ISOVER FireProtect

Fire Protection of Structural Steel

ISOVER
SAINT-GOBAIN

The World's Leading Thermal, Acoustic and Fire Protection Insulations

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Design

Protection of structural steel

The bearing capacity of a steel structure is substantially reduced if temperature rise due to fire. ISOVER FireProtect is a simple and reliable system that limits the temperature rise in the steel.

ISOVER FireProtect system

The ISOVER FireProtect system provides very efficient fire protection for structural steel. It is a quick, simple and secure system with easily worked materials and simple fixing equipment, which is assembled without complicated, expensive installation tools.

The system works equally well for the supporting columns or supporting beams of steel. ISOVER FireProtect can be used for fire protection of structural steel with fire resistance from R 30 up to R 240.

Fire protection of more than two hours must meet very strict requirements. A two hour fire resistance rating (R 120) is normally the maximum requirement set by the authorities in Europe.

ISOVER FireProtect is tested according to ENV 13381-4 and approved by SINTEF NBL (Product documentation SINTEF 010-0202).

ISOVER FireProtect boards

ISOVER FireProtect boards are made of specially produced stone wool.

The choice of product is based on requirements for fire resistance, insulation thickness and mechanical properties. It is possible to select from boards with a normal waffle pattern on the surfaces or with a glass lining fleece on one side, depending on the surface finishes.

Fixing

There are two possibilities how to fix ISOVER FireProtect:
- with ISOVER FireProtect Screws
- with cuphead pins or pins and washers.

Both methods can be also combined.

Fig. 1 Tools to be used for mounting ISOVER FireProtect

Fixing materials and tools

- ISOVER FireProtect boards
- ISOVER FireProtect Screw fixing screws
- Washers and pins or cuphead pins as required
- Standard laggers knife
- Screwdriver (preferably battery-powered)
- Rubber hammer

Installation, I-sections

Cut 100 mm wide fitted pieces of ISOVER FireProtect boards in lengths that correspond to the distance between flanges plus 2-3 mm. The same board as is normally used for the insulation works. However, a minimum board thickness of 40 mm must be used for the fitted pieces. For steel beams higher than 400 mm, the additional support of a transverse fitted piece, which must fit into the web of the section, is also required.

Push the fitted pieces in between the flanges facing the subsequent joints in the insulation boards and at maximum 600 mm spacings. (For sections above 400 mm, the fitted pieces are screwed into the transverse fitted pieces).

Cut ISOVER FireProtect boards to 2-3 mm oversize in width.

Screw the boards onto the fitted pieces and in adjacent boards at the corners.

In the case of 3-sided cladding of I beams with insulation ≥ 60 mm, the upper row of ISOVER FireScrew is replaced with pins fixed to the top flange of the beam.

Pins can also be used as intermediate fixings to steel faces wider than 300 mm.

Installation, box sections

ISOVER FireProtect is fitted to steel box sections in the same way as for I-sections, but fitted pieces are not required. In the case of 3-sided cladding of beams, the upper row of ISOVER FireProtect Screw is replaced with pins at 150 mm centres.

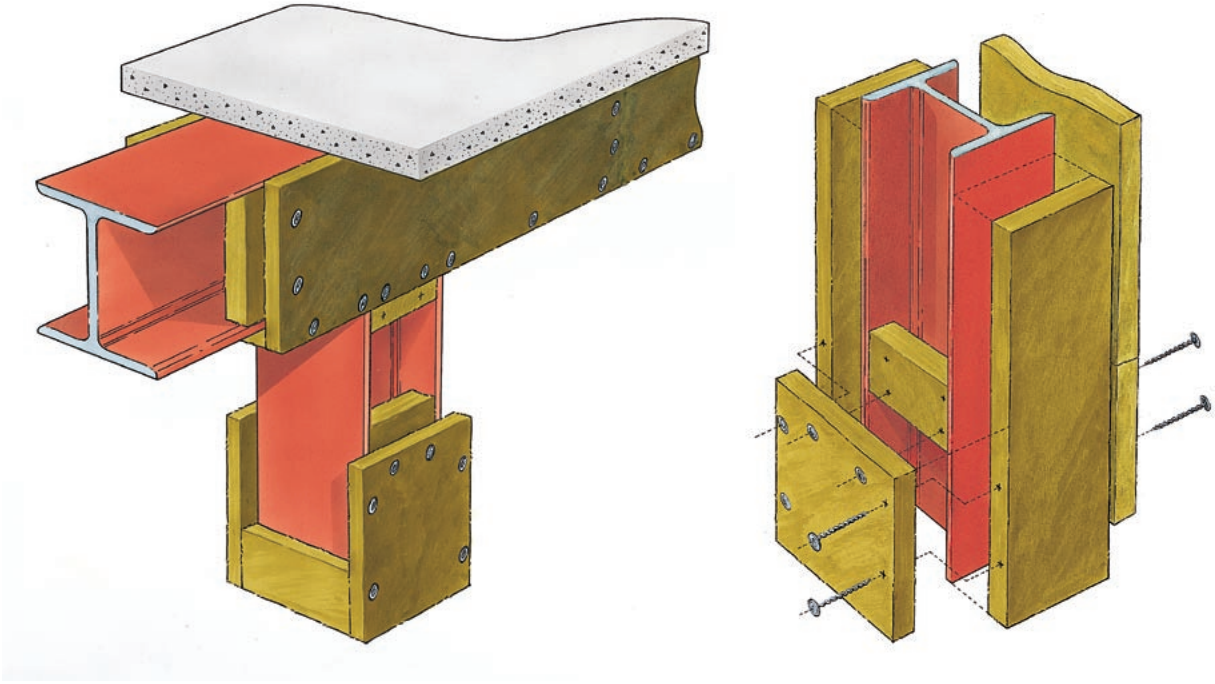
Installation, special shapings

For large projects, it is possible to produce ISOVER FireProtect in special shapings, e.g. to be installed for insulation around circular constructions as shown in fig. 2. Installation must be carried out in accordance with special instructions from ISOVER.

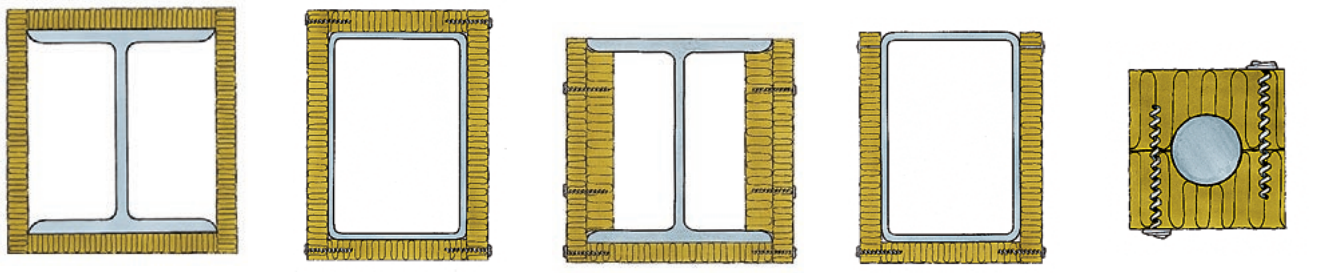
Fixing with ISOVER FireProtect Screw

ISOVER FireProtect Screw is designed specifically for this type of fire insulation. The single screw and a battery-powered screwdriver are all needed for making a quick, cost effective and accurate mounting. The screws are available in different lengths. The screw must be at least twice as long as the insulation thickness.

When fixing to surfaces with a width > 300 mm and other places where it is not possible to fix FireProtect by screwing the boards together, they must be supplemented by washers and pins or cuphead pins.



Position of the fixations



4-sided fire loading | 4-sided fire loading | 3-sided fire loading | 3-sided fire loading | Special shaping for 4-sided fire loading

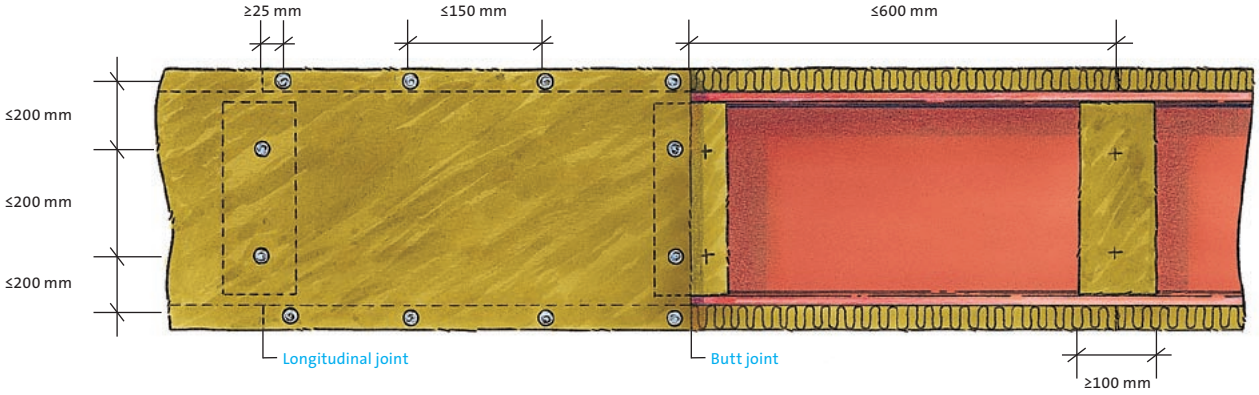


Fig. 2 Installation of ISOVER FireProtect screws

Fixing with pins

Cut the ISOVER FireProtect boards to 2-3 mm oversize and put them into the steel profiles. Fix the boards at pin spacings with d ≤ 300 mm. About 10 pieces/m² are needed.

Pins must have a minimum diameter of 2.8 mm and the washer must be no less than 30 mm wide. Maximum distance from the cladding's edges is 75 mm.

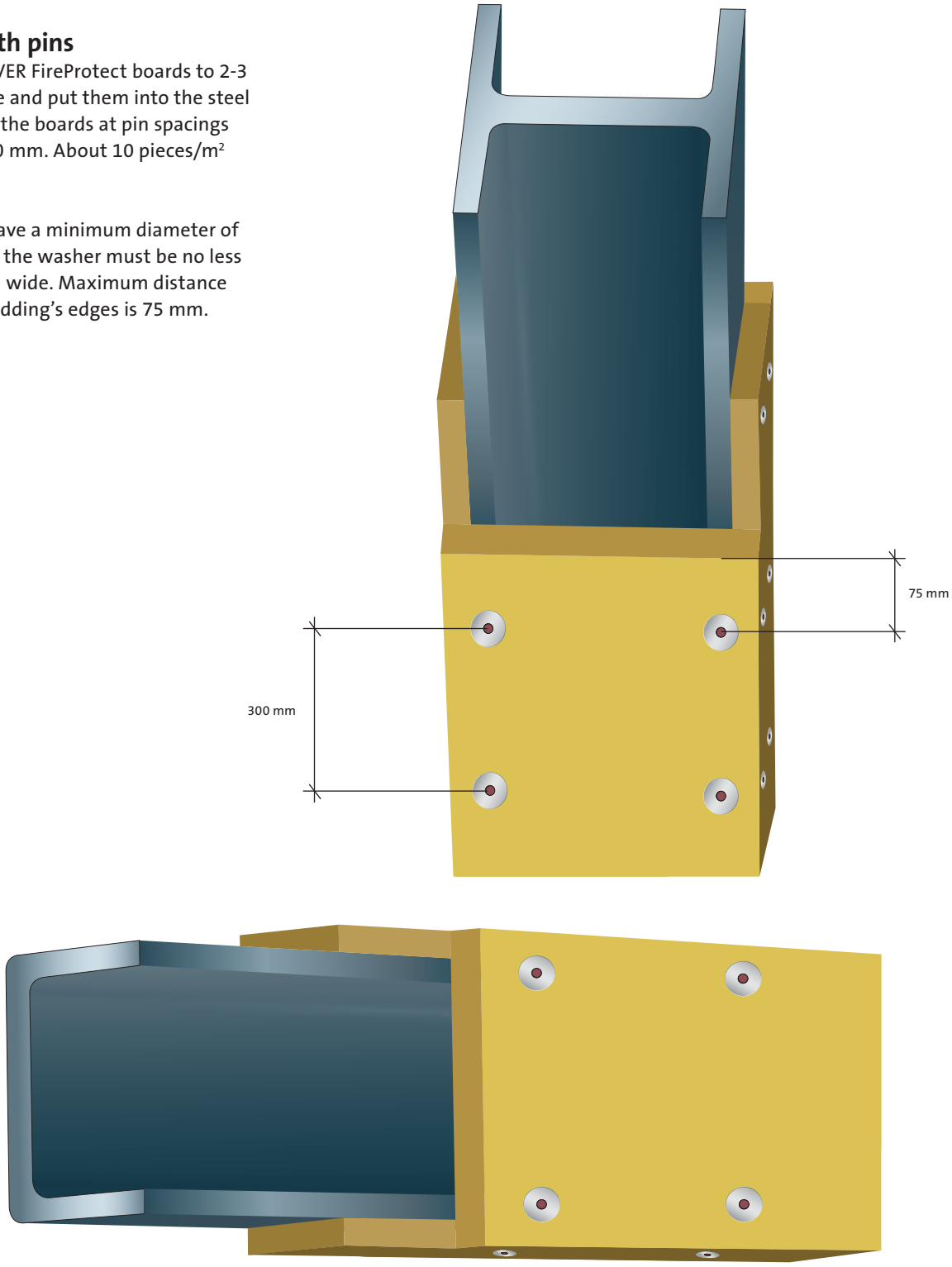


Fig. 3 Installation of ISOVER FireProtect with pins

Design

What happens in a fire?

What happens in a fire?

A fire is a blaze which is out of control. The design of steel structures must take account of the reduction in strength of the steel due to temperature loads in the event of fire.

Fire

Fire is a combustion process that liberates heat and light. Combustible material, oxygen and heat must be present to feed the fire. If one of the three is absent, the fire goes out.

Progress of a fire

The progress of a fire in a building is determined first and foremost by the quantity of combustible material. The oxygen supply is also highly significant. The progress of a normal fire can be described as shown in fig. 4.

The ignition phase is the most important phase from a safety point of view. It is during this phase that it is possible to make rescue efforts and extinguish the fire.

The temperature rises quickly, and combustible materials emit flammable gases and smoke. When the flammable gases reach their flashpoint, flashover can occur.

The flame phase starts when flashover occurs. People in the room at that time have little chance of leaving alive, and the rescue teams have little chance of extinguishing the fire. In the flame phase, the temperature reaches a maximum of around 1000 °C. Fire insulation of structural steelwork ensures that the building does not collapse.
In the cooling phase, or rather the glowing phase, the carbonised remnants and embers usually emit strong radiant heat. Even during this phase, the fire insulation protects the steel structures from harmful temperature rises.

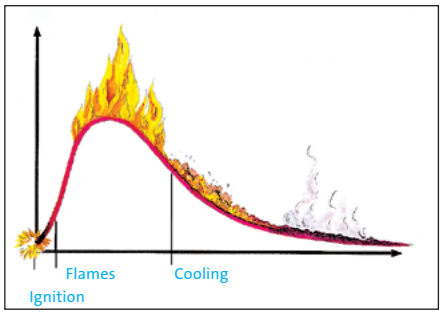


Fig. 4 Proceeding of a fire (in a building)

Non-combustible materials

The combustibility of a material is determined in accordance with an international fire testing method (EN ISO 1182 and EN ISO 1716).

ISOVER FireProtect contains so little flammable binder that in practice it does not contribute to the fire. Therefore, the material is classified as non-combustible with reaction to fire A1 according to EN 13501-1.

Steel strength

Steel strength is reduced at high temperatures. The critical temperature is the temperature at which yield stress occurs in the steel. The critical temperature of the steel therefore depends on the degree to which its strength is used structurally.

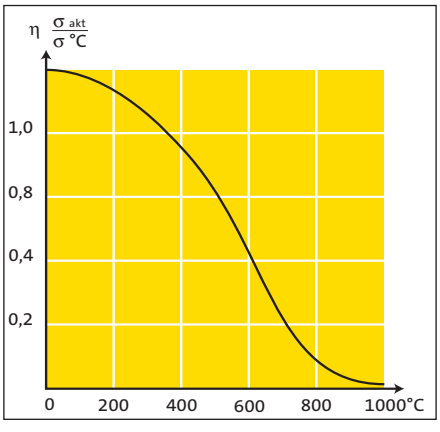


Fig. 5 The strength of the steel as a function of the temperature

Design

Design for steel beams

In the design of a steel structure, consideration must be given to how the steel would be affected under the influence of fire, causing the tension in the steel to decrease with increasing temperature. ISOVER FireProtect is a very efficient system for limiting temperature rise of the supporting steel structure, thus prolonging its fire resistance.

Fire resistance

Coarse structures have the best fire resistance. How quickly a steel structure is heated in a given fire is measured by the ratio of profile steel fire exposed surfaces and profile heat capacity. This relationship is expressed through the so-called section factor, Ai/Vs. Ai is the internal perimeter of the insulation in meters, Vs is the steel cross-sectional area in m^2. Examples of profiles with a low section factor (Ai/Vs) are HEB and HEM. High section factor Ai/Vs means quick heating of the steel. This means that slender structural steel requires thicker fire insulation.

Calculation

The fire resistance of a steel structure is calculated on the basis of the critical steel temperature. Calculation of the critical steel temperature is based on steel cross-section load ratio.

Normally, you can calculate the required insulation thickness at the critical steel temperature of 500 °C. You can check with the designer for that project on the critical steel temperature for the different structures and find out if it is higher compared to the amount of steel used in a normal situation. A higher critical steel temperature of the steel will require thinner insulation thickness. More information can be found in EN 1993-1-2: Eurocode 3: Design of steel structures – Part 1-2: General rules – Structural fire design.

It must also be taken into account if one has independent columns and beams or if you have columns that are built with non-combustible cladding, such as gypsum (see page 13). Such cladding offers a positive contribution to fire protection and means thinner insulation thickness is required. ISOVER FireProtect is approved also for fire insulation of HSQ-profiles (hat profiles) – more information on page 14.

First decide the profile type and size, then find the section ratio Ai/Vs using profile data from the steel supplier. One can find the most common profiles in tables on page 8, necessary insulation thicknesses can be found in the tables on pages 9 – 12.

One can also find the most common profiles in the on-line program's FireProtect Calc database. The program will then calculate the required insulation thickness based on selected critical steel temperature. The calculations are according to ENV 13381-4: 2007.

On-line design software is available on the following web site: http://fireprotect.isover.se/?lang=en

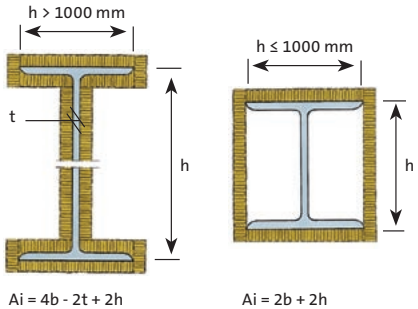
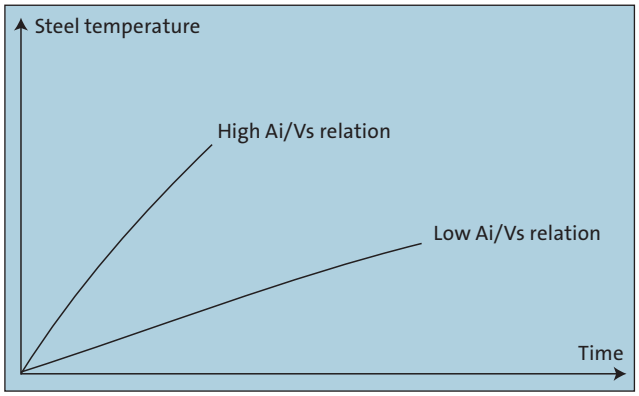
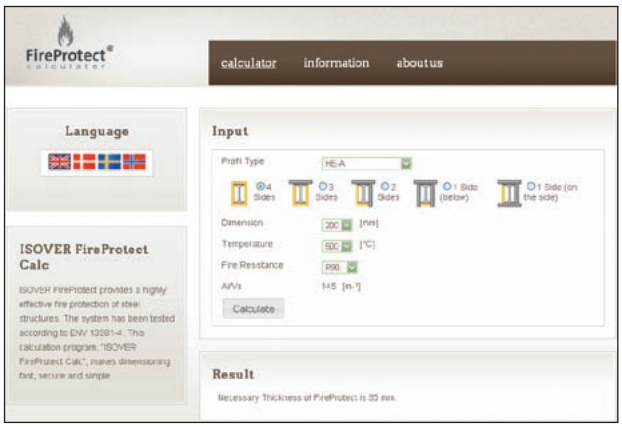


Fig. 6 Example of sections with a low section factor (Ai/Vs) are e.g. HEB and HEM. A high section factor leads to rapid heating of the steel. This implies that slim constructions require thicker fire insulation

Section factor (Ai/Vs value)
Ai = internal perimeter of the insulation (m)
Vs = steel cross-sectional area (m^2)

Rising of steel temperature





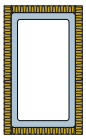
Design

Design for steel beams

The following tables show the Ai/Vs ratio for a number of standard sections.

H-shaped profiles (HE or IPE) with rectangular outlines of the fire insulation layer																					
HE-A		100	120	140	160	180	200	220	240	260	280	300	320	340	360	400	450	500	550	600	650
Ai/Vs-3		138	138	129	120	115	108	100	91	88	84	78	74	72	70	68	66	65	65	65	65
Ai/Vs-4		185	185	174	161	155	145	134	122	118	113	105	98	94	91	87	83	80	79	79	78
HE-B		100	120	140	160	180	200	220	240	260	280	300	320	340	360	400	450	500	550	600	650
Ai/Vs-3		115	106	98	89	83	77	73	68	66	64	60	58	57	56	56	55	54	55	56	56
Ai/Vs-4		154	141	130	118	110	102	97	91	88	85	80	77	75	73	71	69	67	67	67	66
HE-M		100	120	140	160	180	200	220	240	260	280	300	320	340	360	400	450	500	550	600	650
Ai/Vs-3		65	61	58	54	52	49	47	39	39	38	33	33	34	34	36	38	39	41	42	44
Ai/Vs-4		85	80	76	71	68	65	62	52	51	50	43	43	43	44	45	47	48	50	51	52
IPE	80	100	120	140	160	180	200	220	240		270	300		330	360	400	450	500	550	600	
Ai/Vs-3	270	248	230	215	200	189	175	165	153		147	139		131	122	116	110	103	98	91	
Ai/Vs-4	330	301	279	260	241	227	211	198	184		176	167		157	146	137	130	121	113	105	

H-shaped profiles (HE or IPE) with the fire insulation following the outlines of the profile														
HE-A	300	320	340	360	400	450	500	550	600	650	700	800	900	1000
Ai/Vs-3	130	120	115	109	103	98	93	91	90	88	86	85	82	81
Ai/Vs-4	156	144	137	130	122	114	108	105	103	100	97	95	91	90
HE-B	300	320	340	360	400	450	500	550	600	650	700	800	900	1000
Ai/Vs-3	98	93	90	87	83	80	77	76	76	75	73	73	71	71
Ai/Vs-4	118	112	107	104	99	94	90	88	87	85	83	82	79	78
HE-M	300	320	340	360	400	450	500	550	600	650	700	800	900	1000
Ai/Vs-3	51	50	51	51	52	54	55	56	57	58	59	61	62	64
Ai/Vs-4	61	60	60	61	62	63	64	65	65	66	67	68	70	71
IPE	300		330	360	400	450	500	550	600					
Ai/Vs-3	191		178	166	155	146	135	127	117					
Ai/Vs-4	219		204	189	177	165	152	142	131					



Rectangular hollow sections																																	
Height	100	100	100	100	100	100	120	120	120	120	120	120	150	150	150	150	160	160	160	160	200	200	200	200	250	250	250	250	300	300	300
Width	50	50	50	60	60	60	60	60	60	80	80	80	100	100	100	100	80	80	80	80	100	100	100	100	150	150	150	150	200	200	200
Thickness	5	6,3	8	5	6,3	8	5	6,3	8	5	6,3	8	5	6,3	8	10	5	6,3	8	10	5	6,3	8	10	6,3	8	10	12,5	6,3	8	12,5
Ai/Vs-3	187	148	120	177	144	116	180	145	135	174	138	111	169	136	109	89	176	142	114	93	129	140	112	91	134	107	87	71	131	104	68
Ai/Vs-4	224	178	144	218	177	143	216	174	162	214	172	139	211	169	136	111	211	170	136	112	155	168	134	109	165	132	107	87	164	130	85

Square hollow sections																															
Height	60	60	60	80	80	80	100	100	100	100	120	120	120	150	150	150	180	180	180	200	200	200	200	250	250	250	250	300	300	300
Width	60	60	60	80	80	80	100	100	100	100	120	120	120	150	150	150	180	180	180	200	200	200	200	250	250	250	250	300	300	300
Thickness	5	6,3	8	5	6,3	8	5	6,3	8	10	6,3	8	10	6,3	8	10	6,3	8	10	6,3	8	10	12,5	6,3	8	10	12,5	8	10	12,5
Ai/Vs-3	151	120	94	151	120	95	151	120	94	76	120	94	76	120	94	76	120	94	76	120	94	76	61	120	94	76	61	94	76	61
Ai/Vs-4	201	160	126	201	160	126	201	160	126	101	160	126	101	160	126	101	160	126	101	160	126	101	81	160	126	101	81	126	101	81

3-sided fire exposure

4-sided fire exposure

Insulation thickness for ISOVER FireProtect at critical steel temperature of 350 °C.

Ai/Vs	Fire resistance in minutes							
	30	60	90	120	150	180	210	240
≤ 50	20	20	20	30	40	50	60	70
60	20	20	25	35	50	60	70	80
70	20	20	30	40	60	70	80	
80	20	20	30	50	60	80		
90	20	20	35	50	70	80		
100	20	20	35	60	70			
110	20	25	40	60	80			
120	20	25	50	60	80			
130	20	25	50	70	80			
140	20	30	50	70				
150	20	30	50	70				
160	20	30	50	70				
170	20	30	50	70				
180	20	40	60	80				
190	20	40	60	80				
200	20	40	60	80				
210	20	40	60	80				
220	20	40	60	80				
230	20	40	60	80				
240	20	40	60					
250	20	40	60					

Insulation thickness for ISOVER FireProtect at critical steel temperature of 400 °C.

Ai/Vs	Fire resistance in minutes							
	30	60	90	120	150	180	210	240
≤ 50	20	20	20	25	35	50	60	70
60	20	20	20	30	40	60	70	80
70	20	20	25	35	50	60	80	
80	20	20	25	40	60	70	80	
90	20	20	30	50	60	80		
100	20	20	35	50	70	80		
110	20	20	35	60	70			
120	20	20	40	60	80			
130	20	25	40	60	80			
140	20	25	50	60	80			
150	20	25	50	70				
160	20	30	50	70				
170	20	30	50	70				
180	20	30	50	80				
190	20	30	50	80				
200	20	35	60	80				
210	20	35	60	80				
220	20	35	60	80				
230	20	35	60	80				
240	20	35	60	80				
250	20	35	60					

Insulation thickness for ISOVER FireProtect at critical steel temperature of 450 °C.

Ai/Vs	Fire resistance in minutes							
	30	60	90	120	150	180	210	240
≤ 50	20	20	20	20	30	40	50	60
60	20	20	20	25	35	50	60	70
70	20	20	20	30	50	60	70	80
80	20	20	25	35	50	60	80	
90	20	20	25	40	60	70	80	
100	20	20	30	50	60	70		
110	20	20	30	50	60	80		
120	20	20	35	50	70	80		
130	20	20	35	50	70			
140	20	20	35	60	70			
150	20	20	40	60	80			
160	20	25	40	60	80			
170	20	25	40	60	80			
180	20	25	50	60	80			
190	20	25	50	70	80			
200	20	25	50	70				
210	20	30	50	70				
220	20	30	50	70				
230	20	30	50	70				
240	20	30	50	70				
250	20	30	50	70				

Insulation thickness for ISOVER FireProtect at critical steel temperature of 500 °C.

Ai/Vs	Fire resistance in minutes							
	30	60	90	120	150	180	210	240
≤ 50	20	20	20	20	25	35	50	60
60	20	20	20	25	35	50	60	70
70	20	20	20	30	40	50	60	80
80	20	20	20	30	50	60	70	80
90	20	20	25	35	50	70	80	
100	20	20	25	40	60	70	80	
110	20	20	30	50	60	70		
120	20	20	30	50	60	80		
130	20	20	35	50	70	80		
140	20	20	35	50	70			
150	20	20	35	60	70			
160	20	20	40	60	70			
170	20	20	40	60	80			
180	20	25	40	60	80			
190	20	25	40	60	80			
200	20	25	50	60	80			
210	20	25	50	70	80			
220	20	25	50	70				
230	20	30	50	70				
240	20	30	50	70				
250	20	30	50	70				

Insulation thickness for ISOVER FireProtect at critical steel temperature of 525 °C.

Ai/Vs	Fire resistance in minutes							
	30	60	90	120	150	180	210	240
≤ 50	20	20	20	20	25	35	40	50
60	20	20	20	20	30	40	50	60
70	20	20	20	25	35	50	60	70
80	20	20	20	30	40	60	70	80
90	20	20	20	35	50	60	80	
100	20	20	25	35	50	70	80	
110	20	20	25	40	60	70		
120	20	20	30	50	60	80		
130	20	20	30	50	60	80		
140	20	20	35	50	70	80		
150	20	20	35	50	70			
160	20	20	35	60	70			
170	20	20	40	60	80			
180	20	20	40	60	80			
190	20	25	40	60	80			
200	20	25	40	60	80			
210	20	25	50	60	80			
220	20	25	50	70	80			
230	20	25	50	70				
240	20	25	50	70				
250	20	30	50	70				

Insulation thickness for ISOVER FireProtect at critical steel temperature of 550 °C.

Ai/Vs	Fire resistance in minutes							
	30	60	90	120	150	180	210	240
≤ 50	20	20	20	20	20	30	40	50
60	20	20	20	20	30	40	50	60
70	20	20	20	25	35	50	60	70
80	20	20	20	25	40	50	60	80
90	20	20	20	30	50	60	70	80
100	20	20	20	35	50	60	80	
110	20	20	25	35	50	70	80	
120	20	20	25	40	60	70		
130	20	20	30	40	60	70		
140	20	20	30	50	60	80		
150	20	20	30	50	60	80		
160	20	20	35	50	70	80		
170	20	20	35	50	70			
180	20	20	35	50	70			
190	20	20	35	60	70			
200	20	20	40	60	80			
210	20	20	40	60	80			
220	20	20	40	60	80			
230	20	25	40	60	80			
240	20	25	40	60	80			
250	20	25	50	60	80			

Insulation thickness for ISOVER FireProtect at critical steel temperature of 600 °C.

Ai/Vs	Fire resistance in minutes							
	30	60	90	120	150	180	210	240
≤ 50	20	20	20	20	20	30	35	50
60	20	20	20	20	25	35	50	60
70	20	20	20	20	30	40	60	70
80	20	20	20	25	35	50	60	70
90	20	20	20	30	40	60	70	80
100	20	20	20	30	50	60	70	
110	20	20	20	35	50	70	80	
120	20	20	25	40	50	70	80	
130	20	20	25	40	60	70		
140	20	20	30	50	60	80		
150	20	20	30	50	60	80		
160	20	20	30	50	70	80		
170	20	20	30	50	70	80		
180	20	20	35	50	70			
190	20	20	35	60	70			
200	20	20	35	60	70			
210	20	20	40	60	80			
220	20	20	40	60	80			
230	20	20	40	60	80			
240	20	20	40	60	80			
250	20	25	40	60	80			

Insulation thickness for ISOVER FireProtect at critical steel temperature of 650 °C.

Ai/Vs	Fire resistance in minutes							
	30	60	90	120	150	180	210	240
≤ 50	20	20	20	20	20	25	35	40
60	20	20	20	20	20	30	50	60
70	20	20	20	20	25	40	50	70
80	20	20	20	20	35	50	60	80
90	20	20	20	25	40	60	70	80
100	20	20	20	30	50	60	80	
110	20	20	20	35	50	70	80	
120	20	20	20	35	50	70		
130	20	20	20	40	60	70		
140	20	20	25	40	60	80		
150	20	20	25	50	60	80		
160	20	20	30	50	70			
170	20	20	30	50	70			
180	20	20	30	50	70			
190	20	20	35	60	70			
200	20	20	35	60	80			
210	20	20	35	60	80			
220	20	20	40	60	80			
230	20	20	40	60	80			
240	20	20	40	60	80			
250	20	20	40	60				

Design

Column of square section built into lightweight wall

Steel columns built into lightweight partitions or external walls with plasterboard cladding do not need as high insulation thicknesses. This is because the plasterboard sheets contribute to protection and the column is not affected by fire in the same way as a free-standing column.

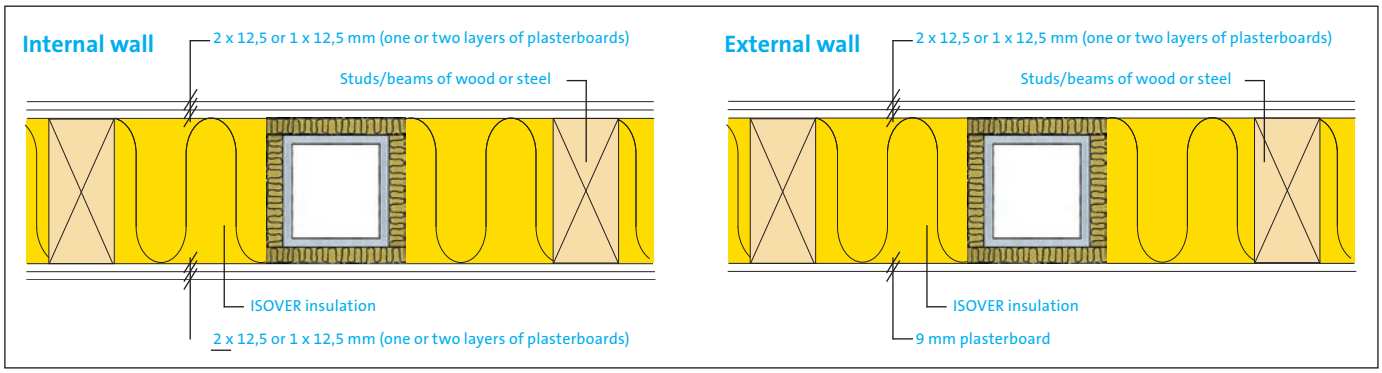


Fig. 7 Insulation of a square section in partition and external walls

The insulation thickness depends on the fire class, the critical steel temperature, the number of plasterboard sheets in the internal cladding and the material thickness of the square section.

The square section can be placed at any distance in relation to the studs (timber or steel).

With insulation of flange edge

		Internal wall								External wall							
Insulation thickness d [mm]		Fire resistance								Fire resistance							
Plasterboards on internal walls	Steel thickness of the studs/ beams	R 60				R 90				R 60				R 90			
		Critical temperature								Critical temperature							
		450 °C	500 °C	550 °C	600 °C	450 °C	500 °C	550 °C	600 °C	450 °C	500 °C	550 °C	600 °C	450 °C	500 °C	550 °C	600 °C
1 x 12,5 mm	5 mm	20	20	20	20	40	35	35	30	20	20	20	20	35	35	35	35
	6 mm	20	20	20	20	35	30	30	25	20	20	20	20	30	30	30	30
	8 mm	20	20	20	20	30	25	25	20	20	20	20	20	25	25	25	25
	10 mm	20	20	20	20	25	20	20	20	20	20	20	20	20	20	20	20
2 x 12,5 mm	5 mm	20	20	20	20	25	25	20	20	20*	20*	20*	20*	20	20	20	20
	6 mm	20	20	20	20	25	20	20	20	20*	20*	20*	20*	20	20	20	20
	8 mm	20	20	20	20	20	20	20	20	20*	20*	20*	20*	20	20	20	20
	10 mm	20	20	20	20	20	20	20	20	20*	20*	20*	20*	20	20	20	20

The section only needs to be insulated with FireProtect on 3 sides. The uninsulated side faces the outside of the wall.

Design for HSQ

HSQ (top hat) sections are often used in combination with concrete units. In this case, the concrete units help cool the steel sections, so lower insulation thicknesses can be applied. The insulation thickness depends on fire class, the critical steel temperature, density of the concrete unit, and the thickness of the lower flange of the HSQ. The insulation can be installed in two ways: with or without insulating the flange edge.

No insulation to flange edge

If the flange thickness is 15 mm or less, insulation to the flange edge can in some instances be omitted. The FireProtect board just needs to project at least 50 mm beyond the flange on both sides.

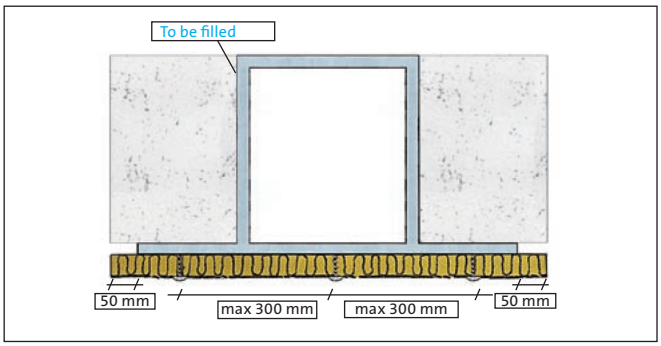


Fig. 8 No insulation to flange edge

With insulation to flange edge

FireProtect is fixed with two or more rows of pins depending on flange width. The insulation is shaped so that its width corresponds to the flange + 2 times the insulation thickness d. The flange edges are protected by a strip of FireProtect with the same thickness as the flange and a width corresponding to the insulation thickness d.

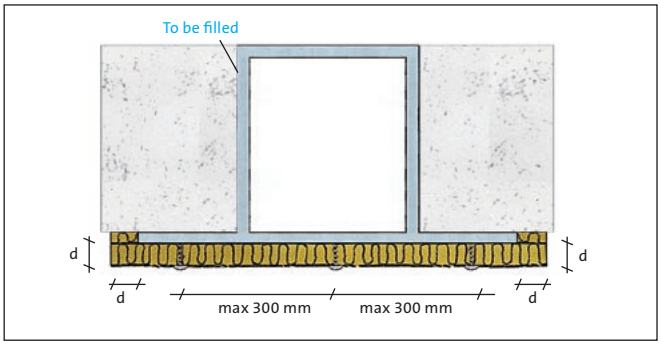


Fig. 9 With insulation to flange edge

Design for HSQ

No insulation to flange edge

Insulation thickness d [mm]		Fire resistance								
		R 30			R 60			R 90		
Density of concrete	Flange thickness	Critical temperature								
		400 °C	500 °C	600 °C	400 °C	500 °C	600 °C	400 °C	500 °C	600 °C
660 kg/m³	8 mm	20	20	20		20	20			25
	10 mm	20	20	20		20	20			25
	12 mm	20	20	20		20	20			25
	15 mm	20	20	20		20	20			25
1800 kg/m³	8 mm	20	20	20		20	20			25
	10 mm	20	20	20		20	20			25
	12 mm	20	20	20	20	20	20			25
	15 mm	20	20	20	20	20	20		25	25
2300 kg/m³	8 mm	20	20	20	25	20	20			25
	10 mm	20	20	20	25	20	20			25
	12 mm	20	20	20	20	20	20			25
	15 mm	20	20	20	20	20	20		25	25

With insulation to flange edge

Insulation thickness d [mm]		Fire resistance								
		R 30 – R 120			R 180			R 240		
Density of concrete	Flange thickness	Critical temperature								
		400 °C	500 °C	600 °C	400 °C	500 °C	600 °C	400 °C	500 °C	600 °C
660 kg/m³	8 mm	20	20	20		25	25			25
	10 mm	20	20	20		25	20			25
	12 mm	20	20	20		20	20			25
	15 mm	20	20	20	25	20	20			20
	20 mm	20	20	20	25	20	20			20
	25 mm	20	20	20	25	20	20		25	20
1800 kg/m³	8 mm	20	20	20	20	20	20		20	20
	10 mm	20	20	20	20	20	20		20	20
	12 mm	20	20	20	20	20	20		20	20
	15 mm	20	20	20	20	20	20	25	20	20
	20 mm	20	20	20	20	20	20	25	20	20
	25 mm	20	20	20	20	20	20	25	20	20
2300 kg/m³	8 mm	20	20	20	20	20	20		20	20
	10 mm	20	20	20	20	20	20	25	20	20
	12 mm	20	20	20	20	20	20	25	20	20
	15 mm	20	20	20	20	20	20	25	20	20
	20 mm	20	20	20	20	20	20	20	20	20
	25 mm	20	20	20	20	20	20	20	20	20

Further information about ISOVER FireProtect

For more information about ISOVER FireProtect, please contact the local Isover representative in your country.

A lifetime investment which pays off daily

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