National technical approval

DiBt - Deutsches Institut für Bautechnik

Approval body for construction products and types of construction
Technical test authority

A public-law institution jointly supported by the Federal Government and the Länder
Member of the EOTA, the UEA and the WFTA

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Approval number: Z-33.1-1175

Period of validity
from: 8th May 2015
to: 8th March 2020

Applicant:
AGROB BUCHTAL GmbH
Buchtal 1
D-92521 Schwarzenfeld

Subject matter of the approval:
Facade system "KeraTwin K20"

The subject matter of the approval stated above is hereby granted the national technical approval. This national technical approval comprises nine pages and 31 sheets of annexes. This national technical approval has been admitted for the first time on the 4th of March, 2010.

From DiBt not checked translation of the German version.

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I. GENERAL PROVISIONS

1 With the national technical approval, the usability or applicability of the subject matter of the approval is proved in the meaning of the “Landesbauordnungen” (Building Regulations of the Länder).

2 If in the national technical approval demands are made on the special expert knowledge and experience of the persons entrusted with the production of construction products and types of construction according to the regulations of the Länder corresponding to § 17 sect. 5 “Musterbauordnung” (Model Building Regulation), it has to be considered that this expert knowledge and experience can also be proved by proofs of equal value of other member states of the European Union. Should the situation arise, this also applies to proofs of equal value submitted within the scope of the Agreement on the European Economic Area or other bilateral agreements.

3 The national technical approval does not replace the statutory approvals, consents and certificates for the realization of building projects.

4 The national technical approval is granted regardless of the rights of third parties, in particular private property rights.

5 The manufacturer and the distributor of the subject matter of the approval have to make copies of the national technical approval available to the user of the subject matter of the approval, regardless of further regulations in the “Special Provisions”, and to point out that the national technical approval must be available at the place of use. Upon request, copies of the national technical approval have to be made available to the authorities involved.

6 The national technical approval may be copied only completely. A partial publication requires the consent of Deutsches Institut für Bautechnik. Texts and drawings of advertising brochures must not conflict with the national technical approval. Translations of the national technical approval must contain the note “Translation of the German original version not reviewed by Deutsches Institut für Bautechnik”.

7 The national technical approval is granted until revoked. The provisions of the national technical approval can be amended and modified later, especially if new technical knowledge requires this.

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II. SPECIAL PROVISIONS

1 Subject matter of the approval and area of application

The national technical approval covers the curtain-type, rear-ventilated outside wall cladding "KeraTwin® K20" - hereinafter the facade system "KeraTwin® K20" - consisting of "KeraTwin® K20" ceramic facade panels with profile on the reverse side, which are fastened on an aluminium substructure. The facade panels are fixed in a form-fitting manner on system clamps or on system-specific, vertically arranged system rails, T-profiles or Omega profiles made of aluminium.

The system clamps and the system rails are fixed on the substructure by means of rivets or screws.

The ceramic facade panels "KeraTwin® K20", the system rails, the T-profiles and the Omega profiles as well as the system clamps are non-combustible.

The permissible building height for the use of the facade system "KeraTwin® K20" results from the proof of stability, provided that the fire protection regulations of the Länder valid at a time do not stipulate lower heights.

The stability of the substructure and its anchoring at the building are not the subject matter of this national technical approval.

A possibly existing heat insulation must consist of non-combustible mineral fibrous insulating materials according to DIN EN 131621. It must be directly fixed at the building, independent of the substructure.

2 Provisions for the construction products and the type of construction

2.1 General

The subject matter of the approval (type of construction) and its components (construction products) must correspond to the Special Provisions and the annexes of this national technical approval as well as the specifications submitted to Deutsches Institut für Bautechnik.

2.2 Properties and composition

2.2.1 Ceramic façade panels "KeraTwin® K20"

The façade panels "KeraTwin® K20" are extruded ceramic panels according to DIN EN 14411², Annex B, group AIIa – part 1, precision, with the following characteristics.

The (mean) weight per unit area of the façade panels is $32 \pm 2$ kg/m² and the total thickness (without grooves) is $d = 20 \pm 1$ mm. Refer to Table 1 for nominal heights; in-between sizes (e.g. panels with nominal heights between the standard nominal heights according to Table 1) may only be used when the provisions of this Approval are adhered to.

For the cross-sectional dimensions of the façade panels and the grooves on the reverse side of the panels, please refer to Annexes 2.1 and 2.2. Deviations as regards the position of the extrusion holes or the grooves on the reverse – except in areas where the panels are to be fastened – are permissible, as long as the requirements as regards the flexural load-bearing capacity are adhered to. Shape and dimensions of panels with in-between heights (height between the nominal heights listed in Table 1) must be based on shape and dimensions of the next smaller or next larger standard nominal height; in particular, shape and dimensions of panel edges and fixing points must be identical with shape and dimensions of the standard version.

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2. Ceramic tiles – Definitions, classification, characteristics, evaluation of conformity and marking
The maximum panel length is 1.80 m (for fastening on vertical profiles according to Section 2.2.2 a to c) or 1.35 m (for fastening with brackets according to Section 2.2.2 d) (see also Section 3.1).

Table 1: Heights of the facade panels "KeraTwin® K20"

<table>
<thead>
<tr>
<th>Grid height / nominal height [mm]</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>400</th>
<th>500</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production height H [mm]</td>
<td>205 ± 2</td>
<td>255 ± 2</td>
<td>305 ± 2</td>
<td>405 ± 2</td>
<td>505 ± 2</td>
<td>605 ± 2</td>
</tr>
</tbody>
</table>

The visible face of the façade panels is smooth or grooved (lined), glazed or unglazed. In tests in accordance with DIN EN ISO 10545-4 (3-point bend testing, span l2 = L – 20 mm with L = panel length, test along the longitudinal axis, testing speed 1 mm/min), the KeraTwin façade panels exhibited at least the breaking loads (F_{bs}) listed in Table 2 below (F_{bs} determined in accordance with DIN EN ISO 10545-4, Section 8).

Table 2: Minimum breaking loads for “KeraTwin® K20” façade panels

<table>
<thead>
<tr>
<th>Test</th>
<th>Breaking loads F_{bs} each nominal height [N]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal height 200</td>
</tr>
<tr>
<td>Visible side in the bending pressure zone</td>
<td>3180</td>
</tr>
<tr>
<td>Visible side in the bending tension zone</td>
<td>3620</td>
</tr>
</tbody>
</table>

When using façade panels with in-between sizes, the breaking loads of the next larger standard nominal height must be used.

### 2.2.2 Fixing materials and fasteners

Only the vertically profiles according to points a) to c) (system rails, T-profiles, Omega profiles) or the system clamps according to point d) described in the following may be used as fixing materials for the facade panels.

a). System rail

The vertical system rails must consist of the aluminium alloy EN AW 5754 (H22) according to DIN EN 485-2, have a thickness of at least 2 mm and correspond to the specifications in the annexes 3.1 to 3.4.

b). T-profiles

The vertical T-profiles must consist of the aluminium alloy EN AW 6060 T6 according to DIN EN 755-2, have a thickness of at least 2 mm and correspond to the specifications in the annexes 4.1 to 4.4.

c). Omega profiles

The vertical Omega profiles must consist of the aluminium alloy EN AW 5754 (H22) according to DIN EN 485-2, have a thickness of at least 2 mm and correspond to the specifications in the annexes 5.1 to 5.8.

d). System clamp

The system clamps (single-clamp, twin-clamp, edge clamp, edge clamp, left and edge clamp, right) must consist of the aluminium alloy EN AW 5754 (H22) according to DIN EN 485-2, have a material thickness of at least 3 mm and correspond to the specifications in the annexes 6.1 to 6.4.
e). Fasteners (screws and rivets)
   For the connection of the system clamp to the bearing profiles of the substructure, the following fasteners have to be used:
   - Drilling screws MAGE TOPEX Ø 3.5 mm, made of stainless steel according to DIN EN 10088, material no. 1.4567, corresponding to the specifications in annex 7,
   - Gesipa PolyGrip blind rivet Ø 3.2 mm, made of stainless steel according to DIN EN 10088: tubular rivet made of the material no. 1.4567 and rivetting mandrel made of the material no. 1.4541, corresponding to the specifications in annex 7.

   For the connection of the vertical system rail or the Omega profiles to the bearing profile of the substructure, the following fasteners have to be used:
   - Drilling screws MAGE TOPEX Ø 4.8 mm, made of stainless steel according to DIN EN 10088, material no. 1.4578, corresponding to the specifications in annex 7,
   - blind rivet Gesipa PolyGrip Alu Ø 4.8 mm with a shank made of aluminium EN-AW 5052 according to DIN EN 573 and a mandrel made of stainless steel according to DIN EN 10088, material no. 1.4541 according to approval no. Z-14.1-4, annex 2.13.

   Other fasteners, i.e. drilling screws and rivets which are not specified above, may be used if they are regulated products (e.g. according to the approval no. Z-14.1-537 or no. Z-14.1-4) and their suitability concerning the static requirements has been proved for the specific project. With regard to corrosion protection, DIN 18516-1 must be observed.

2.2.3 Substructure
   The vertical or horizontal aluminium bearing profiles of the substructure must correspond to the following specifications:
   - Tensile strength: Rm ≥ 245 N/mm² (e.g. aluminium alloy EN AW-6063 T66 according to DIN EN 755-2)
   - Material thickness: t_{min} ≥ 2 mm
   - Width of profile flange ≥ 80 mm (in case of applications with system rails) and ≥ 60 mm (in case of applications with system clamps) respectively

2.2.4 Accessories
   In the case of the "KeraTwin® K20" facade system with panel fastening on system rails, T-profiles or Omega profiles, joint profiles or spacers made of aluminium have to be used for securing the position of the facade panels (see annexes 3.4, 4.4, 5.4 and 5.8).

2.2.5 Facade system "KeraTwin® K20"
   The facade system "KeraTwin® K20" may only consist of construction products according to the sections 2.2.1 to 2.2.4.
   The structure of the facade system "KeraTwin® K20" is shown in the annexes 1.1 to 1.6 (survey of the diverse fastening variants).

2.3 Production, packaging, transport, storage and marking
2.3.1 Production
   The construction products according to sections 2.2.1 to 2.2.3 have to be factory-made.

2.3.2 Packaging, transport, storage
   The construction products according to sections 2.2.1 to 2.2.3 must be stored according to the manufacturers’ instructions and protected against damage. Damaged products must not be installed.
2.3.3 Marking

The construction products according to the sections 2.2.2, their packagings, package leaflets or delivery notes must be marked with the conformity mark (German Ü-Zeichen) by the manufacturer in accordance with the Conformity Mark Regulations of the Länder. The mark may only be applied if the requirements according to section 2.4 are met.

2.4 Evidence of conformity

2.4.1 Proof of compliance by manufacturer’s declaration of conformity and initial inspection

Proof of compliance with the provisions of this present Technical Approval of the attachment systems and fasteners according to Section 2.2.2 (apart from the already approved blind rivets) must be furnished for each manufacturing plant by way of a declaration of compliance by the manufacturer based on the in-house product monitoring and an initial test of the construction product by a certified testing authority. The manufacturer must declare compliance by labelling the construction product with the mark of conformity with reference to its designated use.

2.4.2 In-plant production control

Each manufacturing plant must set up and carry out internal production monitoring. Internal production monitoring refers to a continuous production monitoring by the manufacturer to ensure that the products made by it comply with the regulations of this Technical Approval. The internal production monitoring must at least include the measures mentioned in Annex 3.

Table 3: In-plant production control

<table>
<thead>
<tr>
<th>Construction product</th>
<th>Type of test/standard</th>
<th>Requirements</th>
<th>Extent and frequency of the controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamps, system rails, Omega profiles, T-profiles, screws and rivets according to section 2.2.2</td>
<td>Dimensions, material properties</td>
<td>See section 2.2.2 and the annexes 3.1 to 3.4, 4.1 to 4.4, 5.1 to 5.8 as well as 6.1 to 6.4 and 7</td>
<td>Acceptance test certificate 3.1 according to DIN EN 10204 for the base material, every delivery</td>
</tr>
</tbody>
</table>

The results of the internal production monitoring must be recorded and analysed. Such records must contain at least the following data:
- Name of construction product and/or of the raw material and the components;
- Type of monitoring or inspection;
- Date of production and inspection of the construction product and/or of the raw material or the components;
- Result of inspections and monitoring and, if applicable, comparison with the requirements;
- Signature of the person responsible for the internal production monitoring.
The records must be kept for are at least five years. They must be submitted to Deutsches Institut für Bautechnik and the competent supreme construction supervisory authority upon request. If an inspection produces an unsatisfactory result, the manufacturer must immediately take all measures necessary to rectify the fault. Construction products which do not meet the requirements must be handled in such a way as to make sure that no mix-up with compliant products may occur. The respective inspection must be repeated immediately upon rectification of the fault – provided it is technically possible and necessary to furnish evidence for the correction of the fault.

2.4.3 Initial inspection by an accredited inspection authority

During the initial inspection of the attachment systems and fasteners, dimensions and material characteristics must be verified according to Section 2.2.2 and according to Annexes 3.1 to 3.4, 4.1 to 4.4, 5.1 to 5.8, 6.1 to 6.4 and 7.

3 Provisions for design and dimensioning

3.1 Proof of stability

The proof of stability of the facade panels "KeraTwin® K20" according to section 2.2.1 and their fastening by hanging in on the system rails, T-profiles, Omega profiles or system clamps according to section 2.2.2 has to be furnished project-specifically in compliance with the following provisions.

Any facade panel must be fastened at four points according to the provisions from Annex 1.1 or 1.3 to 1.6, respectively, as single-span girder without jib. Alternatively, when fastened on vertical system rails, Omega or T-profiles type-3, the facade panels may also be mounted as single-span girders with jibs on both sides (length of jib L_J = L/4 with L = panel length) (see Annex1.2).

The maximum facade panel lengths depending on fastening type, the nominal panel height H [mm] and the wind load [kN/m²] are listed in Tables 4.1 to 4.3. When using facade panels with in-between sizes (panel height between the standard nominal heights listed below), the maximum panel lengths for the next larger standard nominal height must be used.

The respective smaller value of maximum panel length under positive wind pressure and maximum panel length under negative wind pressure shall be decisive.

Permissible wind loads can be deduced from the Technical Construction Regulations (Technische Baubestimmungen)\(^3\) established by the approval authority.

\(^3\) See www.dibt.de, section: >“fields of activity” <; sub-section: >“Construction Products Lists (Bauregellisten) / Technische Baubestimmungen”<
Table 4.1 maximum panel length $L$ [m] for single-span girders without jib for fastening on retaining clamps (horizontal or vertical mounting) depending on wind load and nominal height $H$ [mm] of the façade panels

<table>
<thead>
<tr>
<th>Wind load $[kN/m^2]$</th>
<th>0.50</th>
<th>0.75</th>
<th>1.00</th>
<th>1.25</th>
<th>1.50</th>
<th>2.00</th>
<th>2.50</th>
<th>3.00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>under positive wind pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$H = 200$</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.30</td>
<td>1.19</td>
<td>1.03</td>
<td>0.92</td>
<td>0.84</td>
</tr>
<tr>
<td>$H = 250$</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.25</td>
<td>1.14</td>
<td>0.99</td>
<td>0.88</td>
<td>0.81</td>
</tr>
<tr>
<td>$H = 300$</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.32</td>
<td>1.21</td>
<td>1.05</td>
<td>0.94</td>
<td>0.85</td>
</tr>
<tr>
<td>$H = 400$</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.30</td>
<td>1.19</td>
<td>1.03</td>
<td>0.92</td>
<td>0.84</td>
</tr>
<tr>
<td>$H = 500$</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.31</td>
<td>1.19</td>
<td>1.03</td>
<td>0.92</td>
<td>0.84</td>
</tr>
<tr>
<td>under negative wind pressure (wind suction)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$H = 200$</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.26</td>
<td>1.09</td>
<td>0.98</td>
<td>0.89</td>
</tr>
<tr>
<td>$H = 250$</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.30</td>
<td>1.13</td>
<td>1.01</td>
<td>0.92</td>
</tr>
<tr>
<td>$H = 300$</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.23</td>
<td>1.06</td>
<td>0.95</td>
<td>0.87</td>
</tr>
<tr>
<td>$H = 400$</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.26</td>
<td>1.04</td>
<td>0.83</td>
<td>0.69</td>
</tr>
<tr>
<td>$H = 500$</td>
<td>1.35</td>
<td>1.35</td>
<td>1.35</td>
<td>1.31</td>
<td>1.11</td>
<td>0.83</td>
<td>0.67</td>
<td>0.56</td>
</tr>
</tbody>
</table>

Table 4.2 maximum panel length $L$ [m] for single-span girders without jib for fastening on vertical system rails, Omega profiles and T-Profiles depending on wind load and nominal height $H$ [mm] of the façade panels

<table>
<thead>
<tr>
<th>Wind load $[kN/m^2]$</th>
<th>0.50</th>
<th>0.75</th>
<th>1.00</th>
<th>1.25</th>
<th>1.50</th>
<th>2.00</th>
<th>2.50</th>
<th>3.00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>under positive wind pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$H = 200$</td>
<td>1.80</td>
<td>1.68</td>
<td>1.46</td>
<td>1.30</td>
<td>1.19</td>
<td>1.03</td>
<td>0.92</td>
<td>0.84</td>
</tr>
<tr>
<td>$H = 250$</td>
<td>1.80</td>
<td>1.61</td>
<td>1.40</td>
<td>1.25</td>
<td>1.14</td>
<td>0.99</td>
<td>0.88</td>
<td>0.81</td>
</tr>
<tr>
<td>$H = 300$</td>
<td>1.80</td>
<td>1.71</td>
<td>1.48</td>
<td>1.32</td>
<td>1.21</td>
<td>1.05</td>
<td>0.94</td>
<td>0.85</td>
</tr>
<tr>
<td>$H = 400$</td>
<td>1.80</td>
<td>1.68</td>
<td>1.45</td>
<td>1.30</td>
<td>1.19</td>
<td>1.03</td>
<td>0.92</td>
<td>0.84</td>
</tr>
<tr>
<td>$H = 500$</td>
<td>1.80</td>
<td>1.69</td>
<td>1.46</td>
<td>1.31</td>
<td>1.19</td>
<td>1.03</td>
<td>0.92</td>
<td>0.84</td>
</tr>
<tr>
<td>$H = 600$</td>
<td>1.80</td>
<td>1.69</td>
<td>1.46</td>
<td>1.31</td>
<td>1.19</td>
<td>1.03</td>
<td>0.92</td>
<td>0.84</td>
</tr>
<tr>
<td>under negative wind pressure (wind suction)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$H = 200$</td>
<td>1.80</td>
<td>1.78</td>
<td>1.54</td>
<td>1.38</td>
<td>1.26</td>
<td>1.09</td>
<td>0.98</td>
<td>0.83</td>
</tr>
<tr>
<td>$H = 250$</td>
<td>1.80</td>
<td>1.80</td>
<td>1.56</td>
<td>1.39</td>
<td>1.27</td>
<td>1.00</td>
<td>0.80</td>
<td>0.67</td>
</tr>
<tr>
<td>$H = 300$</td>
<td>1.80</td>
<td>1.74</td>
<td>1.51</td>
<td>1.33</td>
<td>1.11</td>
<td>0.83</td>
<td>0.67</td>
<td>0.56</td>
</tr>
<tr>
<td>$H = 400$</td>
<td>1.80</td>
<td>1.67</td>
<td>1.25</td>
<td>1.00</td>
<td>0.83</td>
<td>0.63</td>
<td>0.50</td>
<td>0.42</td>
</tr>
<tr>
<td>$H = 500$</td>
<td>1.80</td>
<td>1.33</td>
<td>1.00</td>
<td>0.80</td>
<td>0.67</td>
<td>0.50</td>
<td>0.40</td>
<td>0.33</td>
</tr>
<tr>
<td>$H = 600$</td>
<td>1.67</td>
<td>1.11</td>
<td>0.83</td>
<td>0.67</td>
<td>0.56</td>
<td>0.42</td>
<td>0.33</td>
<td>0.28</td>
</tr>
</tbody>
</table>
Table 4.3: maximum panel length L [m] for single-span girders with jib on both sides \( L_{\lambda} = L/4 \) for fastening on vertical system rails, Omega profiles and T-Profiles depending on wind load and nominal height \( H \) [mm] of the façade panels

<table>
<thead>
<tr>
<th>Wind load [kN/m²]</th>
<th>0.50</th>
<th>0.75</th>
<th>1.00</th>
<th>1.25</th>
<th>1.50</th>
<th>2.00</th>
<th>2.50</th>
<th>3.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>( H = 200 )</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.78</td>
</tr>
<tr>
<td>( H = 250 )</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
</tr>
<tr>
<td>( H = 300 )</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
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<td>1.80</td>
<td>1.80</td>
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<tr>
<td>( H = 400 )</td>
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<td>1.80</td>
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<td>1.80</td>
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<tr>
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<td>1.80</td>
<td>1.80</td>
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<tr>
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under positive wind pressure

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<th>Wind load [kN/m²]</th>
<th>0.50</th>
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<th>1.50</th>
<th>2.00</th>
<th>2.50</th>
<th>3.00</th>
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<td>1.80</td>
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<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.51</td>
</tr>
<tr>
<td>( H = 400 )</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.26</td>
</tr>
<tr>
<td>( H = 500 )</td>
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<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>0.94</td>
</tr>
<tr>
<td>( H = 600 )</td>
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<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.80</td>
<td>1.26</td>
<td>0.94</td>
<td>0.76</td>
</tr>
</tbody>
</table>

under negative wind pressure (wind suction)

The permissible max. panel length are provided with the following conditions:
- the conditions at the paragraphs 2.2.1 to 2.2.3 must be kept
- the max. deflection at the Omega rails, T-rails as well as the System rails and the clamps has to account 1/200 at the supporting width of the rails.

3.2 Thermal insulation and protection against moisture subject to climate conditions

For the proof of the thermal insulation, DIN 4108-2 is applicable.

At the calculation of the thermal resistance (R-value) according to DIN EN ISO 6946 for the outside wall construction, the air layer (rear-ventilation gap) and the facade panels must not be taken into account.

At the proof of the thermal insulation, the rated value of the thermal conductivity according to DIN 4108-4\(^3\), Table 2, Category I, is to be applied for the insulating material used. A rated value according to Category II applies to insulating boards at which a limit value \( \lambda_{\text{limit}} \) was determined within the scope of the technical specification of the insulating material.

The thermal bridges caused by the substructure and its anchoring due to the fact that the thermal insulation layer is penetrated or reduced in its thickness have to be taken into account.

For the proof of the protection against moisture subject to climate conditions, DIN 4108-3 is applicable.
3.3 Fire protection
The ceramic facade panels "KeraTwin® K20" according to section 2.2.1 as well as the fixing materials according to section 2.2.2 are non-combustible.

3.4 Sound insulation
For the proof of the sound insulation (protection against outside noise), DIN 4109 inclusive of Amendment 1 to DIN 4109 are applicable.

4 Provisions for the execution and installation
4.1 Structure
The wall-cladding system “KeraTwin® K20” according to Section 2.25 must be built according to the following definitions and according to the provisions detailed in the Annexes while taking into account the Provisions for Design and Dimensioning (see Section 3).

4.2 Requirements of applicant and contractor

• Applicant:
The applicant shall undertake to inform all persons entrusted with the design and installation of the façade cladding system about the Special Provisions of this Technical Approval and about all other details necessary for a faultless execution of the construction.

• Contractor:
The qualified staff of the contractor must ask the applicant for information about the Special Provisions of this Technical Approval and about all other details necessary for a faultless execution of the construction. According to Annex 9, the contractor has to confirm the approval-compliant execution of façade cladding system. This confirmation must be handed to the building owner.

4.3 Incoming control of the construction products
An incoming control of the labelling according to Section 2.3.3 or according to the relevant standards and approvals must be carried out at the building site for construction products according to Section 2.2.

4.4 Mounting of the facade panels on system rails, T-profiles or Omega profiles
Each system rail or each Omega profile must be fastened to supporting rails of the substructure according to Section 2.2.3 by means of the screws or rivets detailed in Section 2.2.2. Each pair of screws or rivets must be placed in the holes directly underneath the retaining lug of the system rail which holds the façade panel.

Each system rail must be fastened to a vertical support profile of the substructure according to Section 2.2.3.

The Omega profiles are usually fastened to horizontal supporting rails of the substructure.

The T-profiles are usually fastened to wall brackets.

Each façade panel must be fastened at the bottommost and topmost groove on its reverse side in a form fit to the retaining lugs of the system rail, Omega or T-profile (see Annexes 1.1 to 1.4). Joint profiles or joint spacers according to Section 2.2.4 must be used to secure the position of the façade panels.
4.5 Mounting of the façade panels with clamps

4.5.1 Horizontal laying

In the case of the horizontal laying of the facade panels, the fastening with system clamps must be carried out in such a way that the lips of the system clamps laterally engage with the extrusion holes horizontally running through the facade panels. The panels are fastened on both sides, always at the lowest and the topmost extrusion hole (see annex 1.5).

In the area of the cross joints between the facade panels, always four panels are held by a twin-clamp. In areas without panel cross joints, single-clamps or edge-clamps have to be used.

Each system clamp must be fixed on a vertical bearing profile of the substructure according to section 2.2.3 by means of two screws or rivets per clamp according to section 2.2.2.

4.3.2 Vertical laying

In the case of the vertical laying of the facade panels, the fastening with system clamps must be carried out in such a way that the lips of the system clamps engage with the extrusion holes vertically running through the facade panels at the upper and the lower panel edge. The panels are always fastened at the left and the right extrusion hole (see annex 1.6).

In the area of the cross joints between the facade panels, always four panels are held by a twin-clamp. In areas without panel cross joints, single-clamps or edge-clamps have to be used.

Each system clamp must be fixed on a symmetrical horizontal bearing profile (e.g. top-hat profile), which must be fixed on vertical substructure profiles. Alternatively, the system clamps may be directly fixed on vertical bearing profiles of the substructure. Always two screws or rivets according to section 2.2.2 per clamp have to be used as fasteners.

Manfred Klein
Certified Head of division [signature illegible]

Round stamp: Deutsches Institut für Bautechnik
SYSTEM OVERVIEW

Façade cladding system KeraTwin K20 – fastening of the façade panels as single-span girders without jib on vertical system rails

1 - KERATWIN K20 FAÇADE PANEL
2 - VERTICAL SYSTEM RAIL
3 - VERTICAL SUPPORT PROFILE
4 - ALUMINIUM WALL BRACKET
Horizontal section (example for fastening on vertical system rails)

Façade panel as single-span girder without jib

Façade panel as single-span girder with jib on both sides* (L_k = 1/4 L with L= panel length)

* Permissible for fastening on vertical system rails, T-profiles or Omega profiles. L_k = 1/4 L is the distance between the panel edge and the central axis of the profiles mentioned above.

Façade cladding system “KeraTwin K20”

Façade panel as single-span girder without jib or with jib on both sides
SYSTEM OVERVIEW

Façade cladding system KeraTwin K20 – fastening of the façade panels as single-span girders without jib on T-profiles.

1 - KERATWIN® K20 FAÇADE PANEL
2 - SYSTEM RAIL T-PROFILE
3 - ALUMINIUM WALL BRACKET

Façade cladding system "KeraTwin K20"

Fastening on vertical T-profiles – system overview

Annex 1.3
Façade cladding system KeraTwin K20 – fastening of the façade panels as single-span girders without jib on Omega profiles

1 - KERATWIN® K20 FAÇADE PANEL
2 - VERTICAL OMEGA PROFILE
3 - HORIZONTAL CAP PROFILE

Façade cladding system "KeraTwin K20"

Fastening on Omega profiles – system overview
SYSTEM OVERVIEW

Façade cladding system KeraTwin K20 – fastening of the façade panels as single-span girders without jib on clamps; horizontal mounting

1 - KERATWIN® K20 FAÇADE PANEL
2 - FASTENING CLAMP SYSTEM K20
3 - VERTICAL SUPPORT PROFILE
4 - ALUMINIUM WALL BRACKET

Façade cladding system “KeraTwin K20”

Fastening on clamps – horizontal mounting – system overview

Annex 1.5
SYSTEM OVERVIEW

Façade cladding system KeraTwin K20 – fastening of the façade panels as single-span girders without jib on clamps; vertical mounting

1 - KERATWIN K20 FAÇADE PANEL
2 - FASTENING CLAMP SYSTEM K20
3 - HORIZONTAL SUPPORT PROFILE
4 - VERTICAL SUPPORT PROFILE
5 - ALUMINIUM WALL BRACKET

Façade cladding system "KeraTwin K20"

Fastening on clamps – vertical mounting – system overview

Annex 1.6
KeraTwin K20 panels, cross-sectional shape and dimensions – grid heights 300, 250 and 200 mm

Fixing points for retaining clamps according to 4.3

Façade cladding system “KeraTwin K20”

KeraTwin K20 panels, cross-sectional shape and dimensions – grid heights 300, 250 and 200 mm

Annex 2.1
KeraTwin K20 panels, cross-sectional shape and dimensions – grid heights 600, 500 and 400 mm

Fixing points for retaining clamps according to 4.3

Façade cladding system "KeraTwin K20"

KeraTwin K20 panels, cross-sectional shape and dimensions – grid heights 600, 500 and 400 mm

Annex 2.2
System rail K20 for panel grid sizes 200 and 250 mm

Joint grid

Mounting holes for screws / rivets according to 2.2.2

Façade cladding system "KeraTwin K20"
System rail K20 for panel grid sizes 300 and 400 mm

Façade cladding system "KeraTwin K20"

Annex 3.2
System rail K20 for panel grid sizes 600 and 500 mm

Façade cladding system "KeraTwin K20"

System rail K20 for panel grid sizes 600 and 500 mm
Detail, fastening on system rails K20

JOINT CONSTRUCTION

Supporting rail
System rail
Façade panel "KeraTwin K20"

JOINT-PROFILE

Façade cladding system "KeraTwin K20"

Detail, fastening on vertical system rails
Joint construction

Annex 3.4
T-profile K20 – type 1 for panel grid sizes 200 and 250 mm
(the same dimensions apply for T-profiles K20 – types 2 and 3)

Façade cladding system “KeraTwin K20”

T-profile K20 for panel grid sizes 200 and 250 mm
T-profile K20 – type 1 for panel grid sizes 300 and 400 mm
(the same dimensions apply for T-profiles K20 – types 2 and 3)

Façade cladding system “KeraTwin K20”

T-profile K20 for panel grid sizes 300 and 400 mm

Annex 4.2
T-profile K20 – type 1 for panel grid sizes 600 and 500 mm
(the same dimensions apply for T-profiles K20 – types 2 and 3)
Detail, fastening on T-profiles types 1 to 3 – joint constructions

JOINT CONSTRUCTION – TYPE 1

T-profile K20

Façade panel
"KeraTwin® K20"

JOINT CONSTRUCTION – TYPE 2

T-profile K20

Façade panel
"KeraTwin® K20"

JOINT CONSTRUCTION – TYPE 3

T-profile K20

Façade panel
"KeraTwin® K20"

Joint spacer

Note: Type 1 and Type 2 may only be used for single-span girders without jib.

Façade cladding system "KeraTwin K20"

Annex 4.4
Omega profile 20 for panel grid sizes 200 and 250 mm

Façade cladding system "KeraTwin K20"

Omega profile 20 for panel grid sizes 200 and 250 mm
General Technical Approval (Allgemeine bauaufsichtliche Zulassung)
no. Z-33.1-1175 dated 12 March 2015

Omega profile 20 for panel grid sizes 300 and 400 mm

Façade cladding system "KeraTwin K20"

Omega profile 20 for panel grid sizes 300 and 400 mm

Annex 5.2
Omega profile 20 for panel grid sizes 600 and 500 mm

Façade cladding system "KeraTwin K20"

Omega profile 20 for panel grid sizes 600 and 500 mm

Annex 5.3
Detail, fastening on Omega profiles 20

Façade panel "KeraTwin® K20"

OMEGA PROFILE 20 WITH JOINT-PROFILE

OMEGA PROFILE 20 WITH JOINT SPACER

Façade cladding system "KeraTwin K20"

Detail, fastening on Omega profiles 20

Annex 5.4
Omega profile 50 for panel grid sizes 200 and 250 mm

Façade cladding system "KeraTwin K20"

Omega profile 50 for panel grid sizes 200 and 250 mm

Annex 5.5
Omega profile 50 for panel grid sizes 300 and 400 mm
Omega profile 50 for panel grid sizes 600 and 500 mm

Façade cladding system "KeraTwin K20"

Annex 5.7
Fastening on Omega profile 50 – detail, joint construction

Façade cladding system "KeraTwin K20"

Detail, fastening on Omega profiles 50
Joint construction
General Technical Approval (Allgemeine bauaufsichtliche Zulassung)
no. Z-33.1-1175 dated 12 March 2015

Single-clamp 3 mm

Fastening with screws / rivets according to Section 2.2.2

Twin-clamp 3 mm

Fastening with screws / rivets according to Section 2.2.2

Façade cladding system "KeraTwin K20"

Single-clamp and twin-clamp

Annex 6.1
Façade cladding system "KeraTwin K20"

Edge-clamp

Annex 6.2
General Technical Approval (Allgemeine bauaufsichtliche Zulassung)
no. Z-33.1-1175 dated 12 March 2015

Edge-clamp, left, 3 mm

Fastening with screws / rivets according to Section 2.2.2

Edge-clamp, right, 3 mm

Fastening with screws / rivets according to Section 2.2.2

Façade cladding system "KeraTwin K20"

Edge-clamp left, edge-clamp right

Annex 6.3
Façade cladding system "KeraTwin K20"

Detail, fastening on clamps
Fasteners

For fastening the clamps

Multigrid blind rivets stainless steel A2

\[ D1 = \text{rivet shank } \varnothing 3.2 \]
\[ D2 = \text{rivet head } \varnothing 6.5 \]
\[ k = \text{height of rivet head} \]
\[ d = \text{mandrel } \varnothing \]
\[ L = \text{length of rivet shank } 0.5 \]

Grip range 1.5–6.5

All dimensions and figures in mm

MAGE TOPE stainless steel A2
\[ \varnothing 3.5 \text{ mm} \]
Material no. 1.4567

For fastening of the system profile

PolyGrip®
Aluminium / standard stainless steel

\[ D1 = \text{rivet shank } \varnothing 4.8 \]
\[ D2 = \text{rivet head } \varnothing 9.5 \]
\[ k = \text{height of rivet head} \]
\[ d = \text{mandrel } \varnothing \]
\[ L = \text{length of rivet shank } 10 \]

Grip range 0.5–6.5

All dimensions and figures in mm

MAGE TOPEX stainless steel A4
\[ \varnothing 4.8 \text{ mm} \]
\[ L = 16 \text{ mm} \]
Material no. 1.4578

Façade cladding system "KeraTwin K20"

Annex 7
Evidence for the fasteners for the Omega profiles

One pair of screws or rivets must be placed in the elongated holes of the Omega profile at each fixing point. For flexible points, the screws/rivets must be placed centrally and for fixed points at the upper edge of the elongated holes.

For fastening on aluminium profiles according to Section 2.2.3, the following rated resistance values \( (R_d) \) for fasteners according to Section 2.2.2 must be used:

- rated values:
  \[ R_{d,\text{tension}} = 1.8 \text{ kN/pair of screws} \]
  \[ R_{d,\text{tension}} = 1.26 \text{ kN/pair of rivets} \]

- resistance against transverse forces (dead weight):
  rated values:
  \[ R_{d,\text{transverse}} = 3.66 \text{ kN/pair of screws} \]
  \[ R_{d,\text{transverse}} = 1.51 \text{ kN/pair of rivets} \]

- The rated value for the oblique tension force for a combined load (tensile load and transverse force) at the anchor point must be determined as follows:

Façade cladding system "KeraTwin K20"
General Technical Approval (Allgemeine baufällige Zulassung)  
no. Z-33.1-1175 dated 12 March 2015

This certificate must be filled in at the building site by the contractor’s specialised tradesman after completion of the façade cladding system and handed to the client (building owner).

Postal address of the building:

Street address / house number: ____________________ Postal code / city: ____________

Description of the façade cladding system installed

General Technical Approval (Allgemeine baufällige Zulassung) no. Z-33.1-1175

Façade cladding system installed: "KeraTwin K20"

Products used:
- façade panels: KeraTwin K20 according to Section 2.2.1:  
  Breaking load according to the manufacturer’s declaration of performance (for each nominal height): ..........  
- Fasteners (see Section 2. 2. 2): .................

Postal address of contractor:

Company: ____________________ Street address: ____________________
Postal code / city: ______________ Country: ____________________

We herewith declare, that we have installed the façade cladding system detailed above using products according to Section 2.2 and according to the provisions of General Technical Approval no. Z-33.1-1175 and the manufacturer’s processing instructions.

Date and signature of the specialist tradesman: .................................................................

Façade cladding system "KeraTwin K20"  
Contractor declaration of compliance for the building owner  

Annex 9