

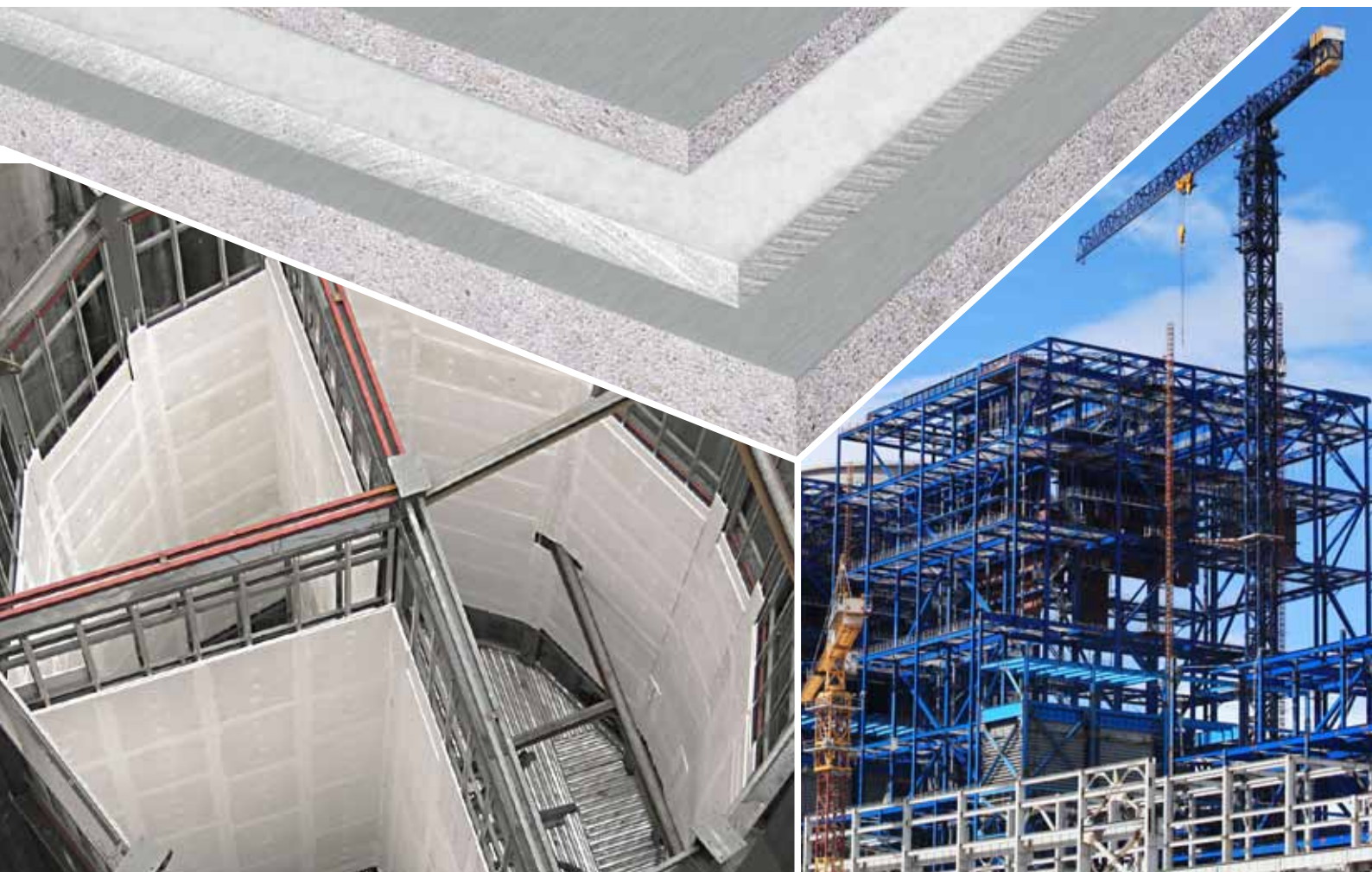
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April 2020



Structural Steel Protection with Kemwell Tecbor® and Silboard®

Fire protection board systems designed to meet the stringent requirements of the multi-storey commercial and industrial steel framed market



SAVING LIVES | PROTECTING BUILDINGS & CONTENTS | MAINTAINING VITAL SERVICES

PASSIVE FIRE PROTECTION

Specialists for the construction, infrastructure, transport, energy, industrial and commercial sectors.

www.kemwell-fire.com



Kemwell Tecbor® and Silboard® Structural Steel Protection

Steel structures are used for building purposes worldwide. One of the main advantages is that they have great resistance per weight unit, which provides them with huge versatility and the possibility of creating complex yet light structures.

However, the thermal conductivity of steel represents a disadvantage. Therefore, in the event of a fire, the gradual increases in temperature plus steel high heat transmission result in a substantial reduction of the structure's bearing capacity and mechanical resistance. The resistance and elastic limit are modified above 250°C, and above roughly 500°C the drop in resistance is significant enough not to support its design capacity.

Tests with Kemwell Tecbor® and Silboard® have been performed pursuant to standard EN 13381-4 to determine the boards' fire protection properties when applied to steel structural elements such as beams, columns or tension elements. Kemwell Tecbor® and Silboard® have been tested to cover a great variety of steel profiles characterised by their section factors. Likewise, they have been tested for several standard specified design temperatures.

Kemwell Tecbor® is an A1 classified magnesium based board as per EN 13501-1. It is designed to achieve fire protection up to EI 240. Kemwell Tecbor boards have been developed for a wide range of applications in the construction industry.

Kemwell Silboard® is a calcium silicate board with a clean white appearance and a density of approx. 550 kg/m³. It is supplied in a convenient size of 1250 x 800mm for ease of handling and is very easy to work, cut and fix. Kemwell Silboard® is suitable for internal and semi-exposed applications.

The thickness of board required to provide the desired level of fire protection is determined by reference to the steel section factor and the limiting steel temperature. The tables on page 5 for Kemwell Tecbor® and Silboard® provide the thickness of board for up to 4 hours protection to steel factors up to A/V 250m⁻¹ at a limiting temperature of 550°C. For other section factors and/or other limiting temperatures, please contact our technical department.

You can specify Kemwell Tecbor® & Silboard® with confidence.

SUPPORT

Our project team provides expert support services throughout all stages of any construction project, including:

- Technical advice
- Supply of data sheets and certification
- Product selection and application consultation
- Site-visits
- Installation advice
- On-site and off-site Educational Seminars
- Benefit from years of industry knowledge and experience

We understand the complex and stringent requirements of the building and construction industry and our products provide architects, developers, and contractors with adaptability and performance benefits to enable safe and innovative designs to be easily realised.

Please contact us to discuss your project or requirements further.

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KEMWELL TECBOR® COMPOSITION

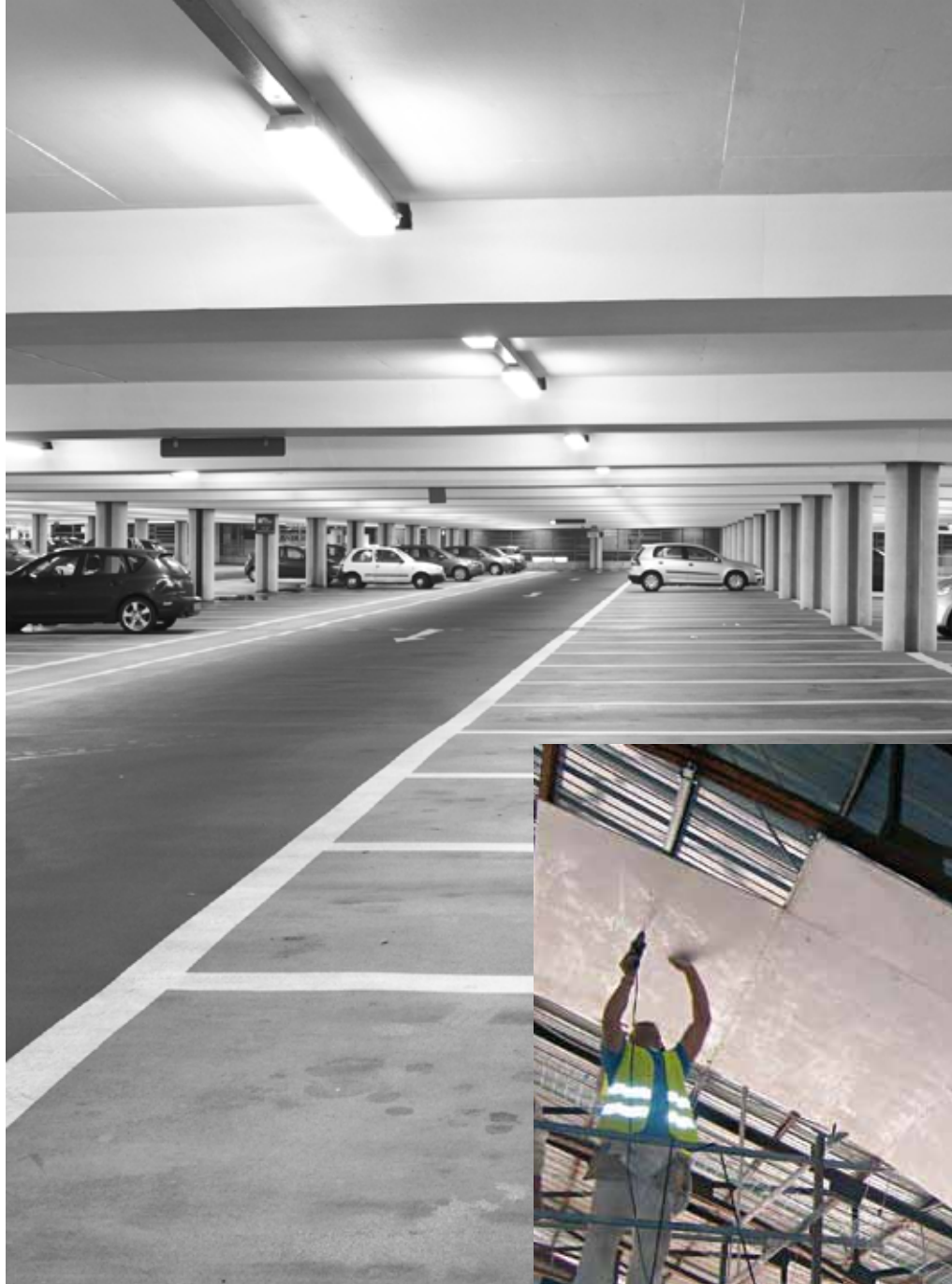
Kemwell Tecbor® boards are A1 non-combustible rigid fire protection panels made of magnesium oxide, silicates, and other additives, finished with a fibreglass mesh on both sides. They have a smooth finish in a light grey / white colour on the external side.

APPLICATIONS

- Column encasement
- Beam encasement
- Wind posts
- Cellular beams
- Castellated sections

SECTORS

- Commercial offices
- Warehouses
- Factories
- Multi-storey car parks
- Retail and leisure
- Petrochem
- Powergen



FEATURES



Fire Resistance

A1 classified as per EN 13501-1, designed to achieve fire protection up to EI 240.



Insulation Performance

Kemwell Tecbor® boards have high thermal insulation.



Moisture Resistance

Kemwell Tecbor® boards are suitable for use in internal conditions with humidity below 85% RH, according to EAD 350142-00-1106 for Type Z₂



Smooth Surface

Kemwell Tecbor® boards can be left as a standalone finish or can be painted if required. Edges of boards can be squared or tapered.



Easy Workability

Edges of boards can be squared or tapered and the boards are quick and easy to assemble.



Durability

Kemwell Tecbor® boards are strong and robust. System performance is unaffected by the hazards and conditions of the working environment.



Vermin Resistant

Kemwell Tecbor® boards remain unaffected by rodent, termite and insect attack.

KEMWELL SILBOARD® COMPOSITION

Kemwell Silboard® is a medium density and lightweight calcium silicate non-combustible board designed to provide fire protection to structural steel members and self-supporting duct work.

When used in structural steelwork, it can provide up to 360 minutes resistance to fire depending on the section factor of this steel, the thickness of board used, and the critical limiting temperature.

Kemwell Silboard® is white in colour with both faces sanded smooth that produces a clean bright finish. It can be left undecorated or painted. As a calcium silicate board, it is resistant to the effects of moisture and can be used in semi-exposed and humid conditions. This makes it ideal for use on external walls where the steel can be protected before the cladding is installed.

APPLICATIONS

- Column encasement
- Beam encasement
- Self-supporting duct work
- Semi-exposed and humid applications
- Castellated sections

SECTORS

- Commercial offices
- Warehouses and Factories
- Multi-storey car parks
- Retail and leisure
- Petrochem and Powergen



FEATURES



Fire Resistance

A1 classified as per EN 13501-1, designed to achieve fire protection up to R 360.



Insulation Performance

Kemwell Silboard® boards have high thermal insulation.



Moisture Resistance

Kemwell Silboard® boards are classified as Type Y according to EAD 350142- 00-1106 for use in internal and semi-exposed applications



Smooth Surface

Kemwell Silboard® boards can be left as a standalone finish or can be painted if required.



Easy Workability

Edges of boards are square and the boards are quick and easy to assemble.



Durability

Kemwell Silboard® boards are strong and robust. System performance is unaffected by the hazards and conditions of the working environment.



Vermin Resistant

Kemwell Silboard® boards remain unaffected by rodent, termite and insect attack.

KEMWELL TECBOR® AND SILBOARD® - SECTION FACTOR (A/V)

The necessary board thickness for the steel structure protection depends on the A/V ratio of the steel section and the limiting critical temperature.

The A/V rate is a measure of the speed at which a steel section is heated during a fire. The higher the section factor is, the thicker the board will be for the profile fire protection. A/V (m⁻¹)

Where A = heated perimeter in meters (m)

Where V = total cross-sectional area in sq m (m²)

The information in this chart appears in ETA-18/0546. The chart is valid for design temperature of 550°C on steel according to ENV 13381-4

Section Factor A/V m⁻¹

Kemwell Tecbor® Structural Steel Protection System

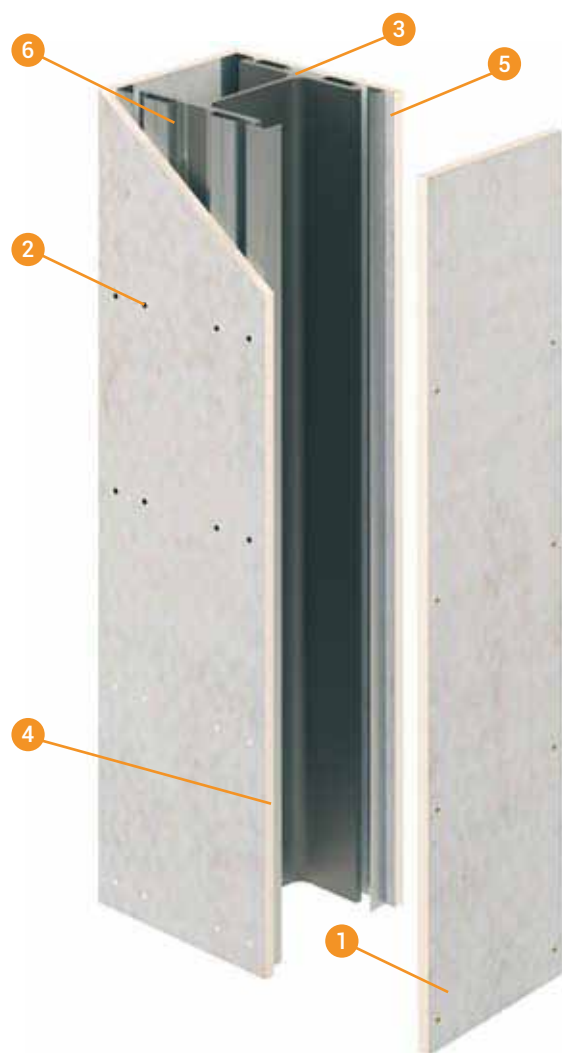
	Period of Fire Resistance at 550°C - minutes					
	30	60	90	120	180	240
	Thickness of Kemwell Tecbor - mm					
58	10	10	10	12	25	40
70	10	10	15	20	30	45
80	10	10	15	20	35	45
90	10	10	20	25	35	45
100	10	12	20	25	35	50
110	10	12	20	25	35	50
120	10	12	20	25	40	50
130	10	12	20	25	40	50
140	10	15	20	25	40	50
150	10	15	20	30	40	50
160	10	15	20	30	40	55
170	10	15	25	30	40	55
180	10	15	25	30	40	55
190	10	15	25	30	40	55
200	10	15	25	30	40	55
210	10	15	25	30	40	55
220	10	15	25	30	40	55
230	10	15	25	30	40	55
240	10	15	25	30	40	55
250	10	15	25	30	45	55
260	10	15	25	30	45	55

Kemwell Silboard® Structural Steel Protection System

	Period of Fire Resistance at 550°C - minutes					
	30	60	90	120	180	240
	Thickness of Kemwell Silboard - mm					
58	20	20	20	20	30	40
70	20	20	20	20	35	40
80	20	20	20	30	40	25 + 20
90	20	20	30	30	45	25 + 25
100	20	20	30	30	45	30 + 25
110	20	20	30	40	50	30 + 30
120	20	20	30	40	50	30 + 30
130	20	20	30	40	50	30 + 40
140	20	20	30	40	50	30 + 40
150	20	20	30	40	50	30 + 40
160	20	30	30	40	50	30 + 40
170	20	30	40	50	30 + 30	30 + 40
180	20	30	40	50	30 + 30	40 + 40
190	20	30	40	50	30 + 30	40 + 40
200	20	30	40	50	30 + 30	40 + 40
210	20	30	40	50	30 + 30	40 + 40
220	20	30	40	50	30 + 30	40 + 40
230	20	30	40	50	30 + 30	40 + 40
240	20	30	40	50	30 + 30	40 + 40
250	20	30	40	50	30 + 30	40 + 40
260	20	30	40	50	30 + 30	40 + 40

Section Factor A/V m⁻¹

STRUCTURAL STEEL PROTECTION: COLUMNS



TESTS

Standard: ENV 13381-4

Laboratory: APPLUS

Test No: 10/1483-1014

SOLUTION

- 1 Kemwell Tecbor® boards
- 2 See table below.
- 3 Steel column.
- 4 Kemwell Tecbor® Joint Paste.
- 5 30 x 30 x 0.6mm angle section.
- 6 45 x 15 x 0.6mm omega.

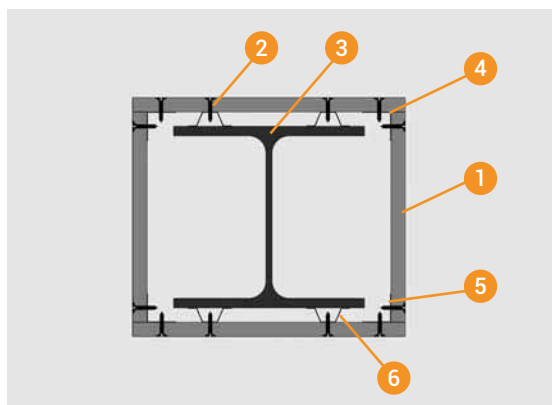
DESCRIPTION OF ASSEMBLY

Fix 45 x 15 x 0.6mm omega profiles to the outer side of the metal profile's flange to be protected with steel nails every 725mm.

Fix 30 x 30 x 0.6mm angle section to the Kemwell Tecbor® board strips, and then the strips onto the omega profiles with self-tapping screws every 250mm. Assemble the strips.

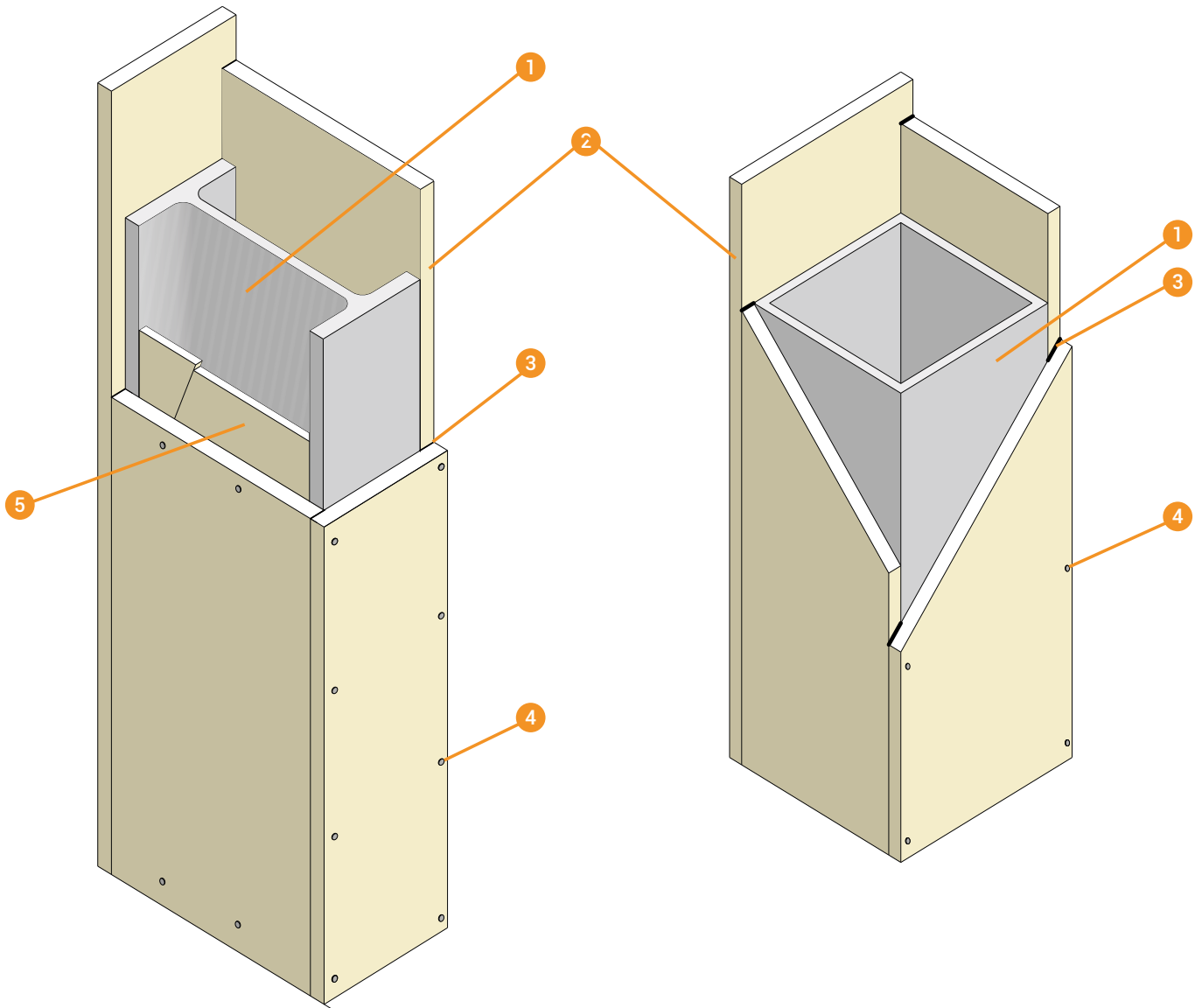
Use Kemwell Tecbor® Joint Paste in screw heads and between boards.

NOTE: If protection procedure is done with 15mm Kemwell Tecbor® boards or greater, they may be joined using board to board fixing system as per the detail below with 5 x thickness screws every 250mm.



Plan showing metal frame assembly

FRAMELESS ENCASEMENT SYSTEM USING KEMWELL TECBOR®

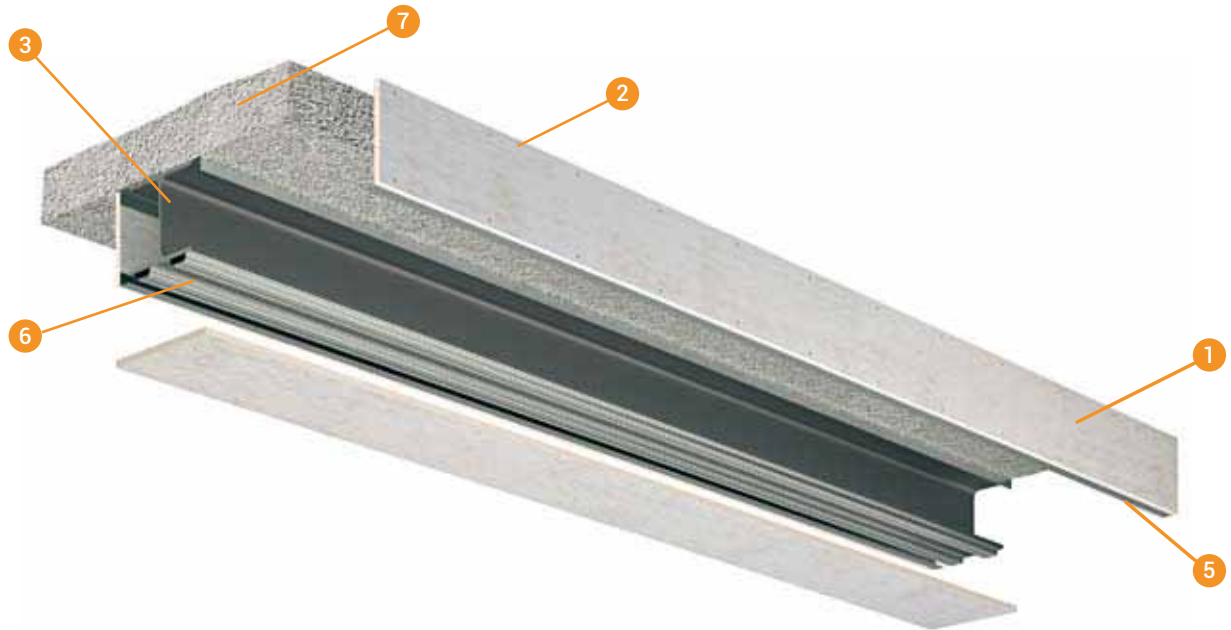


- 1 Steel column, beam, square or rectangular hollow section, size to be confirmed to determine H_p/A factor.
- 2 Kemwell Tecbor® 2300 x 1220mm sheet size, thickness to suit period of fire protection required and based on the section factor of the steel and limiting temperature.
- 3 Kemwell Tecbor® Joint Paste.
- 4 Deep thread screws of 5mm dia. suitable length to suit board thickness at max. 250mm centres. See table.
- 5 Kemwell Tecbor® soldiers wedge fitted behind the joint and at max. 600mm centres, 100mm wide and the same board thickness as the casing board. For double layer casing, soldier to be the same thickness as thickest layer.
- 6 Abutments and junctions with other components to be sealed using Kemwell Tecbor® Joint Paste.

KEMWELL TECBOR SCREW SIZES: SINGLE & MULTILAYER SYSTEMS

Single and multi-layer fire protection systems				
Overall Board Thickness	Thickness of Kemwell Tecbor® (multi-layers)	"Screw size for inner layer dia. x length mm"	"Screw size for intermediate layer dia. x length mm"	"Screw size for outer layer dia. x length mm"
10	-	-	-	3.5 x 25
15	-	-	-	3.5 x 25
20	-	-	-	3.5 x 25
25	-	-	-	3.5 x 35
	15 + 10	3.5 x 25	-	3.5 x 35
30	15 + 15	3.5 x 35	-	3.5 x 45
	20 + 10	3.5 x 25	-	3.5 x 45
	10 + 10 + 10	3.5 x 35	3.5 x 35	3.5 x 45
35	20 + 15	3.5 x 35	-	3.5 x 45
	25 + 10	3.5 x 25	-	3.5 x 45
	15 + 10 + 10	3.5 x 25	3.5 x 35	3.5 x 45
40	20 + 20	3.5 x 35	-	3.5 x 55
	20 + 10 + 10	3.5 x 35	3.5 x 45	3.5 x 55
	30 + 10	3.5 x 45	-	3.5 x 55
45	25 + 20	3.5 x 35	-	3.5 x 55
	30 + 15	3.5 x 45	-	3.5 x 55
	15 + 15 + 15	3.5 x 25	3.5 x 45	3.5 x 55
50	25 + 25	3.5 x 35	-	4.2 x 70
	30 + 20	3.5 x 45	-	4.2 x 70
	20 + 20 + 10	3.5 x 35	3.5 x 55	4.2 x 70
	20 + 15 + 15	3.5 x 35	3.5 x 45	4.2 x 70
55	30 + 25	3.5 x 45	-	4.2 x 70
	20 + 20 + 15	3.5 x 35	3.5 x 55	4.2 x 70
60	30 + 30	3.5 x 45	-	4.2 x 70
	30 + 15 + 15	3.5 x 45	3.5 x 55	4.2 x 70
Board thickness shown in following order; Inner layer + intermediate layer (if any) + outer layer				

BEAM PROTECTION USING KEMWELL TECBOR



TESTS

Standard: ENV 13381-4

Laboratory: APPLUS

Test No: 10/1483-1014

SOLUTION

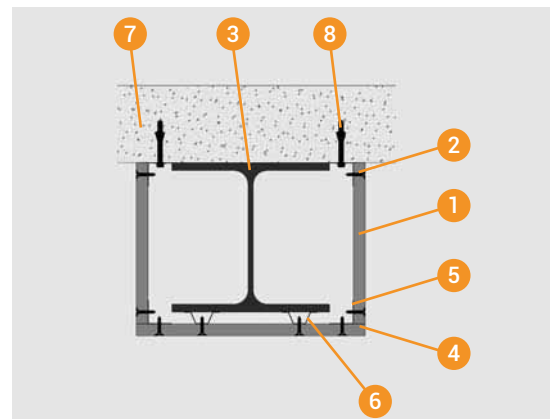
- 1 Kemwell Tecbor® boards.
- 2 Self-tapping screw (size according to board).
- 3 Steel beam.
- 4 Kemwell Tecbor® Joint Paste.
- 5 30 x 30 x 0.6mm angle section.
- 6 45 x 15 x 0.6mm omega.
- 7 Slab.
- 8 6 x 60mm metal plug.

DESCRIPTION OF ASSEMBLY

Fix 45 x 15 x 0.6mm omega profiles to the outer side of the metal profile's flange to be protected with steel nails every 725mm. Fix the 30 x 30 x 0.6mm angle to the slabs with 6 x 60mm plugs every 300mm.

Fix 30 x 30 x 0.6mm lower angle section to the Kemwell Tecbor® board strips and these onto the omega profiles and onto the angle anchored to the slabs with self-tapping screws every 250mm.

Use Kemwell Tecbor® Joint Paste in screw heads and between boards.



Plan

TESTS

Kemwell Tecbor® boards are tested in official laboratories certified by ENAC or other similar international entities and in accordance to EN and ASTM standards, among others.

It is our aim to make Kemwell Tecbor® an integral solution, so we conduct real-scale tests in tunnels, hydrocarbon curve tests, RWS curve tests or tests under the American UL standard.

BOARD SIZES

Boards manufactured in accordance with:

ISO 9001:2008 Standard Quality Management Systems

ISO 14001:2004 Environmental Management Systems

Thickness	10, 12, 15, 20, 25, 30 and 40 mm
Widths	1220 mm
Lengths	2300 mm

MANUFACTURING TOLERANCES

Length Tolerance	+/- 5 mm
Width Tolerance	+/- 3 mm
Thickness Tolerance	+2 mm / -1 mm
Diagonal Tolerance	+/- 5 mm



TESTS

Kemwell Silboard® boards are tested in official laboratories certified by ENAC or other similar international entities and in accordance to EN and ASTM standards, among others.

It is our aim to make Kemwell Silboard® an integral solution, so we conduct real-scale tests in tunnels, hydrocarbon curve tests, RWS curve tests or tests under the American UL standard.

BOARD SIZES

Boards manufactured in accordance with:

ISO 9001:2008 Standard Quality Management Systems

ISO 14001:2004 Environmental Management Systems

Thickness	20, 30, 40 and 50 mm
Widths	800 mm
Lengths	1250 mm

MANUFACTURING TOLERANCES

Length Tolerance	+/- 3 mm
Width Tolerance	+/- 5 mm
Thickness Tolerance	+/- 2 mm
Diagonal Tolerance	+/- 5 mm

SCREW SIZES

Overall Board Thickness mm	Steel screws minimum dimensions (diameter x length mm)	
	Used in corner connections	Used in connections with spacer elements
20	3.5 x 40	3.0 x 35
30	4.0 x 60	3.5 x 40
40	4.0 x 60	3.5 x 50
50	5.0 x 90	4.0 x 60



DISCLAIMER

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