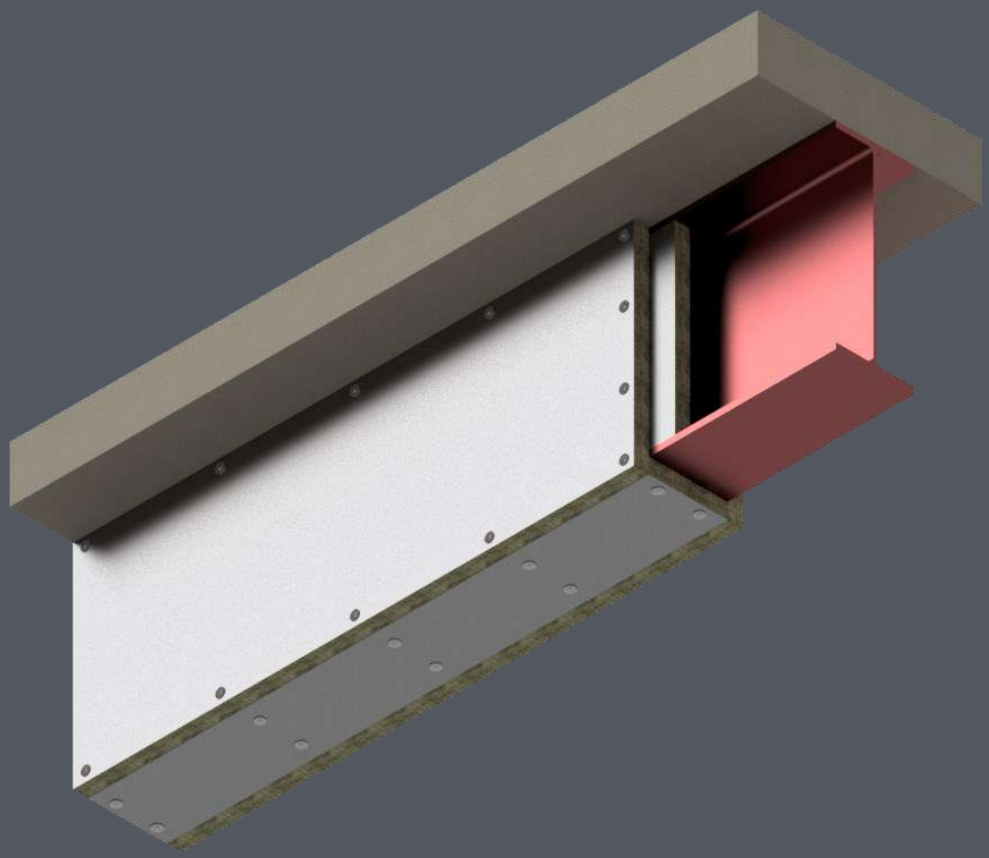
RYANFIRE
PASSIVE FIRE PROTECTION

New Zealand's leading supplier of passive fire protection solutions



FIRE PROTECTION GUIDE / STEEL

Loadbearing Steel Beams & Columns
Glue free/mechanical fix solution

DETERMINE THE REQUIRED FIRE RESISTANCE PERIOD

The fire resistance requirement for a building is defined in terms of fire resistance period and stated in terms of minutes (30, 60, 90, 120, etc. up to 240 minutes). This information is usually given in local building regulations and it depends on the height, occupants and type of the building. In practice it means that the building frame has to maintain its load bearing capacity during the fire until everybody has left the burning building. It is the responsibility of the design engineer, using design codes such as BS476 Part 21, to specify the appropriate limiting or failure temperature for a given section.

Different load bearing materials have different fire resistance periods. These materials are usually tested by using a standard fire curve which demonstrates development of a real fire. The temperature in a standard fire rises rather quickly and then increases indefinitely.

Fire resistance test results are expressed in terms of time of failure against one or more of three criteria:

- Load bearing capacity (R)
- Integrity (passage of hot gasses/flames) (E)
- Insulation (temperature raise on the cold side of the structural element, usually max. 180°C (I)

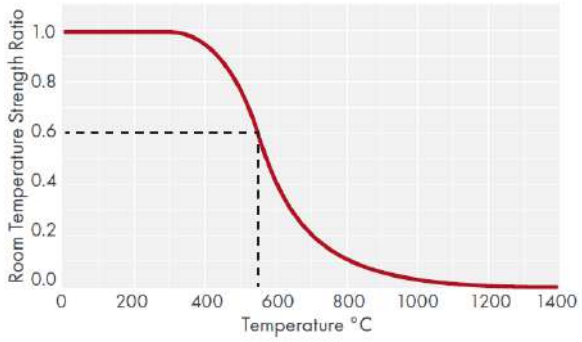
In some building constructions all of these are needed but for the steel frames only load bearing capacity is required e.g. R120 or 120/-/-

DETERMINE CRITICAL TEMPERATURE AND SECTION FACTOR OF THE STEEL

All materials lose their strength as they get hot.

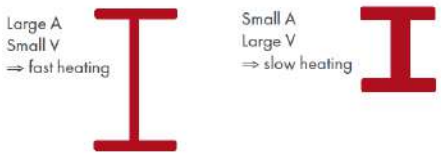
- Fully loaded steel beam exposed on four sides, fails at 550°C, regardless of the steel grade.
- Fully loaded beam exposed on three sides, fails at 620°C. Temperature 450-500°C is commonly used as rather a safe limit value.

Fires in buildings regularly exceed 1000°C within a relatively short period of time (30-60 minutes), yet heavily loaded steel loses its design margin of safety, about 40% at temperatures around 550°C regardless of the grade. As the temperature rises further the loss of strength is rapid and significant.



The design of fire protection is therefore based on this limiting temperature for elements exposed to fire on four sides. The aim is to keep the steel temperature below its critical temperature. The rate of increase in temperature of a steel cross section is determined by the ratio of the heated surface area (A_m) to the volume (V). This ratio, (A_m/V), has units of m^{-1} and is known as the section factor. Members with low section factors will heat up more slowly. The section factor is thus a measure of the rate at which a section will heat up in a fire and the higher the value, the greater will be the protection thickness required.

A steel section with a large surface area (A) (m2/m) will receive more heat than one with a smaller surface area. Also, the greater the volume (V) (m3/m) of the section, the greater the heat sink. It follows therefore, that a small thick section will be slower to increase in temperature than a large thin one.



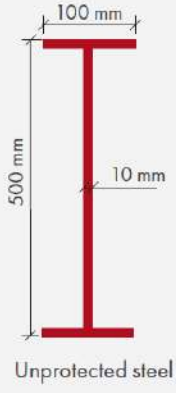
In calculating the section factor value, the full volume, V, is used whether the section is exposed on three sides or four as the entire steel section will be receiving heat. A, however, is the exposed surface area and that depends on the configuration of the fire protection.

Example of calculating section factor Am/V

- Surface area (Am) of one meter long beam is 1.38 m^2
- Volume (V) of one meter long beam is 0.0068 m^3

A / V = 1.38 / 0.0068 = 203 m^{-1}

Section factors vary generally from 25 m^{-1} for very large sections to over 300 m^{-1} for small, slender sections.



DETERMINE PROTECTION METHOD

The most practical way to limit the rise in steel temperature is to insulate it from the fire. In considering any fire protection system it is important to distinguish between profile, box and solid methods of application.

Profile Box Solid

Sprayed materials would normally be applied to follow the profile of the section. Special insulating concretes can be used to form the solid protection. Board materials would normally be used to form a box around the section or with higher profiles following the profile.

The type of insulation has to be taken into account when designing steel structures because insulation also conducts heat. In case of protected members the section factor A_p/V is multiplied by a factor, allowing for the thermal conductivity of the protection material, divided by its thickness λ_p/d_p.

$$(A_p/V) \times (\lambda_p/d_p)$$

Summary:

The thickness of fire protection insulation required depends on

- **Duration of fire resistance specified in national regulations (R30, R60, R90, R120…)**
- **Critical temperature and the section factor of the steel**
  - **Perimeter of steel section exposed to fire (A)**
  - **Shape and size of steel section (total volume, V)**
- **Type of protection used**

You can also use ready-calculated A_p/V values from the profile manufacturers:

1. Find the section factor A_p/V by using the data for the steel profile from the steel supplier. For example section factor for four sides exposed HE 140 B profile is $130m^{-1}$

2. In the following figures you can find the fire class and the needed thickness of insulation. Choose the table based on required fire resistance time, check the critical temperature and read the **PAROC Ryanlite Steel Protection Board** thick ness from the section factor row. For example if critical temperature for the steel profile is 450°C and required fire resistance time is 30 min, you need 20mm **PAROC Ryanlite Steel Protection Board** for the section factor $130m^{-1}$

HEA-profile			HEB-profile			HEM-profile		
a	b		c	d		e	f	
	a A_p/V (m^{-1})	b A/V (m^{-1})		c A_p/V (m^{-1})	d A_p/V (m^{-1})		e A_p/V (m^{-1})	f A_p/V (m^{-1})
HE 100 A	184	138	HE 100 B	154	115	HE 100 M	85	65
HE 120 A	185	137	HE 120 B	141	106	HE 120 B	80	61
HE 140 A	174	129	HE 140 B	130	98	HE 140 M	76	58
HE 160 A	161	120	HE 160 B	118	89	HE 160 M	71	54
HE 180 A	155	115	HE 180 B	110	83	HE 180 M	68	52
HE 200 A	145	108	HE 200 B	103	77	HE 200 M	65	49
HE 220 A	134	100	HE 220 B	97	73	HE 220 M	62	47
HE 240 A	122	91	HE 240 B	91	68	HE 240 M	52	40
HE 260 A	118	88	HE 260 B	88	66	HE 260 M	51	39
HE 280 A	113	84	HE 280 B	85	64	HE 280 M	50	38
HE 300 A	105	78	HE 300 B	81	60	HE 300 M	43	33
HE 320 A	98	74	HE 320 B	77	58			
HE 340 A	94	72	HE 340 B	75	57			
HE 360 A	91	70	HE 360 B	73	57			
HE 400 A	87	68	HE 400 B	71	56			
HE 450 A	83	66	HE 450 B	69	55			
HE 500 A	80	65	HE 500 B	67	55			
HE 550 A	79	65	HE 550 B	67	55			
HE 600 A	79	65	HE 600 B	67	56			
HE 650 A	79	65	HE 650 B	66	56			

Given insulation thicknesses in the tables are based on a designed program of fire tests on both loaded and unloaded specimens and a mathematical procedure applied to the results of the tests. Test programs were designed to determine both the insulation characteristics of a fire protection material and its physical performance under fire conditions for a range of steel sizes. Steel sections protected with **PAROC Ryanlite Steel Protection Board** were tested and calculated according to EN 1363-1:2012 and ENV 13381-4:2013 and assessed to BS 476 Part 21 by Warrington Fire Research LTD.

INSULATION THICKNESS FOR R30 STEEL STRUCTURE
A/V 130, CRITICAL STEEL TEMPERATURE 450 °C

Fire resistance period 30 minutes									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m^{-1}]	Thickness in mm of fire protection material to maintain steel temperature below design temperature								
47	20	20	20	20	20	20	20	20	20
50	20	20	20	20	20	20	20	20	20
55	20	20	20	20	20	20	20	20	20
60	20	20	20	20	20	20	20	20	20
65	20	20	20	20	20	20	20	20	20
70	20	20	20	20	20	20	20	20	20
75	20	20	20	20	20	20	20	20	20
80	20	20	20	20	20	20	20	20	20
85	20	20	20	20	20	20	20	20	20
90	20	20	20	20	20	20	20	20	20
95	20	20	20	20	20	20	20	20	20
100	20	20	20	20	20	20	20	20	20
105	20	20	20	20	20	20	20	20	20
110	20	20	20	20	20	20	20	20	20
115	20	20	20	20	20	20	20	20	20
120	20	20	20	20	20	20	20	20	20
125	20	20	20	20	20	20	20	20	20
130	20	20	20	20	20	20	20	20	20
135	20	20	20	20	20	20	20	20	20
140	20	20	20	20	20	20	20	20	20
145	20	20	20	20	20	20	20	20	20
150	20	20	20	20	20	20	20	20	20
155	20	20	20	20	20	20	20	20	20
160	20	20	20	20	20	20	20	20	20
165	20	20	20	20	20	20	20	20	20
170	20	20	20	20	20	20	20	20	20
175	20	20	20	20	20	20	20	20	20
180	20	20	20	20	20	20	20	20	20
185	20	20	20	20	20	20	20	20	20
190	20	20	20	20	20	20	20	20	20
195	20	20	20	20	20	20	20	20	20
200	25	20	20	20	20	20	20	20	20
205	25	20	20	20	20	20	20	20	20
210	25	20	20	20	20	20	20	20	20
215	25	20	20	20	20	20	20	20	20
220	25	20	20	20	20	20	20	20	20
225	25	20	20	20	20	20	20	20	20
230	25	20	20	20	20	20	20	20	20
235	25	20	20	20	20	20	20	20	20
240	25	20	20	20	20	20	20	20	20
245	30	20	20	20	20	20	20	20	20
250	30	20	20	20	20	20	20	20	20
255	30	20	20	20	20	20	20	20	20
260	30	20	20	20	20	20	20	20	20
265	30	20	20	20	20	20	20	20	20
270	30	20	20	20	20	20	20	20	20
275	30	20	20	20	20	20	20	20	20
280	30	20	20	20	20	20	20	20	20
281	30	25	20	20	20	20	20	20	20

OPEN AND CLOSED STEEL SECTIONS

INSULATION THICKNESS FOR R60 STEEL STRUCTURE

Fire resistance period 60 minutes									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m^{-1}]	Thickness in mm of fire protection material to maintain steel temperature below design temperature								
47	20	20	20	20	20	20	20	20	20
50	20	20	20	20	20	20	20	20	20
55	20	20	20	20	20	20	20	20	20
60	20	20	20	20	20	20	20	20	20
65	20	20	20	20	20	20	20	20	20
70	20	20	20	20	20	20	20	20	20
75	20	20	20	20	20	20	20	20	20
80	20	20	20	20	20	20	20	20	20
85	20	20	20	20	20	20	20	20	20
90	25	20	20	20	20	20	20	20	20
95	25	20	20	20	20	20	20	20	20
100	25	20	20	20	20	20	20	20	20
105	30	20	20	20	20	20	20	20	20
110	30	25	20	20	20	20	20	20	20
115	30	25	20	20	20	20	20	20	20
120	30	25	20	20	20	20	20	20	20
125	40	25	20	20	20	20	20	20	20
130	40	30	20	20	20	20	20	20	20
135	40	30	20	20	20	20	20	20	20
140	40	30	25	20	20	20	20	20	20
145	40	30	25	20	20	20	20	20	20
150	40	30	25	20	20	20	20	20	20
155	40	40	25	20	20	20	20	20	20
160	40	40	30	20	20	20	20	20	20
165	40	40	30	20	20	20	20	20	20
170	50	40	30	25	20	20	20	20	20
175	50	40	30	25	20	20	20	20	20
180	50	40	30	25	20	20	20	20	20
185	50	40	30	25	20	20	20	20	20
190	50	40	30	25	20	20	20	20	20
195	50	40	40	25	20	20	20	20	20
200	50	40	40	25	20	20	20	20	20
205	50	40	40	30	20	20	20	20	20
210	50	40	40	30	25	20	20	20	20
215	50	50	40	30	25	20	20	20	20
220	60	50	40	30	25	20	20	20	20
225	60	50	40	30	25	20	20	20	20
230	60	50	40	30	25	20	20	20	20
235	60	50	40	30	25	20	20	20	20
240	60	50	40	30	25	20	20	20	20
245	60	50	40	30	25	20	20	20	20
250	60	50	40	30	25	20	20	20	20
255	60	50	40	40	25	20	20	20	20
260	60	50	40	40	30	25	20	20	20
265	60	50	40	40	30	25	20	20	20
270	60	50	40	40	30	25	20	20	20
275	0	50	40	40	30	25	20	20	20
280	0	50	40	40	30	25	20	20	20
281	0	50	40	40	30	25	20	20	20

INSULATION THICKNESS FOR R90 STEEL STRUCTURE

Fire resistance period 90 minutes									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m^{-1}]	Thickness in mm of fire protection material to maintain steel temperature below design temperature								
47	20	20	20	20	20	20	20	20	20
50	20	20	20	20	20	20	20	20	20
55	20	20	20	20	20	20	20	20	20
60	25	20	20	20	20	20	20	20	20
65	25	20	20	20	20	20	20	20	20
70	30	25	20	20	20	20	20	20	20
75	30	25	20	20	20	20	20	20	20
80	40	30	20	20	20	20	20	20	20
85	40	30	25	20	20	20	20	20	20
90	40	30	25	20	20	20	20	20	20
95	40	40	30	20	20	20	20	20	20
100	40	40	30	25	20	20	20	20	20
105	50	40	30	25	20	20	20	20	20
110	50	40	40	30	20	20	20	20	20
115	50	40	40	30	25	20	20	20	20
120	50	50	40	30	25	20	20	20	20
125	50	50	40	30	25	20	20	20	20
130	50	50	40	40	30	20	20	20	20
135	60	50	40	40	30	25	20	20	20
140	60	50	40	40	30	25	20	20	20
145	60	50	50	40	30	25	20	20	20
150	60	50	50	40	40	25	20	20	20
155	60	60	50	40	40	30	25	20	20
160	60	60	50	40	40	30	25	20	20
165	0	60	50	40	40	30	25	20	20
170	0	60	50	40	40	30	25	20	20
175	0	60	50	50	40	30	25	20	20
180	0	60	50	50	40	30	25	25	20
185	0	60	50	50	40	40	30	25	20
190	0	60	50	50	40	40	30	25	20
195	0	60	60	50	40	40	30	25	20
200	0	0	60	50	40	40	30	25	20
205	0	0	60	50	40	40	30	25	20
210	0	0	60	50	40	40	30	25	20
215	0	0	60	50	40	40	30	25	25
220	0	0	60	50	40	40	30	30	25
225	0	0	60	50	50	40	30	30	25
230	0	0	60	50	50	40	40	30	25
235	0	0	60	50	50	40	40	30	25
240	0	0	60	50	50	40	40	30	25
245	0	0	60	50	50	40	40	30	25
250	0	0	60	50	50	40	40	30	25
255	0	0	60	50	50	40	40	30	25
260	0	0	60	50	50	40	40	30	25
265	0	0	60	60	50	40	40	30	25
270	0	0	0	60	50	40	40	30	30
275	0	0	0	60	50	40	40	30	30
280	0	0	0	60	50	40	40	30	30
281	0	0	0	60	50	40	40	30	30

INSULATION THICKNESS FOR R120 STEEL STRUCTURE

Fire resistance period 120 minutes									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m^{-1}]	Thickness in mm of fire protection material to maintain steel temperature below design temperature								
47	25	20	20	20	20	20	20	20	20
50	30	25	20	20	20	20	20	20	20
55	30	25	20	20	20	20	20	20	20
60	40	30	25	20	20	20	20	20	20
65	40	40	30	20	20	20	20	20	20
70	40	40	30	25	20	20	20	20	20
75	50	40	40	30	20	20	20	20	20
80	50	40	40	30	25	20	20	20	20
85	50	50	40	40	30	20	20	20	20
90	50	50	40	40	30	25	20	20	20
95	60	50	50	40	40	25	20	20	20
100	60	50	50	40	40	30	20	20	20
105	60	60	50	40	40	30	25	20	20
110	60	60	50	50	40	40	25	20	20
115	0	60	50	50	40	40	30	25	20
120	0	60	60	50	40	40	30	25	20
125	0	60	60	50	50	40	30	25	20
130	0	0	60	50	50	40	40	30	25
135	0	0	60	50	50	40	40	30	25
140	0	0	60	60	50	40	40	30	25
145	0	0	60	60	50	40	40	30	25
150	0	0	60	60	50	50	40	40	30
155	0	0	0	60	50	50	40	40	30
160	0	0	0	60	50	50	40	40	30
165	0	0	0	60	50	50	40	40	30
170	0	0	0	60	50	50	40	40	30
175	0	0	0	60	60	50	40	40	30
180	0	0	0	60	60	50	40	40	40
185	0	0	0	60	60	50	50	40	40
190	0	0	0	0	60	50	50	40	40
195	0	0	0	0	60	50	50	40	40
200	0	0	0	0	60	50	50	40	40
205	0	0	0	0	60	50	50	40	40
210	0	0	0	0	60	50	50	40	40
215	0	0	0	0	60	50	50	40	40
220	0	0	0	0	60	50	50	40	40
225	0	0	0	0	60	50	50	40	40
230	0	0	0	0	60	60	50	40	40
235	0	0	0	0	60	60	50	40	40
240	0	0	0	0	60	60	50	50	40
245	0	0	0	0	60	60	50	50	40
250	0	0	0	0	60	60	50	50	40
255	0	0	0	0	60	60	50	50	40
260	0	0	0	0	60	60	50	50	40
265	0	0	0	0	0	60	50	50	40
270	0	0	0	0	0	60	50	50	40
275	0	0	0	0	0	60	50	50	40
280	0	0	0	0	0	60	50	50	40
281	0	0	0	0	0	60	50	50	40

INSULATION THICKNESS FOR R150 STEEL STRUCTURE

Fire resistance period 150 minutes									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m^{-1}]	Thickness in mm of fire protection material to maintain steel temperature below design temperature								
47	40	30	25	20	20	20	20	20	20
50	40	30	30	20	20	20	20	20	20
55	40	40	30	25	20	20	20	20	20
60	50	40	40	30	25	20	20	20	20
65	50	50	40	40	30	20	20	20	20
70	50	50	50	40	40	25	20	20	20
75	60	50	50	40	40	30	25	20	20
80	60	60	50	50	40	40	30	20	20
85	60	60	50	50	50	40	30	25	20
90	0	60	60	50	50	40	40	30	20
95	0	60	60	50	50	40	40	30	25
100	0	0	60	60	50	50	40	40	25
105	0	0	60	60	50	50	40	40	30
110	0	0	0	60	60	50	50	40	30
115	0	0	0	60	60	50	50	40	40
120	0	0	0	0	60	50	50	40	40
125	0	0	0	0	60	60	50	40	40
130	0	0	0	0	60	60	50	50	40
135	0	0	0	0	60	60	50	50	40
140	0	0	0	0	60	60	50	50	40
145	0	0	0	0	0	60	50	50	40
150	0	0	0	0	0	60	50	50	40
155	0	0	0	0	0	60	60	50	50
160	0	0	0	0	0	60	60	50	50
165	0	0	0	0	0	60	60	50	50
170	0	0	0	0	0	60	60	50	50
175	0	0	0	0	0	60	60	50	50
180	0	0	0	0	0	0	60	50	50
185	0	0	0	0	0	0	60	50	50
190	0	0	0	0	0	0	60	50	50
195	0	0	0	0	0	0	60	50	50
200	0	0	0	0	0	0	60	60	50
205	0	0	0	0	0	0	60	60	50
210	0	0	0	0	0	0	60	60	50
215	0	0	0	0	0	0	60	60	50
220	0	0	0	0	0	0	60	60	50
225	0	0	0	0	0	0	60	60	50
230	0	0	0	0	0	0	60	60	50
235	0	0	0	0	0	0	60	60	50
240	0	0	0	0	0	0	60	60	50
245	0	0	0	0	0	0	60	60	50
250	0	0	0	0	0	0	60	60	50
255	0	0	0	0	0	0	60	60	50
260	0	0	0	0	0	0	0	60	50
265	0	0	0	0	0	0	0	60	50
270	0	0	0	0	0	0	0	60	50
275	0	0	0	0	0	0	0	60	50
280	0	0	0	0	0	0	0	60	50
281	0	0	0	0	0	0	0	60	50

INSULATION THICKNESS FOR R180 STEEL STRUCTURE

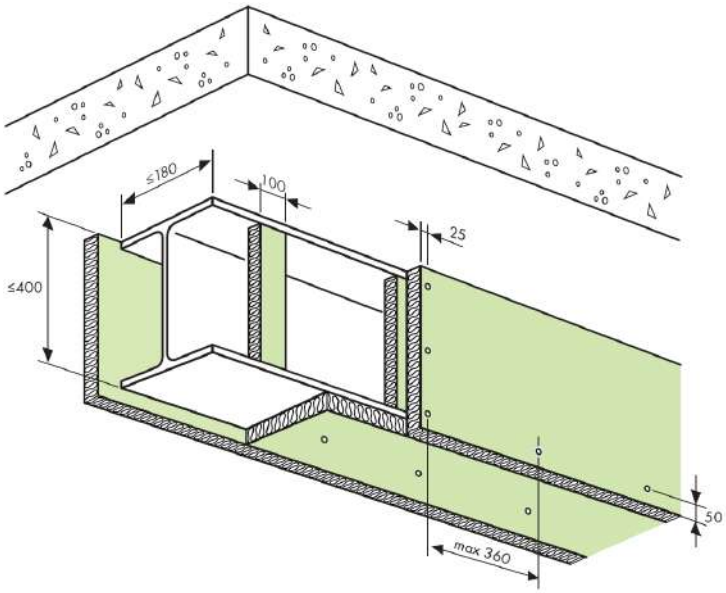
Fire resistance period 180 minutes									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m^{-1}]	Thickness in mm of fire protection material to maintain steel temperature below design temperature								
47	40	40	40	30	20	20	20	20	20
50	50	40	40	40	25	20	20	20	20
55	50	50	40	40	40	25	20	20	20
60	60	50	50	50	40	30	25	20	20
65	60	60	50	50	50	40	30	20	20
70	60	60	60	50	50	40	40	30	20
75	0	60	60	60	50	50	40	40	25
80	0	0	60	60	60	50	50	40	30
85	0	0	0	60	60	50	50	40	40
90	0	0	0	0	60	60	50	50	40
95	0	0	0	0	60	60	50	50	40
100	0	0	0	0	0	60	60	50	50
105	0	0	0	0	0	60	60	50	50
110	0	0	0	0	0	0	60	50	50
115	0	0	0	0	0	0	60	60	50
120	0	0	0	0	0	0	60	60	50
125	0	0	0	0	0	0	60	60	50
130	0	0	0	0	0	0	0	60	50
135	0	0	0	0	0	0	0	60	60
140	0	0	0	0	0	0	0	60	60
145	0	0	0	0	0	0	0	60	60
150	0	0	0	0	0	0	0	60	60
155	0	0	0	0	0	0	0	60	60
160	0	0	0	0	0	0	0	60	60
165	0	0	0	0	0	0	0	60	60
170	0	0	0	0	0	0	0	0	60
175	0	0	0	0	0	0	0	0	60
180	0	0	0	0	0	0	0	0	60
185	0	0	0	0	0	0	0	0	60
190	0	0	0	0	0	0	0	0	60
195	0	0	0	0	0	0	0	0	60
200	0	0	0	0	0	0	0	0	60
205	0	0	0	0	0	0	0	0	60
210	0	0	0	0	0	0	0	0	60
215	0	0	0	0	0	0	0	0	60
220	0	0	0	0	0	0	0	0	60
225	0	0	0	0	0	0	0	0	60
230	0	0	0	0	0	0	0	0	60
235	0	0	0	0	0	0	0	0	60
240	0	0	0	0	0	0	0	0	60
245	0	0	0	0	0	0	0	0	60
250	0	0	0	0	0	0	0	0	60
255	0	0	0	0	0	0	0	0	0
260	0	0	0	0	0	0	0	0	0
265	0	0	0	0	0	0	0	0	0
270	0	0	0	0	0	0	0	0	0
275	0	0	0	0	0	0	0	0	0
280	0	0	0	0	0	0	0	0	0
281	0	0	0	0	0	0	0	0	0

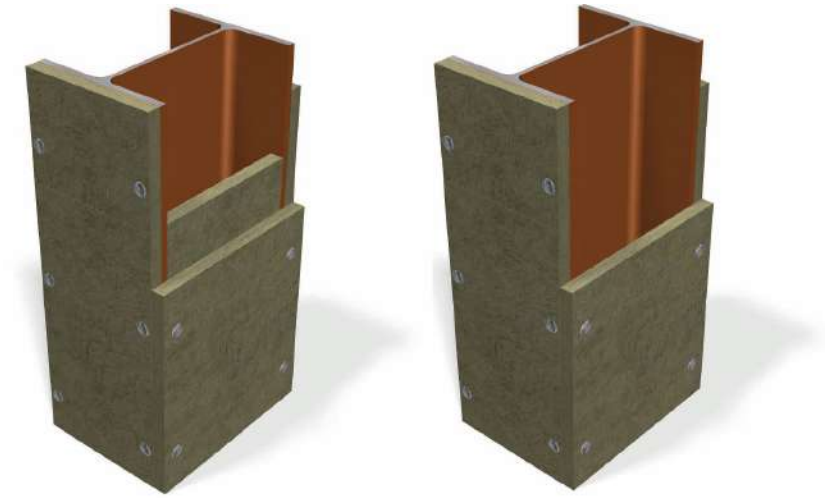
INSULATION THICKNESS FOR R210 STEEL STRUCTURE

Fire resistance period 210 minutes									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m^{-1}]	Thickness in mm of fire protection material to maintain steel temperature below design temperature								
47	50	50	50	40	40	30	20	20	20
50	50	50	50	50	40	40	25	20	20
55	60	60	50	50	50	40	40	25	20
60	60	60	60	60	50	50	40	40	25
65	0	0	60	60	60	50	50	40	40
70	0	0	0	0	60	60	50	50	40
75	0	0	0	0	0	60	60	50	50
80	0	0	0	0	0	0	60	60	50
85	0	0	0	0	0	0	60	60	50
90	0	0	0	0	0	0	0	60	60
95	0	0	0	0	0	0	0	60	60
100	0	0	0	0	0	0	0	0	60
105	0	0	0	0	0	0	0	0	60
110	0	0	0	0	0	0	0	0	60
115	0	0	0	0	0	0	0	0	60
120	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0

INSULATION THICKNESS FOR R240 STEEL STRUCTURE

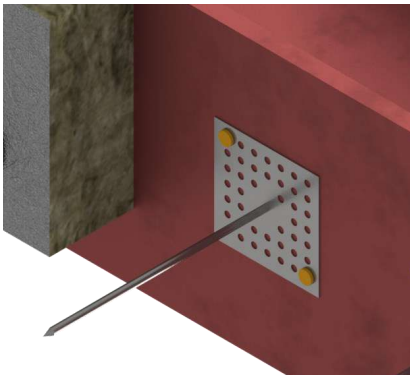
Fire resistance period 240 minutes									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m^{-1}]	Thickness in mm of fire protection material to maintain steel temperature below design temperature								
47	60	60	50	50	50	50	40	25	20
50	60	60	60	60	50	50	50	40	20
55	0	0	60	60	60	60	50	50	40
60	0	0	0	0	0	60	60	60	50
65	0	0	0	0	0	0	0	60	60
70	0	0	0	0	0	0	0	0	60
75	0	0	0	0	0	0	0	0	60
80	0	0	0	0	0	0	0	0	0





Spiral screws

Ryanfix S-Pins



Ramset™ Premium Drive Pins

INSTALLATION

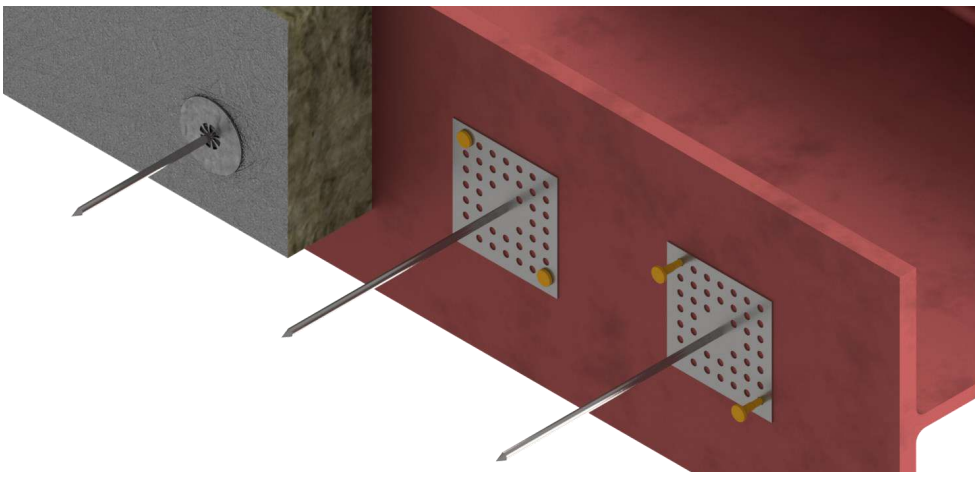
1. The insulation is installed using 3mm steel Ryanfix S-Pins fixed into the flanges. The S-Pins are fastened with min. 15mm steel pins using a Ramset Trakfast™ 800 gun. Secure the boards into place with lock washers.
2. S-Pins are fastened maximum 50mm in from each joint.
3. The maximum distance between fasteners is 360mm.
4. For flanges with a width of 180mm or below, a minimum one S-Pin should be used, placed in the centre of the flange. This means 4 pins in total per insulation board.

   For flanges with a width above 180mm, two pins should be used, placed on each side 50mm from the edge of the flange, to a total of 8 pins per insulation board.
5. Insert a 100mm wide butt joint board behind the horizontal joints in each side board. This should be tightly fit between the upper and lower flange and be the same thickness of the insulation being used. The butt joint board should be fixed to each side board with spiral screws. The spiral screws should be placed in the centre of each profile with a height of 400mm or lower and for profiles with a height above 400mm two spiral screws should be placed at the 1/3 point and 2/3 point.
6. Boards must be cut slightly over-sized so they fit tight. No glue, mastic or adhesive is needed. Any exposed cut edges must be sealed with foil tape.
7. All edges of the profile must be fully covered by the boards and There should be no openings in the fire protection.
8. For installation on beams the boards on the sides should overlap the bottom layer boards and not vice versa.

Fire protection achieved with inorganic stone wool is very durable. Maintenance is only needed if there will be some impact damage and damage is easy to repair.

PAROC Ryanlite Steel Protection Board system shall be used in indoor spaces with normal indoor temperature and moisture conditions.

INSTALLATION OF PAROC RYANLITE STEEL PROTECTION BOARD



SECURING THE BOARD

1 The boards are fixed by using 3mm steel Ryanfix S-Pins & lock washers. Place the S-Pins flush to the surface of the flange at the required position. See page 8 for detailed instructions

2 Secure using a Ramset Trakfast 800 pin gun to fire 2 x 15mm steel pins into the flange.

Ramset Trakfast™ 800

3 Place the Ryanlite into position through the S-Pins.

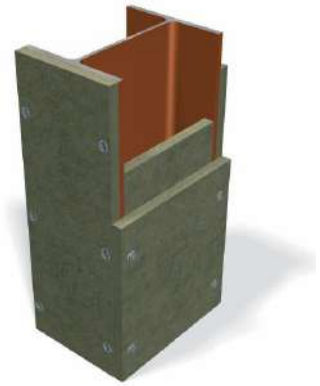
4 Snip the excess length of the S-Pin to size. The pin length should be 2-3mm greater than the board thickness.

5 Use a lock (non-return) washer to secure the Ryanlite against the beam.

DEALING WITH JOINTS

1 For joints, cut the board to a width of 100mm and a length suitable to the profile with 2-3mm extra length. Always use the same thickness of slab as used for the current profile.

2 Fit the butt joint board between the flanges behind a joint. It should be a tight fit.



GENERAL INFORMATION

1 The boards should form a solid corner on the steel profile. No steel should be visible.

2 Follow the instructions for the steel pin fastening equipment to ensure the installation of the pins is completed correctly.

Ensure that the pins are properly fastened. A minimum 15mm steel pin is required.

RHS PROFILES

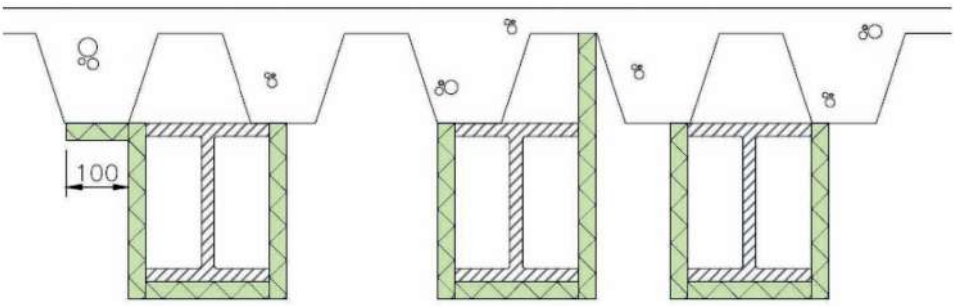
The Ryanlite should be fixed to the top of RHS profiles by butt joining. The steel pins are fixed at intervals max. 360mm and max. 50mm from joints in the boards.

CONNECTION DETAIL

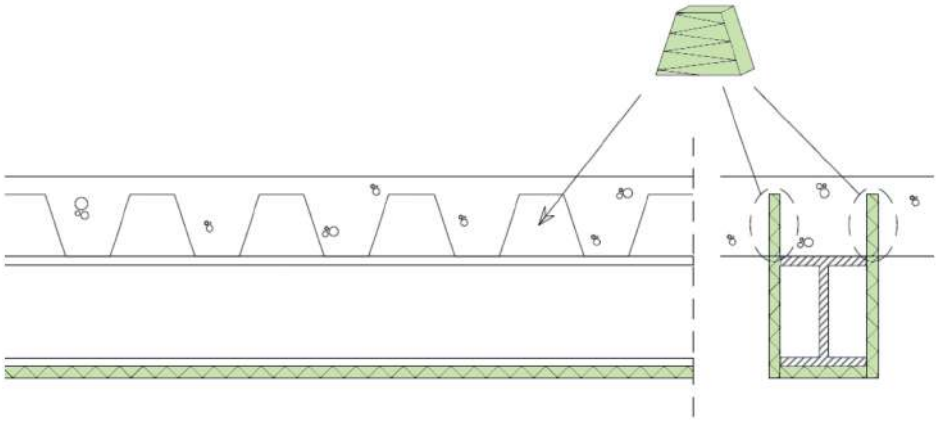
When the fire protected steel beam is mounted under a composite steel deck, the following construction details should be utilised. It should be noted that fire protection of the load bearing trapezoidal steel sheet and fire protection of the load bearing beam must always be considered separately.

The fire protection board has to be installed tightly against the deck. No gaps are allowed.

In the case of a gap in the corrugation of the adjoining steel deck fix a 100mm wide board adjacent to the fire insulating board on the profile.



If the profile is installed across the corrugated steel deck, pre-cut pieces of the same insulation are pressed into the gaps before the installation of the boards on the vertical side of the profile. Pieces should be fixed to the metal sheet with Ryanfire Mastic.



PRODUCT INFORMATION / PAROC RYANLITE STEEL PROTECTION

Property	Standard
Width x Length: 600 mm x 1200 mm	EN 822
Thickness: 20–120 mm Tolerances: T5; EN12 162	EN 823
Reaction to Fire: A1	EN 13 501-1
Thermal conductivity: λD = 0.038 W/mK	EN 13 162

APPLICATION

PAROC Ryanlite Steel Protection Board is a non-combustible stone wool insulation for use as a glue-free fire protection for steel structures.

PACKAGING

Plastic packages on a pallet or loose product on a pallet.