K25.en Fire Protection Claddings of Beams and Columns

K252v.en Vidifire A1 - Steel Beam Encasement
K253v.en Vidifire A1 - Steel Column Encasement
Calculating the section ratio of steel beams/columns

<table>
<thead>
<tr>
<th>Structure</th>
<th>Fire Exposure</th>
<th>Surface Section ratio</th>
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<tbody>
<tr>
<td>Flat bar</td>
<td>4-sided</td>
<td>200 ( \frac{b}{t} )</td>
</tr>
<tr>
<td>Flange</td>
<td>4-sided</td>
<td>200 ( \frac{b}{t} )</td>
</tr>
<tr>
<td>Flange</td>
<td>3-sided</td>
<td>100 ( \frac{b}{t} )</td>
</tr>
<tr>
<td>Angle</td>
<td>4-sided</td>
<td>200 ( \frac{b}{t} )</td>
</tr>
<tr>
<td>Angle</td>
<td>4-sided</td>
<td>200 ( \frac{b}{t} )</td>
</tr>
<tr>
<td>Double angle</td>
<td>4-sided</td>
<td>200 ( \frac{b}{t} )</td>
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<tr>
<td>Square and rectangular closed profiles, tubes, columns</td>
<td>4-sided</td>
<td>100 ( \frac{b}{t} )</td>
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<tr>
<td>Beam or column</td>
<td>4-sided</td>
<td>( \frac{2b + 2h}{A} \times 100 )</td>
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<tr>
<td>Beam or column</td>
<td>4-sided</td>
<td>( \frac{2b + 2h}{A} \times 100 )</td>
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<tr>
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</table>
### HE-A DIN 1025-3 EURONORM 53-62 Cladding thickness with protection on 4 sides at 500°C

<table>
<thead>
<tr>
<th>I sections</th>
<th>Hot-rolled, wide flange</th>
<th>Wide flange</th>
<th>Medium flange</th>
<th>Wide flange</th>
<th>Medium flange</th>
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<tr>
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<td>≤ 110</td>
<td>&gt;110 and ≤ 333</td>
<td>F90</td>
<td>≤ 110</td>
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<tr>
<td>F120</td>
<td>≤ 60</td>
<td>&gt;60 and ≤ 333</td>
<td>R60</td>
<td>≤ 60</td>
<td>&gt;60 and ≤ 333</td>
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<tr>
<td>F180</td>
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<td>&gt;60 and ≤ 333</td>
<td>R90</td>
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<td>F30</td>
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<td>R120</td>
<td>≤ 60</td>
<td>&gt;60 and ≤ 333</td>
</tr>
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</table>

For closed profile cross sections the cladding thickness depends on section

### HE-A DIN 1025-3 EURONORM 53-62 Cladding thickness with protection on 3 sides at 500°C

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<thead>
<tr>
<th>I sections</th>
<th>Hot-rolled, wide flange</th>
<th>Wide flange</th>
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<td>&gt;60 and ≤ 333</td>
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<td>F120</td>
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<td>R90</td>
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<tr>
<td>F30</td>
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For closed profile cross sections the cladding thickness depends on section.
### HE-B DIN 1025-2 EURONORM 53-62 Cladding thickness with protection on 4 sides at 500°C

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#### HE-B DIN 1025-2 EURONORM 53-62 Cladding thickness with protection on 3 sides at 500°C

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**Cladding thickness with 4-sided fire exposure**

- **I sections**
  - Hot-rolled, light design
  - Hot-rolled, medium flange
  - Hot-rolled, wide flange
  - Narrow flange

- **Profile types**
  - F180
  - F120
  - ≤ F60

- **Knauf Fireboard Steel Beam Encasement**
  - HEA
  - HEB

**Cladding thickness with 3-sided fire exposure**

- **HEM**
  - b

**Fire resistance with cladding thickness U/A ratio of the steel profile**

- For steel beams made of standard construction steel sections, depending on the fire resistance class.

- **Proof:** ABP P-3069/073/12
### HE-M DIN 1025-4 EURONORM 53-62: Cladding thickness with protection on 4 sides at 500°C

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### HE-M DIN 1025-4 EURONORM 53-62: Cladding thickness with protection on 3 sides at 500°C

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</table>

Cladding thickness for steel beams made of standard construction steel sections, depending on the fire resistance class:

- **F120**
- **F180**
- **F30**
- **F60**
- **F90**

The stated cladding thicknesses are valid for 3-sided exposure to fire.

**DIN 1025-5 EURONORM 19-57**

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<thead>
<tr>
<th>Beams</th>
<th>IPE 80</th>
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</table>

Cladding thickness for steel columns, depending on the U/A ratio of the steel profile:

- **K252**
- **Knauf Fireboard Steel Beam Encasement**
- **K253.de**

The cladding thicknesses are for 4-sided fire exposure at 500°C.
### Cladding thickness with protection on 4 sides at 500°C

<table>
<thead>
<tr>
<th>Profile Types</th>
<th>DIN 1025</th>
<th>Knauf Fireboard Steel Beam Encasement</th>
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### Cladding thickness with protection on 3 sides at 500°C

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<td>50 58 66 74 82 90 98 106 113 119 125 131 137 143 149 155 163 170 178 185 200 215</td>
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Cladding thickness depending on the section ratios and the required fire resistance have been tested in accordance with БДС EN 13381-4:2013 and classified in accordance with БДС EN 13501-2:
- classification statement FIRES – CR – 147-17 AUPE
- classification statement FIRES – CR – 148-17 AUPE
- Acceptance statement reg. No: 1983 СД – 87 of 09.08.17
**View of a beam with single-layer cladding**

All dimensions are given in mm

- **U-shaped supporting structure with joints between boards**
- **U-shaped supporting structure without joints between boards**
- **Clips in 'side-front' connection**
- **Distance between U-shaped supporting structures**

---

**K25v.en Sectional view of a beam with single-layer cladding**

- **Tren-Fix**
- **Joint filler Uniflott**
- **Steel clip**
- **U-shaped auxiliary structure made of Vidifire A1 - 15 mm**
  - at distance between axes of 600 mm at board joints and between them
- **Steel profile**
- **Vidifire A1-15 mm**
- **Steel clip - corner**
- **Vidifire A1-15 mm of 200 mm length at joints**

---

**‘Side-front’ connection**

- Details are valid for IPE, HEA, HEB and HEM profiles up to 600 mm height.
- All boards and parts of boards are 15 mm thick.
- Clips at ‘side-front’ connections between boards on beams are 45 mm long
- Clips for making U-shaped supports for beams are 45 mm long
- Clips at ‘side-side’ connections on beams are 25 mm long
K25.en Knauf Vidifire A1 - Fire Protection Claddings of Beams

View of a beam with single-layer cladding

1st layer
All dimensions are given in mm

View of a beam with double-layer cladding

2nd layer
All dimensions are given in mm

K252v.en Sectional view of a beam with double-layer cladding

‘Side-side’ connection

See notes on previous page
Double-layer cladding

Steel column

Vidifire A1
15 mm

Displacement of joints between layers

≥200

≤100

≤100

Single-layer cladding

Steel column

Vidifire A1
15 mm

Details are valid for IPE, HEA, HEB and HEM profiles and closed profile with cross-sections height up to 600 mm.

All boards and parts of boards are 15 mm thick.

Clips at ‘side-front’ connections between boards on columns are 45 mm long.

Clips at ‘side-side’ connections on columns are 22 mm long.

See notes on page 9.
Installation

Columns
For cutting it is recommended to use handheld circular saw with bus and blade for wood. There must be a gap of 5 to 10 mm between the boards and the structure. Board fixing.

- For single-layer cladding, boards are fixed 'side-to-front' using 45 mm long clips at distances ≤100 mm.
- For multiple-layer cladding, each board of the first layer is fixed to the adjacent board 'side-to-front' using clips that are 45 mm long at distances ≤100 mm. Each board, to the exception of the first layer boards, is fixed to the underlying board 'side-to-side' at a distance of 50 mm from the edge and not more than 150 mm in the horizontal direction using 22 mm clips. In the vertical direction clips must be spaced at not more than 100 mm.
- Joints: In single-layer cladding, a padding at least 150 mm wide is installed under the joint, if necessary, and boards are fixed using 22 mm clips spaced at 50 mm. In multiple-layer cladding, the joints of two adjacent layers must be displaced by at least 200 mm. Clips are driven at 50 mm from each other on both sides of the joint.

The joints in all layers must be filled using Uniflott.

Beams
Prepare in advance a U-shaped auxiliary structure at least 150 mm wide at the bottom and two spacers with dimensions equal to the exact distance between the two edges of the open end and the Vidifire A1 boards. Spacers must be prepared to fit exactly between the two edges of the open end. The spacers are fixed to the bottom using 45 mm clips spaced at 50 mm. That structure is inserted to fit between the flanges so that the spacers fit completely between the flanges while the bottom is tangent to the profile edges and parallel to the web. The obtained U-shaped structures are installed at distances of not more than 600 mm.

- In single-layer cladding, side boards are fixed to the sides of the auxiliary U-shaped structures using 25 mm clips, and to the board at the bottom of the beam 'side-to-front' using 45 mm long clips at distances ≤100 mm.
- In multiple-layer cladding, the first layer must be installed as single-layer cladding. In each subsequent layer, the side board is fixed to the adjacent side at corners 'side-to-front' using 45 mm clips at distances ≤100 mm, and to the underlying layer using clips 25 mm, the horizontal spacing between the clips is no more than 500 mm and vertical spacing no more than 150 mm.
- Joints: In single-layer cladding, joints must be on the U-shaped structure. On both sides of the joint, 25 mm clips are driven into the U-shaped structure spaced at 50 mm.
- In multiple-layer cladding, the joints of the first layer must be achieved like in single-layer cladding. In subsequent layers, the joints of two adjacent layers must be displaced by at least 200 mm. On both sides of the joint, 25 mm clips are driven at 50 mm from each other to the previous layer.

The joints in all layers must be filled using Uniflott.

Estimated materials consumption

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>Beam - 4500 mm</th>
<th>Column - 3000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IPE 240 R45 1x15 mm Vidifire A1</td>
<td>IPE 240 R120 3x15 mm Vidifire A1</td>
</tr>
<tr>
<td>Knauf Vidifire A1 15 mm cladding [m2 / m]</td>
<td>0.69</td>
<td>2.514</td>
</tr>
<tr>
<td>Knauf Vidifire A1 15 mm strips [m2 / m]</td>
<td>0.27</td>
<td>0.25</td>
</tr>
<tr>
<td>Clips 45 [mm/ m]</td>
<td>49</td>
<td>69</td>
</tr>
<tr>
<td>Clips 25 [mm/ m]</td>
<td>31</td>
<td>61</td>
</tr>
<tr>
<td>Joint filler Knauf Uniflott [kg/ m]</td>
<td>0.85</td>
<td>2.68</td>
</tr>
<tr>
<td>Knauf Uniflott ground coat -1mm [kg/ m]</td>
<td>1.1</td>
<td>1.24</td>
</tr>
<tr>
<td>Knauf Trenn-Fix, 65 mm, self-adhesive</td>
<td>if necessary</td>
<td></td>
</tr>
<tr>
<td>Knauf corner protection bus 31x31x3</td>
<td>if necessary</td>
<td></td>
</tr>
</tbody>
</table>

Observe the technical specifications of Knauf products.
Filling

Filler
- Uniflott filler: hand filling using Uniflott and fiberglass joint bands.

Execution
- In multiple-layer cladding, all joints of lower layers must be filled with Uniflott filler.
- All joints of visible layers of the cladding must be filled and sealed using fiberglass joint bands.
- Also fill the clips.
- An additional layer of Uniflott filler must be applied only if there are special requirements for the surface.
- The use of corner protection profiles is recommended for beams.

Joints in adjacent structural elements
- Fill the connecting joints of all cladding layers.
- The connection to adjacent structures (walls) is achieved depending on the circumstances and the requirements for protection against cracks using Knauf Trenn-Fix or Knauf fiberglass joint band.
- The connection to solid structural elements is achieved using Trenn-Fix.

General instructions: Fill the joints of all layers in multiple-layer or single-layer claddings.

Processing temperature / climate
- Filling is to be carried out only when significant linear dimensional changes of Knauf boards are not expected, e.g. due to temperature and humidity fluctuations.
- While filling, the temperature of the room and the base must not fall below +10 °C.
- In case of cement or self-leveling mortar, Knauf boards must be putted after application of the mortar.

Coatings

Pretreatment
Before applying a coating, the surface to be coated must be dust free.
- Apply a primer coat on the Vidifire A1 board;
- The primer coat and the coating/paint must be compatible. May be used primers such as Haftemulsion, Grundiermittel, Tiefengrund Specialhaftgrund, etc.

Appropriate coatings
The following coatings may be applied on Vidifire A1 boards:
- Coatings:
  - Knauf dispersion paints (e.g. Intol E.L.F., Malerweiss E.L.F.), multicolor effect paints, dispersion silicate paints with appropriate primer

Inappropriate:
- Alkaline coatings such as lime, water-glass and entirely silicate paints.

Information about the resistance of Knauf products and Vidifire A1 claddings on columns and beams

Building assessment systems analyze the resistance through detailed evaluation of all environmental, economic, social, functional and technical aspects.

DGNB (German Sustainable Building Council), BNB (Assessment System for Sustainable Building) and LEED (Leadership in Energy and Environmental Design) certification systems are extremely important in Bulgaria.

Knauf Vidifire A1 claddings on columns and beams may have a significant impact on many of these criteria.

DGNB/BNB

Environmental quality
- Criterion: Environmental risks
  → The construction material gypsum as environment-friendly material

Economic quality
- Criterion: Construction taking into consideration the cost over the entire life cycle
  → Economic construction method: Knauf drywall construction

Social, cultural and functional quality
- Criterion: Ability to change the use
  → Flexibility of Knauf drywall construction

Technical quality
- Criterion: Fire protection
  → Extensive fire protection knowledge of Knauf
- Criterion: Easy dismantling, recycling or reuse
  → Requirements are met due to Knauf drywall construction

LEED

Materials and resources
- Credit: Contain recycled materials
  → Recycled part of Knauf filler
- Credit: Regional materials
  → Shorter transportation distances due to the large network of Knauf production sites.

Detailed information upon request.