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Designated according to Article 29 of Regulation (EU) No 305/2011

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European Technical Assessment

ETA 18/0701
of 17/01/2019

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: Warringtonfire	
Trade name of the construction product	**FIRETEX FX6002**
Product family to which the construction product belongs	35. Fire Protective Products Reactive Coating for the Fire Protection of Steel Elements
Manufacturer	**Sherwin-Williams Protective and Marine Coatings** Tower Works Kestor Street Bolton BL2 2AL
Manufacturing plant(s)	**Sherwin-Williams Protective and Marine Coatings** Tower Works Kestor Street Bolton BL2 2AL
This European Technical Assessment contains	23 pages including 1 Annex which form an integral part of this assessment.
	Annex(es) A - C Contain(s) confidential information and is/are not included in the European Technical Assessment when that assessment is publicly available.
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	EAD 350402-00-1106: FIRE PROTECTIVE REACTIVE COATING FOR STRUCTURAL STEEL
This version replaces:	N/A

1 SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical Description of the Product

FIRETEX FX6002 is a spray applied intumescent paint. The intumescent paint systems work with primer, and with or without topcoat where appropriate to suit the environmental conditions.

In accordance with EAD 350402-00-1106, FIRETEX FX6002 may be considered as a reactive coating (Option 1) or a reactive coating kit that includes one or more primers and/or topcoats (Option 2).

According to the manufacturer's declaration, the product specification has been compared with Directive 67/548/EEC and Regulation (EC) No 1272/2008 and SGDS "Indicative list on dangerous substances", that that it does not contain such dangerous substances.

2 Specification Of The Intended Use In Accordance With The Relevant EAD

The intended use of FIRETEX FX6002 is to fire protect various sizes of structural steel I-section beams and columns, Circular hollow columns, Rectangular hollow columns and beams. The precise scope is given in Tables of Results which show the total dry film thickness of FIRETEX FX6002 (excluding primer and top coat) required to provide classifications of R15 IncSlow to R120 IncSlow for sections for various design temperatures and section factors.

The provisions made in this ETA are based on an assumed working life of the applied coating for the intended use of 10 years, provided that it is subject to appropriate use and maintenance according to manufacturer's instruction. The indications given on the intended working life cannot be interpreted as a guarantee given by the producer, but are to be used as a means for selecting the appropriate product in relation to the expected economically reasonable working life of the works.

The results of the analysis of the test data FIRETEX FX6002 has been assessed as being compatible with the primers and top coats as specified below:

Primers				
Primer Reference[2]	**Primer Type[2]**	**Tested Nominal Primer DFT (mm)**	**Permitted Primer Thickness Range (mm)**	
			Minimum[1]	**Maximum**
FIRETEX C69	A two pack epoxy blast primer	0.075	0.038	0.113
Sherwin M155	Alkyd	0.100	0.050	0.150
Macropoxy C400v3	A multi-functional Epoxy Zinc Phosphate coating	0.125	0.063	0.188
Macropoxy C400v3	A multi-functional Epoxy Zinc Phosphate coating	0.285	0.143	0.428
Procryl 7000	Water Based Blast Primer	0.035	0.018	0.053
Zinc Clad M501	A two pack Zinc ich epoxy primer	0.085	0.043	0.128
M501/M330	A two pack Zinc ich epoxy primer/ A two pack epoxy sealercoat	0.085/0.05	0.045/0.025	0.13/0.075
Mordant Wash L703 / Macropoxy K267 (galvanised steel)[3]	Blue mordant solution / A high solids two-pack epoxy, pigmented with micaceous iron oxide	0.100	0.050	0.150
Macropoxy K267 (galvanised steel, sweep blasted before primer application)[3]	A high solids two-pack epoxy	0.100	0.050	0.150
D301W	Two Component Epoxy	0.200	0.100	0.300
Macropoxy C400V3/Acrolon 7300	A multifunctional epoxy zinc phosphate primer/ A Fast Drying Acrylic Urethane Gloss Finish	0.1/0.08	0.05/0.04	0.15/0.12
FC7220	Two Component Epoxy	0.100	0.050	0.150

1, Where the permitted theoretical minimum DFT is less than typical minimum dry film thickness recommended by manufacturer, the practical information given in product data sheet must be followed

2, Results applicable to other primers from the same generic group

3, Results applicable to the specific primer only, for galvanised substrate

Top Coat				
Top Coat Reference[1]	**Top Coat Description[1]**	**Tested Nominal Top Coat DFT (mm)**	**Permitted Top Coat Thickness Range (mm)**	
			Minimum	**Maximum**
N/A	N/A	0.000	0.000	0.000
FIRETEX M71V2	Acrylic	0.030	0.030	0.450
Sher-Cryl M770	Acrylic	0.065	0.065	0.098
Acrolon C237	Acrylic Urethane	0.100	0.100	0.150
Acrolon C137v2	Acrylic Urethane	0.080	0.080	0.120
Acrolon 7300	Acrylic Urethane	0.100	0.100	0.150

1, Results applicable to the specific topcoat only

FIRETEX FX6002 has been assessed as having passed requirements for durability with the following top coats:

Top Coat Reference[1]	Top Coat Description[1]	Approved Top Coat Colours	Durability Approvals Based On The Carried Out Testing			
			Type Z_2	TypeZ_1	Type Y	Type X
N/A		All Colours	✓	✓	✓	✓
Acrolon C137v2	Acrylic Urethane	All Colours	✓	✓	✓	✓
Acrolon C237	Acrylic Urethane	All Colours	✓	✓	✓	✓
Acrolon 7300	Acrylic Urethane	All Colours	✓	✓	✓	✓
FIRETEX M71V2	Acrylic	All Colours	✓	✓		
Sher-Cryl M770	Acrylic	All Colours	✓	✓		

1, Results applicable to the specific topcoat only

3 Performance Of The Product And References To The Methods Used For Its Assessment

Product: Reactive coating		Intended use: Fire protection of structural steel elements
Verification method	Product characteristic	Performance
MECHANICAL RESISTANCE AND STABILITY		
-	-	-
SAFETY IN CASE OF FIRE		
EN 13501-1	Reaction to fire	Class D-s1, d0 (with the Firetex C69 primer and FIRETEX M71V2 black top coat)
EN 13501-2	Fire resistance	Up to R120 IncSlow (exact scope see Annex A)
HYGIENE, HEALTH AND THE ENVIRONMENT		
Manufacturer's declaration	Release of dangerous substances	It does not contain such dangerous substances according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and SGDS "Indicative list on dangerous substances". VOC emission test results after 28 days: VOC<0.022mg/m3, R value of 2.37 according to AgBB 2015
SAFETY IN USE		
-	-	-
PROTECTION AGAINST NOISE		
-	-	-
ENERGY ECONOMY AND HEAT RETENTION		
-	-	-
ASPECTS OF SERVICEABILITY, DURABILITY AND IDENTIFICATION		

EAD 350402-00-1106, section 2.2.5	Durability and serviceability	• Primer and top coat compatibility • Type Z_2 durability • Type Z_1 durability • Type Y durability • Type X durability
EAD 350402-00-1106, Annex E	Identification	Thermoanalytical analyses (TG) and Infrared spectroscopy analyses (IR)

In addition to the specific clauses relating to dangerous substances contained in this European technical assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

4 Assessment And Verification Of Constancy Of Performance (Hereinafter AVCP) System Applied, With References To Its Legal base

According to the decision 1999/454/EC of the European Commission Decision of date 22 June 1999 on the procedure for attesting the conformity of construction products pursuant to Article 20(2) of Council Directive 89/106/EEC as regards fire stopping, fire sealing and fire protective products, the system of assessment and verification of constancy of performance (see Annex V to the Regulation (EU) No 305/2011) given in the following table apply:

Products	Intended uses	Level or Class	System
Fire protective products (including coatings)	Fire protection of steel elements	Any	1

5 Technical Details Necessary For The Implementation Of The AVCP System, As Provided For In The Applicable EAD.

The manufacturer shall exercise permanent internal control, record and evaluate the results of factory production in accordance with the provisions laid down in the "Control Plan" related to this European Technical Assessment. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. The production control system shall ensure that the product is in conformity with this European Technical Assessment.

The manufacturer may only use verified by Technical Assessment Body initial/raw/constituent materials stated in the technical documentations related to this European Technical Assessment.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

In cases where the provisions of the European technical assessment and its "Control Plan" are no longer fulfilled the certification body shall withdraw the Certificate of Constancy and inform the relevant authorities e.g. Nando, EOTA.

The Table 5 in EAD 350402-00-1106 presents an example of the properties that shall be controlled and minimum frequencies of control. The exact test method and threshold have been laid down in the factory production control plan, operated by the manufacturer and deposited at Warringtonfire.

Signatories

Responsible Officer

N. Stoyanov* - Certification Engineer

Approved

J. Yuan* - Chief Engineer

* For and on behalf of Warringtonfire Testing and Certification Limted

Annex A - Product Performance: Fire Resistance

1. 1 This Annex relates to the use of FIRETEX FX6002 for the fire protection I-section beams and columns, Circular hollow columns, Rectangular hollow columns and beams. The precise scope is given in Tables of Results which show the total dry film thickness of FIRETEX FX6002 (excluding primer and top coat) required to provide classifications of R15 to R120 for sections for various design temperatures and section factors. A summary of the salient features of the testing and assessment are shown in A1 of this Annex.

2. The product is approved on the basis of:

   i) Approval testing in accordance with the principles of EN 13381-8:2013.

   ii) A design appraisal against this ETA adopting the principles defined in Annex E of EN 13381-8:2013

3. The data presented in the tables in this Annex may refer to both beams (three-sided fire exposure) and columns (up to four sided exposure, and column results also apply to beams with four side fire exposure), as specified in the results.

4. The data shown is applicable to steel sections blast cleaned to ISO 8501-1 Sa 2.5 or equivalent and primed with the compatible primers and top coats listed in this ETA.

5. The data for the 'I' and 'H' shaped columns applies also to other shaped steel sections that have re-entrant details such as channels, angles and tees.

6. FIRETEX FX6002 has been exposed to the slowing heating regime defined in Annex A of EN 13381-8: 2013 and has satisfied the requirements.

Table of Results

Table 1 I-Section Beams 15 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	583	600	603	610	620	650	700	750
50	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
55	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
60	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
65	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
70	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
75	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
80	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
85	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
90	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
95	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
100	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
105	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
110	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
115	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
120	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
125	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
130	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
135	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
140	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
145	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
150	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
155	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
160	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
165	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
170	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
175	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
180	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
185	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
190	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
195	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
200	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
205	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
210	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
215	0.375	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
220	0.388	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
225	0.401	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
230	0.414	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
235	0.426	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
240	0.439	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
245	0.452	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
250	0.465	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
255	0.478	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
260	0.490	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
265	0.503	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
270	0.516	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
275	0.529	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
280	0.542	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
285	0.554	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
290	0.567	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
295	0.580	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
300	0.593	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
305	0.606	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
310	0.618	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
315	0.631	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
320	0.644	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
325	0.657	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
330	0.669	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
335	0.682	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
340	0.695	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
345	0.708	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
350	0.721	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
355	0.733	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
360	0.746	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
365	0.759	0.377	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
370	0.772	0.389	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
375	0.785	0.400	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
380	0.797	0.412	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
385	0.810	0.423	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
390	0.823	0.435	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
395	0.836	0.446	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 2 I-Section Beams 20 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	583	600	603	610	620	650	700	750
50	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
55	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
60	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
65	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
70	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
75	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
80	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
85	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
90	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
95	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
100	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
105	0.372	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
110	0.387	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
115	0.402	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
120	0.417	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
125	0.432	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
130	0.447	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
135	0.462	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
140	0.477	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
145	0.492	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
150	0.507	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
155	0.522	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
160	0.537	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
165	0.552	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
170	0.567	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
175	0.582	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
180	0.597	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
185	0.612	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
190	0.627	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
195	0.642	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
200	0.657	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
205	0.671	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
210	0.686	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
215	0.701	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
220	0.716	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
225	0.731	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
230	0.746	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
235	0.761	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
240	0.776	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
245	0.791	0.369	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
250	0.806	0.384	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
255	0.821	0.399	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
260	0.836	0.414	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
265	0.851	0.429	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
270	0.866	0.444	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
275	0.881	0.459	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
280	0.896	0.474	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
285	0.911	0.489	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
290	0.926	0.504	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
295	0.941	0.519	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
300	0.956	0.534	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
305	0.971	0.549	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
310	0.986	0.564	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
315	1.001	0.579	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
320	1.016	0.594	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
325	1.031	0.609	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
330	1.046	0.624	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
335	1.061	0.639	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
340	1.076	0.654	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
345	1.091	0.669	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
350	1.106	0.684	0.368	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
355	1.121	0.699	0.381	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
360	1.136	0.714	0.395	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
365	1.151	0.729	0.409	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
370	1.165	0.743	0.423	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
375	1.180	0.758	0.436	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
380	1.195	0.773	0.450	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
385	1.210	0.788	0.464	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
390	1.225	0.803	0.477	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
395	1.240	0.818	0.491	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 3 I-Section Beams 30 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	583	600	603	610	620	650	700	750
50	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
55	0.379	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
60	0.410	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
65	0.440	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
70	0.470	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
75	0.500	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
80	0.531	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
85	0.561	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
90	0.591	0.385	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
95	0.622	0.402	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
100	0.652	0.420	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
105	0.682	0.438	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
110	0.713	0.456	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
115	0.743	0.473	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
120	0.773	0.491	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
125	0.804	0.509	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
130	0.834	0.527	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
135	0.864	0.545	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
140	0.895	0.562	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
145	0.925	0.580	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
150	0.955	0.598	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
155	0.985	0.616	0.383	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
160	1.016	0.633	0.400	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
165	1.046	0.651	0.417	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
170	1.076	0.669	0.433	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
175	1.107	0.687	0.450	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
180	1.137	0.705	0.467	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
185	1.167	0.722	0.484	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
190	1.198	0.740	0.500	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
195	1.228	0.758	0.517	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
200	1.258	0.776	0.534	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
205	1.289	0.794	0.550	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
210	1.319	0.811	0.567	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
215	1.349	0.829	0.584	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
220	1.380	0.847	0.601	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
225	1.410	0.865	0.617	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
230	1.440	0.882	0.634	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
235	1.470	0.900	0.651	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
240	1.501	0.918	0.668	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
245	1.524	0.936	0.684	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
250	1.543	0.954	0.701	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
255	1.562	0.971	0.718	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
260	1.580	0.989	0.734	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
265	1.599	1.007	0.751	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
270	1.618	1.025	0.768	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
275	1.636	1.042	0.785	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
280	1.655	1.060	0.801	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
285	1.674	1.078	0.818	0.370	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
290	1.693	1.096	0.835	0.391	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
295	1.711	1.114	0.851	0.411	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
300	1.730	1.131	0.868	0.431	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
305	1.749	1.149	0.885	0.451	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
310	1.767	1.167	0.902	0.471	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
315	1.786	1.185	0.918	0.492	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
320	1.805	1.202	0.935	0.512	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
325	1.824	1.220	0.952	0.532	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
330	1.842	1.238	0.968	0.552	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
335	1.861	1.256	0.985	0.572	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
340	1.880	1.274	1.002	0.593	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
345	1.898	1.291	1.019	0.613	0.371	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
350	1.917	1.309	1.035	0.633	0.390	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
355	1.936	1.327	1.052	0.653	0.409	0.374	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
360	1.955	1.345	1.069	0.673	0.428	0.393	0.377	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
365	1.973	1.363	1.085	0.694	0.447	0.412	0.395	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
370	1.992	1.380	1.102	0.714	0.466	0.431	0.414	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
375	2.011	1.398	1.119	0.734	0.485	0.450	0.433	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
380	2.029	1.416	1.136	0.754	0.505	0.469	0.452	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
385	2.048	1.434	1.152	0.774	0.524	0.488	0.471	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
390	2.067	1.451	1.169	0.795	0.543	0.507	0.489	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
395	2.086	1.469	1.186	0.815	0.562	0.525	0.508	0.373	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 4 I-Section Beams 45 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	583	600	603	610	620	650	700	750
50	0.746	0.424	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
55	0.821	0.470	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
60	0.896	0.521	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
65	0.971	0.572	0.368	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
70	1.046	0.622	0.400	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
75	1.121	0.673	0.431	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
80	1.196	0.724	0.463	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
85	1.271	0.774	0.495	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
90	1.346	0.825	0.526	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
95	1.421	0.876	0.558	0.385	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
100	1.496	0.926	0.590	0.405	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
105	1.530	0.977	0.621	0.426	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
110	1.552	1.028	0.653	0.447	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
115	1.575	1.078	0.685	0.468	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
120	1.597	1.129	0.716	0.489	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
125	1.619	1.180	0.748	0.510	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
130	1.642	1.230	0.780	0.531	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
135	1.664	1.281	0.812	0.552	0.380	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
140	1.686	1.332	0.843	0.572	0.401	0.369	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
145	1.709	1.382	0.875	0.593	0.421	0.390	0.374	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
150	1.731	1.433	0.907	0.614	0.442	0.411	0.395	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
155	1.753	1.484	0.938	0.635	0.463	0.432	0.416	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
160	1.775	1.529	0.970	0.656	0.484	0.452	0.436	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
165	1.798	1.568	1.002	0.677	0.504	0.473	0.457	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
170	1.820	1.607	1.033	0.698	0.525	0.494	0.478	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
175	1.842	1.645	1.065	0.719	0.546	0.515	0.499	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
180	1.865	1.684	1.097	0.739	0.566	0.535	0.520	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
185	1.887	1.723	1.129	0.760	0.587	0.556	0.540	0.390	0.381	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
190	1.909	1.762	1.160	0.781	0.608	0.577	0.561	0.412	0.403	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
195	1.932	1.800	1.192	0.802	0.629	0.598	0.582	0.434	0.425	0.389	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
200	1.954	1.839	1.224	0.823	0.649	0.619	0.603	0.456	0.447	0.411	0.382	0.367	0.367	0.367	0.367	0.367	0.367	0.367
205	1.976	1.878	1.255	0.844	0.670	0.639	0.624	0.478	0.469	0.433	0.404	0.367	0.367	0.367	0.367	0.367	0.367	0.367
210	1.998	1.917	1.287	0.865	0.691	0.660	0.644	0.500	0.491	0.456	0.427	0.367	0.367	0.367	0.367	0.367	0.367	0.367
215	2.021	1.955	1.319	0.886	0.712	0.681	0.665	0.522	0.513	0.478	0.450	0.367	0.367	0.367	0.367	0.367	0.367	0.367
220	2.043	1.994	1.350	0.906	0.732	0.702	0.686	0.544	0.535	0.501	0.472	0.367	0.367	0.367	0.367	0.367	0.367	0.367
225	2.065	2.033	1.382	0.927	0.753	0.722	0.707	0.566	0.557	0.523	0.495	0.367	0.367	0.367	0.367	0.367	0.367	0.367
230	2.088	2.071	1.414	0.948	0.774	0.743	0.727	0.588	0.579	0.545	0.518	0.367	0.367	0.367	0.367	0.367	0.367	0.367
235	2.110	2.110	1.445	0.969	0.794	0.764	0.748	0.610	0.602	0.568	0.540	0.367	0.367	0.367	0.367	0.367	0.367	0.367
240	2.149	2.149	1.477	0.990	0.815	0.785	0.769	0.632	0.624	0.590	0.563	0.367	0.367	0.367	0.367	0.367	0.367	0.367
245	2.188	2.188	1.509	1.011	0.836	0.805	0.790	0.654	0.646	0.612	0.586	0.377	0.367	0.367	0.367	0.367	0.367	0.367
250	2.226	2.226	1.557	1.032	0.857	0.826	0.811	0.676	0.668	0.635	0.608	0.403	0.367	0.367	0.367	0.367	0.367	0.367
255	2.265	2.265	1.607	1.053	0.877	0.847	0.831	0.698	0.690	0.657	0.631	0.429	0.380	0.367	0.367	0.367	0.367	0.367
260	2.304	2.304	1.657	1.073	0.898	0.868	0.852	0.720	0.712	0.680	0.654	0.455	0.407	0.367	0.367	0.367	0.367	0.367
265	2.343	2.343	1.707	1.094	0.919	0.888	0.873	0.742	0.734	0.702	0.676	0.481	0.434	0.367	0.367	0.367	0.367	0.367
270	2.381	2.381	1.757	1.115	0.940	0.909	0.894	0.764	0.756	0.724	0.699	0.507	0.461	0.367	0.367	0.367	0.367	0.367
275	2.420	2.420	1.807	1.136	0.960	0.930	0.915	0.786	0.778	0.747	0.722	0.533	0.488	0.367	0.367	0.367	0.367	0.367
280	2.459	2.459	1.857	1.157	0.981	0.951	0.935	0.808	0.800	0.769	0.744	0.559	0.514	0.367	0.367	0.367	0.367	0.367
285	2.498	2.498	1.907	1.178	1.002	0.972	0.956	0.830	0.822	0.791	0.767	0.585	0.541	0.395	0.367	0.367	0.367	0.367
290	2.536	2.536	1.957	1.199	1.022	0.992	0.977	0.852	0.844	0.814	0.789	0.611	0.568	0.425	0.368	0.367	0.367	0.367
295	2.575	2.575	2.007	1.220	1.043	1.013	0.998	0.874	0.866	0.836	0.812	0.637	0.595	0.455	0.397	0.367	0.367	0.367
300	2.614	2.614	2.057	1.241	1.064	1.034	1.019	0.896	0.889	0.859	0.835	0.663	0.622	0.485	0.427	0.367	0.367	0.367
305	2.652	2.652	2.107	1.261	1.085	1.055	1.039	0.918	0.911	0.881	0.857	0.689	0.649	0.515	0.456	0.367	0.367	0.367
310	2.691	2.691	2.157	1.282	1.105	1.075	1.060	0.940	0.933	0.903	0.880	0.715	0.675	0.545	0.486	0.367	0.367	0.367
315	2.730	2.730	2.207	1.303	1.126	1.096	1.081	0.962	0.955	0.926	0.903	0.741	0.702	0.575	0.515	0.367	0.367	0.367
320	2.769	2.769	2.257	1.324	1.147	1.117	1.102	0.984	0.977	0.948	0.925	0.767	0.729	0.605	0.545	0.372	0.367	0.367
325	2.807	2.807	2.307	1.345	1.167	1.138	1.123	1.006	0.999	0.970	0.948	0.793	0.756	0.635	0.575	0.402	0.367	0.367
330	2.846	2.846	2.357	1.366	1.188	1.158	1.143	1.028	1.021	0.993	0.971	0.819	0.783	0.665	0.604	0.433	0.367	0.367
335	2.885	2.885	2.407	1.387	1.209	1.179	1.164	1.050	1.043	1.015	0.993	0.845	0.810	0.695	0.634	0.464	0.367	0.367
340	2.924	2.924	2.457	1.408	1.230	1.200	1.185	1.072	1.065	1.038	1.016	0.871	0.836	0.725	0.663	0.494	0.367	0.367
345	2.962	2.962	2.507	1.428	1.250	1.221	1.206	1.094	1.087	1.060	1.039	0.897	0.863	0.755	0.693	0.525	0.367	0.367
350	3.001	3.001	2.557	1.449	1.271	1.241	1.227	1.116	1.109	1.082	1.061	0.922	0.890	0.785	0.723	0.555	0.367	0.367
355	3.040	3.040	2.607	1.470	1.292	1.262	1.247	1.138	1.131	1.105	1.084	0.948	0.917	0.815	0.752	0.586	0.367	0.367
360	3.078	3.078	2.657	1.491	1.313	1.283	1.268	1.160	1.153	1.127	1.107	0.974	0.944	0.845	0.782	0.616	0.367	0.367
365	3.117	3.117	2.707	1.512	1.333	1.304	1.289	1.182	1.175	1.149	1.129	1.000	0.971	0.875	0.811	0.647	0.367	0.367
370	3.156	3.156	2.757	1.599	1.354	1.324	1.310	1.204	1.198	1.172	1.152	1.026	0.998	0.905	0.841	0.677	0.367	0.367
375	3.195	3.195	2.807	1.690	1.375	1.345	1.331	1.226	1.220	1.194	1.175	1.052	1.024	0.935	0.870	0.708	0.394	0.367
380	3.233	3.233	2.857	1.781	1.395	1.366	1.351	1.248	1.242	1.217	1.197	1.078	1.051	0.965	0.900	0.739	0.423	0.367
385	3.485	3.272	2.907	1.873	1.416	1.387	1.372	1.270	1.264	1.239	1.220	1.104	1.078	0.995	0.930	0.769	0.452	0.367
390	3.633	3.311	2.957	1.964	1.437	1.408	1.393	1.292	1.286	1.261	1.242	1.130	1.105	1.025	0.959	0.800	0.481	0.367
395	3.719	3.350	3.007	2.055	1.458	1.428	1.414	1.314	1.308	1.284	1.265	1.156	1.132	1.055	0.989	0.830	0.510	0.367

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 5 I-Section Beams 60 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	583	600	603	610	620	650	700	750
50	1.182	0.791	0.512	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
55	1.301	0.879	0.568	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
60	1.420	0.967	0.635	0.402	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
65	1.527	1.055	0.702	0.456	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
70	1.593	1.143	0.770	0.509	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
75	1.659	1.230	0.837	0.563	0.393	0.374	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
80	1.725	1.318	0.904	0.616	0.435	0.414	0.404	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
85	1.791	1.406	0.971	0.670	0.478	0.454	0.443	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
90	1.857	1.494	1.038	0.724	0.520	0.495	0.483	0.400	0.396	0.382	0.372	0.367	0.367	0.367	0.367	0.367	0.367	0.367
95	1.923	1.544	1.105	0.777	0.562	0.535	0.522	0.435	0.431	0.416	0.405	0.367	0.367	0.367	0.367	0.367	0.367	0.367
100	1.988	1.584	1.172	0.831	0.604	0.576	0.562	0.470	0.466	0.450	0.438	0.372	0.367	0.367	0.367	0.367	0.367	0.367
105	2.054	1.624	1.240	0.884	0.646	0.616	0.601	0.505	0.501	0.484	0.472	0.404	0.393	0.367	0.367	0.367	0.367	0.367
110	2.120	1.664	1.307	0.938	0.688	0.656	0.641	0.541	0.536	0.518	0.505	0.435	0.424	0.391	0.367	0.367	0.367	0.367
115	2.186	1.704	1.374	0.991	0.730	0.697	0.681	0.576	0.571	0.552	0.538	0.466	0.455	0.422	0.381	0.367	0.367	0.367
120	2.252	1.744	1.441	1.045	0.772	0.737	0.720	0.611	0.606	0.586	0.572	0.498	0.485	0.452	0.410	0.367	0.367	0.367
125	2.318	1.783	1.508	1.098	0.814	0.777	0.760	0.646	0.641	0.620	0.605	0.529	0.516	0.483	0.438	0.367	0.367	0.367
130	2.384	1.823	1.565	1.152	0.857	0.818	0.799	0.682	0.676	0.654	0.638	0.560	0.547	0.513	0.466	0.367	0.367	0.367
135	2.450	1.863	1.621	1.205	0.899	0.858	0.839	0.717	0.711	0.688	0.672	0.592	0.578	0.544	0.495	0.367	0.367	0.367
140	2.516	1.903	1.677	1.259	0.941	0.899	0.878	0.752	0.746	0.722	0.705	0.623	0.609	0.574	0.523	0.385	0.367	0.367
145	2.582	1.943	1.733	1.313	0.983	0.939	0.918	0.787	0.781	0.756	0.738	0.654	0.640	0.604	0.551	0.412	0.367	0.367
150	2.648	1.983	1.789	1.366	1.025	0.979	0.958	0.823	0.816	0.790	0.772	0.686	0.671	0.635	0.580	0.438	0.367	0.367
155	2.714	2.023	1.845	1.420	1.067	1.020	0.997	0.858	0.851	0.824	0.805	0.717	0.702	0.665	0.608	0.465	0.367	0.367
160	2.776	2.062	1.901	1.473	1.109	1.060	1.037	0.893	0.886	0.858	0.838	0.748	0.733	0.696	0.636	0.492	0.367	0.367
165	2.837	2.102	1.958	1.528	1.151	1.100	1.076	0.928	0.921	0.892	0.872	0.780	0.764	0.726	0.665	0.518	0.367	0.367
170	2.897	2.142	2.014	1.585	1.193	1.141	1.116	0.964	0.956	0.926	0.905	0.811	0.795	0.757	0.693	0.545	0.367	0.367
175	2.958	2.182	2.070	1.642	1.235	1.181	1.155	0.999	0.991	0.960	0.938	0.842	0.826	0.787	0.721	0.571	0.367	0.367
180	3.019	2.222	2.126	1.699	1.278	1.222	1.195	1.034	1.026	0.994	0.972	0.874	0.857	0.817	0.750	0.598	0.367	0.367
185	3.080	2.262	2.182	1.757	1.320	1.262	1.234	1.069	1.061	1.028	1.005	0.905	0.888	0.848	0.778	0.625	0.367	0.367
190	3.141	2.302	2.238	1.814	1.362	1.302	1.274	1.105	1.096	1.062	1.038	0.936	0.919	0.878	0.806	0.651	0.367	0.367
195	3.202	2.341	2.294	1.871	1.404	1.343	1.314	1.140	1.131	1.096	1.072	0.968	0.950	0.909	0.835	0.678	0.367	0.367
200	3.263	2.381	2.350	1.929	1.446	1.383	1.353	1.175	1.166	1.130	1.105	0.999	0.981	0.939	0.863	0.704	0.395	0.367
205	3.324	2.421	2.406	1.986	1.488	1.424	1.393	1.210	1.201	1.164	1.138	1.030	1.012	0.970	0.891	0.731	0.424	0.367
210	3.385	2.462	2.462	2.043	1.538	1.464	1.432	1.246	1.236	1.198	1.172	1.062	1.043	1.000	0.920	0.758	0.453	0.367
215	3.446	2.518	2.518	2.100	1.601	1.504	1.472	1.281	1.271	1.233	1.205	1.093	1.074	1.030	0.948	0.784	0.482	0.367
220	3.507	2.574	2.574	2.158	1.663	1.563	1.511	1.316	1.306	1.267	1.238	1.124	1.105	1.061	0.977	0.811	0.511	0.367
225	3.568	2.630	2.630	2.215	1.726	1.627	1.575	1.351	1.341	1.301	1.272	1.156	1.136	1.091	1.005	0.837	0.540	0.367
230	3.622	2.687	2.687	2.272	1.788	1.691	1.640	1.387	1.376	1.335	1.305	1.187	1.167	1.122	1.033	0.864	0.569	0.367
235	3.676	2.743	2.743	2.329	1.850	1.755	1.705	1.422	1.411	1.369	1.338	1.218	1.198	1.152	1.062	0.891	0.598	0.367
240	3.730	2.799	2.799	2.387	1.913	1.819	1.770	1.457	1.446	1.403	1.372	1.250	1.229	1.183	1.090	0.917	0.627	0.367
245	3.783	2.855	2.855	2.444	1.975	1.883	1.835	1.492	1.481	1.437	1.405	1.281	1.260	1.213	1.118	0.944	0.656	0.367
250	3.837	2.930	2.911	2.501	2.038	1.947	1.900	1.542	1.519	1.471	1.438	1.312	1.291	1.243	1.147	0.970	0.685	0.367
255	3.890	3.082	2.967	2.558	2.100	2.012	1.965	1.613	1.590	1.505	1.472	1.344	1.322	1.274	1.175	0.997	0.714	0.367
260	3.944	3.233	3.023	2.616	2.162	2.076	2.030	1.684	1.662	1.568	1.505	1.375	1.353	1.304	1.203	1.024	0.743	0.367
265	3.998	3.385	3.079	2.673	2.225	2.140	2.095	1.754	1.733	1.641	1.570	1.406	1.384	1.335	1.232	1.050	0.772	0.367
270	4.051	3.536	3.135	2.730	2.287	2.204	2.159	1.825	1.804	1.715	1.644	1.438	1.415	1.365	1.260	1.077	0.801	0.367
275	4.105	3.609	3.191	2.788	2.350	2.268	2.224	1.896	1.875	1.788	1.719	1.469	1.446	1.396	1.288	1.104	0.830	0.367
280	4.159	3.660	3.247	2.845	2.412	2.332	2.289	1.967	1.946	1.861	1.794	1.500	1.477	1.426	1.317	1.130	0.859	0.367
285	4.212	3.710	3.303	2.902	2.474	2.396	2.354	2.037	2.018	1.934	1.868	1.560	1.508	1.456	1.345	1.157	0.888	0.386
290	4.266	3.760	3.359	2.959	2.537	2.460	2.419	2.108	2.089	2.007	1.943	1.641	1.582	1.487	1.373	1.183	0.917	0.422
295	4.319	3.811	3.416	3.017	2.599	2.524	2.484	2.179	2.160	2.080	2.017	1.721	1.664	1.525	1.402	1.210	0.946	0.458
300	4.373	3.861	3.472	3.074	2.662	2.588	2.549	2.250	2.231	2.153	2.092	1.801	1.745	1.609	1.430	1.237	0.975	0.495
305	4.427	3.911	3.528	3.131	2.724	2.652	2.614	2.320	2.302	2.226	2.167	1.882	1.827	1.694	1.458	1.263	1.004	0.531
310	4.480	3.962	3.585	3.188	2.786	2.716	2.679	2.391	2.373	2.299	2.241	1.962	1.908	1.779	1.487	1.290	1.033	0.567
315	4.527	4.012	3.646	3.246	2.849	2.780	2.744	2.462	2.445	2.373	2.316	2.042	1.990	1.863	1.520	1.316	1.062	0.603
320	4.572	4.062	3.707	3.303	2.911	2.844	2.809	2.533	2.516	2.446	2.391	2.123	2.071	1.948	1.617	1.343	1.091	0.639
325	4.616	4.113	3.768	3.360	2.973	2.908	2.874	2.603	2.587	2.519	2.465	2.203	2.153	2.033	1.714	1.370	1.120	0.675
330	4.661	4.163	3.830	3.417	3.036	2.972	2.939	2.674	2.658	2.592	2.540	2.283	2.234	2.117	1.810	1.396	1.149	0.711
335	4.705	4.213	3.891	3.475	3.098	3.036	3.003	2.745	2.729	2.665	2.614	2.363	2.316	2.202	1.907	1.423	1.178	0.747
340	4.750	4.264	3.952	3.532	3.161	3.100	3.068	2.815	2.801	2.738	2.689	2.444	2.397	2.287	2.003	1.449	1.207	0.783
345	4.795	4.314	4.013	3.596	3.223	3.164	3.133	2.886	2.872	2.811	2.764	2.524	2.479	2.371	2.100	1.476	1.236	0.819
350	4.839	4.364	4.074	3.673	3.285	3.228	3.198	2.957	2.943	2.884	2.838	2.604	2.560	2.456	2.197	1.503	1.265	0.856
355	4.884	4.415	4.135	3.751	3.348	3.293	3.263	3.028	3.014	2.957	2.913	2.685	2.642	2.540	2.293	1.592	1.294	0.892
360	4.928	4.465	4.197	3.828	3.410	3.357	3.328	3.098	3.085	3.031	2.988	2.765	2.723	2.625	2.390	1.721	1.323	0.928
365	4.973	4.517	4.258	3.905	3.473	3.421	3.393	3.169	3.156	3.104	3.062	2.845	2.805	2.710	2.486	1.849	1.352	0.964
370	5.017	4.570	4.319	3.983	3.535	3.485	3.458	3.240	3.228	3.177	3.137	2.925	2.886	2.794	2.583	1.978	1.381	1.000
375	5.062	4.623	4.380	4.060	3.590	3.549	3.523	3.311	3.299	3.250	3.212	3.006	2.968	2.879	2.680	2.107	1.410	1.036
380	5.107	4.676	4.441	4.138	3.635	3.600	3.582	3.381	3.370	3.323	3.286	3.086	3.049	2.964	2.776	2.236	1.439	1.072
385	5.151	4.729	4.502	4.215	3.680	3.644	3.626	3.452	3.441	3.396	3.361	3.166	3.131	3.048	2.873	2.365	1.468	1.108
390	5.196	4.783	4.560	4.292	3.725	3.689	3.671	3.523	3.512	3.469	3.435	3.247	3.213	3.133	2.970	2.494	1.497	1.144
395	5.240	4.836	4.618	4.370	3.771	3.733	3.715	3.584	3.578	3.542	3.510	3.327	3.294	3.218	3.066	2.623	1.577	1.181

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 6 I-Section Beams 75 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	583	600	603	610	620	650	700	750
50	1.667	1.163	0.837	0.591	0.403	0.380	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
55	1.782	1.288	0.930	0.656	0.448	0.422	0.411	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
60	1.896	1.413	1.030	0.741	0.522	0.495	0.483	0.404	0.400	0.386	0.376	0.367	0.367	0.367	0.367	0.367	0.367	0.367
65	2.011	1.531	1.130	0.827	0.597	0.567	0.554	0.470	0.466	0.451	0.440	0.380	0.370	0.367	0.367	0.367	0.367	0.367
70	2.125	1.621	1.230	0.912	0.671	0.640	0.626	0.536	0.532	0.516	0.505	0.441	0.431	0.402	0.368	0.367	0.367	0.367
75	2.239	1.711	1.330	0.998	0.746	0.713	0.698	0.603	0.598	0.581	0.569	0.503	0.492	0.462	0.425	0.367	0.367	0.367
80	2.354	1.802	1.430	1.083	0.821	0.786	0.770	0.669	0.665	0.646	0.633	0.564	0.553	0.523	0.482	0.372	0.367	0.367
85	2.468	1.892	1.524	1.168	0.895	0.859	0.842	0.736	0.731	0.711	0.697	0.626	0.614	0.583	0.540	0.426	0.367	0.367
90	2.583	1.982	1.590	1.254	0.970	0.931	0.913	0.802	0.797	0.776	0.761	0.687	0.675	0.643	0.597	0.480	0.367	0.367
95	2.697	2.072	1.657	1.339	1.044	1.004	0.985	0.869	0.863	0.841	0.825	0.749	0.736	0.703	0.654	0.535	0.367	0.367
100	2.781	2.163	1.723	1.425	1.119	1.077	1.057	0.935	0.929	0.906	0.889	0.810	0.797	0.763	0.712	0.589	0.386	0.367
105	2.855	2.253	1.789	1.510	1.194	1.150	1.129	1.002	0.995	0.971	0.953	0.872	0.858	0.823	0.769	0.643	0.432	0.367
110	2.928	2.343	1.856	1.591	1.268	1.222	1.201	1.068	1.062	1.036	1.017	0.933	0.919	0.884	0.826	0.697	0.478	0.367
115	3.002	2.433	1.922	1.672	1.343	1.295	1.273	1.134	1.128	1.101	1.081	0.995	0.980	0.944	0.884	0.752	0.524	0.367
120	3.076	2.523	1.988	1.753	1.417	1.368	1.344	1.201	1.194	1.166	1.145	1.056	1.041	1.004	0.941	0.806	0.570	0.367
125	3.149	2.614	2.054	1.834	1.492	1.441	1.416	1.267	1.260	1.231	1.210	1.118	1.102	1.064	0.998	0.860	0.616	0.383
130	3.223	2.704	2.121	1.915	1.554	1.513	1.488	1.334	1.326	1.296	1.274	1.179	1.163	1.124	1.056	0.914	0.662	0.419
135	3.297	2.788	2.187	1.996	1.612	1.568	1.547	1.400	1.392	1.361	1.338	1.241	1.224	1.184	1.113	0.969	0.708	0.456
140	3.371	2.871	2.253	2.076	1.669	1.622	1.600	1.467	1.458	1.426	1.402	1.302	1.285	1.245	1.170	1.023	0.754	0.492
145	3.444	2.954	2.319	2.157	1.726	1.676	1.653	1.536	1.526	1.490	1.466	1.364	1.346	1.305	1.228	1.077	0.801	0.529
150	3.518	3.036	2.386	2.238	1.784	1.731	1.706	1.613	1.603	1.563	1.533	1.425	1.407	1.365	1.285	1.131	0.847	0.565
155	3.609	3.119	2.452	2.319	1.841	1.785	1.758	1.689	1.679	1.639	1.610	1.487	1.468	1.425	1.342	1.186	0.893	0.602
160	3.743	3.201	2.518	2.400	1.899	1.839	1.811	1.766	1.756	1.716	1.686	1.556	1.532	1.485	1.400	1.240	0.939	0.638
165	3.877	3.284	2.585	2.481	1.956	1.893	1.864	1.842	1.832	1.792	1.762	1.631	1.607	1.553	1.457	1.294	0.985	0.675
170	4.010	3.367	2.651	2.562	2.013	1.948	1.919	1.919	1.909	1.869	1.839	1.706	1.682	1.628	1.515	1.348	1.031	0.711
175	4.144	3.449	2.717	2.642	2.071	2.002	1.995	1.995	1.985	1.945	1.915	1.781	1.757	1.702	1.591	1.403	1.077	0.748
180	4.278	3.532	2.840	2.723	2.128	2.072	2.072	2.072	2.062	2.022	1.992	1.856	1.832	1.777	1.666	1.457	1.123	0.784
185	4.412	3.627	2.971	2.804	2.186	2.148	2.148	2.148	2.138	2.098	2.068	1.931	1.907	1.852	1.742	1.511	1.169	0.820
190	4.508	3.731	3.102	2.885	2.243	2.225	2.225	2.225	2.215	2.174	2.144	2.006	1.981	1.926	1.818	1.589	1.216	0.857
195	4.547	3.836	3.233	2.966	2.301	2.301	2.301	2.301	2.291	2.251	2.221	2.081	2.056	2.001	1.893	1.667	1.262	0.893
200	4.587	3.940	3.365	3.047	2.378	2.378	2.378	2.378	2.368	2.327	2.297	2.156	2.131	2.075	1.969	1.745	1.308	0.930
205	4.626	4.045	3.496	3.127	2.454	2.454	2.454	2.454	2.444	2.404	2.373	2.231	2.206	2.150	2.045	1.823	1.354	0.966
210	4.665	4.150	3.610	3.208	2.531	2.531	2.531	2.531	2.521	2.480	2.450	2.306	2.281	2.224	2.120	1.902	1.400	1.003
215	4.704	4.254	3.700	3.289	2.608	2.608	2.608	2.608	2.597	2.557	2.526	2.381	2.356	2.299	2.196	1.980	1.446	1.039
220	4.743	4.359	3.791	3.370	2.684	2.684	2.684	2.684	2.674	2.633	2.602	2.456	2.431	2.374	2.272	2.058	1.492	1.076
225	4.782	4.463	3.881	3.451	2.761	2.761	2.761	2.761	2.750	2.709	2.679	2.531	2.505	2.448	2.347	2.136	1.559	1.112
230	4.821	4.524	3.972	3.532	2.837	2.837	2.837	2.837	2.827	2.786	2.755	2.606	2.580	2.523	2.423	2.214	1.642	1.149
235	4.860	4.568	4.063	3.612	2.914	2.914	2.914	2.914	2.903	2.862	2.832	2.681	2.655	2.597	2.499	2.293	1.725	1.185
240	4.900	4.611	4.153	3.691	2.998	2.990	2.990	2.990	2.980	2.939	2.908	2.756	2.730	2.672	2.574	2.371	1.809	1.221
245	4.939	4.655	4.244	3.770	3.169	3.067	3.067	3.067	3.056	3.015	2.984	2.831	2.805	2.746	2.650	2.449	1.892	1.258
250	4.978	4.699	4.335	3.849	3.340	3.143	3.143	3.143	3.133	3.092	3.061	2.906	2.880	2.821	2.726	2.527	1.976	1.294
255	5.017	4.742	4.425	3.928	3.511	3.307	3.220	3.220	3.209	3.168	3.137	2.981	2.955	2.896	2.801	2.605	2.059	1.331
260	5.056	4.786	4.506	4.007	3.596	3.526	3.408	3.296	3.286	3.245	3.213	3.056	3.029	2.970	2.877	2.684	2.142	1.367
265	5.095	4.829	4.557	4.086	3.635	3.601	3.584	3.373	3.363	3.321	3.290	3.131	3.104	3.045	2.953	2.762	2.226	1.404
270	5.134	4.873	4.608	4.165	3.674	3.641	3.624	3.449	3.439	3.397	3.366	3.206	3.179	3.119	3.028	2.840	2.309	1.440
275	5.174	4.917	4.659	4.244	3.713	3.680	3.663	3.526	3.516	3.474	3.442	3.281	3.254	3.194	3.104	2.918	2.393	1.477
280	5.213	4.960	4.710	4.323	3.752	3.719	3.702	3.587	3.581	3.550	3.519	3.356	3.329	3.268	3.180	2.996	2.476	1.513
285	5.252	5.004	4.761	4.402	3.791	3.758	3.742	3.626	3.621	3.599	3.583	3.431	3.404	3.343	3.255	3.075	2.559	1.607
290	5.291	5.047	4.811	4.482	3.831	3.798	3.781	3.665	3.660	3.638	3.622	3.506	3.479	3.418	3.331	3.153	2.643	1.700
295	5.330	5.091	4.862	4.546	3.870	3.837	3.820	3.704	3.699	3.677	3.661	3.576	3.554	3.492	3.407	3.231	2.726	1.793
300	5.369	5.135	4.913	4.608	3.909	3.876	3.860	3.744	3.738	3.717	3.700	3.618	3.618	3.567	3.483	3.309	2.809	1.887
305	5.408	5.178	4.964	4.670	3.948	3.915	3.899	3.783	3.777	3.756	3.740	3.680	3.680	3.631	3.558	3.387	2.893	1.980
310	5.447	5.222	5.015	4.732	3.987	3.955	3.938	3.822	3.817	3.795	3.779	3.742	3.742	3.694	3.625	3.466	2.976	2.073
315	5.487	5.266	5.066	4.794	4.026	3.994	3.978	3.861	3.856	3.834	3.818	3.804	3.804	3.758	3.690	3.544	3.060	2.167
320	5.526	5.309	5.117	4.856	4.066	4.033	4.017	3.901	3.895	3.873	3.866	3.866	3.866	3.821	3.754	3.594	3.143	2.260
325	5.565	5.353	5.168	4.918	4.105	4.073	4.056	3.940	3.934	3.928	3.928	3.928	3.928	3.885	3.819	3.629	3.226	2.354
330	5.604	5.396	5.219	4.980	4.144	4.112	4.096	3.990	3.990	3.990	3.990	3.990	3.990	3.948	3.884	3.664	3.310	2.447
335	5.643	5.440	5.270	5.042	4.183	4.151	4.135	4.052	4.052	4.052	4.052	4.052	4.052	4.012	3.949	3.699	3.393	2.540
340	5.682	5.484	5.321	5.104	4.222	4.190	4.174	4.114	4.114	4.114	4.114	4.114	4.114	4.075	4.014	3.735	3.477	2.634
345	5.721	5.527	5.372	5.166	4.261	4.230	4.214	4.175	4.175	4.175	4.175	4.175	4.175	4.139	4.078	3.770	3.560	2.727
350	5.760	5.571	5.423	5.228	4.301	4.269	4.253	4.237	4.237	4.237	4.237	4.237	4.237	4.202	4.143	3.805	3.599	2.820
355	5.800	5.614	5.473	5.290	4.340	4.308	4.299	4.299	4.299	4.299	4.299	4.299	4.299	4.266	4.208	3.841	3.632	2.914
360	5.839	5.658	5.524	5.352	4.379	4.361	4.361	4.361	4.361	4.361	4.361	4.361	4.361	4.329	4.273	3.876	3.665	3.007
365	5.878	5.702	5.575	5.414	4.423	4.423	4.423	4.423	4.423	4.423	4.423	4.423	4.423	4.393	4.338	3.911	3.698	3.100
370	5.917	5.745	5.626	5.476	4.485	4.485	4.485	4.485	4.485	4.485	4.485	4.485	4.485	4.456	4.402	3.947	3.730	3.194
375	5.956	5.789	5.677	5.538	4.559	4.559	4.559	4.559	4.559	4.559	4.559	4.559	4.559	4.524	4.467	3.982	3.763	3.287
380	5.995	5.832	5.728	5.600	4.646	4.635	4.635	4.635	4.635	4.635	4.635	4.635	4.635	4.598	4.536	4.017	3.796	3.380
385	6.034	5.876	5.779	5.662	4.787	4.711	4.711	4.711	4.711	4.711	4.711	4.711	4.711	4.672	4.608	4.053	3.829	3.474
390	6.073	5.920	5.830	5.724	4.927	4.817	4.787	4.787	4.787	4.787	4.787	4.787	4.787	4.746	4.679	4.088	3.862	3.567
395	6.113	5.963	5.881	5.786	5.068	4.958	4.903	4.862	4.862	4.862	4.862	4.862	4.862	4.820	4.751	4.123	3.895	3.601

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 7 I-Section Beams 90 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	583	600	603	610	620	650	700	750
50	2.105	1.593	1.162	0.893	0.693	0.667	0.654	0.567	0.563	0.547	0.536	0.473	0.463	0.435	0.401	0.367	0.367	0.367
55	2.263	1.735	1.291	0.992	0.769	0.741	0.727	0.629	0.625	0.607	0.595	0.525	0.514	0.483	0.445	0.367	0.367	0.367
60	2.422	1.877	1.424	1.108	0.873	0.843	0.827	0.725	0.721	0.702	0.689	0.617	0.605	0.573	0.532	0.432	0.367	0.367
65	2.580	2.019	1.553	1.224	0.977	0.944	0.928	0.822	0.817	0.797	0.782	0.708	0.696	0.664	0.619	0.514	0.367	0.367
70	2.736	2.161	1.673	1.340	1.081	1.046	1.029	0.918	0.912	0.892	0.876	0.800	0.787	0.754	0.706	0.596	0.427	0.367
75	2.872	2.304	1.793	1.456	1.185	1.148	1.130	1.014	1.008	0.986	0.970	0.892	0.878	0.844	0.793	0.679	0.499	0.367
80	3.008	2.446	1.914	1.561	1.288	1.250	1.231	1.110	1.104	1.081	1.064	0.983	0.969	0.934	0.880	0.761	0.570	0.375
85	3.143	2.588	2.034	1.655	1.392	1.352	1.332	1.206	1.200	1.176	1.158	1.075	1.060	1.025	0.967	0.844	0.642	0.436
90	3.279	2.729	2.154	1.749	1.496	1.453	1.433	1.302	1.296	1.270	1.252	1.166	1.151	1.115	1.054	0.926	0.714	0.496
95	3.415	2.818	2.274	1.842	1.607	1.558	1.534	1.398	1.392	1.365	1.346	1.258	1.242	1.205	1.142	1.008	0.785	0.557
100	3.551	2.906	2.395	1.936	1.719	1.665	1.640	1.495	1.488	1.460	1.440	1.350	1.333	1.296	1.229	1.091	0.857	0.617
105	3.686	2.995	2.515	2.030	1.831	1.773	1.746	1.585	1.581	1.552	1.532	1.441	1.424	1.386	1.316	1.173	0.929	0.677
110	3.822	3.084	2.635	2.124	1.943	1.881	1.851	1.675	1.672	1.642	1.620	1.530	1.515	1.476	1.403	1.256	1.001	0.738
115	3.958	3.173	2.750	2.218	2.055	1.989	1.957	1.764	1.764	1.731	1.707	1.610	1.610	1.569	1.490	1.338	1.072	0.798
120	4.093	3.262	2.849	2.312	2.168	2.096	2.062	1.856	1.856	1.821	1.795	1.705	1.705	1.663	1.583	1.420	1.144	0.859
125	4.229	3.351	2.947	2.406	2.280	2.204	2.168	1.948	1.948	1.910	1.883	1.800	1.800	1.758	1.678	1.503	1.216	0.919
130	4.365	3.440	3.046	2.499	2.392	2.312	2.273	2.040	2.040	1.999	1.970	1.895	1.895	1.852	1.773	1.598	1.287	0.980
135	4.496	3.529	3.144	2.593	2.504	2.419	2.379	2.132	2.132	2.089	2.058	1.989	1.989	1.947	1.868	1.694	1.359	1.040
140	4.555	3.708	3.243	2.687	2.616	2.527	2.485	2.224	2.224	2.178	2.145	2.084	2.084	2.041	1.963	1.791	1.431	1.101
145	4.613	3.965	3.341	2.800	2.728	2.635	2.590	2.316	2.316	2.268	2.233	2.179	2.179	2.136	2.058	1.888	1.502	1.161
150	4.671	4.222	3.440	2.926	2.814	2.740	2.696	2.408	2.408	2.357	2.321	2.274	2.274	2.230	2.154	1.984	1.599	1.222
155	4.730	4.479	3.538	3.051	2.900	2.828	2.790	2.499	2.499	2.447	2.408	2.369	2.369	2.324	2.249	2.081	1.699	1.282
160	4.788	4.542	3.754	3.177	2.986	2.917	2.880	2.591	2.591	2.536	2.496	2.463	2.463	2.419	2.344	2.178	1.799	1.343
165	4.846	4.594	4.025	3.303	3.073	3.005	2.970	2.683	2.683	2.625	2.583	2.558	2.558	2.513	2.439	2.274	1.900	1.403
170	4.905	4.646	4.297	3.429	3.159	3.094	3.060	2.781	2.781	2.715	2.671	2.653	2.653	2.608	2.534	2.371	2.000	1.464
175	4.963	4.699	4.508	3.555	3.245	3.182	3.149	2.884	2.884	2.820	2.767	2.748	2.748	2.702	2.629	2.468	2.101	1.531
180	5.022	4.751	4.560	3.805	3.331	3.271	3.239	2.987	2.987	2.928	2.879	2.843	2.843	2.797	2.725	2.564	2.201	1.629
185	5.080	4.803	4.613	4.073	3.418	3.359	3.329	3.090	3.090	3.035	2.990	2.937	2.937	2.891	2.820	2.661	2.301	1.727
190	5.138	4.855	4.666	4.340	3.504	3.448	3.419	3.194	3.194	3.143	3.101	3.032	3.032	2.986	2.915	2.758	2.402	1.825
195	5.197	4.907	4.718	4.517	3.585	3.537	3.509	3.297	3.297	3.250	3.213	3.127	3.127	3.080	3.010	2.854	2.502	1.923
200	5.255	4.959	4.771	4.573	3.650	3.608	3.589	3.400	3.400	3.358	3.324	3.222	3.222	3.174	3.105	2.951	2.603	2.021
205	5.313	5.011	4.824	4.628	3.715	3.670	3.649	3.508	3.503	3.466	3.435	3.317	3.317	3.269	3.200	3.048	2.703	2.119
210	5.372	5.063	4.876	4.684	3.780	3.731	3.709	3.591	3.587	3.571	3.547	3.411	3.411	3.363	3.295	3.145	2.803	2.217
215	5.430	5.115	4.929	4.740	3.844	3.793	3.769	3.639	3.635	3.617	3.605	3.506	3.506	3.458	3.391	3.241	2.904	2.315
220	5.489	5.167	4.982	4.796	3.909	3.854	3.829	3.687	3.682	3.663	3.650	3.606	3.606	3.552	3.486	3.338	3.004	2.413
225	5.547	5.219	5.034	4.851	3.974	3.916	3.889	3.736	3.730	3.717	3.717	3.717	3.717	3.659	3.582	3.435	3.105	2.511
230	5.605	5.271	5.087	4.907	4.039	3.977	3.948	3.827	3.827	3.827	3.827	3.827	3.827	3.768	3.686	3.531	3.205	2.610
235	5.664	5.324	5.140	4.963	4.103	4.038	4.008	3.937	3.937	3.937	3.937	3.937	3.937	3.878	3.790	3.591	3.305	2.708
240	5.722	5.376	5.193	5.019	4.168	4.100	4.068	4.048	4.048	4.048	4.048	4.048	4.048	3.987	3.894	3.625	3.406	2.806
245	5.780	5.428	5.245	5.074	4.233	4.161	4.158	4.158	4.158	4.158	4.158	4.158	4.158	4.097	3.998	3.660	3.506	2.904
250	5.839	5.480	5.298	5.130	4.298	4.268	4.268	4.268	4.268	4.268	4.268	4.268	4.268	4.206	4.102	3.695	3.582	3.002
255	5.897	5.532	5.351	5.186	4.379	4.379	4.379	4.379	4.379	4.379	4.379	4.379	4.379	4.316	4.206	3.729	3.613	3.100
260	5.956	5.584	5.403	5.241	4.489	4.489	4.489	4.489	4.489	4.489	4.489	4.489	4.489	4.425	4.310	3.764	3.645	3.198
265	6.014	5.636	5.456	5.297	4.552	4.552	4.552	4.552	4.552	4.552	4.552	4.552	4.552	4.516	4.414	3.799	3.677	3.296
270	6.072	5.688	5.509	5.353	4.612	4.612	4.612	4.612	4.612	4.612	4.612	4.612	4.612	4.576	4.507	3.833	3.709	3.394
275	6.131	5.740	5.561	5.409	4.673	4.673	4.673	4.673	4.673	4.673	4.673	4.673	4.673	4.636	4.567	3.868	3.741	3.492
280	6.189	5.792	5.614	5.464	4.752	4.734	4.734	4.734	4.734	4.734	4.734	4.734	4.734	4.697	4.628	3.903	3.773	3.576
285	6.247	5.844	5.667	5.520	4.839	4.794	4.794	4.794	4.794	4.794	4.794	4.794	4.794	4.757	4.688	3.937	3.805	3.607
290	-	5.896	5.719	5.576	4.926	4.855	4.855	4.855	4.855	4.855	4.855	4.855	4.855	4.817	4.748	3.972	3.836	3.638
295	-	5.949	5.772	5.632	5.013	4.915	4.915	4.915	4.915	4.915	4.915	4.915	4.915	4.877	4.809	4.006	3.868	3.669
300	-	6.001	5.825	5.687	5.100	5.002	4.976	4.976	4.976	4.976	4.976	4.976	4.976	4.937	4.869	4.041	3.900	3.701
305	-	6.053	5.878	5.743	5.187	5.093	5.042	5.037	5.037	5.037	5.037	5.037	5.037	4.998	4.929	4.076	3.932	3.732
310	-	6.105	5.930	5.799	5.273	5.184	5.135	5.097	5.097	5.097	5.097	5.097	5.097	5.058	4.989	4.110	3.964	3.763
315	-	6.157	5.983	5.855	5.360	5.275	5.228	5.158	5.158	5.158	5.158	5.158	5.158	5.118	5.050	4.145	3.996	3.794
320	-	6.209	6.036	5.910	5.447	5.366	5.321	5.219	5.219	5.219	5.219	5.219	5.219	5.178	5.110	4.180	4.028	3.825
325	-	6.261	6.088	5.966	5.534	5.456	5.414	5.279	5.279	5.279	5.279	5.279	5.279	5.238	5.170	4.214	4.059	3.856
330	-	-	6.141	6.022	5.621	5.547	5.507	5.340	5.340	5.340	5.340	5.340	5.340	5.299	5.231	4.249	4.091	3.887
335	-	-	6.194	6.078	5.708	5.638	5.600	5.401	5.401	5.401	5.401	5.401	5.401	5.359	5.291	4.284	4.123	3.918
340	-	-	6.246	6.133	5.794	5.729	5.693	5.461	5.461	5.461	5.461	5.461	5.461	5.419	5.351	4.318	4.155	3.949
345	-	-	-	6.189	5.881	5.820	5.786	5.522	5.522	5.522	5.522	5.522	5.522	5.479	5.411	4.353	4.187	3.980
350	-	-	-	6.245	5.968	5.911	5.879	5.583	5.583	5.583	5.583	5.583	5.583	5.539	5.472	4.388	4.219	4.011
355	-	-	-	-	6.055	6.002	5.972	5.661	5.644	5.643	5.643	5.643	5.643	5.600	5.532	4.422	4.251	4.042
360	-	-	-	-	6.142	6.092	6.065	5.774	5.759	5.704	5.704	5.704	5.704	5.660	5.592	4.457	4.282	4.073
365	-	-	-	-	6.229	6.183	6.158	5.887	5.873	5.814	5.765	5.764	5.764	5.720	5.653	4.491	4.314	4.104
370	-	-	-	-	-	6.274	6.251	6.000	5.987	5.935	5.891	5.825	5.825	5.780	5.713	4.639	4.346	4.135
375	-	-	-	-	-	-	-	6.113	6.102	6.055	6.017	5.886	5.886	5.840	5.773	4.793	4.378	4.166
380	-	-	-	-	-	-	-	6.226	6.216	6.176	6.144	5.946	5.946	5.901	5.833	4.946	4.410	4.197
385	-	-	-	-	-	-	-	-	-	-	6.270	6.007	6.007	5.961	5.894	5.099	4.442	4.228
390	-	-	-	-	-	-	-	-	-	-	-	6.135	6.068	6.021	5.954	5.253	4.474	4.259
395	-	-	-	-	-	-	-	-	-	-	-	-	6.128	6.081	6.014	5.406	4.549	4.290

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 8 I-Section Beams 105 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	583	600	603	610	620	650	700	750
50	-	2.041	1.536	1.196	0.982	0.954	0.940	0.849	0.845	0.828	0.815	0.751	0.740	0.712	0.673	0.573	0.428	0.367
55	-	2.228	1.707	1.328	1.091	1.060	1.044	0.943	0.938	0.919	0.906	0.834	0.822	0.790	0.747	0.636	0.475	0.367
60	-	2.415	1.882	1.475	1.224	1.191	1.174	1.067	1.062	1.042	1.028	0.954	0.941	0.909	0.861	0.746	0.572	0.391
65	-	2.602	2.057	1.624	1.357	1.322	1.304	1.192	1.187	1.165	1.150	1.074	1.060	1.027	0.976	0.855	0.669	0.476
70	-	2.771	2.232	1.774	1.490	1.452	1.434	1.317	1.311	1.289	1.272	1.194	1.179	1.145	1.090	0.964	0.766	0.560
75	-	2.904	2.406	1.925	1.659	1.604	1.578	1.441	1.435	1.412	1.394	1.313	1.298	1.263	1.205	1.074	0.864	0.645
80	-	3.036	2.581	2.075	1.835	1.775	1.746	1.575	1.569	1.539	1.517	1.433	1.417	1.382	1.319	1.183	0.961	0.729
85	-	3.169	2.750	2.225	2.011	1.945	1.914	1.722	1.719	1.686	1.661	1.556	1.530	1.500	1.434	1.293	1.058	0.814
90	-	3.302	2.890	2.376	2.186	2.115	2.081	1.869	1.869	1.832	1.806	1.686	1.614	1.585	1.536	1.402	1.155	0.899
95	-	3.435	3.029	2.526	2.362	2.285	2.249	2.019	2.019	1.979	1.950	1.815	1.699	1.666	1.613	1.512	1.252	0.983
100	-	3.568	3.169	2.676	2.538	2.456	2.416	2.169	2.169	2.126	2.094	1.945	1.783	1.747	1.690	1.612	1.349	1.068
105	-	3.701	3.309	2.798	2.714	2.626	2.584	2.319	2.319	2.272	2.239	2.075	1.868	1.827	1.766	1.713	1.447	1.152
110	-	3.833	3.449	2.904	2.804	2.761	2.739	2.469	2.469	2.419	2.383	2.204	1.952	1.908	1.843	1.814	1.537	1.237
115	-	3.966	3.588	3.011	2.888	2.845	2.823	2.618	2.618	2.566	2.527	2.334	2.037	1.989	1.919	1.914	1.612	1.322
120	-	4.099	3.728	3.118	2.972	2.929	2.908	2.751	2.751	2.712	2.672	2.464	2.121	2.070	2.015	2.015	1.687	1.406
125	-	4.232	3.868	3.225	3.056	3.013	2.992	2.839	2.839	2.808	2.783	2.593	2.206	2.151	2.115	2.115	1.762	1.491
130	-	4.365	4.007	3.332	3.139	3.098	3.076	2.928	2.928	2.898	2.874	2.723	2.290	2.231	2.216	2.216	1.837	1.603
135	-	4.497	4.147	3.439	3.223	3.182	3.161	3.016	3.016	2.988	2.965	2.824	2.374	2.317	2.317	2.317	1.912	1.726
140	-	4.630	4.287	3.546	3.307	3.266	3.245	3.105	3.105	3.078	3.057	2.924	2.459	2.417	2.417	2.417	1.987	1.848
145	-	4.763	4.509	4.509	3.391	3.350	3.330	3.193	3.193	3.168	3.148	3.024	2.543	2.518	2.518	2.518	2.063	1.970
150	-	4.896	4.625	4.625	3.475	3.434	3.414	3.282	3.282	3.258	3.239	3.124	2.628	2.618	2.618	2.618	2.138	2.093
155	-	5.029	4.740	4.740	3.559	3.519	3.499	3.371	3.370	3.348	3.330	3.224	2.719	2.719	2.719	2.719	2.215	2.215
160	-	5.162	4.855	4.855	3.707	3.629	3.593	3.461	3.459	3.438	3.421	3.325	2.933	2.868	2.868	2.868	2.337	2.337
165	-	5.294	4.985	4.970	3.866	3.780	3.740	3.551	3.547	3.528	3.513	3.425	3.179	3.020	3.020	3.020	2.460	2.460
170	-	5.427	5.125	5.085	4.025	3.931	3.888	3.664	3.657	3.629	3.610	3.525	3.425	3.285	3.172	3.172	2.582	2.582
175	-	5.560	5.265	5.201	4.184	4.082	4.035	3.782	3.774	3.742	3.731	3.731	3.731	3.588	3.370	3.325	2.704	2.704
180	-	5.693	5.404	5.316	4.343	4.233	4.182	4.126	4.126	4.126	4.126	4.126	4.126	3.998	3.790	3.477	2.827	2.827
185	-	5.826	5.544	5.431	4.502	4.498	4.498	4.498	4.498	4.498	4.498	4.498	4.498	4.409	4.191	3.594	2.949	2.949
190	-	5.959	5.684	5.546	4.676	4.574	4.574	4.574	4.574	4.574	4.574	4.574	4.574	4.550	4.509	3.655	3.071	3.071
195	-	6.091	5.823	5.661	4.850	4.712	4.649	4.649	4.649	4.649	4.649	4.649	4.649	4.621	4.576	3.716	3.581	3.194
200	-	6.224	5.963	5.776	5.024	4.882	4.813	4.725	4.725	4.725	4.725	4.725	4.725	4.693	4.642	3.777	3.620	3.316
205	-	-	6.103	5.892	5.198	5.052	4.982	4.801	4.801	4.801	4.801	4.801	4.801	4.764	4.708	3.838	3.660	3.438
210	-	-	6.242	6.007	5.372	5.223	5.151	4.876	4.876	4.876	4.876	4.876	4.876	4.836	4.774	3.899	3.699	3.561
215	-	-	-	6.122	5.546	5.393	5.320	4.952	4.952	4.952	4.952	4.952	4.952	4.907	4.840	3.960	3.739	3.599
220	-	-	-	6.237	5.720	5.564	5.489	5.027	5.027	5.027	5.027	5.027	5.027	4.979	4.906	4.021	3.778	3.631
225	-	-	-	-	5.893	5.734	5.658	5.103	5.103	5.103	5.103	5.103	5.103	5.050	4.972	4.082	3.818	3.663
230	-	-	-	-	6.067	5.904	5.827	5.223	5.201	5.179	5.179	5.179	5.179	5.121	5.038	4.143	3.857	3.695
235	-	-	-	-	6.241	6.075	5.996	5.370	5.347	5.255	5.254	5.254	5.254	5.193	5.105	4.204	3.897	3.727
240	-	-	-	-	-	6.245	6.165	5.517	5.493	5.398	5.330	5.330	5.330	5.264	5.171	4.265	3.936	3.759
245	-	-	-	-	-	-	-	5.663	5.639	5.542	5.472	5.405	5.405	5.336	5.237	4.326	3.976	3.790
250	-	-	-	-	-	-	-	5.810	5.785	5.685	5.614	5.481	5.481	5.407	5.303	4.387	4.015	3.822
255	-	-	-	-	-	-	-	5.957	5.931	5.829	5.756	5.557	5.557	5.479	5.369	4.449	4.055	3.854
260	-	-	-	-	-	-	-	6.104	6.077	5.972	5.897	5.632	5.632	5.550	5.435	4.516	4.094	3.886
265	-	-	-	-	-	-	-	6.250	6.223	6.115	6.039	5.708	5.708	5.622	5.501	4.600	4.133	3.918
270	-	-	-	-	-	-	-	-	-	6.259	6.181	5.783	5.783	5.693	5.567	4.684	4.173	3.949
275	-	-	-	-	-	-	-	-	-	-	-	5.859	5.859	5.764	5.634	4.768	4.212	3.981
280	-	-	-	-	-	-	-	-	-	-	-	5.935	5.935	5.836	5.700	4.852	4.252	4.013
285	-	-	-	-	-	-	-	-	-	-	-	6.053	6.010	5.907	5.766	4.936	4.291	4.045
290	-	-	-	-	-	-	-	-	-	-	-	6.175	6.086	5.979	5.832	5.020	4.331	4.077
295	-	-	-	-	-	-	-	-	-	-	-	-	6.161	6.050	5.898	5.104	4.370	4.109
300	-	-	-	-	-	-	-	-	-	-	-	-	6.237	6.122	5.964	5.188	4.410	4.140
305	-	-	-	-	-	-	-	-	-	-	-	-	-	6.193	6.030	5.272	4.449	4.172
310	-	-	-	-	-	-	-	-	-	-	-	-	-	6.265	6.096	5.356	4.489	4.204
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.163	5.441	4.600	4.236
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.229	5.525	4.721	4.268
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.609	4.841	4.300
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.693	4.962	4.331
335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.777	5.082	4.363
340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.861	5.203	4.395
345	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.945	5.324	4.427
350	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.029	5.444	4.459
355	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.113	5.565	4.490
360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.197	5.685	4.650
365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.281	5.806	4.821
370	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.926	4.991
375	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.047	5.162
380	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.168	5.333
385	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.503
390	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.674
395	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.845

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 9 I-Section Beams 120 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	583	600	603	610	620	650	700	750
50	-	2.489	1.988	1.564	1.272	1.241	1.226	1.131	1.126	1.108	1.095	1.030	1.018	0.989	0.944	0.837	0.674	0.502
55	-	2.721	2.208	1.738	1.413	1.379	1.363	1.256	1.251	1.231	1.217	1.144	1.130	1.098	1.048	0.929	0.748	0.557
60	-	2.953	2.429	1.942	1.607	1.552	1.525	1.409	1.404	1.383	1.367	1.291	1.277	1.244	1.190	1.065	0.871	0.666
65	-	-	2.649	2.147	1.853	1.791	1.761	1.581	1.574	1.542	1.519	1.439	1.424	1.390	1.332	1.201	0.993	0.774
70	-	-	2.869	2.352	2.099	2.030	1.997	1.791	1.789	1.753	1.727	1.608	1.566	1.534	1.474	1.337	1.115	0.882
75	-	-	-	2.556	2.345	2.269	2.233	2.003	2.003	1.964	1.935	1.798	1.698	1.661	1.602	1.473	1.237	0.991
80	-	-	-	2.761	2.591	2.509	2.469	2.218	2.218	2.174	2.143	1.988	1.830	1.789	1.724	1.624	1.359	1.099
85	-	-	-	-	2.793	2.739	2.705	2.433	2.433	2.385	2.350	2.178	1.962	1.916	1.846	1.780	1.481	1.207
90	-	-	-	-	2.943	2.887	2.860	2.647	2.647	2.596	2.558	2.367	2.094	2.044	1.969	1.936	1.604	1.316
95	-	-	-	-	3.093	3.035	3.006	2.783	2.783	2.761	2.744	2.557	2.226	2.171	2.093	2.093	1.728	1.424
100	-	-	-	-	3.242	3.183	3.153	2.874	2.874	2.853	2.836	2.737	2.358	2.299	2.249	2.249	1.852	1.533
105	-	-	-	-	3.392	3.331	3.300	2.965	2.965	2.944	2.928	2.834	2.490	2.426	2.405	2.405	1.976	1.648
110	-	-	-	-	3.542	3.478	3.447	3.055	3.055	3.036	3.021	2.932	2.622	2.562	2.562	2.562	2.100	1.763
115	-	-	-	-	3.691	3.626	3.594	3.146	3.146	3.127	3.113	3.030	2.791	2.718	2.718	2.718	2.224	1.878
120	-	-	-	-	3.841	3.774	3.740	3.236	3.236	3.219	3.205	3.127	3.094	2.937	2.838	2.838	2.348	1.993
125	-	-	-	-	3.991	3.922	3.887	3.397	3.397	3.397	3.397	3.397	3.397	3.263	3.018	2.955	2.472	2.108
130	-	-	-	-	4.141	4.069	4.034	3.699	3.699	3.699	3.699	3.699	3.699	3.589	3.379	3.073	2.596	2.223
135	-	-	-	-	4.290	4.217	4.181	4.002	4.002	4.002	4.002	4.002	4.002	3.915	3.739	3.190	2.720	2.338
140	-	-	-	-	4.440	4.365	4.327	4.304	4.304	4.304	4.304	4.304	4.304	4.241	4.100	3.308	2.897	2.453
145	-	-	-	-	4.590	4.549	4.549	4.549	4.549	4.549	4.549	4.549	4.549	4.526	4.461	3.425	3.077	2.568
150	-	-	-	-	4.739	4.697	4.697	4.697	4.697	4.697	4.697	4.697	4.697	4.670	4.622	3.543	3.257	2.682
155	-	-	-	-	-	-	4.768	4.844	4.844	4.844	4.844	4.844	4.844	4.814	4.763	3.680	3.437	2.880
160	-	-	-	-	-	-	-	-	4.992	4.992	4.992	4.992	4.992	4.958	4.903	3.824	3.596	3.129
165	-	-	-	-	-	-	-	-	-	-	-	5.140	5.140	5.102	5.044	3.968	3.694	3.378
170	-	-	-	-	-	-	-	-	-	-	-	5.288	5.288	5.246	5.185	4.112	3.793	3.587
175	-	-	-	-	-	-	-	-	-	-	-	5.435	5.435	5.390	5.326	4.256	3.892	3.660
180	-	-	-	-	-	-	-	-	-	-	-	5.583	5.583	5.534	5.467	4.400	3.991	3.734
185	-	-	-	-	-	-	-	-	-	-	-	5.731	5.731	5.678	5.608	4.604	4.090	3.807
190	-	-	-	-	-	-	-	-	-	-	-	5.879	5.879	5.822	5.749	4.919	4.188	3.880
195	-	-	-	-	-	-	-	-	-	-	-	6.054	6.027	5.966	5.890	5.234	4.287	3.954
200	-	-	-	-	-	-	-	-	-	-	-	-	6.174	6.110	6.031	5.549	4.386	4.027
205	-	-	-	-	-	-	-	-	-	-	-	-	-	6.254	6.172	5.864	4.485	4.101
210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.179	4.833	4.174
215	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.205	4.247
220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.576	4.321
225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.947	4.394
230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.468
235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.569
240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.685
245	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.801
250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.917
255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.033
260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.149
265	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.265
270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.381
275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.497
280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.613
285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.729
290	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.845
295	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.961
300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.077
305	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.193
310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
345	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
350	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
355	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
370	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
375	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
380	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
385	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
390	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
395	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 10 I-Section Columns 15 minutes															
Required Thickness (mm) for a Design Temperature (°C)															
Section Factor (m-1)	350	400	450	500	510	530	539	545	550	563	580	600	650	700	750
50	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
55	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
60	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
65	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
70	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
75	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
80	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
85	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
90	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
95	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
100	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
105	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
110	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
115	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
120	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
125	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
130	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
135	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
140	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
145	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
150	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
155	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
160	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
165	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
170	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
175	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
180	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
185	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
190	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
195	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
200	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
205	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
210	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
215	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
220	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
225	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
230	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
235	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
240	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
245	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
250	0.383	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
255	0.411	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
260	0.439	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
265	0.467	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
270	0.495	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
275	0.522	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
280	0.550	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
285	0.578	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
290	0.606	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
295	0.634	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
300	0.661	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
305	0.689	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
310	0.717	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
315	0.745	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
320	0.773	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
325	0.800	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
330	0.828	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
335	0.856	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
340	0.884	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
345	0.912	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
350	0.939	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
355	0.967	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
360	0.995	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
365	1.023	0.386	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
370	1.051	0.407	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380

Thickness is intumescent only. Results also apply to I-section beams exposed on all four sides limited to a maximum protection thickness of 6.284mm.

Table 11 I-Section Columns 20 minutes															
Required Thickness (mm) for a Design Temperature (°C)															
Section Factor (m-1)	350	400	450	500	510	530	539	545	550	563	580	600	650	700	750
50	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
55	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
60	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
65	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
70	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
75	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
80	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
85	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
90	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
95	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
100	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
105	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
110	0.390	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
115	0.416	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
120	0.441	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
125	0.466	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
130	0.491	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
135	0.517	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
140	0.542	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
145	0.567	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
150	0.592	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
155	0.617	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
160	0.643	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
165	0.668	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
170	0.693	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
175	0.718	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
180	0.744	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
185	0.769	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
190	0.794	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
195	0.819	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
200	0.844	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
205	0.870	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
210	0.895	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
215	0.920	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
220	0.945	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
225	0.971	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
230	0.996	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
235	1.021	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
240	1.046	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
245	1.071	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
250	1.097	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
255	1.122	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
260	1.147	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
265	1.172	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
270	1.198	0.406	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
275	1.223	0.434	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
280	1.248	0.462	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
285	1.273	0.490	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
290	1.299	0.518	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
295	1.324	0.546	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
300	1.349	0.574	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
305	1.374	0.602	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
310	1.399	0.630	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
315	1.425	0.658	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
320	1.450	0.686	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
325	1.475	0.714	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
330	1.500	0.742	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
335	1.526	0.770	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
340	1.547	0.798	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
345	1.566	0.825	0.391	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
350	1.585	0.853	0.415	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
355	1.605	0.881	0.439	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
360	1.624	0.909	0.463	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
365	1.643	0.937	0.487	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
370	1.662	0.965	0.511	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380

Thickness is intumescent only. Results also apply to I-section beams exposed on all four sides limited to a maximum protection thickness of 6.284mm.

Table 12 I-Section Columns 30 minutes															
Required Thickness (mm) for a Design Temperature (°C)															
Section Factor (m-1)	350	400	450	500	510	530	539	545	550	563	580	600	650	700	750
50	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
55	0.418	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
60	0.469	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
65	0.520	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
70	0.571	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
75	0.623	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
80	0.674	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
85	0.725	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
90	0.776	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
95	0.827	0.410	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
100	0.878	0.440	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
105	0.929	0.471	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
110	0.980	0.501	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
115	1.031	0.531	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
120	1.082	0.562	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
125	1.133	0.592	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
130	1.184	0.622	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
135	1.235	0.653	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
140	1.286	0.683	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
145	1.338	0.713	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
150	1.389	0.744	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
155	1.440	0.774	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
160	1.491	0.804	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
165	1.538	0.834	0.400	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
170	1.561	0.865	0.427	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
175	1.584	0.895	0.454	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
180	1.608	0.925	0.482	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
185	1.631	0.956	0.509	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
190	1.654	0.986	0.536	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
195	1.677	1.016	0.563	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
200	1.701	1.047	0.590	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
205	1.724	1.077	0.617	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
210	1.747	1.107	0.644	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
215	1.771	1.137	0.672	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
220	1.794	1.168	0.699	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
225	1.817	1.198	0.726	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
230	1.841	1.228	0.753	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
235	1.864	1.259	0.780	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
240	1.887	1.289	0.807	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
245	1.911	1.319	0.834	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
250	1.934	1.350	0.861	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
255	1.957	1.380	0.889	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
260	1.981	1.410	0.916	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
265	2.004	1.440	0.943	0.383	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
270	2.027	1.471	0.970	0.416	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
275	2.050	1.501	0.997	0.448	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
280	2.074	1.531	1.024	0.481	0.412	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
285	2.097	1.556	1.051	0.514	0.444	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
290	2.120	1.581	1.079	0.547	0.476	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
295	2.144	1.606	1.106	0.579	0.508	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
300	2.167	1.630	1.133	0.612	0.540	0.402	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
305	2.190	1.655	1.160	0.645	0.572	0.433	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
310	2.214	1.680	1.187	0.677	0.604	0.463	0.402	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
315	2.237	1.704	1.214	0.710	0.636	0.493	0.431	0.391	0.380	0.380	0.380	0.380	0.380	0.380	0.380
320	2.260	1.729	1.241	0.743	0.668	0.523	0.460	0.419	0.385	0.380	0.380	0.380	0.380	0.380	0.380
325	2.284	1.753	1.269	0.775	0.699	0.553	0.490	0.448	0.414	0.380	0.380	0.380	0.380	0.380	0.380
330	2.307	1.778	1.296	0.808	0.731	0.584	0.519	0.477	0.442	0.380	0.380	0.380	0.380	0.380	0.380
335	2.330	1.803	1.323	0.841	0.763	0.614	0.548	0.506	0.470	0.382	0.380	0.380	0.380	0.380	0.380
340	2.354	1.827	1.350	0.873	0.795	0.644	0.578	0.534	0.498	0.409	0.380	0.380	0.380	0.380	0.380
345	2.377	1.852	1.377	0.906	0.827	0.674	0.607	0.563	0.527	0.436	0.380	0.380	0.380	0.380	0.380
350	2.400	1.876	1.404	0.939	0.859	0.705	0.636	0.592	0.555	0.463	0.380	0.380	0.380	0.380	0.380
355	2.423	1.901	1.431	0.971	0.891	0.735	0.666	0.621	0.583	0.490	0.380	0.380	0.380	0.380	0.380
360	2.447	1.926	1.459	1.004	0.923	0.765	0.695	0.649	0.611	0.517	0.398	0.380	0.380	0.380	0.380
365	2.470	1.950	1.486	1.037	0.955	0.795	0.724	0.678	0.640	0.544	0.424	0.380	0.380	0.380	0.380
370	2.493	1.975	1.513	1.070	0.987	0.825	0.754	0.707	0.668	0.571	0.449	0.380	0.380	0.380	0.380

Thickness is intumescent only. Results also apply to I-section beams exposed on all four sides limited to a maximum protection thickness of 6.284mm.

Table 13 I-Section Columns 45 minutes															
Required Thickness (mm) for a Design Temperature (°C)															
Section Factor (m-1)	350	400	450	500	510	530	539	545	550	563	580	600	650	700	750
50	0.774	0.475	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
55	0.859	0.527	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
60	0.950	0.592	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
65	1.042	0.657	0.391	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
70	1.133	0.722	0.441	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
75	1.224	0.787	0.491	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
80	1.315	0.853	0.541	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
85	1.407	0.918	0.591	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
90	1.498	0.983	0.641	0.385	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
95	1.561	1.048	0.691	0.423	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
100	1.606	1.113	0.741	0.462	0.409	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
105	1.651	1.178	0.791	0.501	0.446	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
110	1.696	1.244	0.841	0.540	0.482	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
115	1.741	1.309	0.891	0.578	0.519	0.405	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
120	1.786	1.374	0.941	0.617	0.556	0.437	0.387	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
125	1.831	1.439	0.991	0.656	0.592	0.470	0.417	0.383	0.380	0.380	0.380	0.380	0.380	0.380	0.380
130	1.876	1.504	1.041	0.694	0.629	0.503	0.448	0.413	0.384	0.380	0.380	0.380	0.380	0.380	0.380
135	1.921	1.550	1.091	0.733	0.666	0.535	0.479	0.442	0.412	0.380	0.380	0.380	0.380	0.380	0.380
140	1.966	1.578	1.141	0.772	0.703	0.568	0.509	0.471	0.441	0.380	0.380	0.380	0.380	0.380	0.380
145	2.011	1.607	1.191	0.811	0.739	0.601	0.540	0.501	0.469	0.386	0.380	0.380	0.380	0.380	0.380
150	2.056	1.636	1.241	0.849	0.776	0.634	0.571	0.530	0.498	0.414	0.380	0.380	0.380	0.380	0.380
155	2.101	1.665	1.292	0.888	0.813	0.666	0.601	0.559	0.527	0.443	0.380	0.380	0.380	0.380	0.380
160	2.146	1.693	1.342	0.927	0.850	0.699	0.632	0.589	0.555	0.472	0.380	0.380	0.380	0.380	0.380
165	2.191	1.722	1.392	0.965	0.886	0.732	0.663	0.618	0.584	0.501	0.380	0.380	0.380	0.380	0.380
170	2.236	1.751	1.442	1.004	0.923	0.764	0.694	0.648	0.613	0.529	0.396	0.380	0.380	0.380	0.380
175	2.281	1.780	1.492	1.043	0.960	0.797	0.724	0.677	0.641	0.558	0.425	0.380	0.380	0.380	0.380
180	2.326	1.808	1.538	1.082	0.996	0.830	0.755	0.706	0.670	0.587	0.454	0.380	0.380	0.380	0.380
185	2.371	1.837	1.567	1.120	1.033	0.863	0.786	0.736	0.698	0.616	0.484	0.380	0.380	0.380	0.380
190	2.416	1.866	1.596	1.159	1.070	0.895	0.816	0.765	0.727	0.644	0.513	0.380	0.380	0.380	0.380
195	2.461	1.895	1.625	1.198	1.107	0.928	0.847	0.794	0.756	0.673	0.543	0.380	0.380	0.380	0.380
200	2.506	1.923	1.654	1.236	1.143	0.961	0.878	0.824	0.784	0.702	0.572	0.380	0.380	0.380	0.380
205	2.551	1.952	1.683	1.275	1.180	0.993	0.908	0.853	0.813	0.731	0.602	0.390	0.380	0.380	0.380
210	2.596	1.981	1.712	1.314	1.217	1.026	0.939	0.882	0.842	0.759	0.631	0.421	0.380	0.380	0.380
215	2.641	2.010	1.741	1.353	1.253	1.059	0.970	0.912	0.870	0.788	0.660	0.453	0.380	0.380	0.380
220	2.686	2.038	1.770	1.391	1.290	1.092	1.000	0.941	0.899	0.817	0.690	0.484	0.380	0.380	0.380
225	2.731	2.067	1.798	1.430	1.327	1.124	1.031	0.971	0.927	0.846	0.719	0.516	0.380	0.380	0.380
230	2.776	2.096	1.827	1.469	1.364	1.157	1.062	1.000	0.956	0.874	0.749	0.547	0.380	0.380	0.380
235	2.824	2.125	1.856	1.507	1.400	1.190	1.093	1.029	0.985	0.903	0.778	0.579	0.380	0.380	0.380
240	2.876	2.153	1.885	1.544	1.437	1.222	1.123	1.059	1.013	0.932	0.808	0.610	0.380	0.380	0.380
245	2.928	2.182	1.914	1.575	1.474	1.255	1.154	1.088	1.042	0.961	0.837	0.642	0.380	0.380	0.380
250	2.979	2.211	1.943	1.606	1.510	1.288	1.185	1.117	1.070	0.989	0.867	0.673	0.380	0.380	0.380
255	3.031	2.240	1.972	1.637	1.546	1.321	1.215	1.147	1.099	1.018	0.896	0.705	0.380	0.380	0.380
260	3.082	2.268	2.001	1.669	1.578	1.353	1.246	1.176	1.128	1.047	0.925	0.736	0.380	0.380	0.380
265	3.134	2.297	2.029	1.700	1.610	1.386	1.277	1.206	1.156	1.076	0.955	0.768	0.380	0.380	0.380
270	3.186	2.326	2.058	1.731	1.642	1.419	1.307	1.235	1.185	1.104	0.984	0.799	0.380	0.380	0.380
275	3.237	2.355	2.087	1.762	1.674	1.451	1.338	1.264	1.214	1.133	1.014	0.830	0.380	0.380	0.380
280	3.289	2.383	2.116	1.793	1.706	1.484	1.369	1.294	1.242	1.162	1.043	0.862	0.381	0.380	0.380
285	3.341	2.412	2.145	1.824	1.738	1.517	1.400	1.323	1.271	1.191	1.073	0.893	0.414	0.380	0.380
290	3.392	2.441	2.174	1.856	1.770	1.550	1.430	1.352	1.299	1.219	1.102	0.925	0.448	0.380	0.380
295	3.444	2.470	2.203	1.887	1.802	1.585	1.461	1.382	1.328	1.248	1.131	0.956	0.481	0.380	0.380
300	3.496	2.498	2.232	1.918	1.834	1.620	1.492	1.411	1.357	1.277	1.161	0.988	0.515	0.380	0.380
305	3.547	2.527	2.261	1.949	1.866	1.655	1.522	1.440	1.385	1.306	1.190	1.019	0.548	0.380	0.380
310	3.599	2.556	2.289	1.980	1.899	1.689	1.557	1.470	1.414	1.334	1.220	1.051	0.582	0.380	0.380
315	3.651	2.585	2.318	2.012	1.931	1.724	1.593	1.499	1.443	1.363	1.249	1.082	0.615	0.380	0.380
320	3.702	2.613	2.347	2.043	1.963	1.759	1.629	1.529	1.471	1.392	1.279	1.114	0.649	0.380	0.380
325	3.754	2.642	2.376	2.074	1.995	1.794	1.666	1.565	1.500	1.421	1.308	1.145	0.682	0.380	0.380
330	3.806	2.671	2.405	2.105	2.027	1.828	1.702	1.603	1.528	1.450	1.338	1.177	0.716	0.380	0.380
335	3.857	2.700	2.434	2.136	2.059	1.863	1.739	1.641	1.565	1.478	1.367	1.208	0.750	0.380	0.380
340	3.909	2.728	2.463	2.168	2.091	1.898	1.775	1.678	1.604	1.507	1.396	1.240	0.783	0.380	0.380
345	3.960	2.757	2.492	2.199	2.123	1.933	1.812	1.716	1.643	1.536	1.426	1.271	0.817	0.411	0.380
350	4.012	2.786	2.520	2.230	2.155	1.967	1.848	1.754	1.681	1.574	1.455	1.303	0.850	0.441	0.380
355	4.064	2.843	2.549	2.261	2.187	2.002	1.884	1.792	1.720	1.612	1.485	1.334	0.884	0.472	0.380
360	4.115	2.934	2.578	2.292	2.219	2.037	1.921	1.830	1.759	1.650	1.514	1.366	0.917	0.502	0.380
365	4.167	3.024	2.607	2.324	2.251	2.072	1.957	1.868	1.798	1.689	1.546	1.397	0.951	0.533	0.380
370	4.219	3.114	2.636	2.355	2.284	2.106	1.994	1.906	1.836	1.727	1.583	1.429	0.984	0.563	0.380

Thickness is intumescent only. Results also apply to I-section beams exposed on all four sides limited to a maximum protection thickness of 6.284mm.

Table 14 I-Section Columns 60 minutes															
Required Thickness (mm) for a Design Temperature (°C)															
Section Factor (m-1)	350	400	450	500	510	530	539	545	550	563	580	600	650	700	750
50	1.171	0.815	0.562	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
55	1.301	0.905	0.624	0.411	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
60	1.432	1.005	0.705	0.478	0.436	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
65	1.556	1.104	0.786	0.544	0.500	0.414	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
70	1.654	1.204	0.866	0.611	0.564	0.473	0.434	0.409	0.389	0.380	0.380	0.380	0.380	0.380	0.380
75	1.752	1.304	0.947	0.677	0.628	0.533	0.492	0.465	0.444	0.390	0.380	0.380	0.380	0.380	0.380
80	1.850	1.403	1.028	0.744	0.692	0.592	0.549	0.521	0.498	0.441	0.380	0.380	0.380	0.380	0.380
85	1.948	1.503	1.108	0.810	0.756	0.652	0.606	0.576	0.553	0.492	0.416	0.380	0.380	0.380	0.380
90	2.046	1.579	1.189	0.877	0.821	0.711	0.663	0.632	0.607	0.543	0.463	0.380	0.380	0.380	0.380
95	2.144	1.644	1.270	0.944	0.885	0.771	0.720	0.688	0.661	0.594	0.510	0.418	0.380	0.380	0.380
100	2.242	1.709	1.351	1.010	0.949	0.830	0.778	0.743	0.716	0.646	0.557	0.460	0.380	0.380	0.380
105	2.340	1.774	1.431	1.077	1.013	0.890	0.835	0.799	0.770	0.697	0.605	0.502	0.380	0.380	0.380
110	2.438	1.839	1.512	1.143	1.077	0.949	0.892	0.855	0.825	0.748	0.652	0.545	0.380	0.380	0.380
115	2.536	1.904	1.568	1.210	1.142	1.009	0.949	0.910	0.879	0.799	0.699	0.587	0.380	0.380	0.380
120	2.634	1.969	1.616	1.276	1.206	1.068	1.007	0.966	0.933	0.850	0.746	0.630	0.380	0.380	0.380
125	2.732	2.034	1.663	1.343	1.270	1.128	1.064	1.022	0.988	0.902	0.793	0.672	0.395	0.380	0.380
130	2.819	2.099	1.710	1.410	1.334	1.188	1.121	1.077	1.042	0.953	0.840	0.714	0.427	0.380	0.380
135	2.880	2.164	1.757	1.476	1.398	1.247	1.178	1.133	1.097	1.004	0.887	0.757	0.458	0.380	0.380
140	2.942	2.229	1.804	1.539	1.462	1.307	1.235	1.189	1.151	1.055	0.935	0.799	0.489	0.380	0.380
145	3.003	2.294	1.852	1.573	1.527	1.366	1.293	1.244	1.205	1.107	0.982	0.842	0.520	0.380	0.380
150	3.065	2.359	1.899	1.608	1.564	1.426	1.350	1.300	1.260	1.158	1.029	0.884	0.551	0.380	0.380
155	3.126	2.424	1.946	1.642	1.598	1.485	1.407	1.356	1.314	1.209	1.076	0.926	0.582	0.380	0.380
160	3.187	2.490	1.993	1.677	1.632	1.540	1.464	1.411	1.368	1.260	1.123	0.969	0.613	0.380	0.380
165	3.249	2.555	2.040	1.712	1.666	1.574	1.521	1.467	1.423	1.311	1.170	1.011	0.644	0.380	0.380
170	3.310	2.620	2.088	1.746	1.700	1.608	1.561	1.523	1.477	1.363	1.217	1.054	0.675	0.380	0.380
175	3.372	2.685	2.135	1.781	1.734	1.642	1.595	1.561	1.532	1.414	1.265	1.096	0.706	0.380	0.380
180	3.433	2.750	2.182	1.815	1.768	1.676	1.629	1.595	1.567	1.465	1.312	1.138	0.737	0.380	0.380
185	3.494	2.814	2.229	1.850	1.802	1.711	1.663	1.629	1.600	1.516	1.359	1.181	0.768	0.380	0.380
190	3.556	2.873	2.277	1.884	1.836	1.745	1.697	1.663	1.634	1.556	1.406	1.223	0.800	0.380	0.380
195	3.617	2.932	2.324	1.919	1.870	1.779	1.731	1.697	1.668	1.590	1.453	1.266	0.831	0.394	0.380
200	3.679	2.991	2.371	1.954	1.905	1.813	1.765	1.731	1.702	1.624	1.500	1.308	0.862	0.427	0.380
205	3.740	3.050	2.418	1.988	1.939	1.847	1.799	1.765	1.736	1.658	1.544	1.350	0.893	0.461	0.380
210	3.801	3.109	2.465	2.023	1.973	1.881	1.833	1.799	1.770	1.692	1.578	1.393	0.924	0.494	0.380
215	3.863	3.169	2.513	2.057	2.007	1.915	1.867	1.833	1.804	1.726	1.612	1.435	0.955	0.528	0.380
220	3.924	3.228	2.560	2.092	2.041	1.949	1.901	1.867	1.838	1.760	1.647	1.478	0.986	0.561	0.380
225	3.986	3.287	2.607	2.127	2.075	1.983	1.935	1.901	1.872	1.794	1.681	1.520	1.017	0.595	0.380
230	4.047	3.346	2.654	2.161	2.109	2.017	1.969	1.935	1.906	1.828	1.715	1.558	1.048	0.628	0.380
235	4.108	3.405	2.702	2.196	2.143	2.052	2.003	1.969	1.940	1.862	1.750	1.593	1.079	0.661	0.380
240	4.170	3.464	2.749	2.230	2.177	2.086	2.037	2.003	1.974	1.896	1.784	1.628	1.110	0.695	0.380
245	4.231	3.524	2.796	2.265	2.211	2.120	2.071	2.037	2.008	1.931	1.818	1.663	1.141	0.728	0.380
250	4.293	3.583	2.872	2.300	2.245	2.154	2.105	2.071	2.042	1.965	1.853	1.698	1.173	0.762	0.380
255	4.354	3.642	2.951	2.334	2.279	2.188	2.139	2.105	2.076	1.999	1.887	1.733	1.204	0.795	0.380
260	4.415	3.701	3.031	2.369	2.313	2.222	2.173	2.139	2.110	2.033	1.921	1.768	1.235	0.829	0.380
265	4.477	3.760	3.110	2.403	2.347	2.256	2.207	2.173	2.144	2.067	1.955	1.803	1.266	0.862	0.380
270	4.538	3.819	3.190	2.438	2.381	2.290	2.241	2.207	2.178	2.101	1.990	1.838	1.297	0.896	0.380
275	4.600	3.879	3.269	2.473	2.415	2.324	2.275	2.241	2.212	2.135	2.024	1.873	1.328	0.929	0.380
280	4.644	3.938	3.349	2.507	2.449	2.358	2.309	2.275	2.246	2.169	2.058	1.908	1.359	0.963	0.382
285	4.683	3.997	3.428	2.542	2.483	2.392	2.343	2.309	2.280	2.203	2.093	1.943	1.390	0.996	0.423
290	4.722	4.056	3.508	2.576	2.517	2.427	2.377	2.343	2.314	2.237	2.127	1.978	1.421	1.030	0.465
295	4.761	4.115	3.587	2.611	2.551	2.461	2.411	2.377	2.348	2.271	2.161	2.013	1.452	1.063	0.506
300	4.800	4.174	3.667	2.646	2.585	2.495	2.445	2.411	2.382	2.305	2.196	2.048	1.483	1.097	0.548
305	4.838	4.234	3.746	2.680	2.619	2.529	2.479	2.445	2.416	2.339	2.230	2.083	1.514	1.130	0.589
310	4.877	4.293	3.826	2.715	2.653	2.563	2.513	2.479	2.450	2.373	2.264	2.118	1.549	1.163	0.630
315	4.916	4.352	3.905	2.749	2.687	2.597	2.547	2.513	2.484	2.407	2.299	2.154	1.591	1.197	0.672
320	4.955	4.411	3.984	2.784	2.721	2.631	2.581	2.547	2.518	2.441	2.333	2.189	1.633	1.230	0.713
325	4.994	4.470	4.064	2.884	2.755	2.665	2.615	2.581	2.552	2.475	2.367	2.224	1.674	1.264	0.754
330	5.033	4.529	4.143	3.047	2.789	2.699	2.649	2.615	2.586	2.509	2.401	2.259	1.716	1.297	0.796
335	5.072	4.589	4.223	3.209	2.920	2.733	2.683	2.649	2.620	2.543	2.436	2.294	1.758	1.331	0.837
340	5.110	4.647	4.302	3.372	3.100	2.768	2.717	2.683	2.654	2.577	2.470	2.329	1.799	1.364	0.878
345	5.149	4.705	4.382	3.535	3.280	2.804	2.751	2.717	2.688	2.611	2.504	2.364	1.841	1.398	0.920
350	5.188	4.763	4.461	3.698	3.460	3.001	2.785	2.751	2.722	2.645	2.539	2.399	1.883	1.431	0.961
355	5.227	4.820	4.541	3.860	3.640	3.198	2.906	2.785	2.756	2.679	2.573	2.434	1.925	1.465	1.003
360	5.266	4.878	4.619	4.023	3.820	3.394	3.104	2.906	2.790	2.713	2.607	2.469	1.966	1.498	1.044
365	5.305	4.936	4.678	4.186	4.000	3.591	3.303	3.105	2.936	2.747	2.642	2.504	2.008	1.532	1.085
370	5.344	4.994	4.737	4.348	4.180	3.788	3.501	3.305	3.136	2.781	2.676	2.539	2.050	1.571	1.127

Thickness is intumescent only. Results also apply to I-section beams exposed on all four sides limited to a maximum protection thickness of 6.284mm.

Table 15 I-Section Columns 75 minutes															
Required Thickness (mm) for a Design Temperature (°C)															
Section Factor (m-1)	350	400	450	500	510	530	539	545	550	563	580	600	650	700	750
50	1.625	1.156	0.865	0.644	0.604	0.528	0.495	0.474	0.457	0.413	0.380	0.380	0.380	0.380	0.380
55	1.777	1.284	0.960	0.715	0.671	0.586	0.549	0.526	0.507	0.458	0.397	0.380	0.380	0.380	0.380
60	1.929	1.418	1.071	0.809	0.763	0.672	0.633	0.607	0.587	0.535	0.470	0.398	0.380	0.380	0.380
65	2.080	1.550	1.183	0.904	0.854	0.758	0.717	0.689	0.668	0.612	0.542	0.466	0.380	0.380	0.380
70	2.232	1.669	1.294	0.998	0.946	0.845	0.800	0.771	0.748	0.689	0.615	0.533	0.380	0.380	0.380
75	2.383	1.789	1.405	1.092	1.037	0.931	0.884	0.853	0.829	0.766	0.687	0.601	0.404	0.380	0.380
80	2.535	1.908	1.517	1.186	1.129	1.017	0.968	0.935	0.909	0.843	0.760	0.668	0.459	0.380	0.380
85	2.686	2.027	1.614	1.281	1.220	1.103	1.051	1.017	0.990	0.920	0.833	0.736	0.514	0.380	0.380
90	2.826	2.147	1.710	1.375	1.312	1.190	1.135	1.099	1.070	0.997	0.905	0.803	0.570	0.380	0.380
95	2.931	2.266	1.805	1.469	1.403	1.276	1.219	1.181	1.151	1.074	0.978	0.871	0.625	0.380	0.380
100	3.036	2.386	1.900	1.558	1.495	1.362	1.302	1.263	1.231	1.151	1.050	0.938	0.680	0.423	0.380
105	3.141	2.505	1.996	1.636	1.576	1.448	1.386	1.345	1.312	1.228	1.123	1.005	0.735	0.469	0.380
110	3.246	2.624	2.091	1.713	1.650	1.534	1.469	1.427	1.392	1.305	1.195	1.073	0.791	0.514	0.380
115	3.351	2.744	2.186	1.790	1.725	1.602	1.548	1.509	1.472	1.382	1.268	1.140	0.846	0.560	0.380
120	3.456	2.851	2.281	1.868	1.799	1.670	1.612	1.576	1.548	1.459	1.340	1.208	0.901	0.606	0.380
125	3.560	2.947	2.377	1.945	1.873	1.737	1.675	1.637	1.606	1.535	1.413	1.275	0.956	0.651	0.380
130	3.665	3.043	2.472	2.023	1.947	1.805	1.738	1.697	1.665	1.589	1.485	1.343	1.012	0.697	0.380
135	3.770	3.139	2.567	2.100	2.021	1.872	1.802	1.758	1.724	1.642	1.550	1.410	1.067	0.742	0.380
140	3.875	3.235	2.662	2.177	2.095	1.940	1.865	1.819	1.782	1.695	1.596	1.478	1.122	0.788	0.414
145	3.980	3.331	2.758	2.255	2.170	2.007	1.928	1.880	1.841	1.749	1.643	1.540	1.177	0.834	0.452
150	4.085	3.427	2.852	2.332	2.244	2.075	1.992	1.940	1.900	1.802	1.690	1.580	1.233	0.879	0.490
155	4.189	3.523	2.947	2.410	2.318	2.142	2.055	2.001	1.958	1.856	1.737	1.620	1.288	0.925	0.528
160	4.294	3.619	3.041	2.487	2.392	2.210	2.118	2.062	2.017	1.909	1.784	1.659	1.343	0.970	0.565
165	4.399	3.715	3.135	2.564	2.466	2.278	2.182	2.123	2.076	1.962	1.831	1.699	1.398	1.016	0.603
170	4.504	3.811	3.229	2.642	2.541	2.345	2.245	2.184	2.134	2.016	1.878	1.739	1.454	1.061	0.641
175	4.609	3.907	3.323	2.719	2.615	2.413	2.308	2.244	2.193	2.069	1.925	1.778	1.509	1.107	0.679
180	4.663	4.003	3.418	2.797	2.689	2.480	2.372	2.305	2.252	2.122	1.971	1.818	1.553	1.153	0.716
185	4.714	4.099	3.512	2.894	2.763	2.548	2.435	2.366	2.310	2.176	2.018	1.858	1.589	1.198	0.754
190	4.765	4.195	3.606	2.993	2.850	2.615	2.498	2.427	2.369	2.229	2.065	1.897	1.624	1.244	0.792
195	4.816	4.291	3.700	3.092	2.951	2.683	2.562	2.487	2.428	2.283	2.112	1.937	1.659	1.289	0.829
200	4.867	4.387	3.794	3.191	3.051	2.750	2.625	2.548	2.486	2.336	2.159	1.977	1.694	1.335	0.867
205	4.918	4.483	3.889	3.290	3.152	2.827	2.688	2.609	2.545	2.389	2.206	2.016	1.730	1.380	0.905
210	4.969	4.579	3.983	3.388	3.252	2.931	2.752	2.670	2.604	2.443	2.253	2.056	1.765	1.426	0.943
215	5.020	4.641	4.077	3.487	3.352	3.035	2.824	2.730	2.662	2.496	2.300	2.096	1.800	1.472	0.980
220	5.071	4.683	4.171	3.586	3.453	3.140	2.928	2.791	2.721	2.549	2.346	2.135	1.836	1.517	1.018
225	5.122	4.726	4.265	3.685	3.553	3.244	3.032	2.888	2.780	2.603	2.393	2.175	1.871	1.556	1.056
230	5.173	4.768	4.360	3.784	3.654	3.348	3.135	2.991	2.867	2.656	2.440	2.215	1.906	1.592	1.093
235	5.224	4.810	4.454	3.883	3.754	3.452	3.239	3.095	2.970	2.710	2.487	2.254	1.942	1.627	1.131
240	5.275	4.852	4.548	3.981	3.855	3.556	3.343	3.199	3.074	2.763	2.534	2.294	1.977	1.663	1.169
245	5.326	4.895	4.627	4.080	3.955	3.660	3.447	3.302	3.177	2.832	2.581	2.334	2.012	1.698	1.207
250	5.377	4.937	4.669	4.179	4.056	3.764	3.551	3.406	3.281	2.938	2.628	2.373	2.047	1.734	1.244
255	5.428	4.979	4.711	4.278	4.156	3.868	3.655	3.509	3.385	3.044	2.675	2.413	2.083	1.769	1.282
260	5.508	5.021	4.753	4.377	4.257	3.973	3.758	3.613	3.488	3.151	2.721	2.453	2.118	1.805	1.320
265	5.588	5.064	4.795	4.476	4.357	4.077	3.862	3.716	3.592	3.257	2.768	2.492	2.153	1.840	1.357
270	5.668	5.106	4.837	4.575	4.458	4.181	3.966	3.820	3.695	3.363	2.839	2.532	2.189	1.876	1.395
275	5.748	5.148	4.879	4.644	4.558	4.285	4.070	3.924	3.799	3.470	2.967	2.572	2.224	1.911	1.433
280	5.828	5.190	4.921	4.692	4.637	4.389	4.174	4.027	3.902	3.576	3.094	2.611	2.259	1.947	1.471
285	5.908	5.232	4.963	4.741	4.688	4.493	4.277	4.131	4.006	3.683	3.221	2.651	2.294	1.982	1.508
290	5.988	5.275	5.005	4.790	4.739	4.597	4.381	4.234	4.109	3.789	3.348	2.691	2.330	2.017	1.547
295	6.068	5.317	5.046	4.838	4.804	4.804	4.485	4.338	4.213	3.895	3.475	2.730	2.365	2.053	1.588
300	6.148	5.359	5.088	5.031	5.031	5.031	4.589	4.442	4.316	4.002	3.602	2.770	2.400	2.088	1.630
305	6.228	5.401	5.258	5.258	5.258	5.258	4.803	4.545	4.420	4.108	3.730	2.841	2.436	2.124	1.671
310	6.308	5.492	5.486	5.486	5.486	5.486	5.053	4.703	4.523	4.214	3.857	3.024	2.471	2.159	1.712
315	6.388	5.713	5.713	5.713	5.713	5.713	5.304	4.973	4.648	4.321	3.984	3.208	2.506	2.195	1.754
320	6.468	5.940	5.940	5.940	5.940	5.940	5.555	5.243	4.935	4.427	4.111	3.391	2.542	2.230	1.795
325	6.548	6.167	6.167	6.167	6.167	6.167	5.806	5.512	5.222	4.533	4.238	3.574	2.577	2.266	1.836
330	6.628	6.395	6.395	6.395	6.395	6.395	6.056	5.782	5.509	4.693	4.365	3.757	2.612	2.301	1.878
335	6.708	6.622	6.622	6.622	6.622	6.622	6.307	6.052	5.797	5.025	4.493	3.940	2.647	2.337	1.919
340	6.849	6.849	6.849	6.849	6.849	6.849	6.558	6.322	6.084	5.358	4.627	4.123	2.683	2.372	1.960
345	7.077	7.077	7.077	7.077	7.077	7.077	6.808	6.592	6.371	5.691	4.967	4.307	2.718	2.408	2.001
350	7.304	7.304	7.304	7.304	7.304	7.304	7.059	6.862	6.658	6.023	5.307	4.490	2.753	2.443	2.043
355	7.531	7.531	7.531	7.531	7.531	7.531	7.310	7.132	6.945	6.356	5.647	4.719	2.789	2.479	2.084
360	7.758	7.758	7.758	7.758	7.758	7.758	7.560	7.401	7.232	6.689	5.987	5.047	2.969	2.514	2.125
365	-	-	-	-	-	-	-	7.671	7.519	7.022	6.327	5.376	3.229	2.550	2.167
370	-	-	-	-	-	-	-	-	7.806	7.354	6.667	5.704	3.488	2.585	2.208

Thickness is intumescent only. Results also apply to I-section beams exposed on all four sides limited to a maximum protection thickness of 6.284mm.

Table 16 I-Section Columns 90 minutes															
Required Thickness (mm) for a Design Temperature (°C)															
Section Factor (m-1)	350	400	450	500	510	530	539	545	550	563	580	600	650	700	750
50	2.094	1.537	1.167	0.918	0.874	0.791	0.755	0.732	0.713	0.665	0.605	0.539	0.388	0.380	0.380
55	2.293	1.708	1.296	1.019	0.971	0.879	0.839	0.812	0.792	0.739	0.672	0.599	0.431	0.380	0.380
60	2.491	1.883	1.438	1.141	1.090	0.992	0.949	0.920	0.898	0.841	0.770	0.691	0.510	0.380	0.380
65	2.689	2.058	1.583	1.263	1.209	1.105	1.059	1.028	1.004	0.944	0.867	0.783	0.590	0.400	0.380
70	2.849	2.233	1.735	1.385	1.328	1.217	1.169	1.136	1.111	1.046	0.965	0.875	0.669	0.469	0.380
75	2.959	2.408	1.886	1.507	1.446	1.330	1.278	1.244	1.217	1.149	1.063	0.968	0.749	0.538	0.380
80	3.070	2.583	2.038	1.635	1.567	1.443	1.388	1.352	1.324	1.251	1.160	1.060	0.828	0.607	0.380
85	3.180	2.758	2.189	1.764	1.692	1.557	1.498	1.460	1.430	1.354	1.258	1.152	0.908	0.675	0.421
90	3.290	2.896	2.341	1.893	1.818	1.674	1.609	1.568	1.536	1.456	1.356	1.244	0.987	0.744	0.480
95	3.401	3.022	2.492	2.023	1.943	1.791	1.720	1.675	1.641	1.557	1.453	1.336	1.066	0.813	0.540
100	3.511	3.148	2.644	2.152	2.068	1.908	1.831	1.783	1.745	1.654	1.549	1.429	1.146	0.882	0.599
105	3.621	3.274	2.796	2.281	2.193	2.025	1.941	1.890	1.849	1.751	1.637	1.521	1.225	0.951	0.658
110	3.731	3.400	2.932	2.410	2.319	2.142	2.052	1.997	1.954	1.848	1.725	1.601	1.305	1.019	0.718
115	3.842	3.526	3.068	2.539	2.444	2.259	2.163	2.104	2.058	1.945	1.813	1.679	1.384	1.088	0.777
120	3.952	3.652	3.203	2.669	2.569	2.376	2.274	2.212	2.162	2.042	1.901	1.757	1.464	1.157	0.837
125	4.062	3.778	3.339	2.798	2.695	2.493	2.385	2.319	2.267	2.139	1.989	1.835	1.540	1.226	0.896
130	4.173	3.904	3.475	2.933	2.822	2.610	2.495	2.426	2.371	2.236	2.077	1.913	1.597	1.294	0.955
135	4.283	4.030	3.610	3.069	2.957	2.727	2.606	2.533	2.475	2.333	2.165	1.990	1.653	1.363	1.015
140	4.393	4.156	3.746	3.204	3.093	2.852	2.717	2.641	2.580	2.430	2.253	2.068	1.709	1.432	1.074
145	4.504	4.282	3.882	3.339	3.228	2.987	2.833	2.748	2.684	2.527	2.341	2.146	1.765	1.501	1.133
150	4.614	4.408	4.018	3.475	3.364	3.123	2.967	2.868	2.788	2.624	2.429	2.224	1.821	1.553	1.193
155	4.724	4.534	4.153	3.610	3.499	3.259	3.101	3.000	2.916	2.721	2.517	2.302	1.877	1.591	1.252
160	4.834	4.660	4.289	3.745	3.635	3.395	3.235	3.132	3.047	2.824	2.605	2.380	1.933	1.628	1.312
165	4.945	4.786	4.425	3.881	3.770	3.531	3.369	3.264	3.177	2.951	2.693	2.458	1.989	1.665	1.371
170	5.055	4.912	4.561	4.016	3.906	3.667	3.502	3.396	3.308	3.079	2.781	2.536	2.045	1.702	1.430
175	5.165	5.038	4.674	4.152	4.041	3.803	3.636	3.528	3.439	3.206	2.897	2.614	2.101	1.740	1.490
180	5.276	5.164	4.772	4.287	4.177	3.939	3.770	3.660	3.570	3.334	3.021	2.692	2.157	1.777	1.543
185	5.386	5.290	4.870	4.422	4.312	4.075	3.904	3.792	3.700	3.461	3.145	2.770	2.213	1.814	1.580
190	5.496	5.416	4.968	4.558	4.448	4.211	4.038	3.925	3.831	3.589	3.269	2.874	2.269	1.851	1.616
195	5.613	5.613	5.067	4.832	4.584	4.347	4.171	4.057	3.962	3.716	3.393	2.995	2.326	1.889	1.653
200	5.818	5.818	5.208	5.208	4.959	4.483	4.305	4.189	4.093	3.844	3.517	3.115	2.382	1.926	1.690
205	6.022	6.022	5.585	5.585	5.407	4.637	4.439	4.321	4.223	3.971	3.641	3.236	2.438	1.963	1.726
210	6.226	6.226	5.961	5.961	5.855	5.397	4.573	4.453	4.354	4.099	3.765	3.357	2.494	2.000	1.763
215	6.430	6.430	6.337	6.337	6.302	6.158	5.122	4.585	4.485	4.226	3.889	3.478	2.550	2.038	1.799
220	6.919	6.919	6.919	6.919	6.919	6.919	5.861	5.176	4.618	4.354	4.012	3.599	2.606	2.075	1.836
225	-	-	-	-	-	-	6.601	5.899	5.367	4.481	4.136	3.720	2.662	2.112	1.872
230	-	-	-	-	-	-	7.340	6.623	6.115	4.609	4.260	3.841	2.718	2.149	1.909
235	-	-	-	-	-	-	-	7.347	6.863	5.366	4.384	3.962	2.774	2.187	1.945
240	-	-	-	-	-	-	-	-	-	6.156	4.508	4.082	2.863	2.224	1.982
245	-	-	-	-	-	-	-	-	-	6.945	4.721	4.203	2.982	2.261	2.019
250	-	-	-	-	-	-	-	-	-	-	5.491	4.324	3.101	2.298	2.055
255	-	-	-	-	-	-	-	-	-	-	6.261	4.445	3.220	2.336	2.092
260	-	-	-	-	-	-	-	-	-	-	7.030	4.566	3.338	2.373	2.128
265	-	-	-	-	-	-	-	-	-	-	-	4.878	3.457	2.410	2.165
270	-	-	-	-	-	-	-	-	-	-	-	5.321	3.576	2.447	2.201
275	-	-	-	-	-	-	-	-	-	-	-	5.763	3.695	2.485	2.238
280	-	-	-	-	-	-	-	-	-	-	-	6.206	3.814	2.522	2.274
285	-	-	-	-	-	-	-	-	-	-	-	6.648	3.933	2.559	2.311
290	-	-	-	-	-	-	-	-	-	-	-	7.090	4.052	2.596	2.348
295	-	-	-	-	-	-	-	-	-	-	-	7.533	4.171	2.634	2.384
300	-	-	-	-	-	-	-	-	-	-	-	-	4.289	2.671	2.421
305	-	-	-	-	-	-	-	-	-	-	-	-	4.408	2.708	2.457
310	-	-	-	-	-	-	-	-	-	-	-	-	4.527	2.745	2.494
315	-	-	-	-	-	-	-	-	-	-	-	-	4.757	2.783	2.530
320	-	-	-	-	-	-	-	-	-	-	-	-	5.302	2.923	2.567
325	-	-	-	-	-	-	-	-	-	-	-	-	5.847	3.164	2.603
330	-	-	-	-	-	-	-	-	-	-	-	-	6.391	3.404	2.640
335	-	-	-	-	-	-	-	-	-	-	-	-	6.936	3.644	2.677
340	-	-	-	-	-	-	-	-	-	-	-	-	7.480	3.885	2.713
345	-	-	-	-	-	-	-	-	-	-	-	-	-	4.125	2.750
350	-	-	-	-	-	-	-	-	-	-	-	-	-	4.366	2.786
355	-	-	-	-	-	-	-	-	-	-	-	-	-	4.606	2.913
360	-	-	-	-	-	-	-	-	-	-	-	-	-	5.396	3.101
365	-	-	-	-	-	-	-	-	-	-	-	-	-	6.205	3.288
370	-	-	-	-	-	-	-	-	-	-	-	-	-	7.015	3.476

Thickness is intumescent only. Results also apply to I-section beams exposed on all four sides limited to a maximum protection thickness of 6.284mm.

Table 17 I-Section Columns 105 minutes															
Required Thickness (mm) for a Design Temperature (°C)															
Section Factor (m-1)	350	400	450	500	510	530	539	545	550	563	580	600	650	700	750
50	6.433	1.998	1.515	1.192	1.145	1.055	1.016	0.990	0.969	0.918	0.853	0.783	0.623	0.465	0.380
55	6.433	2.219	1.684	1.324	1.271	1.172	1.128	1.099	1.076	1.019	0.948	0.869	0.691	0.516	0.380
60	6.433	2.441	1.892	1.473	1.418	1.311	1.264	1.233	1.209	1.147	1.070	0.986	0.794	0.608	0.407
65	6.433	2.663	2.101	1.646	1.571	1.451	1.401	1.367	1.341	1.275	1.193	1.103	0.898	0.699	0.488
70	6.433	2.884	2.309	1.833	1.754	1.604	1.538	1.502	1.473	1.403	1.316	1.220	1.001	0.791	0.569
75	-	-	2.517	2.021	1.937	1.778	1.702	1.656	1.619	1.531	1.438	1.336	1.104	0.883	0.650
80	-	-	2.726	2.208	2.120	1.951	1.867	1.816	1.775	1.678	1.564	1.453	1.207	0.975	0.731
85	-	-	2.934	2.396	2.303	2.125	2.032	1.976	1.932	1.825	1.700	1.572	1.310	1.067	0.812
90	-	-	-	2.583	2.487	2.298	2.197	2.137	2.089	1.973	1.835	1.695	1.413	1.159	0.893
95	-	-	-	2.771	2.670	2.472	2.362	2.297	2.245	2.120	1.971	1.818	1.516	1.251	0.975
100	-	-	-	2.958	2.851	2.645	2.527	2.458	2.402	2.267	2.107	1.940	1.613	1.343	1.056
105	-	-	-	-	3.029	2.819	2.692	2.618	2.559	2.414	2.243	2.063	1.708	1.435	1.137
110	-	-	-	-	3.206	2.996	2.859	2.778	2.715	2.562	2.378	2.186	1.803	1.527	1.218
115	-	-	-	-	3.384	3.172	3.030	2.944	2.875	2.709	2.514	2.309	1.898	1.599	1.299
120	-	-	-	-	3.561	3.349	3.202	3.111	3.039	2.859	2.650	2.432	1.993	1.670	1.380
125	-	-	-	-	3.739	3.526	3.373	3.278	3.202	3.014	2.785	2.554	2.088	1.741	1.461
130	-	-	-	-	3.916	3.703	3.544	3.445	3.366	3.170	2.933	2.677	2.183	1.812	1.540
135	-	-	-	-	4.094	3.880	3.715	3.612	3.530	3.325	3.081	2.800	2.278	1.883	1.597
140	-	-	-	-	4.271	4.057	3.886	3.779	3.693	3.480	3.230	2.942	2.373	1.953	1.654
145	-	-	-	-	4.449	4.233	4.057	3.946	3.857	3.635	3.379	3.084	2.468	2.024	1.711
150	-	-	-	-	4.627	4.410	4.228	4.113	4.021	3.791	3.528	3.225	2.563	2.095	1.768
155	-	-	-	-	4.804	4.587	4.399	4.280	4.184	3.946	3.676	3.367	2.658	2.166	1.825
160	-	-	-	-	4.982	4.764	4.570	4.447	4.348	4.101	3.825	3.509	2.754	2.237	1.882
165	-	-	-	-	5.159	4.941	4.742	4.614	4.511	4.256	3.974	3.651	3.031	2.307	1.939
170	-	-	-	-	5.337	5.117	4.913	4.781	4.675	4.412	4.123	3.793	3.491	2.378	1.996
175	-	-	-	-	5.514	5.294	5.084	4.948	4.839	4.567	4.271	3.950	3.950	2.449	2.054
180	-	-	-	-	5.692	5.471	5.255	5.115	5.002	4.719	4.420	4.410	4.410	2.520	2.111
185	-	-	-	-	5.869	5.648	5.426	5.282	5.166	4.871	4.870	4.870	4.870	2.591	2.168
190	-	-	-	-	-	-	5.597	5.449	5.329	5.329	5.329	5.329	5.329	2.661	2.225
195	-	-	-	-	-	-	5.789	5.789	5.789	5.789	5.789	5.789	5.789	2.732	2.282
200	-	-	-	-	-	-	6.249	6.249	6.249	6.249	6.249	6.249	6.249	2.814	2.339
205	-	-	-	-	-	-	-	-	6.709	6.709	6.709	6.709	6.709	3.278	2.396
210	-	-	-	-	-	-	-	-	-	7.168	7.168	7.168	7.168	3.742	2.453
215	-	-	-	-	-	-	-	-	-	7.628	7.628	7.628	7.628	4.205	2.510
220	-	-	-	-	-	-	-	-	-	-	-	-	-	4.669	2.567
225	-	-	-	-	-	-	-	-	-	-	-	-	-	5.133	2.624
230	-	-	-	-	-	-	-	-	-	-	-	-	-	5.596	2.681
235	-	-	-	-	-	-	-	-	-	-	-	-	-	6.060	2.738
240	-	-	-	-	-	-	-	-	-	-	-	-	-	6.524	2.795
245	-	-	-	-	-	-	-	-	-	-	-	-	-	6.987	2.890
250	-	-	-	-	-	-	-	-	-	-	-	-	-	7.451	2.988
255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.086
260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.185
265	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.283
270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.381
275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.480
280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.578
285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.676
290	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.775
295	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.873
300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.971
305	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.070
310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.168
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.266
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.365
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.463
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.561
335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.423
340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.198
345	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
350	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
355	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
370	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results also apply to I-section beams exposed on all four sides limited to a maximum protection thickness of 6.284mm.

Table 18 I-Section Columns 120 minutes															
Required Thickness (mm) for a Design Temperature (°C)															
Section Factor (m-1)	350	400	450	500	510	530	539	545	550	563	580	600	650	700	750
50	-	2.463	1.974	1.523	1.439	1.318	1.276	1.248	1.225	1.170	1.101	1.026	0.857	0.693	0.517
55	-	2.731	2.193	1.692	1.599	1.465	1.417	1.386	1.361	1.300	1.223	1.140	0.952	0.770	0.574
60	-	2.999	2.448	1.938	1.842	1.671	1.597	1.551	1.520	1.453	1.371	1.281	1.079	0.885	0.677
65	-	-	2.703	2.183	2.086	1.906	1.822	1.769	1.728	1.630	1.519	1.423	1.205	1.000	0.780
70	-	-	2.958	2.428	2.329	2.141	2.046	1.988	1.942	1.832	1.703	1.571	1.332	1.115	0.883
75	-	-	-	2.673	2.573	2.377	2.270	2.206	2.156	2.035	1.891	1.743	1.459	1.230	0.987
80	-	-	-	2.918	2.816	2.612	2.494	2.425	2.370	2.237	2.079	1.915	1.591	1.345	1.090
85	-	-	-	-	-	2.847	2.718	2.643	2.584	2.439	2.267	2.088	1.730	1.460	1.193
90	-	-	-	-	-	-	2.942	2.861	2.798	2.641	2.455	2.260	1.869	1.573	1.296
95	-	-	-	-	-	-	-	-	3.012	2.844	2.644	2.433	2.008	1.683	1.400
100	-	-	-	-	-	-	-	-	-	-	2.832	2.605	2.147	1.793	1.503
105	-	-	-	-	-	-	-	-	-	-	-	2.777	2.286	1.903	1.600
110	-	-	-	-	-	-	-	-	-	-	-	2.959	2.425	2.013	1.694
115	-	-	-	-	-	-	-	-	-	-	-	3.143	2.564	2.123	1.788
120	-	-	-	-	-	-	-	-	-	-	-	3.326	2.703	2.233	1.882
125	-	-	-	-	-	-	-	-	-	-	-	3.510	2.844	2.343	1.976
130	-	-	-	-	-	-	-	-	-	-	-	3.693	2.990	2.453	2.070
135	-	-	-	-	-	-	-	-	-	-	-	3.877	3.135	2.563	2.164
140	-	-	-	-	-	-	-	-	-	-	-	4.060	3.281	2.673	2.259
145	-	-	-	-	-	-	-	-	-	-	-	4.244	3.427	2.783	2.353
150	-	-	-	-	-	-	-	-	-	-	-	4.427	3.573	2.909	2.447
155	-	-	-	-	-	-	-	-	-	-	-	4.611	3.718	3.039	2.541
160	-	-	-	-	-	-	-	-	-	-	-	4.794	3.864	3.168	2.635
165	-	-	-	-	-	-	-	-	-	-	-	4.978	4.010	3.298	2.729
170	-	-	-	-	-	-	-	-	-	-	-	5.161	4.155	3.427	3.298
175	-	-	-	-	-	-	-	-	-	-	-	5.378	5.378	5.378	5.378
180	-	-	-	-	-	-	-	-	-	-	-	7.457	7.457	7.457	7.457
185	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
195	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
205	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
215	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
245	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
265	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
290	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
295	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
305	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
345	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
350	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
355	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
370	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results also apply to I-section beams exposed on all four sides limited to a maximum protection thickness of 6.284mm.

Table 19 Circular Hollow Columns 15 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
55	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
60	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
65	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
70	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
75	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
80	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
85	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
90	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
95	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
100	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
105	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
110	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
115	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
120	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
125	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
130	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
135	0.387	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
140	0.413	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
145	0.439	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
150	0.464	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
155	0.490	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
160	0.516	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
165	0.541	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
170	0.567	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
175	0.593	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
180	0.619	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
185	0.644	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
190	0.670	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
195	0.696	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
200	0.721	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
205	0.747	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
210	0.773	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
215	0.798	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
220	0.824	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
225	0.850	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
230	0.875	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
235	0.901	0.384	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
240	0.927	0.409	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
245	0.953	0.434	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
250	0.978	0.460	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
255	1.004	0.485	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
260	1.030	0.511	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
265	1.055	0.536	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
270	1.081	0.561	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
275	1.107	0.587	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
280	1.132	0.612	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
285	1.158	0.638	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
290	1.184	0.663	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
295	1.209	0.689	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
300	1.235	0.714	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
305	1.261	0.739	0.373	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
310	1.286	0.765	0.396	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
315	1.312	0.790	0.419	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
320	1.338	0.816	0.442	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
325	1.364	0.841	0.465	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
330	1.389	0.866	0.488	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365

Thickness is intumescent only.

Table 20 Circular Hollow Columns 20 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
55	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
60	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
65	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
70	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
75	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
80	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
85	0.383	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
90	0.416	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
95	0.449	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
100	0.481	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
105	0.514	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
110	0.547	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
115	0.580	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
120	0.613	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
125	0.646	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
130	0.679	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
135	0.712	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
140	0.745	0.376	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
145	0.778	0.407	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
150	0.811	0.438	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
155	0.844	0.469	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
160	0.877	0.500	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
165	0.910	0.530	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
170	0.943	0.561	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
175	0.976	0.592	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
180	1.008	0.623	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
185	1.041	0.654	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
190	1.074	0.684	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
195	1.107	0.715	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
200	1.140	0.746	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
205	1.173	0.777	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
210	1.206	0.808	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
215	1.239	0.838	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
220	1.272	0.869	0.373	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
225	1.305	0.900	0.405	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
230	1.338	0.931	0.437	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
235	1.371	0.962	0.469	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
240	1.404	0.992	0.501	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
245	1.437	1.023	0.533	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
250	1.470	1.054	0.565	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
255	1.502	1.085	0.597	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
260	1.535	1.116	0.628	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
265	1.568	1.146	0.660	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
270	1.601	1.177	0.692	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
275	1.634	1.208	0.724	0.420	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
280	1.667	1.239	0.756	0.510	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
285	1.700	1.270	0.788	0.599	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
290	1.733	1.300	0.820	0.688	0.430	0.404	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
295	1.766	1.331	0.852	0.778	0.526	0.502	0.380	0.365	0.365	0.365	0.365	0.365	0.365	0.365
300	1.799	1.362	0.883	0.867	0.621	0.600	0.481	0.456	0.365	0.365	0.365	0.365	0.365	0.365
305	1.832	1.393	0.956	0.956	0.717	0.698	0.582	0.558	0.365	0.365	0.365	0.365	0.365	0.365
310	1.865	1.424	1.046	1.046	0.813	0.796	0.682	0.660	0.365	0.365	0.365	0.365	0.365	0.365
315	1.898	1.454	1.135	1.135	0.909	0.894	0.783	0.761	0.365	0.365	0.365	0.365	0.365	0.365
320	1.931	1.485	1.224	1.224	1.004	0.992	0.884	0.863	0.365	0.365	0.365	0.365	0.365	0.365
325	1.964	1.516	1.314	1.314	1.100	1.090	0.985	0.964	0.365	0.365	0.365	0.365	0.365	0.365
330	1.996	1.547	1.403	1.403	1.196	1.188	1.086	1.066	0.371	0.365	0.365	0.365	0.365	0.365

Thickness is intumescent only.

Table 21 Circular Hollow Columns 30 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	0.388	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
55	0.461	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
60	0.533	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
65	0.605	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
70	0.678	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
75	0.750	0.390	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
80	0.822	0.440	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
85	0.895	0.489	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
90	0.967	0.539	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
95	1.040	0.588	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
100	1.112	0.638	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
105	1.184	0.688	0.394	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
110	1.257	0.737	0.435	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
115	1.329	0.787	0.475	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
120	1.401	0.836	0.515	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
125	1.474	0.886	0.555	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
130	1.546	0.935	0.596	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
135	1.618	0.985	0.636	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
140	1.691	1.034	0.676	0.382	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
145	1.763	1.084	0.716	0.498	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
150	1.835	1.134	0.757	0.614	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
155	1.908	1.183	0.797	0.730	0.484	0.465	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
160	1.980	1.233	0.846	0.846	0.609	0.593	0.473	0.448	0.365	0.365	0.365	0.365	0.365	0.365
165	2.041	1.282	0.962	0.962	0.734	0.721	0.606	0.582	0.365	0.365	0.365	0.365	0.365	0.365
170	2.087	1.332	1.078	1.078	0.860	0.849	0.738	0.715	0.365	0.365	0.365	0.365	0.365	0.365
175	2.132	1.381	1.194	1.194	0.985	0.977	0.871	0.849	0.365	0.365	0.365	0.365	0.365	0.365
180	2.177	1.431	1.310	1.310	1.110	1.105	1.003	0.982	0.365	0.365	0.365	0.365	0.365	0.365
185	2.223	1.480	1.425	1.425	1.235	1.233	1.136	1.116	0.365	0.365	0.365	0.365	0.365	0.365
190	2.268	1.541	1.541	1.541	1.361	1.361	1.269	1.249	0.511	0.383	0.365	0.365	0.365	0.365
195	2.314	1.657	1.657	1.657	1.489	1.489	1.401	1.383	0.676	0.554	0.365	0.365	0.365	0.365
200	2.359	1.773	1.773	1.773	1.617	1.617	1.534	1.516	0.842	0.725	0.365	0.365	0.365	0.365
205	2.404	1.889	1.889	1.889	1.745	1.745	1.666	1.650	1.008	0.895	0.365	0.365	0.365	0.365
210	2.450	2.005	2.005	2.005	1.873	1.873	1.799	1.783	1.173	1.066	0.365	0.365	0.365	0.365
215	2.495	2.121	2.121	2.121	2.001	2.001	1.931	1.917	1.339	1.237	0.365	0.365	0.365	0.365
220	2.541	2.237	2.237	2.237	2.129	2.129	2.064	2.050	1.505	1.407	0.365	0.365	0.365	0.365
225	2.586	2.353	2.353	2.353	2.257	2.257	2.196	2.184	1.670	1.578	0.365	0.365	0.365	0.365
230	2.632	2.469	2.469	2.469	2.385	2.385	2.329	2.318	1.836	1.749	0.365	0.365	0.365	0.365
235	2.677	2.585	2.585	2.585	2.513	2.513	2.462	2.451	2.002	1.920	0.365	0.365	0.365	0.365
240	2.722	2.700	2.700	2.700	2.641	2.641	2.594	2.585	2.167	2.090	0.365	0.365	0.365	0.365
245	2.816	2.816	2.816	2.816	2.769	2.769	2.727	2.718	2.333	2.261	0.613	0.365	0.365	0.365
250	2.932	2.932	2.932	2.932	2.897	2.897	2.859	2.852	2.499	2.432	0.861	0.365	0.365	0.365
255	3.048	3.048	3.048	3.048	3.025	3.025	2.992	2.985	2.664	2.602	1.110	0.365	0.365	0.365
260	3.164	3.164	3.164	3.164	3.153	3.153	3.124	3.119	2.830	2.773	1.358	0.365	0.365	0.365
265	3.281	3.281	3.281	3.281	3.281	3.281	3.257	3.252	2.996	2.944	1.607	0.365	0.365	0.365
270	3.409	3.409	3.409	3.409	3.409	3.409	3.390	3.386	3.161	3.114	1.855	0.365	0.365	0.365
275	3.537	3.537	3.537	3.537	3.537	3.537	3.522	3.519	3.327	3.285	2.104	0.365	0.365	0.365
280	3.665	3.665	3.665	3.665	3.665	3.665	3.655	3.653	3.492	3.456	2.352	0.365	0.365	0.365
285	3.793	3.793	3.793	3.793	3.793	3.793	3.787	3.786	3.658	3.626	2.601	0.377	0.365	0.365
290	3.920	3.920	3.920	3.920	3.920	3.920	3.920	3.920	3.824	3.797	2.850	0.616	0.365	0.365
295	4.053	4.053	4.053	4.053	4.053	4.053	4.053	4.053	3.989	3.968	3.098	0.854	0.365	0.365
300	4.187	4.187	4.187	4.187	4.187	4.187	4.187	4.187	4.155	4.138	3.347	1.093	0.365	0.365
305	4.321	4.321	4.321	4.321	4.321	4.321	4.321	4.321	4.321	4.309	3.595	1.332	0.365	0.365
310	4.455	4.455	4.455	4.455	4.455	4.455	4.455	4.455	4.455	4.454	3.844	1.571	0.365	0.365
315	4.487	4.487	4.487	4.487	4.487	4.487	4.487	4.487	4.487	4.485	4.092	1.809	0.365	0.365
320	4.521	4.521	4.521	4.521	4.521	4.521	4.521	4.521	4.519	4.516	4.341	2.048	0.365	0.365
325	4.557	4.557	4.557	4.557	4.557	4.557	4.557	4.557	4.551	4.548	4.463	2.287	0.365	0.365
330	4.593	4.593	4.593	4.593	4.593	4.593	4.593	4.593	4.582	4.579	4.488	2.526	0.365	0.365

Thickness is intumescent only.

Table 22 Circular Hollow Columns 45 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	1.051	0.560	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
55	1.194	0.675	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
60	1.338	0.790	0.421	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
65	1.481	0.906	0.514	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
70	1.624	1.021	0.607	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
75	1.767	1.137	0.699	0.430	0.375	0.373	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
80	1.911	1.252	0.792	0.502	0.444	0.441	0.419	0.414	0.365	0.365	0.365	0.365	0.365	0.365
85	2.061	1.367	0.885	0.575	0.513	0.510	0.486	0.481	0.367	0.365	0.365	0.365	0.365	0.365
90	2.237	1.483	0.978	0.648	0.581	0.579	0.553	0.548	0.427	0.413	0.365	0.365	0.365	0.365
95	2.412	1.598	1.070	0.720	0.650	0.648	0.620	0.615	0.486	0.472	0.365	0.365	0.365	0.365
100	2.588	1.713	1.163	0.793	0.719	0.716	0.688	0.682	0.546	0.531	0.365	0.365	0.365	0.365
105	2.763	1.829	1.256	0.866	0.787	0.785	0.755	0.749	0.606	0.591	0.365	0.365	0.365	0.365
110	2.939	1.944	1.348	0.939	0.856	0.854	0.822	0.816	0.666	0.650	0.425	0.365	0.365	0.365
115	3.115	2.057	1.441	1.011	0.925	0.922	0.889	0.882	0.726	0.709	0.553	0.365	0.365	0.365
120	3.290	2.164	1.534	1.084	0.993	0.991	0.956	0.949	0.786	0.768	0.682	0.365	0.365	0.365
125	3.466	2.270	1.626	1.157	1.062	1.060	1.023	1.016	0.846	0.827	0.810	0.365	0.365	0.365
130	3.559	2.377	1.719	1.229	1.131	1.129	1.091	1.083	0.939	0.939	0.939	0.365	0.365	0.365
135	3.599	2.484	1.812	1.302	1.199	1.197	1.158	1.150	1.068	1.068	1.068	0.398	0.365	0.365
140	3.639	2.591	1.904	1.375	1.268	1.266	1.225	1.217	1.196	1.196	1.196	0.541	0.365	0.365
145	3.680	2.697	1.997	1.447	1.337	1.335	1.325	1.325	1.325	1.325	1.325	0.684	0.365	0.365
150	3.720	2.804	2.105	1.520	1.453	1.453	1.453	1.453	1.453	1.453	1.453	0.827	0.365	0.365
155	3.760	2.911	2.219	1.593	1.582	1.582	1.582	1.582	1.582	1.582	1.582	0.969	0.365	0.365
160	3.800	3.018	2.333	1.710	1.710	1.710	1.710	1.710	1.710	1.710	1.710	1.112	0.365	0.365
165	3.840	3.125	2.447	1.839	1.839	1.839	1.839	1.839	1.839	1.839	1.839	1.255	0.365	0.365
170	3.880	3.231	2.560	1.967	1.967	1.967	1.967	1.967	1.967	1.967	1.967	1.397	0.419	0.365
175	3.920	3.338	2.674	2.096	2.096	2.096	2.096	2.096	2.096	2.096	2.096	1.540	0.570	0.365
180	3.960	3.445	2.788	2.224	2.224	2.224	2.224	2.224	2.224	2.224	2.224	1.683	0.722	0.365
185	4.000	3.546	2.902	2.353	2.353	2.353	2.353	2.353	2.353	2.353	2.353	1.826	0.874	0.365
190	4.041	3.620	3.016	2.482	2.482	2.482	2.482	2.482	2.482	2.482	2.482	1.968	1.025	0.365
195	4.081	3.694	3.129	2.610	2.610	2.610	2.610	2.610	2.610	2.610	2.610	2.111	1.177	0.365
200	4.121	3.768	3.243	2.739	2.739	2.739	2.739	2.739	2.739	2.739	2.739	2.254	1.329	0.365
205	4.161	3.841	3.357	2.867	2.867	2.867	2.867	2.867	2.867	2.867	2.867	2.397	1.480	0.365
210	4.201	3.915	3.471	2.996	2.996	2.996	2.996	2.996	2.996	2.996	2.996	2.539	1.632	0.365
215	4.241	3.989	3.584	3.124	3.124	3.124	3.124	3.124	3.124	3.124	3.124	2.682	1.784	0.365
220	4.281	4.062	3.698	3.253	3.253	3.253	3.253	3.253	3.253	3.253	3.253	2.825	1.936	0.365
225	4.321	4.136	3.812	3.392	3.381	3.381	3.381	3.381	3.381	3.381	3.381	2.968	2.087	0.365
230	4.361	4.210	3.926	3.561	3.510	3.510	3.510	3.510	3.510	3.510	3.510	3.110	2.239	0.365
235	4.401	4.284	4.040	3.730	3.638	3.638	3.638	3.638	3.638	3.638	3.638	3.253	2.391	0.365
240	4.442	4.357	4.153	3.900	3.797	3.797	3.767	3.767	3.767	3.767	3.767	3.396	2.542	0.398
245	4.647	4.431	4.267	4.069	3.994	3.994	3.946	3.935	3.896	3.896	3.896	3.539	2.694	0.524
250	4.884	4.538	4.381	4.238	4.192	4.192	4.156	4.149	4.024	4.024	4.024	3.681	2.846	0.651
255	5.120	4.655	4.519	4.408	4.389	4.389	4.367	4.363	4.153	4.153	4.153	3.824	2.997	0.777
260	5.357	4.772	4.692	4.531	4.518	4.518	4.507	4.505	4.456	4.450	4.281	3.967	3.149	0.903
265	5.594	4.888	4.865	4.641	4.618	4.618	4.604	4.601	4.539	4.532	4.410	4.109	3.301	1.030
270	5.831	5.039	5.039	4.750	4.718	4.718	4.700	4.697	4.623	4.614	4.493	4.252	3.453	1.156
275	6.060	5.212	5.212	4.859	4.818	4.818	4.797	4.793	4.706	4.696	4.557	4.395	3.604	1.282
280	6.185	5.385	5.385	4.969	4.918	4.918	4.893	4.889	4.790	4.778	4.621	4.479	3.756	1.409
285	6.311	5.558	5.558	5.078	5.018	5.018	4.990	4.984	4.873	4.859	4.684	4.527	3.908	1.535
290	6.437	5.731	5.731	5.188	5.118	5.118	5.086	5.080	4.957	4.941	4.748	4.576	4.059	1.661
295	6.562	5.904	5.904	5.297	5.218	5.218	5.183	5.176	5.040	5.023	4.812	4.625	4.211	1.788
300	6.688	6.061	6.061	5.406	5.318	5.318	5.279	5.272	5.123	5.105	4.876	4.673	4.363	1.914
305	6.813	6.123	6.123	5.516	5.418	5.418	5.376	5.368	5.207	5.187	4.940	4.722	4.464	2.040
310	6.939	6.186	6.186	5.625	5.518	5.518	5.472	5.463	5.290	5.268	5.004	4.771	4.502	2.167
315	7.065	6.248	6.248	5.734	5.618	5.618	5.569	5.559	5.374	5.350	5.068	4.820	4.539	2.293
320	7.190	6.311	6.311	5.844	5.718	5.718	5.665	5.655	5.457	5.432	5.131	4.868	4.577	2.419
325	7.316	6.374	6.374	5.953	5.818	5.818	5.762	5.751	5.540	5.514	5.195	4.917	4.614	2.546
330	7.442	6.436	6.436	6.057	5.918	5.918	5.858	5.847	5.624	5.595	5.259	4.966	4.652	2.672

Thickness is intumescent only.

Table 23 Circular Hollow Columns 60 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	1.741	1.153	0.719	0.444	0.390	0.388	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365
55	1.958	1.332	0.868	0.546	0.481	0.479	0.455	0.450	0.365	0.365	0.365	0.365	0.365	0.365
60	2.313	1.511	1.018	0.670	0.600	0.597	0.571	0.566	0.449	0.437	0.365	0.365	0.365	0.365
65	2.727	1.690	1.168	0.793	0.718	0.716	0.687	0.682	0.555	0.541	0.365	0.365	0.365	0.365
70	3.140	1.870	1.317	0.917	0.836	0.834	0.803	0.798	0.661	0.646	0.430	0.365	0.365	0.365
75	3.537	2.067	1.467	1.040	0.954	0.952	0.920	0.913	0.766	0.750	0.519	0.365	0.365	0.365
80	3.578	2.365	1.617	1.164	1.073	1.071	1.036	1.029	0.872	0.855	0.608	0.394	0.365	0.365
85	3.618	2.662	1.766	1.288	1.191	1.189	1.152	1.145	0.978	0.960	0.697	0.469	0.365	0.365
90	3.659	2.960	1.916	1.411	1.309	1.307	1.268	1.261	1.083	1.064	0.786	0.545	0.365	0.365
95	3.700	3.258	2.062	1.535	1.427	1.425	1.384	1.376	1.189	1.169	0.875	0.620	0.399	0.365
100	3.741	3.538	2.197	1.658	1.546	1.544	1.501	1.492	1.295	1.274	0.964	0.696	0.463	0.365
105	3.782	3.583	2.333	1.782	1.664	1.662	1.617	1.608	1.400	1.378	1.053	0.771	0.526	0.365
110	3.822	3.628	2.468	1.906	1.782	1.780	1.733	1.724	1.506	1.483	1.142	0.847	0.589	0.365
115	3.863	3.674	2.604	2.027	1.901	1.899	1.849	1.839	1.612	1.588	1.231	0.923	0.653	0.365
120	3.904	3.719	2.739	2.119	2.019	2.017	1.965	1.955	1.717	1.692	1.320	0.998	0.716	0.365
125	3.945	3.764	2.875	2.210	2.102	2.101	2.063	2.055	1.823	1.797	1.409	1.074	0.779	0.394
130	3.985	3.809	3.010	2.301	2.185	2.184	2.142	2.134	1.928	1.901	1.498	1.149	0.843	0.448
135	4.026	3.854	3.146	2.392	2.268	2.267	2.222	2.213	2.037	2.006	1.587	1.225	0.906	0.502
140	4.067	3.899	3.281	2.484	2.350	2.350	2.302	2.292	2.170	2.136	1.676	1.301	0.969	0.557
145	4.108	3.945	3.417	2.575	2.433	2.433	2.381	2.371	2.302	2.269	1.765	1.376	1.033	0.611
150	4.149	3.990	3.545	2.666	2.516	2.516	2.461	2.450	2.435	2.403	1.854	1.452	1.096	0.665
155	4.189	4.035	3.618	2.757	2.599	2.599	2.568	2.568	2.568	2.537	1.943	1.527	1.159	0.719
160	4.230	4.080	3.691	2.849	2.700	2.700	2.700	2.700	2.700	2.671	2.039	1.603	1.223	0.773
165	4.271	4.125	3.765	2.940	2.833	2.833	2.833	2.833	2.833	2.805	2.200	1.678	1.286	0.827
170	4.312	4.170	3.838	3.031	2.966	2.966	2.966	2.966	2.966	2.939	2.361	1.754	1.349	0.881
175	4.353	4.216	3.911	3.122	3.098	3.098	3.098	3.098	3.098	3.073	2.522	1.830	1.413	0.936
180	4.393	4.261	3.985	3.231	3.231	3.231	3.231	3.231	3.231	3.206	2.683	1.905	1.476	0.990
185	4.434	4.306	4.058	3.363	3.363	3.363	3.363	3.363	3.363	3.340	2.844	1.981	1.539	1.044
190	4.647	4.351	4.131	3.496	3.496	3.496	3.496	3.496	3.496	3.474	3.004	2.117	1.603	1.098
195	4.950	4.396	4.205	3.629	3.629	3.629	3.629	3.629	3.629	3.608	3.165	2.328	1.666	1.152
200	5.252	4.442	4.278	3.761	3.761	3.761	3.761	3.761	3.761	3.742	3.326	2.538	1.729	1.206
205	5.555	4.624	4.352	3.894	3.894	3.894	3.894	3.894	3.894	3.876	3.487	2.748	1.793	1.261
210	5.858	4.830	4.425	4.052	4.027	4.027	4.027	4.027	4.027	4.010	3.648	2.958	1.856	1.315
215	6.126	5.036	4.691	4.260	4.159	4.159	4.159	4.159	4.159	4.143	3.809	3.168	1.919	1.369
220	6.333	5.242	5.044	4.474	4.359	4.359	4.292	4.292	4.292	4.277	3.970	3.378	1.983	1.423
225	6.541	5.448	5.398	4.737	4.649	4.649	4.607	4.599	4.424	4.411	4.130	3.588	2.128	1.477
230	6.748	5.751	5.751	5.000	4.895	4.895	4.847	4.838	4.630	4.606	4.291	3.798	2.406	1.531
235	6.956	6.065	6.065	5.264	5.142	5.142	5.088	5.077	4.851	4.825	4.452	4.008	2.684	1.585
240	7.163	6.160	6.160	5.527	5.388	5.388	5.328	5.317	5.073	5.043	4.617	4.218	2.963	1.640
245	7.371	6.255	6.255	5.790	5.635	5.635	5.569	5.556	5.294	5.262	4.783	4.428	3.241	1.694
250	7.578	6.360	6.350	6.052	5.882	5.882	5.809	5.795	5.516	5.480	4.948	4.555	3.520	1.748
255	7.786	6.509	6.444	6.135	6.076	6.076	6.050	6.035	5.737	5.699	5.113	4.673	3.798	1.802
260	7.993	6.658	6.539	6.218	6.157	6.157	6.131	6.125	5.959	5.917	5.278	4.791	4.076	1.856
265	8.201	6.806	6.634	6.302	6.238	6.238	6.210	6.205	6.094	6.080	5.444	4.908	4.355	1.910
270	8.408	6.955	6.729	6.385	6.319	6.319	6.290	6.285	6.169	6.154	5.609	5.026	4.507	1.965
275	-	7.104	6.823	6.469	6.400	6.400	6.370	6.364	6.244	6.228	5.774	5.144	4.596	2.019
280	-	7.253	6.918	6.552	6.481	6.481	6.450	6.444	6.318	6.301	5.939	5.262	4.685	2.869
285	-	7.402	7.013	6.635	6.562	6.562	6.530	6.524	6.393	6.375	6.072	5.380	4.774	3.771
290	-	7.551	7.108	6.719	6.643	6.643	6.610	6.604	6.467	6.449	6.138	5.498	4.863	4.464
295	-	7.700	7.202	6.802	6.724	6.724	6.690	6.683	6.542	6.523	6.204	5.616	4.952	4.528
300	-	7.849	7.297	6.886	6.805	6.805	6.770	6.763	6.616	6.597	6.270	5.733	5.041	4.592
305	-	7.998	7.392	6.969	6.886	6.886	6.850	6.843	6.691	6.671	6.336	5.851	5.130	4.656
310	-	8.146	7.487	7.052	6.967	6.967	6.930	6.922	6.765	6.745	6.402	5.969	5.218	4.720
315	-	8.295	7.581	7.136	7.048	7.048	7.010	7.002	6.840	6.819	6.468	6.070	5.307	4.784
320	-	8.444	7.676	7.219	7.129	7.129	7.090	7.082	6.914	6.893	6.534	6.132	5.396	4.847
325	-	-	7.771	7.303	7.210	7.210	7.169	7.161	6.989	6.966	6.600	6.193	5.485	4.911
330	-	-	7.866	7.386	7.291	7.291	7.249	7.241	7.064	7.040	6.666	6.255	5.574	4.975

Thickness is intumescent only.

Table 24 Circular Hollow Columns 75 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	3.155	1.767	1.247	0.875	0.801	0.799	0.770	0.765	0.637	0.624	0.435	0.365	0.365	0.365
55	3.610	2.012	1.454	1.048	0.967	0.964	0.934	0.927	0.782	0.766	0.538	0.365	0.365	0.365
60	3.795	2.576	1.661	1.220	1.132	1.130	1.097	1.090	0.933	0.916	0.669	0.458	0.365	0.365
65	3.980	3.153	1.867	1.393	1.298	1.296	1.260	1.253	1.083	1.065	0.800	0.573	0.373	0.365
70	4.165	3.568	2.097	1.566	1.464	1.462	1.423	1.415	1.234	1.215	0.931	0.688	0.473	0.365
75	4.350	3.665	2.392	1.738	1.630	1.628	1.586	1.578	1.385	1.364	1.062	0.803	0.573	0.365
80	4.535	3.762	2.688	1.911	1.796	1.793	1.749	1.741	1.535	1.514	1.193	0.918	0.674	0.365
85	4.720	3.859	2.983	2.098	1.961	1.959	1.912	1.903	1.686	1.663	1.324	1.033	0.774	0.433
90	4.905	3.956	3.279	2.310	2.146	2.144	2.084	2.073	1.836	1.812	1.454	1.148	0.874	0.522
95	5.091	4.053	3.542	2.522	2.342	2.340	2.274	2.261	1.987	1.962	1.585	1.263	0.974	0.611
100	5.276	4.151	3.594	2.735	2.537	2.536	2.463	2.449	2.142	2.113	1.716	1.378	1.075	0.701
105	5.461	4.248	3.646	2.947	2.733	2.732	2.653	2.638	2.298	2.266	1.847	1.493	1.175	0.790
110	5.646	4.345	3.698	3.159	2.928	2.928	2.843	2.826	2.454	2.419	1.978	1.608	1.275	0.879
115	5.831	4.442	3.751	3.371	3.125	3.125	3.032	3.014	2.610	2.572	2.092	1.723	1.375	0.968
120	6.016	4.539	3.803	3.549	3.321	3.321	3.222	3.203	2.767	2.724	2.197	1.838	1.476	1.058
125	6.201	4.636	3.855	3.612	3.517	3.517	3.411	3.391	2.923	2.877	2.303	1.953	1.576	1.147
130	6.386	4.733	3.907	3.674	3.595	3.595	3.559	3.551	3.079	3.030	2.408	2.074	1.676	1.236
135	6.572	4.830	3.959	3.737	3.662	3.662	3.627	3.620	3.235	3.183	2.514	2.205	1.776	1.325
140	6.757	4.927	4.012	3.799	3.729	3.729	3.696	3.689	3.391	3.336	2.619	2.336	1.877	1.414
145	6.942	5.024	4.064	3.861	3.795	3.795	3.764	3.758	3.542	3.489	2.725	2.468	1.977	1.504
150	7.127	5.122	4.116	3.924	3.862	3.862	3.833	3.827	3.624	3.594	2.830	2.599	2.095	1.593
155	7.312	5.219	4.168	3.986	3.928	3.928	3.901	3.895	3.706	3.678	2.936	2.730	2.228	1.682
160	7.497	5.316	4.220	4.049	3.995	3.995	3.969	3.964	3.789	3.763	3.041	2.861	2.362	1.771
165	7.682	5.413	4.272	4.111	4.061	4.061	4.038	4.033	3.871	3.847	3.146	2.992	2.495	1.860
170	7.867	5.510	4.325	4.173	4.128	4.128	4.106	4.102	3.954	3.932	3.252	3.124	2.628	1.950
175	8.053	5.607	4.377	4.236	4.195	4.195	4.175	4.171	4.036	4.016	3.357	3.255	2.762	2.050
180	8.238	5.704	4.429	4.298	4.261	4.261	4.243	4.239	4.119	4.101	3.463	3.386	2.895	2.196
185	8.423	5.801	4.769	4.361	4.328	4.328	4.312	4.308	4.201	4.185	3.589	3.517	3.028	2.342
190	-	5.898	5.275	4.423	4.394	4.394	4.380	4.377	4.284	4.270	3.761	3.648	3.162	2.489
195	-	5.995	5.781	4.691	4.522	4.522	4.450	4.446	4.366	4.354	3.933	3.780	3.295	2.635
200	-	6.224	6.116	5.096	4.904	4.904	4.823	4.807	4.450	4.439	4.105	3.911	3.428	2.781
205	-	6.628	6.255	5.502	5.285	5.285	5.195	5.178	4.792	4.749	4.277	4.042	3.562	2.927
210	-	7.033	6.394	5.907	5.666	5.666	5.568	5.549	5.133	5.086	4.450	4.173	3.695	3.074
215	-	7.437	6.533	6.131	6.048	6.048	5.940	5.919	5.475	5.423	4.744	4.305	3.828	3.220
220	-	7.842	6.672	6.255	6.171	6.171	6.135	6.128	5.817	5.760	5.038	4.436	3.962	3.366
225	-	8.246	6.811	6.378	6.292	6.292	6.255	6.247	6.087	6.066	5.332	4.680	4.095	3.513
230	-	-	6.950	6.502	6.413	6.413	6.374	6.366	6.200	6.178	5.626	4.936	4.228	3.659
235	-	-	7.089	6.626	6.534	6.534	6.493	6.486	6.312	6.290	5.920	5.192	4.362	3.805
240	-	-	7.228	6.750	6.655	6.655	6.613	6.605	6.425	6.402	6.105	5.448	4.530	3.952
245	-	-	7.367	6.874	6.775	6.775	6.732	6.724	6.538	6.514	6.202	5.703	4.765	4.098
250	-	-	7.506	6.997	6.896	6.896	6.852	6.843	6.651	6.626	6.299	5.959	4.999	4.244
255	-	-	7.645	7.121	7.017	7.017	6.971	6.962	6.764	6.738	6.396	6.106	5.233	4.391
260	-	-	7.784	7.245	7.138	7.138	7.091	7.082	6.877	6.850	6.493	6.192	5.468	4.542
265	-	-	7.923	7.369	7.259	7.259	7.210	7.201	6.989	6.962	6.590	6.277	5.702	4.698
270	-	-	8.062	7.493	7.380	7.380	7.330	7.320	7.102	7.074	6.687	6.363	5.937	4.853
275	-	-	8.201	7.616	7.501	7.501	7.449	7.439	7.215	7.186	6.784	6.449	6.091	5.009
280	-	-	8.339	7.740	7.622	7.622	7.569	7.558	7.328	7.298	6.881	6.534	6.168	5.164
285	-	-	8.478	7.864	7.743	7.743	7.688	7.678	7.441	7.410	6.978	6.620	6.246	5.320
290	-	-	-	7.988	7.864	7.864	7.808	7.797	7.554	7.522	7.075	6.706	6.323	5.476
295	-	-	-	8.112	7.985	7.985	7.927	7.916	7.667	7.634	7.172	6.791	6.400	5.631
300	-	-	-	8.235	8.106	8.106	8.047	8.035	7.779	7.746	7.269	6.877	6.478	5.787
305	-	-	-	8.359	8.226	8.226	8.166	8.154	7.892	7.858	7.366	6.962	6.555	5.942
310	-	-	-	8.483	8.347	8.347	8.286	8.274	8.005	7.970	7.463	7.048	6.633	6.074
315	-	-	-	-	8.448	8.468	8.405	8.393	8.118	8.082	7.560	7.134	6.710	6.150
320	-	-	-	-	-	-	-	-	8.231	8.194	7.657	7.219	6.788	6.226
325	-	-	-	-	-	-	-	-	8.344	8.306	7.754	7.305	6.865	6.302
330	-	-	-	-	-	-	-	-	8.457	8.418	7.851	7.391	6.943	6.379

Thickness is intumescent only.

Table 25 Circular Hollow Columns 90 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	-	3.212	1.792	1.340	1.251	1.248	1.214	1.208	1.049	1.032	0.786	0.587	0.411	0.365
55	-	3.662	2.091	1.563	1.465	1.463	1.426	1.418	1.244	1.226	0.958	0.725	0.513	0.365
60	-	3.870	2.609	1.786	1.680	1.677	1.637	1.629	1.440	1.420	1.130	0.879	0.651	0.365
65	-	4.079	3.127	2.009	1.894	1.892	1.848	1.839	1.636	1.615	1.302	1.033	0.788	0.471
70	-	4.287	3.575	2.384	2.166	2.162	2.083	2.068	1.832	1.809	1.474	1.187	0.925	0.595
75	-	4.495	3.763	2.768	2.522	2.520	2.430	2.412	2.030	2.004	1.646	1.341	1.063	0.720
80	-	4.704	3.951	3.152	2.879	2.877	2.776	2.757	2.321	2.280	1.818	1.495	1.200	0.845
85	-	4.912	4.139	3.535	3.235	3.234	3.122	3.101	2.611	2.564	1.990	1.649	1.338	0.969
90	-	5.121	4.327	3.663	3.555	3.555	3.469	3.445	2.901	2.849	2.190	1.803	1.475	1.094
95	-	5.329	4.515	3.790	3.684	3.684	3.640	3.631	3.192	3.134	2.397	1.956	1.613	1.218
100	-	5.537	4.703	3.918	3.813	3.813	3.769	3.761	3.482	3.418	2.604	2.108	1.750	1.343
105	-	5.746	4.891	4.045	3.942	3.942	3.899	3.890	3.645	3.614	2.811	2.259	1.887	1.467
110	-	5.954	5.080	4.173	4.071	4.071	4.028	4.020	3.779	3.749	3.018	2.410	2.024	1.592
115	-	6.162	5.268	4.300	4.200	4.200	4.158	4.150	3.913	3.884	3.224	2.560	2.132	1.717
120	-	6.371	5.456	4.427	4.329	4.329	4.288	4.279	4.047	4.018	3.431	2.711	2.239	1.841
125	-	6.579	5.644	4.555	4.458	4.458	4.417	4.409	4.181	4.153	3.569	2.862	2.347	1.966
130	-	6.788	5.832	4.682	4.587	4.587	4.547	4.538	4.315	4.287	3.637	3.012	2.455	2.086
135	-	6.996	6.020	4.810	4.716	4.716	4.676	4.668	4.449	4.422	3.704	3.163	2.562	2.202
140	-	7.204	6.208	4.937	4.845	4.845	4.806	4.798	4.584	4.557	3.772	3.313	2.670	2.319
145	-	7.413	6.396	5.065	4.974	4.974	4.935	4.927	4.718	4.691	3.840	3.464	2.777	2.435
150	-	7.621	6.584	5.192	5.103	5.103	5.065	5.057	4.852	4.826	3.908	3.581	2.885	2.551
155	-	7.830	6.772	5.319	5.232	5.232	5.194	5.187	4.986	4.960	3.976	3.667	2.993	2.668
160	-	8.038	6.960	5.447	5.361	5.361	5.324	5.316	5.120	5.095	4.043	3.754	3.100	2.784
165	-	8.246	7.148	5.574	5.490	5.490	5.453	5.446	5.254	5.230	4.111	3.841	3.208	2.901
170	-	8.455	7.336	5.702	5.619	5.619	5.583	5.576	5.388	5.364	4.179	3.927	3.315	3.017
175	-	-	7.524	5.829	5.748	5.748	5.713	5.705	5.523	5.499	4.247	4.014	3.423	3.133
180	-	-	7.712	5.957	5.877	5.877	5.842	5.835	5.657	5.633	4.315	4.100	3.531	3.250
185	-	-	7.901	6.123	6.006	6.006	5.972	5.965	5.791	5.768	4.382	4.187	3.660	3.366
190	-	-	8.089	6.402	6.212	6.212	6.142	6.129	5.925	5.903	4.463	4.273	3.790	3.482
195	-	-	8.277	6.681	6.460	6.460	6.377	6.361	6.062	6.037	4.905	4.360	3.920	3.599
200	-	-	8.465	6.960	6.709	6.709	6.612	6.594	6.249	6.214	5.347	4.446	4.050	3.715
205	-	-	-	7.239	6.957	6.957	6.848	6.827	6.436	6.396	5.789	4.817	4.180	3.832
210	-	-	-	7.518	7.205	7.205	7.083	7.060	6.623	6.577	6.108	5.192	4.310	3.948
215	-	-	-	7.797	7.453	7.453	7.318	7.292	6.810	6.759	6.248	5.568	4.440	4.064
220	-	-	-	8.076	7.701	7.701	7.553	7.525	6.997	6.940	6.388	5.943	4.792	4.181
225	-	-	-	8.355	7.950	7.950	7.788	7.758	7.184	7.122	6.528	6.141	5.156	4.297
230	-	-	-	-	8.198	8.198	8.023	7.990	7.371	7.304	6.668	6.268	5.521	4.414
235	-	-	-	-	8.386	8.446	8.258	8.223	7.558	7.485	6.808	6.394	5.886	4.704
240	-	-	-	-	-	-	-	8.456	7.745	7.667	6.949	6.520	6.114	5.069
245	-	-	-	-	-	-	-	-	7.932	7.849	7.089	6.647	6.229	5.433
250	-	-	-	-	-	-	-	-	8.119	8.030	7.229	6.773	6.343	5.797
255	-	-	-	-	-	-	-	-	8.306	8.212	7.369	6.899	6.458	6.082
260	-	-	-	-	-	-	-	-	-	8.393	7.509	7.026	6.573	6.186
265	-	-	-	-	-	-	-	-	-	-	7.649	7.152	6.688	6.289
270	-	-	-	-	-	-	-	-	-	-	7.789	7.279	6.803	6.392
275	-	-	-	-	-	-	-	-	-	-	7.929	7.405	6.918	6.496
280	-	-	-	-	-	-	-	-	-	-	8.069	7.531	7.032	6.599
285	-	-	-	-	-	-	-	-	-	-	8.209	7.658	7.147	6.703
290	-	-	-	-	-	-	-	-	-	-	8.349	7.784	7.262	6.806
295	-	-	-	-	-	-	-	-	-	-	8.489	7.910	7.377	6.909
300	-	-	-	-	-	-	-	-	-	-	-	8.037	7.492	7.013
305	-	-	-	-	-	-	-	-	-	-	-	8.163	7.606	7.116
310	-	-	-	-	-	-	-	-	-	-	-	8.290	7.721	7.220
315	-	-	-	-	-	-	-	-	-	-	-	8.416	7.836	7.323
320	-	-	-	-	-	-	-	-	-	-	-	-	7.951	7.426
325	-	-	-	-	-	-	-	-	-	-	-	-	8.066	7.530
330	-	-	-	-	-	-	-	-	-	-	-	-	8.180	7.633

Thickness is intumescent only.

Table 26 Circular Hollow Columns 105 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	-	-	2.923	1.818	1.712	1.710	1.670	1.662	1.476	1.456	1.173	0.931	0.716	0.453
55	-	-	3.569	2.178	1.977	1.974	1.930	1.922	1.718	1.697	1.387	1.124	0.885	0.572
60	-	-	3.819	2.787	2.492	2.488	2.380	2.359	1.960	1.937	1.601	1.318	1.059	0.732
65	-	-	4.069	3.396	3.059	3.056	2.932	2.908	2.369	2.318	1.815	1.511	1.233	0.892
70	-	-	4.319	3.709	3.571	3.570	3.484	3.457	2.836	2.776	2.034	1.704	1.407	1.053
75	-	-	4.569	3.935	3.791	3.791	3.733	3.722	3.302	3.234	2.375	1.897	1.582	1.213
80	-	-	4.819	4.161	4.012	4.012	3.952	3.940	3.639	3.606	2.717	2.113	1.756	1.373
85	-	-	5.069	4.386	4.233	4.233	4.170	4.158	3.848	3.813	3.059	2.373	1.930	1.533
90	-	-	5.319	4.612	4.454	4.454	4.389	4.376	4.056	4.020	3.401	2.633	2.114	1.693
95	-	-	5.569	4.837	4.675	4.675	4.607	4.594	4.265	4.227	3.617	2.892	2.310	1.853
100	-	-	5.820	5.063	4.896	4.896	4.826	4.812	4.473	4.434	3.752	3.152	2.506	2.013
105	-	-	6.070	5.289	5.117	5.117	5.044	5.030	4.682	4.641	3.887	3.412	2.703	2.155
110	-	-	6.320	5.514	5.338	5.338	5.263	5.248	4.890	4.848	4.022	3.567	2.899	2.295
115	-	-	6.570	5.740	5.559	5.559	5.481	5.466	5.099	5.055	4.157	3.627	3.095	2.436
120	-	-	6.820	5.966	5.780	5.780	5.700	5.684	5.307	5.262	4.292	3.687	3.291	2.577
125	-	-	7.070	6.191	6.001	6.001	5.919	5.902	5.516	5.469	4.427	3.747	3.487	2.717
130	-	-	7.320	6.417	6.222	6.222	6.137	6.120	5.724	5.675	4.562	3.808	3.584	2.858
135	-	-	7.570	6.642	6.443	6.443	6.356	6.338	5.933	5.882	4.697	3.868	3.649	2.999
140	-	-	7.820	6.868	6.664	6.664	6.574	6.556	6.141	6.089	4.832	3.928	3.714	3.139
145	-	-	8.070	7.094	6.885	6.885	6.793	6.774	6.350	6.296	4.967	3.988	3.779	3.280
150	-	-	8.320	7.319	7.106	7.106	7.011	6.992	6.558	6.503	5.102	4.049	3.845	3.421
155	-	-	-	7.545	7.327	7.327	7.230	7.211	6.767	6.710	5.237	4.109	3.910	3.550
160	-	-	-	7.770	7.548	7.548	7.448	7.429	6.975	6.917	5.372	4.169	3.975	3.631
165	-	-	-	7.996	7.769	7.769	7.667	7.647	7.183	7.124	5.507	4.229	4.040	3.712
170	-	-	-	8.222	7.990	7.990	7.885	7.865	7.392	7.331	5.642	4.289	4.105	3.792
175	-	-	-	8.447	8.211	8.211	8.104	8.083	7.600	7.538	5.777	4.350	4.170	3.873
180	-	-	-	-	8.403	8.432	8.322	8.301	7.809	7.745	5.912	4.410	4.235	3.954
185	-	-	-	-	-	-	-	-	8.017	7.952	6.047	4.652	4.300	4.035
190	-	-	-	-	-	-	-	-	8.226	8.159	6.392	5.207	4.365	4.115
195	-	-	-	-	-	-	-	-	8.434	8.366	6.741	5.761	4.430	4.196
200	-	-	-	-	-	-	-	-	-	-	7.091	6.157	4.822	4.277
205	-	-	-	-	-	-	-	-	-	-	7.441	6.377	5.338	4.358
210	-	-	-	-	-	-	-	-	-	-	7.790	6.598	5.853	4.438
215	-	-	-	-	-	-	-	-	-	-	8.140	6.819	6.153	4.921
220	-	-	-	-	-	-	-	-	-	-	8.490	7.040	6.320	5.458
225	-	-	-	-	-	-	-	-	-	-	-	7.260	6.486	5.995
230	-	-	-	-	-	-	-	-	-	-	-	7.481	6.653	6.188
235	-	-	-	-	-	-	-	-	-	-	-	7.702	6.819	6.342
240	-	-	-	-	-	-	-	-	-	-	-	7.923	6.986	6.495
245	-	-	-	-	-	-	-	-	-	-	-	8.144	7.152	6.648
250	-	-	-	-	-	-	-	-	-	-	-	8.364	7.319	6.802
255	-	-	-	-	-	-	-	-	-	-	-	-	7.485	6.955
260	-	-	-	-	-	-	-	-	-	-	-	-	7.652	7.109
265	-	-	-	-	-	-	-	-	-	-	-	-	7.818	7.262
270	-	-	-	-	-	-	-	-	-	-	-	-	7.985	7.415
275	-	-	-	-	-	-	-	-	-	-	-	-	8.151	7.569
280	-	-	-	-	-	-	-	-	-	-	-	-	8.318	7.722
285	-	-	-	-	-	-	-	-	-	-	-	-	8.484	7.876
290	-	-	-	-	-	-	-	-	-	-	-	-	-	8.029
295	-	-	-	-	-	-	-	-	-	-	-	-	-	8.182
300	-	-	-	-	-	-	-	-	-	-	-	-	-	8.336
305	-	-	-	-	-	-	-	-	-	-	-	-	-	8.489
310	-	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only.

Table 27 Circular Hollow Columns 120 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	-	-	-	2.878	2.528	2.521	2.385	2.358	1.914	1.892	1.569	1.299	1.054	0.748
55	-	-	-	3.166	3.301	3.297	3.151	3.123	2.451	2.390	1.826	1.532	1.265	0.935
60	-	-	-	-	-	-	3.673	3.662	3.137	3.064	2.144	1.765	1.477	1.131
65	-	-	-	-	-	-	3.949	3.938	3.646	3.614	2.655	1.998	1.688	1.327
70	-	-	-	-	-	-	4.225	4.213	3.910	3.876	3.166	2.380	1.899	1.523
75	-	-	-	-	-	-	4.501	4.489	4.174	4.138	3.601	2.780	2.153	1.718
80	-	-	-	-	-	-	4.777	4.764	4.438	4.401	3.837	3.179	2.465	1.914
85	-	-	-	-	-	-	5.053	5.040	4.702	4.663	4.073	3.558	2.778	2.128
90	-	-	-	-	-	-	5.329	5.315	4.966	4.925	4.309	3.772	3.090	2.363
95	-	-	-	-	-	-	5.605	5.591	5.231	5.188	4.545	3.987	3.403	2.597
100	-	-	-	-	-	-	5.882	5.866	5.495	5.450	4.781	4.201	3.612	2.832
105	-	-	-	-	-	-	6.158	6.142	5.759	5.712	5.018	4.415	3.745	3.067
110	-	-	-	-	-	-	6.434	6.417	6.023	5.975	5.254	4.629	3.878	3.302
115	-	-	-	-	-	-	6.710	6.693	6.287	6.237	5.490	4.843	4.012	3.536
120	-	-	-	-	-	-	6.986	6.968	6.551	6.500	5.726	5.057	4.145	3.594
125	-	-	-	-	-	-	7.262	7.244	6.815	6.762	5.962	5.271	4.278	3.652
130	-	-	-	-	-	-	7.538	7.519	7.080	7.024	6.198	5.485	4.412	3.711
135	-	-	-	-	-	-	7.814	7.795	7.344	7.287	6.435	5.699	4.545	3.769
140	-	-	-	-	-	-	8.090	8.070	7.608	7.549	6.671	5.913	4.678	3.827
145	-	-	-	-	-	-	8.366	8.346	7.872	7.811	6.907	6.128	4.812	3.886
150	-	-	-	-	-	-	-	-	8.136	8.074	7.143	6.342	4.945	3.944
155	-	-	-	-	-	-	-	-	8.400	8.336	7.379	6.556	5.078	4.002
160	-	-	-	-	-	-	-	-	-	-	7.615	6.770	5.212	4.061
165	-	-	-	-	-	-	-	-	-	-	7.852	6.984	5.345	4.119
170	-	-	-	-	-	-	-	-	-	-	8.088	7.198	5.478	4.178
175	-	-	-	-	-	-	-	-	-	-	8.324	7.412	5.612	4.236
180	-	-	-	-	-	-	-	-	-	-	-	7.626	5.745	4.294
185	-	-	-	-	-	-	-	-	-	-	-	7.840	5.878	4.353
190	-	-	-	-	-	-	-	-	-	-	-	8.055	6.012	4.411
195	-	-	-	-	-	-	-	-	-	-	-	8.269	6.397	4.743
200	-	-	-	-	-	-	-	-	-	-	-	8.483	6.888	5.548
205	-	-	-	-	-	-	-	-	-	-	-	-	7.378	6.168
210	-	-	-	-	-	-	-	-	-	-	-	-	7.869	6.478
215	-	-	-	-	-	-	-	-	-	-	-	-	8.360	6.789
220	-	-	-	-	-	-	-	-	-	-	-	-	-	7.099
225	-	-	-	-	-	-	-	-	-	-	-	-	-	7.410
230	-	-	-	-	-	-	-	-	-	-	-	-	-	7.720
235	-	-	-	-	-	-	-	-	-	-	-	-	-	8.031
240	-	-	-	-	-	-	-	-	-	-	-	-	-	8.341
245	-	-	-	-	-	-	-	-	-	-	-	-	-	-
250	-	-	-	-	-	-	-	-	-	-	-	-	-	-
255	-	-	-	-	-	-	-	-	-	-	-	-	-	-
260	-	-	-	-	-	-	-	-	-	-	-	-	-	-
265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
270	-	-	-	-	-	-	-	-	-	-	-	-	-	-
275	-	-	-	-	-	-	-	-	-	-	-	-	-	-
280	-	-	-	-	-	-	-	-	-	-	-	-	-	-
285	-	-	-	-	-	-	-	-	-	-	-	-	-	-
290	-	-	-	-	-	-	-	-	-	-	-	-	-	-
295	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	-	-	-	-	-	-	-	-	-	-	-	-	-	-
305	-	-	-	-	-	-	-	-	-	-	-	-	-	-
310	-	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only.

Table 28 Rectangular Hollow Columns 15 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
55	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
60	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
65	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
70	0.383	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
75	0.411	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
80	0.438	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
85	0.466	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
90	0.493	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
95	0.520	0.375	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
100	0.548	0.397	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
105	0.575	0.419	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
110	0.603	0.442	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
115	0.630	0.464	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
120	0.658	0.486	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
125	0.685	0.509	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
130	0.712	0.531	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
135	0.740	0.553	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
140	0.767	0.576	0.383	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
145	0.795	0.598	0.403	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
150	0.822	0.620	0.423	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
155	0.849	0.643	0.443	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
160	0.877	0.665	0.463	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
165	0.904	0.687	0.483	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
170	0.932	0.710	0.504	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
175	0.959	0.732	0.524	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
180	0.987	0.754	0.544	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
185	1.014	0.777	0.564	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
190	1.041	0.799	0.584	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
195	1.069	0.821	0.604	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
200	1.096	0.844	0.624	0.392	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
205	1.124	0.866	0.644	0.427	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
210	1.151	0.888	0.664	0.462	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
215	1.179	0.911	0.685	0.497	0.384	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
220	1.206	0.933	0.705	0.531	0.418	0.389	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
225	1.233	0.955	0.725	0.566	0.453	0.423	0.373	0.369	0.369	0.369	0.369	0.369	0.369	0.369
230	1.261	0.978	0.745	0.601	0.487	0.457	0.407	0.401	0.369	0.369	0.369	0.369	0.369	0.369
235	1.288	1.000	0.765	0.636	0.522	0.492	0.441	0.435	0.369	0.369	0.369	0.369	0.369	0.369
240	1.316	1.022	0.785	0.671	0.556	0.526	0.475	0.469	0.369	0.369	0.369	0.369	0.369	0.369
245	1.343	1.045	0.805	0.705	0.591	0.561	0.510	0.503	0.369	0.369	0.369	0.369	0.369	0.369
250	1.371	1.067	0.825	0.740	0.625	0.595	0.544	0.537	0.369	0.369	0.369	0.369	0.369	0.369
255	1.398	1.089	0.845	0.775	0.660	0.629	0.578	0.571	0.392	0.371	0.369	0.369	0.369	0.369
260	1.425	1.112	0.866	0.810	0.694	0.664	0.612	0.606	0.425	0.403	0.369	0.369	0.369	0.369
265	1.453	1.134	0.886	0.844	0.729	0.698	0.647	0.640	0.458	0.436	0.369	0.369	0.369	0.369
270	1.480	1.156	0.906	0.879	0.763	0.733	0.681	0.674	0.491	0.469	0.369	0.369	0.369	0.369
275	1.508	1.179	0.926	0.914	0.798	0.767	0.715	0.708	0.524	0.501	0.369	0.369	0.369	0.369
280	1.535	1.201	0.949	0.949	0.832	0.801	0.749	0.742	0.557	0.534	0.369	0.369	0.369	0.369
285	1.563	1.223	0.984	0.984	0.867	0.836	0.783	0.776	0.590	0.567	0.369	0.369	0.369	0.369
290	1.590	1.246	1.018	1.018	0.901	0.870	0.818	0.810	0.623	0.599	0.369	0.369	0.369	0.369
295	1.617	1.268	1.053	1.053	0.936	0.904	0.852	0.845	0.656	0.632	0.369	0.369	0.369	0.369
300	1.645	1.290	1.088	1.088	0.970	0.939	0.886	0.879	0.689	0.664	0.369	0.369	0.369	0.369
305	1.672	1.313	1.123	1.123	1.004	0.973	0.920	0.913	0.722	0.697	0.369	0.369	0.369	0.369
310	1.700	1.335	1.157	1.157	1.039	1.008	0.955	0.947	0.754	0.730	0.369	0.369	0.369	0.369
315	1.727	1.357	1.192	1.192	1.073	1.042	0.989	0.981	0.787	0.762	0.369	0.369	0.369	0.369
320	1.755	1.380	1.227	1.227	1.108	1.076	1.023	1.015	0.820	0.795	0.369	0.369	0.369	0.369
325	1.782	1.402	1.262	1.262	1.142	1.111	1.057	1.049	0.853	0.828	0.369	0.369	0.369	0.369
330	1.809	1.424	1.297	1.297	1.177	1.145	1.091	1.084	0.886	0.860	0.393	0.369	0.369	0.369
335	1.837	1.447	1.331	1.331	1.211	1.180	1.126	1.118	0.919	0.893	0.423	0.369	0.369	0.369
340	1.864	1.469	1.366	1.366	1.246	1.214	1.160	1.152	0.952	0.925	0.453	0.369	0.369	0.369
345	1.892	1.491	1.401	1.401	1.280	1.248	1.194	1.186	0.985	0.958	0.482	0.369	0.369	0.369
350	1.919	1.513	1.436	1.436	1.315	1.283	1.228	1.220	1.018	0.991	0.512	0.369	0.369	0.369
355	1.947	1.536	1.471	1.471	1.349	1.317	1.263	1.254	1.051	1.023	0.542	0.369	0.369	0.369

Thickness is intumescent only. Results also apply to rectangular hollow beams exposed on all four sides limited to a maximum protection thickness of 5.667mm.

Table 29 Rectangular Hollow Columns 20 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	0.390	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
55	0.436	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
60	0.482	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
65	0.528	0.375	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
70	0.574	0.405	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
75	0.620	0.435	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
80	0.666	0.465	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
85	0.712	0.495	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
90	0.758	0.525	0.384	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
95	0.804	0.555	0.411	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
100	0.850	0.585	0.438	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
105	0.896	0.616	0.464	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
110	0.942	0.646	0.491	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
115	0.988	0.676	0.518	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
120	1.034	0.706	0.545	0.387	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
125	1.080	0.736	0.572	0.433	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
130	1.126	0.766	0.599	0.479	0.409	0.391	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
135	1.172	0.796	0.626	0.525	0.454	0.436	0.405	0.399	0.369	0.369	0.369	0.369	0.369	0.369
140	1.218	0.826	0.653	0.572	0.500	0.482	0.450	0.444	0.369	0.369	0.369	0.369	0.369	0.369
145	1.264	0.856	0.680	0.618	0.546	0.527	0.496	0.489	0.369	0.369	0.369	0.369	0.369	0.369
150	1.310	0.886	0.706	0.664	0.591	0.573	0.541	0.534	0.369	0.369	0.369	0.369	0.369	0.369
155	1.355	0.916	0.733	0.710	0.637	0.618	0.586	0.580	0.405	0.384	0.369	0.369	0.369	0.369
160	1.401	0.946	0.760	0.756	0.683	0.664	0.631	0.625	0.450	0.428	0.369	0.369	0.369	0.369
165	1.447	0.977	0.802	0.802	0.728	0.709	0.677	0.670	0.495	0.473	0.369	0.369	0.369	0.369
170	1.493	1.007	0.848	0.848	0.774	0.755	0.722	0.715	0.540	0.518	0.369	0.369	0.369	0.369
175	1.539	1.037	0.895	0.895	0.819	0.800	0.767	0.761	0.585	0.563	0.369	0.369	0.369	0.369
180	1.585	1.067	0.941	0.941	0.865	0.846	0.813	0.806	0.630	0.608	0.369	0.369	0.369	0.369
185	1.631	1.097	0.987	0.987	0.911	0.891	0.858	0.851	0.675	0.652	0.369	0.369	0.369	0.369
190	1.677	1.127	1.033	1.033	0.956	0.937	0.903	0.896	0.720	0.697	0.369	0.369	0.369	0.369
195	1.723	1.157	1.079	1.079	1.002	0.982	0.948	0.941	0.765	0.742	0.369	0.369	0.369	0.369
200	1.769	1.187	1.125	1.125	1.048	1.028	0.994	0.987	0.810	0.787	0.369	0.369	0.369	0.369
205	1.815	1.217	1.172	1.172	1.093	1.073	1.039	1.032	0.855	0.832	0.382	0.369	0.369	0.369
210	1.861	1.247	1.218	1.218	1.139	1.119	1.084	1.077	0.900	0.877	0.427	0.369	0.369	0.369
215	1.907	1.277	1.264	1.264	1.185	1.164	1.129	1.122	0.945	0.921	0.472	0.369	0.369	0.369
220	1.953	1.310	1.310	1.310	1.230	1.210	1.175	1.168	0.990	0.966	0.517	0.369	0.369	0.369
225	1.999	1.356	1.356	1.356	1.276	1.255	1.220	1.213	1.035	1.011	0.563	0.369	0.369	0.369
230	2.045	1.402	1.402	1.402	1.322	1.301	1.265	1.258	1.080	1.056	0.608	0.369	0.369	0.369
235	2.095	1.449	1.449	1.449	1.367	1.346	1.311	1.303	1.125	1.101	0.653	0.369	0.369	0.369
240	2.144	1.495	1.495	1.495	1.413	1.392	1.356	1.348	1.170	1.145	0.698	0.369	0.369	0.369
245	2.194	1.541	1.541	1.541	1.459	1.437	1.401	1.394	1.216	1.190	0.744	0.369	0.369	0.369
250	2.243	1.587	1.587	1.587	1.504	1.483	1.446	1.439	1.261	1.235	0.789	0.369	0.369	0.369
255	2.293	1.633	1.633	1.633	1.550	1.528	1.492	1.484	1.306	1.280	0.834	0.369	0.369	0.369
260	2.342	1.679	1.679	1.679	1.596	1.574	1.537	1.529	1.351	1.325	0.879	0.369	0.369	0.369
265	2.392	1.726	1.726	1.726	1.641	1.619	1.582	1.575	1.396	1.369	0.925	0.389	0.369	0.369
270	2.441	1.772	1.772	1.772	1.687	1.665	1.627	1.620	1.441	1.414	0.970	0.423	0.369	0.369
275	2.490	1.818	1.818	1.818	1.733	1.710	1.673	1.665	1.486	1.459	1.015	0.456	0.369	0.369
280	2.540	1.864	1.864	1.864	1.778	1.756	1.718	1.710	1.531	1.504	1.060	0.489	0.369	0.369
285	2.589	1.910	1.910	1.910	1.824	1.801	1.763	1.755	1.576	1.549	1.106	0.522	0.369	0.369
290	2.639	1.956	1.956	1.956	1.869	1.847	1.809	1.801	1.621	1.594	1.151	0.556	0.369	0.369
295	2.688	2.002	2.002	2.002	1.915	1.892	1.854	1.846	1.666	1.638	1.196	0.589	0.369	0.369
300	2.738	2.049	2.049	2.049	1.961	1.938	1.899	1.891	1.711	1.683	1.241	0.622	0.369	0.369
305	2.787	2.095	2.095	2.095	2.006	1.984	1.944	1.936	1.756	1.728	1.287	0.656	0.369	0.369
310	2.837	2.141	2.141	2.141	2.052	2.029	1.990	1.982	1.801	1.773	1.332	0.689	0.369	0.369
315	2.886	2.187	2.187	2.187	2.098	2.075	2.035	2.027	1.846	1.818	1.377	0.722	0.369	0.369
320	2.935	2.233	2.233	2.233	2.143	2.120	2.080	2.072	1.891	1.862	1.422	0.755	0.369	0.369
325	2.985	2.279	2.279	2.279	2.189	2.166	2.125	2.117	1.936	1.907	1.467	0.789	0.369	0.369
330	3.034	2.326	2.326	2.326	2.235	2.211	2.171	2.162	1.981	1.952	1.513	0.822	0.369	0.369
335	3.084	2.372	2.372	2.372	2.280	2.257	2.216	2.208	2.026	1.997	1.558	0.855	0.369	0.369
340	3.133	2.418	2.418	2.418	2.326	2.302	2.261	2.253	2.071	2.042	1.603	0.888	0.369	0.369
345	3.183	2.464	2.464	2.464	2.372	2.348	2.307	2.298	2.116	2.087	1.648	0.922	0.369	0.369
350	3.232	2.510	2.510	2.510	2.417	2.393	2.352	2.343	2.161	2.131	1.694	0.955	0.372	0.369
355	3.281	2.556	2.556	2.556	2.463	2.439	2.397	2.388	2.206	2.176	1.739	0.988	0.393	0.369

Thickness is intumescent only. Results also apply to rectangular hollow beams exposed on all four sides limited to a maximum protection thickness of 5.667mm.

Table 30 Rectangular Hollow Columns 30 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	0.850	0.574	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
55	0.942	0.642	0.406	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
60	1.034	0.711	0.461	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
65	1.126	0.779	0.517	0.377	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
70	1.218	0.848	0.572	0.420	0.391	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369	0.369
75	1.310	0.916	0.627	0.462	0.442	0.442	0.420	0.415	0.369	0.369	0.369	0.369	0.369	0.369
80	1.402	0.984	0.682	0.515	0.515	0.515	0.492	0.487	0.369	0.369	0.369	0.369	0.369	0.369
85	1.494	1.053	0.737	0.588	0.588	0.588	0.564	0.560	0.440	0.426	0.369	0.369	0.369	0.369
90	1.586	1.121	0.792	0.661	0.661	0.661	0.637	0.632	0.511	0.496	0.369	0.369	0.369	0.369
95	1.678	1.190	0.847	0.734	0.734	0.734	0.709	0.704	0.582	0.567	0.369	0.369	0.369	0.369
100	1.770	1.258	0.902	0.807	0.807	0.807	0.781	0.776	0.653	0.638	0.376	0.369	0.369	0.369
105	1.862	1.327	0.957	0.880	0.880	0.880	0.854	0.848	0.724	0.708	0.446	0.369	0.369	0.369
110	1.954	1.395	1.012	0.953	0.953	0.953	0.926	0.921	0.795	0.779	0.517	0.369	0.369	0.369
115	2.046	1.464	1.067	1.026	1.026	1.026	0.998	0.993	0.866	0.849	0.587	0.369	0.369	0.369
120	2.134	1.532	1.122	1.099	1.099	1.099	1.071	1.065	0.937	0.920	0.658	0.369	0.369	0.369
125	2.222	1.601	1.177	1.172	1.172	1.172	1.143	1.137	1.008	0.990	0.729	0.397	0.369	0.369
130	2.310	1.669	1.245	1.245	1.245	1.245	1.216	1.210	1.079	1.061	0.799	0.454	0.369	0.369
135	2.398	1.738	1.318	1.318	1.318	1.318	1.288	1.282	1.150	1.132	0.870	0.511	0.369	0.369
140	2.487	1.806	1.391	1.391	1.391	1.391	1.360	1.354	1.221	1.202	0.941	0.569	0.369	0.369
145	2.575	1.874	1.464	1.464	1.464	1.464	1.433	1.426	1.292	1.273	1.011	0.626	0.369	0.369
150	2.663	1.943	1.537	1.537	1.537	1.537	1.505	1.498	1.363	1.343	1.082	0.683	0.370	0.369
155	2.751	2.011	1.610	1.610	1.610	1.610	1.577	1.571	1.434	1.414	1.152	0.740	0.416	0.369
160	2.839	2.098	1.683	1.683	1.683	1.683	1.650	1.643	1.505	1.484	1.223	0.798	0.462	0.369
165	2.927	2.201	1.756	1.756	1.756	1.756	1.722	1.715	1.576	1.555	1.294	0.855	0.508	0.369
170	3.015	2.303	1.829	1.829	1.829	1.829	1.794	1.787	1.647	1.626	1.364	0.912	0.555	0.369
175	3.103	2.405	1.902	1.902	1.902	1.902	1.867	1.859	1.718	1.696	1.435	0.970	0.601	0.369
180	3.192	2.507	1.975	1.975	1.975	1.975	1.939	1.932	1.789	1.767	1.505	1.027	0.647	0.369
185	3.280	2.609	2.048	2.048	2.048	2.048	2.011	2.004	1.860	1.837	1.576	1.084	0.693	0.369
190	3.368	2.711	2.121	2.121	2.121	2.121	2.084	2.076	1.931	1.908	1.647	1.141	0.739	0.369
195	3.456	2.814	2.194	2.194	2.194	2.194	2.156	2.148	2.002	1.979	1.717	1.199	0.785	0.369
200	3.514	2.916	2.267	2.267	2.267	2.267	2.228	2.220	2.073	2.049	1.788	1.256	0.832	0.369
205	3.565	3.018	2.340	2.340	2.340	2.340	2.301	2.293	2.145	2.120	1.859	1.313	0.878	0.369
210	3.616	3.120	2.413	2.413	2.413	2.413	2.373	2.365	2.216	2.190	1.929	1.371	0.924	0.402
215	3.667	3.222	2.486	2.486	2.486	2.486	2.445	2.437	2.287	2.261	2.000	1.428	0.970	0.441
220	3.717	3.325	2.559	2.559	2.559	2.559	2.518	2.509	2.358	2.331	2.070	1.485	1.016	0.479
225	3.768	3.427	2.642	2.632	2.632	2.632	2.590	2.582	2.429	2.402	2.141	1.542	1.063	0.518
230	3.819	3.501	2.782	2.705	2.705	2.705	2.662	2.654	2.500	2.473	2.212	1.600	1.109	0.557
235	3.870	3.550	2.922	2.778	2.778	2.778	2.735	2.726	2.571	2.543	2.282	1.657	1.155	0.595
240	3.921	3.600	3.063	2.851	2.851	2.851	2.807	2.798	2.642	2.614	2.353	1.714	1.201	0.634
245	3.971	3.650	3.203	2.924	2.924	2.924	2.880	2.870	2.713	2.684	2.424	1.772	1.247	0.673
250	4.022	3.699	3.343	2.997	2.997	2.997	2.952	2.943	2.784	2.755	2.494	1.829	1.293	0.711
255	4.073	3.749	3.477	3.070	3.070	3.070	3.024	3.015	2.855	2.825	2.565	1.886	1.340	0.750
260	4.124	3.799	3.522	3.143	3.143	3.143	3.097	3.087	2.926	2.896	2.635	1.943	1.386	0.789
265	4.174	3.848	3.566	3.216	3.216	3.216	3.169	3.159	2.997	2.967	2.706	2.001	1.432	0.827
270	4.225	3.898	3.611	3.289	3.289	3.289	3.241	3.231	3.068	3.037	2.777	2.058	1.478	0.866
275	4.276	3.947	3.655	3.491	3.362	3.362	3.314	3.304	3.139	3.108	2.847	2.115	1.524	0.905
280	4.327	3.997	3.700	3.531	3.435	3.435	3.386	3.376	3.210	3.178	2.918	2.173	1.570	0.943
285	4.378	4.047	3.745	3.570	3.493	3.493	3.458	3.448	3.281	3.249	2.988	2.230	1.617	0.982
290	4.428	4.096	3.789	3.610	3.534	3.534	3.506	3.500	3.352	3.320	3.059	2.287	1.663	1.021
295	4.479	4.146	3.834	3.649	3.574	3.574	3.546	3.540	3.423	3.390	3.130	2.344	1.709	1.059
300	4.567	4.196	3.878	3.689	3.615	3.615	3.586	3.580	3.485	3.461	3.200	2.402	1.755	1.098
305	4.681	4.245	3.923	3.729	3.655	3.655	3.627	3.621	3.523	3.505	3.271	2.459	1.801	1.137
310	4.796	4.295	3.968	3.768	3.696	3.696	3.667	3.661	3.562	3.544	3.342	2.516	1.848	1.175
315	4.910	4.345	4.012	3.808	3.737	3.737	3.707	3.701	3.601	3.582	3.412	2.574	1.894	1.214
320	5.024	4.394	4.057	3.847	3.777	3.777	3.748	3.742	3.639	3.621	3.478	2.631	1.940	1.253
325	5.139	4.444	4.102	3.887	3.818	3.818	3.788	3.782	3.678	3.659	3.511	2.688	1.986	1.291
330	5.253	4.493	4.146	3.926	3.858	3.858	3.828	3.822	3.717	3.698	3.545	2.745	2.032	1.330
335	5.367	4.587	4.191	3.966	3.899	3.899	3.869	3.863	3.755	3.736	3.578	2.803	2.078	1.369
340	5.481	4.687	4.235	4.006	3.940	3.940	3.909	3.903	3.794	3.775	3.611	2.860	2.125	1.408
345	5.596	4.786	4.280	4.045	3.980	3.980	3.950	3.943	3.833	3.814	3.644	2.917	2.171	1.446
350	5.710	4.886	4.325	4.085	4.021	4.021	3.990	3.984	3.871	3.852	3.677	2.975	2.217	1.485
355	5.824	4.986	4.369	4.124	4.061	4.061	4.030	4.024	3.910	3.891	3.711	3.032	2.263	1.524

Thickness is intumescent only. Results also apply to rectangular hollow beams exposed on all four sides limited to a maximum protection thickness of 5.667mm.

Table 31 Rectangular Hollow Columns 45 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	1.540	1.163	0.868	0.638	0.589	0.577	0.557	0.553	0.458	0.448	0.369	0.369	0.369	0.369
55	1.701	1.291	0.975	0.729	0.677	0.664	0.643	0.639	0.534	0.523	0.369	0.369	0.369	0.369
60	1.863	1.418	1.083	0.821	0.765	0.752	0.729	0.724	0.613	0.601	0.432	0.369	0.369	0.369
65	2.024	1.546	1.190	0.912	0.853	0.839	0.814	0.810	0.692	0.679	0.499	0.369	0.369	0.369
70	2.197	1.673	1.298	1.004	0.941	0.926	0.900	0.895	0.771	0.757	0.567	0.423	0.369	0.369
75	2.372	1.800	1.406	1.095	1.029	1.013	0.986	0.981	0.850	0.835	0.635	0.480	0.369	0.369
80	2.547	1.928	1.513	1.186	1.117	1.100	1.072	1.066	0.928	0.913	0.703	0.537	0.414	0.369
85	2.722	2.061	1.621	1.278	1.205	1.187	1.158	1.152	1.007	0.991	0.771	0.595	0.500	0.369
90	2.898	2.242	1.728	1.369	1.293	1.274	1.243	1.237	1.086	1.069	0.839	0.652	0.586	0.369
95	3.073	2.423	1.836	1.461	1.381	1.361	1.329	1.323	1.165	1.147	0.907	0.709	0.672	0.386
100	3.248	2.604	1.943	1.552	1.469	1.449	1.415	1.408	1.244	1.225	0.975	0.766	0.759	0.467
105	3.423	2.785	2.058	1.644	1.557	1.536	1.501	1.494	1.323	1.303	1.043	0.845	0.845	0.547
110	3.551	2.966	2.252	1.735	1.645	1.623	1.587	1.579	1.401	1.382	1.111	0.931	0.931	0.628
115	3.661	3.147	2.445	1.826	1.733	1.710	1.672	1.665	1.480	1.460	1.179	1.017	1.017	0.709
120	3.770	3.328	2.639	1.918	1.821	1.797	1.758	1.750	1.559	1.538	1.247	1.103	1.103	0.790
125	3.879	3.488	2.832	2.009	1.909	1.884	1.844	1.836	1.638	1.616	1.315	1.189	1.189	0.870
130	3.988	3.559	3.026	2.202	1.997	1.971	1.930	1.921	1.717	1.694	1.383	1.276	1.276	0.951
135	4.097	3.630	3.220	2.452	2.169	2.092	2.016	2.007	1.796	1.772	1.450	1.362	1.362	1.032
140	4.207	3.702	3.413	2.701	2.432	2.359	2.231	2.205	1.874	1.850	1.518	1.448	1.448	1.113
145	4.316	3.773	3.516	2.951	2.695	2.626	2.505	2.480	1.953	1.928	1.586	1.534	1.534	1.194
150	4.425	3.844	3.576	3.200	2.957	2.893	2.779	2.755	2.032	2.006	1.654	1.620	1.620	1.274
155	4.534	3.916	3.637	3.450	3.220	3.161	3.053	3.031	2.361	2.245	1.722	1.706	1.706	1.355
160	4.643	3.987	3.698	3.522	3.476	3.428	3.326	3.306	2.726	2.621	1.793	1.793	1.793	1.436
165	4.753	4.058	3.759	3.576	3.530	3.519	3.499	3.495	3.092	2.997	1.879	1.879	1.879	1.517
170	4.862	4.130	3.820	3.630	3.584	3.572	3.552	3.548	3.457	3.372	1.965	1.965	1.965	1.598
175	4.971	4.201	3.880	3.683	3.639	3.626	3.605	3.601	3.523	3.511	2.051	2.051	2.051	1.678
180	5.080	4.272	3.941	3.737	3.693	3.680	3.659	3.654	3.574	3.562	2.495	2.137	2.137	1.759
185	5.190	4.344	4.002	3.790	3.747	3.734	3.712	3.708	3.625	3.613	3.491	2.224	2.224	1.840
190	5.299	4.415	4.063	3.844	3.801	3.788	3.765	3.761	3.677	3.664	3.538	2.310	2.310	1.921
195	5.408	4.486	4.123	3.898	3.855	3.842	3.819	3.814	3.728	3.715	3.586	2.396	2.396	2.002
200	5.517	4.597	4.184	3.951	3.910	3.896	3.872	3.867	3.779	3.766	3.633	2.482	2.482	2.082
205	5.626	4.717	4.245	4.005	3.964	3.949	3.925	3.921	3.830	3.817	3.680	2.568	2.568	2.163
210	5.736	4.837	4.306	4.058	4.018	4.003	3.979	3.974	3.882	3.868	3.727	2.654	2.654	2.244
215	5.845	4.957	4.366	4.112	4.072	4.057	4.032	4.027	3.933	3.919	3.774	2.831	2.741	2.325
220	5.954	5.077	4.427	4.166	4.127	4.111	4.085	4.080	3.984	3.970	3.821	3.497	2.827	2.406
225	6.063	5.198	4.488	4.219	4.181	4.165	4.139	4.133	4.035	4.021	3.868	3.550	2.913	2.486
230	6.168	5.318	4.591	4.273	4.235	4.219	4.192	4.187	4.087	4.072	3.915	3.603	2.999	2.567
235	6.272	5.438	4.704	4.326	4.289	4.273	4.245	4.240	4.138	4.123	3.962	3.657	3.085	2.648
240	6.375	5.558	4.817	4.380	4.343	4.327	4.299	4.293	4.189	4.174	4.009	3.710	3.171	2.729
245	6.479	5.678	4.931	4.434	4.398	4.380	4.352	4.346	4.240	4.225	4.056	3.764	3.258	2.810
250	6.583	5.798	5.044	4.487	4.452	4.434	4.405	4.400	4.292	4.276	4.103	3.817	3.344	2.890
255	6.686	5.918	5.157	4.586	4.512	4.488	4.459	4.453	4.343	4.327	4.150	3.870	3.430	2.971
260	6.790	6.039	5.270	4.698	4.621	4.585	4.524	4.512	4.394	4.378	4.198	3.924	3.502	3.052
265	6.893	6.147	5.384	4.810	4.729	4.694	4.634	4.622	4.445	4.429	4.245	3.977	3.558	3.133
270	6.997	6.247	5.497	4.923	4.838	4.802	4.743	4.731	4.497	4.480	4.292	4.030	3.614	3.214
275	7.101	6.347	5.610	5.035	4.946	4.911	4.852	4.840	4.598	4.563	4.339	4.084	3.671	3.294
280	7.204	6.447	5.724	5.148	5.055	5.020	4.961	4.949	4.704	4.669	4.386	4.137	3.727	3.375
285	7.308	6.547	5.837	5.260	5.163	5.129	5.070	5.058	4.809	4.774	4.433	4.191	3.783	3.456
290	7.412	6.647	5.950	5.372	5.272	5.237	5.179	5.168	4.915	4.880	4.480	4.244	3.839	3.511
295	7.515	6.747	6.063	5.485	5.380	5.346	5.288	5.277	5.020	4.985	4.554	4.297	3.896	3.559
300	7.619	6.847	6.166	5.597	5.489	5.455	5.398	5.386	5.125	5.091	4.648	4.351	3.952	3.607
305	7.722	6.947	6.265	5.709	5.597	5.564	5.507	5.495	5.231	5.196	4.743	4.404	4.008	3.655
310	7.826	7.047	6.364	5.822	5.706	5.672	5.616	5.604	5.336	5.302	4.837	4.458	4.065	3.702
315	7.930	7.147	6.464	5.934	5.814	5.781	5.725	5.714	5.442	5.407	4.931	4.554	4.121	3.750
320	8.033	7.247	6.563	6.046	5.923	5.890	5.834	5.823	5.547	5.513	5.026	4.820	4.177	3.798
325	8.137	7.347	6.662	6.181	6.031	5.999	5.943	5.932	5.653	5.618	5.120	5.086	4.234	3.846
330	8.241	7.448	6.762	6.327	6.157	6.114	6.052	6.041	5.758	5.724	5.352	5.352	4.290	3.894
335	8.344	7.548	6.861	6.473	6.300	6.256	6.183	6.168	5.863	5.829	5.618	5.618	4.346	3.941
340	-	7.648	6.960	6.619	6.443	6.398	6.323	6.308	5.969	5.935	5.884	5.884	4.403	3.989
345	-	7.748	7.060	6.766	6.586	6.540	6.463	6.448	6.099	6.099	6.099	6.099	4.459	4.037
350	-	7.848	7.159	6.912	6.729	6.682	6.603	6.587	6.201	6.159	6.151	6.151	4.555	4.085
355	-	7.948	7.258	7.058	6.872	6.824	6.744	6.727	6.331	6.287	6.203	6.203	4.758	4.133

Thickness is intumescent only. Results also apply to rectangular hollow beams exposed on all four sides limited to a maximum protection thickness of 5.667mm.

Table 32 Rectangular Hollow Columns 60 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	2.276	1.753	1.391	1.110	1.052	1.038	1.014	1.009	0.895	0.882	0.695	0.528	0.369	0.369
55	2.536	1.939	1.551	1.249	1.186	1.171	1.145	1.140	1.018	1.004	0.807	0.620	0.431	0.369
60	2.796	2.159	1.710	1.387	1.320	1.304	1.277	1.272	1.141	1.126	0.918	0.724	0.527	0.369
65	3.055	2.419	1.870	1.526	1.454	1.437	1.408	1.403	1.263	1.248	1.030	0.828	0.623	0.449
70	3.315	2.679	2.030	1.665	1.589	1.570	1.540	1.534	1.386	1.370	1.142	0.933	0.719	0.535
75	3.528	2.939	2.282	1.803	1.723	1.703	1.671	1.665	1.509	1.492	1.253	1.037	0.815	0.621
80	3.668	3.199	2.541	1.942	1.857	1.837	1.803	1.796	1.632	1.614	1.365	1.141	0.911	0.707
85	3.808	3.459	2.799	2.121	1.991	1.970	1.934	1.927	1.755	1.735	1.477	1.245	1.007	0.793
90	3.948	3.596	3.058	2.406	2.221	2.174	2.095	2.078	1.877	1.857	1.588	1.350	1.103	0.878
95	4.088	3.725	3.317	2.691	2.510	2.464	2.386	2.370	2.000	1.979	1.700	1.454	1.199	0.964
100	4.228	3.855	3.523	2.976	2.798	2.754	2.677	2.662	2.253	2.198	1.811	1.558	1.295	1.050
105	4.368	3.984	3.648	3.261	3.086	3.044	2.969	2.954	2.574	2.521	1.923	1.662	1.391	1.136
110	4.508	4.114	3.772	3.502	3.374	3.333	3.260	3.246	2.894	2.843	2.035	1.767	1.487	1.222
115	4.648	4.243	3.897	3.614	3.546	3.530	3.493	3.490	3.214	3.166	2.413	1.871	1.583	1.308
120	4.788	4.373	4.021	3.726	3.655	3.639	3.566	3.563	3.487	3.477	2.809	1.975	1.679	1.393
125	4.928	4.502	4.146	3.838	3.765	3.748	3.639	3.635	3.556	3.546	3.205	2.147	1.775	1.479
130	5.068	4.631	4.270	3.950	3.874	3.857	3.712	3.708	3.625	3.614	3.494	2.440	1.871	1.565
135	5.208	4.761	4.395	4.062	3.984	3.965	3.785	3.781	3.694	3.683	3.556	2.733	1.966	1.651
140	5.348	4.890	4.519	4.174	4.093	4.074	3.858	3.854	3.763	3.752	3.618	3.026	2.094	1.737
145	5.488	5.020	4.644	4.286	4.203	4.183	3.931	3.927	3.832	3.820	3.680	3.319	2.340	1.822
150	5.628	5.149	4.768	4.398	4.312	4.292	4.004	3.999	3.902	3.889	3.742	3.505	2.586	1.908
155	5.768	5.279	4.893	4.510	4.422	4.401	4.077	4.072	3.971	3.957	3.804	3.569	2.832	1.994
160	5.908	5.408	5.017	4.622	4.531	4.510	4.150	4.145	4.040	4.026	3.867	3.634	3.078	2.190
165	6.048	5.538	5.142	4.734	4.641	4.619	4.223	4.218	4.109	4.095	3.929	3.699	3.323	2.525
170	6.188	5.667	5.266	4.846	4.750	4.728	4.296	4.290	4.178	4.163	3.991	3.764	3.500	2.859
175	6.328	5.797	5.391	4.958	4.860	4.836	4.369	4.363	4.247	4.232	4.053	3.829	3.566	3.194
180	6.468	5.926	5.515	5.070	4.969	4.945	4.442	4.436	4.316	4.300	4.115	3.894	3.633	3.484
185	6.608	6.056	5.640	5.182	5.079	5.054	4.532	4.519	4.385	4.369	4.177	3.959	3.699	3.545
190	6.748	6.185	5.765	5.294	5.188	5.163	4.688	4.675	4.454	4.438	4.239	4.024	3.765	3.605
195	6.888	6.315	5.889	5.406	5.298	5.272	4.845	4.832	4.550	4.514	4.301	4.089	3.832	3.666
200	7.028	6.444	6.014	5.518	5.407	5.381	5.001	4.988	4.699	4.662	4.363	4.153	3.898	3.727
205	7.168	6.573	6.133	5.630	5.517	5.490	5.158	5.144	4.847	4.810	4.425	4.218	3.965	3.787
210	7.308	6.703	6.246	5.742	5.626	5.599	5.314	5.301	4.996	4.959	4.488	4.283	4.031	3.848
215	7.448	6.832	6.359	5.854	5.736	5.707	5.471	5.457	5.145	5.107	4.607	4.348	4.097	3.909
220	7.588	6.962	6.472	5.966	5.845	5.816	5.627	5.614	5.293	5.255	4.741	4.413	4.164	3.969
225	7.728	7.091	6.585	6.078	5.955	5.925	5.784	5.770	5.442	5.404	4.874	4.478	4.230	4.030
230	7.868	7.221	6.697	6.240	6.064	6.034	5.940	5.926	5.590	5.552	5.008	4.730	4.297	4.091
235	8.008	7.350	6.810	6.405	6.219	6.173	6.097	6.083	5.739	5.700	5.142	5.081	4.363	4.151
240	8.148	7.480	6.923	6.570	6.385	6.338	6.262	6.247	5.888	5.849	5.432	5.432	4.430	4.212
245	8.288	7.609	7.036	6.735	6.551	6.504	6.427	6.412	6.036	5.997	5.782	5.782	4.496	4.273
250	8.428	7.739	7.149	6.900	6.717	6.669	6.592	6.577	6.192	6.149	6.096	6.096	4.790	4.333
255	-	7.868	7.262	7.065	6.882	6.835	6.757	6.741	6.350	6.308	6.173	6.173	5.099	4.394
260	-	7.998	7.374	7.230	7.048	7.000	6.922	6.906	6.509	6.466	6.250	6.250	5.408	4.455
265	-	8.127	7.487	7.395	7.214	7.166	7.087	7.071	6.667	6.624	6.326	6.326	5.717	4.566
270	-	8.256	7.600	7.560	7.380	7.332	7.252	7.236	6.826	6.782	6.403	6.403	6.026	4.826
275	-	8.386	7.725	7.725	7.546	7.497	7.417	7.400	6.985	6.941	6.480	6.480	6.137	5.086
280	-	-	7.890	7.890	7.712	7.663	7.582	7.565	7.143	7.099	6.556	6.556	6.200	5.346
285	-	-	8.055	8.055	7.878	7.828	7.747	7.730	7.302	7.257	6.633	6.633	6.262	5.606
290	-	-	8.220	8.220	8.044	7.994	7.912	7.894	7.461	7.416	6.710	6.710	6.325	5.866
295	-	-	8.385	8.385	8.210	8.159	8.077	8.059	7.619	7.574	6.786	6.786	6.388	6.094
300	-	-	-	-	8.376	8.325	8.242	8.224	7.778	7.732	6.916	6.863	6.451	6.143
305	-	-	-	-	-	-	8.407	8.389	7.936	7.891	7.056	6.940	6.514	6.193
310	-	-	-	-	-	-	-	-	8.095	8.049	7.195	7.016	6.577	6.243
315	-	-	-	-	-	-	-	-	8.254	8.207	7.335	7.093	6.639	6.293
320	-	-	-	-	-	-	-	-	8.412	8.366	7.475	7.170	6.702	6.342
325	-	-	-	-	-	-	-	-	-	-	7.615	7.246	6.765	6.392
330	-	-	-	-	-	-	-	-	-	-	7.754	7.323	6.828	6.442
335	-	-	-	-	-	-	-	-	-	-	7.894	7.400	6.891	6.491
340	-	-	-	-	-	-	-	-	-	-	8.034	7.476	6.954	6.541
345	-	-	-	-	-	-	-	-	-	-	8.174	7.553	7.016	6.591
350	-	-	-	-	-	-	-	-	-	-	8.313	7.630	7.079	6.641
355	-	-	-	-	-	-	-	-	-	-	-	7.706	7.142	6.690

Thickness is intumescent only. Results also apply to rectangular hollow beams exposed on all four sides limited to a maximum protection thickness of 5.667mm.

Table 33 Rectangular Hollow Columns 75 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	3.093	2.457	1.860	1.582	1.514	1.498	1.471	1.465	1.335	1.320	1.122	0.951	0.796	0.611
55	3.432	2.796	2.170	1.768	1.695	1.677	1.648	1.642	1.501	1.486	1.276	1.098	0.929	0.723
60	3.626	3.135	2.497	1.954	1.875	1.856	1.825	1.819	1.668	1.652	1.430	1.246	1.071	0.862
65	3.800	3.474	2.823	2.220	2.068	2.035	2.002	1.996	1.835	1.817	1.584	1.394	1.212	1.001
70	3.974	3.640	3.149	2.557	2.404	2.367	2.304	2.291	2.002	1.983	1.739	1.542	1.353	1.141
75	4.148	3.807	3.475	2.894	2.741	2.704	2.641	2.629	2.309	2.269	1.893	1.690	1.494	1.280
80	4.322	3.973	3.631	3.232	3.078	3.042	2.978	2.966	2.661	2.622	2.055	1.837	1.636	1.419
85	4.496	4.139	3.788	3.521	3.414	3.379	3.315	3.304	3.014	2.975	2.432	1.985	1.777	1.558
90	4.670	4.305	3.945	3.687	3.609	3.591	3.560	3.554	3.366	3.328	2.808	2.220	1.918	1.697
95	4.844	4.471	4.101	3.853	3.773	3.755	3.723	3.717	3.568	3.553	3.185	2.510	2.071	1.836
100	5.018	4.637	4.258	4.019	3.937	3.918	3.885	3.879	3.704	3.688	3.502	2.799	2.307	1.975
105	5.192	4.804	4.415	4.186	4.101	4.082	4.047	4.041	3.840	3.823	3.622	3.089	2.543	2.175
110	5.366	4.970	4.571	4.352	4.265	4.245	4.210	4.203	3.975	3.958	3.743	3.378	2.779	2.430
115	5.540	5.136	4.728	4.518	4.429	4.409	4.372	4.365	4.111	4.093	3.863	3.575	3.015	2.686
120	5.714	5.302	4.885	4.684	4.594	4.572	4.535	4.528	4.247	4.228	3.983	3.725	3.251	2.941
125	5.888	5.468	5.041	4.850	4.758	4.736	4.697	4.690	4.382	4.363	4.104	3.876	3.478	3.196
130	6.062	5.634	5.198	5.016	4.922	4.899	4.860	4.852	4.518	4.498	4.224	4.026	3.556	3.451
135	6.236	5.801	5.354	5.183	5.086	5.063	5.022	5.014	4.654	4.633	4.345	4.177	3.634	3.539
140	6.410	5.967	5.511	5.349	5.250	5.226	5.185	5.177	4.789	4.768	4.465	4.327	3.712	3.611
145	6.584	6.133	5.668	5.515	5.414	5.389	5.347	5.339	4.925	4.903	4.585	4.478	3.790	3.683
150	6.758	6.299	5.824	5.681	5.578	5.553	5.510	5.501	5.061	5.038	4.706	4.628	3.868	3.754
155	6.932	6.465	5.981	5.847	5.742	5.716	5.672	5.663	5.197	5.173	4.826	4.779	3.946	3.826
160	7.106	6.631	6.138	6.014	5.906	5.880	5.834	5.826	5.332	5.308	4.947	4.930	4.024	3.898
165	7.280	6.798	6.294	6.180	6.070	6.043	5.997	5.988	5.468	5.443	5.080	5.080	4.102	3.970
170	7.454	6.964	6.451	6.346	6.234	6.207	6.159	6.150	5.604	5.578	5.231	5.231	4.180	4.041
175	7.628	7.130	6.608	6.512	6.398	6.370	6.322	6.312	5.739	5.712	5.381	5.381	4.258	4.113
180	7.802	7.296	6.764	6.678	6.563	6.534	6.484	6.475	5.875	5.847	5.532	5.532	4.336	4.185
185	7.976	7.462	6.921	6.844	6.727	6.697	6.647	6.637	6.011	5.982	5.682	5.682	4.414	4.256
190	8.150	7.628	7.078	7.011	6.891	6.861	6.809	6.799	6.174	6.132	5.833	5.833	4.492	4.328
195	8.324	7.795	7.234	7.177	7.055	7.024	6.972	6.961	6.371	6.328	5.983	5.983	4.795	4.400
200	-	7.961	7.391	7.343	7.219	7.187	7.134	7.124	6.568	6.525	6.120	6.120	5.123	4.472
205	-	8.127	7.547	7.509	7.383	7.351	7.297	7.286	6.764	6.722	6.228	6.228	5.451	4.665
210	-	8.293	7.704	7.675	7.547	7.514	7.459	7.448	6.961	6.918	6.335	6.335	5.780	4.940
215	-	-	7.861	7.841	7.711	7.678	7.622	7.610	7.158	7.115	6.443	6.443	6.092	5.214
220	-	-	8.017	8.008	7.875	7.841	7.784	7.773	7.355	7.311	6.550	6.550	6.180	5.488
225	-	-	8.174	8.174	8.039	8.005	7.946	7.935	7.552	7.508	6.721	6.658	6.269	5.762
230	-	-	8.331	8.340	8.203	8.168	8.109	8.097	7.749	7.705	6.900	6.765	6.357	6.037
235	-	-	-	-	8.367	8.332	8.271	8.259	7.946	7.901	7.080	6.873	6.445	6.146
240	-	-	-	-	-	-	-	8.421	8.143	8.098	7.259	6.980	6.534	6.219
245	-	-	-	-	-	-	-	-	8.340	8.295	7.439	7.088	6.622	6.292
250	-	-	-	-	-	-	-	-	-	-	7.618	7.195	6.711	6.364
255	-	-	-	-	-	-	-	-	-	-	7.798	7.303	6.799	6.437
260	-	-	-	-	-	-	-	-	-	-	7.977	7.410	6.887	6.510
265	-	-	-	-	-	-	-	-	-	-	8.157	7.518	6.976	6.583
270	-	-	-	-	-	-	-	-	-	-	8.337	7.625	7.064	6.656
275	-	-	-	-	-	-	-	-	-	-	-	7.733	7.152	6.729
280	-	-	-	-	-	-	-	-	-	-	-	7.840	7.241	6.802
285	-	-	-	-	-	-	-	-	-	-	-	7.948	7.329	6.874
290	-	-	-	-	-	-	-	-	-	-	-	8.055	7.417	6.947
295	-	-	-	-	-	-	-	-	-	-	-	8.163	7.506	7.020
300	-	-	-	-	-	-	-	-	-	-	-	8.270	7.594	7.093
305	-	-	-	-	-	-	-	-	-	-	-	8.378	7.682	7.166
310	-	-	-	-	-	-	-	-	-	-	-	-	7.771	7.239
315	-	-	-	-	-	-	-	-	-	-	-	-	7.859	7.312
320	-	-	-	-	-	-	-	-	-	-	-	-	7.948	7.384
325	-	-	-	-	-	-	-	-	-	-	-	-	8.036	7.457
330	-	-	-	-	-	-	-	-	-	-	-	-	8.124	7.530
335	-	-	-	-	-	-	-	-	-	-	-	-	8.213	7.603
340	-	-	-	-	-	-	-	-	-	-	-	-	8.301	7.676
345	-	-	-	-	-	-	-	-	-	-	-	-	8.389	7.749
350	-	-	-	-	-	-	-	-	-	-	-	-	-	7.822
355	-	-	-	-	-	-	-	-	-	-	-	-	-	7.895

Thickness is intumescent only. Results also apply to rectangular hollow beams exposed on all four sides limited to a maximum protection thickness of 5.667mm.

Table 34 Rectangular Hollow Columns 90 minutes														
Required Thickness (mm) for a Design Temperature (°C)														
Section Factor (m-1)	350	400	450	500	512	515	520	521	547	550	600	650	700	750
50	-	-	2.622	2.092	1.971	1.942	1.894	1.884	1.774	1.758	1.548	1.386	1.241	1.080
55	-	-	3.017	2.444	2.312	2.280	2.228	2.217	1.985	1.968	1.745	1.577	1.428	1.260
60	-	-	3.418	2.844	2.706	2.674	2.619	2.608	2.332	2.299	1.942	1.768	1.614	1.448
65	-	-	-	3.243	3.100	3.067	3.010	2.999	2.730	2.697	2.240	1.960	1.801	1.636
70	-	-	-	-	-	3.461	3.401	3.391	3.128	3.094	2.642	2.223	1.988	1.824
75	-	-	-	-	-	-	-	3.630	3.499	3.483	3.044	2.539	2.225	2.012
80	-	-	-	-	-	-	-	3.829	3.691	3.674	3.446	2.856	2.484	2.267
85	-	-	-	-	-	-	-	4.027	3.882	3.865	3.636	3.172	2.742	2.535
90	-	-	-	-	-	-	-	4.226	4.074	4.056	3.810	3.482	3.001	2.803
95	-	-	-	-	-	-	-	4.425	4.266	4.247	3.984	3.644	3.259	3.070
100	-	-	-	-	-	-	-	4.623	4.457	4.438	4.158	3.807	3.499	3.338
105	-	-	-	-	-	-	-	4.822	4.649	4.628	4.333	3.970	3.645	3.547
110	-	-	-	-	-	-	-	5.020	4.841	4.819	4.507	4.133	3.791	3.696
115	-	-	-	-	-	-	-	5.219	5.032	5.010	4.681	4.296	3.937	3.844
120	-	-	-	-	-	-	-	5.418	5.224	5.201	4.855	4.459	4.083	3.993
125	-	-	-	-	-	-	-	5.616	5.416	5.392	5.029	4.621	4.229	4.141
130	-	-	-	-	-	-	-	5.815	5.608	5.583	5.203	4.784	4.375	4.290
135	-	-	-	-	-	-	-	6.013	5.799	5.774	5.377	4.947	4.521	4.439
140	-	-	-	-	-	-	-	6.212	5.991	5.965	5.551	5.110	4.668	4.587
145	-	-	-	-	-	-	-	6.411	6.183	6.156	5.725	5.273	4.814	4.736
150	-	-	-	-	-	-	-	6.609	6.374	6.347	5.900	5.436	4.960	4.884
155	-	-	-	-	-	-	-	6.808	6.566	6.538	6.074	5.598	5.106	5.033
160	-	-	-	-	-	-	-	7.006	6.758	6.729	6.248	5.761	5.252	5.182
165	-	-	-	-	-	-	-	7.205	6.949	6.920	6.422	5.924	5.398	5.330
170	-	-	-	-	-	-	-	7.404	7.141	7.111	6.596	6.087	5.544	5.479
175	-	-	-	-	-	-	-	7.602	7.333	7.302	6.770	6.250	5.691	5.627
180	-	-	-	-	-	-	-	7.801	7.524	7.492	6.944	6.413	5.837	5.776
185	-	-	-	-	-	-	-	7.999	7.716	7.683	7.118	6.575	5.983	5.925
190	-	-	-	-	-	-	-	8.198	7.908	7.874	7.292	6.738	6.129	6.073
195	-	-	-	-	-	-	-	8.397	8.099	8.065	7.467	6.901	6.275	6.179
200	-	-	-	-	-	-	-	-	8.291	8.256	7.641	7.064	6.421	6.280
205	-	-	-	-	-	-	-	-	-	-	7.815	7.227	6.567	6.381
210	-	-	-	-	-	-	-	-	-	-	7.989	7.390	6.713	6.483
215	-	-	-	-	-	-	-	-	-	-	8.163	7.552	6.860	6.584
220	-	-	-	-	-	-	-	-	-	-	8.337	7.715	7.006	6.686
225	-	-	-	-	-	-	-	-	-	-	-	7.878	7.152	6.787
230	-	-	-	-	-	-	-	-	-	-	-	8.041	7.298	6.888
235	-	-	-	-	-	-	-	-	-	-	-	8.204	7.444	6.990
240	-	-	-	-	-	-	-	-	-	-	-	8.367	7.590	7.091
245	-	-	-	-	-	-	-	-	-	-	-	-	7.736	7.193
250	-	-	-	-	-	-	-	-	-	-	-	-	7.882	7.294
255	-	-	-	-	-	-	-	-	-	-	-	-	8.029	7.395
260	-	-	-	-	-	-	-	-	-	-	-	-	8.175	7.497
265	-	-	-	-	-	-	-	-	-	-	-	-	8.321	7.598
270	-	-	-	-	-	-	-	-	-	-	-	-	-	7.700
275	-	-	-	-	-	-	-	-	-	-	-	-	-	7.801
280	-	-	-	-	-	-	-	-	-	-	-	-	-	7.902
285	-	-	-	-	-	-	-	-	-	-	-	-	-	8.004
290	-	-	-	-	-	-	-	-	-	-	-	-	-	8.105
295	-	-	-	-	-	-	-	-	-	-	-	-	-	8.207
300	-	-	-	-	-	-	-	-	-	-	-	-	-	8.308
305	-	-	-	-	-	-	-	-	-	-	-	-	-	8.409
310	-	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-
335	-	-	-	-	-	-	-	-	-	-	-	-	-	-
340	-	-	-	-	-	-	-	-	-	-	-	-	-	-
345	-	-	-	-	-	-	-	-	-	-	-	-	-	-
350	-	-	-	-	-	-	-	-	-	-	-	-	-	-
355	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results also apply to rectangular hollow beams exposed on all four sides limited to a maximum protection thickness of 5.667mm.

Table 35 Rectangular Hollow Beams 15 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	580	600	603	610	620	650	700	750
40	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
45	0.404	0.404	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
50	0.414	0.414	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
55	0.424	0.424	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
60	0.434	0.434	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
65	0.444	0.444	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
70	0.453	0.453	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
75	0.463	0.463	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
80	0.473	0.473	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
85	0.483	0.483	0.397	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
90	0.493	0.493	0.419	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
95	0.503	0.503	0.441	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
100	0.513	0.513	0.462	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
105	0.523	0.523	0.484	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
110	0.533	0.533	0.506	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
115	0.543	0.543	0.527	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
120	0.552	0.552	0.549	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
125	0.571	0.571	0.571	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
130	0.592	0.592	0.592	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
135	0.614	0.614	0.614	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
140	0.636	0.636	0.636	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
145	0.657	0.657	0.657	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
150	0.679	0.679	0.679	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
155	0.700	0.700	0.700	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
160	0.722	0.722	0.722	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
165	0.744	0.744	0.744	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
170	0.765	0.765	0.765	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
175	0.787	0.787	0.787	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
180	0.809	0.809	0.809	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
185	0.830	0.830	0.830	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
190	0.852	0.852	0.852	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
195	0.874	0.874	0.874	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
200	0.895	0.895	0.895	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
205	0.917	0.917	0.917	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
210	0.939	0.939	0.939	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
215	0.960	0.960	0.960	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
220	0.982	0.982	0.982	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
225	1.004	1.004	1.004	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
230	1.025	1.025	1.025	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
235	1.047	1.047	1.047	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
240	1.068	1.068	1.068	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
245	1.090	1.090	1.090	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
250	1.112	1.112	1.112	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
255	1.133	1.133	1.133	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
260	1.155	1.155	1.155	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
265	1.177	1.177	1.177	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
270	1.198	1.198	1.198	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
275	1.220	1.220	1.220	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
280	1.242	1.242	1.242	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
285	1.263	1.263	1.263	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
290	1.285	1.285	1.285	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
295	1.307	1.307	1.307	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
300	1.328	1.328	1.328	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
305	1.350	1.350	1.350	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
310	1.371	1.371	1.371	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
315	1.393	1.393	1.393	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
320	1.415	1.415	1.415	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
325	1.436	1.436	1.436	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
330	1.458	1.458	1.458	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
335	1.480	1.480	1.480	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
340	1.501	1.501	1.501	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 36 Rectangular Hollow Beams 20 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	580	600	603	610	620	650	700	750
40	0.454	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
45	0.471	0.406	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
50	0.487	0.420	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
55	0.503	0.434	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
60	0.520	0.447	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
65	0.536	0.461	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
70	0.553	0.475	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
75	0.569	0.489	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
80	0.585	0.503	0.416	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
85	0.602	0.516	0.447	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
90	0.618	0.530	0.478	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
95	0.635	0.544	0.509	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
100	0.651	0.558	0.539	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
105	0.667	0.572	0.570	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
110	0.684	0.601	0.601	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
115	0.700	0.632	0.632	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
120	0.716	0.663	0.663	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
125	0.733	0.693	0.693	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
130	0.749	0.724	0.724	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
135	0.766	0.755	0.755	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
140	0.786	0.786	0.786	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
145	0.817	0.817	0.817	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
150	0.847	0.847	0.847	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
155	0.878	0.878	0.878	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
160	0.909	0.909	0.909	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
165	0.940	0.940	0.940	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
170	0.971	0.971	0.971	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
175	1.002	1.002	1.002	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
180	1.032	1.032	1.032	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
185	1.063	1.063	1.063	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
190	1.094	1.094	1.094	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
195	1.125	1.125	1.125	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
200	1.156	1.156	1.156	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
205	1.186	1.186	1.186	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
210	1.217	1.217	1.217	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
215	1.248	1.248	1.248	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
220	1.279	1.279	1.279	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
225	1.310	1.310	1.310	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
230	1.340	1.340	1.340	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
235	1.371	1.371	1.371	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
240	1.402	1.402	1.402	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
245	1.433	1.433	1.433	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
250	1.464	1.464	1.464	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
255	1.494	1.494	1.494	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
260	1.525	1.525	1.525	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
265	1.556	1.556	1.556	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
270	1.587	1.587	1.587	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
275	1.618	1.618	1.618	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
280	1.648	1.648	1.648	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
285	1.679	1.679	1.679	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
290	1.710	1.710	1.710	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
295	1.741	1.741	1.741	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
300	1.772	1.772	1.772	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
305	1.802	1.802	1.802	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
310	1.833	1.833	1.833	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
315	1.864	1.864	1.864	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
320	1.895	1.895	1.895	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
325	1.926	1.926	1.926	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
330	1.956	1.956	1.956	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
335	1.987	1.987	1.987	0.404	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
340	2.018	2.018	2.018	0.452	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 37 Rectangular Hollow Beams 30 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	580	600	603	610	620	650	700	750
40	0.671	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
45	0.693	0.413	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
50	0.716	0.435	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
55	0.738	0.457	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
60	0.761	0.479	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
65	0.783	0.501	0.402	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
70	0.806	0.524	0.452	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
75	0.829	0.546	0.502	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
80	0.851	0.568	0.552	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
85	0.874	0.602	0.602	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
90	0.896	0.652	0.652	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
95	0.919	0.702	0.702	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
100	0.941	0.752	0.752	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
105	0.964	0.802	0.802	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
110	0.986	0.851	0.851	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
115	1.009	0.901	0.901	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
120	1.031	0.951	0.951	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
125	1.054	1.001	1.001	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
130	1.076	1.051	1.051	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
135	1.101	1.101	1.101	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
140	1.151	1.151	1.151	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
145	1.201	1.201	1.201	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
150	1.251	1.251	1.251	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
155	1.301	1.301	1.301	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
160	1.351	1.351	1.351	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
165	1.401	1.401	1.401	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
170	1.451	1.451	1.451	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
175	1.501	1.501	1.501	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
180	1.551	1.551	1.551	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
185	1.601	1.601	1.601	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
190	1.651	1.651	1.651	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
195	1.701	1.701	1.701	0.442	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
200	1.751	1.751	1.751	0.513	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
205	1.801	1.801	1.801	0.584	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
210	1.851	1.851	1.851	0.655	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
215	1.901	1.901	1.901	0.726	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
220	1.951	1.951	1.951	0.797	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
225	2.001	2.001	2.001	0.868	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
230	2.051	2.051	2.051	0.940	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
235	2.101	2.101	2.101	1.011	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
240	2.151	2.151	2.151	1.082	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
245	2.201	2.201	2.201	1.153	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
250	2.251	2.251	2.251	1.224	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
255	2.300	2.300	2.300	1.295	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
260	2.350	2.350	2.350	1.366	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
265	2.400	2.400	2.400	1.437	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
270	2.450	2.450	2.450	1.509	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
275	2.500	2.500	2.500	1.580	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
280	2.550	2.550	2.550	1.651	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
285	2.600	2.600	2.600	1.722	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
290	2.650	2.650	2.650	1.793	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
295	2.700	2.700	2.700	1.864	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
300	2.750	2.750	2.750	1.935	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
305	2.800	2.800	2.800	2.007	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
310	2.850	2.850	2.850	2.078	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
315	2.900	2.900	2.900	2.149	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
320	2.950	2.950	2.950	2.220	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
325	3.000	3.000	3.000	2.291	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
330	3.050	3.050	3.050	2.362	0.431	0.431	0.431	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
335	3.100	3.100	3.100	2.433	0.550	0.550	0.550	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
340	3.150	3.150	3.150	2.504	0.669	0.669	0.669	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 38 Rectangular Hollow Beams 45 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	580	600	603	610	620	650	700	750
40	0.997	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
45	1.055	0.445	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
50	1.113	0.499	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
55	1.171	0.552	0.447	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
60	1.229	0.605	0.527	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
65	1.287	0.658	0.607	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
70	1.345	0.711	0.687	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
75	1.403	0.767	0.767	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
80	1.461	0.847	0.847	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
85	1.519	0.927	0.927	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
90	1.577	1.007	1.007	0.403	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
95	1.635	1.087	1.087	0.494	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
100	1.693	1.167	1.167	0.586	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
105	1.751	1.248	1.248	0.677	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
110	1.809	1.328	1.328	0.769	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
115	1.867	1.408	1.408	0.861	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
120	1.925	1.488	1.488	0.952	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
125	1.983	1.568	1.568	1.044	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
130	2.068	1.648	1.648	1.135	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
135	2.160	1.728	1.728	1.227	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
140	2.251	1.808	1.808	1.319	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
145	2.343	1.888	1.888	1.410	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
150	2.434	1.968	1.968	1.502	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
155	2.526	2.048	2.048	1.594	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
160	2.617	2.129	2.129	1.685	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
165	2.709	2.209	2.209	1.777	0.488	0.488	0.488	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
170	2.800	2.289	2.289	1.868	0.616	0.616	0.616	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
175	2.892	2.369	2.369	1.960	0.744	0.744	0.744	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
180	2.983	2.449	2.449	2.052	0.872	0.872	0.872	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
185	3.057	2.529	2.529	2.143	1.000	1.000	1.000	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
190	3.123	2.609	2.609	2.235	1.128	1.128	1.128	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
195	3.190	2.689	2.689	2.326	1.256	1.256	1.256	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
200	3.256	2.769	2.769	2.418	1.384	1.384	1.384	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
205	3.323	2.849	2.849	2.510	1.512	1.512	1.512	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
210	3.389	2.930	2.930	2.601	1.640	1.640	1.640	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
215	3.456	3.010	3.010	2.693	1.768	1.768	1.768	0.541	0.428	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
220	3.522	3.090	3.090	2.784	1.896	1.896	1.896	0.721	0.613	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
225	3.589	3.170	3.170	2.876	2.024	2.024	2.024	0.901	0.798	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
230	3.656	3.250	3.250	2.968	2.153	2.153	2.153	1.082	0.984	0.485	0.485	0.385	0.385	0.385	0.385	0.385	0.385	0.385
235	3.722	3.330	3.330	3.059	2.281	2.281	2.281	1.262	1.169	0.697	0.697	0.385	0.385	0.385	0.385	0.385	0.385	0.385
240	3.789	3.410	3.410	3.151	2.409	2.409	2.409	1.442	1.355	0.908	0.908	0.385	0.385	0.385	0.385	0.385	0.385	0.385
245	3.855	3.490	3.490	3.243	2.537	2.537	2.537	1.623	1.540	1.119	1.119	0.421	0.385	0.385	0.385	0.385	0.385	0.385
250	3.922	3.570	3.570	3.334	2.665	2.665	2.665	1.803	1.725	1.330	1.330	0.656	0.550	0.385	0.385	0.385	0.385	0.385
255	3.988	3.650	3.650	3.426	2.793	2.793	2.793	1.983	1.911	1.541	1.541	0.891	0.788	0.530	0.385	0.385	0.385	0.385
260	4.055	3.745	3.730	3.517	2.921	2.921	2.921	2.164	2.096	1.753	1.753	1.125	1.026	0.776	0.385	0.385	0.385	0.385
265	4.121	3.872	3.811	3.609	3.049	3.049	3.049	2.344	2.281	1.964	1.964	1.360	1.264	1.023	0.516	0.385	0.385	0.385
270	4.188	3.999	3.891	3.701	3.177	3.177	3.177	2.524	2.467	2.175	2.175	1.594	1.501	1.269	0.801	0.385	0.385	0.385
275	4.254	4.125	3.971	3.792	3.305	3.305	3.305	2.704	2.652	2.386	2.386	1.829	1.739	1.515	1.086	0.385	0.385	0.385
280	4.321	4.252	4.051	3.884	3.433	3.433	3.433	2.885	2.837	2.598	2.598	2.063	1.977	1.762	1.371	0.385	0.385	0.385
285	4.387	4.379	4.131	3.975	3.561	3.561	3.561	3.065	3.023	2.809	2.809	2.298	2.215	2.008	1.656	0.385	0.385	0.385
290	-	-	4.211	4.067	3.689	3.689	3.689	3.245	3.208	3.020	3.020	2.532	2.452	2.254	1.942	0.385	0.385	0.385
295	-	-	4.291	4.159	3.817	3.817	3.817	3.426	3.393	3.231	3.231	2.767	2.690	2.501	2.227	0.588	0.385	0.385
300	-	-	4.371	4.250	3.945	3.945	3.945	3.606	3.579	3.442	3.442	3.002	2.928	2.747	2.512	0.926	0.385	0.385
305	-	-	-	4.342	4.210	4.109	4.073	3.786	3.764	3.654	3.654	3.236	3.166	2.993	2.797	1.264	0.385	0.385
310	-	-	-	-	-	-	4.201	3.967	3.950	3.865	3.865	3.471	3.403	3.240	3.082	1.602	0.385	0.385
315	-	-	-	-	-	-	4.329	4.147	4.135	4.076	4.076	3.705	3.641	3.486	3.367	1.940	0.385	0.385
320	-	-	-	-	-	-	-	4.327	4.320	4.287	4.287	3.940	3.879	3.732	3.652	2.278	0.385	0.385
325	-	-	-	-	-	-	-	-	-	-	-	4.174	4.117	3.979	3.937	2.616	0.385	0.385
330	-	-	-	-	-	-	-	-	-	-	-	-	-	4.225	4.222	2.954	0.385	0.385
335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.292	0.385	0.385
340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.630	0.385	0.385

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 39 Rectangular Hollow Beams 60 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	580	600	603	610	620	650	700	750
40	1.322	0.547	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
45	1.421	0.667	0.426	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
50	1.520	0.787	0.512	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
55	1.619	0.907	0.597	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
60	1.717	1.026	0.683	0.419	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
65	1.816	1.146	0.769	0.479	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
70	1.915	1.266	0.854	0.540	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
75	2.034	1.386	0.940	0.601	0.410	0.410	0.410	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
80	2.241	1.506	1.025	0.662	0.524	0.524	0.524	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
85	2.449	1.626	1.111	0.723	0.638	0.638	0.638	0.468	0.458	0.415	0.415	0.385	0.385	0.385	0.385	0.385	0.385	0.385
90	2.656	1.745	1.197	0.783	0.752	0.752	0.752	0.583	0.573	0.531	0.531	0.385	0.385	0.385	0.385	0.385	0.385	0.385
95	2.863	1.865	1.282	0.866	0.866	0.866	0.866	0.698	0.688	0.647	0.647	0.397	0.385	0.385	0.385	0.385	0.385	0.385
100	3.030	1.985	1.368	0.980	0.980	0.980	0.980	0.813	0.804	0.763	0.763	0.517	0.473	0.385	0.385	0.385	0.385	0.385
105	3.099	2.122	1.453	1.094	1.094	1.094	1.094	0.928	0.919	0.878	0.878	0.637	0.593	0.481	0.385	0.385	0.385	0.385
110	3.169	2.260	1.539	1.207	1.207	1.207	1.207	1.043	1.034	0.994	0.994	0.757	0.714	0.605	0.385	0.385	0.385	0.385
115	3.238	2.399	1.625	1.321	1.321	1.321	1.321	1.158	1.149	1.110	1.110	0.877	0.835	0.728	0.483	0.385	0.385	0.385
120	3.308	2.537	1.710	1.435	1.435	1.435	1.435	1.274	1.264	1.226	1.226	0.997	0.956	0.851	0.615	0.385	0.385	0.385
125	3.378	2.675	1.796	1.549	1.549	1.549	1.549	1.389	1.379	1.341	1.341	1.117	1.077	0.974	0.746	0.385	0.385	0.385
130	3.447	2.814	1.881	1.663	1.663	1.663	1.663	1.504	1.495	1.457	1.457	1.237	1.198	1.098	0.878	0.385	0.385	0.385
135	3.517	2.952	1.967	1.777	1.777	1.777	1.777	1.619	1.610	1.573	1.573	1.357	1.319	1.221	1.009	0.385	0.385	0.385
140	3.586	3.064	2.065	1.891	1.891	1.891	1.891	1.734	1.725	1.689	1.689	1.477	1.439	1.344	1.141	0.385	0.385	0.385
145	3.656	3.156	2.169	2.005	2.005	2.005	2.005	1.849	1.840	1.804	1.804	1.597	1.560	1.468	1.272	0.385	0.385	0.385
150	3.725	3.249	2.274	2.119	2.119	2.119	2.119	1.964	1.955	1.920	1.920	1.717	1.681	1.591	1.404	0.385	0.385	0.385
155	3.795	3.341	2.378	2.232	2.232	2.232	2.232	2.079	2.071	2.036	2.036	1.837	1.802	1.714	1.535	0.544	0.385	0.385
160	3.865	3.434	2.482	2.346	2.346	2.346	2.346	2.194	2.186	2.152	2.152	1.957	1.923	1.837	1.667	0.711	0.385	0.385
165	3.934	3.526	2.587	2.460	2.460	2.460	2.460	2.309	2.301	2.268	2.268	2.077	2.044	1.961	1.798	0.877	0.385	0.385
170	4.004	3.619	2.691	2.574	2.574	2.574	2.574	2.424	2.416	2.383	2.383	2.197	2.165	2.084	1.930	1.043	0.385	0.385
175	4.073	3.712	2.795	2.688	2.688	2.688	2.688	2.539	2.531	2.499	2.499	2.317	2.285	2.207	2.061	1.210	0.385	0.385
180	4.143	3.804	2.900	2.802	2.802	2.802	2.802	2.654	2.647	2.615	2.615	2.437	2.406	2.330	2.193	1.376	0.385	0.385
185	4.213	3.897	3.004	2.916	2.916	2.916	2.916	2.769	2.762	2.731	2.731	2.557	2.527	2.454	2.324	1.542	0.385	0.385
190	4.282	3.989	3.220	3.030	3.030	3.030	3.030	2.884	2.877	2.846	2.846	2.677	2.648	2.577	2.456	1.709	0.385	0.385
195	4.352	4.082	3.443	3.144	3.144	3.144	3.144	2.999	2.992	2.962	2.962	2.797	2.769	2.700	2.588	1.875	0.385	0.385
200	-	4.175	3.665	3.257	3.257	3.257	3.257	3.114	3.107	3.078	3.078	2.917	2.890	2.823	2.719	2.041	0.385	0.385
205	-	4.267	3.887	3.371	3.371	3.371	3.371	3.230	3.223	3.194	3.194	3.037	3.011	2.947	2.851	2.208	0.385	0.385
210	-	4.360	4.110	3.485	3.485	3.485	3.485	3.345	3.338	3.309	3.309	3.157	3.132	3.070	2.982	2.374	0.385	0.385
215	-	-	-	3.623	3.599	3.599	3.599	3.460	3.453	3.425	3.425	3.277	3.252	3.193	3.114	2.540	0.385	0.385
220	-	-	-	3.944	3.713	3.713	3.713	3.575	3.568	3.541	3.541	3.397	3.373	3.316	3.245	2.707	0.385	0.385
225	-	-	-	4.265	3.827	3.827	3.827	3.690	3.683	3.657	3.657	3.516	3.494	3.440	3.377	2.873	0.385	0.385
230	-	-	-	-	3.941	3.941	3.941	3.805	3.799	3.772	3.772	3.636	3.615	3.563	3.508	3.039	0.385	0.385
235	-	-	-	-	-	4.055	4.055	3.920	3.914	3.888	3.888	3.756	3.736	3.686	3.640	3.206	0.385	0.385
240	-	-	-	-	-	4.169	4.169	4.035	4.029	4.004	4.004	3.876	3.857	3.809	3.771	3.372	0.708	0.675
245	-	-	-	-	-	4.338	4.283	4.150	4.144	4.120	4.120	3.996	3.978	3.933	3.903	3.538	1.210	0.984
250	-	-	-	-	-	-	4.396	4.265	4.259	4.235	4.235	4.116	4.098	4.056	4.034	3.705	1.712	1.293
255	-	-	-	-	-	-	-	4.380	4.374	4.351	4.351	4.236	4.219	4.179	4.166	3.871	2.213	1.602
260	-	-	-	-	-	-	-	-	-	-	-	4.356	4.340	4.302	4.297	4.037	2.715	1.911
265	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.204	3.217	2.22
270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.370	3.718	2.529
275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.838
280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.147
285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.456
290	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.765
295	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.074
300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
305	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 40 Rectangular Hollow Beams 75 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	580	600	603	610	620	650	700	750
40	1.648	1.001	0.586	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
45	1.788	1.178	0.734	0.436	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
50	1.927	1.355	0.882	0.553	0.427	0.427	0.427	0.389	0.387	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385	0.385
55	2.166	1.531	1.031	0.671	0.509	0.509	0.509	0.460	0.457	0.447	0.447	0.395	0.387	0.385	0.385	0.385	0.385	0.385
60	2.500	1.708	1.179	0.789	0.591	0.591	0.591	0.530	0.527	0.515	0.515	0.455	0.446	0.425	0.385	0.385	0.385	0.385
65	2.834	1.885	1.327	0.906	0.711	0.672	0.672	0.601	0.597	0.583	0.583	0.516	0.505	0.492	0.492	0.385	0.385	0.385
70	3.049	2.090	1.475	1.024	0.872	0.793	0.754	0.671	0.667	0.652	0.652	0.617	0.617	0.617	0.617	0.385	0.385	0.385
75	3.132	2.343	1.624	1.141	1.034	0.952	0.836	0.742	0.742	0.742	0.742	0.742	0.742	0.742	0.742	0.446	0.385	0.385
80	3.215	2.595	1.772	1.259	1.195	1.111	0.918	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.866	0.573	0.385	0.385
85	3.298	2.848	1.920	1.377	1.357	1.269	1.000	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.701	0.385	0.385
90	3.382	3.040	2.100	1.518	1.518	1.428	1.116	1.116	1.116	1.116	1.116	1.116	1.116	1.116	1.116	0.829	0.385	0.385
95	3.465	3.124	2.310	1.679	1.679	1.586	1.241	1.241	1.241	1.241	1.241	1.241	1.241	1.241	1.241	0.957	0.385	0.385
100	3.548	3.209	2.521	1.841	1.841	1.745	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.085	0.385	0.385
105	3.631	3.294	2.732	2.002	2.002	1.904	1.490	1.490	1.490	1.490	1.490	1.490	1.490	1.490	1.490	1.213	0.498	0.385
110	3.714	3.379	2.943	2.164	2.164	2.062	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.340	0.643	0.385
115	3.798	3.463	3.076	2.325	2.325	2.221	1.740	1.740	1.740	1.740	1.740	1.740	1.740	1.740	1.740	1.468	0.788	0.385
120	3.881	3.548	3.175	2.487	2.487	2.379	1.864	1.864	1.864	1.864	1.864	1.864	1.864	1.864	1.864	1.596	0.933	0.385
125	3.964	3.633	3.273	2.648	2.648	2.538	1.989	1.989	1.989	1.989	1.989	1.989	1.989	1.989	1.989	1.724	1.078	0.385
130	4.047	3.717	3.371	2.810	2.810	2.697	2.114	2.114	2.114	2.114	2.114	2.114	2.114	2.114	2.114	1.852	1.223	0.385
135	4.131	3.802	3.470	2.971	2.971	2.855	2.239	2.239	2.239	2.239	2.239	2.239	2.239	2.239	2.239	1.979	1.369	0.385
140	4.214	3.887	3.568	3.084	3.084	3.012	2.364	2.364	2.364	2.364	2.364	2.364	2.364	2.364	2.364	2.107	1.514	0.385
145	4.297	3.971	3.666	3.182	3.182	3.114	2.488	2.488	2.488	2.488	2.488	2.488	2.488	2.488	2.488	2.235	1.659	0.385
150	-	4.056	3.764	3.280	3.280	3.216	2.613	2.613	2.613	2.613	2.613	2.613	2.613	2.613	2.613	2.363	1.804	0.385
155	-	4.141	3.863	3.391	3.377	3.317	2.738	2.738	2.738	2.738	2.738	2.738	2.738	2.738	2.738	2.491	1.949	0.385
160	-	4.225	3.961	3.532	3.475	3.419	2.863	2.863	2.863	2.863	2.863	2.863	2.863	2.863	2.863	2.618	2.095	0.385
165	-	4.310	4.059	3.674	3.573	3.521	2.987	2.987	2.987	2.987	2.987	2.987	2.987	2.987	2.987	2.746	2.240	0.385
170	-	4.395	4.157	3.815	3.671	3.623	3.112	3.112	3.112	3.112	3.112	3.112	3.112	3.112	3.112	2.874	2.385	0.385
175	-	-	4.256	3.957	3.769	3.725	3.237	3.237	3.237	3.237	3.237	3.237	3.237	3.237	3.237	3.002	2.530	0.385
180	-	-	4.354	4.098	3.867	3.826	3.362	3.362	3.362	3.362	3.362	3.362	3.362	3.362	3.362	3.130	2.675	0.385
185	-	-	-	4.239	3.964	3.928	3.486	3.486	3.486	3.486	3.486	3.486	3.486	3.486	3.486	3.257	2.821	0.385
190	-	-	-	-	4.062	4.030	3.611	3.611	3.611	3.611	3.611	3.611	3.611	3.611	3.611	3.385	2.966	0.385
195	-	-	-	-	-	-	-	3.831	3.811	3.736	3.736	3.736	3.736	3.736	3.736	3.513	3.111	0.385
200	-	-	-	-	-	-	-	4.126	4.112	4.047	4.047	3.861	3.861	3.861	3.861	3.641	3.256	0.578
205	-	-	-	-	-	-	-	-	-	4.371	4.371	4.014	3.985	3.985	3.985	3.769	3.401	0.974
210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.110	3.897	3.546	1.370
215	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.235	4.024	3.692	1.766
220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.360	4.152	3.837	2.163
225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.280	3.982	2.559
230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.408	4.127	2.955
235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.272	3.352
240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.748
245	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
265	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
290	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
295	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
305	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 41 Rectangular Hollow Beams 90 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	580	600	603	610	620	650	700	750
40	1.974	1.456	1.012	0.662	0.536	0.536	0.536	0.492	0.489	0.478	0.478	0.420	0.410	0.385	0.385	0.385	0.385	0.385
45	2.406	1.689	1.214	0.834	0.663	0.663	0.663	0.606	0.603	0.590	0.590	0.523	0.512	0.489	0.454	0.385	0.385	0.385
50	2.872	1.923	1.415	1.006	0.791	0.791	0.791	0.720	0.717	0.702	0.702	0.626	0.614	0.587	0.548	0.429	0.385	0.385
55	-	2.255	1.617	1.178	0.919	0.919	0.919	0.835	0.831	0.814	0.814	0.730	0.716	0.685	0.643	0.513	0.385	0.385
60	-	2.632	1.818	1.350	1.047	1.047	1.047	0.949	0.944	0.926	0.926	0.833	0.819	0.782	0.737	0.596	0.385	0.385
65	-	3.009	2.036	1.522	1.175	1.175	1.175	1.064	1.058	1.038	1.038	0.936	0.921	0.880	0.831	0.680	0.434	0.385
70	-	-	2.364	1.694	1.303	1.303	1.303	1.178	1.172	1.150	1.150	1.039	1.023	0.977	0.926	0.763	0.497	0.385
75	-	-	2.692	1.866	1.443	1.431	1.431	1.292	1.286	1.262	1.262	1.142	1.125	1.075	1.020	0.846	0.560	0.385
80	-	-	3.012	2.064	1.591	1.559	1.559	1.407	1.400	1.374	1.374	1.245	1.227	1.172	1.114	0.930	0.623	0.385
85	-	-	3.105	2.339	1.739	1.687	1.687	1.521	1.514	1.486	1.486	1.349	1.329	1.270	1.209	1.013	0.687	0.385
90	-	-	3.197	2.614	1.887	1.825	1.815	1.635	1.627	1.598	1.598	1.452	1.431	1.367	1.303	1.097	0.750	0.385
95	-	-	3.290	2.890	2.465	1.970	1.943	1.750	1.741	1.710	1.710	1.555	1.533	1.465	1.397	1.180	0.813	0.385
100	-	-	3.383	3.066	3.066	3.032	2.127	1.864	1.855	1.822	1.822	1.658	1.636	1.562	1.492	1.263	0.876	0.497
105	-	-	3.475	3.167	3.149	3.116	2.349	1.979	1.969	1.933	1.933	1.761	1.738	1.660	1.586	1.347	0.939	0.631
110	-	-	3.568	3.267	3.232	3.199	2.571	2.166	2.148	2.082	2.082	1.865	1.840	1.757	1.681	1.430	1.002	0.764
115	-	-	3.660	3.368	3.314	3.283	2.793	2.365	2.346	2.277	2.277	1.968	1.942	1.855	1.775	1.514	1.065	0.898
120	-	-	3.753	3.469	3.397	3.366	3.012	2.564	2.545	2.471	2.471	2.122	2.076	1.952	1.869	1.597	1.129	1.032
125	-	-	3.845	3.570	3.480	3.450	3.135	2.763	2.743	2.665	2.665	2.294	2.245	2.091	1.989	1.724	1.192	1.165
130	-	-	3.938	3.670	3.563	3.534	3.257	2.962	2.941	2.859	2.859	2.466	2.414	2.261	2.114	1.852	1.299	1.299
135	-	-	4.030	3.771	3.645	3.617	3.379	3.117	3.103	3.043	3.043	2.638	2.583	2.431	2.258	1.979	1.432	1.432
140	-	-	4.123	3.872	3.728	3.701	3.502	3.259	3.246	3.190	3.190	2.811	2.753	2.601	2.415	2.107	1.566	1.566
145	-	-	4.216	3.972	3.811	3.784	3.624	3.401	3.388	3.337	3.337	2.983	2.922	2.771	2.573	2.235	1.699	1.699
150	-	-	4.308	4.073	3.894	3.868	3.746	3.542	3.531	3.485	3.485	3.165	3.101	2.941	2.731	2.363	1.833	1.833
155	-	-	-	4.174	3.976	3.951	3.869	3.684	3.674	3.632	3.632	3.348	3.293	3.137	2.888	2.491	1.966	1.966
160	-	-	-	4.275	4.059	4.035	3.991	3.825	3.817	3.779	3.779	3.532	3.484	3.349	3.072	2.618	2.100	2.100
165	-	-	-	4.375	4.142	4.118	4.114	3.967	3.959	3.927	3.927	3.715	3.675	3.562	3.344	2.746	2.240	2.234
170	-	-	-	-	4.236	4.236	4.236	4.109	4.102	4.074	4.074	3.899	3.866	3.774	3.615	2.874	2.385	2.367
175	-	-	-	-	4.307	4.285	4.358	4.250	4.245	4.222	4.222	4.083	4.057	3.987	3.886	3.002	2.530	2.501
180	-	-	-	-	-	-	-	-	-	4.369	4.369	4.266	4.248	4.199	4.157	3.130	2.675	2.634
185	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.690	2.821	2.768
190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.966	2.901
195	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.706	3.082
200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.461
205	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.840
210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.219
215	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
245	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
265	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
290	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
295	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
305	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 42 Rectangular Hollow Beams 105 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	580	600	603	610	620	650	700	750
40	2.832	1.910	1.439	1.064	0.878	0.878	0.878	0.817	0.813	0.801	0.801	0.734	0.724	0.699	0.658	0.523	0.385	0.385
45	-	2.354	1.693	1.287	1.049	1.049	1.049	0.972	0.968	0.953	0.953	0.877	0.865	0.836	0.792	0.650	0.399	0.385
50	-	2.860	1.948	1.509	1.220	1.220	1.220	1.127	1.122	1.105	1.105	1.019	1.007	0.972	0.927	0.776	0.508	0.385
55	-	-	2.364	1.731	1.391	1.391	1.391	1.282	1.277	1.258	1.258	1.162	1.148	1.109	1.061	0.902	0.616	0.385
60	-	-	2.816	1.953	1.579	1.561	1.561	1.437	1.431	1.410	1.410	1.304	1.290	1.246	1.196	1.029	0.725	0.385
65	-	-	-	2.311	1.775	1.732	1.732	1.592	1.585	1.562	1.562	1.447	1.431	1.383	1.330	1.155	0.833	0.456
70	-	-	-	2.699	1.972	1.918	1.903	1.747	1.740	1.714	1.714	1.589	1.572	1.520	1.465	1.281	0.942	0.677
75	-	-	-	-	3.013	2.728	2.145	1.902	1.894	1.867	1.867	1.732	1.714	1.656	1.599	1.407	1.050	0.897
80	-	-	-	-	3.095	3.073	2.469	2.114	2.098	2.041	2.041	1.874	1.855	1.793	1.734	1.534	1.159	1.118
85	-	-	-	-	3.178	3.155	2.794	2.414	2.397	2.335	2.335	2.036	1.998	1.930	1.868	1.660	1.338	1.338
90	-	-	-	-	3.260	3.238	3.043	2.713	2.696	2.628	2.628	2.307	2.265	2.136	2.010	1.786	1.559	1.559
95	-	-	-	-	3.343	3.320	3.143	3.010	2.994	2.922	2.922	2.579	2.533	2.406	2.265	1.913	1.779	1.779
100	-	-	-	-	3.426	3.403	3.243	3.114	3.107	3.082	3.082	2.850	2.801	2.676	2.520	2.074	2.000	2.000
105	-	-	-	-	3.508	3.486	3.343	3.217	3.211	3.187	3.187	3.054	3.033	2.947	2.776	2.301	2.220	2.220
110	-	-	-	-	3.591	3.568	3.444	3.321	3.315	3.291	3.291	3.163	3.143	3.095	3.019	2.527	2.441	2.441
115	-	-	-	-	3.673	3.651	3.544	3.424	3.419	3.396	3.396	3.272	3.253	3.206	3.135	2.754	2.661	2.661
120	-	-	-	-	3.756	3.734	3.644	3.528	3.522	3.500	3.500	3.381	3.362	3.317	3.252	2.981	2.882	2.882
125	-	-	-	-	3.839	3.816	3.744	3.631	3.626	3.604	3.604	3.489	3.472	3.429	3.368	3.121	3.048	3.048
130	-	-	-	-	3.921	3.899	3.845	3.735	3.730	3.709	3.709	3.598	3.581	3.540	3.484	3.249	3.140	3.140
135	-	-	-	-	4.004	3.982	3.945	3.838	3.833	3.813	3.813	3.707	3.691	3.652	3.600	3.378	3.232	3.232
140	-	-	-	-	4.087	4.064	4.045	3.942	3.937	3.917	3.917	3.816	3.800	3.763	3.717	3.506	3.324	3.324
145	-	-	-	-	4.169	4.147	4.145	4.045	4.041	4.022	4.022	3.924	3.910	3.874	3.833	3.634	3.417	3.417
150	-	-	-	-	4.252	4.246	4.246	4.149	4.144	4.126	4.126	4.033	4.019	3.986	3.949	3.762	3.509	3.509
155	-	-	-	-	4.334	4.312	4.346	4.252	4.248	4.230	4.230	4.142	4.129	4.097	4.065	3.890	3.601	3.601
160	-	-	-	-	-	-	-	4.356	4.352	4.335	4.335	4.251	4.239	4.208	4.182	4.019	3.693	3.693
165	-	-	-	-	-	-	-	-	-	-	-	4.360	4.348	4.320	4.298	4.147	3.814	3.785
170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.275	4.007	3.877
175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.403	4.201	3.970
180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.394	4.062
185	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.154
190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.246
195	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.338
200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
205	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
215	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
245	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
265	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
290	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
295	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
305	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.

Table 43 Rectangular Hollow Beams 120 minutes																		
Required Thickness (mm) for a Design Temperature (°C)																		
Section Factor (m-1)	350	400	450	500	544	550	553	575	576	580	580	600	603	610	620	650	700	750
40	-	2.691	1.865	1.467	1.221	1.221	1.221	1.142	1.138	1.123	1.123	1.049	1.038	1.011	0.972	0.844	0.578	0.385
45	-	-	2.329	1.739	1.434	1.434	1.434	1.337	1.333	1.316	1.316	1.230	1.219	1.186	1.145	1.010	0.731	0.385
50	-	-	2.908	2.026	1.670	1.648	1.648	1.533	1.528	1.508	1.508	1.412	1.399	1.362	1.319	1.176	0.884	0.547
55	-	-	-	2.531	1.914	1.868	1.862	1.729	1.723	1.701	1.701	1.594	1.580	1.538	1.493	1.343	1.036	0.856
60	-	-	-	-	2.772	2.542	2.157	1.924	1.917	1.894	1.894	1.776	1.760	1.713	1.667	1.509	1.189	1.164
65	-	-	-	-	-	-	2.586	2.252	2.237	2.183	2.183	1.957	1.941	1.889	1.840	1.675	1.472	1.472
70	-	-	-	-	-	-	-	2.655	2.639	2.579	2.579	2.293	2.255	2.144	2.034	1.841	1.781	1.781
75	-	-	-	-	-	-	-	-	-	2.976	2.976	2.668	2.627	2.518	2.392	2.089	2.089	2.089
80	-	-	-	-	-	-	-	-	-	3.098	3.098	3.018	2.998	2.892	2.750	2.397	2.397	2.397
85	-	-	-	-	-	-	-	-	-	3.195	3.195	3.115	3.103	3.076	3.036	2.706	2.706	2.706
90	-	-	-	-	-	-	-	-	-	3.292	3.292	3.212	3.201	3.173	3.135	3.010	3.010	3.010
95	-	-	-	-	-	-	-	-	-	3.389	3.389	3.309	3.298	3.271	3.233	3.108	3.086	3.086
100	-	-	-	-	-	-	-	-	-	3.486	3.486	3.407	3.395	3.368	3.332	3.207	3.163	3.163
105	-	-	-	-	-	-	-	-	-	3.583	3.583	3.504	3.492	3.465	3.430	3.306	3.239	3.239
110	-	-	-	-	-	-	-	-	-	3.680	3.680	3.601	3.589	3.563	3.529	3.405	3.315	3.315
115	-	-	-	-	-	-	-	-	-	3.777	3.777	3.698	3.687	3.660	3.627	3.504	3.391	3.391
120	-	-	-	-	-	-	-	-	-	3.874	3.874	3.795	3.784	3.757	3.726	3.603	3.467	3.467
125	-	-	-	-	-	-	-	-	-	3.971	3.971	3.892	3.881	3.854	3.824	3.702	3.544	3.544
130	-	-	-	-	-	-	-	-	-	4.068	4.068	3.989	3.978	3.952	3.923	3.801	3.620	3.620
135	-	-	-	-	-	-	-	-	-	4.165	4.165	4.087	4.076	4.049	4.022	3.900	3.706	3.696
140	-	-	-	-	-	-	-	-	-	4.262	4.262	4.184	4.173	4.146	4.120	3.999	3.812	3.772
145	-	-	-	-	-	-	-	-	-	4.359	4.359	4.281	4.270	4.244	4.219	4.098	3.917	3.848
150	-	-	-	-	-	-	-	-	-	-	-	4.378	4.367	4.341	4.317	4.197	4.023	3.925
155	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.296	4.128	4.001
160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.234	4.077
165	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.339	4.153
170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.229
175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.305
180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.382
185	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
195	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
205	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
215	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
245	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
265	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
290	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
295	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
305	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results apply to beams with concrete slabs with 3 sided fire exposure.