# CERTIFICATE OF APPROVAL
# No CF 5757

**This is to certify that, in accordance with**
**TS00 General Requirements for Certification of Fire Protection Products**
**The undermentioned products of**

## Etex Building Performance Limited
**Gordano House, Marsh Lane, Easton-in-Gordano, Bristol, BS20 0NE**
**TEL 0800 145 6033**

**Have been assessed against the requirements of the Technical Schedule(s) denoted below and are approved for use subject to the conditions appended hereto:**

| CERTIFIED PRODUCT | TECHNICAL SCHEDULE |
|---|---|
| VERMICULUX®-S Structural steel protection | TS14 Passive Fire Protection for Steelwork |

**Signed and sealed for and on behalf of Warringtonfire Testing and Certification Limited**

Paul Duggan
**Certification Manager**

Issued: 12th September 2019
Re-issued: 6th March 2025
Valid to: 31st August 2025

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# Etex Building Performance Limited

## VERMICULUX®-S

1. This approval relates to the use of VERMICULUX®-S for the fire protection of I/H beams and columns. The precise scope is given in Tables 1 to 8 which show the total protection thickness of VERMICULUX®-S required to provide fire resistance periods in accordance with BS476: Part 21: 1987 of up to 240 minutes for differing sections and section factors at specific design temperatures.

2. This certification is provided to the client for their own purposes and we cannot opine on whether it will be accepted by Building Control authorities or any other third parties for any purpose.

3. The products are approved on the basis of:
   i) Initial type testing
   ii) A design appraisal against TS14
   iii) Production surveillance under ISO 9001
   iv) Inspection and surveillance of factory production control
   v) Audit testing

4. The results for I/H sections can be applied to angles, channels and T-sections for the same section factor with the same fixing method. The data referring to three-sided fire exposure of beams relates to beams supporting concrete floor slabs. The protection thickness shown for I/H columns can be applied to beams exposed on all four sides.

5. It is assumed that the steel surface preparation will be the same to that used for the tested sections. Specifications of surface preparations are available from Etex Building Performance Ltd whose responsibility is to ensure VERMICULUX®-S is compatible for use in respect of both ambient and fire conditions.

6. The maximum web depth for I/H beams is limited to 609mm and the maximum permitted depth of 812mm is permitted for I/H and hollow columns.

7. The data shown is applicable to VERMICULUX®-S applied by the same fixing method for the protection system to horizontal, vertical, flexural and compression members supporting loads up to the maximum design loads specified in BS449: Part 2.

8. The approval relates to on-going production. Product and/or its immediate packaging is identified with the manufacturers' name, the product name or number, the CERTIFIRE name or name and mark, together with the CERTIFIRE certificate number and application where appropriate.

9. The data shown in the tables is based on an assessment which complies with the criteria for acceptability now incorporated within the CERTIFIRE scheme.



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## Fitting/Fixing

The certification is limited to the same fixing method for the protection system as detailed in the following:

### Beams

Steel angle, 50 x 25 x 0.7mm, fixed to top flange on both sides of the web with 3.7 x 16mm shot-fired nails or 13mm x M4.2 self-drill, self-tapping wafer head screws at 300mm centres. Angles is offset from flange by 3mm.

First layer side boards fixed to steel angle at 200mm centres with GTEC Drywall self-tapping screws at 200mm centres as per Table A below. Screws to penetrate a minimum 10mm through angle.

Soffit board fixed between side boards with GTEC drywall High Thread screws at 200mm centres. Screws should penetrate minimum 30mm in to board.

A 120mm wide x 20mm thick VERMICULUX®-S cover strip is fitted behind all side board and soffit joints with GTEC Drywall High Thread screws.

Second layer side boards fixed to steel angle at 200mm centres with GTEC Drywall self-tapping screws at 200mm centres as per Table A below. Screws to penetrate a minimum 10mm through angle.

Soffit board fixed between side boards with GTEC drywall High Thread screws at 200mm centres.

Beam Fixings (sample fixing detailing for a beam is shown in Figure 1)

| Board thickness | Board to Angle - GTEC Drywall self-tapping | | Board to Board - GTEC Drywall High Thread | |
|---|---|---|---|---|
| | 1st Layer | 2nd Layer | 1st Layer | 2nd Layer |
| 20mm | 32mm x M3.5 | - | 50mm x M3.5 | - |
| 25mm | 38mm x M3.5 | - | 65mm x M4.2 | - |
| 30mm | 42mm x M3.5 | - | 65mm x M4.2 | - |
| 35mm | 50mm x M3.5 | - | 65mm x M4.2 | - |
| 40mm | 50mm x M3.5 | - | 75mm x M4.2 | - |
| 45mm (20 + 25) | 32mm x M3.5 | 65mm x M4.2 | 50mm x M3.5 | 65mm x M4.2 |
| 50mm (25 + 25) | 38mm x M3.5 | 65mm x M4.2 | 65mm x M4.2 | 65mm x M4.2 |
| 55mm (30 + 25) | 42mm x M3.5 | 65mm x M4.2 | 65mm x M4.2 | 65mm x M4.2 |
| 60mm (30 + 30) | 42mm x M3.5 | 75mm x M4.2 | 65mm x M4.2 | 65mm x M4.2 |
| 65mm (35 + 30) | 50mm x M3.5 | 75mm x M4.2 | 65mm x M4.2 | 65mm x M4.2 |
| 70mm (35 + 35) | 50mm x M3.5 | 90mm x M4.8 | 65mm x M4.2 | 65mm x M4.2 |
| 75mm (40 + 35) | 50mm x M3.5 | 90mm x M4.8 | 75mm x M4.2 | 65mm x M4.2 |
| 80mm (40 + 40) | 50mm x M3.5 | 100mm x M4.8 | 75mm x M4.2 | 75mm x M4.2 |



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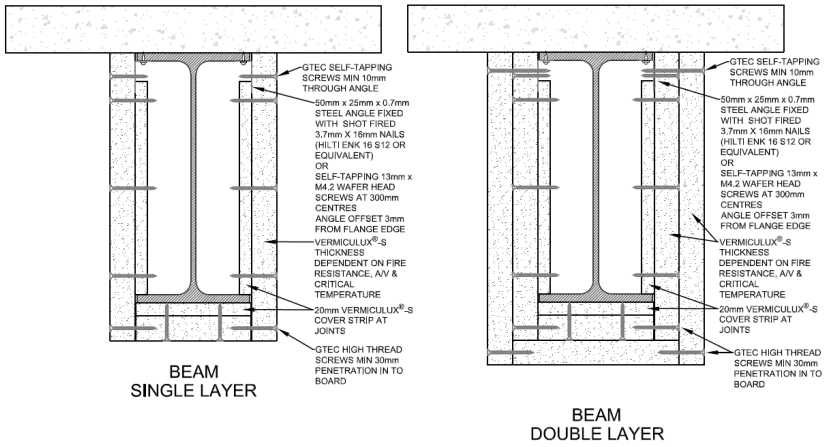
Figure 1 Illustration of fixing method for beams




**Columns**

Boards fitted around column and fixed with GTEC Drywall High Thread screws at 200mm centres as per Table B below. Joints on adjacent faces should be staggered by minimum of 500mm.

Cover strips at joints are not required.

Figure 2 illustrates a sample fixing detailing for a column

Depending on site conditions, alternative fixing methods may be required for beams or columns with 1- side or 2- sided exposure, nested between brick, blockwork or concrete. Fixing methods used must follow the same principles as used in the tests. It is suggested that the manufacturers recommendations are followed subject to approval by relevant project authorities or by independent 3rd party assessment.

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Column Fixings

| Board thickness | Board to Board - GTEC High Thread | |
|---|---|---|
| | 1st Layer | 2nd Layer |
| 20mm | 50mm x M3.5 | - |
| 25mm | 65mm x M4.2 | - |
| 30mm | 65mm x M4.2 | - |
| 35mm | 65mm x M4.2 | - |
| 40mm | 75mm x M4.2 | - |
| 45mm | 75mm x M4.2 | - |
| 50mm | 90mm x M4.8 | - |
| 45mm (20 + 25) | 50mm x M3.5 | 65mm x M4.2 |
| 50mm (25 + 25) | 65mm x M4.2 | 65mm x M4.2 |
| 55mm (30 + 25) | 65mm x M4.2 | 65mm x M4.2 |
| 60mm (30 + 30) | 65mm x M4.2 | 65mm x M4.2 |
| 65mm (35 + 30) | 65mm x M4.2 | 65mm x M4.2 |
| 70mm (35 + 35) | 65mm x M4.2 | 65mm x M4.2 |
| 75mm (40 + 35) | 75mm x M4.2 | 65mm x M4.2 |
| 80mm (40 + 40) | 75mm x M4.2 | 75mm x M4.2 |


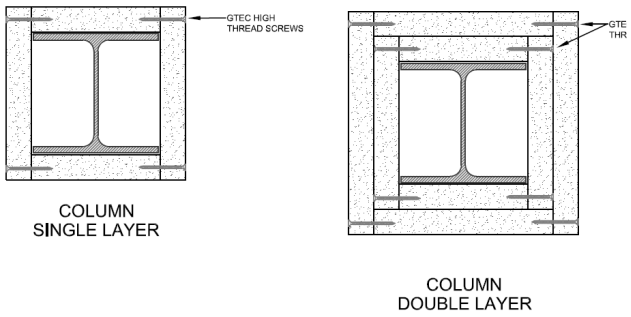


Figure 2 Illustration of fixing method for columns



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| Table 1 Vermiculux I-section beams and columns 30 minutes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Required Thickness (mm) for a Design Temperature (°C) | | | | | | | | | |
| Section Factor (m-1) | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 |
| 50 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 55 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 60 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 65 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 70 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 75 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 80 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 85 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 90 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 95 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 100 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 105 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 110 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 115 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 120 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 125 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 130 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 135 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 140 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 145 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 150 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 155 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 160 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 165 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 170 | 18.1 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 175 | 18.3 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 180 | 18.6 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 185 | 18.8 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 190 | 19.1 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 195 | 19.3 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 200 | 19.5 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 205 | 19.8 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 210 | 20.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 215 | 20.2 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 220 | 20.3 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 225 | 20.5 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 230 | 20.7 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 235 | 20.9 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 240 | 21.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 245 | 21.2 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 250 | 21.3 | 18.2 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 255 | 21.5 | 18.3 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 260 | 21.6 | 18.5 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 265 | 21.7 | 18.6 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 270 | 21.9 | 18.7 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 275 | 22.0 | 18.9 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |

Results are also applicable to beams with 3-sided fire exposure (with concrete topping above). Maximum protection thickness is limited to 80mm for columns and beams with 4-sided fire exposure.



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| Table 2 Vermiculux I-section beams and columns 60 minutes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Required Thickness (mm) for a Design Temperature (°C) | | | | | | | | | |
| | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 |
| 50 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 55 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 60 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 65 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 70 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 75 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 80 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 85 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 90 | 18.6 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 95 | 19.4 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 100 | 20.2 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 105 | 21.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 110 | 21.6 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 115 | 22.3 | 18.1 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 120 | 22.9 | 18.8 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 125 | 23.4 | 19.4 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 130 | 24.0 | 20.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 135 | 24.5 | 20.6 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 140 | 24.9 | 21.1 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 145 | 25.4 | 21.5 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 150 | 25.8 | 22.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 155 | 26.2 | 22.4 | 18.5 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 160 | 26.6 | 22.8 | 18.9 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 165 | 26.9 | 23.2 | 19.3 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 170 | 27.3 | 23.6 | 19.7 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 175 | 27.6 | 23.9 | 20.1 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 180 | 27.9 | 24.3 | 20.5 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 185 | 28.2 | 24.6 | 20.8 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 190 | 28.5 | 24.9 | 21.1 | 18.1 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 195 | 28.7 | 25.1 | 21.4 | 18.4 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 200 | 29.0 | 25.4 | 21.7 | 18.7 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 205 | 29.2 | 25.7 | 22.0 | 19.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 210 | 29.5 | 25.9 | 22.3 | 19.3 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 215 | 29.7 | 26.2 | 22.5 | 19.6 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 220 | 29.9 | 26.4 | 22.8 | 19.9 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 225 | 30.1 | 26.6 | 23.0 | 20.1 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 230 | 30.3 | 26.8 | 23.2 | 20.4 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 235 | 30.5 | 27.0 | 23.5 | 20.6 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 240 | 30.7 | 27.2 | 23.7 | 20.8 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 245 | 30.9 | 27.4 | 23.9 | 21.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 250 | 31.1 | 27.6 | 24.1 | 21.2 | 18.2 | 18.0 | 18.0 | 18.0 | 18.0 |
| 255 | 31.2 | 27.8 | 24.2 | 21.4 | 18.4 | 18.0 | 18.0 | 18.0 | 18.0 |
| 260 | 31.4 | 27.9 | 24.4 | 21.6 | 18.6 | 18.0 | 18.0 | 18.0 | 18.0 |
| 265 | 31.6 | 28.1 | 24.6 | 21.8 | 18.8 | 18.0 | 18.0 | 18.0 | 18.0 |
| 270 | 31.7 | 28.2 | 24.7 | 22.0 | 19.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 275 | 31.9 | 28.4 | 24.9 | 22.2 | 19.2 | 18.0 | 18.0 | 18.0 | 18.0 |

Results are also applicable to beams with 3-sided fire exposure (with concrete topping above). Maximum protection thickness is limited to 80mm for columns and beams with 4-sided fire exposure.



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| Table 3 Vermiculux I-section beams and columns 90 minutes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Required Thickness (mm) for a Design Temperature (°C) | | | | | | | | | |
| | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 |
| 50 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 55 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 60 | 18.6 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 65 | 20.2 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 70 | 21.7 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 75 | 23.1 | 18.2 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 80 | 24.4 | 19.7 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 85 | 25.5 | 20.9 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 90 | 26.6 | 22.1 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 95 | 27.5 | 23.2 | 18.3 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 100 | 28.4 | 24.2 | 19.4 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 105 | 29.3 | 25.1 | 20.4 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 110 | 30.1 | 25.9 | 21.3 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 115 | 30.8 | 26.7 | 22.2 | 18.4 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 120 | 31.5 | 27.4 | 23.0 | 19.3 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 125 | 32.1 | 28.1 | 23.8 | 20.1 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 130 | 32.7 | 28.8 | 24.4 | 20.9 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 135 | 33.3 | 29.4 | 25.1 | 21.6 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 140 | 33.8 | 29.9 | 25.7 | 22.2 | 18.2 | 18.0 | 18.0 | 18.0 | 18.0 |
| 145 | 34.3 | 30.4 | 26.2 | 22.9 | 18.9 | 18.0 | 18.0 | 18.0 | 18.0 |
| 150 | 34.8 | 30.9 | 26.8 | 23.4 | 19.5 | 18.0 | 18.0 | 18.0 | 18.0 |
| 155 | 35.2 | 31.4 | 27.3 | 24.0 | 20.1 | 18.0 | 18.0 | 18.0 | 18.0 |
| 160 | 35.7 | 31.8 | 27.7 | 24.5 | 20.7 | 18.0 | 18.0 | 18.0 | 18.0 |
| 165 | 36.1 | 32.3 | 28.2 | 25.0 | 21.2 | 18.0 | 18.0 | 18.0 | 18.0 |
| 170 | 36.5 | 32.7 | 28.6 | 25.4 | 21.7 | 18.6 | 18.0 | 18.0 | 18.0 |
| 175 | 36.8 | 33.0 | 29.0 | 25.8 | 22.2 | 19.1 | 18.0 | 18.0 | 18.0 |
| 180 | 37.2 | 33.4 | 29.4 | 26.2 | 22.6 | 19.6 | 18.0 | 18.0 | 18.0 |
| 185 | 37.5 | 33.7 | 29.7 | 26.6 | 23.0 | 20.0 | 18.0 | 18.0 | 18.0 |
| 190 | 37.9 | 34.1 | 30.0 | 27.0 | 23.4 | 20.5 | 18.0 | 18.0 | 18.0 |
| 195 | 38.2 | 34.4 | 30.4 | 27.3 | 23.8 | 20.9 | 18.0 | 18.0 | 18.0 |
| 200 | 38.5 | 34.7 | 30.7 | 27.6 | 24.1 | 21.2 | 18.4 | 18.0 | 18.0 |
| 205 | 38.7 | 34.9 | 31.0 | 28.0 | 24.5 | 21.6 | 18.8 | 18.0 | 18.0 |
| 210 | 39.0 | 35.2 | 31.2 | 28.3 | 24.8 | 22.0 | 19.2 | 18.0 | 18.0 |
| 215 | 39.3 | 35.5 | 31.5 | 28.5 | 25.1 | 22.3 | 19.6 | 18.0 | 18.0 |
| 220 | 39.5 | 35.7 | 31.8 | 28.8 | 25.4 | 22.6 | 19.9 | 18.0 | 18.0 |
| 225 | 39.8 | 36.0 | 32.0 | 29.1 | 25.6 | 22.9 | 20.2 | 18.0 | 18.0 |
| 230 | 40.0 | 36.2 | 32.2 | 29.3 | 25.9 | 23.2 | 20.5 | 18.0 | 18.0 |
| 235 | 40.2 | 36.4 | 32.5 | 29.5 | 26.2 | 23.4 | 20.8 | 18.0 | 18.0 |
| 240 | 40.4 | 36.6 | 32.7 | 29.8 | 26.4 | 23.7 | 21.1 | 18.3 | 18.0 |
| 245 | 40.6 | 36.8 | 32.9 | 30.0 | 26.6 | 23.9 | 21.4 | 18.6 | 18.0 |
| 250 | 40.8 | 37.0 | 33.1 | 30.2 | 26.8 | 24.2 | 21.6 | 18.9 | 18.0 |
| 255 | 41.0 | 37.2 | 33.3 | 30.4 | 27.1 | 24.4 | 21.9 | 19.2 | 18.0 |
| 260 | 41.2 | 37.4 | 33.5 | 30.6 | 27.3 | 24.6 | 22.1 | 19.4 | 18.0 |
| 265 | 41.4 | 37.6 | 33.6 | 30.8 | 27.5 | 24.8 | 22.3 | 19.7 | 18.0 |
| 270 | 41.6 | 37.7 | 33.8 | 30.9 | 27.6 | 25.0 | 22.5 | 19.9 | 18.0 |
| 275 | 41.7 | 37.9 | 34.0 | 31.1 | 27.8 | 25.2 | 22.8 | 20.1 | 18.0 |

Results are also applicable to beams with 3-sided fire exposure (with concrete topping above). Maximum protection thickness is limited to 80mm for columns and beams with 4-sided fire exposure.



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# Etex Building Performance Limited

| Table 4 Vermiculux I-section beams and columns 120 minutes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Required Thickness (mm) for a Design Temperature (°C) | | | | | | | | | |
| | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 |
| 50 | 21.2 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 55 | 23.5 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 60 | 25.6 | 20.4 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 65 | 27.4 | 22.5 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 70 | 29.1 | 24.4 | 18.7 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 75 | 30.7 | 26.1 | 20.7 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 80 | 32.1 | 27.6 | 22.4 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 85 | 33.4 | 29.0 | 24.0 | 19.6 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 90 | 34.5 | 30.3 | 25.4 | 21.2 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 95 | 35.6 | 31.5 | 26.7 | 22.6 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 100 | 36.7 | 32.5 | 27.8 | 23.9 | 19.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 105 | 37.6 | 33.5 | 28.9 | 25.1 | 20.4 | 18.0 | 18.0 | 18.0 | 18.0 |
| 110 | 38.5 | 34.4 | 29.9 | 26.2 | 21.6 | 18.0 | 18.0 | 18.0 | 18.0 |
| 115 | 39.3 | 35.3 | 30.8 | 27.2 | 22.7 | 18.8 | 18.0 | 18.0 | 18.0 |
| 120 | 40.1 | 36.1 | 31.6 | 28.1 | 23.7 | 20.0 | 18.0 | 18.0 | 18.0 |
| 125 | 40.8 | 36.8 | 32.4 | 29.0 | 24.7 | 21.0 | 18.0 | 18.0 | 18.0 |
| 130 | 41.5 | 37.5 | 33.1 | 29.7 | 25.5 | 22.0 | 18.3 | 18.0 | 18.0 |
| 135 | 42.1 | 38.2 | 33.8 | 30.5 | 26.3 | 22.8 | 19.3 | 18.0 | 18.0 |
| 140 | 42.7 | 38.8 | 34.4 | 31.1 | 27.0 | 23.7 | 20.2 | 18.0 | 18.0 |
| 145 | 43.3 | 39.3 | 35.0 | 31.7 | 27.7 | 24.4 | 21.1 | 18.0 | 18.0 |
| 150 | 43.8 | 39.9 | 35.5 | 32.3 | 28.3 | 25.1 | 21.8 | 18.2 | 18.0 |
| 155 | 44.3 | 40.4 | 36.1 | 32.9 | 28.9 | 25.7 | 22.5 | 19.0 | 18.0 |
| 160 | 44.8 | 40.8 | 36.5 | 33.4 | 29.5 | 26.3 | 23.2 | 19.7 | 18.0 |
| 165 | 45.2 | 41.3 | 37.0 | 33.9 | 30.0 | 26.9 | 23.8 | 20.4 | 18.0 |
| 170 | 45.7 | 41.7 | 37.4 | 34.3 | 30.5 | 27.4 | 24.4 | 21.0 | 18.0 |
| 175 | 46.1 | 42.1 | 37.8 | 34.7 | 30.9 | 27.9 | 24.9 | 21.6 | 18.7 |
| 180 | 46.5 | 42.5 | 38.2 | 35.2 | 31.4 | 28.4 | 25.4 | 22.1 | 19.3 |
| 185 | 46.9 | 42.9 | 38.6 | 35.5 | 31.8 | 28.8 | 25.9 | 22.7 | 19.8 |
| 190 | 47.2 | 43.2 | 39.0 | 35.9 | 32.1 | 29.2 | 26.3 | 23.1 | 20.4 |
| 195 | 47.6 | 43.6 | 39.3 | 36.2 | 32.5 | 29.6 | 26.7 | 23.6 | 20.9 |
| 200 | 47.9 | 43.9 | 39.6 | 36.6 | 32.8 | 30.0 | 27.1 | 24.0 | 21.3 |
| 205 | 48.2 | 44.2 | 39.9 | 36.9 | 33.2 | 30.3 | 27.5 | 24.4 | 21.8 |
| 210 | 48.5 | 44.5 | 40.2 | 37.2 | 33.5 | 30.6 | 27.9 | 24.8 | 22.2 |
| 215 | 48.8 | 44.8 | 40.5 | 37.5 | 33.8 | 30.9 | 28.2 | 25.2 | 22.6 |
| 220 | 49.1 | 45.1 | 40.7 | 37.7 | 34.1 | 31.2 | 28.5 | 25.5 | 23.0 |
| 225 | 49.4 | 45.3 | 41.0 | 38.0 | 34.3 | 31.5 | 28.8 | 25.8 | 23.3 |
| 230 | 49.6 | 45.6 | 41.2 | 38.2 | 34.6 | 31.8 | 29.1 | 26.1 | 23.6 |
| 235 | 49.9 | 45.8 | 41.5 | 38.5 | 34.8 | 32.1 | 29.4 | 26.4 | 24.0 |
| 240 | 50.1 | 46.0 | 41.7 | 38.7 | 35.1 | 32.3 | 29.6 | 26.7 | 24.3 |
| 245 | 50.4 | 46.2 | 41.9 | 38.9 | 35.3 | 32.5 | 29.9 | 27.0 | 24.6 |
| 250 | 50.6 | 46.5 | 42.1 | 39.1 | 35.5 | 32.8 | 30.1 | 27.2 | 24.8 |
| 255 | 50.8 | 46.7 | 42.3 | 39.3 | 35.7 | 33.0 | 30.4 | 27.5 | 25.1 |
| 260 | 51.0 | 46.9 | 42.5 | 39.5 | 35.9 | 33.2 | 30.6 | 27.7 | 25.3 |
| 265 | 51.2 | 47.1 | 42.7 | 39.7 | 36.1 | 33.4 | 30.8 | 28.0 | 25.6 |
| 270 | 51.4 | 47.2 | 42.9 | 39.9 | 36.3 | 33.6 | 31.0 | 28.2 | 25.8 |
| 275 | 51.6 | 47.4 | 43.1 | 40.1 | 36.5 | 33.8 | 31.2 | 28.4 | 26.0 |

Results are also applicable to beams with 3-sided fire exposure (with concrete topping above). Maximum protection thickness is limited to 80mm for columns and beams with 4-sided fire exposure.



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# Etex Building Performance Limited

| Table 5 Vermiculux I-section beams and columns 150 minutes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Required Thickness (mm) for a Design Temperature (°C) | | | | | | | | | |
| | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 |
| 50 | 27.7 | 22.3 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 55 | 30.2 | 25.2 | 18.9 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 60 | 32.5 | 27.8 | 21.9 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 65 | 34.6 | 30.1 | 24.5 | 19.4 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 70 | 36.5 | 32.1 | 26.8 | 22.1 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 75 | 38.2 | 34.0 | 28.8 | 24.4 | 18.5 | 18.0 | 18.0 | 18.0 | 18.0 |
| 80 | 39.8 | 35.6 | 30.6 | 26.5 | 20.9 | 18.0 | 18.0 | 18.0 | 18.0 |
| 85 | 41.2 | 37.1 | 32.3 | 28.3 | 23.0 | 18.2 | 18.0 | 18.0 | 18.0 |
| 90 | 42.5 | 38.5 | 33.7 | 30.0 | 24.9 | 20.4 | 18.0 | 18.0 | 18.0 |
| 95 | 43.7 | 39.8 | 35.1 | 31.4 | 26.6 | 22.3 | 18.0 | 18.0 | 18.0 |
| 100 | 44.9 | 40.9 | 36.3 | 32.8 | 28.0 | 24.0 | 19.7 | 18.0 | 18.0 |
| 105 | 45.9 | 42.0 | 37.4 | 34.0 | 29.4 | 25.5 | 21.4 | 18.0 | 18.0 |
| 110 | 46.9 | 43.0 | 38.4 | 35.0 | 30.6 | 26.8 | 22.9 | 18.3 | 18.0 |
| 115 | 47.8 | 43.9 | 39.3 | 36.0 | 31.7 | 28.0 | 24.3 | 19.8 | 18.0 |
| 120 | 48.6 | 44.7 | 40.2 | 37.0 | 32.6 | 29.1 | 25.5 | 21.2 | 18.0 |
| 125 | 49.4 | 45.5 | 41.0 | 37.8 | 33.6 | 30.1 | 26.6 | 22.5 | 18.8 |
| 130 | 50.2 | 46.3 | 41.8 | 38.6 | 34.4 | 31.0 | 27.6 | 23.6 | 20.0 |
| 135 | 50.9 | 47.0 | 42.5 | 39.3 | 35.2 | 31.9 | 28.6 | 24.7 | 21.2 |
| 140 | 51.6 | 47.6 | 43.1 | 40.0 | 35.9 | 32.7 | 29.4 | 25.6 | 22.3 |
| 145 | 52.2 | 48.2 | 43.7 | 40.6 | 36.5 | 33.4 | 30.2 | 26.5 | 23.2 |
| 150 | 52.8 | 48.8 | 44.3 | 41.2 | 37.2 | 34.0 | 30.9 | 27.2 | 24.1 |
| 155 | 53.4 | 49.3 | 44.8 | 41.8 | 37.7 | 34.6 | 31.6 | 28.0 | 24.9 |
| 160 | 53.9 | 49.9 | 45.3 | 42.3 | 38.3 | 35.2 | 32.2 | 28.6 | 25.6 |
| 165 | 54.4 | 50.3 | 45.8 | 42.8 | 38.8 | 35.7 | 32.7 | 29.3 | 26.3 |
| 170 | 54.9 | 50.8 | 46.3 | 43.2 | 39.2 | 36.2 | 33.3 | 29.9 | 26.9 |
| 175 | 55.4 | 51.2 | 46.7 | 43.7 | 39.7 | 36.7 | 33.8 | 30.4 | 27.5 |
| 180 | 55.8 | 51.7 | 47.1 | 44.1 | 40.1 | 37.1 | 34.2 | 30.9 | 28.1 |
| 185 | 56.2 | 52.1 | 47.5 | 44.4 | 40.5 | 37.6 | 34.7 | 31.4 | 28.6 |
| 190 | 56.6 | 52.4 | 47.9 | 44.8 | 40.9 | 38.0 | 35.1 | 31.8 | 29.1 |
| 195 | 57.0 | 52.8 | 48.2 | 45.2 | 41.2 | 38.3 | 35.5 | 32.2 | 29.5 |
| 200 | 57.4 | 53.1 | 48.5 | 45.5 | 41.6 | 38.7 | 35.8 | 32.6 | 29.9 |
| 205 | 57.7 | 53.5 | 48.9 | 45.8 | 41.9 | 39.0 | 36.2 | 33.0 | 30.3 |
| 210 | 58.1 | 53.8 | 49.2 | 46.1 | 42.2 | 39.3 | 36.5 | 33.3 | 30.7 |
| 215 | 58.4 | 54.1 | 49.5 | 46.4 | 42.5 | 39.6 | 36.8 | 33.7 | 31.1 |
| 220 | 58.7 | 54.4 | 49.7 | 46.7 | 42.8 | 39.9 | 37.1 | 34.0 | 31.4 |
| 225 | 59.0 | 54.7 | 50.0 | 46.9 | 43.0 | 40.2 | 37.4 | 34.3 | 31.7 |
| 230 | 59.3 | 54.9 | 50.2 | 47.2 | 43.3 | 40.4 | 37.7 | 34.6 | 32.0 |
| 235 | 59.6 | 55.2 | 50.5 | 47.4 | 43.5 | 40.7 | 37.9 | 34.9 | 32.3 |
| 240 | 59.8 | 55.4 | 50.7 | 47.6 | 43.7 | 40.9 | 38.2 | 35.1 | 32.6 |
| 245 | 60.1 | 55.7 | 51.0 | 47.9 | 44.0 | 41.1 | 38.4 | 35.4 | 32.9 |
| 250 | 60.3 | 55.9 | 51.2 | 48.1 | 44.2 | 41.3 | 38.6 | 35.6 | 33.1 |
| 255 | 60.6 | 56.1 | 51.4 | 48.3 | 44.4 | 41.6 | 38.9 | 35.8 | 33.3 |
| 260 | 60.8 | 56.3 | 51.6 | 48.5 | 44.6 | 41.8 | 39.1 | 36.0 | 33.6 |
| 265 | 61.0 | 56.5 | 51.8 | 48.7 | 44.8 | 41.9 | 39.3 | 36.2 | 33.8 |
| 270 | 61.3 | 56.7 | 52.0 | 48.8 | 44.9 | 42.1 | 39.4 | 36.4 | 34.0 |
| 275 | 61.5 | 56.9 | 52.1 | 49.0 | 45.1 | 42.3 | 39.6 | 36.6 | 34.2 |

Results are also applicable to beams with 3-sided fire exposure (with concrete topping above). Maximum protection thickness is limited to 80mm for columns and beams with 4-sided fire exposure.



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# Etex Building Performance Limited

| Table 6 Vermiculux I-section beams and columns 180 minutes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Required Thickness (mm) for a Design Temperature (°C) | | | | | | | | | |
| | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 |
| 50 | 34.2 | 29.3 | 23.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 55 | 37.0 | 32.5 | 26.6 | 21.2 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 60 | 39.5 | 35.2 | 29.7 | 24.9 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 65 | 41.8 | 37.7 | 32.5 | 28.1 | 21.8 | 18.0 | 18.0 | 18.0 | 18.0 |
| 70 | 43.9 | 39.9 | 34.9 | 30.8 | 25.0 | 19.5 | 18.0 | 18.0 | 18.0 |
| 75 | 45.8 | 41.8 | 37.0 | 33.2 | 27.7 | 22.8 | 18.0 | 18.0 | 18.0 |
| 80 | 47.5 | 43.6 | 38.9 | 35.3 | 30.1 | 25.5 | 20.4 | 18.0 | 18.0 |
| 85 | 49.0 | 45.2 | 40.5 | 37.1 | 32.2 | 27.9 | 23.2 | 18.0 | 18.0 |
| 90 | 50.5 | 46.7 | 42.1 | 38.8 | 34.0 | 30.0 | 25.6 | 20.1 | 18.0 |
| 95 | 51.8 | 48.0 | 43.5 | 40.2 | 35.6 | 31.8 | 27.7 | 22.6 | 18.0 |
| 100 | 53.1 | 49.3 | 44.7 | 41.6 | 37.0 | 33.4 | 29.5 | 24.7 | 20.2 |
| 105 | 54.2 | 50.4 | 45.9 | 42.8 | 38.3 | 34.8 | 31.1 | 26.5 | 22.3 |
| 110 | 55.3 | 51.5 | 46.9 | 43.9 | 39.5 | 36.1 | 32.5 | 28.1 | 24.2 |
| 115 | 56.3 | 52.5 | 47.9 | 44.9 | 40.6 | 37.3 | 33.8 | 29.6 | 25.8 |
| 120 | 57.2 | 53.4 | 48.8 | 45.8 | 41.6 | 38.3 | 35.0 | 30.9 | 27.2 |
| 125 | 58.1 | 54.2 | 49.7 | 46.7 | 42.4 | 39.3 | 36.0 | 32.0 | 28.5 |
| 130 | 58.9 | 55.0 | 50.4 | 47.5 | 43.3 | 40.1 | 36.9 | 33.0 | 29.7 |
| 135 | 59.7 | 55.7 | 51.2 | 48.2 | 44.0 | 40.9 | 37.8 | 34.0 | 30.7 |
| 140 | 60.5 | 56.4 | 51.8 | 48.9 | 44.7 | 41.7 | 38.6 | 34.8 | 31.7 |
| 145 | 61.1 | 57.1 | 52.5 | 49.5 | 45.4 | 42.3 | 39.3 | 35.6 | 32.5 |
| 150 | 61.8 | 57.7 | 53.1 | 50.1 | 46.0 | 43.0 | 40.0 | 36.3 | 33.3 |
| 155 | 62.4 | 58.3 | 53.6 | 50.7 | 46.5 | 43.5 | 40.6 | 37.0 | 34.0 |
| 160 | 63.0 | 58.9 | 54.2 | 51.2 | 47.1 | 44.1 | 41.1 | 37.6 | 34.7 |
| 165 | 63.6 | 59.4 | 54.7 | 51.7 | 47.6 | 44.6 | 41.7 | 38.2 | 35.3 |
| 170 | 64.1 | 59.9 | 55.1 | 52.1 | 48.0 | 45.1 | 42.2 | 38.7 | 35.9 |
| 175 | 64.6 | 60.3 | 55.6 | 52.6 | 48.5 | 45.5 | 42.6 | 39.2 | 36.4 |
| 180 | 65.1 | 60.8 | 56.0 | 53.0 | 48.9 | 45.9 | 43.1 | 39.7 | 36.9 |
| 185 | 65.6 | 61.2 | 56.4 | 53.4 | 49.3 | 46.3 | 43.5 | 40.1 | 37.3 |
| 190 | 66.0 | 61.6 | 56.8 | 53.7 | 49.6 | 46.7 | 43.9 | 40.5 | 37.8 |
| 195 | 66.4 | 62.0 | 57.1 | 54.1 | 50.0 | 47.1 | 44.2 | 40.9 | 38.2 |
| 200 | 66.8 | 62.4 | 57.5 | 54.4 | 50.3 | 47.4 | 44.6 | 41.2 | 38.5 |
| 205 | 67.2 | 62.7 | 57.8 | 54.7 | 50.6 | 47.7 | 44.9 | 41.6 | 38.9 |
| 210 | 67.6 | 63.1 | 58.1 | 55.0 | 50.9 | 48.0 | 45.2 | 41.9 | 39.2 |
| 215 | 67.9 | 63.4 | 58.4 | 55.3 | 51.2 | 48.3 | 45.5 | 42.2 | 39.6 |
| 220 | 68.3 | 63.7 | 58.7 | 55.6 | 51.5 | 48.6 | 45.7 | 42.5 | 39.9 |
| 225 | 68.6 | 64.0 | 59.0 | 55.9 | 51.7 | 48.8 | 46.0 | 42.8 | 40.1 |
| 230 | 68.9 | 64.3 | 59.3 | 56.1 | 52.0 | 49.1 | 46.3 | 43.0 | 40.4 |
| 235 | 69.2 | 64.6 | 59.5 | 56.4 | 52.2 | 49.3 | 46.5 | 43.3 | 40.7 |
| 240 | 69.5 | 64.8 | 59.7 | 56.6 | 52.4 | 49.5 | 46.7 | 43.5 | 40.9 |
| 245 | 69.8 | 65.1 | 60.0 | 56.8 | 52.6 | 49.7 | 46.9 | 43.7 | 41.2 |
| 250 | 70.1 | 65.3 | 60.2 | 57.0 | 52.8 | 49.9 | 47.1 | 43.9 | 41.4 |
| 255 | 70.4 | 65.6 | 60.4 | 57.2 | 53.0 | 50.1 | 47.3 | 44.1 | 41.6 |
| 260 | 70.6 | 65.8 | 60.6 | 57.4 | 53.2 | 50.3 | 47.5 | 44.3 | 41.8 |
| 265 | 70.9 | 66.0 | 60.8 | 57.6 | 53.4 | 50.5 | 47.7 | 44.5 | 42.0 |
| 270 | 71.1 | 66.2 | 61.0 | 57.8 | 53.6 | 50.7 | 47.9 | 44.7 | 42.2 |
| 275 | 71.3 | 66.4 | 61.2 | 58.0 | 53.8 | 50.8 | 48.1 | 44.9 | 42.4 |

Results are also applicable to beams with 3-sided fire exposure (with concrete topping above). Maximum protection thickness is limited to 80mm for columns and beams with 4-sided fire exposure.



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| Table 7 Vermiculux I-section beams and columns 210 minutes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Required Thickness (mm) for a Design Temperature (°C) | | | | | | | | | |
| | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 |
| 50 | 40.7 | 36.4 | 30.6 | 25.4 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 55 | 43.8 | 39.7 | 34.4 | 29.9 | 22.9 | 18.0 | 18.0 | 18.0 | 18.0 |
| 60 | 46.5 | 42.7 | 37.6 | 33.6 | 27.4 | 21.4 | 18.0 | 18.0 | 18.0 |
| 65 | 49.0 | 45.3 | 40.4 | 36.8 | 31.1 | 25.9 | 19.6 | 18.0 | 18.0 |
| 70 | 51.3 | 47.6 | 42.9 | 39.5 | 34.2 | 29.6 | 24.2 | 18.0 | 18.0 |
| 75 | 53.3 | 49.7 | 45.1 | 41.9 | 36.9 | 32.7 | 27.9 | 21.4 | 18.0 |
| 80 | 55.2 | 51.6 | 47.1 | 44.0 | 39.2 | 35.3 | 31.0 | 25.1 | 19.4 |
| 85 | 56.9 | 53.3 | 48.8 | 45.9 | 41.3 | 37.6 | 33.6 | 28.2 | 23.1 |
| 90 | 58.5 | 54.9 | 50.4 | 47.5 | 43.1 | 39.6 | 35.8 | 30.8 | 26.2 |
| 95 | 59.9 | 56.3 | 51.9 | 49.0 | 44.6 | 41.3 | 37.7 | 33.0 | 28.7 |
| 100 | 61.3 | 57.6 | 53.2 | 50.4 | 46.1 | 42.8 | 39.4 | 34.9 | 30.9 |
| 105 | 62.5 | 58.9 | 54.4 | 51.6 | 47.3 | 44.2 | 40.9 | 36.6 | 32.8 |
| 110 | 63.7 | 60.0 | 55.5 | 52.7 | 48.5 | 45.4 | 42.2 | 38.0 | 34.5 |
| 115 | 64.8 | 61.0 | 56.5 | 53.7 | 49.5 | 46.5 | 43.4 | 39.3 | 35.9 |
| 120 | 65.8 | 62.0 | 57.4 | 54.7 | 50.5 | 47.5 | 44.4 | 40.5 | 37.2 |
| 125 | 66.8 | 62.9 | 58.3 | 55.5 | 51.3 | 48.4 | 45.4 | 41.5 | 38.3 |
| 130 | 67.7 | 63.8 | 59.1 | 56.3 | 52.1 | 49.2 | 46.2 | 42.5 | 39.3 |
| 135 | 68.5 | 64.5 | 59.8 | 57.1 | 52.9 | 50.0 | 47.0 | 43.3 | 40.2 |
| 140 | 69.3 | 65.3 | 60.6 | 57.7 | 53.6 | 50.7 | 47.7 | 44.1 | 41.1 |
| 145 | 70.1 | 66.0 | 61.2 | 58.4 | 54.2 | 51.3 | 48.4 | 44.8 | 41.8 |
| 150 | 70.8 | 66.7 | 61.8 | 59.0 | 54.8 | 51.9 | 49.0 | 45.4 | 42.5 |
| 155 | 71.5 | 67.3 | 62.4 | 59.5 | 55.3 | 52.5 | 49.6 | 46.0 | 43.1 |
| 160 | 72.1 | 67.9 | 63.0 | 60.1 | 55.9 | 53.0 | 50.1 | 46.6 | 43.7 |
| 165 | 72.7 | 68.4 | 63.5 | 60.6 | 56.3 | 53.5 | 50.6 | 47.1 | 44.3 |
| 170 | 73.3 | 68.9 | 64.0 | 61.0 | 56.8 | 53.9 | 51.1 | 47.6 | 44.8 |
| 175 | 73.9 | 69.4 | 64.4 | 61.5 | 57.2 | 54.3 | 51.5 | 48.0 | 45.2 |
| 180 | 74.4 | 69.9 | 64.9 | 61.9 | 57.6 | 54.7 | 51.9 | 48.4 | 45.7 |
| 185 | 74.9 | 70.4 | 65.3 | 62.3 | 58.0 | 55.1 | 52.3 | 48.8 | 46.1 |
| 190 | 75.4 | 70.8 | 65.7 | 62.6 | 58.4 | 55.5 | 52.6 | 49.2 | 46.5 |
| 195 | 75.8 | 71.2 | 66.1 | 63.0 | 58.7 | 55.8 | 52.9 | 49.5 | 46.8 |
| 200 | 76.3 | 71.6 | 66.4 | 63.3 | 59.0 | 56.1 | 53.3 | 49.8 | 47.2 |
| 205 | 76.7 | 72.0 | 66.8 | 63.7 | 59.3 | 56.4 | 53.6 | 50.1 | 47.5 |
| 210 | 77.1 | 72.4 | 67.1 | 64.0 | 59.6 | 56.7 | 53.8 | 50.4 | 47.8 |
| 215 | 77.5 | 72.7 | 67.4 | 64.3 | 59.9 | 57.0 | 54.1 | 50.7 | 48.0 |
| 220 | 77.9 | 73.0 | 67.7 | 64.5 | 60.2 | 57.2 | 54.4 | 51.0 | 48.3 |
| 225 | 78.2 | 73.4 | 68.0 | 64.8 | 60.4 | 57.5 | 54.6 | 51.2 | 48.6 |
| 230 | 78.6 | 73.7 | 68.3 | 65.0 | 60.6 | 57.7 | 54.8 | 51.4 | 48.8 |
| 235 | 78.9 | 74.0 | 68.5 | 65.3 | 60.9 | 57.9 | 55.1 | 51.7 | 49.0 |
| 240 | 79.2 | 74.2 | 68.8 | 65.5 | 61.1 | 58.1 | 55.3 | 51.9 | 49.2 |
| 245 | 79.5 | 74.5 | 69.0 | 65.7 | 61.3 | 58.3 | 55.5 | 52.1 | 49.5 |
| 250 | 79.8 | 74.8 | 69.2 | 66.0 | 61.5 | 58.5 | 55.7 | 52.3 | 49.7 |
| 255 | 80.1 | 75.0 | 69.5 | 66.2 | 61.7 | 58.7 | 55.8 | 52.5 | 49.8 |
| 260 | 80.4 | 75.3 | 69.7 | 66.4 | 61.9 | 58.9 | 56.0 | 52.6 | 50.0 |
| 265 | 80.7 | 75.5 | 69.9 | 66.6 | 62.1 | 59.1 | 56.2 | 52.8 | 50.2 |
| 270 | 80.9 | 75.7 | 70.1 | 66.7 | 62.2 | 59.2 | 56.3 | 53.0 | 50.4 |
| 275 | 81.2 | 76.0 | 70.3 | 66.9 | 62.4 | 59.4 | 56.5 | 53.1 | 50.5 |

Results are also applicable to beams with 3-sided fire exposure (with concrete topping above). Maximum protection thickness is limited to 80mm for columns and beams with 4-sided fire exposure.



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# CERTIFICATE No CF 5757
# Etex Building Performance Limited

| Table 8 Vermiculux I-section beams and columns 240 minutes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Required Thickness (mm) for a Design Temperature (°C) | | | | | | | | | |
| | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 |
| 50 | 47.2 | 43.4 | 38.2 | 34.0 | 27.0 | 19.8 | 18.0 | 18.0 | 18.0 |
| 55 | 50.5 | 47.0 | 42.1 | 38.5 | 32.4 | 26.6 | 19.1 | 18.0 | 18.0 |
| 60 | 53.5 | 50.1 | 45.5 | 42.3 | 36.8 | 31.9 | 25.9 | 18.0 | 18.0 |
| 65 | 56.2 | 52.9 | 48.4 | 45.5 | 40.4 | 36.2 | 31.1 | 23.8 | 18.0 |
| 70 | 58.6 | 55.4 | 51.0 | 48.3 | 43.5 | 39.7 | 35.3 | 29.0 | 22.5 |
| 75 | 60.8 | 57.6 | 53.3 | 50.7 | 46.1 | 42.7 | 38.7 | 33.1 | 27.6 |
| 80 | 62.9 | 59.6 | 55.3 | 52.8 | 48.4 | 45.2 | 41.5 | 36.4 | 31.6 |
| 85 | 64.7 | 61.4 | 57.1 | 54.7 | 50.4 | 47.3 | 43.9 | 39.2 | 34.9 |
| 90 | 66.4 | 63.1 | 58.8 | 56.3 | 52.1 | 49.2 | 46.0 | 41.5 | 37.5 |
| 95 | 68.0 | 64.6 | 60.3 | 57.8 | 53.7 | 50.8 | 47.7 | 43.5 | 39.8 |
| 100 | 69.5 | 66.0 | 61.6 | 59.2 | 55.1 | 52.2 | 49.3 | 45.2 | 41.7 |
| 105 | 70.9 | 67.3 | 62.9 | 60.4 | 56.3 | 53.5 | 50.6 | 46.6 | 43.3 |
| 110 | 72.1 | 68.5 | 64.0 | 61.5 | 57.4 | 54.7 | 51.8 | 47.9 | 44.7 |
| 115 | 73.3 | 69.6 | 65.0 | 62.6 | 58.4 | 55.7 | 52.9 | 49.1 | 46.0 |
| 120 | 74.4 | 70.6 | 66.0 | 63.5 | 59.4 | 56.7 | 53.8 | 50.1 | 47.1 |
| 125 | 75.4 | 71.6 | 66.9 | 64.4 | 60.2 | 57.5 | 54.7 | 51.0 | 48.1 |
| 130 | 76.4 | 72.5 | 67.8 | 65.2 | 61.0 | 58.3 | 55.5 | 51.9 | 49.0 |
| 135 | 77.3 | 73.3 | 68.5 | 65.9 | 61.7 | 59.0 | 56.2 | 52.6 | 49.7 |
| 140 | 78.2 | 74.1 | 69.3 | 66.6 | 62.4 | 59.7 | 56.9 | 53.3 | 50.5 |
| 145 | 79.0 | 74.9 | 70.0 | 67.3 | 63.0 | 60.3 | 57.5 | 53.9 | 51.1 |
| 150 | 79.8 | 75.6 | 70.6 | 67.9 | 63.6 | 60.8 | 58.1 | 54.5 | 51.7 |
| 155 | 80.5 | 76.2 | 71.2 | 68.4 | 64.1 | 61.4 | 58.6 | 55.0 | 52.3 |
| 160 | 81.2 | 76.9 | 71.8 | 69.0 | 64.6 | 61.9 | 59.1 | 55.5 | 52.8 |
| 165 | 81.9 | 77.5 | 72.3 | 69.5 | 65.1 | 62.3 | 59.5 | 56.0 | 53.3 |
| 170 | 82.5 | 78.0 | 72.8 | 69.9 | 65.6 | 62.7 | 59.9 | 56.4 | 53.7 |
| 175 | 83.1 | 78.6 | 73.3 | 70.4 | 66.0 | 63.1 | 60.3 | 56.8 | 54.1 |
| 180 | 83.7 | 79.1 | 73.7 | 70.8 | 66.4 | 63.5 | 60.7 | 57.2 | 54.5 |
| 185 | - | 79.5 | 74.2 | 71.2 | 66.7 | 63.9 | 61.0 | 57.5 | 54.8 |
| 190 | - | 80.0 | 74.6 | 71.6 | 67.1 | 64.2 | 61.4 | 57.9 | 55.2 |
| 195 | - | 80.4 | 75.0 | 71.9 | 67.4 | 64.5 | 61.7 | 58.2 | 55.5 |
| 200 | - | 80.9 | 75.3 | 72.3 | 67.7 | 64.8 | 62.0 | 58.4 | 55.8 |
| 205 | - | 81.3 | 75.7 | 72.6 | 68.0 | 65.1 | 62.2 | 58.7 | 56.0 |
| 210 | - | 81.6 | 76.0 | 72.9 | 68.3 | 65.4 | 62.5 | 59.0 | 56.3 |
| 215 | - | 82.0 | 76.4 | 73.2 | 68.6 | 65.6 | 62.7 | 59.2 | 56.5 |
| 220 | - | 82.4 | 76.7 | 73.5 | 68.9 | 65.9 | 63.0 | 59.5 | 56.8 |
| 225 | - | 82.7 | 77.0 | 73.7 | 69.1 | 66.1 | 63.2 | 59.7 | 57.0 |
| 230 | - | 83.0 | 77.3 | 74.0 | 69.3 | 66.3 | 63.4 | 59.9 | 57.2 |
| 235 | - | 83.3 | 77.5 | 74.2 | 69.6 | 66.5 | 63.6 | 60.1 | 57.4 |
| 240 | - | 83.6 | 77.8 | 74.5 | 69.8 | 66.7 | 63.8 | 60.3 | 57.6 |
| 245 | - | 83.9 | 78.0 | 74.7 | 70.0 | 66.9 | 64.0 | 60.4 | 57.8 |
| 250 | - | - | 78.3 | 74.9 | 70.2 | 67.1 | 64.2 | 60.6 | 57.9 |
| 255 | - | - | 78.5 | 75.1 | 70.4 | 67.3 | 64.3 | 60.8 | 58.1 |
| 260 | - | - | 78.7 | 75.3 | 70.6 | 67.4 | 64.5 | 60.9 | 58.2 |
| 265 | - | - | 79.0 | 75.5 | 70.7 | 67.6 | 64.6 | 61.1 | 58.4 |
| 270 | - | - | 79.2 | 75.7 | 70.9 | 67.8 | 64.8 | 61.2 | 58.5 |
| 275 | - | - | 79.4 | 75.9 | 71.1 | 67.9 | 64.9 | 61.4 | 58.7 |

Results are also applicable to beams with 3-sided fire exposure (with concrete topping above). Maximum protection thickness is limited to 80mm for columns and beams with 4-sided fire exposure.



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