knaufinsulation.co.uk

FIRE PROTECTION OF STRUCTURAL STEEL TO BS EN 13381-4

challenge.
create.
care.

FIRE PROTECTION OF STRUCTURAL STEEL

We are members of the Association for Specialist Fire Protection, and our fire protection products are listed in the Yellow Book, which presents economical methods for the fire protection of structural steelwork to provide compliance with Building Regulations.

Fire protection design

Structural steel requires fire protection because it loses structural strength at temperatures that can be rapidly reached in a building fire. This will consequently have a negative impact on the structural integrity of the building. Protecting the structural steel from the heat of a fire will delay the onset of this loss of strength and the possible collapse of the building. This is essential because it allows extra time for both the occupants of the building to escape and fire services to tackle the fire. It could also prevent the actual collapse of the building minimising insurance losses.

Building Regulations covering fire safety are concerned with the preservation of life.

With the increasing use of structural steel in construction, designers need fire protection solutions that provide a combination of fast installation and cost-effectiveness whilst achieving the desired finish.

Whatever the application we have a range of board products and systems to cater for any project.

When used for the fire protection of structural steelwork, board systems offer several compelling advantages over site - applied paint and spray coating systems.

Board systems:

- Are manufactured to factory tolerances – this enables the specifier to be certain that the correct thickness of fire protection is being applied, by simply checking the thickness of materials supplied;
- Can be installed prior to the building being sealed and made watertight, subject to approval, in all temperature and humidity conditions. This is in contrast to paint and sprays which are often restricted by normal UK winter conditions, causing potential delays to site programs;
- Are fast, clean, and dry to install, with negligible dust levels, allowing other trades to work in close proximity;
- Are quick and easy to check (by visual inspection) that all relevant areas have been protected;
- Are fully compatible with drylining systems and allow easy integration with partitioning schemes.

Fire protection

Any steel section which is an element of structure, and is deemed by any of the following regulations to require fire resistance, can be protected with a fire protection system of dense Rock Mineral Wool slabs or fibre reinforced gypsum based boards.

1. The Building Regulations (England and Wales) Approved Document B (Fire Safety) – Volumes 1 and 2 (2019)
2. The Building (Scotland) Regulations, Technical Booklets, Section 2 (2019)
3. The Building Regulations (Northern Ireland) Technical Booklet E (2012)
4. The Building Regulations (Republic of Ireland) Technical Guidance Document B (2006)
5. Loss Prevention Council Code of Practice for Construction of Buildings

Steel sections can include universal beams, columns and joists (plain and castellated), structural and rolled tees, angles, channels and square or rectangular hollow sections.

Benefits

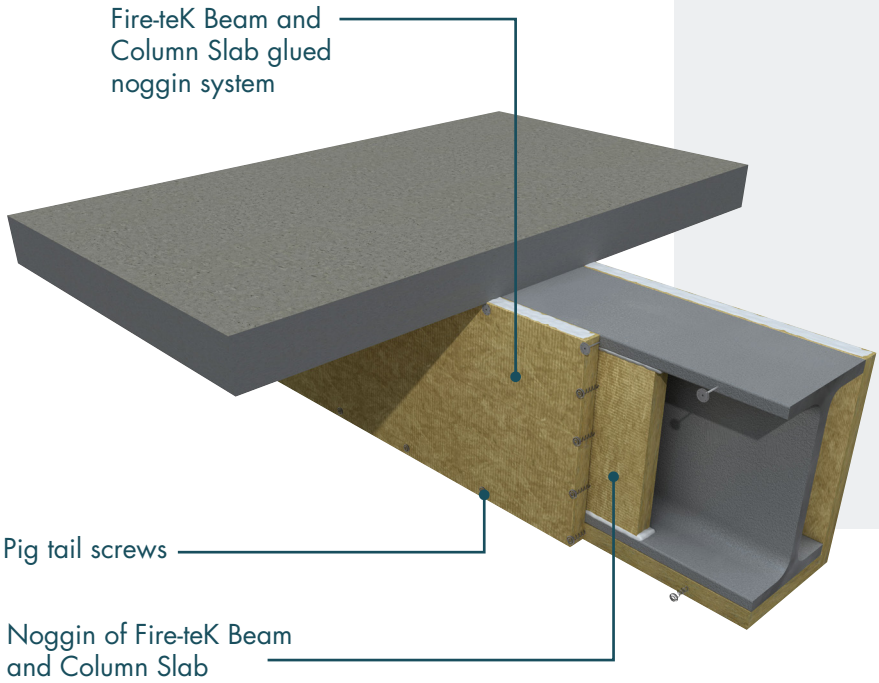
Rock Mineral Wool slabs offer a number of advantages for the fire protection of structural steelwork that make them ideal for fast track projects.

Rock Mineral Wool

- Lightweight product – at less than half the weight of calcium silicate slabs – Rock Mineral Wool fire protection boards are easy to handle and fit on site particularly for overhead work
- Ease of cutting and fixing - Rock Mineral Wool slabs are easy to cut with either a saw or a sharp knife, involving square edge butt joints between the boards which enables a fast and simple system to be installed without delaying other trades and activities.

STRUCTURAL STEELWORK

FIRE-TEK BEAM AND COLUMN SLAB



- Flexible system with multiple installation methods
- Maintenance free, passive system
- Clean installation process with negligible dust generation

FIRE-TEK BEAM AND COLUMN SLAB

Contains no ozone-depleting substances or greenhouse gases. For further environmental information consult the relevant Environmental Product Declaration, available on our website.

Product

Fire-teK Beam and Column Slab is a dense Rock Mineral Wool slab. It is available unfaced or faced with a reinforced aluminium foil, for applications above clean rooms, within air plenums, or for aesthetic purposes.

Plaster manufacturers advice and guidance should be followed regarding pre-treatment of Fire-teK Beam and Column Slabs before application of plaster finishes.

Typical construction

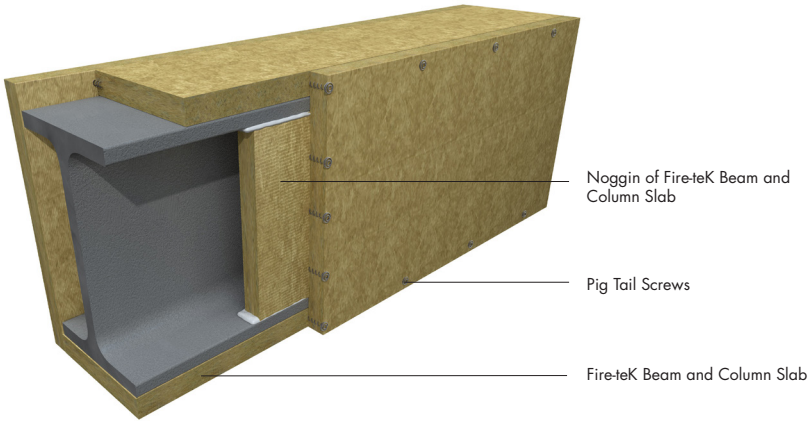
The exposed surfaces of any steel section are fully enclosed in Fire-teK Beam and Column Slab, using any of the fixing systems shown on the following pages.

Fire-teK Beam and Column Slab can be used to provide up to 2 hours fire protection to structural steel columns, beams and trusses. Steel sections may include universal beams, columns and joists, structural and rolled tees, angles, channels and square or rectangular hollow sections.

Installation

Fire-teK Beam and Column Slab should be installed using either the adhesive noggin or welded pin fixing system.

info.uk@knaufinsulation.com ■ technical.uk@knaufinsulation.com ■ www.knaufinsulation.co.uk



Technical specification

Fire-teK Beam and Column Slab, ...mm thick, to be used to provide fire protection to structural steelwork.

It is to be installed using the dry adhesive noggin fixing system as detailed in the Installation section.

Alternatively, consult the National Building Specifications, Standard version clause/clauses... K11/885.....

Knauf Insulation specification clauses can be downloaded from knaufinsulation.co.uk/nbs

NBSPlus

Performance

Fire performance

Fire-teK Beam and Column Slab is non-combustible and has Euroclass A1 reaction to fire classification to BS EN 13501-1. Fire-teK Beam and Column Slab is designed to provide up to 2 hours fire protection to structural steelwork, thereby satisfying the Building Regulations and insurance demands for periods of fire resistance.

Durability

Fire-teK Beam and Column Slab is rot proof, does not sustain vermin and will not encourage the growth of fungi, mould or bacteria.

Fire-teK Beam and Column Slab is odourless and non-hygroscopic.

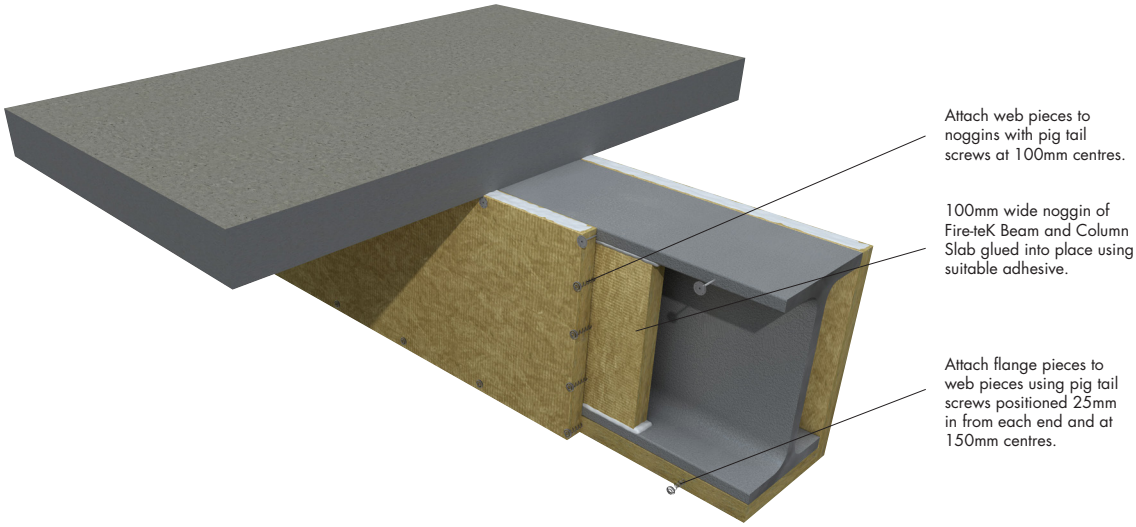
When exposed to 90% relative humidity and 20°C, Fire-teK Beam and Column Slab absorbs less than 0.004% of moisture.

See end of section for Hp/A tables.

INSTALLATION OF FIRE-TEK BEAM AND COLUMN SLAB USING ADHESIVE NOGGIN FIXINGS SYSTEM

Adhesive Noggin Fixing System

Up to 2 hours fire protection



Noggins are cut 100mm wide from Fire-teK Beam and Column Slab and installed at 500mm centres.

Where board thicknesses are below 40mm. Noggins can be made of two layers to meet the minimum noggin thickness of 40mm. Where board thicknesses are 40mm or greater, the noggin should be made from that board thickness.

Max board thickness for both methods is 65mm.

They should be cut to a suitable length relative to the web size to give a tight compression fit.

Noggins are glued top and bottom using a typical thixotropic adhesive and friction fitted between the flanges at 500mm centres.

The noggins should be installed in such a way that they are flush with the flange, and such that they coincide with joints between the boards.

It is preferable to leave the noggins in position for 4 hours to allow the adhesive to cure. However, where this is impractical Fire-teK Beam and Column Slab can still be fitted before the adhesive cures since the noggins are essentially friction fitted.

For web depths greater than 500mm, T-shaped or solid noggins should be used, formed from Fire-teK Beam and Column Slab, and screwed together using pig tail screws.

Adhesive detail

The adhesive used for gluing Fire-teK Beam and Column Slabs should be a thixotropic adhesive type based on soluble solids of silicate and potassium mixed with clay or refractory mineral filler to an approximate ratio of 70:30 by weight. Steelwork should ideally be dry but the presence of condensation will merely prolong the cure time, not weaken the bond strength.

Note: Steelwork should be clean and free from grease prior to the application of adhesive.

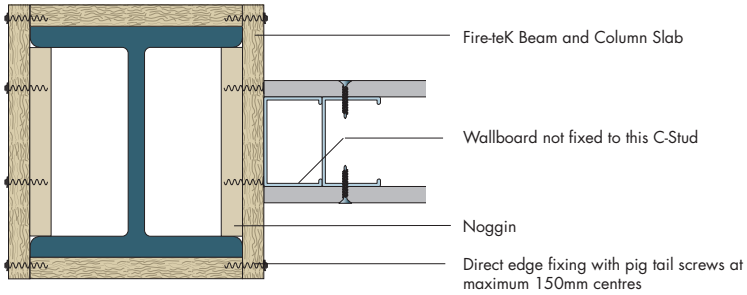
Pig tail screws

Pig tail screws are made from 1.6mm diameter spirally wound galvanised wire.

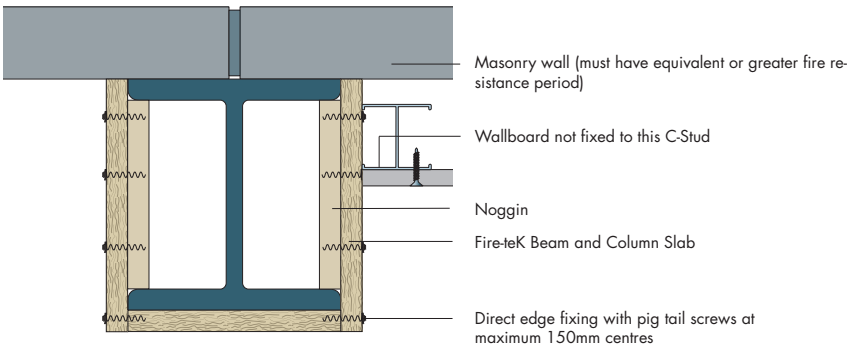
Board thickness (mm)	20	>35	>45	>65
Min screw length (mm)	40	55	90	110

The screws should be installed flush at 150mm centres on board to board joints and 100mm centres over noggins, using either power or hand tools. There is no need to countersink the screw heads.

Column with partition abutment



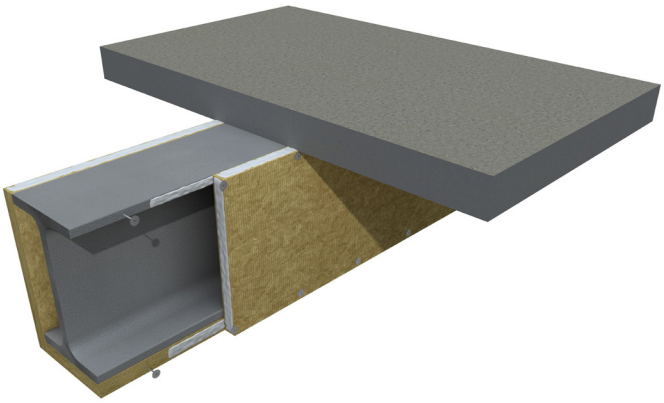
Column with wall lining abutment



INSTALLATION OF FIRE-TEK BEAM AND COLUMN SLAB USING WELDED PIN FIXING SYSTEM

The Welded Pin Fixing System

Can be used to provide up to 2 hours fire protection structural steelwork.



I and H Section Beams

CD weld nails are fixed along the top and bottom flange toes on both sides of the beam, and in two rows to the underside of the bottom flange via a capacitor discharge welding machine. The nails are located at nominal 800mm centres on the flange tips, and at no more than 110mm from the board ends. Those on the bottom flange are located at a nominal distance of 50mm from the flange edges and at nominal 500mm centres along the length of the beam, and again at no more than 110mm from the board ends.

The beam is clad on three sides with the Fire-teK Beam and Column Slab insulation. The flange face panels are cut to the corresponding width of the beam and the web face panels are cut to the corresponding depth of the beams plus 1x the nominal protection thickness applied. Joints in the panels across the web are offset with respect to those across the bottom flange by a minimum of 750mm. The boards are installed by pushing them over the pins and securing them in place using 38mm-diameter x 0.4mm-thick mid steel disc washers pushed over the weld pins. All board-to-board joints are glued using a suitable thixotrophic mastic adhesive.

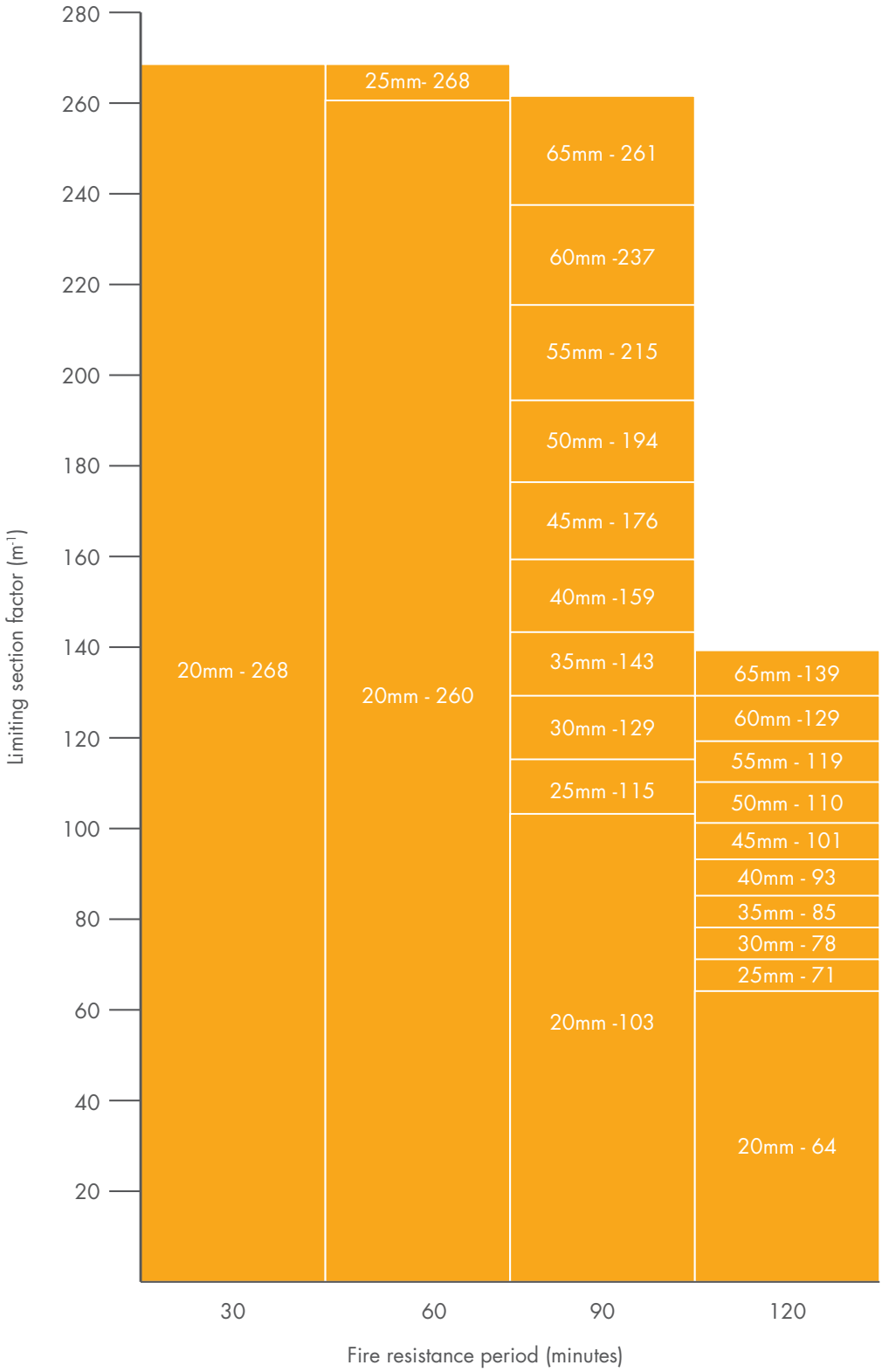
Any gaps between the boards and the soffit of the construction above the beam are sealed with intumescent sealant.

Rectangular and square hollow section beams

This method can also be used to protect rectangular and square hollow steel beams. In this case, the pins are located on each face of the hollow section in pairs, 50mm from the edge of each face. Those on the sides of the beam are located at nominal 800mm centres and those on the bottom face at nominal 500mm centres.

HP/A TABLES - ADHESIVE NOGGIN

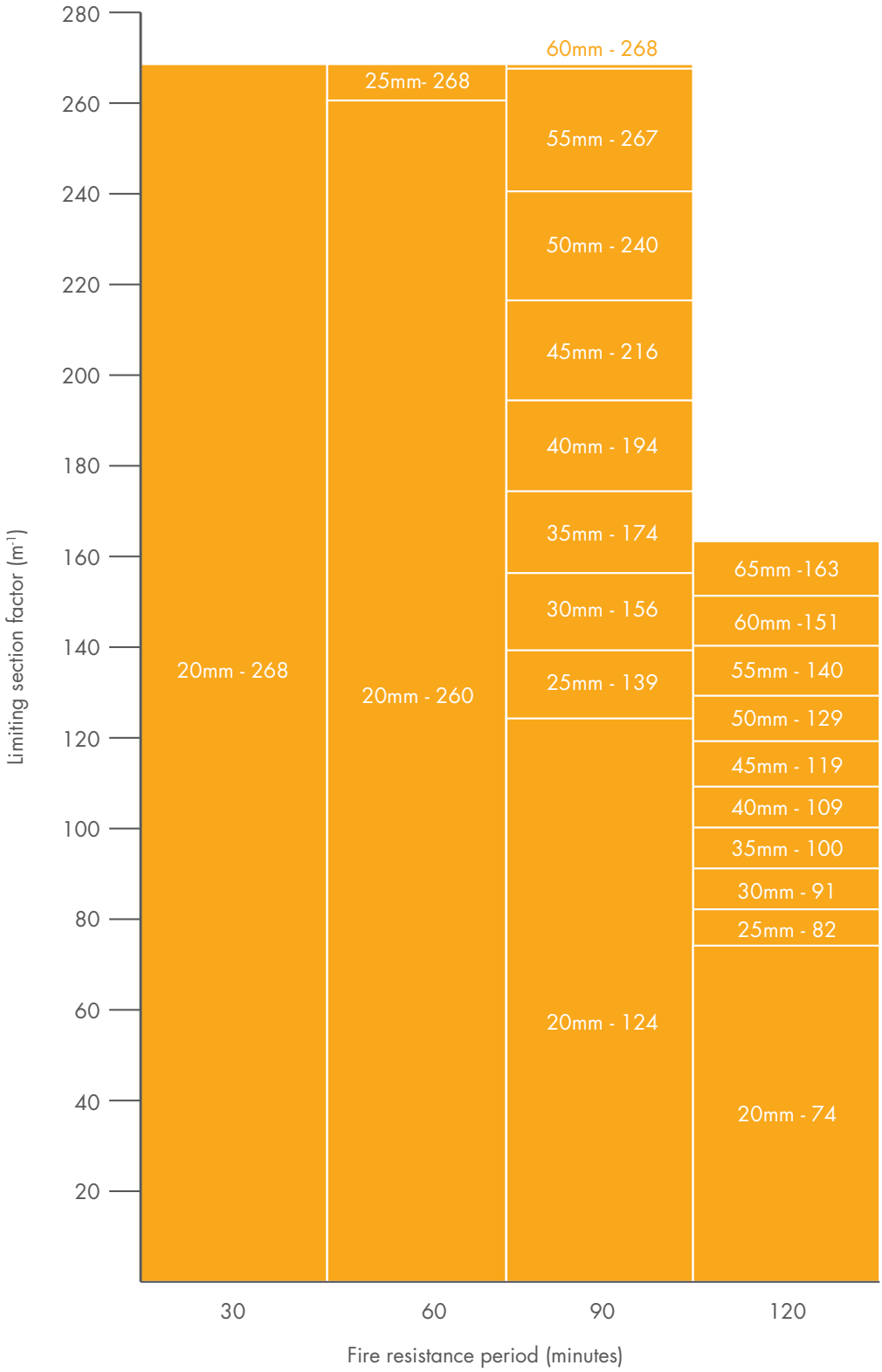
Required Thickness (mm) of Fire-teK Beam and Column Slab for a design temperature of 550°C



info.uk@knaufinsulation.com ■ technical.uk@knaufinsulation.com ■ www.knaufinsulation.co.uk

HP/A TABLES - ADHESIVE NOGGIN

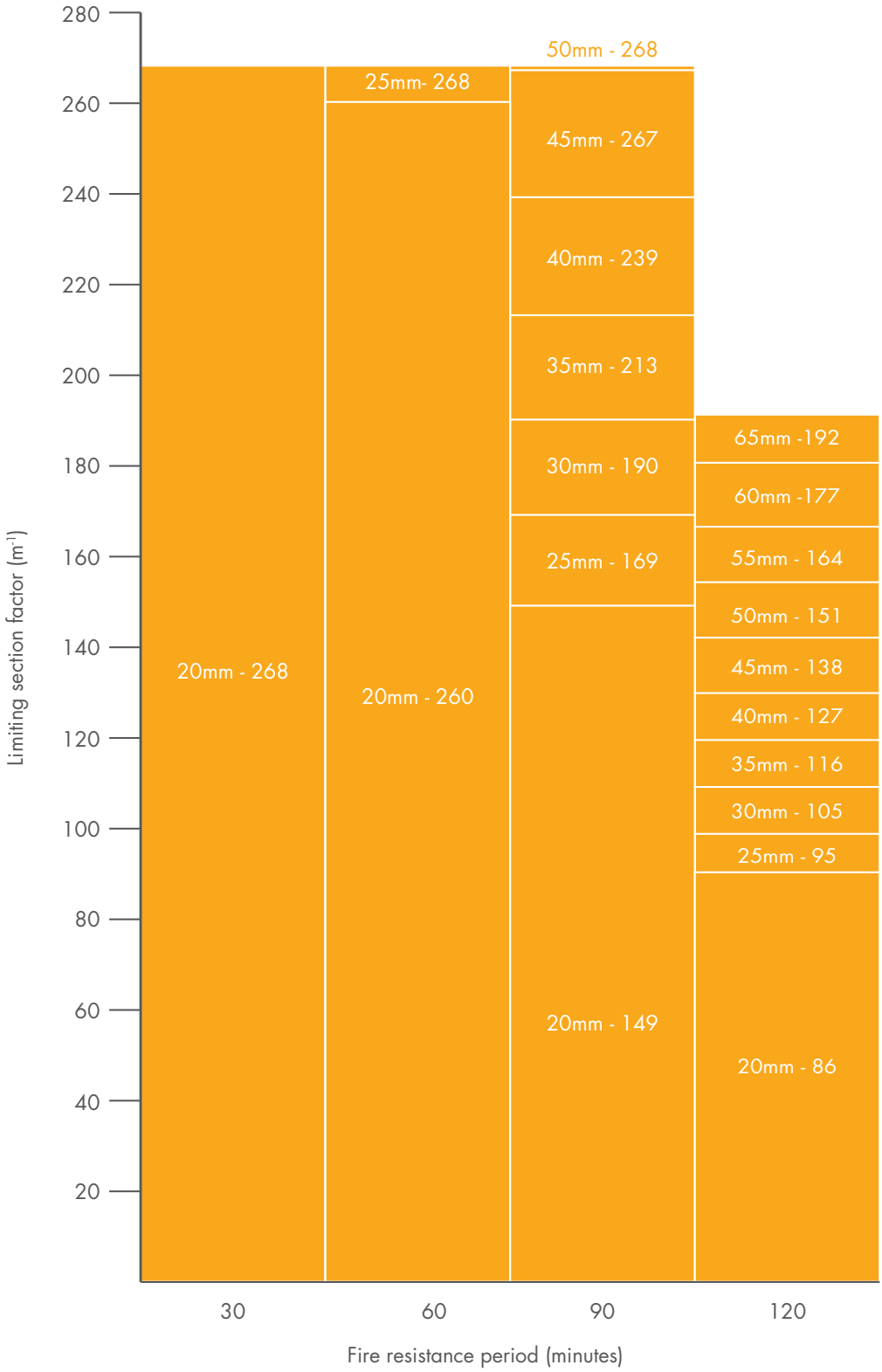
Required Thickness (mm) of Fire-teK Beam and Column Slab for a design temperature of 600°C



info.uk@knaufinsulation.com ■ technical.uk@knaufinsulation.com ■ www.knaufinsulation.co.uk

HP/A TABLES - ADHESIVE NOGGIN

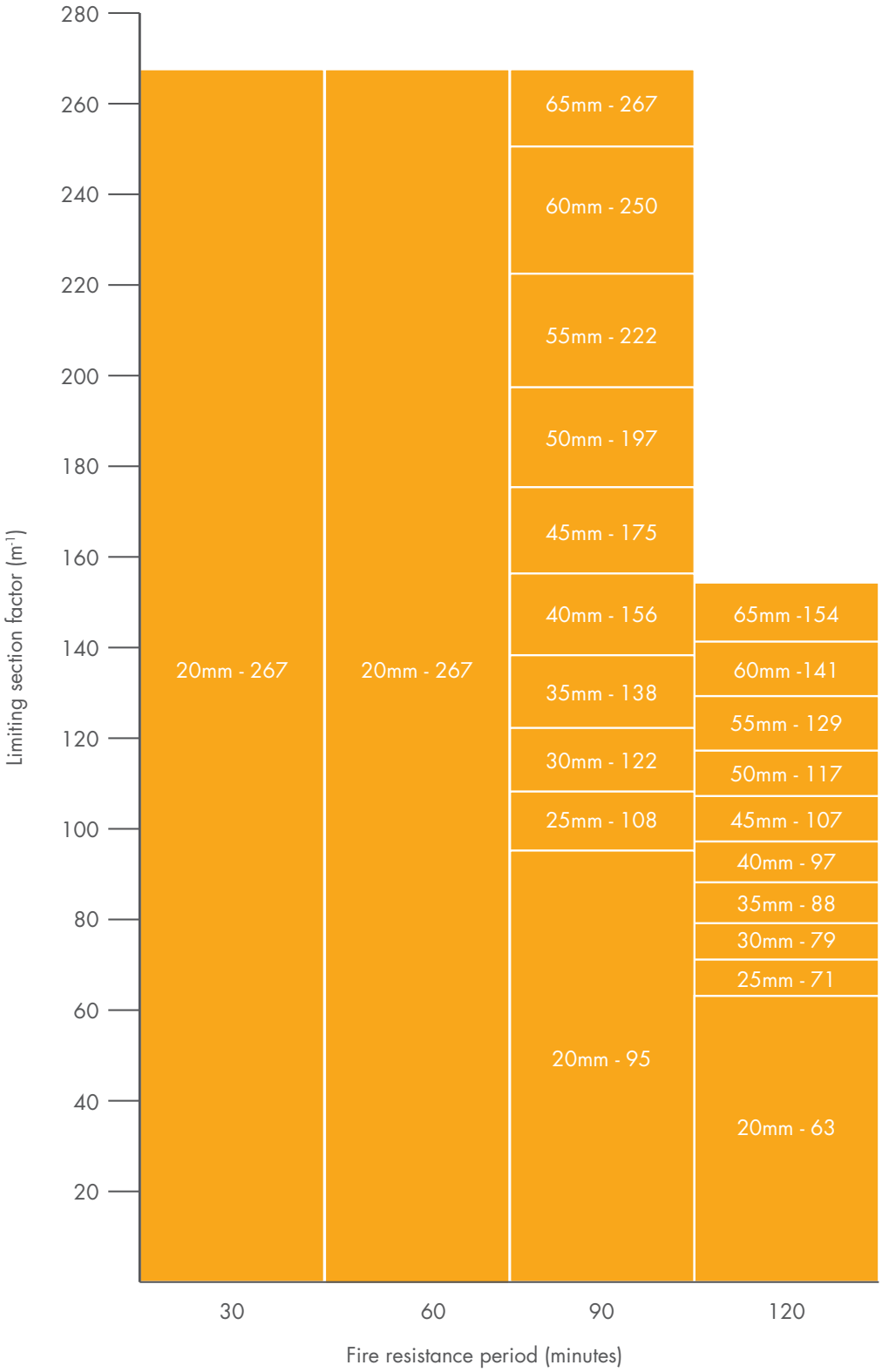
Required Thickness (mm) of Fire-teK Beam and Column Slab for a design temperature of 650°C



info.uk@knaufinsulation.com ■ technical.uk@knaufinsulation.com ■ www.knaufinsulation.co.uk

HP/A TABLES - WELDED PIN

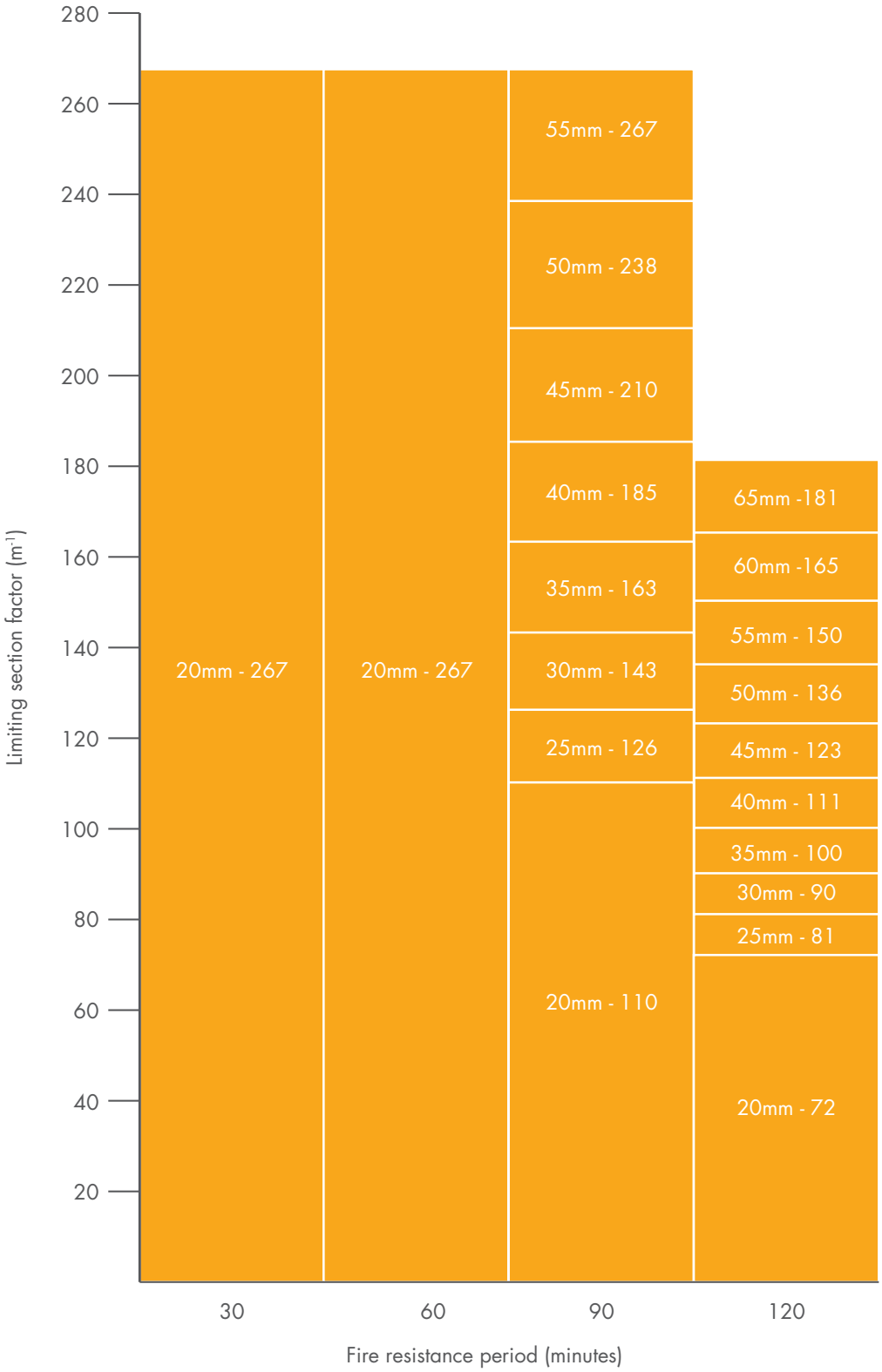
Required Thickness (mm) of Fire-teK Beam and Column Slab for a design temperature of 550°C



info.uk@knaufinsulation.com ■ technical.uk@knaufinsulation.com ■ www.knaufinsulation.co.uk

HP/A TABLES - WELDED PIN

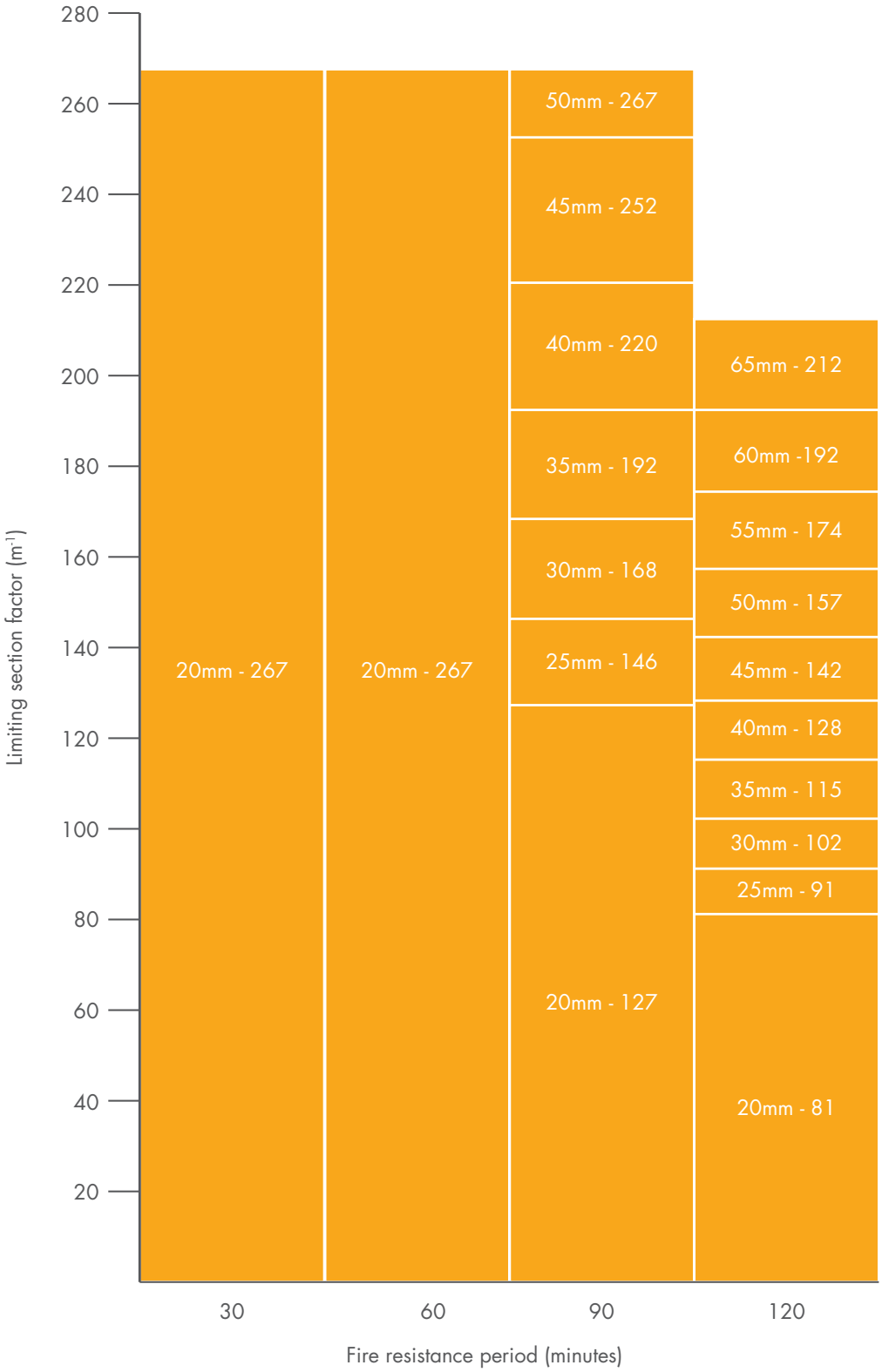
Required Thickness (mm) of Fire-teK Beam and Column Slab for a design temperature of 600°C



info.uk@knaufinsulation.com ■ technical.uk@knaufinsulation.com ■ www.knaufinsulation.co.uk

HP/A TABLES - WELDED PIN

Required Thickness (mm) of Fire-teK Beam and Column Slab for a design temperature of 650°C



info.uk@knaufinsulation.com ■ technical.uk@knaufinsulation.com ■ www.knaufinsulation.co.uk

CONTACTS

Customer Service
01744 766 766
sales.uk@knaufinsulation.com

Technical Support Team
01744 766 666
technical.uk@knaufinsulation.com

Literature
info.uk@knaufinsulation.com

Knauf Insulation Ltd PO Box 10, Stafford Road, St.Helens, Merseyside, WA10 3NS. UK

For more information please visit **knaufinsulation.co.uk**

All rights reserved, including those of photomechanical reproduction and storage in electronic media. Extreme caution was observed when putting together and processing the information, texts and illustrations in this document. Nevertheless, errors cannot quite be ruled out. The publisher and editors cannot assume legal responsibility or any liability whatever for incorrect information and the consequences thereof. The publisher and editors will be grateful for improvement suggestions and details of possible errors pointed out.

challenge.
create.
care.

KINE4178GID-V0721