



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

VERMICULUX®-S Structural
protection

TECHNICAL SCHEDULE

steel 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
Valid to: 11th September 2024



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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

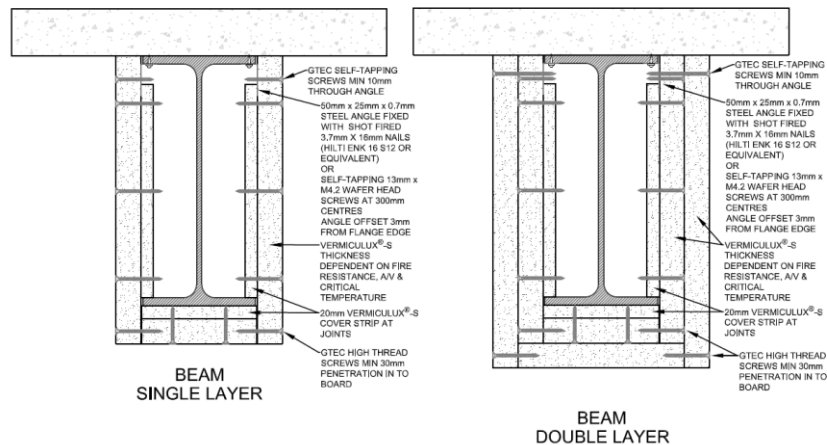
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Figure 1 Illustration of fixing method for beams



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.

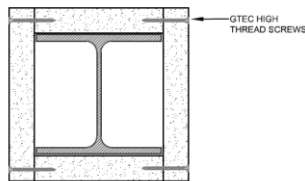
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Column Fixings

Board thickness	Board to Board - GTEC High Thread		Length (mm)	Diameter (mm)
	1st Layer	2nd Layer		
20mm	50mm x M3.5	-	25	3.5
25mm	65mm x M4.2	-	32	3.5
30mm	65mm x M4.2	-	38	3.5
35mm	65mm x M4.2	-	42	3.5
40mm	75mm x M4.2	-	50	3.5
45mm	75mm x M4.2	-	65	4.2
50mm	90mm x M4.8	-	75	4.2
			90	4.8
45mm (20 + 25)	50mm x M3.5	65mm x M4.2	32	3.5
50mm (25 + 25)	65mm x M4.2	65mm x M4.2	38	3.5
55mm (30 + 25)	65mm x M4.2	65mm x M4.2	42	3.5
60mm (30 + 30)	65mm x M4.2	65mm x M4.2	50	3.5
65mm (35 + 30)	65mm x M4.2	65mm x M4.2	65	4.2
70mm (35 + 35)	65mm x M4.2	65mm x M4.2	75	4.2
75mm (40 + 35)	75mm x M4.2	65mm x M4.2	90	4.8
80mm (40 + 40)	75mm x M4.2	75mm x M4.2	100	4.8



COLUMN SINGLE LAYER



COLUMN DOUBLE LAYER

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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Etex Building Performance Limited

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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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.

Signed
N/015



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