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Authorised and notified according to Article 10 of the Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products.

European Organisation for Technical Approvals

EUOPEAN TECHNICAL APPROVAL ETA -11/0252

Trade name:	Hensotherm 320KS
Holder of the approval:	**Rudolf Hensel GmbH** Lauenburger Landstr 11, D-21039 Bornsen, Germany Telefon : +49 40 72 10 62 12 Telefax : +49 40 72 10 62 52 Web : www.rudolf-hensel.de
Generic type and use of construction product(s):	Reactive Coating for the Fire Protection of Structural Steel
Validity from:	**30/06/2013**
to:	**01/05/2017**
Manufacturing plant(s):	**Rudolf Hensel GmbH** Lauenburger Landstr 11, D-21039 Bornsen, Germany
This European Technical Approval contains:	11 pages and 1 Annex, 35 pages in total.

I LEGAL BASES AND GENERAL CONDITIONS

1 This European Technical Approval is issued by Warrington Certification Limited in accordance with:

The Council Directive (89/106/EEC)[1] of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products as amended by Council Directive 93/68/EEC of 22 July 1993[2].

UK implementation of CPD Statutory Instruments 1991, No 1620 Building and Buildings The Construction Products Regulations 1991- made 15 July 1991, laid before Parliament 22 July 1991, coming into force 27 December 1991, and amended by The Construction Products (Amendment) Regulations 1994 (Statutory Instruments 1994, No 3051).

Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC[3]

European Technical Approval Guideline 018 Fire Protective Products Part 1: General and Part 2: Reactive Coatings For Fire Protection of Steel Elements.

2 Warrington Certification Limited is authorised to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant(s). Nevertheless, the responsibility for the conformity of the products with the European Technical Approval and for their fitness for their intended use remains with the holder of the European Technical Approval.

3 This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1.

4 This European Technical Approval may be withdrawn by Warrington Certification Limited pursuant to Article 5.1 of the Council Directive 89/106/EEC.

5 Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Warrington Certification Limited. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.

6 The European Technical Approval is issued by the approval body in its official language of English. This version should correspond fully to the version used by EOTA for circulation. Translations in other languages have to be designated as such.

[1] Official Journal of the European Communities N° L40, 11 Feb 1989, p 12
[2] Official Journal of the European Communities N° L220, 30 Aug 1993, p 1.
[3] Official Journal of the European Communities N° L17, 20 Jan 1994, p 34.

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 General

Hensotherm 320KS is a spray or brush/roller applied intumescent paint formulated for the fire protection of structural steel elements installed in the following environmental conditions:

Internal and semi-exposed conditions – ETAG 018-2 Type Y
All conditions – ETAG 018-2 Type X

1.2 Intended Use

The intended use of Hensotherm 320KS is to fire protect various sizes of structural steel 'H' or 'I' beams and columns and rectangular and circular hollow section columns for up to a fire resistance classification of R120 and for design temperatures in the range of 350^{o}C to 750^{o}C.

1.3 Working life

The provisions made in this ETA are based on an assumed intended working life of the applied coating for the intended use of 10 years, provided that it is subject to appropriate use and maintenance.

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.

2 Characteristics of the product and methods of verification

The assessment of fitness for use has been made in accordance with ETAG 018-2.

ETAG Clause No.	ETA Clause No.	Characteristic	Assessment of characteristic
5.1		**Mechanical resistance and stability**	Not relevant
5.2	2.1	**Safety in case of fire**	
5.2.1	2.1.1	Resistance to fire	
5.2.2	2.1.2	Reaction to fire	
5.3		**Hygiene, Health and the Environment**	

5.3.2	2.2	- Release of dangerous substances	
5.4	-	**Safety in use**	Not relevant
5.5	-	**Protection against noise**	Not relevant
5.6	-	**Energy, Economy and Heat Retention**	Not relevant
5.7	2.3	**Related aspects of serviceability**	
5.7.2.2	2.3.1 2.3.2 to 2.3.5	- Primer and top coat compatibility - Type Y Durability - Type X Durability	
5.7.3 and Annex E	2.5	- Identification	

2.1 Safety in case of fire

2.1.1 Resistance to Fire

The resistance to fire performance according to EN 13501-2 determined in accordance with test principles defined in EN 13381-8: 2013 including Annex A (slow heating curve as defined in EN 1363-2, "IncSlow" according to EN 13501-2). The test data was analysed adopting the numerical regression method defined in Annex E of EN 13381-8: 2013. Annex A summarises the results of the analysis.

In accordance with ETAG 018-2 (foreword), Hensotherm 320KS 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).

Until the withdrawal of relevant national test and classification standards, CE Marking will cover a finite number of variations in coating thickness subjected to a fire resistance assessment. As time progresses, the performance declaration for fire resistance covered by CE Marking may change and the ETA holder may incorporate the changes in this ETA by amendment or revision.

In the meantime, and taking into account the transitional arrangements for test and classification standards and the corresponding national legislation (see EC Guidance paper J), the ETA holder shall be permitted to maintain and be able to use - on a national basis – the test data for this characteristic, based on relevant national standards, next to the performance declaration covered by the CE Marking based on this ETA.

2.1.2 Reaction to Fire

The fire protection coating in conjunction with Hensogrund 1966E and Hensogrund 2K primer and Hensotop 84 and Hensotop 84 Aussen topcoats has a performance determined for a reaction to fire classification in accordance with EN 13501-1 of Class E. Annex B shows the results of the testing.

2.2 Dangerous substances

According to the manufacturer's declaration, the product specification has been compared with Annex XVII of REACH and the ECHA Candidate List of Substances of Very High Concern to verify that that it does not contain such substances.

2.3 Related Aspects of Serviceability

2.3.1 Hensotherm 320KS has been assessed as being compatible, in accordance with the test procedures defined in ETAG 018-2 Clause 5.7.2.1 with the following primers and topcoats:

Primers	
Name	**Type**
Hensogrund 1966E	Alkyd resin, solvent based
Hensogrund 2K	Two component epoxy resin, solvent based

Top Coats	
Name	**Type**
Hensotop 84	Acrylic resin, solvent based
Hensotop 84 Aussen	Acrylic resin, solvent based
Hensotop SB	Acrylic resin, solvent based

The Hensogrund 2K system has been tested in accordance with the test procedures defined in ETAG 018-2 Clause 5.7.2.1 on galvanised steel substrates and passed the performance requirements for compatibility.

2.3.2 Hensotherm 320KS has been assessed as having passed the requirements for use in internal and semi-exposed conditions defined in ETAG 018-2 for Type Y environmental conditions can be used with and without the following top coats:

Top Coat	
Name	Type
Hensotop 84	Acrylic resin, solvent based

2.3.3 On the basis of passing the Type Y requirements Hensotherm 320KS has been assessed as having also passed the requirements for internal use defined in ETAG 018-2 for Type Z1 and Type Z2 environmental conditions.

2.3.4 Hensotherm 320KS has been assessed as having passed the requirements for use in internal and semi-exposed conditions defined in ETAG 018-2 for Type X environmental conditions can be used with the following top coat:

Top Coat	
Name	Type
Hensotop 84 Aussen	Acrylic resin, solvent based
Hensotop SB	Acrylic resin, solvent based

2.3.5 On the basis of passing the Type X requirements Hensotherm 320KS has been assessed as having also passed the requirements for internal use defined in ETAG 018-2 for Type Y, Type Z1 and Type Z2 environmental conditions.

2.3.6 Hensotherm 320KS has been fingerprinted in accordance with the methods of identification defined in ETAG 018-2 Annex E (Infrared spectroscopy) as well as non-volatile content. Each product container is identified with the name Hensotherm 320KS and is CE marked.

3 Evaluation of Conformity and CE marking

3.1 Attestation of Conformity system

The system of attestation of conformity specified by the European Commission Decision 99/454/EC for fire protective products is system 1 and is detailed as follows:

Certification of the conformity of the product by an approved certification body on the basis of:

(a) Tasks for the manufacturer

-factory production control

-testing of samples taken at the factory in accordance with a prescribed test plan

(b) Tasks for the Notified body

- initial type-testing of the product;

- initial inspection of factory and of factory production control

– continuous surveillance, assessment and approval of factory production control

3.2 Responsibilities

3.2.1 Tasks for the Manufacturer -

3.2.1.1 Factory production control

The manufacturer of Hensotherm 320KS covered by this European Technical Approval shall document, operate and maintain an adequate factory production control system to enable the achievement of the required product characteristics, hence conformity of the product to this ETA, and the effective operation of the production control system to be checked.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control that applies. The manufacturer's documentation and procedures shall be appropriate to the product and manufacturing process. The factory production control system shall achieve an appropriate level of confidence in the conformity of the product. This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations ;

b) the effective implementation of these procedures and instructions.

c) the recording of these procedures and their results.

d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the factory production control to rectify the cause of non-conformity.

e) a procedure to ensure that both the Notified Body and the Certification Body are advised before any significant change to the product, its components or manufacturing process, is made.

f) a procedure to ensure that personnel involved in the production processes and the quality control procedures are qualified and adequately trained to carry out their required tasks.

g) that all testing and measuring equipment is maintained and up to date calibration records are documented.

h) maintenance of records to ensure every container of coating material produced is clearly labelled with the batch number, which allows traceability to its production to be identified.

3.2.1.2 Other tasks for the manufacturer

The following tables derived from ETAG 018-2 specify properties that should be controlled and minimum frequencies of control. The test method and threshold have been laid down in the factory production control plan.

Reactive Coating

Property	Property Paragraph (ETAG)	Threshold	Minimum frequency of tests
Char depth	Annex G or similar	Manufacturer's declaration, minimum value	Every batch
Insulating efficiency	Annex A or alternative(1)	Manufacturer's declaration (2)	Every 10th batch or at least once per month
Sag resistance		Manufacturer's declaration	Every batch
Viscosity	EN ISO 3219		Every batch
Raw materials(3)		Check specification	Every delivery
Pigment dispersion	EN ISO 3219		Every batch
Non- volatile content	ISO 3251		Every batch

According Table 8.1of ETAG 018-2

(1) agreed with Approvals bodies and manufacturer.
(2) if result of char depth is not sufficient an insulating efficiency test should be carried out.
(3) check test results according to specification.

Primer HENSOGRUND 1966E

Property	Property Paragraph (ETAG)	Threshold	Minimum frequency of tests
Raw materials(1)		Check specification	Every delivery
Viscosity	EN ISO 3219		Every batch
Non-volatile content	ISO 3251		Every batch
Pigment content colour			Every batch
Fineness			Every batch

According Table 8.1of ETAG 018-2

(1) check test results according to specification.

Top Coat HENSOTOP 84 / HENSOTOP 84 Aussen / HENSOTOP SB

Property	Property Paragraph (ETAG)	Threshold	Minimum frequency of tests
Raw materials(1)		Check specification	Every delivery
Viscosity	EN ISO 3219		Every batch
Non-volatile content	ISO 3251		Every batch
Pigment content colour			Every batch

According Table 8.1of ETAG 018-2

(1) check test results according to specification

3.2.2 Tasks of Notified Bodies

3.2.2.1. Initial type testing

The approval tests have been conducted on behalf the notified body in accordance ETAG 018, Parts 1 or 2, as relevant, and the notified ETA issuing body has assessed the results of these tests in accordance with the ETAG, as part of the ETA issuing procedure.

These tests shall be used by the certification body for Certificate of Conformity purposes.

3.2.2.2. Assessment of the factory production control system - initial inspection and continuous surveillance

Assessment of the factory production control system is the responsibility of the ETA issuing body.

An initial inspection shall be carried out of the production unit specified in this ETA to demonstrate that the factory production control is in conformity with the ETA.

Subsequently continuous surveillance of factory production control is necessary to ensure continuing conformity with the ETA. It is recommended that surveillance inspections be conducted at least twice a year.

The results of certification of conformity and of the continuous surveillance shall be made available to Warrington Certification Limited. Where the provisions of the ETA are no longer fulfilled, the certificate of conformity shall be withdrawn by the certification body.

3.3 CE marking

The CE conformity marking symbol consists exclusively of the letters “CE” in accordance with Directive 93/68/EEC.

NOTE: The manufacturer, or his authorised representative established in the EEA, is responsible for the affixing of the CE marking symbol.

The CE marking symbol shall be accompanied by the following information:

a) Identification number of the ETA issuing body;

b) The name or identifying mark of the producer;

c) Registered address of the producer;

d) The last two digits of the year in which the marking was first applied;

e) The number of the ETA;

f) Reference to ETAG 018, Parts 1 and 2;

g) Indication of intended use;

The CE marking symbol and items a) to g) above shall accompany the product and shall be included with the application instructions.

Additionally, at least the CE marking symbol and item a) of all this information shall be affixed to the supply containers and optionally on its packaging.

4. ASSUMPTIONS UNDER WHICH THE FITNESS FOR USE OF THE PRODUCT FOR THE INTENDED USE WILL BE ASSESSED

4.1 Manufacturing, transport and storage

Hensotherm 320KS is manufactured in accordance with the provisions of the ETA using the manufacturing process as identified during the inspection of the factory by Warrington Certification Limited and the approved body and laid down in the technical documentation.

It is assumed that the manufacture of Hensotherm 320KS fulfils the criteria for stable industrial production. The samples taken in connection with the evaluation of properties shall be representative of the whole production.

4.2 Application

The ETA is issued under the assumption that the application of Hensotherm 320KS shall be in accordance with the manufacturer's technical literature.

4.3 Maintenance and repair

The assessment of the fitness for use is based on the assumption that necessary maintenance and repair if required is carried out in accordance with the manufacturer's instructions during the assumed intended working life.

ANNEX A - Product Performance: Fire Resistance

1 This Annex relates to the use of Hensotherm 320KS for the fire protection of 'H' or 'I' shaped beams and columns, and also the rectangular and circular hollow sections. The precise scope is given in Tables 1 to 18 and 19 to 26 which show the total dry film thickness of Hensotherm 320KS (excluding primer and top coat) required to provide classifications of R15 to R120 for various design temperatures and section factors.

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 graphical analysis defined in Annex E of EN 13381-8:2013.
iii) A design appraisal against this ETA adopting the numerical regression analysis defined in Annex E of EN 13381-8:2013.

3. The data presented in the tables in this Annex refers to both beams (three-sided fire exposure) and columns (four sided exposure), and also to rectangular and circular hollow sections.

4. The data shown is applicable to steel sections blast cleaned to ISO 8501-1 SA$2^{1}/_{2}$ or equivalent and primed with the compatible primers and top coats listed in this ETA. Based on the test data the total dry film thickness of primer and top coat together (but excluding thickness of zinc coating on galvanised steel) should not exceed 0.20 mm.

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

6. Hensotherm 320KS has been exposed to the slowing heating regime defined in Annex A of EN 13381-8: 2013 and has satisfied the requirements.

Table 1: I Section Beams 15 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
50	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
55	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
60	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
65	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
70	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
75	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
80	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
85	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
90	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
95	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
100	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
105	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
110	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
115	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
120	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
125	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
130	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
135	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
140	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
145	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
150	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
155	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
160	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
165	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
170	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
175	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
180	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
185	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
190	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
195	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
200	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
205	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
210	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
215	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
220	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
225	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
230	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
235	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
240	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
245	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
250	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
255	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
260	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
265	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
270	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
275	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
280	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
285	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
295	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
300	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
305	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
307	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290

Thickness is intumescent only.

Table 2: I Section Beams 30 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
50	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
55	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
60	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
65	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
70	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
75	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
80	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
85	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
90	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
95	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
100	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
105	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
110	1.310	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
115	1.351	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
120	1.390	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
125	1.427	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
130	1.462	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
135	1.496	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
140	1.528	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
145	1.559	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
150	1.588	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
155	1.617	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
160	1.644	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
165	1.670	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
170	1.695	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
175	1.719	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
180	1.743	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
185	1.765	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
190	1.787	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
195	1.807	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
200	1.828	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
205	1.847	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
210	1.866	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
215	1.884	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
220	1.902	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
225	1.919	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
230	1.935	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
235	1.951	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
240	1.966	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
245	1.982	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
250	1.996	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
255	2.010	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
260	2.024	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
265	2.037	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
270	2.050	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
275	2.063	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
280	2.075	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
285	2.087	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
290	2.099	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
295	2.110	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
300	2.121	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
305	2.132	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
307	2.137	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290

Thickness is intumescent only.

Table 3: I Section Beams 45 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
50	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
55	1.395	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
60	1.511	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
65	1.620	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
70	1.722	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
75	1.818	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
80	1.908	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
85	1.992	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
90	2.072	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
95	2.148	1.299	1.290	1.290	1.290	1.290	1.290	1.290	1.290
100	2.220	1.357	1.290	1.290	1.290	1.290	1.290	1.290	1.290
105	2.288	1.412	1.290	1.290	1.290	1.290	1.290	1.290	1.290
110	2.352	1.464	1.290	1.290	1.290	1.290	1.290	1.290	1.290
115	2.413	1.513	1.290	1.290	1.290	1.290	1.290	1.290	1.290
120	2.472	1.560	1.290	1.290	1.290	1.290	1.290	1.290	1.290
125	2.527	1.605	1.290	1.290	1.290	1.290	1.290	1.290	1.290
130	2.581	1.648	1.290	1.290	1.290	1.290	1.290	1.290	1.290
135	2.631	1.689	1.290	1.290	1.290	1.290	1.290	1.290	1.290
140	2.680	1.728	1.290	1.290	1.290	1.290	1.290	1.290	1.290
145	2.726	1.765	1.290	1.290	1.290	1.290	1.290	1.290	1.290
150	2.771	1.801	1.290	1.290	1.290	1.290	1.290	1.290	1.290
155	2.813	1.835	1.290	1.290	1.290	1.290	1.290	1.290	1.290
160	2.854	1.868	1.290	1.290	1.290	1.290	1.290	1.290	1.290
165	2.894	1.899	1.290	1.290	1.290	1.290	1.290	1.290	1.290
170	2.931	1.929	1.290	1.290	1.290	1.290	1.290	1.290	1.290
175	2.968	1.959	1.290	1.290	1.290	1.290	1.290	1.290	1.290
180	3.003	1.987	1.309	1.290	1.290	1.290	1.290	1.290	1.290
185	3.036	2.014	1.333	1.290	1.290	1.290	1.290	1.290	1.290
190	3.069	2.040	1.355	1.290	1.290	1.290	1.290	1.290	1.290
195	3.100	2.065	1.376	1.290	1.290	1.290	1.290	1.290	1.290
200	3.131	2.089	1.397	1.290	1.290	1.290	1.290	1.290	1.290
205	3.160	2.112	1.417	1.290	1.290	1.290	1.290	1.290	1.290
210	3.188	2.135	1.437	1.290	1.290	1.290	1.290	1.290	1.290
215	3.215	2.156	1.455	1.290	1.290	1.290	1.290	1.290	1.290
220	3.242	2.178	1.473	1.290	1.290	1.290	1.290	1.290	1.290
225	3.267	2.198	1.491	1.290	1.290	1.290	1.290	1.290	1.290
230	3.292	2.218	1.508	1.290	1.290	1.290	1.290	1.290	1.290
235	3.316	2.237	1.524	1.290	1.290	1.290	1.290	1.290	1.290
240	3.339	2.255	1.540	1.290	1.290	1.290	1.290	1.290	1.290
245	3.362	2.273	1.556	1.290	1.290	1.290	1.290	1.290	1.290
250	3.384	2.291	1.571	1.290	1.290	1.290	1.290	1.290	1.290
255	3.405	2.308	1.585	1.290	1.290	1.290	1.290	1.290	1.290
260	3.426	2.324	1.599	1.290	1.290	1.290	1.290	1.290	1.290
265	3.446	2.340	1.613	1.290	1.290	1.290	1.290	1.290	1.290
270	3.466	2.356	1.626	1.290	1.290	1.290	1.290	1.290	1.290
275	3.485	2.371	1.639	1.290	1.290	1.290	1.290	1.290	1.290
280	3.503	2.386	1.652	1.290	1.290	1.290	1.290	1.290	1.290
285	3.521	2.400	1.664	1.290	1.290	1.290	1.290	1.290	1.290
290	3.538	2.414	1.676	1.290	1.290	1.290	1.290	1.290	1.290
295	3.556	2.427	1.688	1.290	1.290	1.290	1.290	1.290	1.290
300	3.572	2.441	1.699	1.290	1.290	1.290	1.290	1.290	1.290
305	3.588	2.453	1.710	1.290	1.290	1.290	1.290	1.290	1.290
307	3.595	2.459	1.715	1.290	1.290	1.290	1.290	1.290	1.290

Thickness is intumescent only.

Table 4: I Section Beams 60 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	1.929	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
50	1.949	1.290	1.290	1.290	1.290	1.290	1.290	1.290	1.290
55	2.116	1.321	1.290	1.290	1.290	1.290	1.290	1.290	1.290
60	2.271	1.449	1.290	1.290	1.290	1.290	1.290	1.290	1.290
65	2.417	1.570	1.290	1.290	1.290	1.290	1.290	1.290	1.290
70	2.553	1.682	1.290	1.290	1.290	1.290	1.290	1.290	1.290
75	2.680	1.787	1.290	1.290	1.290	1.290	1.290	1.290	1.290
80	2.800	1.886	1.290	1.290	1.290	1.290	1.290	1.290	1.290
85	2.914	1.980	1.361	1.290	1.290	1.290	1.290	1.290	1.290
90	3.021	2.067	1.439	1.290	1.290	1.290	1.290	1.290	1.290
95	3.122	2.150	1.512	1.290	1.290	1.290	1.290	1.290	1.290
100	3.217	2.229	1.581	1.290	1.290	1.290	1.290	1.290	1.290
105	3.308	2.303	1.647	1.290	1.290	1.290	1.290	1.290	1.290
110	3.394	2.374	1.709	1.290	1.290	1.290	1.290	1.290	1.290
115	3.476	2.441	1.768	1.290	1.290	1.290	1.290	1.290	1.290
120	3.554	2.505	1.824	1.290	1.290	1.290	1.290	1.290	1.290
125	3.628	2.566	1.877	1.298	1.290	1.290	1.290	1.290	1.290
130	3.699	2.623	1.928	1.343	1.290	1.290	1.290	1.290	1.290
135	3.767	2.679	1.977	1.387	1.290	1.290	1.290	1.290	1.290
140	3.832	2.732	2.023	1.428	1.290	1.290	1.290	1.290	1.290
145	3.894	2.782	2.067	1.468	1.290	1.290	1.290	1.290	1.290
150	3.953	2.831	2.110	1.505	1.290	1.290	1.290	1.290	1.290
155	4.010	2.877	2.150	1.541	1.290	1.290	1.290	1.290	1.290
160	4.065	2.921	2.189	1.576	1.290	1.290	1.290	1.290	1.290
165	4.117	2.964	2.227	1.609	1.290	1.290	1.290	1.290	1.290
170	4.167	3.005	2.263	1.641	1.290	1.290	1.290	1.290	1.290
175	4.216	3.045	2.297	1.672	1.290	1.290	1.290	1.290	1.290
180	4.263	3.083	2.330	1.701	1.290	1.290	1.290	1.290	1.290
185	4.308	3.119	2.362	1.730	1.290	1.290	1.290	1.290	1.290
190	4.351	3.154	2.393	1.757	1.290	1.290	1.290	1.290	1.290
195	-	3.188	2.423	1.784	1.290	1.290	1.290	1.290	1.290
200	-	3.221	2.451	1.809	1.290	1.290	1.290	1.290	1.290
205	-	3.253	2.479	1.833	1.290	1.290	1.290	1.290	1.290
210	-	3.284	2.506	1.857	1.290	1.290	1.290	1.290	1.290
215	-	3.313	2.531	1.880	1.290	1.290	1.290	1.290	1.290
220	-	3.342	2.556	1.902	1.295	1.290	1.290	1.290	1.290
225	-	3.369	2.581	1.923	1.314	1.290	1.290	1.290	1.290
230	-	3.396	2.604	1.944	1.332	1.290	1.290	1.290	1.290
235	-	3.422	2.627	1.964	1.350	1.290	1.290	1.290	1.290
240	-	3.447	2.648	1.984	1.367	1.290	1.290	1.290	1.290
245	-	3.472	2.670	2.002	1.384	1.290	1.290	1.290	1.290
250	-	3.495	2.690	2.021	1.400	1.290	1.290	1.290	1.290
255	-	3.518	2.710	2.038	1.415	1.290	1.290	1.290	1.290
260	-	3.541	2.730	2.056	1.431	1.290	1.290	1.290	1.290
265	-	3.562	2.749	2.072	1.445	1.290	1.290	1.290	1.290
270	-	3.583	2.767	2.088	1.460	1.290	1.290	1.290	1.290
275	-	3.604	2.785	2.104	1.474	1.290	1.290	1.290	1.290
280	-	3.624	2.802	2.120	1.487	1.290	1.290	1.290	1.290
285	-	3.643	2.819	2.134	1.500	1.290	1.290	1.290	1.290
290	-	3.662	2.835	2.149	1.513	1.290	1.290	1.290	1.290
295	-	3.681	2.851	2.163	1.525	1.290	1.290	1.290	1.290
300	-	3.698	2.867	2.177	1.538	1.290	1.290	1.290	1.290
305	-	3.716	2.882	2.190	1.549	1.290	1.290	1.290	1.290
307	-	3.724	2.889	2.196	1.555	1.290	1.290	1.290	1.290

Thickness is intumescent only.

Table 5: I Section Beams 75 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	2.603	1.758	1.290	1.290	1.290	1.290	1.290	1.290	1.290
50	2.628	1.780	1.290	1.290	1.290	1.290	1.290	1.290	1.290
55	2.837	1.954	1.372	1.290	1.290	1.290	1.290	1.290	1.290
60	3.031	2.117	1.518	1.290	1.290	1.290	1.290	1.290	1.290
65	3.213	2.268	1.654	1.290	1.290	1.290	1.290	1.290	1.290
70	3.383	2.410	1.781	1.290	1.290	1.290	1.290	1.290	1.290
75	3.543	2.543	1.900	1.355	1.290	1.290	1.290	1.290	1.290
80	3.693	2.668	2.011	1.456	1.290	1.290	1.290	1.290	1.290
85	3.835	2.786	2.116	1.551	1.290	1.290	1.290	1.290	1.290
90	3.969	2.897	2.215	1.641	1.290	1.290	1.290	1.290	1.290
95	4.095	3.002	2.308	1.725	1.290	1.290	1.290	1.290	1.290
100	4.215	3.101	2.397	1.805	1.290	1.290	1.290	1.290	1.290
105	4.328	3.195	2.480	1.880	1.317	1.290	1.290	1.290	1.290
110	-	3.284	2.559	1.952	1.382	1.290	1.290	1.290	1.290
115	-	3.369	2.634	2.019	1.443	1.290	1.290	1.290	1.290
120	-	3.449	2.706	2.084	1.500	1.290	1.290	1.290	1.290
125	-	3.526	2.774	2.145	1.555	1.290	1.290	1.290	1.290
130	-	3.599	2.839	2.203	1.608	1.290	1.290	1.290	1.290
135	-	3.669	2.901	2.259	1.658	1.290	1.290	1.290	1.290
140	-	3.736	2.960	2.312	1.705	1.290	1.290	1.290	1.290
145	-	3.799	3.016	2.363	1.751	1.290	1.290	1.290	1.290
150	-	3.860	3.070	2.411	1.794	1.290	1.290	1.290	1.290
155	-	3.919	3.122	2.458	1.836	1.302	1.290	1.290	1.290
160	-	3.975	3.172	2.502	1.876	1.338	1.290	1.290	1.290
165	-	4.029	3.219	2.545	1.914	1.373	1.290	1.290	1.290
170	-	4.081	3.265	2.586	1.951	1.406	1.290	1.290	1.290
175	-	4.131	3.309	2.626	1.986	1.438	1.290	1.290	1.290
180	-	4.179	3.351	2.663	2.020	1.468	1.290	1.290	1.290
185	-	4.225	3.392	2.700	2.052	1.498	1.290	1.290	1.290
190	-	4.269	3.431	2.735	2.084	1.526	1.290	1.290	1.290
195	-	4.312	3.469	2.769	2.114	1.554	1.290	1.290	1.290
200	-	4.354	3.505	2.802	2.143	1.580	1.290	1.290	1.290
205	-	-	3.541	2.833	2.171	1.605	1.290	1.290	1.290
210	-	-	3.575	2.864	2.199	1.630	1.290	1.290	1.290
215	-	-	3.608	2.893	2.225	1.654	1.290	1.290	1.290
220	-	-	3.639	2.921	2.250	1.676	1.290	1.290	1.290
225	-	-	3.670	2.949	2.275	1.699	1.290	1.290	1.290
230	-	-	3.700	2.976	2.298	1.720	1.290	1.290	1.290
235	-	-	3.729	3.001	2.321	1.741	1.290	1.290	1.290
240	-	-	3.757	3.026	2.344	1.761	1.290	1.290	1.290
245	-	-	3.784	3.050	2.365	1.780	1.290	1.290	1.290
250	-	-	3.810	3.074	2.386	1.799	1.290	1.290	1.290
255	-	-	3.836	3.097	2.407	1.817	1.306	1.290	1.290
260	-	-	3.860	3.119	2.426	1.835	1.322	1.290	1.290
265	-	-	3.884	3.140	2.445	1.852	1.338	1.290	1.290
270	-	-	3.908	3.161	2.464	1.869	1.353	1.290	1.290
275	-	-	3.930	3.181	2.482	1.885	1.368	1.290	1.290
280	-	-	3.952	3.201	2.499	1.901	1.382	1.290	1.290
285	-	-	3.974	3.220	2.517	1.917	1.396	1.290	1.290
290	-	-	3.995	3.239	2.533	1.932	1.410	1.290	1.290
295	-	-	4.015	3.257	2.549	1.946	1.423	1.290	1.290
300	-	-	4.035	3.275	2.565	1.960	1.436	1.290	1.290
305	-	-	4.054	3.292	2.580	1.974	1.448	1.290	1.290
307	-	-	4.063	3.299	2.587	1.980	1.454	1.290	1.290

Thickness is intumescent only.

Table 6: I Section Beams 90 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	3.277	2.351	1.753	1.290	1.290	1.290	1.290	1.290	1.290
50	3.308	2.377	1.777	1.290	1.290	1.290	1.290	1.290	1.290
55	3.558	2.588	1.967	1.441	1.290	1.290	1.290	1.290	1.290
60	3.791	2.784	2.144	1.603	1.290	1.290	1.290	1.290	1.290
65	4.010	2.967	2.309	1.754	1.290	1.290	1.290	1.290	1.290
70	4.214	3.139	2.464	1.895	1.358	1.290	1.290	1.290	1.290
75	-	3.299	2.608	2.027	1.477	1.290	1.290	1.290	1.290
80	-	3.450	2.744	2.150	1.590	1.290	1.290	1.290	1.290
85	-	3.592	2.871	2.266	1.695	1.290	1.290	1.290	1.290
90	-	3.726	2.991	2.376	1.794	1.292	1.290	1.290	1.290
95	-	3.853	3.105	2.479	1.887	1.378	1.290	1.290	1.290
100	-	3.973	3.212	2.576	1.975	1.458	1.290	1.290	1.290
105	-	4.086	3.313	2.668	2.059	1.534	1.290	1.290	1.290
110	-	4.194	3.410	2.755	2.138	1.606	1.290	1.290	1.290
115	-	4.296	3.501	2.838	2.212	1.675	1.290	1.290	1.290
120	-	-	3.588	2.917	2.283	1.740	1.290	1.290	1.290
125	-	-	3.670	2.992	2.351	1.801	1.322	1.290	1.290
130	-	-	3.749	3.063	2.415	1.860	1.376	1.290	1.290
135	-	-	3.824	3.131	2.477	1.916	1.427	1.290	1.290
140	-	-	3.896	3.196	2.535	1.969	1.476	1.290	1.290
145	-	-	3.965	3.258	2.591	2.020	1.523	1.290	1.290
150	-	-	4.031	3.317	2.645	2.069	1.568	1.290	1.290
155	-	-	4.093	3.374	2.696	2.116	1.610	1.290	1.290
160	-	-	4.154	3.428	2.745	2.160	1.651	1.290	1.290
165	-	-	4.212	3.481	2.792	2.203	1.691	1.290	1.290
170	-	-	4.267	3.531	2.837	2.244	1.728	1.290	1.290
175	-	-	4.321	3.579	2.880	2.284	1.765	1.290	1.290
180	-	-	-	3.625	2.922	2.321	1.799	1.303	1.290
185	-	-	-	3.670	2.962	2.358	1.833	1.334	1.290
190	-	-	-	3.713	3.001	2.393	1.865	1.363	1.290
195	-	-	-	3.754	3.038	2.427	1.896	1.392	1.290
200	-	-	-	3.794	3.074	2.459	1.926	1.419	1.290
205	-	-	-	3.833	3.109	2.491	1.955	1.445	1.290
210	-	-	-	3.870	3.142	2.521	1.983	1.471	1.290
215	-	-	-	3.906	3.174	2.551	2.009	1.495	1.290
220	-	-	-	3.941	3.205	2.579	2.035	1.519	1.290
225	-	-	-	3.974	3.236	2.606	2.060	1.542	1.290
230	-	-	-	4.007	3.265	2.633	2.085	1.564	1.290
235	-	-	-	4.038	3.293	2.658	2.108	1.586	1.290
240	-	-	-	4.069	3.320	2.683	2.131	1.606	1.290
245	-	-	-	4.098	3.347	2.707	2.153	1.626	1.290
250	-	-	-	4.127	3.373	2.731	2.174	1.646	1.290
255	-	-	-	4.155	3.398	2.753	2.195	1.665	1.290
260	-	-	-	4.182	3.422	2.775	2.215	1.683	1.290
265	-	-	-	4.208	3.445	2.796	2.234	1.701	1.290
270	-	-	-	4.234	3.468	2.817	2.253	1.718	1.290
275	-	-	-	4.258	3.490	2.837	2.272	1.735	1.290
280	-	-	-	4.283	3.512	2.857	2.290	1.751	1.290
285	-	-	-	4.306	3.533	2.876	2.307	1.767	1.290
290	-	-	-	4.329	3.553	2.894	2.324	1.783	1.290
295	-	-	-	4.351	3.573	2.912	2.340	1.798	1.290
300	-	-	-	-	3.592	2.930	2.356	1.812	1.290
305	-	-	-	-	3.611	2.947	2.372	1.826	1.290
307	-	-	-	-	3.620	2.954	2.379	1.833	1.290

Thickness is intumescent only.

Table 7: I Section Beams 105 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	3.951	2.944	2.311	1.775	1.290	1.290	1.290	1.290	1.290
50	3.987	2.974	2.338	1.800	1.290	1.290	1.290	1.290	1.290
55	4.279	3.221	2.562	2.006	1.478	1.290	1.290	1.290	1.290
60	-	3.451	2.771	2.198	1.653	1.290	1.290	1.290	1.290
65	-	3.666	2.965	2.376	1.816	1.332	1.290	1.290	1.290
70	-	3.867	3.147	2.542	1.968	1.472	1.290	1.290	1.290
75	-	4.055	3.317	2.698	2.110	1.603	1.290	1.290	1.290
80	-	4.232	3.476	2.844	2.243	1.725	1.290	1.290	1.290
85	-	-	3.626	2.981	2.368	1.840	1.378	1.290	1.290
90	-	-	3.768	3.110	2.486	1.948	1.478	1.290	1.290
95	-	-	3.901	3.232	2.596	2.050	1.573	1.290	1.290
100	-	-	4.027	3.347	2.701	2.146	1.662	1.290	1.290
105	-	-	4.147	3.456	2.800	2.237	1.745	1.290	1.290
110	-	-	4.260	3.559	2.893	2.323	1.825	1.349	1.290
115	-	-	-	3.657	2.982	2.404	1.900	1.419	1.290
120	-	-	-	3.750	3.067	2.481	1.972	1.484	1.290
125	-	-	-	3.838	3.147	2.555	2.040	1.547	1.290
130	-	-	-	3.923	3.223	2.625	2.104	1.606	1.290
135	-	-	-	4.003	3.296	2.692	2.166	1.663	1.290
140	-	-	-	4.080	3.365	2.755	2.224	1.717	1.290
145	-	-	-	4.153	3.432	2.816	2.280	1.769	1.290
150	-	-	-	4.223	3.495	2.874	2.334	1.818	1.290
155	-	-	-	4.290	3.556	2.929	2.385	1.865	1.309
160	-	-	-	4.355	3.614	2.983	2.434	1.910	1.349
165	-	-	-	-	3.670	3.034	2.481	1.953	1.388
170	-	-	-	-	3.724	3.082	2.526	1.995	1.426
175	-	-	-	-	3.775	3.129	2.569	2.035	1.462
180	-	-	-	-	3.824	3.175	2.611	2.073	1.496
185	-	-	-	-	3.872	3.218	2.651	2.110	1.530
190	-	-	-	-	3.918	3.260	2.689	2.145	1.561
195	-	-	-	-	3.962	3.300	2.727	2.179	1.592
200	-	-	-	-	4.005	3.339	2.762	2.212	1.622
205	-	-	-	-	4.046	3.376	2.797	2.243	1.650
210	-	-	-	-	4.085	3.413	2.830	2.274	1.678
215	-	-	-	-	4.124	3.447	2.862	2.303	1.705
220	-	-	-	-	4.161	3.481	2.893	2.332	1.730
225	-	-	-	-	4.196	3.514	2.923	2.359	1.755
230	-	-	-	-	4.231	3.545	2.952	2.386	1.779
235	-	-	-	-	4.265	3.576	2.980	2.412	1.802
240	-	-	-	-	4.297	3.605	3.007	2.437	1.825
245	-	-	-	-	4.328	3.634	3.034	2.461	1.847
250	-	-	-	-	-	3.662	3.059	2.484	1.868
255	-	-	-	-	-	3.689	3.084	2.507	1.888
260	-	-	-	-	-	3.715	3.108	2.529	1.908
265	-	-	-	-	-	3.740	3.131	2.550	1.927
270	-	-	-	-	-	3.765	3.154	2.571	1.946
275	-	-	-	-	-	3.789	3.176	2.591	1.964
280	-	-	-	-	-	3.812	3.197	2.611	1.982
285	-	-	-	-	-	3.835	3.218	2.630	1.999
290	-	-	-	-	-	3.857	3.238	2.648	2.016
295	-	-	-	-	-	3.878	3.258	2.666	2.032
300	-	-	-	-	-	3.899	3.277	2.684	2.048
305	-	-	-	-	-	3.920	3.296	2.701	2.063
307	-	-	-	-	-	3.928	3.304	2.708	2.070

Thickness is intumescent only.

Table 8: I Section Beams 120 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	-	3.536	2.868	2.304	1.767	1.300	1.290	1.290	1.290
50	-	3.571	2.899	2.333	1.793	1.325	1.290	1.290	1.290
55	-	3.854	3.157	2.571	2.012	1.528	1.290	1.290	1.290
60	-	4.118	3.397	2.792	2.214	1.715	1.290	1.290	1.290
65	-	-	3.621	2.998	2.403	1.889	1.439	1.290	1.290
70	-	-	3.829	3.190	2.578	2.052	1.591	1.290	1.290
75	-	-	4.025	3.369	2.743	2.204	1.732	1.290	1.290
80	-	-	4.209	3.538	2.897	2.346	1.864	1.402	1.290
85	-	-	-	3.696	3.041	2.479	1.988	1.517	1.290
90	-	-	-	3.845	3.177	2.605	2.105	1.625	1.290
95	-	-	-	3.985	3.305	2.723	2.214	1.726	1.290
100	-	-	-	4.118	3.426	2.834	2.318	1.822	1.290
105	-	-	-	4.244	3.541	2.939	2.415	1.912	1.371
110	-	-	-	-	3.649	3.039	2.508	1.998	1.449
115	-	-	-	-	3.752	3.134	2.595	2.079	1.522
120	-	-	-	-	3.850	3.223	2.679	2.156	1.592
125	-	-	-	-	3.942	3.309	2.758	2.229	1.658
130	-	-	-	-	4.031	3.390	2.833	2.298	1.721
135	-	-	-	-	4.115	3.467	2.904	2.364	1.781
140	-	-	-	-	4.195	3.541	2.972	2.427	1.839
145	-	-	-	-	4.272	3.611	3.038	2.487	1.893
150	-	-	-	-	4.346	3.679	3.100	2.545	1.945
155	-	-	-	-	-	3.743	3.160	2.600	1.995
160	-	-	-	-	-	3.805	3.217	2.653	2.043
165	-	-	-	-	-	3.864	3.271	2.703	2.089
170	-	-	-	-	-	3.921	3.324	2.751	2.133
175	-	-	-	-	-	3.975	3.374	2.798	2.175
180	-	-	-	-	-	4.028	3.423	2.842	2.215
185	-	-	-	-	-	4.078	3.469	2.885	2.254
190	-	-	-	-	-	4.127	3.514	2.927	2.291
195	-	-	-	-	-	4.173	3.557	2.966	2.327
200	-	-	-	-	-	4.219	3.599	3.005	2.362
205	-	-	-	-	-	4.262	3.639	3.041	2.395
210	-	-	-	-	-	4.304	3.677	3.077	2.428
215	-	-	-	-	-	4.344	3.715	3.111	2.459
220	-	-	-	-	-	-	3.751	3.145	2.489
225	-	-	-	-	-	-	3.786	3.177	2.518
230	-	-	-	-	-	-	3.819	3.208	2.546
235	-	-	-	-	-	-	3.852	3.238	2.573
240	-	-	-	-	-	-	3.884	3.267	2.600
245	-	-	-	-	-	-	3.914	3.295	2.625
250	-	-	-	-	-	-	3.944	3.322	2.650
255	-	-	-	-	-	-	3.973	3.349	2.674
260	-	-	-	-	-	-	4.001	3.375	2.697
265	-	-	-	-	-	-	4.028	3.400	2.720
270	-	-	-	-	-	-	4.054	3.424	2.741
275	-	-	-	-	-	-	4.080	3.447	2.763
280	-	-	-	-	-	-	4.105	3.470	2.783
285	-	-	-	-	-	-	4.129	3.492	2.803
290	-	-	-	-	-	-	4.152	3.514	2.823
295	-	-	-	-	-	-	4.175	3.535	2.842
300	-	-	-	-	-	-	4.198	3.556	2.860
305	-	-	-	-	-	-	4.219	3.575	2.878
307	-	-	-	-	-	-	4.229	3.584	2.886

Thickness is intumescent only.

Table 9: I Section Beams 150 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	-	-	3.982	3.363	2.767	2.252	1.800	1.364	1.290
50	-	-	4.022	3.400	2.801	2.284	1.830	1.392	1.290
55	-	-	4.347	3.701	3.078	2.542	2.072	1.618	1.290
60	-	-	-	3.981	3.336	2.781	2.296	1.827	1.319
65	-	-	-	4.241	3.576	3.004	2.504	2.022	1.497
70	-	-	-	-	3.799	3.211	2.698	2.202	1.662
75	-	-	-	-	4.008	3.405	2.879	2.371	1.817
80	-	-	-	-	4.204	3.587	3.049	2.529	1.961
85	-	-	-	-	-	3.757	3.208	2.677	2.097
90	-	-	-	-	-	3.917	3.357	2.815	2.224
95	-	-	-	-	-	4.068	3.497	2.946	2.343
100	-	-	-	-	-	4.210	3.630	3.069	2.456
105	-	-	-	-	-	4.345	3.755	3.185	2.562
110	-	-	-	-	-	-	3.874	3.295	2.662
115	-	-	-	-	-	-	3.986	3.400	2.758
120	-	-	-	-	-	-	4.092	3.498	2.848
125	-	-	-	-	-	-	4.193	3.592	2.933
130	-	-	-	-	-	-	4.290	3.682	3.015
135	-	-	-	-	-	-	-	3.767	3.092
140	-	-	-	-	-	-	-	3.848	3.166
145	-	-	-	-	-	-	-	3.925	3.237
150	-	-	-	-	-	-	-	3.999	3.304
155	-	-	-	-	-	-	-	4.070	3.369
160	-	-	-	-	-	-	-	4.137	3.430
165	-	-	-	-	-	-	-	4.202	3.489
170	-	-	-	-	-	-	-	4.264	3.546
175	-	-	-	-	-	-	-	4.324	3.600
180	-	-	-	-	-	-	-	-	3.653
185	-	-	-	-	-	-	-	-	3.703
190	-	-	-	-	-	-	-	-	3.751
195	-	-	-	-	-	-	-	-	3.798
200	-	-	-	-	-	-	-	-	3.842
205	-	-	-	-	-	-	-	-	3.886
210	-	-	-	-	-	-	-	-	3.927
215	-	-	-	-	-	-	-	-	3.967
220	-	-	-	-	-	-	-	-	4.006
225	-	-	-	-	-	-	-	-	4.044
230	-	-	-	-	-	-	-	-	4.080
235	-	-	-	-	-	-	-	-	4.115
240	-	-	-	-	-	-	-	-	4.149
245	-	-	-	-	-	-	-	-	4.182
250	-	-	-	-	-	-	-	-	4.214
255	-	-	-	-	-	-	-	-	4.245
260	-	-	-	-	-	-	-	-	4.275
265	-	-	-	-	-	-	-	-	4.304
270	-	-	-	-	-	-	-	-	4.332

Thickness is intumescent only.

Table 10: I Section Columns 15 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
50	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
55	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
60	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
65	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
70	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
75	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
80	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
85	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
90	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
95	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
100	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
105	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
110	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
115	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
120	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
125	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
130	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
135	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
140	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
145	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
150	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
155	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
160	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
165	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
170	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
175	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
180	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
185	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
190	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
195	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
200	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
205	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
210	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
215	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
220	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
225	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
230	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
235	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
240	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
245	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
250	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
255	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
260	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
265	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
270	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
275	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
280	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
285	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
290	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
295	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
300	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
305	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
307	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319

Thickness is intumescent only.

Table 11: I Section Columns 30 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
50	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
55	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
60	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
65	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
70	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
75	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
80	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
85	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
90	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
95	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
100	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
105	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
110	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
115	1.325	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
120	1.364	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
125	1.402	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
130	1.438	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
135	1.472	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
140	1.505	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
145	1.537	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
150	1.567	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
155	1.596	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
160	1.623	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
165	1.650	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
170	1.676	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
175	1.700	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
180	1.724	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
185	1.747	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
190	1.769	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
195	1.791	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
200	1.811	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
205	1.831	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
210	1.850	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
215	1.869	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
220	1.887	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
225	1.904	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
230	1.921	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
235	1.937	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
240	1.953	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
245	1.969	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
250	1.984	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
255	1.998	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
260	2.012	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
265	2.026	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
270	2.039	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
275	2.052	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
280	2.065	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
285	2.077	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
290	2.089	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
295	2.101	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
300	2.112	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
305	2.123	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
307	2.128	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319

Thickness is intumescent only.

Table 12: I Section Columns 45 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
50	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
55	1.379	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
60	1.498	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
65	1.608	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
70	1.712	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
75	1.810	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
80	1.902	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
85	1.989	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
90	2.070	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
95	2.148	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
100	2.221	1.332	1.319	1.319	1.319	1.319	1.319	1.319	1.319
105	2.291	1.389	1.319	1.319	1.319	1.319	1.319	1.319	1.319
110	2.357	1.442	1.319	1.319	1.319	1.319	1.319	1.319	1.319
115	2.420	1.494	1.319	1.319	1.319	1.319	1.319	1.319	1.319
120	2.480	1.542	1.319	1.319	1.319	1.319	1.319	1.319	1.319
125	2.537	1.589	1.319	1.319	1.319	1.319	1.319	1.319	1.319
130	2.592	1.633	1.319	1.319	1.319	1.319	1.319	1.319	1.319
135	2.644	1.675	1.319	1.319	1.319	1.319	1.319	1.319	1.319
140	2.694	1.716	1.319	1.319	1.319	1.319	1.319	1.319	1.319
145	2.741	1.754	1.319	1.319	1.319	1.319	1.319	1.319	1.319
150	2.787	1.791	1.319	1.319	1.319	1.319	1.319	1.319	1.319
155	2.831	1.827	1.319	1.319	1.319	1.319	1.319	1.319	1.319
160	2.873	1.861	1.319	1.319	1.319	1.319	1.319	1.319	1.319
165	2.914	1.894	1.319	1.319	1.319	1.319	1.319	1.319	1.319
170	2.953	1.925	1.319	1.319	1.319	1.319	1.319	1.319	1.319
175	2.990	1.956	1.319	1.319	1.319	1.319	1.319	1.319	1.319
180	3.026	1.985	1.319	1.319	1.319	1.319	1.319	1.319	1.319
185	3.061	2.013	1.319	1.319	1.319	1.319	1.319	1.319	1.319
190	3.094	2.040	1.319	1.319	1.319	1.319	1.319	1.319	1.319
195	3.127	2.066	1.340	1.319	1.319	1.319	1.319	1.319	1.319
200	3.158	2.091	1.361	1.319	1.319	1.319	1.319	1.319	1.319
205	3.188	2.116	1.382	1.319	1.319	1.319	1.319	1.319	1.319
210	3.217	2.139	1.403	1.319	1.319	1.319	1.319	1.319	1.319
215	3.246	2.162	1.422	1.319	1.319	1.319	1.319	1.319	1.319
220	3.273	2.184	1.441	1.319	1.319	1.319	1.319	1.319	1.319
225	3.299	2.206	1.460	1.319	1.319	1.319	1.319	1.319	1.319
230	3.325	2.226	1.478	1.319	1.319	1.319	1.319	1.319	1.319
235	3.350	2.246	1.495	1.319	1.319	1.319	1.319	1.319	1.319
240	3.374	2.266	1.512	1.319	1.319	1.319	1.319	1.319	1.319
245	3.397	2.284	1.528	1.319	1.319	1.319	1.319	1.319	1.319
250	3.420	2.303	1.544	1.319	1.319	1.319	1.319	1.319	1.319
255	3.442	2.321	1.559	1.319	1.319	1.319	1.319	1.319	1.319
260	3.463	2.338	1.574	1.319	1.319	1.319	1.319	1.319	1.319
265	3.484	2.355	1.588	1.319	1.319	1.319	1.319	1.319	1.319
270	3.505	2.371	1.602	1.319	1.319	1.319	1.319	1.319	1.319
275	3.524	2.387	1.616	1.319	1.319	1.319	1.319	1.319	1.319
280	3.543	2.402	1.629	1.319	1.319	1.319	1.319	1.319	1.319
285	3.562	2.417	1.642	1.319	1.319	1.319	1.319	1.319	1.319
290	3.580	2.432	1.655	1.319	1.319	1.319	1.319	1.319	1.319
295	3.598	2.446	1.667	1.319	1.319	1.319	1.319	1.319	1.319
300	3.615	2.460	1.679	1.319	1.319	1.319	1.319	1.319	1.319
305	3.632	2.473	1.690	1.319	1.319	1.319	1.319	1.319	1.319
307	3.639	2.479	1.696	1.319	1.319	1.319	1.319	1.319	1.319

Thickness is intumescent only.

Table 13: I Section Columns 60 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	1.928	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
50	1.949	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
55	2.119	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
60	2.278	1.436	1.319	1.319	1.319	1.319	1.319	1.319	1.319
65	2.427	1.560	1.319	1.319	1.319	1.319	1.319	1.319	1.319
70	2.566	1.677	1.319	1.319	1.319	1.319	1.319	1.319	1.319
75	2.697	1.786	1.319	1.319	1.319	1.319	1.319	1.319	1.319
80	2.820	1.888	1.319	1.319	1.319	1.319	1.319	1.319	1.319
85	2.936	1.985	1.338	1.319	1.319	1.319	1.319	1.319	1.319
90	3.046	2.076	1.419	1.319	1.319	1.319	1.319	1.319	1.319
95	3.150	2.162	1.496	1.319	1.319	1.319	1.319	1.319	1.319
100	3.248	2.244	1.568	1.319	1.319	1.319	1.319	1.319	1.319
105	3.342	2.322	1.637	1.319	1.319	1.319	1.319	1.319	1.319
110	3.431	2.395	1.702	1.319	1.319	1.319	1.319	1.319	1.319
115	3.515	2.465	1.764	1.319	1.319	1.319	1.319	1.319	1.319
120	3.595	2.532	1.823	1.319	1.319	1.319	1.319	1.319	1.319
125	3.672	2.595	1.879	1.319	1.319	1.319	1.319	1.319	1.319
130	3.745	2.656	1.933	1.319	1.319	1.319	1.319	1.319	1.319
135	3.815	2.714	1.984	1.348	1.319	1.319	1.319	1.319	1.319
140	3.882	2.769	2.033	1.391	1.319	1.319	1.319	1.319	1.319
145	3.946	2.822	2.080	1.433	1.319	1.319	1.319	1.319	1.319
150	4.007	2.872	2.125	1.473	1.319	1.319	1.319	1.319	1.319
155	4.066	2.921	2.168	1.511	1.319	1.319	1.319	1.319	1.319
160	4.123	2.968	2.209	1.548	1.319	1.319	1.319	1.319	1.319
165	4.177	3.013	2.249	1.583	1.319	1.319	1.319	1.319	1.319
170	4.229	3.056	2.287	1.617	1.319	1.319	1.319	1.319	1.319
175	4.280	3.097	2.323	1.650	1.319	1.319	1.319	1.319	1.319
180	4.328	3.137	2.359	1.681	1.319	1.319	1.319	1.319	1.319
185	4.375	3.176	2.392	1.711	1.319	1.319	1.319	1.319	1.319
190	4.420	3.213	2.425	1.740	1.319	1.319	1.319	1.319	1.319
195	4.463	3.248	2.457	1.768	1.319	1.319	1.319	1.319	1.319
200	4.505	3.283	2.487	1.796	1.319	1.319	1.319	1.319	1.319
205	4.546	3.316	2.517	1.822	1.319	1.319	1.319	1.319	1.319
210	4.585	3.349	2.545	1.847	1.319	1.319	1.319	1.319	1.319
215	4.623	3.380	2.572	1.871	1.319	1.319	1.319	1.319	1.319
220	4.659	3.410	2.599	1.895	1.319	1.319	1.319	1.319	1.319
225	4.695	3.439	2.625	1.918	1.319	1.319	1.319	1.319	1.319
230	4.729	3.467	2.650	1.940	1.319	1.319	1.319	1.319	1.319
235	4.762	3.495	2.674	1.961	1.319	1.319	1.319	1.319	1.319
240	4.795	3.521	2.697	1.982	1.319	1.319	1.319	1.319	1.319
245	4.826	3.547	2.720	2.002	1.323	1.319	1.319	1.319	1.319
250	4.856	3.572	2.742	2.022	1.341	1.319	1.319	1.319	1.319
255	4.886	3.597	2.763	2.041	1.357	1.319	1.319	1.319	1.319
260	4.915	3.620	2.784	2.059	1.374	1.319	1.319	1.319	1.319
265	4.943	3.643	2.804	2.077	1.389	1.319	1.319	1.319	1.319
270	4.970	3.665	2.824	2.095	1.405	1.319	1.319	1.319	1.319
275	4.996	3.687	2.843	2.112	1.420	1.319	1.319	1.319	1.319
280	5.022	3.708	2.861	2.128	1.434	1.319	1.319	1.319	1.319
285	5.047	3.729	2.879	2.144	1.448	1.319	1.319	1.319	1.319
290	5.071	3.749	2.897	2.160	1.462	1.319	1.319	1.319	1.319
295	5.095	3.768	2.914	2.175	1.475	1.319	1.319	1.319	1.319
300	5.118	3.787	2.931	2.190	1.488	1.319	1.319	1.319	1.319
305	5.140	3.805	2.947	2.204	1.501	1.319	1.319	1.319	1.319
307	5.150	3.814	2.954	2.210	1.507	1.319	1.319	1.319	1.319

Thickness is intumescent only.

Table 14: I Section Columns 75 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	2.619	1.760	1.319	1.319	1.319	1.319	1.319	1.319	1.319
50	2.645	1.782	1.319	1.319	1.319	1.319	1.319	1.319	1.319
55	2.859	1.963	1.358	1.319	1.319	1.319	1.319	1.319	1.319
60	3.058	2.131	1.510	1.319	1.319	1.319	1.319	1.319	1.319
65	3.245	2.289	1.652	1.319	1.319	1.319	1.319	1.319	1.319
70	3.420	2.436	1.785	1.319	1.319	1.319	1.319	1.319	1.319
75	3.584	2.574	1.910	1.327	1.319	1.319	1.319	1.319	1.319
80	3.738	2.705	2.027	1.433	1.319	1.319	1.319	1.319	1.319
85	3.884	2.827	2.137	1.533	1.319	1.319	1.319	1.319	1.319
90	4.022	2.943	2.241	1.628	1.319	1.319	1.319	1.319	1.319
95	4.152	3.052	2.340	1.717	1.319	1.319	1.319	1.319	1.319
100	4.276	3.156	2.433	1.801	1.319	1.319	1.319	1.319	1.319
105	4.393	3.254	2.521	1.881	1.319	1.319	1.319	1.319	1.319
110	4.504	3.348	2.605	1.957	1.339	1.319	1.319	1.319	1.319
115	4.610	3.437	2.684	2.029	1.403	1.319	1.319	1.319	1.319
120	4.711	3.521	2.760	2.098	1.465	1.319	1.319	1.319	1.319
125	4.807	3.602	2.832	2.163	1.524	1.319	1.319	1.319	1.319
130	4.899	3.678	2.901	2.225	1.579	1.319	1.319	1.319	1.319
135	4.987	3.752	2.967	2.284	1.633	1.319	1.319	1.319	1.319
140	5.070	3.822	3.030	2.341	1.684	1.319	1.319	1.319	1.319
145	5.151	3.889	3.090	2.396	1.733	1.319	1.319	1.319	1.319
150	5.228	3.954	3.147	2.448	1.779	1.319	1.319	1.319	1.319
155	5.302	4.015	3.203	2.497	1.824	1.319	1.319	1.319	1.319
160	5.373	4.075	3.256	2.545	1.867	1.322	1.319	1.319	1.319
165	5.441	4.132	3.307	2.591	1.908	1.359	1.319	1.319	1.319
170	5.506	4.186	3.355	2.635	1.947	1.396	1.319	1.319	1.319
175	5.569	4.239	3.402	2.678	1.985	1.430	1.319	1.319	1.319
180	5.630	4.290	3.448	2.718	2.022	1.464	1.319	1.319	1.319
185	5.689	4.338	3.491	2.758	2.057	1.496	1.319	1.319	1.319
190	5.745	4.385	3.533	2.795	2.091	1.527	1.319	1.319	1.319
195	5.799	4.431	3.574	2.832	2.124	1.557	1.319	1.319	1.319
200	5.852	4.475	3.613	2.867	2.155	1.586	1.319	1.319	1.319
205	5.903	4.517	3.651	2.901	2.186	1.614	1.319	1.319	1.319
210	-	4.558	3.687	2.934	2.215	1.641	1.319	1.319	1.319
215	-	4.597	3.722	2.966	2.244	1.667	1.319	1.319	1.319
220	-	4.636	3.757	2.997	2.271	1.692	1.319	1.319	1.319
225	-	4.673	3.790	3.026	2.298	1.716	1.319	1.319	1.319
230	-	4.709	3.822	3.055	2.324	1.740	1.319	1.319	1.319
235	-	4.743	3.853	3.083	2.348	1.763	1.319	1.319	1.319
240	-	4.777	3.883	3.110	2.373	1.785	1.319	1.319	1.319
245	-	4.810	3.912	3.136	2.396	1.806	1.319	1.319	1.319
250	-	4.842	3.940	3.162	2.419	1.827	1.319	1.319	1.319
255	-	4.872	3.967	3.186	2.441	1.847	1.319	1.319	1.319
260	-	4.902	3.994	3.210	2.462	1.867	1.319	1.319	1.319
265	-	4.932	4.020	3.234	2.483	1.886	1.319	1.319	1.319
270	-	4.960	4.045	3.256	2.503	1.904	1.334	1.319	1.319
275	-	4.987	4.070	3.278	2.523	1.922	1.351	1.319	1.319
280	-	5.014	4.094	3.300	2.542	1.940	1.367	1.319	1.319
285	-	5.040	4.117	3.320	2.561	1.957	1.382	1.319	1.319
290	-	5.065	4.139	3.341	2.579	1.973	1.397	1.319	1.319
295	-	5.090	4.161	3.360	2.596	1.989	1.412	1.319	1.319
300	-	5.114	4.183	3.380	2.614	2.005	1.426	1.319	1.319
305	-	5.138	4.203	3.398	2.630	2.020	1.440	1.319	1.319
307	-	5.148	4.213	3.407	2.638	2.027	1.446	1.319	1.319

Thickness is intumescent only.

Table 15: I Section Columns 90 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	3.310	2.376	1.761	1.319	1.319	1.319	1.319	1.319	1.319
50	3.342	2.403	1.785	1.319	1.319	1.319	1.319	1.319	1.319
55	3.599	2.622	1.985	1.425	1.319	1.319	1.319	1.319	1.319
60	3.838	2.826	2.170	1.595	1.319	1.319	1.319	1.319	1.319
65	4.063	3.017	2.344	1.754	1.319	1.319	1.319	1.319	1.319
70	4.273	3.195	2.506	1.903	1.324	1.319	1.319	1.319	1.319
75	4.471	3.363	2.658	2.042	1.451	1.319	1.319	1.319	1.319
80	4.657	3.521	2.801	2.173	1.570	1.319	1.319	1.319	1.319
85	4.832	3.670	2.936	2.296	1.682	1.319	1.319	1.319	1.319
90	4.998	3.810	3.063	2.413	1.788	1.319	1.319	1.319	1.319
95	5.154	3.943	3.183	2.523	1.887	1.377	1.319	1.319	1.319
100	5.303	4.068	3.297	2.626	1.982	1.465	1.319	1.319	1.319
105	5.444	4.187	3.405	2.725	2.071	1.547	1.319	1.319	1.319
110	5.578	4.300	3.507	2.818	2.156	1.626	1.319	1.319	1.319
115	5.705	4.408	3.604	2.907	2.236	1.700	1.319	1.319	1.319
120	5.826	4.510	3.697	2.991	2.313	1.771	1.319	1.319	1.319
125	5.942	4.608	3.785	3.072	2.385	1.839	1.319	1.319	1.319
130	-	4.701	3.869	3.148	2.455	1.903	1.375	1.319	1.319
135	-	4.790	3.950	3.221	2.521	1.964	1.431	1.319	1.319
140	-	4.875	4.026	3.291	2.584	2.023	1.485	1.319	1.319
145	-	4.957	4.100	3.358	2.645	2.079	1.537	1.319	1.319
150	-	5.035	4.170	3.422	2.703	2.132	1.586	1.319	1.319
155	-	5.110	4.238	3.483	2.758	2.184	1.634	1.319	1.319
160	-	5.181	4.302	3.542	2.812	2.233	1.679	1.319	1.319
165	-	5.250	4.364	3.599	2.863	2.280	1.722	1.319	1.319
170	-	5.317	4.424	3.653	2.912	2.325	1.764	1.319	1.319
175	-	5.380	4.482	3.705	2.959	2.369	1.804	1.319	1.319
180	-	5.442	4.537	3.756	3.004	2.411	1.843	1.319	1.319
185	-	5.501	4.590	3.804	3.048	2.451	1.880	1.319	1.319
190	-	5.558	4.641	3.851	3.090	2.490	1.916	1.347	1.319
195	-	5.613	4.691	3.895	3.131	2.528	1.950	1.379	1.319
200	-	5.666	4.739	3.939	3.170	2.564	1.984	1.409	1.319
205	-	5.718	4.785	3.981	3.208	2.599	2.016	1.438	1.319
210	-	5.767	4.829	4.021	3.244	2.632	2.047	1.467	1.319
215	-	5.815	4.872	4.060	3.280	2.665	2.077	1.494	1.319
220	-	5.861	4.914	4.098	3.314	2.696	2.106	1.521	1.319
225	-	5.906	4.954	4.135	3.347	2.727	2.134	1.546	1.319
230	-	-	4.994	4.170	3.379	2.756	2.161	1.571	1.319
235	-	-	5.031	4.204	3.410	2.785	2.187	1.595	1.319
240	-	-	5.068	4.238	3.440	2.812	2.212	1.618	1.319
245	-	-	5.104	4.270	3.469	2.839	2.237	1.640	1.319
250	-	-	5.138	4.301	3.497	2.865	2.261	1.662	1.319
255	-	-	5.172	4.332	3.524	2.891	2.284	1.683	1.319
260	-	-	5.204	4.361	3.551	2.915	2.307	1.704	1.319
265	-	-	5.236	4.390	3.577	2.939	2.329	1.724	1.319
270	-	-	5.267	4.418	3.602	2.962	2.350	1.743	1.319
275	-	-	5.297	4.445	3.626	2.984	2.370	1.762	1.319
280	-	-	5.326	4.471	3.650	3.006	2.390	1.780	1.319
285	-	-	5.354	4.497	3.673	3.028	2.410	1.798	1.319
290	-	-	5.382	4.522	3.696	3.048	2.429	1.816	1.319
295	-	-	5.408	4.546	3.718	3.068	2.448	1.832	1.319
300	-	-	5.434	4.570	3.739	3.088	2.466	1.849	1.319
305	-	-	5.460	4.593	3.760	3.107	2.483	1.865	1.319
307	-	-	5.471	4.603	3.769	3.116	2.491	1.872	1.319

Thickness is intumescent only.

Table 16: I Section Columns 105 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	4.002	2.992	2.347	1.780	1.319	1.319	1.319	1.319	1.319
50	4.039	3.024	2.376	1.807	1.319	1.319	1.319	1.319	1.319
55	4.339	3.281	2.611	2.024	1.459	1.319	1.319	1.319	1.319
60	4.619	3.521	2.830	2.227	1.644	1.319	1.319	1.319	1.319
65	4.881	3.745	3.035	2.415	1.817	1.337	1.319	1.319	1.319
70	5.127	3.955	3.227	2.592	1.979	1.488	1.319	1.319	1.319
75	5.358	4.152	3.407	2.758	2.131	1.630	1.319	1.319	1.319
80	5.575	4.337	3.576	2.913	2.273	1.762	1.319	1.319	1.319
85	5.780	4.512	3.735	3.060	2.407	1.887	1.388	1.319	1.319
90	-	4.677	3.885	3.198	2.533	2.005	1.498	1.319	1.319
95	-	4.833	4.027	3.328	2.652	2.116	1.601	1.319	1.319
100	-	4.980	4.162	3.452	2.765	2.221	1.699	1.319	1.319
105	-	5.120	4.289	3.569	2.872	2.321	1.791	1.319	1.319
110	-	5.253	4.410	3.679	2.973	2.415	1.879	1.345	1.319
115	-	5.380	4.525	3.785	3.069	2.505	1.962	1.422	1.319
120	-	5.500	4.634	3.885	3.160	2.590	2.041	1.494	1.319
125	-	5.615	4.738	3.980	3.247	2.671	2.116	1.564	1.319
130	-	5.724	4.837	4.071	3.330	2.748	2.188	1.630	1.319
135	-	5.829	4.932	4.158	3.409	2.821	2.256	1.692	1.319
140	-	5.929	5.023	4.241	3.485	2.892	2.321	1.752	1.319
145	-	-	5.110	4.321	3.557	2.959	2.383	1.810	1.319
150	-	-	5.193	4.397	3.627	3.023	2.443	1.865	1.319
155	-	-	5.272	4.470	3.693	3.085	2.500	1.917	1.319
160	-	-	5.349	4.540	3.756	3.144	2.555	1.968	1.319
165	-	-	5.422	4.607	3.818	3.201	2.607	2.016	1.319
170	-	-	5.493	4.671	3.876	3.255	2.658	2.062	1.340
175	-	-	5.561	4.733	3.933	3.307	2.706	2.107	1.379
180	-	-	5.626	4.793	3.987	3.358	2.753	2.150	1.417
185	-	-	5.689	4.850	4.039	3.406	2.798	2.191	1.454
190	-	-	5.749	4.906	4.089	3.453	2.841	2.231	1.489
195	-	-	5.808	4.959	4.138	3.498	2.883	2.269	1.523
200	-	-	5.864	5.010	4.185	3.541	2.923	2.306	1.556
205	-	-	5.919	5.060	4.230	3.583	2.962	2.341	1.587
210	-	-	-	5.108	4.273	3.624	2.999	2.376	1.617
215	-	-	-	5.155	4.316	3.663	3.035	2.409	1.647
220	-	-	-	5.200	4.356	3.701	3.070	2.441	1.675
225	-	-	-	5.243	4.396	3.737	3.104	2.472	1.703
230	-	-	-	5.285	4.434	3.773	3.137	2.502	1.729
235	-	-	-	5.326	4.471	3.807	3.169	2.531	1.755
240	-	-	-	5.365	4.507	3.840	3.199	2.560	1.780
245	-	-	-	5.404	4.542	3.872	3.229	2.587	1.804
250	-	-	-	5.441	4.575	3.904	3.258	2.613	1.828
255	-	-	-	5.477	4.608	3.934	3.286	2.639	1.850
260	-	-	-	5.512	4.640	3.963	3.313	2.664	1.872
265	-	-	-	5.546	4.671	3.992	3.340	2.688	1.894
270	-	-	-	5.579	4.701	4.020	3.365	2.712	1.915
275	-	-	-	5.611	4.730	4.047	3.390	2.735	1.935
280	-	-	-	5.643	4.758	4.073	3.414	2.757	1.954
285	-	-	-	5.673	4.786	4.099	3.438	2.779	1.973
290	-	-	-	5.703	4.813	4.124	3.461	2.800	1.992
295	-	-	-	5.732	4.839	4.148	3.483	2.820	2.010
300	-	-	-	5.760	4.864	4.171	3.505	2.840	2.028
305	-	-	-	5.787	4.889	4.194	3.526	2.860	2.045
307	-	-	-	5.799	4.900	4.204	3.536	2.868	2.053

Thickness is intumescent only.

Table 17: I Section Columns 120 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	4.693	3.608	2.933	2.341	1.769	1.319	1.319	1.319	1.319
50	4.735	3.645	2.966	2.372	1.797	1.336	1.319	1.319	1.319
55	5.078	3.940	3.237	2.624	2.029	1.553	1.319	1.319	1.319
60	5.399	4.215	3.490	2.858	2.245	1.756	1.319	1.319	1.319
65	5.699	4.473	3.727	3.077	2.446	1.945	1.462	1.319	1.319
70	-	4.714	3.948	3.281	2.634	2.122	1.627	1.319	1.319
75	-	4.940	4.155	3.473	2.811	2.287	1.782	1.319	1.319
80	-	5.153	4.350	3.653	2.976	2.442	1.927	1.412	1.319
85	-	5.354	4.534	3.823	3.132	2.588	2.063	1.538	1.319
90	-	5.544	4.707	3.983	3.279	2.726	2.192	1.658	1.319
95	-	5.723	4.871	4.134	3.417	2.855	2.313	1.770	1.319
100	-	5.892	5.026	4.277	3.548	2.978	2.427	1.876	1.319
105	-	-	5.173	4.412	3.672	3.094	2.536	1.976	1.319
110	-	-	5.312	4.541	3.790	3.204	2.638	2.071	1.379
115	-	-	5.445	4.663	3.902	3.309	2.736	2.161	1.459
120	-	-	5.571	4.779	4.008	3.408	2.828	2.247	1.535
125	-	-	5.691	4.889	4.109	3.503	2.916	2.329	1.608
130	-	-	5.806	4.995	4.206	3.593	3.000	2.406	1.677
135	-	-	5.915	5.095	4.298	3.679	3.080	2.480	1.743
140	-	-	-	5.191	4.386	3.761	3.157	2.551	1.806
145	-	-	-	5.283	4.470	3.839	3.230	2.618	1.867
150	-	-	-	5.371	4.550	3.914	3.300	2.683	1.924
155	-	-	-	5.456	4.627	3.986	3.367	2.745	1.979
160	-	-	-	5.537	4.701	4.055	3.431	2.804	2.032
165	-	-	-	5.614	4.772	4.121	3.492	2.861	2.083
170	-	-	-	5.689	4.840	4.185	3.552	2.916	2.131
175	-	-	-	5.761	4.906	4.246	3.608	2.968	2.178
180	-	-	-	5.830	4.969	4.305	3.663	3.019	2.223
185	-	-	-	5.896	5.030	4.361	3.716	3.067	2.266
190	-	-	-	-	5.088	4.416	3.766	3.114	2.308
195	-	-	-	-	5.145	4.468	3.815	3.159	2.348
200	-	-	-	-	5.199	4.519	3.862	3.202	2.387
205	-	-	-	-	5.252	4.568	3.908	3.244	2.424
210	-	-	-	-	5.302	4.615	3.951	3.285	2.460
215	-	-	-	-	5.351	4.661	3.994	3.324	2.495
220	-	-	-	-	5.399	4.705	4.035	3.362	2.528
225	-	-	-	-	5.445	4.748	4.075	3.398	2.561
230	-	-	-	-	5.489	4.789	4.113	3.434	2.592
235	-	-	-	-	5.532	4.829	4.150	3.468	2.623
240	-	-	-	-	5.574	4.868	4.186	3.501	2.652
245	-	-	-	-	5.614	4.906	4.221	3.533	2.681
250	-	-	-	-	5.654	4.942	4.255	3.565	2.709
255	-	-	-	-	5.692	4.978	4.288	3.595	2.736
260	-	-	-	-	5.729	5.012	4.320	3.624	2.762
265	-	-	-	-	5.764	5.045	4.351	3.653	2.787
270	-	-	-	-	5.799	5.078	4.381	3.681	2.812
275	-	-	-	-	5.833	5.109	4.410	3.708	2.836
280	-	-	-	-	5.866	5.140	4.438	3.734	2.859
285	-	-	-	-	5.898	5.170	4.466	3.759	2.882
290	-	-	-	-	5.930	5.199	4.493	3.784	2.904
295	-	-	-	-	-	5.227	4.519	3.808	2.925
300	-	-	-	-	-	5.255	4.545	3.832	2.946
305	-	-	-	-	-	5.281	4.570	3.855	2.966
307	-	-	-	-	-	5.293	4.580	3.865	2.975

Thickness is intumescent only.

Table 18: I Section Columns 150 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Design Temperature of**								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
49	-	4.841	4.104	3.464	2.837	2.343	1.864	1.383	1.319
50	-	4.886	4.147	3.503	2.874	2.378	1.897	1.414	1.319
55	-	5.258	4.490	3.823	3.170	2.658	2.161	1.661	1.319
60	-	5.605	4.811	4.121	3.447	2.919	2.407	1.890	1.319
65	-	5.929	5.110	4.400	3.704	3.162	2.635	2.104	1.449
70	-	-	5.390	4.660	3.945	3.389	2.849	2.304	1.629
75	-	-	5.652	4.904	4.171	3.602	3.049	2.491	1.797
80	-	-	5.899	5.134	4.383	3.802	3.237	2.666	1.955
85	-	-	-	5.350	4.582	3.990	3.413	2.830	2.103
90	-	-	-	5.553	4.770	4.167	3.579	2.985	2.242
95	-	-	-	5.745	4.947	4.334	3.736	3.131	2.374
100	-	-	-	5.927	5.115	4.491	3.884	3.269	2.498
105	-	-	-	-	5.274	4.641	4.024	3.400	2.616
110	-	-	-	-	5.425	4.782	4.157	3.524	2.727
115	-	-	-	-	5.568	4.917	4.283	3.641	2.832
120	-	-	-	-	5.704	5.045	4.403	3.752	2.933
125	-	-	-	-	5.833	5.166	4.517	3.859	3.028
130	-	-	-	-	-	5.282	4.626	3.960	3.119
135	-	-	-	-	-	5.393	4.729	4.056	3.205
140	-	-	-	-	-	5.499	4.828	4.148	3.288
145	-	-	-	-	-	5.600	4.923	4.236	3.367
150	-	-	-	-	-	5.696	5.013	4.320	3.442
155	-	-	-	-	-	5.789	5.100	4.400	3.515
160	-	-	-	-	-	5.878	5.183	4.478	3.584
165	-	-	-	-	-	-	5.262	4.552	3.650
170	-	-	-	-	-	-	5.339	4.623	3.714
175	-	-	-	-	-	-	5.412	4.691	3.775
180	-	-	-	-	-	-	5.483	4.757	3.834
185	-	-	-	-	-	-	5.551	4.820	3.891
190	-	-	-	-	-	-	5.617	4.881	3.946
195	-	-	-	-	-	-	5.680	4.939	3.998
200	-	-	-	-	-	-	5.741	4.996	4.049
205	-	-	-	-	-	-	5.800	5.050	4.098
210	-	-	-	-	-	-	5.856	5.103	4.145
215	-	-	-	-	-	-	5.911	5.154	4.191
220	-	-	-	-	-	-	-	5.203	4.235
225	-	-	-	-	-	-	-	5.251	4.277
230	-	-	-	-	-	-	-	5.297	4.319
235	-	-	-	-	-	-	-	5.341	4.359
240	-	-	-	-	-	-	-	5.385	4.397
245	-	-	-	-	-	-	-	5.427	4.435
250	-	-	-	-	-	-	-	5.467	4.471
255	-	-	-	-	-	-	-	5.507	4.507
260	-	-	-	-	-	-	-	5.545	4.541
265	-	-	-	-	-	-	-	5.582	4.574
270	-	-	-	-	-	-	-	5.618	4.606
275	-	-	-	-	-	-	-	5.653	4.638
280	-	-	-	-	-	-	-	5.687	4.668
285	-	-	-	-	-	-	-	5.720	4.698
290	-	-	-	-	-	-	-	5.753	4.727
295	-	-	-	-	-	-	-	5.784	4.755
300	-	-	-	-	-	-	-	5.815	4.782
305	-	-	-	-	-	-	-	5.844	4.809
307	-	-	-	-	-	-	-	5.857	4.821

Thickness is intumescent only.

Table 19 RHS: 30 Minutes									
Section Factor up to m^{-1}	Thickness (mm) Required for a Steel Design Temperature								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
50	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
55	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
60	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
65	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
70	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
75	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
80	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
85	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
90	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
95	1.419	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
100	1.524	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
105	1.625	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
110	1.723	1.360	1.360	1.360	1.360	1.360	1.360	1.360	1.360
115	1.817	1.436	1.360	1.360	1.360	1.360	1.360	1.360	1.360
120	1.909	1.510	1.360	1.360	1.360	1.360	1.360	1.360	1.360
125	1.997	1.579	1.360	1.360	1.360	1.360	1.360	1.360	1.360
130	2.083	1.644	1.404	1.360	1.360	1.360	1.360	1.360	1.360
135	2.166	1.706	1.459	1.364	1.360	1.360	1.360	1.360	1.360
140	2.247	1.765	1.510	1.413	1.360	1.360	1.360	1.360	1.360

Thickness is intumescent only.

Table 20 RHS: 60 Minutes									
Section Factor up to m^{-1}	Thickness (mm) Required for a Steel Design Temperature								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
50	2.183	1.573	1.360	1.360	1.360	1.360	1.360	1.360	1.360
55	2.478	1.847	1.360	1.360	1.360	1.360	1.360	1.360	1.360
60	2.761	2.098	1.583	1.360	1.360	1.360	1.360	1.360	1.360
65	3.033	2.328	1.802	1.513	1.360	1.360	1.360	1.360	1.360
70		2.540	1.996	1.706	1.467	1.360	1.360	1.360	1.360
75		2.735	2.171	1.876	1.637	1.439	1.360	1.360	1.360
80		2.916	2.329	2.027	1.786	1.588	1.395	1.360	1.360
85			2.472	2.161	1.917	1.719	1.526	1.368	1.360
90			2.602	2.282	2.033	1.834	1.641	1.484	1.360
95			2.721	2.391	2.137	1.936	1.743	1.586	1.399
100			2.831	2.489	2.231	2.027	1.833	1.676	1.490
105			2.932	2.580	2.316	2.109	1.914	1.757	1.572
110			3.025	2.662	2.393	2.183	1.987	1.829	1.644
115				2.738	2.463	2.251	2.053	1.895	1.710
120				2.808	2.528	2.312	2.113	1.954	1.769
125				2.872	2.587	2.369	2.168	2.008	1.823
130				2.932	2.642	2.420	2.218	2.057	1.872
135				2.988	2.692	2.468	2.265	2.103	1.918
140					2.739	2.512	2.307	2.145	1.959

Thickness is intumescent only.

Table 21 RHS: 90 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Steel Design Temperature**								
	350°C	**400°C**	**450°C**	**500°C**	**550°C**	**600°C**	**650°C**	**700°C**	**750°C**
50			2.620	2.216	1.852	1.523	1.360	1.360	1.360
55			2.946	2.536	2.176	1.859	1.533	1.360	1.360
60				2.809	2.447	2.133	1.816	1.544	1.360
65					2.675	2.361	2.048	1.783	1.463
70					2.871	2.554	2.242	1.980	1.667
75						2.719	2.406	2.146	1.837
80						2.862	2.547	2.287	1.982
85						2.986	2.670	2.409	2.106
90							2.777	2.516	2.213
95							2.871	2.609	2.308
100							2.956	2.692	2.391
105							3.031	2.766	2.465
110								2.833	2.531
115								2.893	2.591
120								2.947	2.645
125								2.996	2.695
130									2.740
135									2.781
140									2.819

Thickness is intumescent only.

Table 22 RHS: 120 Minutes									
Section Factor up to m^{-1}	**Thickness (mm) Required for a Steel Design Temperature**								
	350°C	**400°C**	**450°C**	**500°C**	**550°C**	**600°C**	**650°C**	**700°C**	**750°C**
50						2.857	2.432	2.057	1.589
55							2.759	2.395	1.947
60							3.021	2.663	2.227
65								2.880	2.452
70									2.636
75									2.790
80									2.921
85									3.033

Thickness is intumescent only.

Table 23 CHS: 30 Minutes									
Section Factor m^{-1}	Thickness (mm) Required for a Steel Design Temperature								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
50	0.594	0.594	0.594	0.594	0.594	0.594	0.594	0.594	0.594
55	0.711	0.594	0.594	0.594	0.594	0.594	0.594	0.594	0.594
60	0.847	0.594	0.594	0.594	0.594	0.594	0.594	0.594	0.594
65	0.977	0.594	0.594	0.594	0.594	0.594	0.594	0.594	0.594
70	1.101	0.594	0.594	0.594	0.594	0.594	0.594	0.594	0.594
75	1.219	0.679	0.594	0.594	0.594	0.594	0.594	0.594	0.594
80	1.332	0.782	0.594	0.594	0.594	0.594	0.594	0.594	0.594
85	1.439	0.879	0.594	0.594	0.594	0.594	0.594	0.594	0.594
90	1.542	0.971	0.594	0.594	0.594	0.594	0.594	0.594	0.594
95	1.641	1.058	0.623	0.594	0.594	0.594	0.594	0.594	0.594
100	1.735	1.141	0.701	0.594	0.594	0.594	0.594	0.594	0.594
105	1.825	1.220	0.774	0.594	0.594	0.594	0.594	0.594	0.594
110	1.912	1.294	0.844	0.594	0.594	0.594	0.594	0.594	0.594
115	1.996	1.365	0.909	0.594	0.594	0.594	0.594	0.594	0.594
120	2.076	1.433	0.971	0.647	0.594	0.594	0.594	0.594	0.594
125	2.153	1.498	1.030	0.703	0.594	0.594	0.594	0.594	0.594
130	2.227	1.560	1.086	0.757	0.594	0.594	0.594	0.594	0.594
135	2.299	1.619	1.139	0.808	0.594	0.594	0.594	0.594	0.594
140	2.368	1.676	1.190	0.856	0.594	0.594	0.594	0.594	0.594
145	2.435	1.730	1.239	0.902	0.602	0.594	0.594	0.594	0.594
150	2.499	1.782	1.285	0.945	0.644	0.594	0.594	0.594	0.594
155	2.561	1.832	1.329	0.987	0.684	0.594	0.594	0.594	0.594
160	2.621	1.880	1.371	1.026	0.722	0.594	0.594	0.594	0.594
165	2.679	1.926	1.412	1.064	0.759	0.594	0.594	0.594	0.594
170	2.735	1.971	1.451	1.100	0.793	0.594	0.594	0.594	0.594
175	2.789	2.014	1.488	1.135	0.826	0.616	0.594	0.594	0.594
180	2.842	2.055	1.524	1.168	0.858	0.647	0.594	0.594	0.594
185	2.893	2.095	1.558	1.200	0.888	0.676	0.594	0.594	0.594
190	2.943	2.133	1.591	1.230	0.917	0.704	0.594	0.594	0.594
195	2.991	2.170	1.623	1.260	0.944	0.731	0.594	0.594	0.594
200	3.037	2.206	1.654	1.288	0.971	0.757	0.594	0.594	0.594
205	3.082	2.240	1.683	1.315	0.996	0.782	0.594	0.594	0.594
210		2.274	1.712	1.341	1.021	0.805	0.602	0.594	0.594
215		2.306	1.739	1.366	1.045	0.828	0.625	0.594	0.594
220		2.338	1.766	1.390	1.067	0.850	0.646	0.594	0.594
225		2.368	1.792	1.414	1.089	0.871	0.667	0.594	0.594
230		2.398	1.816	1.436	1.110	0.892	0.686	0.594	0.594
235		2.426	1.840	1.458	1.131	0.911	0.706	0.594	0.594
240		2.454	1.864	1.479	1.150	0.930	0.724	0.594	0.594
245		2.481	1.886	1.499	1.169	0.949	0.742	0.594	0.594
250		2.507	1.908	1.519	1.187	0.966	0.759	0.594	0.594
255		2.532	1.929	1.538	1.205	0.983	0.775	0.594	0.594
260		2.557	1.950	1.556	1.222	1.000	0.791	0.594	0.594
265		2.581	1.970	1.574	1.239	1.016	0.807	0.594	0.594
270		2.604	1.989	1.592	1.255	1.031	0.822	0.594	0.594
275		2.627	2.008	1.608	1.270	1.046	0.836	0.594	0.594
280		2.649	2.026	1.625	1.286	1.060	0.850	0.594	0.594
285		2.670	2.044	1.641	1.300	1.074	0.864	0.606	0.594
290		2.691	2.061	1.656	1.314	1.088	0.877	0.618	0.594
295		2.712	2.078	1.671	1.328	1.101	0.890	0.631	0.594
300		2.732	2.094	1.685	1.342	1.114	0.902	0.643	0.594
305		2.751	2.110	1.699	1.355	1.126	0.914	0.654	0.594
310		2.770	2.125	1.713	1.367	1.138	0.926	0.665	0.594
315		2.788	2.140	1.727	1.379	1.150	0.937	0.676	0.594
320		2.807	2.155	1.740	1.391	1.161	0.948	0.687	0.594
325		2.824	2.169	1.752	1.403	1.173	0.959	0.697	0.594
330		2.841	2.183	1.765	1.414	1.183	0.969	0.707	0.594
335		2.858	2.197	1.777	1.425	1.194	0.979	0.717	0.594
340		2.874	2.210	1.788	1.436	1.204	0.989	0.727	0.594
343		2.885	2.218	1.796	1.443	1.210	0.995	0.733	0.594

Thickness is intumescent only.

Table 24 CHS: 60 Minutes									
Section Factor m^{-1}	Thickness (mm) Required for a Steel Design Temperature								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
40	1.986	1.373	0.851	0.594	0.594	0.594	0.594	0.594	0.594
45	2.309	1.673	1.140	0.716	0.594	0.594	0.594	0.594	0.594
50	2.616	1.952	1.405	0.977	0.594	0.594	0.594	0.594	0.594
55	2.907	2.213	1.649	1.215	0.790	0.594	0.594	0.594	0.594
60		2.457	1.875	1.432	1.002	0.682	0.594	0.594	0.594
65		2.686	2.084	1.631	1.194	0.873	0.594	0.594	0.594
70		2.901	2.278	1.815	1.370	1.046	0.721	0.594	0.594
75			2.459	1.985	1.532	1.204	0.877	0.594	0.594
80			2.628	2.142	1.680	1.349	1.019	0.595	0.594
85			2.787	2.289	1.818	1.482	1.149	0.721	0.594
90			2.935	2.425	1.946	1.606	1.268	0.836	0.594
95			3.075	2.552	2.064	1.719	1.379	0.942	0.594
100				2.672	2.175	1.825	1.481	1.041	0.625
105				2.784	2.278	1.924	1.575	1.131	0.713
110				2.889	2.374	2.016	1.664	1.216	0.794
115				2.988	2.465	2.101	1.746	1.294	0.869
120				3.082	2.550	2.182	1.823	1.367	0.940
125					2.631	2.258	1.895	1.436	1.006
130					2.706	2.329	1.963	1.500	1.067
135					2.778	2.396	2.026	1.560	1.125
140					2.846	2.459	2.086	1.617	1.179
145					2.910	2.519	2.143	1.670	1.230
150					2.971	2.576	2.197	1.721	1.279
155					3.029	2.630	2.247	1.769	1.324
160					3.084	2.681	2.296	1.814	1.367
165						2.730	2.341	1.857	1.408
170						2.776	2.385	1.898	1.447
175						2.821	2.426	1.937	1.484
180						2.863	2.466	1.974	1.519
185						2.903	2.504	2.009	1.552
190						2.942	2.540	2.042	1.584
195						2.979	2.574	2.075	1.614
200						3.014	2.607	2.105	1.644
205						3.048	2.639	2.135	1.671
210						3.080	2.669	2.163	1.698
215							2.698	2.190	1.724
220							2.726	2.216	1.748
225							2.753	2.241	1.772
230							2.779	2.265	1.794
235							2.803	2.288	1.816
240							2.827	2.310	1.837
245							2.851	2.332	1.857
250							2.873	2.352	1.876
255							2.894	2.372	1.895
260							2.915	2.392	1.913
265							2.935	2.410	1.931
270							2.955	2.428	1.948
275							2.974	2.445	1.964
280							2.992	2.462	1.980
285							3.009	2.479	1.995
290							3.027	2.494	2.010
295							3.043	2.510	2.024
300							3.059	2.524	2.038
305							3.075	2.539	2.051
310							3.090	2.553	2.064
315								2.566	2.077
320								2.580	2.089
325								2.592	2.101
330								2.605	2.113
335								2.617	2.124
340								2.629	2.135
343								2.636	2.142

Thickness is intumescent only.

Table 25 CHS: 90 Minutes									
Section Factor m^{-1}	Thickness (mm) Required for a Steel Design Temperature								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
40		3.000	2.392	1.910	1.415	1.038	0.643	0.594	0.594
45				2.301	1.793	1.412	1.014	0.594	0.594
50				2.655	2.132	1.745	1.341	0.804	0.594
55				2.978	2.438	2.042	1.632	1.084	0.594
60					2.715	2.310	1.891	1.333	0.790
65					2.967	2.552	2.125	1.555	1.005
70						2.772	2.336	1.756	1.197
75						2.973	2.527	1.937	1.370
80							2.702	2.102	1.527
85							2.863	2.252	1.670
90							3.010	2.390	1.800
95								2.517	1.920
100								2.634	2.030
105								2.743	2.132
110								2.843	2.226
115								2.937	2.314
120								3.024	2.396
125									2.472
130									2.544
135									2.611
140									2.674
145									2.733
150									2.789
155									2.842
160									2.892
165									2.939
170									2.984
175									3.027
180									3.067

Thickness is intumescent only.

Table 26 CHS: 120 Minutes									
Section Factor m^{-1}	Thickness (mm) Required for a Steel Design Temperature								
	350°C	400°C	450°C	500°C	550°C	600°C	650°C	700°C	750°C
40					2.820	2.395	1.939	1.308	0.680
45						2.849	2.380	1.730	1.087
50							2.769	2.100	1.440
55								2.425	1.750
60								2.715	2.024
65								2.974	2.268
70									2.487
75									2.684
80									2.863
85									3.025

Thickness is intumescent only.