



# Instytut Techniki Budowlanej

Research and development works | Accredited Group of Laboratories |

Notified Body N° 1488 | EOTA member | Certified management systems ISO 9001, ISO 27001

FIRE RESEARCH DEPARTMENT | 02-656 Warszawa | Ksawerów 21 Str. | tel. +48 22 853 34 27 | fax +48 22 847 23 11 | fire@itb.pl | www.itb.pl

## **TECHNICAL OPINION**

for DEKMETAL ventilated façade system  
falling off in the case of fire

**2658.2/17/Z00NZP**

**Warsaw, June 2018**

(page intentionally left blank)



**Zakład Badań Ogniwych**  
ul. Ksawerów 21, 02-656 Warszawa  
tel.: 22 5664284, fax: 22 8472311  
**Oddział Mazowiecki – Laboratorium**  
ul. Przemysłowa 2, 26-670 Pionki  
tel.: 48 3121600, fax: 48 3121601

www.itb.pl e-mail: fire@itb.pl

---

**Technical Opinion**  
for DEKMETAL ventilated façade system  
falling off in the case of fire

---

Work №: 2658.2/17/Z00NZP

**Client:** DEKMETAL s.r.o,  
Tiskarska 10/257, 108 00 Praha  
Czech Republic

**Contractors:**

Author: Paweł Sulik, PhD. Eng.

Verification, Head of Section: Bartłomiej Sędłak, MSc. Eng.

Head of Department: Bartłomiej Papis, PhD. Eng.

Work start: January 2018  
end: June 2018

Print run: 3 copies  
Appendices: -



## Table of contents

1	Formal bases.....	5
2	Technical bases.....	5
3	Purpose and scope of this work.....	5
4	Characteristics of the system.....	6
4.1	DEKCASSETTE® IDEAL.....	6
4.2	DEKCASSETTE® STANDARD.....	7
4.3	DEKCASSETTE® SPECIAL.....	8
4.4	DEKLAMELLA® IDEAL.....	9
4.5	DEKLAMELLA® FOR ARCHITECT.....	10
4.6	DEKPROFILE® CR(18/40).....	11
4.7	DEKPROFILE® TR(18/35/50).....	12
4.8	DEKPROFILE® FOR ARCHITECT.....	12
5	Laboratory tests for façade parts falling off in the case of fire.....	13
6	Technical assessment of the DEKMETAL ventilated steel façade system in the context of falling off in the case of fire.....	36
7	Final remarks.....	37

## 1 Formal bases

- Order of DEKMETAL s.r.o.;
- Agreement No. 2658/117/R10NZP.

## 2 Technical bases

- [1] Polish Minister of Infrastructure Decree: Rozporządzenie Ministra Infrastruktury z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie (Dz. U. nr 75 z dnia 15 czerwca 2002 r. poz. 690) wraz z późniejszymi zmianami, w tym nowelizacją z 2017 r.
- [2] Test of a façade manufactured by DEKMETAL for façade parts falling off in the case of fire, carried out in ITB Fire Testing Laboratory in Pionki on 17 April of 2018 according to internal procedure of the laboratory.
- [3] Technical documentation provided by the Client, including:
  - Façade Catalogue, DEKMETAL 2017;
  - Assembly instructions - Steel Grid. Basic construction elements of the façade system DEKMETAL. Date of issue 2017/01;
  - Material options - Dekprofile CR 18, CR 40, TR 18, TR 35, TR 50. Date of issue 2017/01;
  - Dekcassette IDEAL. Date of issue 2017/01.
  - Technical picture and drawings.

## 3 Purpose and scope of this work

The requirement of § 225 of the Decree [1] for fastening of a façade cladding, according to § 216 of the Decree [1] in the case of fire should be fulfilled for:

- 120 minutes for buildings of class „A” of fire resistance,
- 60 minutes for buildings of class „B” of fire resistance,
- 30 minutes for buildings of class „C” of fire resistance.

The purpose of this work is an assessment of DEKMETAL façade system manufactured by DEKMETAL s.r.o., in the context of requirements of § 225 of the Decree [1]:

*Elementy okładzin elewacyjnych powinny być mocowane do konstrukcji budynku w sposób uniemożliwiający ich odpadanie w przypadku pożaru w czasie krótszym niż wynikający z wymaganej klasy odporności ogniowej dla ściany zewnętrznej, określonej w § 216 ust. 1, odpowiednio do klasy odporności pożarowej budynku, w którym są one zamocowane. (translated by author: Cladding parts should be mounted to the load-bearing structure of the building in a manner prohibiting them from falling off in the case of fire in a time not shorter than required by external wall classification provided in § 216 par. 1, accordingly to the fire resistance class of the building.)*

The scope of the work includes: formal and technical bases, technical description based on the technical documentation provided by the Client, description of performed laboratory test, assessment of the DEKMETAL façade system manufactured by DEKMETAL s.r.o., final remarks.

## 4 Characteristics of the system

Façade ventilated cladding, which is composed of a supporting grid, anchored to the bearing structure, separately anchored thermal insulation, ending or connecting line profiles and visible facing elements is described in detail in the Façade Catalog, DEKMETAL 2017 [3].

### 4.1 DEKCASSETTE® IDEAL

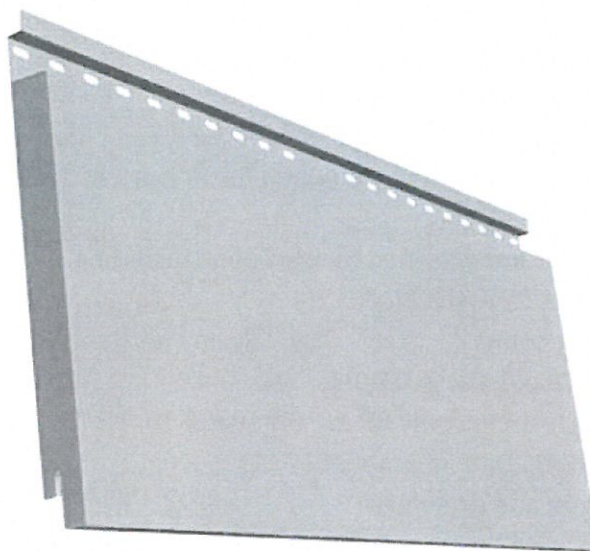


Fig. 1. View of DEKCASSETTE® IDEAL [3]

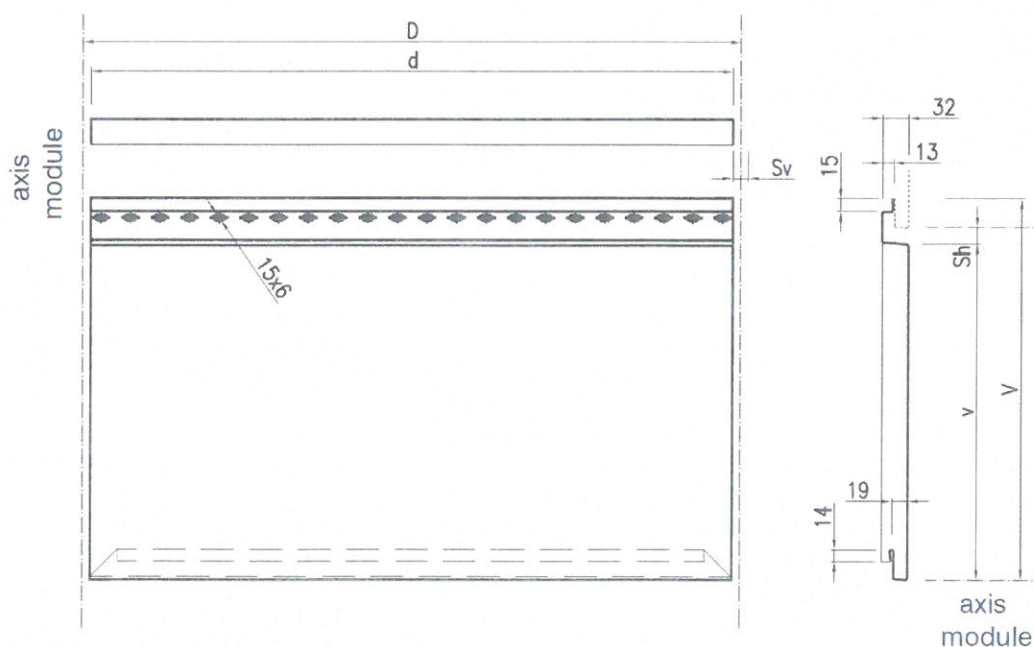


Fig. 2. Dimensions of DEKCASSETTE® IDEAL [3]

Composite length D:	150-6000 mm;
Composite height V:	100-650 (800*) mm;
Total length d:	$D + S_v$ mm;

Total height v:  $V + Sh + 35 \text{ mm};$   
 Depth:  $32 \text{ mm};$   
 Horizontal joint Sh:  $5\text{-}35 \text{ mm};$   
 Vertical joint Sv:  $5\text{-}50 \text{ mm};$   
 Sheet thickness:  $0.75^* / 1.00 / 1.25^* \text{ mm}$

\* after consultation with the manufacturer.

#### 4.2 DEKCASSETTE® STANDARD

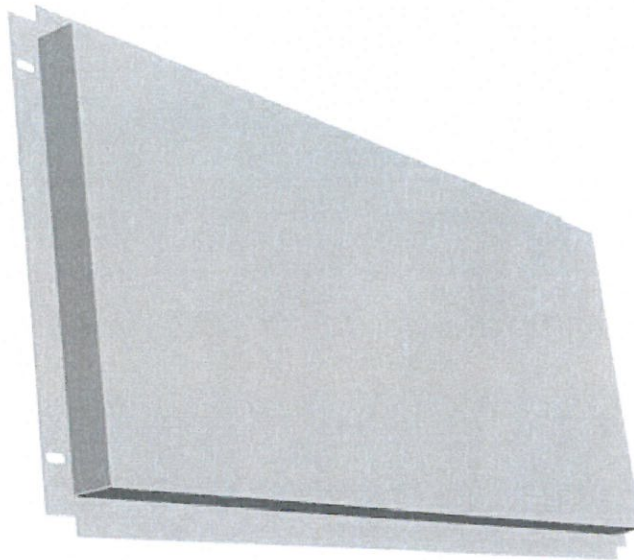


Fig. 3. View of DEKCASSETTE® STANDARD [3]

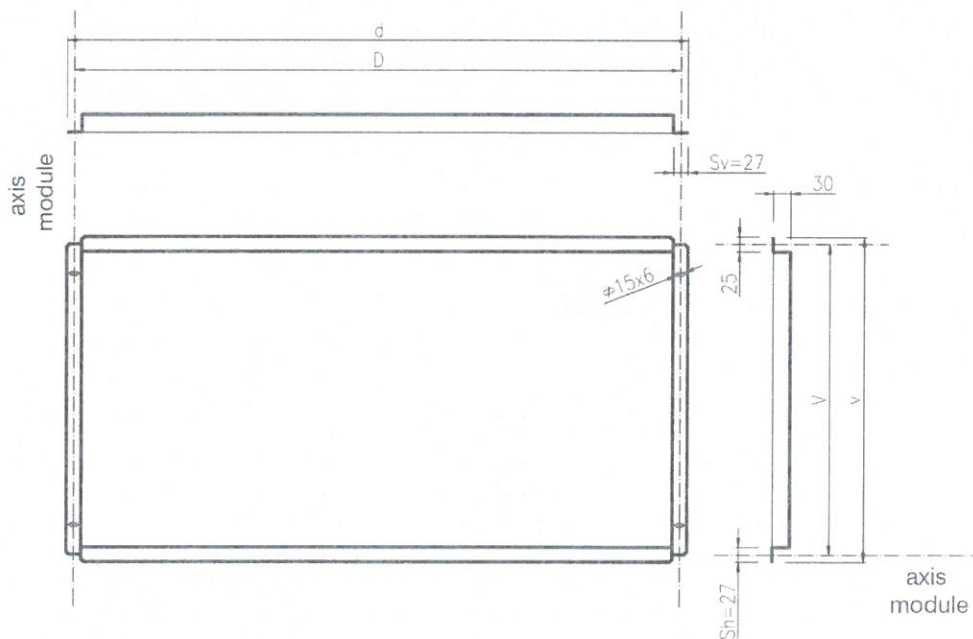


Fig. 4. Dimensions of DEKCASSETTE® STANDARD [3]

Composite length D:  $150\text{-}6000 \text{ mm};$   
 Composite height V:  $100\text{-}500 (800^*) \text{ mm};$

Total length d:	$D + 23 \text{ mm};$
Total height v:	$V + 23 \text{ mm};$
Depth:	30 mm;
Horizontal joint Sh:	27 mm;
Vertical joint Sv:	27 mm;
Sheet thickness:	0.75* / 1.00 / 1.25* mm

\* after consultation with the manufacturer.

### 4.3 DEKCASSETTE® SPECIAL

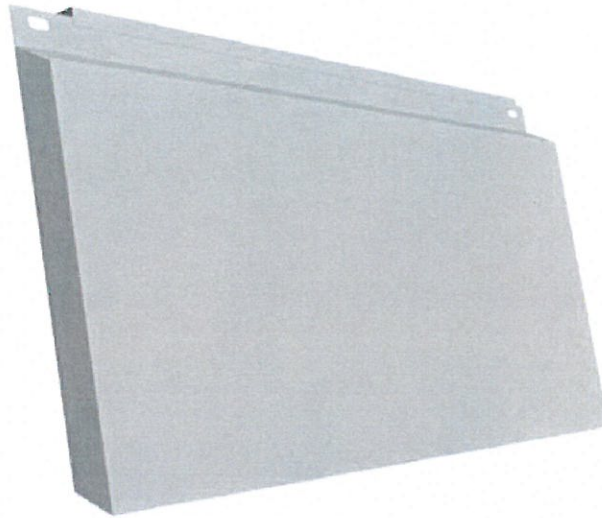


Fig. 5. View of DEKCASSETTE® SPECIAL [3]

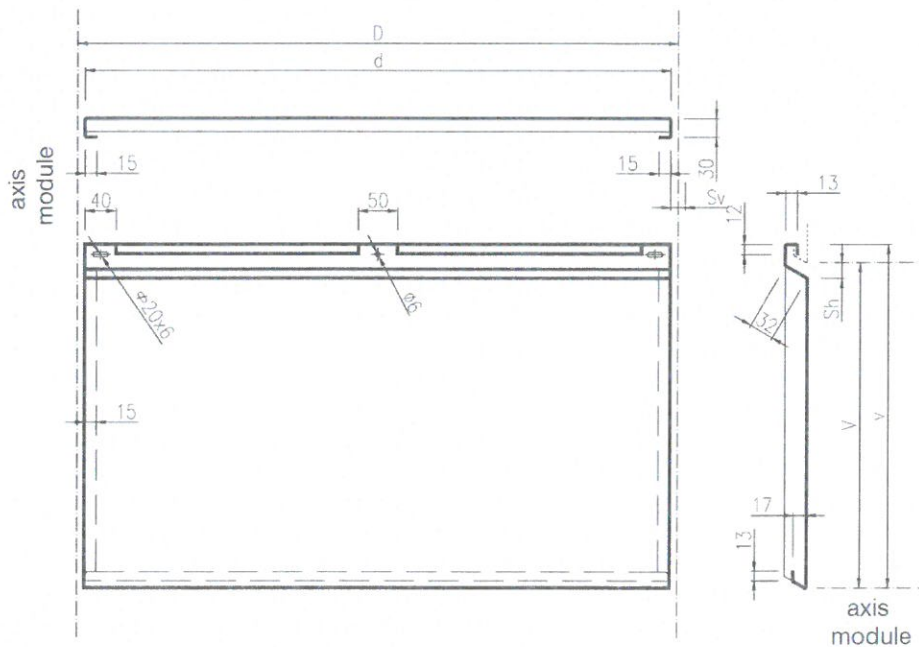


Fig. 6. Dimensions of DEKCASSETTE® SPECIAL [3]

Composite length D:	$d + Sv \text{ mm};$
Composite height V:	150-500 mm;



Total length d:	150 - 1950* mm;
Total height v:	V + Sh + 22 mm;
Depth:	30 mm;
Horizontal joint Sh:	10-30 mm;
Vertical joint Sv:	5-50 mm;
Sheet thickness:	1.00 mm.

\* after consultation with the manufacturer.

#### 4.4 DEKLAMELLA® IDEAL

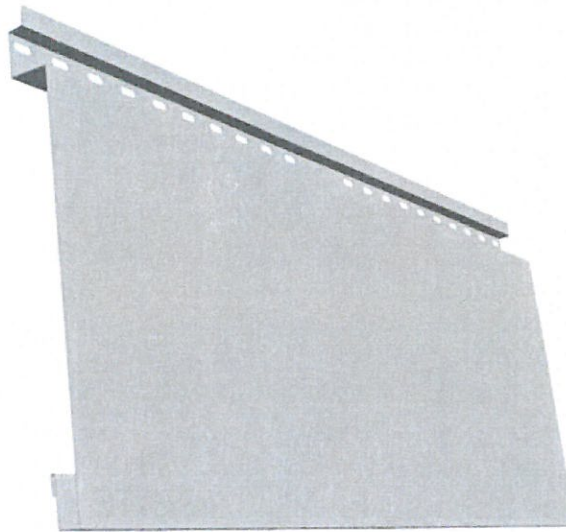


Fig. 7. View of DEKLAMELLA® IDEAL [3]

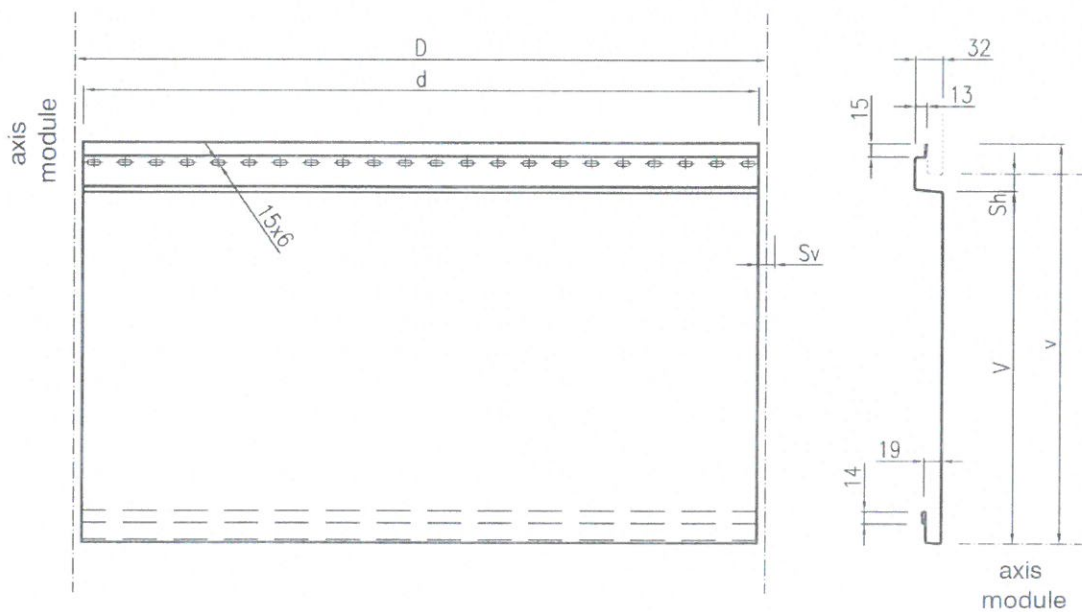


Fig. 8. Dimensions of DEKLAMELLA® IDEAL [3]

Composite length D:	150-6000 mm;
---------------------	--------------

Composite height V:	100-300* mm;
Total length d:	D + Sv mm;
Total height v:	V + Sh + 35 mm;
Depth:	32 mm;
Horizontal joint Sh:	5-35 mm;
Vertical joint Sv:	Dzielenie w T profilu lub przekładce;
Sheet thickness:	0.75* / 1.00* mm

\* after consultation with the manufacturer.

#### 4.5 DEKLAMELLA® FOR ARCHITECT

The DEKLAMELLA® FOR ARCHITECT system is based on the DEKLAMELLA® IDEAL system and has the same basic material parameters, but due to architectural requirements, the surface of the lamellas and their form and shape can take various forms presented below.

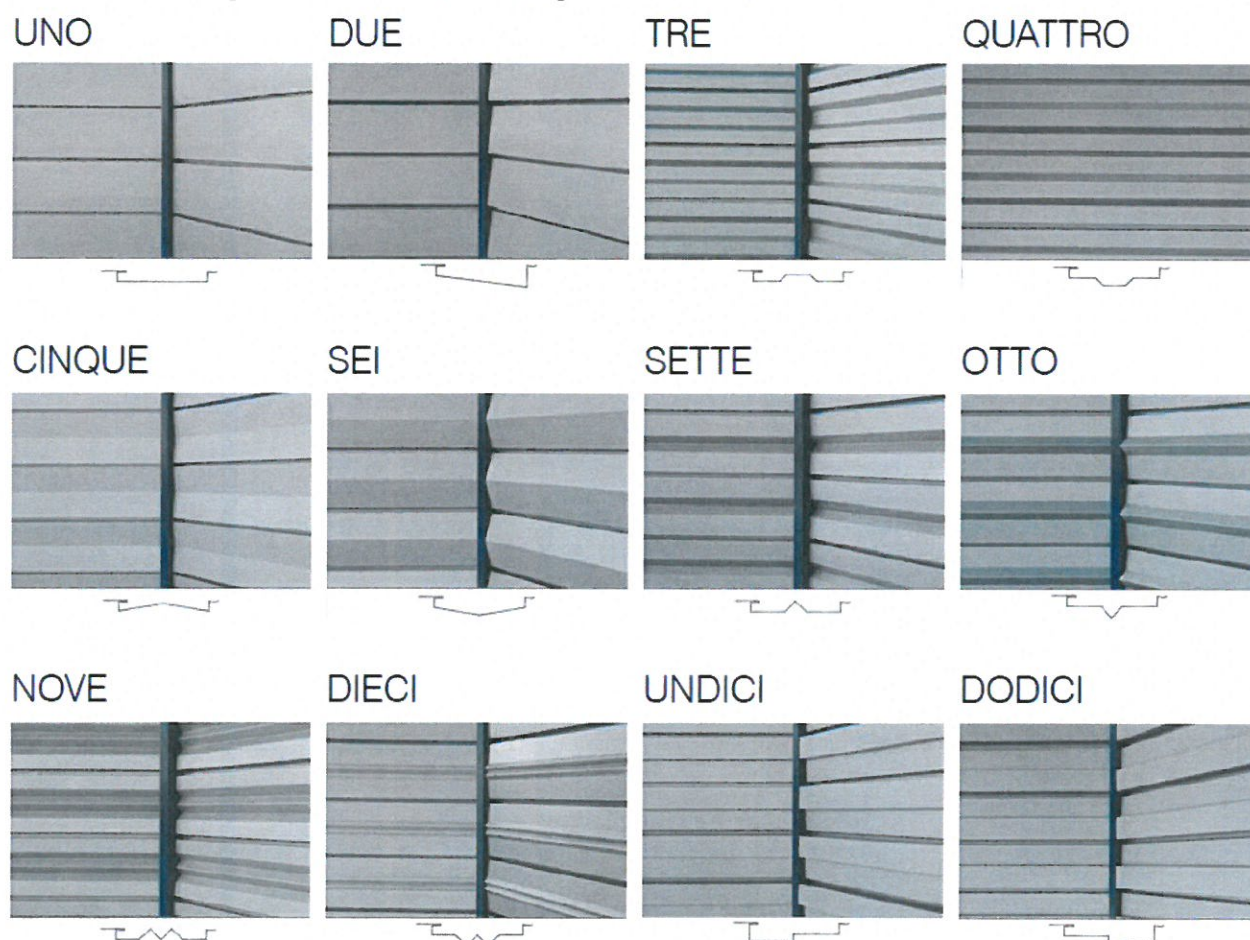


Fig. 9. View of DEKLAMELLA® FOR ARCHITECT [3]

#### 4.6 DEKPROFILE® CR(18/40)



Fig. 10. View of DEKPROFILE® CR(18/40) [3]

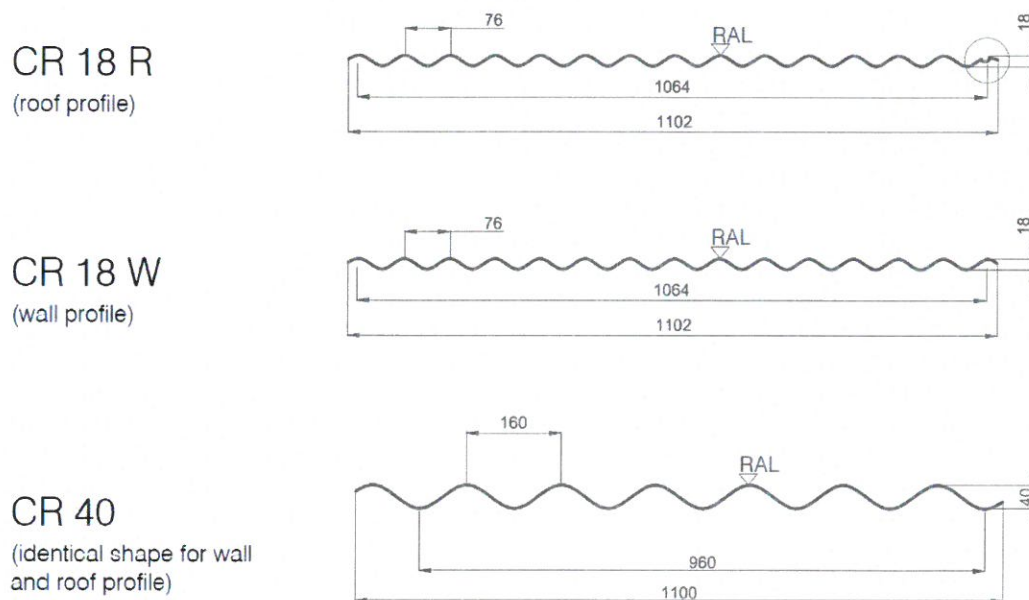


Fig. 11. Dimensions of DEKPROFILE® CR(18/40) [3]

	<b>CR 18</b>	<b>CR 40</b>
Wave height:	18 mm	40 mm
Axial distance between waves:	76 mm	160 mm
Composite profile width:	1064 mm	960 mm
Total profile width:	1102 mm	1100 mm
Maximum profile length*:	15000 mm	9000 mm
Minimum profile length*:	500 mm	500 mm
Sheet thickness*:	0.5-1.00 mm	0.63 mm
Minimum roof pitch*:	8°	8°

\* after consultation with the manufacturer.

#### 4.7 DEKPROFILE® TR(18/35/50)



Fig. 12. View of DEKPROFILE® TR(18/35/50) [3]

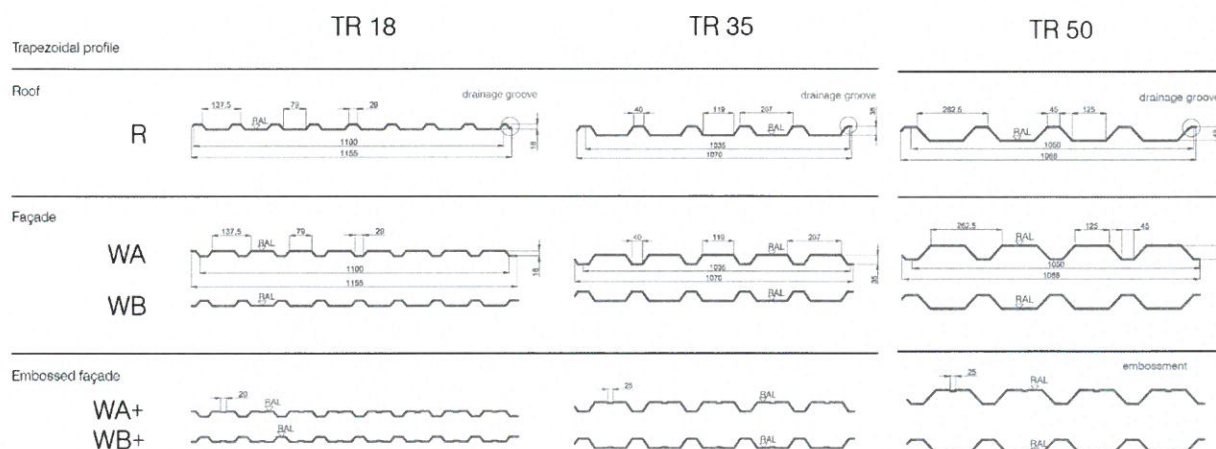


Fig. 13. Dimensions of DEKPROFILE® TR(18/35/50) [3]

	TR 18	TR 35	TR 50
Wave height:	18 mm	35 mm	50 mm
Axial distance between waves:	137.5 mm	207 mm	262.5 mm
Composite profile width:	1100 mm	1035 mm	1050 mm
Total profile width:	1155 mm	1070 mm	1088 mm
Maximum profile length*:	9000 mm	15000 mm	15000 mm
Minimum profile length*:	500 mm	500 mm	500 mm
Sheet thickness*:	0.5-0.63 mm	0.5-1.00 mm	0.63-1.25 mm
Minimum roof pitch*:	8°	8°	8°

\* after consultation with the manufacturer.

#### 4.8 DEKPROFILE® FOR ARCHITECT

DEKPROFILE® FOR ARCHITECTS is projected as a special design series of profiled visual elements, complementing the standard DEKPROFILE® TR and CR product lines.



Fig. 14. View of DEKPROFILE® FOR ARCHITECT [3]

## 5 Laboratory tests for façade parts falling off in the case of fire

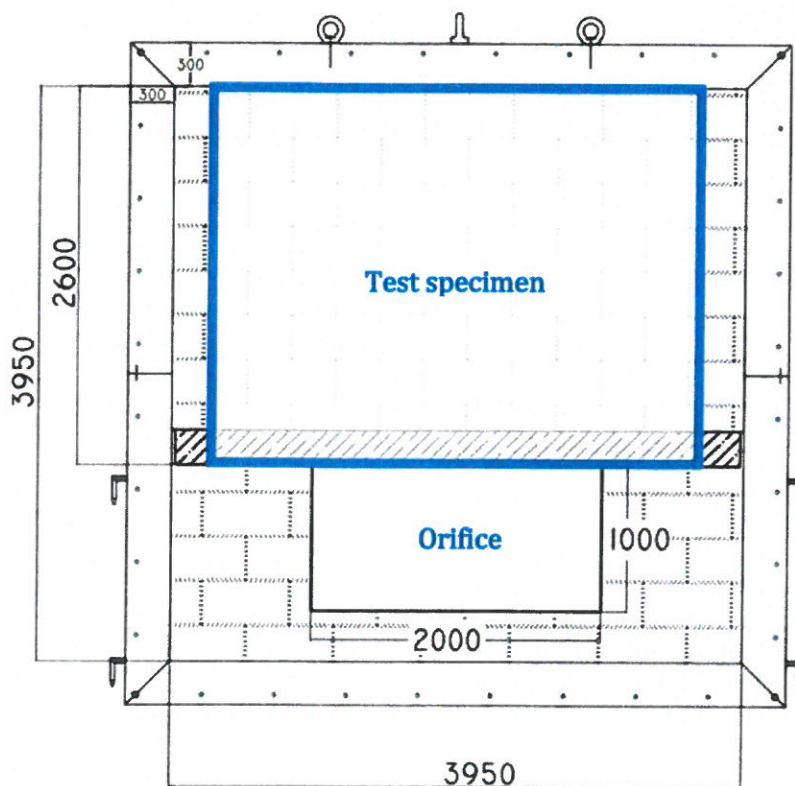


Fig. 15. Scheme of the test stand

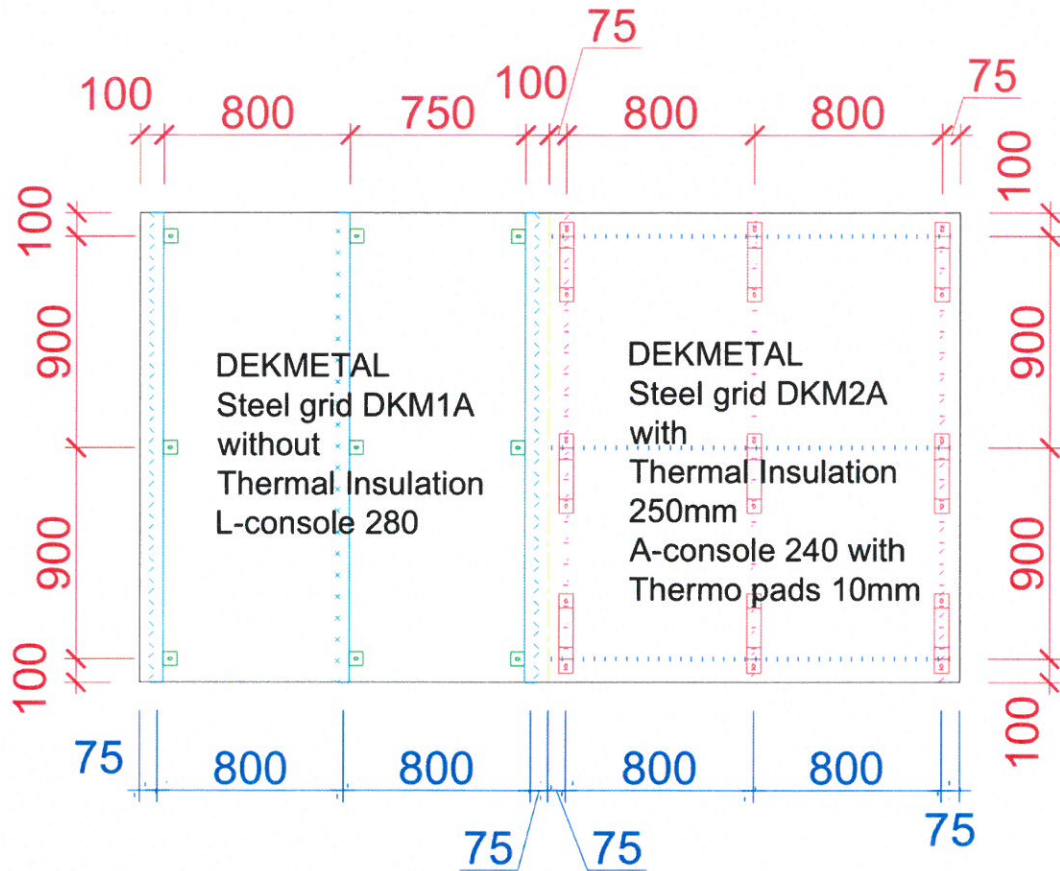


Fig. 16. The view and division of the test specimen - supporting grid

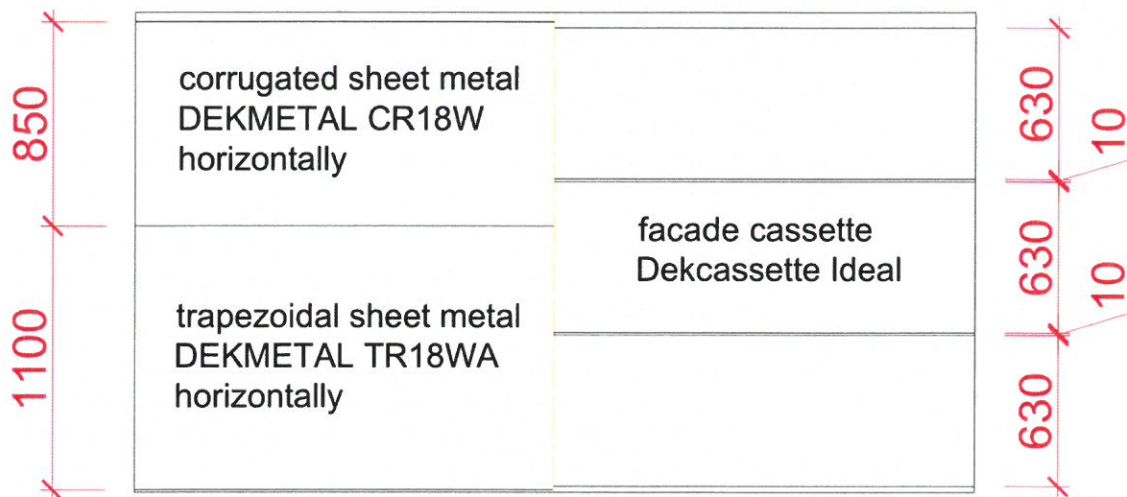


Fig. 17. The view and division of the test specimen - cladding

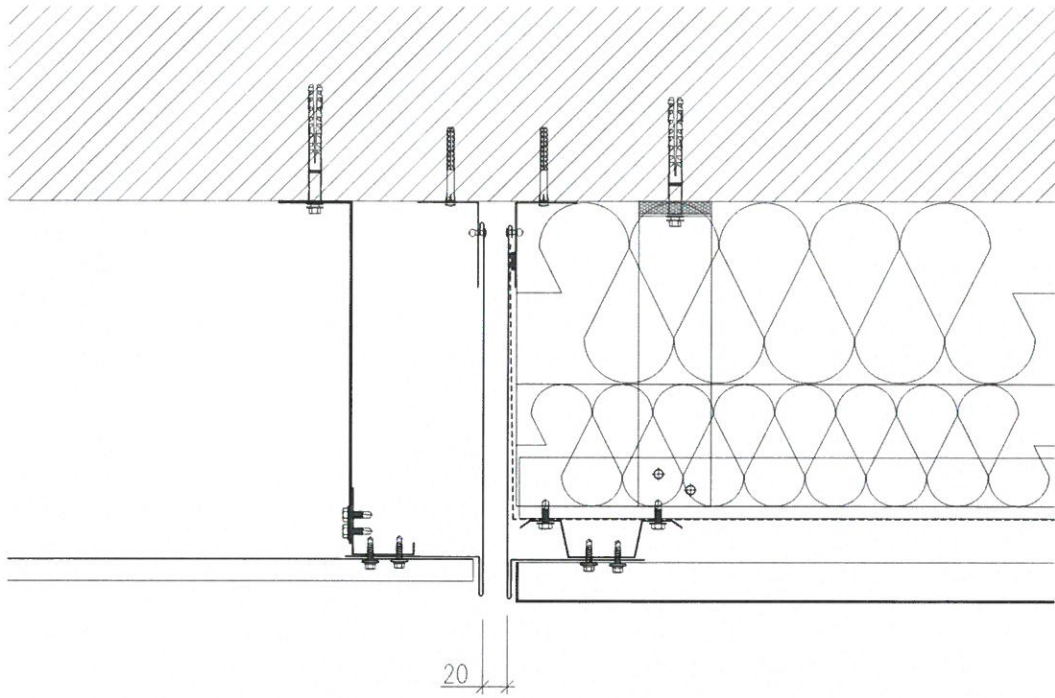
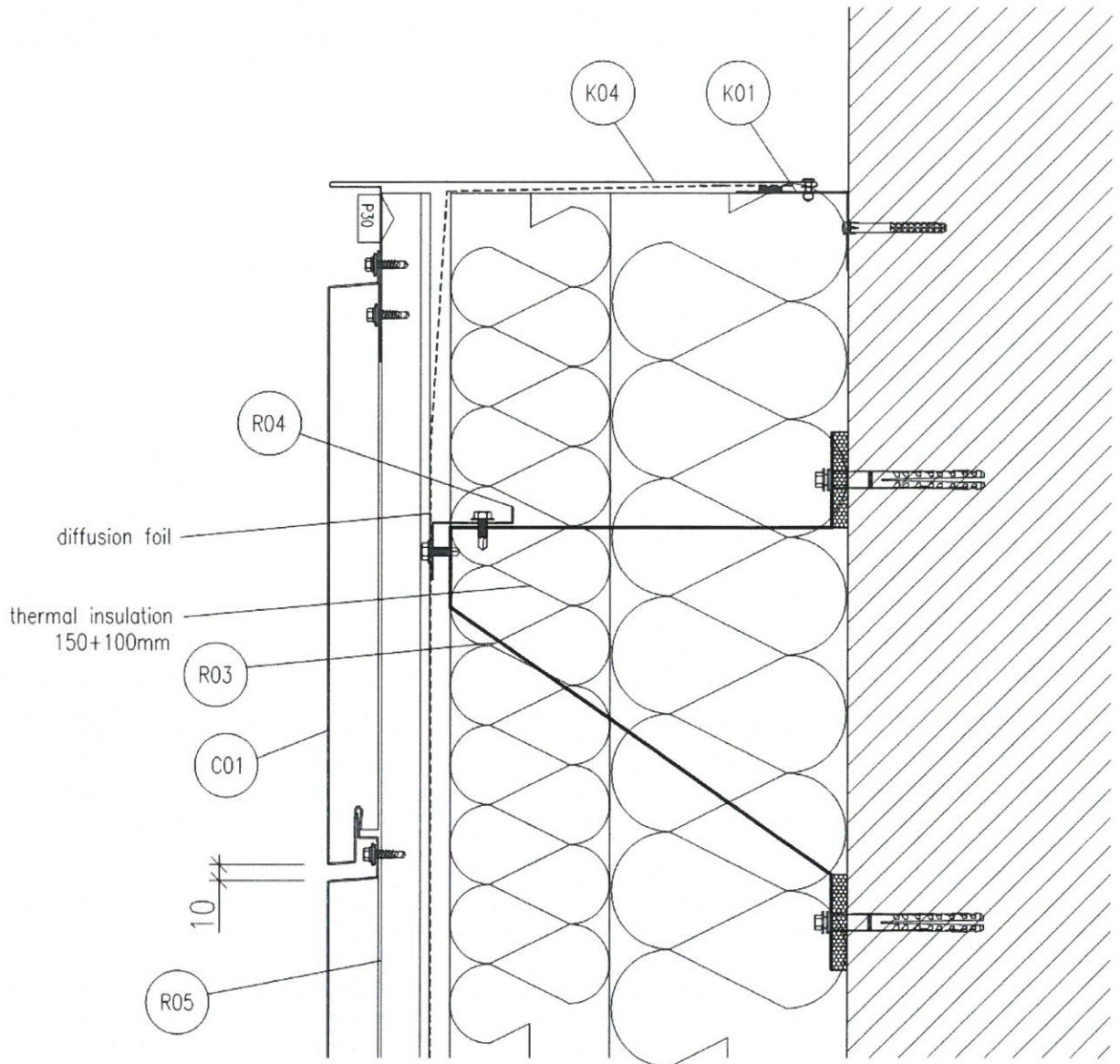
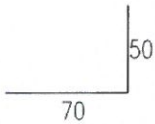


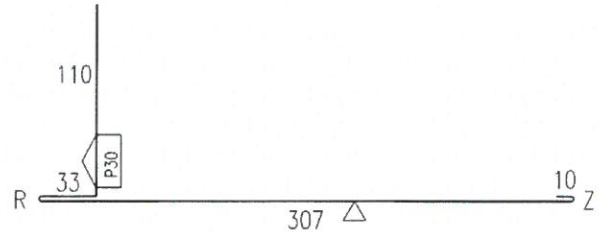
Fig. 18. The view of the test specimen - detail



K01  
attachment profile  
RS 130mm  
th. 0,5mm  
color



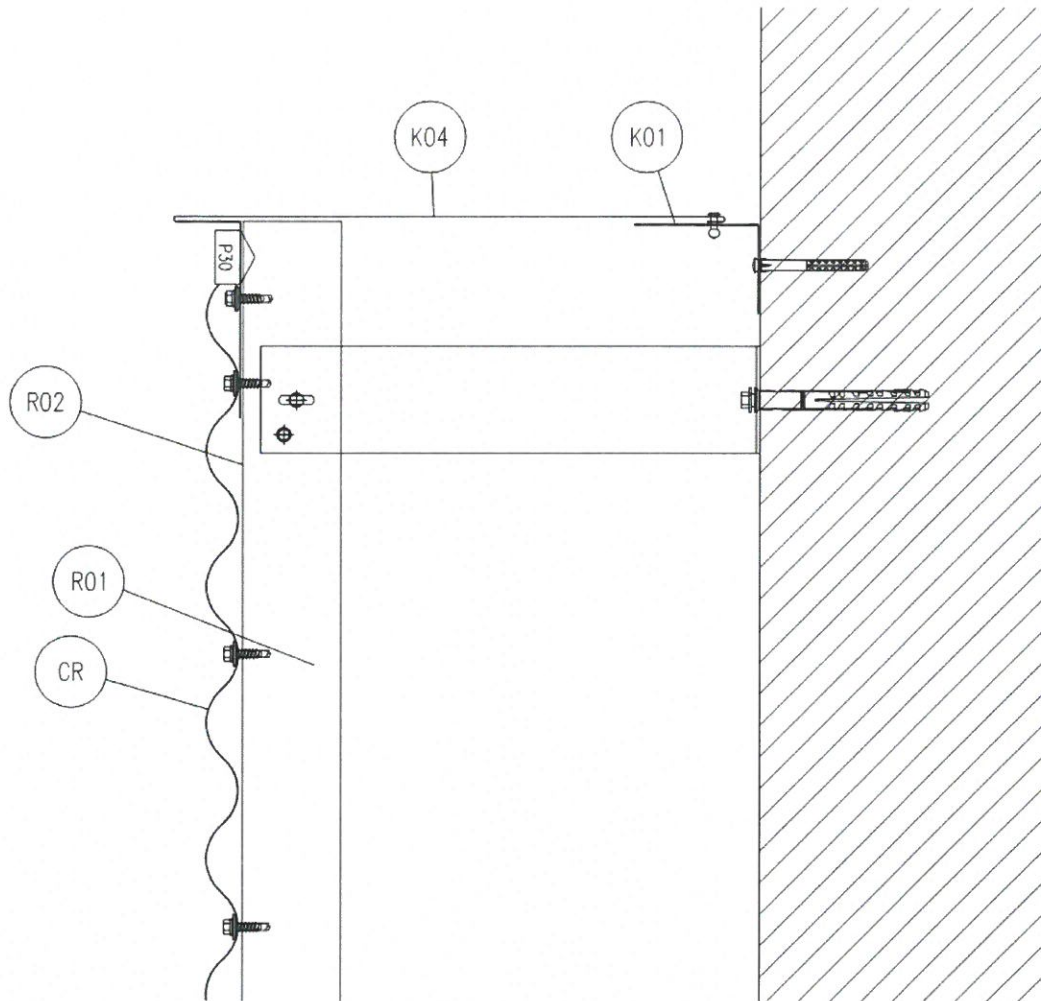
K04  
top end profile  
RS 460mm  
th. 0,5mm  
color



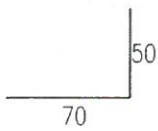
C01 .... DEKCASSETTE IDEAL

Fig. 19. The view of the test specimen - detail

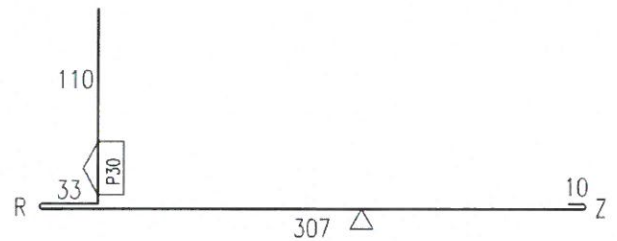




K01  
attachment profile  
RS 130mm  
th. 0,5mm  
color

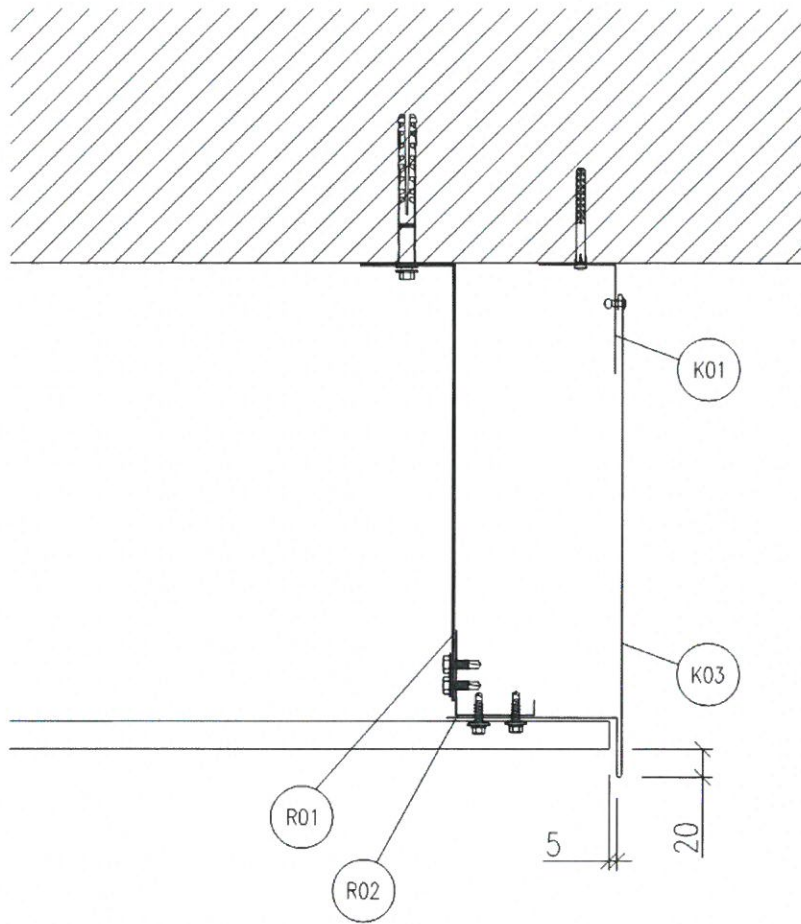


K04  
top end profile  
RS 460mm  
th. 0,5mm  
color

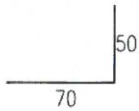


CR ... DEKPROFILE CR18W

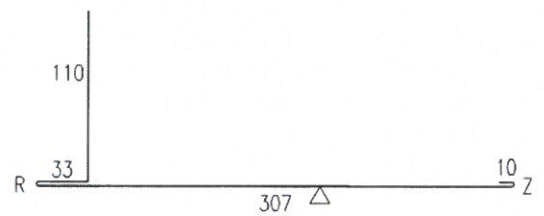
Fig. 20. The view of the test specimen - detail



K01  
attachment profile  
RS 130mm  
th. 0,5mm  
color

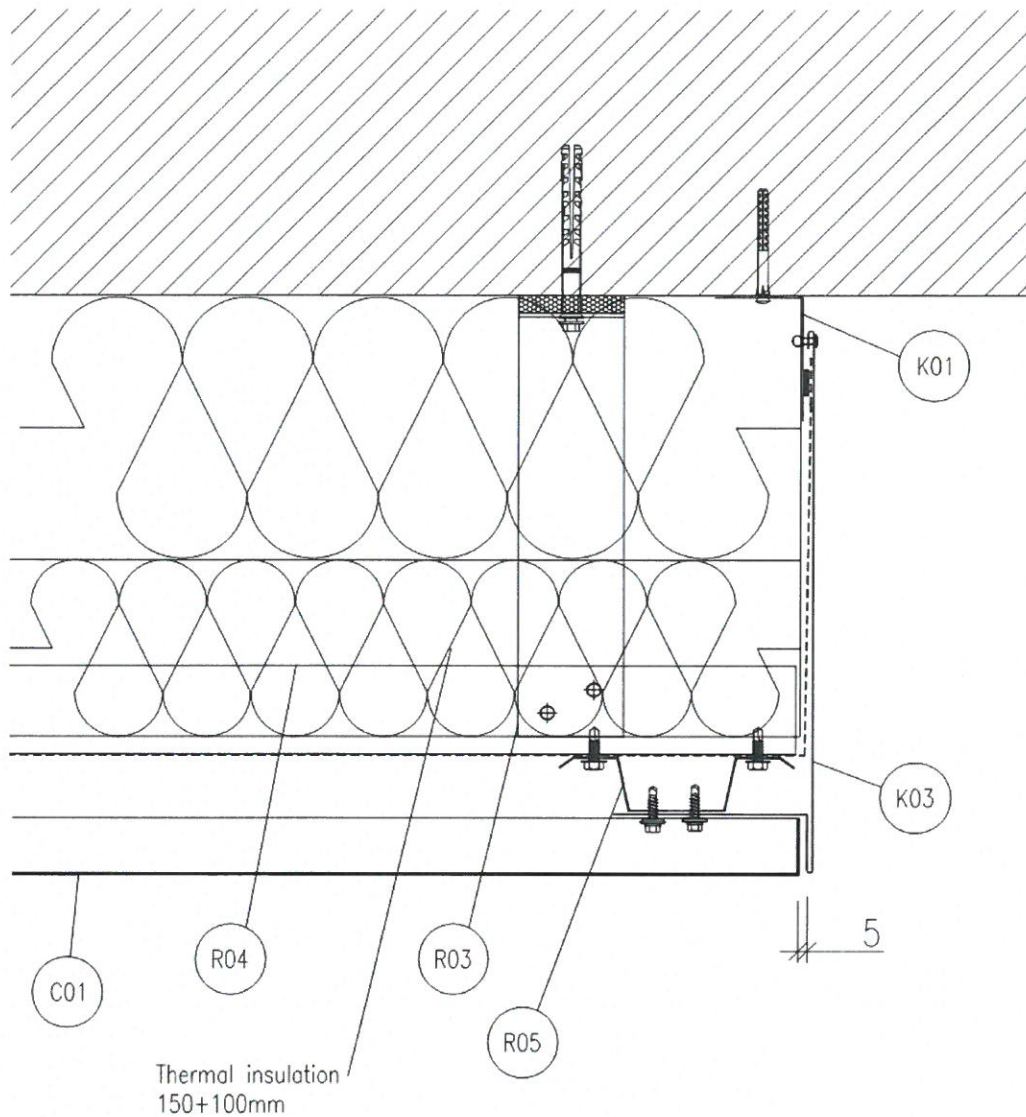


K03  
side end profile  
RS 460mm  
th. 0,5mm  
color

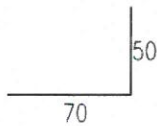


TR ... DEKPROFILE TR18W

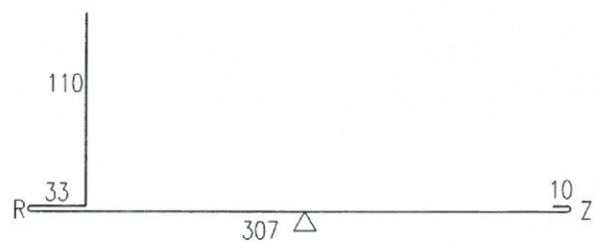
Fig. 21. The view of the test specimen - detail



K01  
 attachment profile  
 RS 130mm  
 th. 0,5mm  
 color

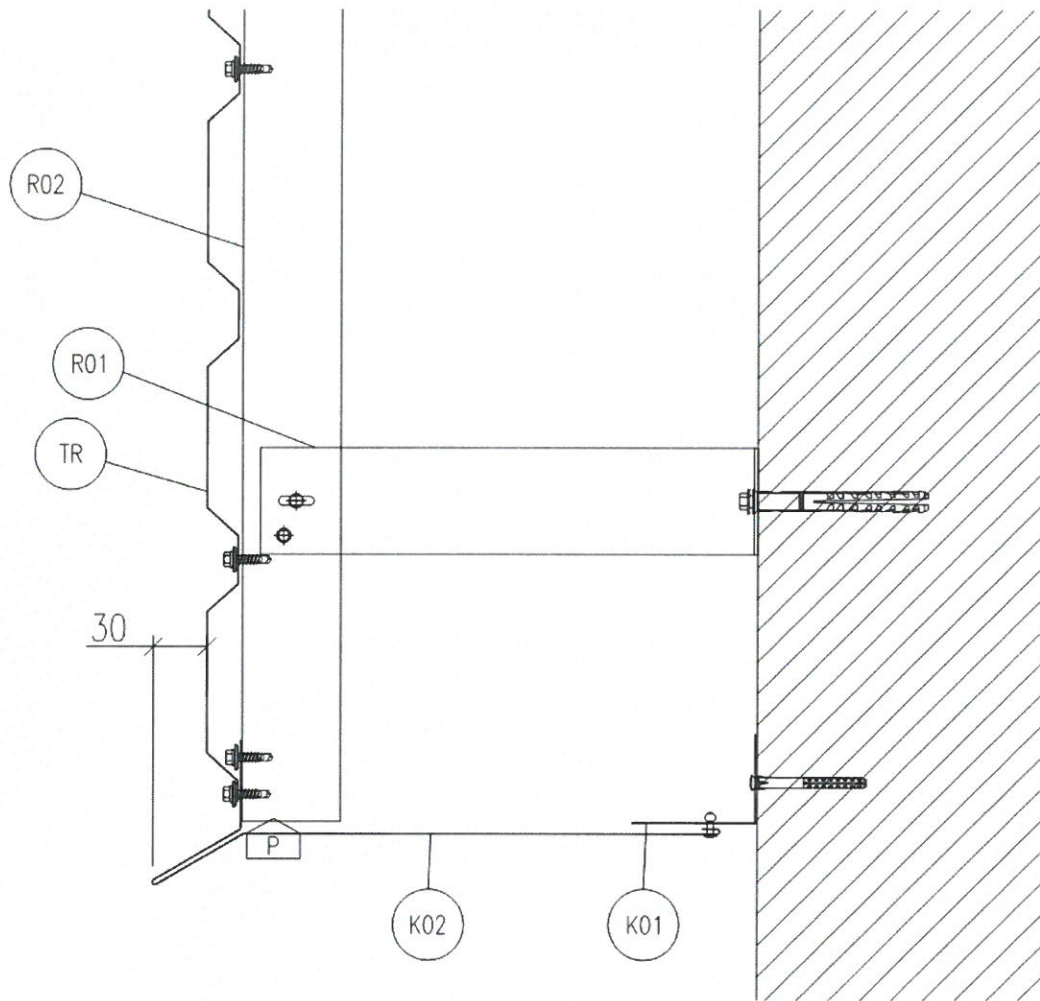


K03  
 side end profile  
 RS 460mm  
 th. 0,5mm  
 color

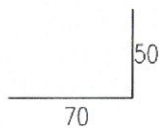


C01 .... DEKCASSETTE IDEAL

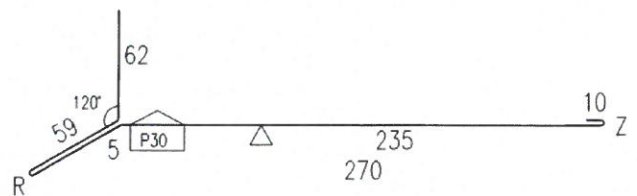
Fig. 22. The view of the test specimen - detail



K01  
attachment profile  
RS 130mm  
th. 0,5mm  
color

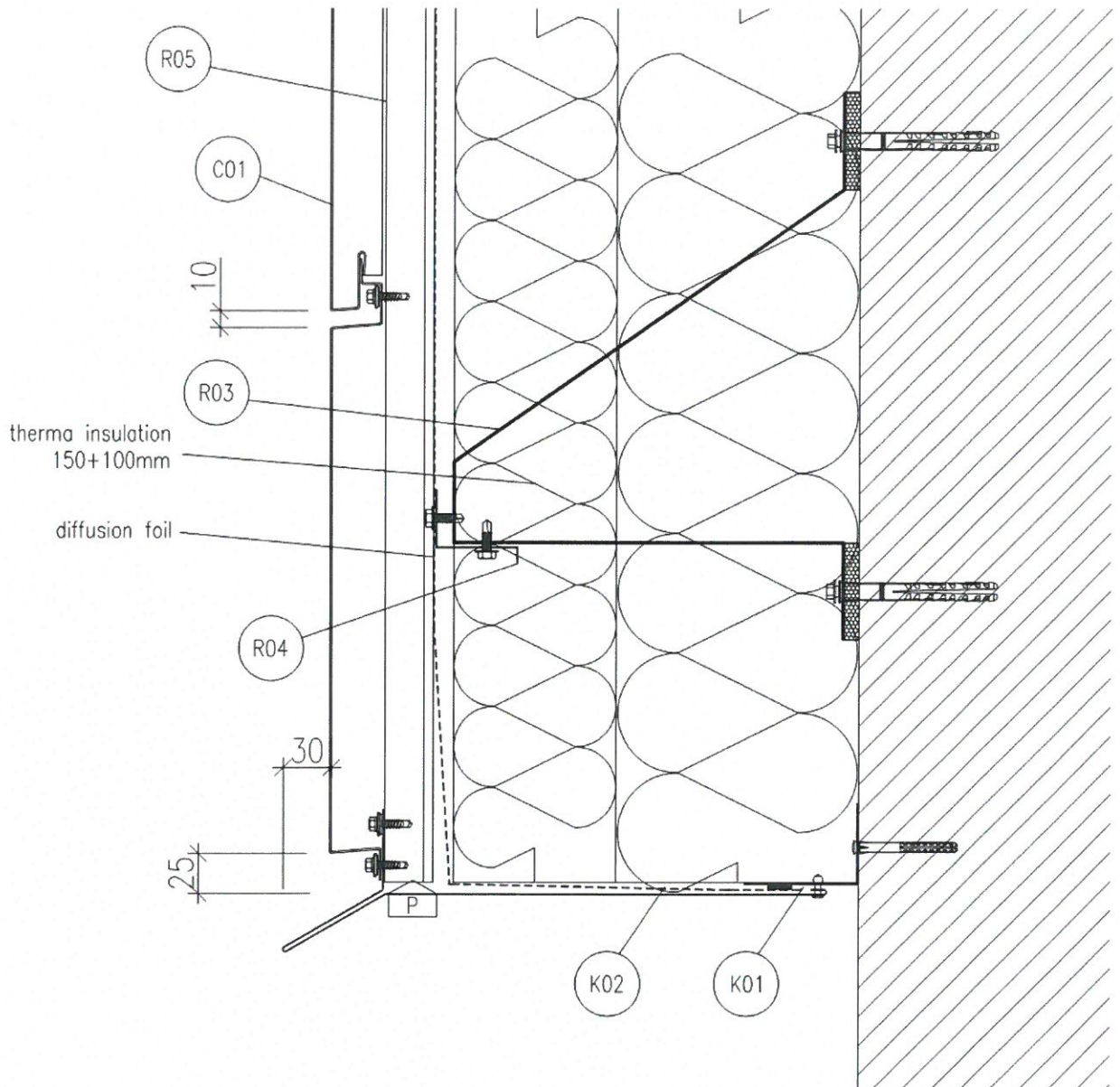


K02  
starting profile with a drip  
RS 460mm  
th. 0,5mm  
color

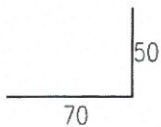


TR ... DEKPROFILE TR18W

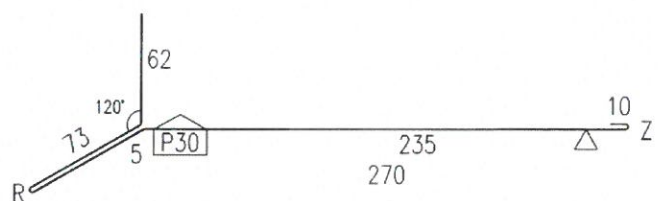
Fig. 23. The view of the test specimen - detail



K01  
 attachment profile  
 RS 130mm  
 th. 0,5mm  
 color



K02  
 starting profile with a drip  
 RS 578 mm  
 th. 0,5mm  
 color



C01 .... DEKCASSETTE IDEAL

Fig. 24. The view of the test specimen - detail



Fig. 25. Installation of the DEKMETAL façade

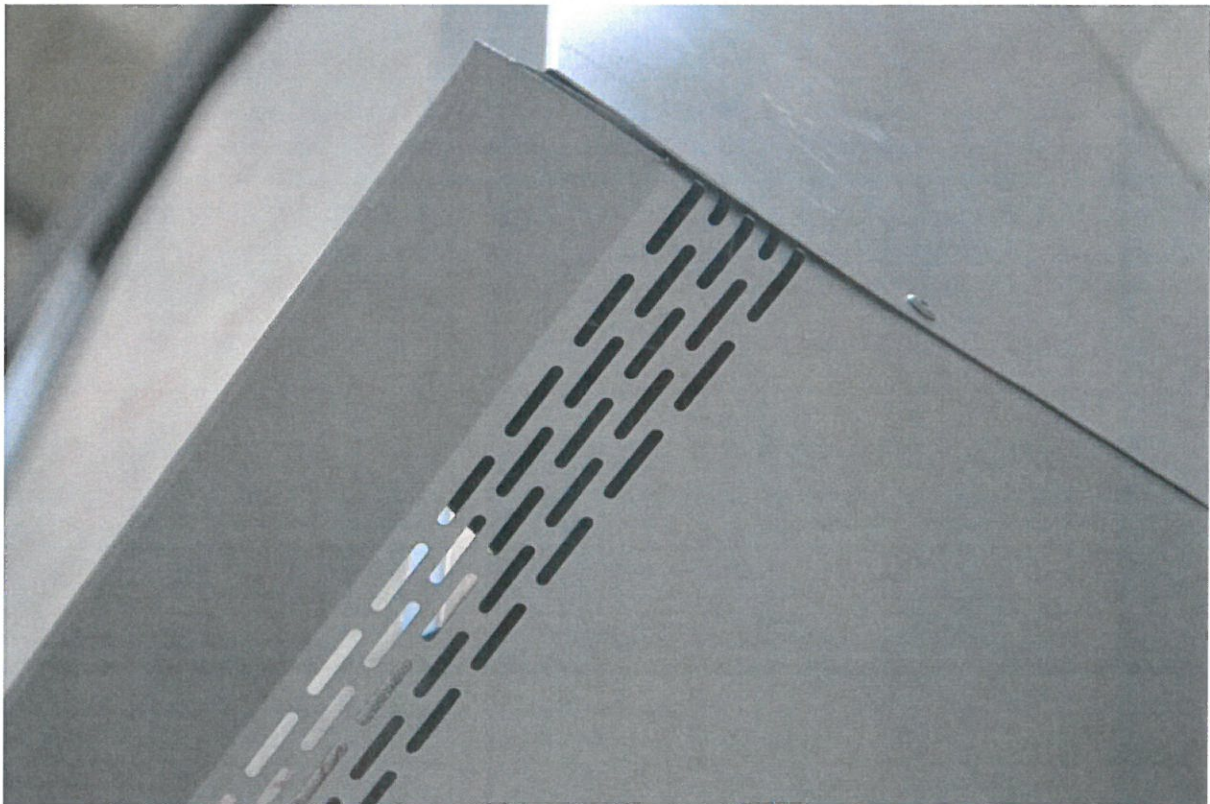


Fig. 26. Installation of the DEKMETAL façade - detail



Fig. 27. Installation of the DEKMETAL façade



Fig. 28. Test specimen prior to the test

The laboratory test was carried out on 17 April of 2018 in the Fire testing Laboratory of ITB in Pionki. The test specimen consisted of DEKMETAL ventilated systems façades systems manufactured by

DEKMETAL s.r.o. [3]. The air temperature and humidity during the test was 19.0°C and 60.0% respectively. The test specimen was made on 16 April of 2018 on a specially prepared and seasoned autoclaved aerated concrete wall (600 kg/m<sup>3</sup>), embedded in a steel test frame.

The scheme of the test stand is shown in Fig. 15. The configuration and dimensions of the test specimen is shown in Fig. 16-24. The test specimen during the installation and on the test site prior to the test is shown in Figs. 25 to 28, the test specimen during the test is shown in Figs. 29 to 41, and test specimen after the test is shown in Figs. 42 to 45.

The width of the test specimen 350 cm, the height of the test specimen 195 cm, the thickness of the test specimen counting from the autoclaved aerated concrete wall 32.6 cm. The test specimen was assembled according to [3].

### **Description of composition A (left side of specimen, without insulation):**

The bearing grid consists of spot L-panels with a 250 mm pitch. The distances between the panels are plotted in the documentation. The panels are attached to the bearing structure with one frame anchor, consisting of a polyamide dowel and a 10x120mm galvanized screw. Vertical J-profiles are installed on the panels, connected using 2 pcs of self-tapping galvanized 5.5x25mm screws. As a perimeter ending, different shaped ledges and profiles are used. These bars are made of galvanized varnished sheet metal with a minimum thickness of 0.5mm and are attached to the profiles of the supporting grid with self-tapping screws with varnished surface and sealing, screw size is 5.5x25mm. Alternatively, aluminum painted rivets 4.0x10mm can be used, which are also used to join the edges and profiles together. Some attachment profiles are attached to the perimeter support structure with 6x60mm knock-in dowels. The facing elements are made of TR18WA trapezoidal sheet and CR18W corrugated sheet. These are attached to the bearing grid with self-drilling screws with varnished coating and sealing, screw size is 5.5x25mm. The attachment is in a place of vertical bearing grid, in every second wave in trapezoidal sheet TR18WA and in every third wave in the corrugated sheet CR18W.

### **Specific parameters of the components:**

#### Anchor to the supporting structure

A frame anchor is used to attach the panels to the supporting structure, anchor diameter is 10mm, length is 120mm. The anchor consists of a polyamide dowel and a hexagonal steel galvanized screw. Anchor from the reference manufacturer Rawl, type R-FF1 or manufacturer Ejot, type SDF-KB-10H.

#### Support rack - L250 bracket

System panel of the Dekmetal carrier grid. Made of galvanized steel sheet min. specification DX51 (according to EN 10346) with guaranteed yield stress min. 140MPa. The thickness of the sheet is 2.0mm.

#### Vertical line J-profiles

Vertical line J-profiles are a system profiles of the Dekmetal carrier grid. They are made of galvanized sheet metal min. specifications DX51 (according to EN10346) with guaranteed yield stress min. 140MPa. The thickness of the sheet is 1.0mm. Profiles are either galvanized or alternatively topped with polyester varnish.

#### Anchor screw for L-bracket / J-profile connection

To attach the J-profiles to the L-brackets, always use 2 pcs of self-tapping galvanized screws with a pressed washer. Screw size is 5.5x25mm. Screws from reference manufacturer Gunnebo, type GT5 FH.

#### Ending bars and profiles

Ending bars and profiles are manufactured in various shapes in accordance with the mounting documentation. Profiles are made of galvanized steel sheet min. specifications DX51 (to EN10346) with guaranteed yield stress min. 140MPa. The thickness of the sheet is at least 0.5mm. Surface is varnished with polyester, alternatively polyurethane lacquers in the thickness of 25-50 microns.



#### Screw for connecting bars and profiles

For the fastening of the bars and profiles, or the connection between them, self-tapped galvanized screws with a pressed washer and an EPDM seal are used. Screw size is 5.5x25mm. Screws from the reference manufacturer Gunnebo, type GT5 Z14, alternatively GT5 Z16. Alternatively, blasting varnished aluminum rivets in the size of 4.0x10mm can be used. Reference manufacturer Gunnebo.

The distance of the screws or rivets is at a maximum distance of 500mm apart.

#### Facing elements

The trapezoidal sheet TR18WA and the CR18W corrugated sheet metal are used as facing elements. These tiling elements are made of galvanized steel sheet min. specifications DX51 (according to EN10346). The thickness of the sheet is at least 0.5mm. Surface treatment is top polyester, alternatively polyurethane lacquers in the thickness of 25-50 microns.

#### Anchor bolt for fastening the facing elements

A self-drilling galvanized screw with a pressed washer and an EPDM seal is used to attach the cladding elements to the supporting grid or to connect them to each other. Screw size is 5.5x25mm. Screws from the reference manufacturer Gunnebo, type GT5 Z14, alternatively GT5 Z16. Reference manufacturer Gunnebo. The screw position is in each vertical profile of the supporting grid and in every second wave in the trapezoidal sheet TR18WA, or every third wave in the corrugated sheet CR18W. In the place of overlapping, the distance between the bolts must be less 500mm.

#### **Description of composition A (right side of specimen, with insulation):**

The supporting grid consists of spot A-panels with a 250 mm pitch. The dimensions of the brackets are plotted in the documentation. The brackets are attached to the base structure by two frame anchors, consisting of a polyamide dowel and a 10x120mm galvanized screw. Horizontal Z-profiles are installed on the panels, connected using 2pcs of self-tapping galvanized 5.5x25mm screws. The composition is supplemented with mineral thermal insulation with a 250mm thickness. The thermal insulation is attached to the base structure with plastic plate dowels and is therefore self-supporting. Horizontal Z-profiles are installed in vertical lanes with an additional windproof and waterproofing, diffusely open lightweight foil. This is temporarily glued to horizontal Z-profiles by double-sided adhesive tape. In the next step, the vertical Omega profiles are fixed to the Z profiles, which are secured in each connected position by 2 pcs of self-tapping galvanized screws of the size 5.5x25mm. As a perimeter end, different shaped bars and profiles are used which are made of galvanized varnished sheet with a minimum thickness of 0.5mm and are attached to the profiles of the supporting grid with self-tapping screws with varnished surface and sealing, screw size is 5.5x25mm. Alternatively, aluminum painted rivets 4.0x10mm can be used, which are also used to join the edges and profiles together. Some attachment profiles are attached to the perimeter support structure with 6x60mm knock-in dowels. The tiling elements are Dekcassettes Ideal. These are attached to the support grid with self-drilling screws with varnished coating and sealing, screw size is 5.5x25mm. The anchorage is done at the points of the vertical OM profiles.

#### **Specific parameters of the components:**

##### Anchor to the base structure

A frame anchor is used to attach the panels to the supporting structure, anchor diameter is 10mm, length is 120mm. The anchor consists of a polyamide dowel and a hexagonal steel galvanized screw. Anchor from the reference manufacturer Rawl, type R-FF1 or manufacturer Ejot, type SDF-KB-10H.

##### Supporting grid - A250 bracket

System console of the Dekmetal supporting grid. Made of galvanized steel sheet min. specification DX51 (to EN 10346) with guaranteed yield stress min. 140MPa. The thickness of the sheet is 2.0mm.

##### Thermo pads

Thermo pads are used to eliminate the thermal bridge between the substructure and the A-brackets of the supporting grid. Thermo pads are made of expanded polystyrene. The size of the thermo pad is 60x60x10mm. The reaction to fire according to EN13501 is Class E.

#### Horizontal Line Z-Profiles

The horizontal linear Z-profiles are a system profiles of the Dekmetal carrier grid. They are made of galvanized sheet metal min. specifications DX51 (to EN10346) with guaranteed yield stress min. 140MPa. The thickness of the sheet is 1.0mm. Profiles are either galvanized or alternatively topped with polyester varnish.

#### Anchor screw for L-bracket / Z-profile connection

To attach the line Z-profiles to the point A brackets, always use 2pcs of self-tapping galvanized screws with a pressed washer. Screw size 5.5x25mm. Screws from reference manufacturer Gunnebo, type GT5 FH.

#### Thermal insulation

Mineral fiber thermal insulation with a total thickness of 250mm is used in the composition. The volume weight of the thermal insulation is 40 kg /m<sup>2</sup>. The anchoring of the thermal insulation is made by plastic plate dowels as recommended by the thermal insulation manufacturer. The reference manufacturer of the thermal insulation is Isover, product type Isover Uni.

#### Complementary lightweight windproof waterproofing foil

A lightweight, diffusely opened foil is applied to protect thermal insulation from weather conditions. The foil is made from polyester or polypropylene. The foil thickness is about 0.6mm. The foil is temporarily attached to horizontal Z-profiles by double-sided adhesive tape. Reference manufacturer Juta, product type Dekten Pro.

#### Vertical linear Omega profiles

Vertical linear omega profiles are attached to the horizontal Z-profiles, which are the system profiles of the Dekmetal supporting grid. They are made of galvanized sheet metal min. specifications DX51 (to EN10346) with guaranteed yield stress min. 140MPa. The thickness of the sheet is 1.0mm. Profiles are either galvanized or alternatively topped with polyester varnish.

#### Anchor screw for Z-profile / Omega profile connection

To attach vertical linear omega profiles to horizontal linear Z-profiles, self-tapping galvanized screws with a pressed washer are used. The number of screws is 2pcs per joint. Screw size is 5.5x25mm. Screws from reference manufacturer Gunnebo, type GT5 FH.

#### Ending bars and profiles

Ending bars and profiles are manufactured in various shapes in accordance to the mounting documentation. Profiles are made of galvanized steel sheet min. specifications DX51 (to EN10346) with guaranteed yield stress min. 140MPa. The thickness of the sheet is at least 0.5mm. Surface treatment is top polyester, alternatively polyurethane varnish in the thickness of 25-50 microns.

#### Anchor screw for fastening bars and profiles

For the fastening of the bars and profiles, or the connection between them, self-tapping galvanized screws with a pressed washer and an EPDM seal are used. Screw size is 5.5x25mm. Screws from the reference manufacturer Gunnebo, type GT5 Z14, alternatively GT5 Z16. Alternatively, blasting varnished aluminum rivets in the size of 4.0x10mm can be used. Reference manufacturer Gunnebo.

The location of the bolts or rivets is at a maximum distance of 500mm apart.

#### Facing elements

Facade cassettes, reference cassettes Dekcassette Ideal, are used as cladding elements. These tile elements are made of galvanized steel sheet min. specifications DX51 (according to EN10346). The thickness of the sheet is in the range of 0.75-1.25mm. A sheet thickness of 1.0mm is used on the test sample with respect to the height of the cassettes about 600mm. Surface treatment is top polyester, alternatively polyurethane lacquers in the thickness of 25-50 microns.

### Anchor bolt for fastening the facing elements

To attach the cladding elements to the supporting grid, self-tapping varnished galvanized screws with pressed washer and EPDM seal are used. Screw size is 5.5x25mm. Screws from the reference manufacturer Gunnebo, type GT5 Z14, alternatively GT5 Z16. Reference manufacturer Gunnebo. The screw position is in each vertical profile of the supporting grid and fixed to pre-prepared oval holes in the cassettes.

A test scenario was adopted with heating using a gas burner of a fragment of the façade, where the flames escaped through the windows and influenced the façade.

### **Observations during the test:**

- t = 2 min - melted aluminium droplets falling off, in solution with mineral wool on the right side. Visible fire between elements on the right side - burning foil;
- t = 4 min - flakes of peeling paint from the cladding;
- t = 5 min - inflammation of the paint on the cladding (2 seconds);
- t = 6 min - deformation of bottom flashing mounted directly above the orifice;
- t = 8 min - ignition for about 2 minutes of the foil between the 2nd and 3rd facing elements from below. Temperature 532°C, about 20 cm from the bottom edge of the sample;
- t = 10 min - the foil went out;
- t = 19 min - stable cladding behavior;
- t = 26 min - slight bending of the horizontal steel sheet, left half, from the furnace, from the inside
- t = 33 min - deflection of the horizontal steel sheet, right half, from the furnace, from the inside. Aluminum rivets melted;
- t = 43 min - falling off a piece of mineral wool (<100 g) from the console area;
- t = 48 min - stable cladding behavior. Deflection of the horizontal bottom steel sheet - 5 cm;
- t = 53 min - bottom panel heated to red;
- t = 60 min - falling off a piece of mineral wool 5×5×3 cm. Fire - 4 seconds.
- t = 62 min - stable cladding behavior. Deflection of the horizontal bottom steel sheet - 30 cm;
- t = 69 min - the bottom steel sheet cladding ripples slightly;
- t = 75 min - falling off a piece of mineral wool 3×3×3 cm. Fire - a few seconds;
- t = 85 min - the middle part of the horizontal sheet deflects more and more;
- t = 89 min - falling off a piece of mineral wool, 200 g. The mineral wool partially melted;
- t = 93 min - on the right side of the specimen, droplets of molten plastic fall off (probably from plastic dowels fixing mineral wool);
- t = 113 min - stable cladding behavior. Deflection of the horizontal bottom steel sheet - 30 cm;
- t = 121 min - the test was terminated with agreement with the Client.



Fig. 29. Test specimen during the test  $t = 5$  min.

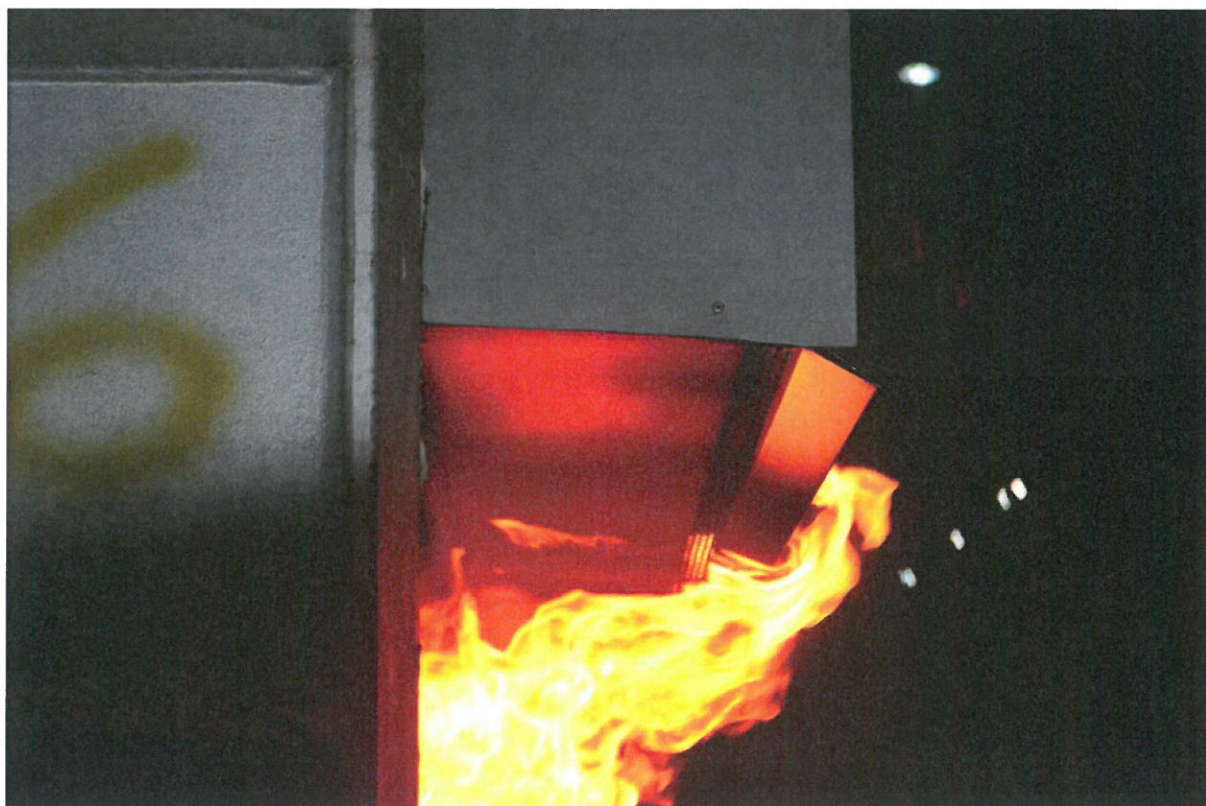


Fig. 30. Test specimen during the test  $t = 5$  min.



Fig. 31. Test specimen during the test  $t = 16$  min



Fig. 32. Test specimen during the test  $t = 31$  min



Fig. 33. Fragments of mineral wool that have fallen off,  $t = 43$  min



Fig. 34. Test specimen during the test  $t = 53$  min



Fig. 35. Test specimen during the test  $t = 63$  min

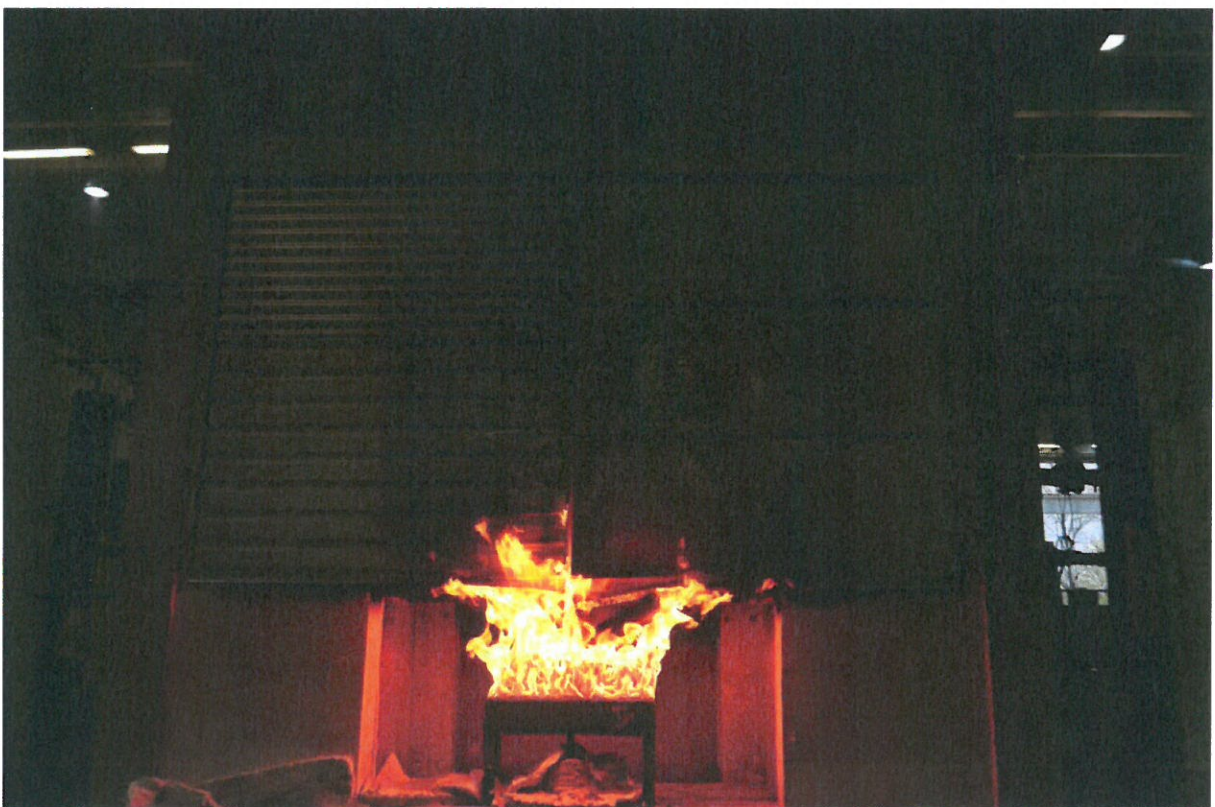


Fig. 36. Test specimen during the test  $t = 75$  min



Fig. 37. Test specimen during the test  $t = 99$  min



Fig. 38. Fragments of mineral wool that have fallen off,  $t = 100$  min.





Fig. 39. Test specimen during the test  $t = 106$  min



Fig. 40. Test specimen during the test  $t = 121$  min



Fig. 41. Test specimen during the test  $t = 121$  min



Fig. 42. Test specimen directly after the test - detail

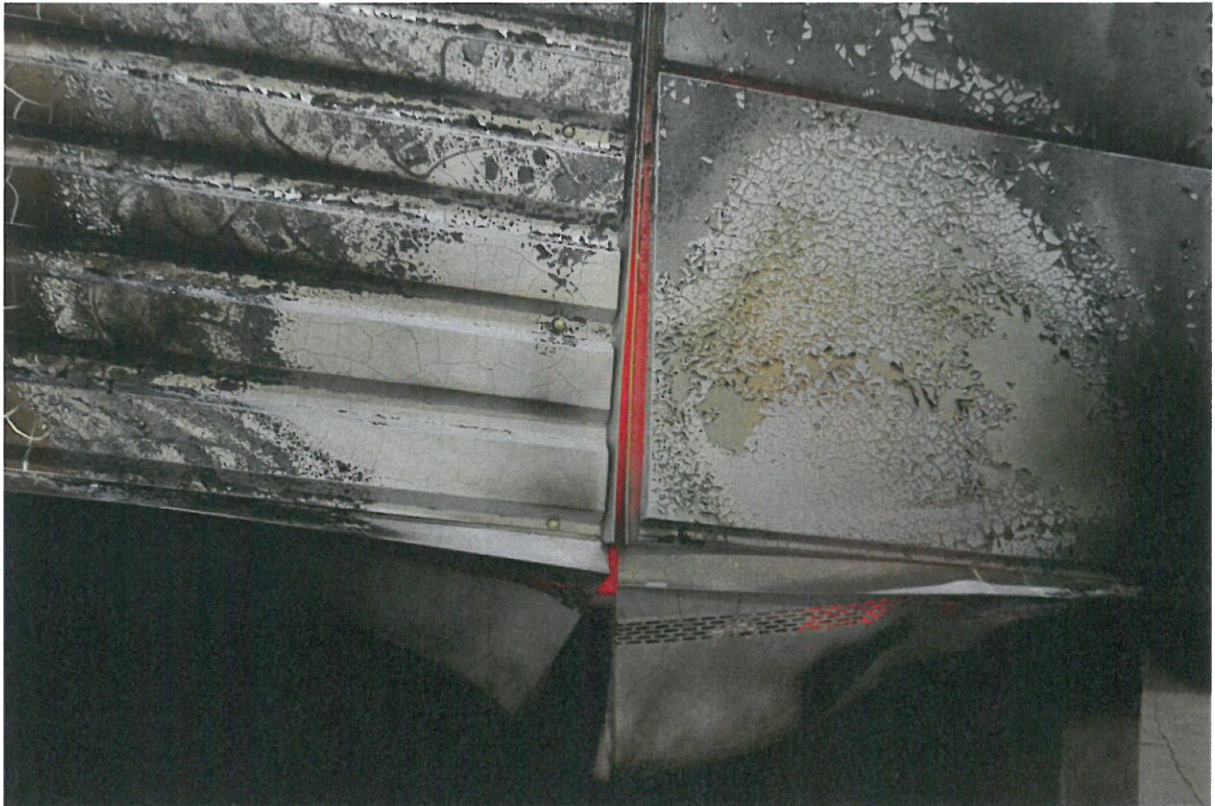


Fig. 43. Test specimen directly after the test - detail



Fig. 44. Test specimen after the test



Fig. 45. Test specimen after the test - detail

After the test, deformation of steel claddings was found, burnout of 2 aluminum rivets and falling off small to 0.2 kg, fragments of mineral wool. Partially burnt also polyamide dowels at the bottom of the specimen. Steel pins (hexagonal steel galvanized screw) remained intact. There was no loosening of the fastenings, defects of the steel carrier grid, destruction of the steel anchors.

## 6 Technical assessment of the DEKMETAL ventilated steel façade system in the context of falling off in the case of fire

- On the basis of analysis of test results and provided technical documentation, it is assessed that the **DEKMETAL** ventilated steel façade system with façade claddings in the form of **DEKCASSETTE**<sup>®</sup> cassettes or **DEKPROFILE**<sup>®</sup> profiled sheets, manufactured by DEKMETAL s.r.o., manufactured and assembled according to description of sections 4 and 5 can be considered safe in the case of fire.

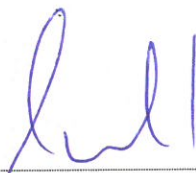
It is assessed that this behaviour should not pose any threat for evacuated people and rescue teams for fire duration up to 120 minutes, therefore the **DEKMETAL** ventilated steel façade system may be considered as safe in the context of § 225 of the Decree [1].

## 7 Final remarks

Technical assessment of this work is granted for unlimited duration, provided that no changes will be introduced to the system **DEKMETAL** ventilated steel façade manufactured by DEKMETAL s.r.o.

In the case of ambiguity, the base of interpretation of this technical opinion is its version in Polish.

Author:



Paweł Sulik, PhD. Eng. (tel. 693350894, p.sulik@itb.pl)

Verified by:

**Head of Fire Resistance  
of Partitions, Service Installations  
and Smoke Control of Doors  
and Shutters Division**

**Bartłomiej Sedlak, M.Sc. Civil Eng.**

**ACTING HEAD  
of Fire Testing Laboratory**

**Bartłomiej Papis, PhD Eng.**

Warsaw, 28.VI.2018 r.

(last page of the Technical Opinion)

