

K25.en

Drywall Construction System 09/ 2017

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

Structure	Fire Exposure	Surface Section ratio
b, h and t in cm surface area A in cm ²		
Flat bar 	4-sided	$\frac{200}{t}$
Flange 	4-sided	$\frac{200}{t}$
Flange 	3-sided	$\frac{100}{t}$
Angle 	4-sided	$\frac{200}{t}$
Angle 	4-sided	$\frac{2b + 2h}{A} \cdot 100$
Double angle 	4-sided	$\frac{2b + 2h}{A} \cdot 100$
Square and rectangular closed profiles, tubes, columns 	4-sided	$\frac{100}{t}$
	4-sided	$\frac{4b}{A} \cdot 100$

Structure	Fire Exposure	Surface Section ratio
b, h and t in cm surface area A in cm ²		
Beam or column 	4-sided	$\frac{2b + 2h}{A} \cdot 100$
Beam or column 	4-sided	$\frac{2b + 2h}{A} \cdot 100$
Beam or column 	4-sided	$\frac{2b + 2h}{A} \cdot 100$
Beam or column 	4-sided	$\frac{2b + 2h}{A} \cdot 100$
Beam 	3-sided	$\frac{2h + b}{A} \cdot 100$
Beam 	3-sided	$\frac{2h + b}{A} \cdot 100$
Beam 	3-sided	$\frac{2h + b}{A} \cdot 100$

Fire resistance class	Thickness of Vidifire A1 cladding depending on section ratio at critical temperature 500°C			
	15	30	45	60
R15	≤ 336			
R30	≤ 336			
R45	≤ 310	>310 and ≤ 333		
R60	≤ 140	>140 and ≤ 333		
R90	≤ 60	>60 and ≤ 333		
R120		≤ 110	>110 and ≤ 333	
R150		≤ 60	>60 and ≤ 333	
R180			≤ 110	>110 and ≤ 333
R210			≤ 54	>54 and ≤ 333

For closed profile cross sections the cladding thickness depends on section

HE-A DIN 1025-3 EURONORM 53-62 Cladding thickness with protection on 4 sides at 500°C																								
Columns	HE-A 100	HE-A 120	HE-A 140	HE-A 160	HE-A 180	HE-A 200	HE-A 220	HE-A 240	HE-A 260	HE-A 280	HE-A 300	HE-A 320	HE-A 340	HE-A 360	HE-A 400	HE-A 450	HE-A 500	HE-A 550	HE-A 600	HE-A 650	HE-A 700	HE-A 800	HE-A 900	HE-A 1000
h [mm]	96	114	133	152	171	190	210	230	250	270	290	310	330	350	390	440	490	540	590	640	690	790	890	990
b [mm]	100	120	140	160	180	200	220	240	260	280	300	300	300	300	300	300	300	300	300	300	300	300	300	300
15												15												
15												15												
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30						15																		
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45												45												
60										45														
60												60												

- R15
- R30
- R45
- R60
- R90
- R120
- R150
- R180
- R210

HE-A DIN 1025-3 EURONORM 53-62 Cladding thickness with protection on 3 sides at 500°C																								
Beams	HE-A 100	HE-A 120	HE-A 140	HE-A 160	HE-A 180	HE-A 200	HE-A 220	HE-A 240	HE-A 260	HE-A 280	HE-A 300	HE-A 320	HE-A 340	HE-A 360	HE-A 400	HE-A 450	HE-A 500	HE-A 550	HE-A 600	HE-A 650	HE-A 700	HE-A 800	HE-A 900	HE-A 1000
h [mm]	96	114	133	152	171	190	210	230	250	270	290	310	330	350	390	440	490	540	590	640	690	790	890	990
b [mm]	100	120	140	160	180	200	220	240	260	280	300	300	300	300	300	300	300	300	300	300	300	300	300	300
15												15												
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- R15
- R30
- R45
- R60
- R90
- R120
- R150
- R180
- R210

HE-B DIN 1025-2 EURONORM 53-62 Cladding thickness with protection on 4 sides at 500° C																								
Columns	HE-B 100	HE-B 120	HE-B 140	HE-B 160	HE-B 180	HE-B 200	HE-B 220	HE-B 240	HE-B 260	HE-B 280	HE-B 300	HE-B 320	HE-B 340	HE-B 360	HE-B 400	HE-B 450	HE-B 500	HE-B 550	HE-B 600	HE-B 650	HE-B 700	HE-B 800	HE-B 900	HE-B 1000
h [mm]	100	120	140	160	180	200	220	240	260	280	300	320	340	360	400	450	500	550	600	650	700	800	900	1000
b [mm]	100	120	140	160	180	200	220	240	260	280	300	300	300	300	300	300	300	300	300	300	300	300	300	300
15											R15													
15											R30													
15											R45													
30	15											R60												
30											R90													
45					30																	R120		
45											R150													
60					45																	R180		
60											R210													

HE-B DIN 1025-2 EURONORM 53-62 Cladding thickness with protection on 3 sides at 500° C																								
Beams	HE-B 100	HE-B 120	HE-B 140	HE-B 160	HE-B 180	HE-B 200	HE-B 220	HE-B 240	HE-B 260	HE-B 280	HE-B 300	HE-B 320	HE-B 340	HE-B 360	HE-B 400	HE-B 450	HE-B 500	HE-B 550	HE-B 600	HE-B 650	HE-B 700	HE-B 800	HE-B 900	HE-B 1000
h [mm]	100	120	140	160	180	200	220	240	260	280	300	320	340	360	400	450	500	550	600	650	700	800	900	1000
b [mm]	100	120	140	160	180	200	220	240	260	280	300	300	300	300	300	300	300	300	300	300	300	300	300	300
15											R15													
15											R30													
15											R45													
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45	30											R120												
45						30										R150								
60	45											R180												
60											R210													

		HE-M DIN 1025-4 EURONORM 53-62 Cladding thickness with protection on 4 sides at 500° C																									
Колони	HE-M 100	HE-M 120	HE-M 140	HE-M 160	HE-M 180	HE-M 200	HE-M 220	HE-M 240	HE-M 260	HE-M 280	HE-M 300	HE-M 320/305	HE-M 320	HE-M 340	HE-M 360	HE-M 400	HE-M 450	HE-M 500	HE-M 550	HE-M 600	HE-M 650	HE-M 700	HE-M 800	HE-M 900	HE-M 1000		
h [mm]	120	140	160	180	200	220	240	270	290	310	340	320	359	377	395	432	478	524	572	620	668	716	814	910	1008		
b [mm]	106	126	146	166	186	206	226	248	268	288	310	305	309	309	308	307	307	306	306	305	305	304	303	302	302		
15												R15															
15												R30															
15												R45															
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45						30																		R150			
45												R180															
60						45						60						45						60		R210	

		HE-M DIN 1025-4 EURONORM 53-62 Cladding thickness with protection on 3 sides at 500° C																							
Греди	HE-M 100	HE-M 120	HE-M 140	HE-M 160	HE-M 180	HE-M 200	HE-M 220	HE-M 240	HE-M 260	HE-M 280	HE-M 300	HE-M 320/305	HE-M 320	HE-M 340	HE-M 360	HE-M 400	HE-M 450	HE-M 500	HE-M 550	HE-M 600	HE-M 650	HE-M 700	HE-M 800	HE-M 900	HE-M 1000
h [mm]	120	140	160	180	200	220	240	270	290	310	340	320	359	377	395	432	478	524	572	620	668	716	814	910	1008
b [mm]	106	126	146	166	186	206	226	248	268	288	310	305	309	309	308	307	307	306	306	305	305	304	303	302	302
15												R15													
15												R30													
15												R45													
15												R60													
30		15																		R90					
30												R120													
45		30																		R150					
45												R180													
60			45																			R210			

		IPE DIN 1025-5 EURONORM 19-57																Cladding thickness with protection on 4 sides at 500° C		
Columns		IPE 100	IPE 120	IPE 140	IPE 160	IPE 180	IPE 200	IPE 220	IPE 240	IPE 270	IPE 300	IPE 330	IPE 360	IPE 400	IPE 450	IPE 500	IPE 550	IPE 600		
h [mm]		100	120	140	160	180	200	220	240	270	300	330	360	400	450	500	550	600		
b [mm]		55	64	73	82	91	100	110	120	135	150	160	170	180	190	200	210	220		
		15																	R15	
		15																	R30	
		15																	R45	
		30										15							R60	
		30																	R90	
		45															30		R120	
		45																	R150	
		60															45		R180	
		60																	R210	

		IPE DIN 1025-5 EURONORM 19-57																Cladding thickness with protection on 3 sides at 500° C			
Beams		IPE 80	IPE 100	IPE 120	IPE 140	IPE 160	IPE 180	IPE 200	IPE 220	IPE 240	IPE 270	IPE 300	IPE 330	IPE 360	IPE 400	IPE 450	IPE 500	IPE 550	IPE 600		
h [mm]		80	100	120	140	160	180	200	220	240	270	300	330	360	400	450	500	550	600		
b [mm]		46	55	64	73	82	91	100	110	120	135	150	160	170	180	190	200	210	220		
		15																	R15		
		15																	R30		
		15																	R45		
		30										15							R60		
		30																	R90		
		45															30		R120		
		45																	R150		
		60															45		R180		
		60																	R210		

IPN (I) DIN 1025 Cladding thickness with protection on 4 sides at 500° C																						
Колони	IPN 100	IPN 120	IPN 140	IPN 160	IPN 180	IPN 200	IPN 220	IPN 240	IPN 260	IPN 280	IPN 300	IPN 320	IPN 340	IPN 360	IPN 380	IPN 400	IPN 425	IPN 450	IPN 475	IPN 500	IPN 550	IPN 600
h [mm]	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	425	450	475	500	550	600
b [mm]	50	58	66	74	82	90	98	106	113	119	125	131	137	143	149	155	163	170	178	185	200	215
15																						
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R15
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R180
R210

IPN (I) DIN 1025 Cladding thickness with protection on 3 sides at 500° C																							
Beams	IPN 80	IPN 100	IPN 120	IPN 140	IPN 160	IPN 180	IPN 200	IPN 220	IPN 240	IPN 260	IPN 280	IPN 300	IPN 320	IPN 340	IPN 360	IPN 380	IPN 400	IPN 425	IPN 450	IPN 475	IPN 500	IPN 550	IPN 600
h [mm]	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	425	450	475	500	550	600
b [mm]	42	50	58	66	74	82	90	98	106	113	119	125	131	137	143	149	155	163	170	178	185	200	215
15																							
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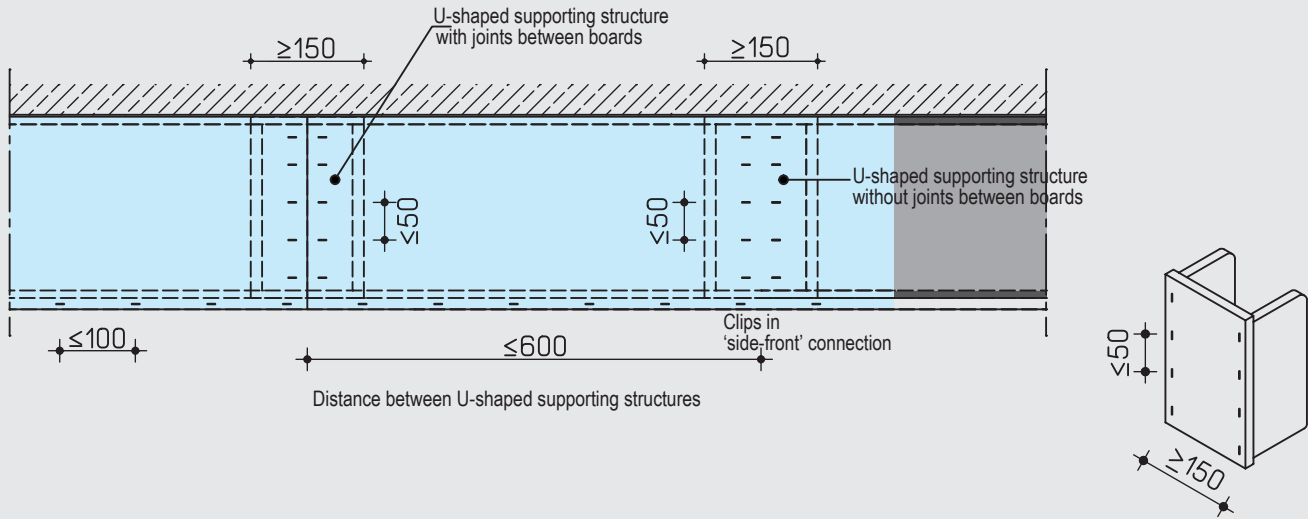
R15
R30
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R210

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

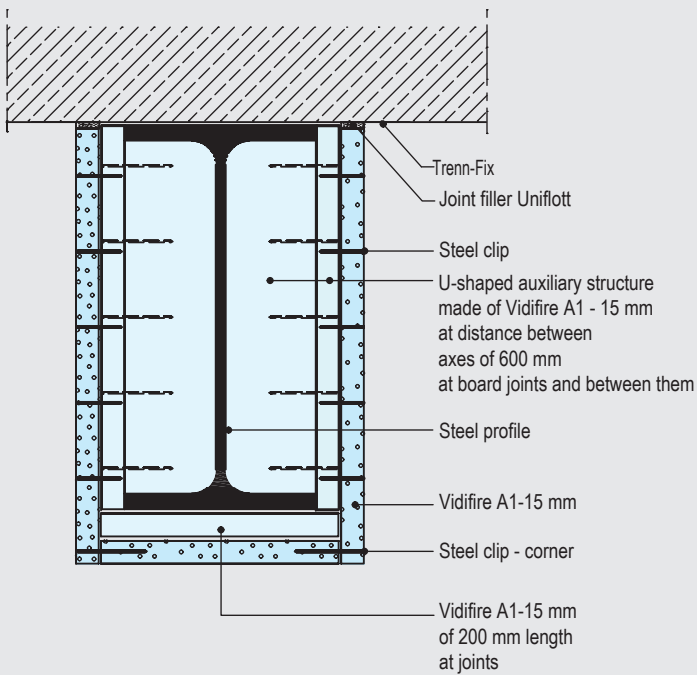
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- classification statement FIRES – CR – 148-17 AUPE
- Acceptance statement reg. No: 1983 СД – 82 of 28.07.17
- Acceptance statement reg. No: 1983 СД – 87 of 09.08.17

View of a beam with single-layer cladding

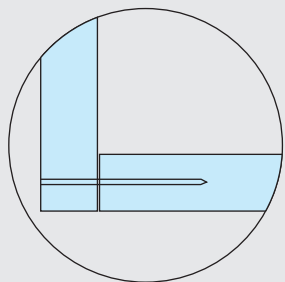
All dimensions are given in mm



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



'Side-front' connection

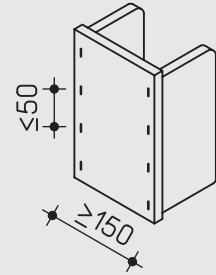
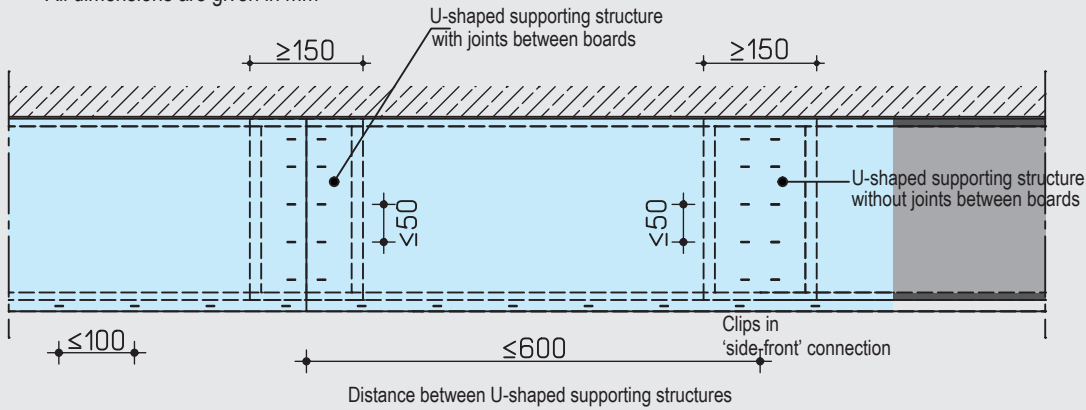


- Details are valid for IPE, HEA, HEB and HEM profiles up to 600 mm height.
- All boards and parts of boards are 15 mm thick.
- Clips at 'side-front' connections between boards on beams are 45 mm long
- Clips for making U-shaped supports for beams are 45 mm long
- Clips at 'side-side' connections on beams are 25 mm long

View of a beam with single-layer cladding

1st layer

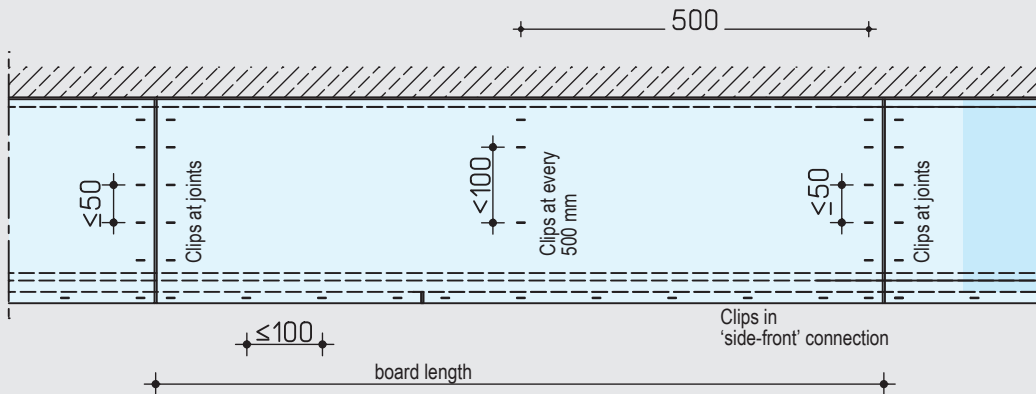
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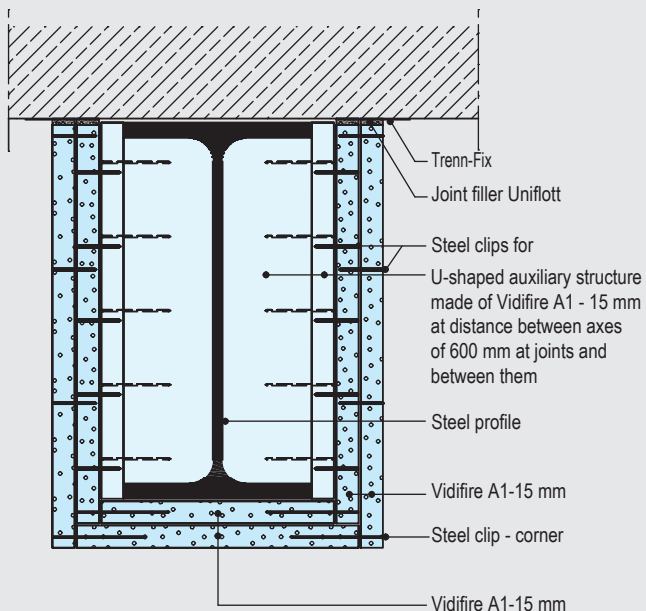
View of a beam with double-layer cladding

2nd layer

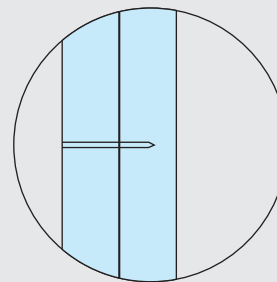
All dimensions are given in mm



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

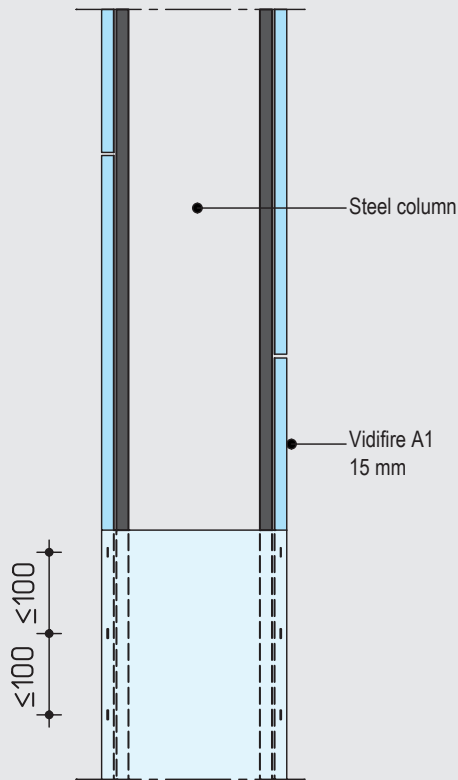


'Side-side' connection

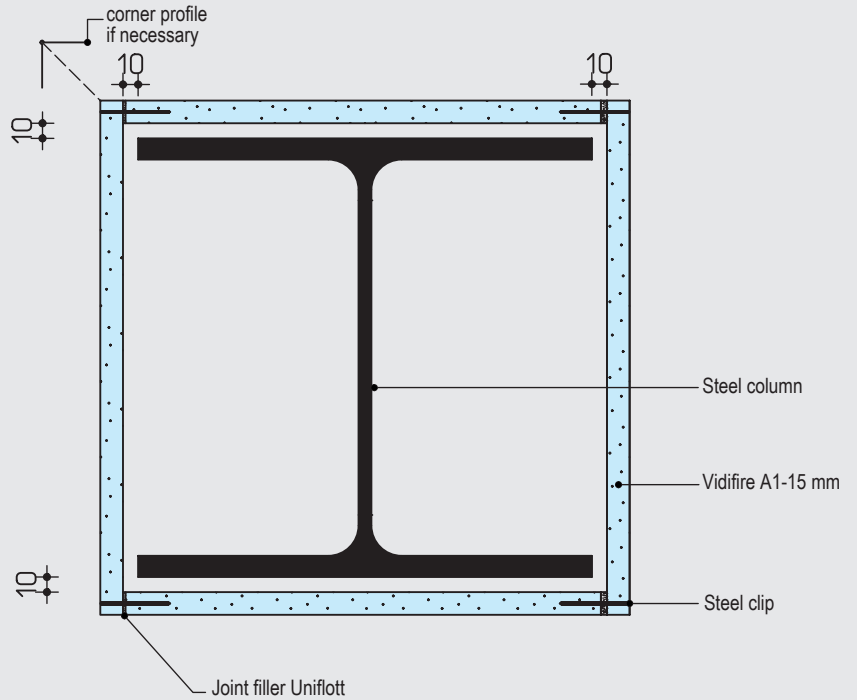


■ See notes on previous page

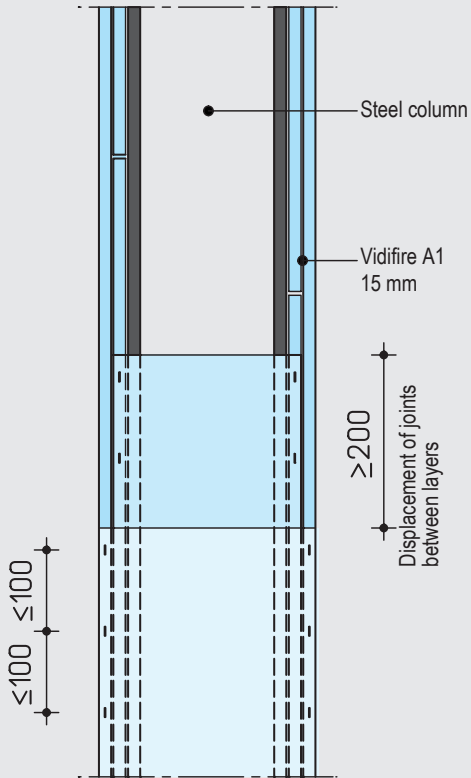
Single-layer cladding



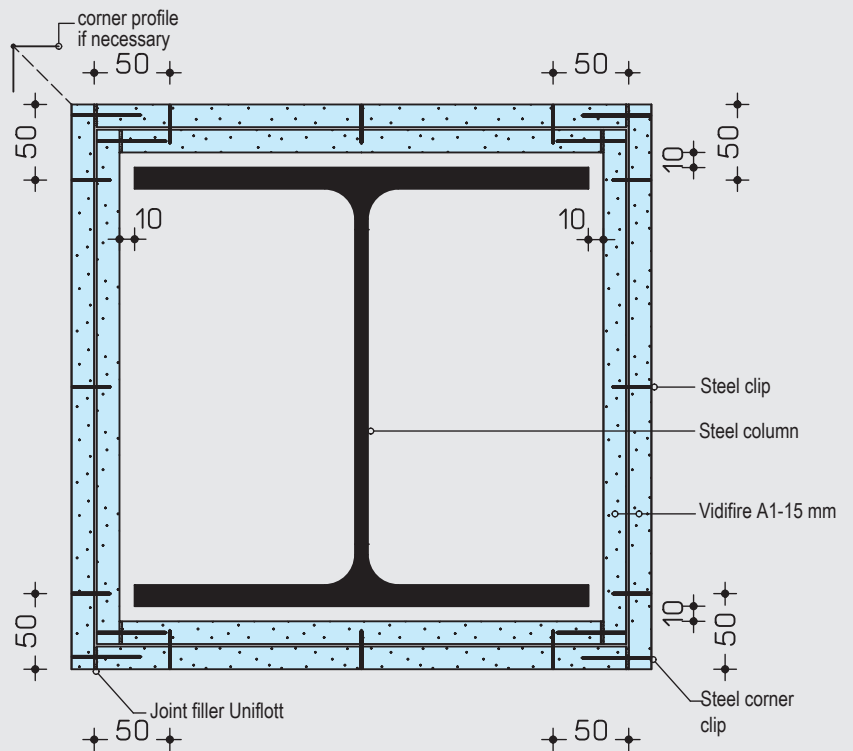
K253v.en Sectional view of a column with single-layer cladding



Double-layer cladding



K253v.en Sectional view of a column with double-layer cladding



See notes on page 9.

- 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

Estimated materials consumption				
DESIGNATION	Beam - 4500 mm		Column - 3000 mm	
	fire protection on 3 sides		fire protection on 4 sides	
	IPE 240 R45 1x15 mm Vidifire A1	IPE 240 R120 3x15 mm Vidifire A1	HEB 180 R45 1x15 mm Vidifire A1	HEB 180 R120 3x15 mm Vidifire A1
Knauf Vidifire A1 15 mm cladding [m2 / m]	0.69	2.514	0.74	2.52
Knauf Vidifire A1 15 mm strips [m2 / m]	0.27	0.25	-	-
Clips 45 [mm/ m]	49	69	42	124
Clips 25 [mm/ m]	31	61	-	248
Joint filler Knauf Uniflott [kg/ m]	0.85	2.68	0.85	2.68
Knauf Uniflott ground coat -1mm [kg/ m]	1.1	1.24	1.2	1.51
Knauf Trenn-Fix, 65 mm, self-adhesive	if necessary			
Knauf corner protection bus 31x31x3	if necessary			

Structure

Fire protection boards Vidifire A1 are suitable for cladding of steel beams and columns up to fire resistance class R210. Knauf Vidifire A1

are special gypsum fibre class A1 15 mm thick boards for high-quality fire protection, type GF-C1- I-W2, in accordance with БДС EN 15283-2.

The cladding of steel beams and columns Knauf Vidifire A1 being achieved on supporting steel elements with additional structure using clips.

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.

Filling		
<p>Filler</p> <ul style="list-style-type: none"> ■ Uniflott filler: hand filling using Uniflott and fiberglass joint bands. <p>Execution</p> <ul style="list-style-type: none"> ■ 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. 	<p>Joints in adjacent structural elements</p> <ul style="list-style-type: none"> ■ 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. ■ Please, follow Technical Guidelines No 3 "Gypsum Fiber Board Structures: Joints and Connections" of the German Gypsum Industry Association („Gipsplattenkonstruktionen - Fugen u. Anschlüsse" of the BVG IGG). <p>General instructions: Fill the joints of all layers in multiple-layer or single-layer claddings.</p>	<p>Processing temperature / climate</p> <ul style="list-style-type: none"> ■ 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 puttied after application of the mortar. ■ Please, follow Technical Guidelines No 1: "Conditions at the Construction site" of the German Gypsum Industry Association ("Baus-tellenbedingungen" BVG).

Coatings		
<p>Pretreatment Before applying a coating, the surface to be coated must be dust free.</p> <ul style="list-style-type: none"> ■ 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, Tiefen-grund Specialhaftgrund, etc. 	<p>Appropriate coatings The following coatings may be applied on Vidifire A1 boards:</p> <ul style="list-style-type: none"> ■ Coatings: <ul style="list-style-type: none"> - Knauf dispersion paints (e.g. Intol E.L.F., Malerweis E.L.F.), multicolor effect paints, dispersion silicate paints with appropriate primer 	<p>Inappropriate:</p> <ul style="list-style-type: none"> ■ 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		
<p>Building assessment systems analyze the resistance through detailed evaluation of all environmental, economic, social, functional and technical aspects.</p> <p>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.</p> <p>Knauf Vidifire A1 claddings on columns and beams may have a significant impact on many of these criteria.</p>	<p>DGNB/BNB <u>Environmental quality</u></p> <ul style="list-style-type: none"> ■ Criterion: Environmental risks → The construction material gypsum as environment-friendly material <p><u>Economic quality</u></p> <ul style="list-style-type: none"> ■ Criterion: Construction taking into consideration the cost over the entire life cycle → Economic construction method: Knauf drywall construction <p><u>Social, cultural and functional quality</u></p> <ul style="list-style-type: none"> ■ Criterion: Ability to change the use → Flexibility of Knauf drywall construction <p><u>Technical quality</u></p> <ul style="list-style-type: none"> ■ Criterion: Fire protection → Extensive fire protection knowledge of Knauf ■ Criterion: Easy dismantling, recycling or reuse → Requirements are met due to Knauf drywall construction 	<p>LEED Materials and resources</p> <ul style="list-style-type: none"> ■ Credit: Contain recycled materials → Recycled part of Knauf filler ■ Credit: Regional materials → Shorter transportation distances due to the large network of Knauf production sites. <p>Detailed information upon request.</p>

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