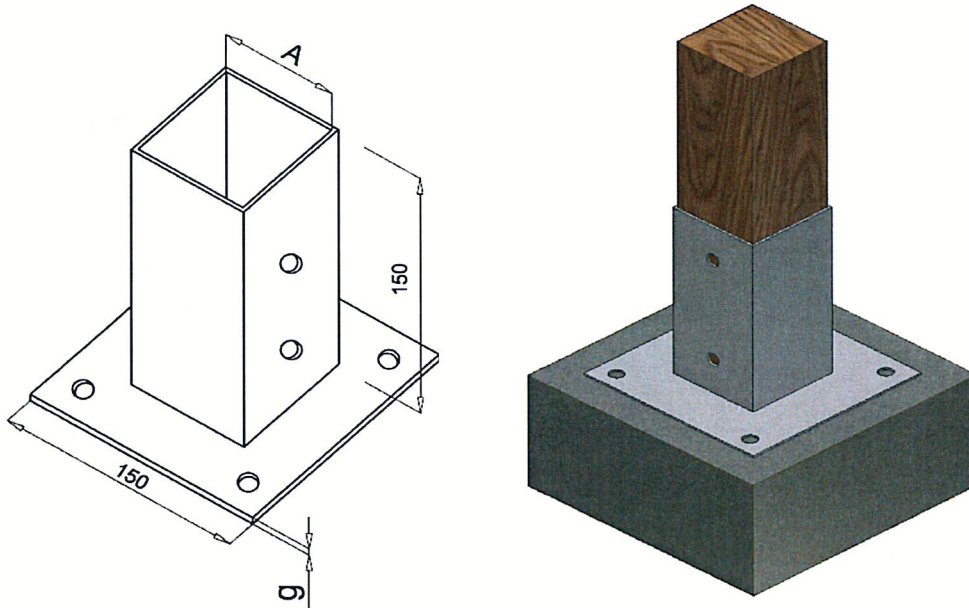
Symbol	A, mm (± 2,0 mm)	B, mm (± 2,0 mm)	C, mm (± 2.0 mm)	D, mm (± 0,1 mm)	g, mm (± 0,05 mm)	Number of holes, Ø 10,5 ± 0,5 mm
PS1	60	60	120	Ø16 x 200	4,0	6 x ø 10,5
PS2	70	60	120	Ø16 x 200	4,0	6 x ø 10,5
PS3	80	60	120	Ø16 x 200	5,0	6 x ø 10,5
PS4	90	60	120	Ø20 x 200	5,0	6 x ø 10,5
PS5	100	60	120	Ø20 x 200	5,0	6 x ø 10,5
PS6	120	60	120	Ø20 x 200	5,0	6 x ø 10,5
PS8	140	60	125	Ø20 x 200	5,0	6 x ø 10,5
PS9	160	90	130	Ø20 x 200	5,0	6 x ø 10,5

MRP®

Product description  
PS1 ÷ PS9

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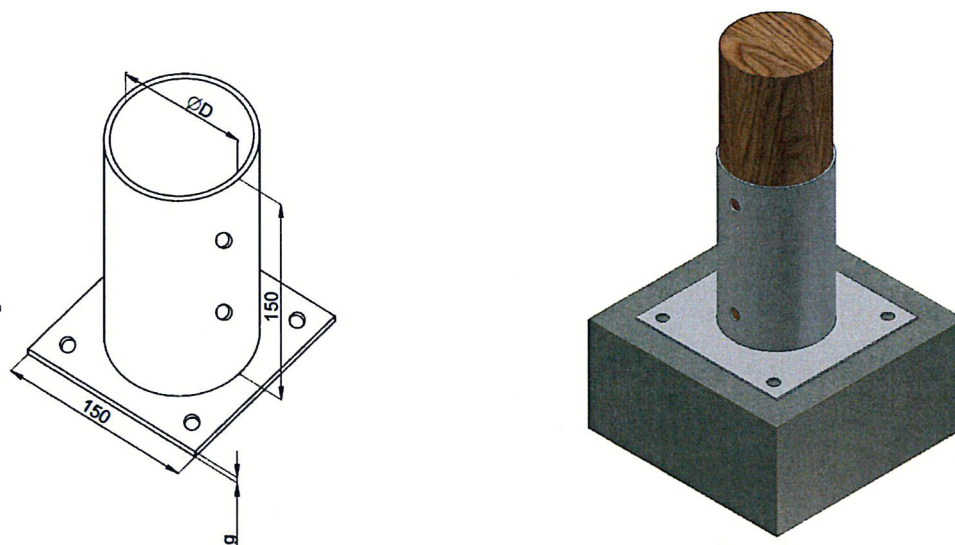


Symbol	A, mm ( $\pm 1,0$ mm)	g, mm ( $\pm 0,05$ mm)	Number of holes, $\varnothing 11,0 \pm 1,0$ mm
PSP1	71	2,0	8 x $\varnothing 11,0$
PSP2	91	2,0	8 x $\varnothing 11,0$
PSP3	101	2,0	8 x $\varnothing 11,0$

MRP®

**Product description**  
PSP1 ÷ PSP3

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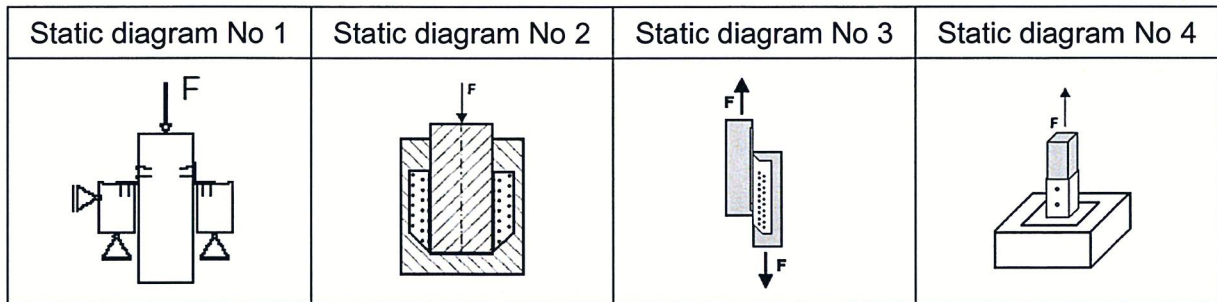


Symbol	D, mm ( $\pm 1,0$ mm)	g, mm ( $\pm 0,05$ mm)	Number of holes, $\varnothing 11,0 \pm 1,0$ mm
PSP4	81	2,0	8 x $\varnothing 11,0$
PSP5	101	2,0	8 x $\varnothing 11,0$
PSP6	121	2,0	8 x $\varnothing 11,0$

**MRP®**

**Product description**  
PSP4 ÷ PSP6

**Annex A13**  
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**Table 1. Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates KW and KB**

MRP® symbol	Nailing*	Characteristic load-carrying capacity**, R <sub>k</sub> , kN
KW1 ÷ KW7 KW2/A ÷ KW5/A KB1 ÷ KB3	full nailing	1,35
* Ring shank nails with the diameter $d \geq 4$ mm and the length $\geq 40$ mm. Timber grade at least C24 according to EN 338 ** Loading according to static diagram No 1		


**MRP®**

Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates KW and KB

**Annex B1**

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**Table 2. Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates KK**

MRP® symbol	Nailing*	Characteristic load-carrying capacity**, R <sub>k</sub> , kN
KK1÷ KK3		7,47
<p>* Ring shank nails with the diameter <math>d \geq 4</math> mm and the length <math>\geq 40</math> mm. Timber grade at least C24 according to EN 338</p> <p>** Loading according to static diagram No 1</p>		

**MRP®**

Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates KK

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**Table 3. Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates KS**

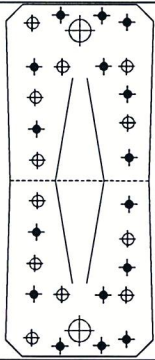
MRP® symbol	Nailing*	Characteristic load-carrying capacity**, R <sub>k</sub> , kN
KS1 ÷ KS3	full nailing	2,16
* Ring shank nails with the diameter $d \geq 4$ mm and the length $\geq 40$ mm. Timber grade at least C24 according to EN 338 ** Loading according to static diagram No 1		

**Table 4. Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates KM, KL and KR**

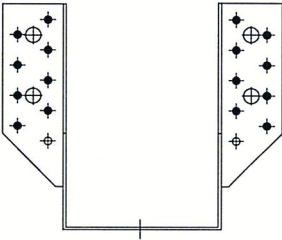
MRP® symbol	Nailing*	Characteristic load-carrying capacity**, R <sub>k</sub> , kN
KM1 ÷ KM17 KL1 ÷ KL7 KR1 ÷ KR4	full nailing	2,34
* Ring shank nails with the diameter $d \geq 4$ mm and the length $\geq 40$ mm. Timber grade at least C24 according to EN 338 ** Loading according to static diagram No 1		

<b>MRP®</b>	<b>Annex B3</b>
Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates KS, KM, KL and KR	of European Technical Assessment ETA-16/0716

**Table 5. Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates KP**

MRP® symbol	Nailing*	Characteristic load-carrying capacity**, R <sub>k</sub> , kN
KP1 ÷ KP8		18,42
<p>* Ring shank nails with the diameter <math>d \geq 4</math> mm and the length <math>\geq 40</math> mm. Timber grade at least C24 according to EN 338</p> <p>** Loading according to static diagram No 1</p>		

**Table 6. Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates WB**

MRP® symbol	Nailing*	Characteristic load-carrying capacity**, R <sub>k</sub> , kN
WB1 ÷ WB38		26,69
<p>* Ring shank nails with the diameter <math>d \geq 4</math> mm and the length <math>\geq 40</math> mm. Timber grade at least C24 according to EN 338</p> <p>** Loading according to static diagram No 2</p>		

**MRP®**

Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates KP and WB

**Annex B4**  
of European  
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**Table 7. Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates LK**

MRP® symbol	Nailing*	Characteristic load-carrying capacity**, R <sub>k</sub> , kN
LK1 ÷ LK10	full nailing	17,91
* Ring shank nails with the diameter $d \geq 4$ mm and the length $\geq 40$ mm. Timber grade at least C24 according to EN 338 ** Loading according to static diagram No 3		

**Table 8. Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates PS and PSP**

MRP® symbol	Nailing*	Characteristic load-carrying capacity**, R <sub>k</sub> , kN
PS1 ÷ PS9 PSP1 ÷ PSP6	full nailing	4,70
* Ring shank nails with the diameter $d \geq 4$ mm and the length $\geq 40$ mm. Timber grade at least C24 according to EN 338 ** Loading according to static diagram No 4		

**MRP®**

Characteristic load-carrying capacity of joints made with MRP® three-dimensional nailing plates LK, PS and PSP

**Annex B5**  
of European  
Technical Assessment  
ETA-16/0716

