

Pièce jointe n°7 – Annexe 1

Notes de calcul Flumilog

FLUMilog

Interface graphique v.5.4.0.5

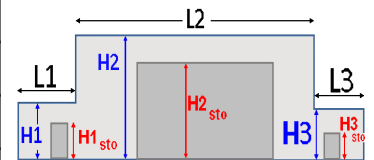
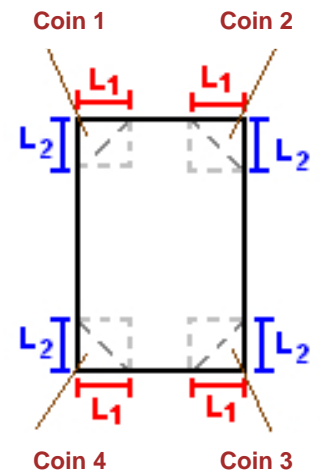
Outil de calculV5.4

Flux Thermiques Détermination des distances d'effets

Utilisateur :	FGM
Société :	Evolutys
Nom du Projet :	PESCANOVA_CF_et_Salle_carreee_1
Cellule :	Generalisee
Commentaire :	
Création du fichier de données d'entrée :	07/12/2020 à 15:16:11 avec l'interface graphique v. 5.4.0.5
Date de création du fichier de résultats :	7/12/20

I. **DONNEES D'ENTREE :****Donnée Cible**Hauteur de la cible : **1,8 m****Données murs entre cellules**REI C1/C2 : **1 min****Géométrie Cellule1**

Nom de la Cellule :Cellule n°1				
Longueur maximum de la cellule (m)		35,0		
Largeur maximum de la cellule (m)		22,7		
Hauteur maximum de la cellule (m)		6,5		
Coin 1	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 2	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 3	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 4	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Hauteur complexe				
	1	2	3	
L (m)	0,0	0,0	0,0	
H (m)	0,0	0,0	0,0	
H sto (m)	0,0	0,0	0,0	

**Toiture**

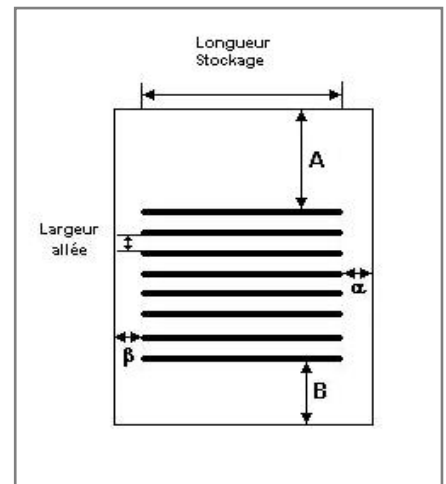
Résistance au feu des poutres (min)	15
Résistance au feu des pannes (min)	15
Matériaux constituant la couverture	metallique multicouches
Nombre d'exutoires	4
Longueur des exutoires (m)	1,8
Largeur des exutoires (m)	1,8

Stockage de la cellule : Cellule n°1

Nombre de niveaux	3
Mode de stockage	Rack

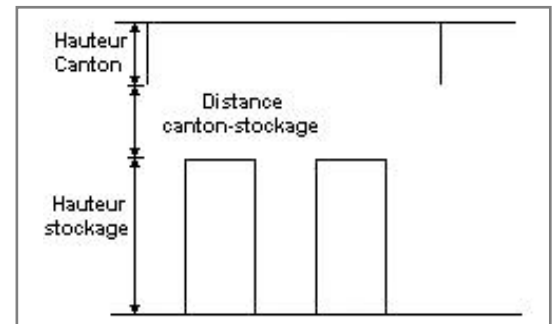
Dimensions

Longueur de stockage	15,6 m
Déport latéral A	0,5 m
Déport latéral B	0,5 m
Longueur de préparation a	0,5 m
Longueur de préparation b	6,6 m
Hauteur maximum de stockage	5,5 m
Hauteur du canton	0,0 m
Ecart entre le haut du stockage et le canton	1,0 m



Stockage en rack

Sens du stockage	dans le sens de la paroi 2
Nombre de double racks	2
Largeur d'un double rack	5,6 m
Nombre de racks simples	2
Largeur d'un rack simple	2,8 m
Largeur des allées entre les racks	5,7 m



Palette type de la cellule Cellule n°1

Dimensions Palette

Longueur de la palette :	3,9 m
Largeur de la palette :	0,8 m
Hauteur de la palette :	1,5 m
Volume de la palette :	4,7 m ³
Nom de la palette :	crevettes

Poids total de la palette : **0,0** kg

Composition de la Palette (Masse en kg)

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC
0,0	0,0	0,0	0,0

Données supplémentaires

Durée de combustion de la palette :	25,0 min
Puissance dégagée par la palette :	750,0 kW

I. DONNEES D'ENTREE :

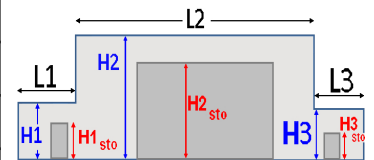
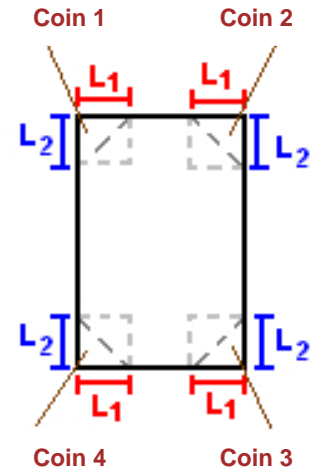
Donnée Cible

Hauteur de la cible : **1,8 m**

Géométrie Cellule2

Nom de la Cellule :Cellule n°2			
Longueur maximum de la cellule (m)	40,3		
Largeur maximum de la cellule (m)	24,5		
Hauteur maximum de la cellule (m)	6,5		
Coin 1	tronqué en diagonale	L1 (m)	8,1
		L2 (m)	9,0
Coin 2	non tronqué	L1 (m)	0,0
		L2 (m)	0,0
Coin 3	non tronqué	L1 (m)	0,0
		L2 (m)	0,0
Coin 4	non tronqué	L1 (m)	0,0
		L2 (m)	0,0

Hauteur complexe			
	1	2	3
L (m)	0,0	0,0	0,0
H (m)	0,0	0,0	0,0
H sto (m)	0,0	0,0	0,0



Toiture

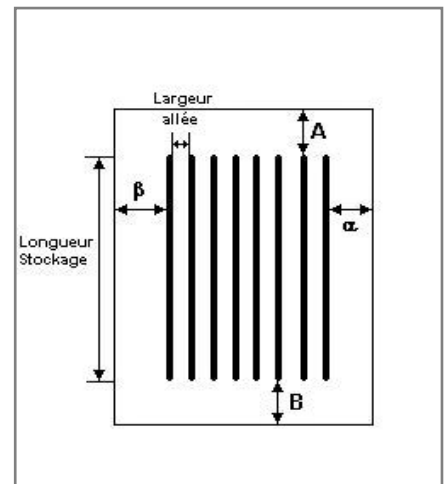
Résistance au feu des poutres (min)	15
Résistance au feu des pannes (min)	15
Matériaux constituant la couverture	metallicque multicouches
Nombre d'exutoires	4
Longueur des exutoires (m)	1,8
Largeur des exutoires (m)	1,8

Stockage de la cellule : Cellule n°2

Nombre de niveaux	3
Mode de stockage	Rack

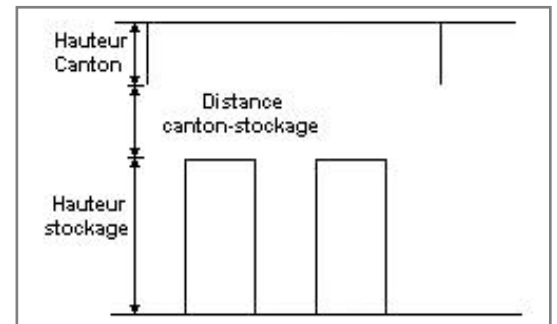
Dimensions

Longueur de stockage	30,0 m
Déport latéral a	6,0 m
Déport latéral b	0,5 m
Longueur de préparation A	5,3 m
Longueur de préparation B	5,0 m
Hauteur maximum de stockage	5,5 m
Hauteur du canton	0,0 m
Ecart entre le haut du stockage et le canton	1,0 m



Stockage en rack

Sens du stockage	dans le sens de la paroi 1
Nombre de double racks	1
Largeur d'un double rack	4,8 m
Nombre de racks simples	2
Largeur d'un rack simple	2,4 m
Largeur des allées entre les racks	4,2 m



Palette type de la cellule Cellule n°2

Dimensions Palette

Longueur de la palette :	2,4 m
Largeur de la palette :	0,8 m
Hauteur de la palette :	1,5 m
Volume de la palette :	2,9 m ³
Nom de la palette :	crevettes

Poids total de la palette : **0,0** kg

Composition de la Palette (Masse en kg)

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC
0,0	0,0	0,0	0,0

Données supplémentaires

Durée de combustion de la palette :	25,0 min
Puissance dégagée par la palette :	750,0 kW

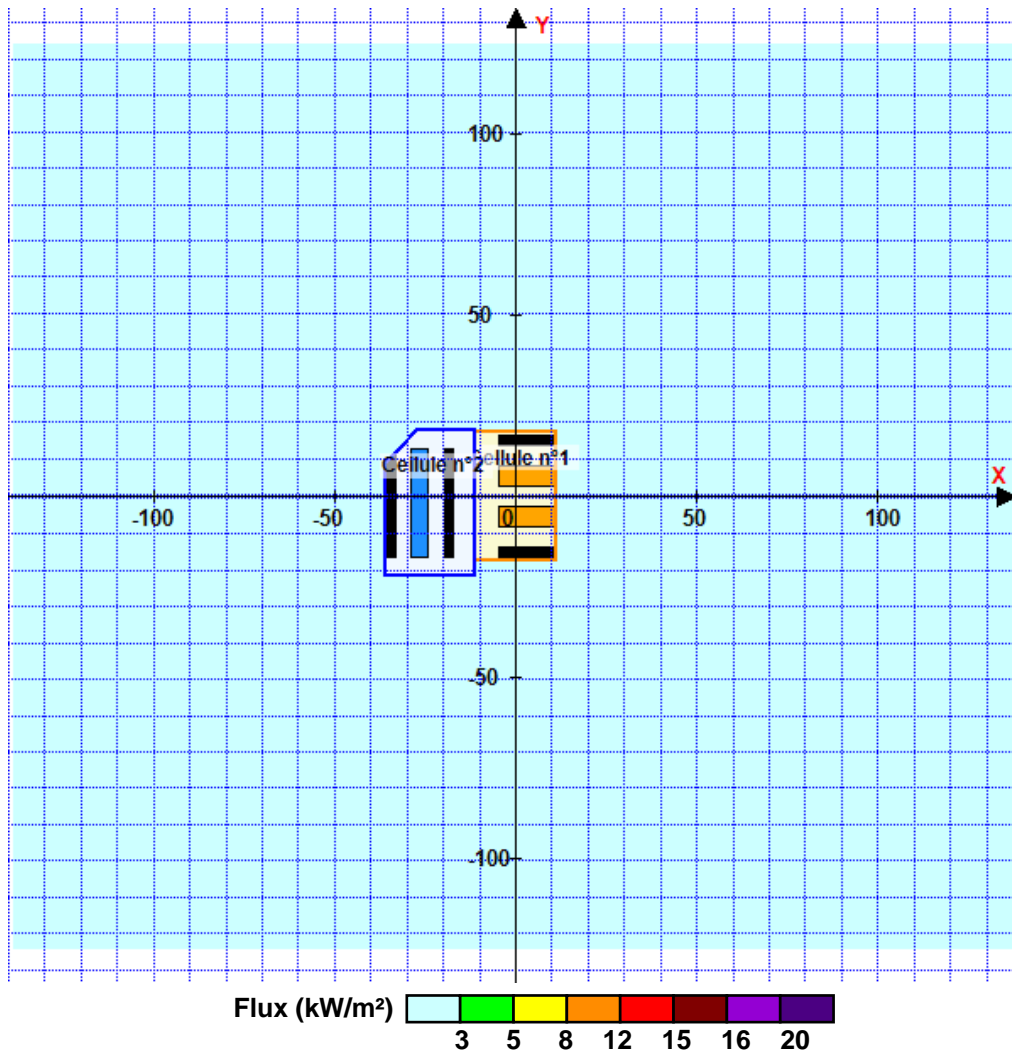
II. RESULTATS :

Départ de l'incendie dans la cellule : **Cellule n°1**

Durée de l'incendie dans la cellule : Cellule n°1 **47,0** min

Durée de l'incendie dans la cellule : Cellule n°2 **53,0** min

Distance d'effets des flux maximum



Avertissement: Dans le cas d'un scénario de propagation, l'interface de calcul Flumilog ne vérifie pas la cohérence entre les saisies des caractéristiques des parois de chaque cellule et la saisie de tenue au feu des parois séparatives indiquée en page 2 de la note de calcul.

Pour information : Dans l'environnement proche de la flamme, le transfert convectif de chaleur ne peut être négligé. Il est donc préconisé pour de faibles distances d'effets comprises entre 1 et 5 m de retenir une distance d'effets de 5 m et pour celles comprises entre 6 m et 10 m de retenir 10 m.

FLUMilog

Interface graphique v.5.4.0.5

Outil de calculV5.4

Flux Thermiques Détermination des distances d'effets

Utilisateur :	FGM
Société :	Evolutys
Nom du Projet :	PESCANOVA_emballages_local1_Constantine_1
Cellule :	emballages
Commentaire :	
Création du fichier de données d'entrée :	07/12/2020 à14:00:19avec l'interface graphique v. 5.4.0.5
Date de création du fichier de résultats :	7/12/20

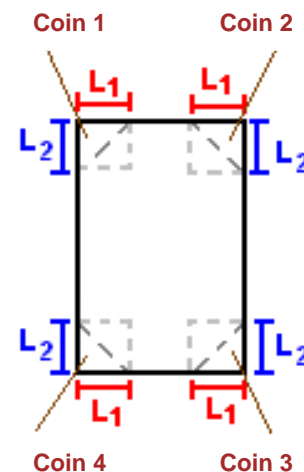
I. DONNEES D'ENTREE :

Donnée Cible

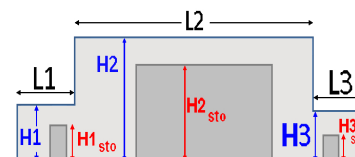
Hauteur de la cible : **-2,5 m**

Géométrie Cellule1

Nom de la Cellule :Cellule n°1				
Longueur maximum de la cellule (m)		49,4		
Largeur maximum de la cellule (m)		17,2		
Hauteur maximum de la cellule (m)		3,7		
Coin 1	tronqué en équerre	L1 (m)	4,6	
		L2 (m)	16,4	
Coin 2	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 3	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 4	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	



Hauteur complexe			
	1	2	3
L (m)	0,0	0,0	0,0
H (m)	0,0	0,0	0,0
H sto (m)	0,0	0,0	0,0



Toiture

Résistance au feu des poutres (min)	15
Résistance au feu des pannes (min)	15
Matériaux constituant la couverture	metallique multicouches
Nombre d'exutoires	8
Longueur des exutoires (m)	1,4
Largeur des exutoires (m)	1,4

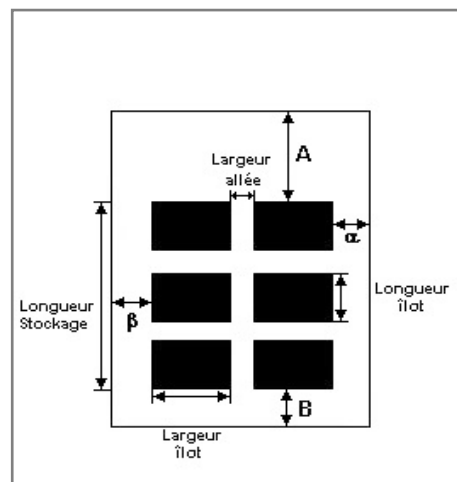
Stockage de la cellule : Cellule n°1

Mode de stockage

Masse

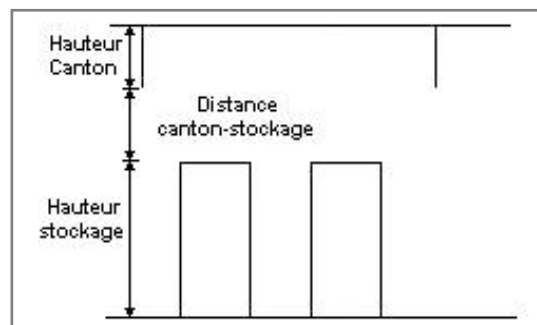
Dimensions

Longueur de préparation A	0,1 m
Longueur de préparation B	0,1 m
Déport latéral a	0,1 m
Déport latéral b	0,1 m
Hauteur du canton	0,0 m



Stockage en masse

Nombre d'îlots dans le sens de la longueur	2
Nombre d'îlots dans le sens de la largeur	2
Largeur des îlots	7,5 m
Longueur des îlots	23,6 m
Hauteur des îlots	1,5 m
Largeur des allées entre îlots	2,0 m



Palette type de la cellule Cellule n°1

Dimensions Palette

Longueur de la palette :	Adaptée aux dimensions de la palette
Largeur de la palette :	Adaptée aux dimensions de la palette
Hauteur de la palette :	Adaptée aux dimensions de la palette
Volume de la palette :	Adaptée aux dimensions de la palette
Nom de la palette :	Palette type 1510

Poids total de la palette : **Par défaut**

Composition de la Palette (Masse en kg)

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC
0,0	0,0	0,0	0,0

Données supplémentaires

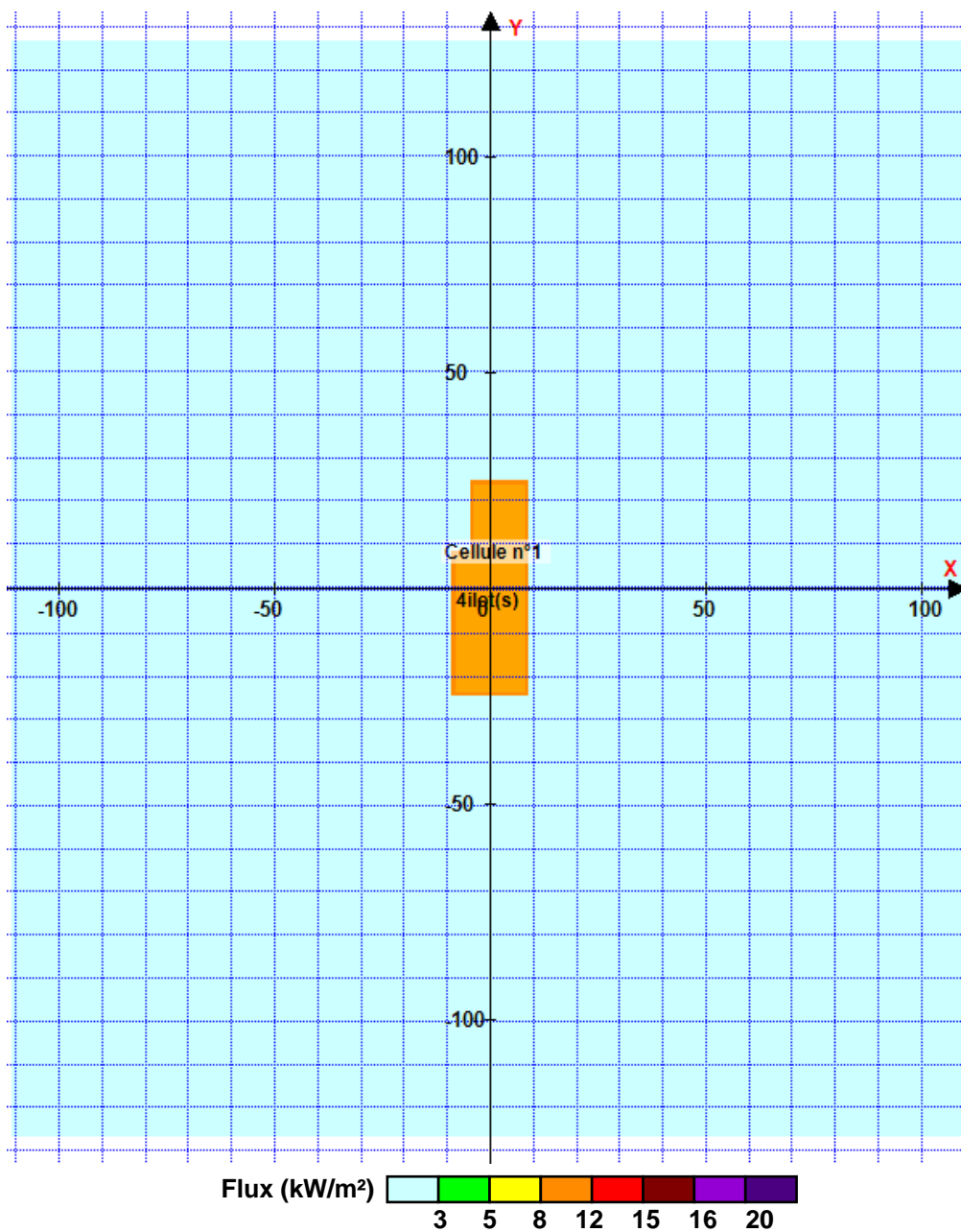
Durée de combustion de la palette :	45,0 min
Puissance dégagée par la palette :	Adaptée aux dimensions de la palette
Rappel : les dimensions standards d'une Palette type 1510 sont de 1,2 m * 0,8 m x 1,5 m, sa puissance est de 1525,0 kW	

II. RESULTATS :

Départ de l'incendie dans la cellule : **Cellule n°1**

Durée de l'incendie dans la cellule : **Cellule n°1 69,0 min**

Distance d'effets des flux maximum



Pour information : Dans l'environnement proche de la flamme, le transfert convectif de chaleur ne peut être négligé. Il est donc préconisé pour de faibles distances d'effets comprises entre 1 et 5 m de retenir une distance d'effets de 5 m et pour celles comprises entre 6 m et 10 m de retenir 10 m.

FLUMilog

Interface graphique v.5.4.0.5

Outil de calculV5.4

Flux Thermiques Détermination des distances d'effets

Utilisateur :	FGM
Société :	Evolutys
Nom du Projet :	PESCANOVA_emballages_local1_talus_1
Cellule :	emballages
Commentaire :	
Création du fichier de données d'entrée :	07/12/2020 à 14:02:21 avec l'interface graphique v. 5.4.0.5
Date de création du fichier de résultats :	7/12/20

I. DONNEES D'ENTREE :

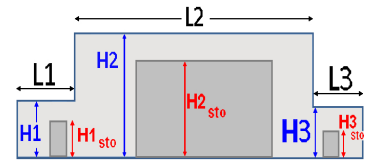
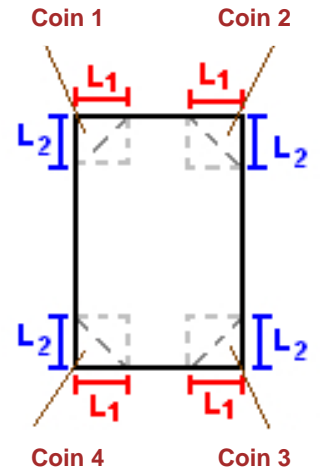
Donnée Cible

Hauteur de la cible : **2,5** m

Géométrie Cellule1

Nom de la Cellule :Cellule n°1				
Longueur maximum de la cellule (m)		49,4		
Largeur maximum de la cellule (m)		17,2		
Hauteur maximum de la cellule (m)		3,7		
Coin 1	tronqué en équerre	L1 (m)	4,6	
		L2 (m)	16,4	
Coin 2	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 3	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 4	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	

Hauteur complexe			
	1	2	3
L (m)	0,0	0,0	0,0
H (m)	0,0	0,0	0,0
H sto (m)	0,0	0,0	0,0



Toiture

Résistance au feu des poutres (min)	15
Résistance au feu des pannes (min)	15
Matériaux constituant la couverture	metallicque multicouches
Nombre d'exutoires	8
Longueur des exutoires (m)	1,4
Largeur des exutoires (m)	1,4

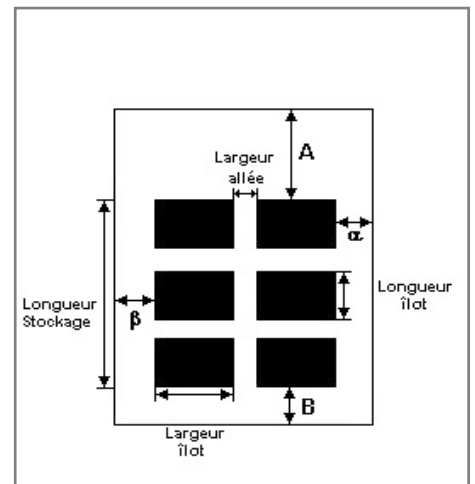
Stockage de la cellule : Cellule n°1

Mode de stockage

Masse

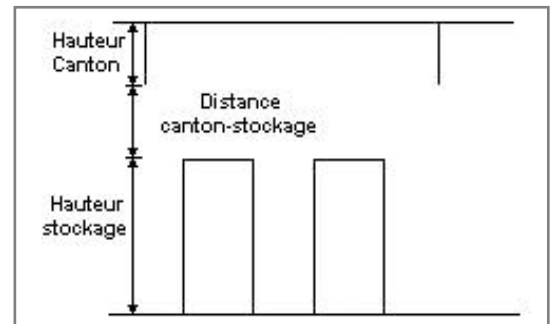
Dimensions

Longueur de préparation A	0,1 m
Longueur de préparation B	0,1 m
Déport latéral a	0,1 m
Déport latéral b	0,1 m
Hauteur du canton	0,0 m



Stockage en masse

Nombre d'îlots dans le sens de la longueur	2
Nombre d'îlots dans le sens de la largeur	2
Largeur des îlots	7,5 m
Longueur des îlots	23,6 m
Hauteur des îlots	1,5 m
Largeur des allées entre îlots	2,0 m



Palette type de la cellule Cellule n°1

Dimensions Palette

Longueur de la palette :	Adaptée aux dimensions de la palette
Largeur de la palette :	Adaptée aux dimensions de la palette
Hauteur de la palette :	Adaptée aux dimensions de la palette
Volume de la palette :	Adaptée aux dimensions de la palette
Nom de la palette :	Palette type 1510

Poids total de la palette : **Par défaut**

Composition de la Palette (Masse en kg)

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC
0,0	0,0	0,0	0,0

Données supplémentaires

Durée de combustion de la palette : **45,0** min

Puissance dégagée par la palette : **Adaptée aux dimensions de la palette**

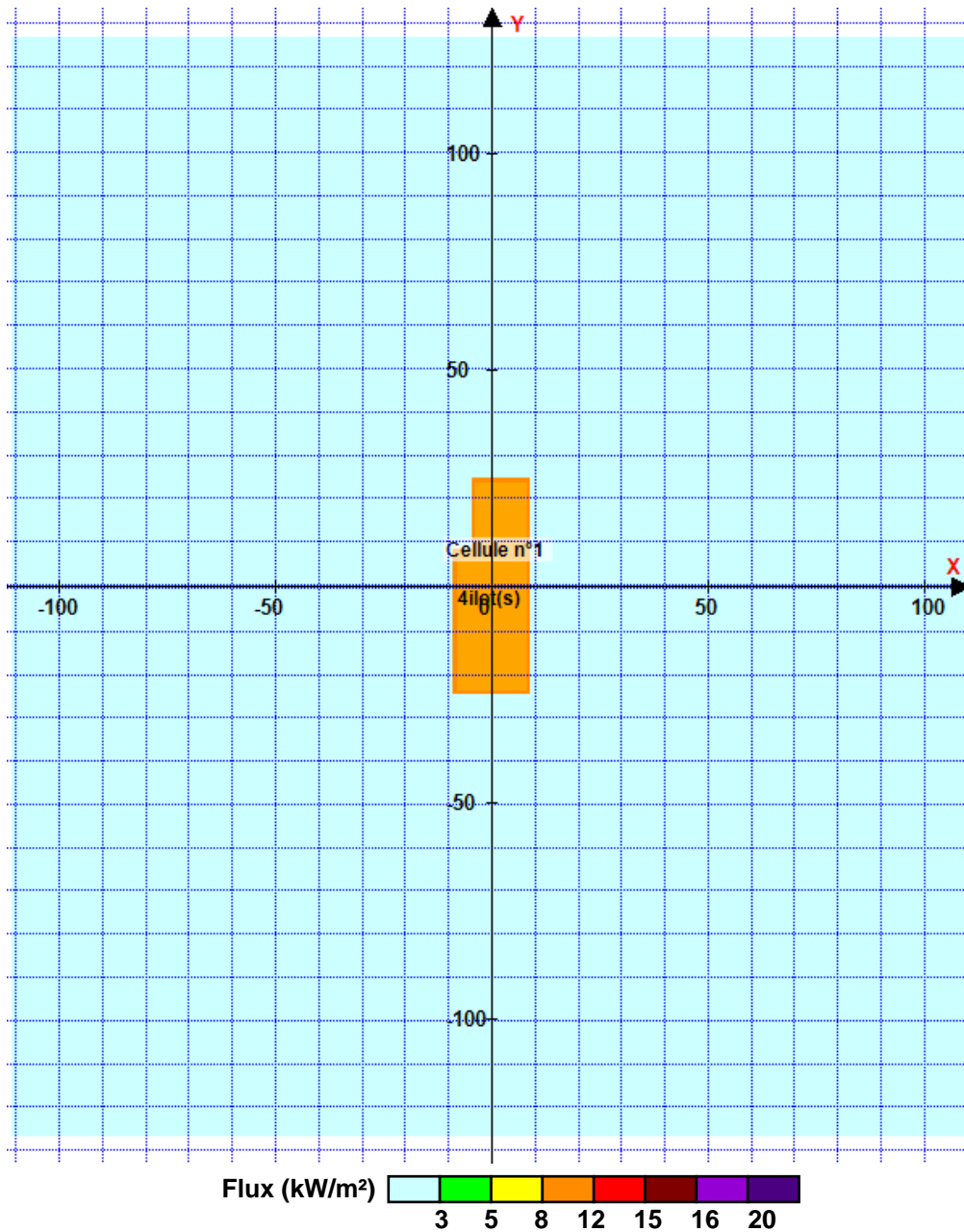
Rappel : les dimensions standards d'une Palette type 1510 sont de 1,2 m * 0,8 m x 1,5 m, sa puissance est de 1525,0 kW

II. RESULTATS :

Départ de l'incendie dans la cellule : **Cellule n°1**

Durée de l'incendie dans la cellule : Cellule n°1 **69,0** min

Distance d'effets des flux maximum



Pour information : Dans l'environnement proche de la flamme, le transfert convectif de chaleur ne peut être négligé. Il est donc préconisé pour de faibles distances d'effets comprises entre 1 et 5 m de retenir une distance d'effets de 5 m et pour celles comprises entre 6 m et 10 m de retenir 10 m.

FLUMilog

Interface graphique v.5.4.0.5

Outil de calculV5.4

Flux Thermiques Détermination des distances d'effets

Utilisateur :	gparis
Société :	Evolutys
Nom du Projet :	PESCANOVA_emballages_local2_Constantine_non_rogne
Cellule :	
Commentaire :	
Création du fichier de données d'entrée :	07/12/2020 à 17:26:19 avec l'interface graphique v. 5.4.0.5
Date de création du fichier de résultats :	7/12/20

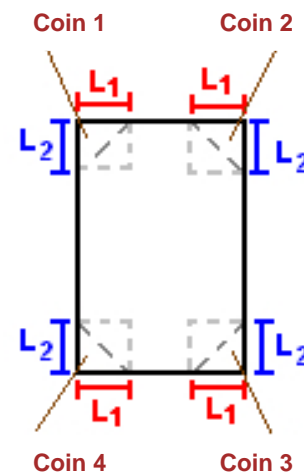
I. DONNEES D'ENTREE :

Donnée Cible

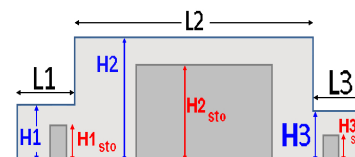
Hauteur de la cible : **-2,5 m**

Géométrie Cellule1

Nom de la Cellule :Cellule n°1				
Longueur maximum de la cellule (m)		16,2		
Largeur maximum de la cellule (m)		17,5		
Hauteur maximum de la cellule (m)		3,7		
Coin 1	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 2	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 3	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 4	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	



Hauteur complexe			
	1	2	3
L (m)	0,0	0,0	0,0
H (m)	0,0	0,0	0,0
H sto (m)	0,0	0,0	0,0

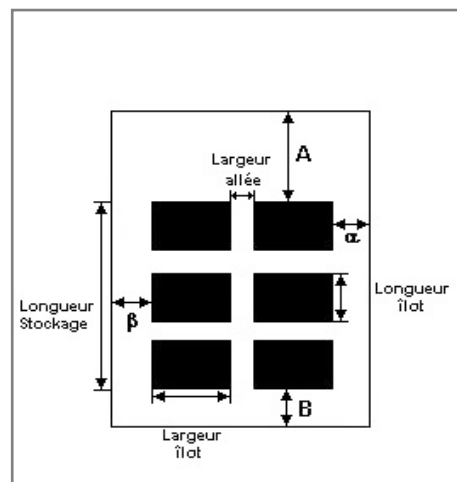


Toiture

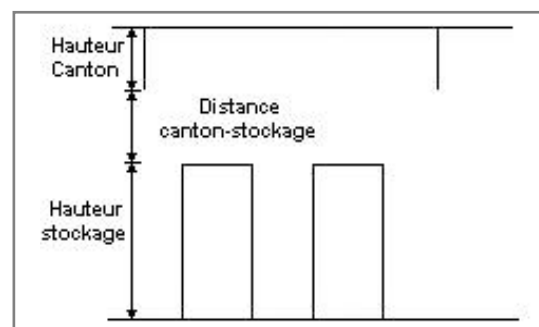
Résistance au feu des poutres (min)	15
Résistance au feu des pannes (min)	15
Matériaux constituant la couverture	metallicque multicouches
Nombre d'exutoires	2
Longueur des exutoires (m)	1,4
Largeur des exutoires (m)	1,4

Stockage de la cellule : Cellule n°1

Mode de stockage	Masse
Dimensions	
Longueur de préparation A	0,1 m
Longueur de préparation B	0,1 m
Déport latéral a	0,1 m
Déport latéral b	0,1 m
Hauteur du canton	0,0 m



Stockage en masse	
Nombre d'îlots dans le sens de la longueur	2
Nombre d'îlots dans le sens de la largeur	2
Largeur des îlots	7,7 m
Longueur des îlots	7,0 m
Hauteur des îlots	1,5 m
Largeur des allées entre îlots	2,0 m



Palette type de la cellule Cellule n°1

Dimensions Palette	
Longueur de la palette :	Adaptée aux dimensions de la palette
Largeur de la palette :	Adaptée aux dimensions de la palette
Hauteur de la palette :	Adaptée aux dimensions de la palette
Volume de la palette :	Adaptée aux dimensions de la palette
Nom de la palette :	Palette type 1510

Poids total de la palette : **Par défaut**

Composition de la Palette (Masse en kg)

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC
0,0	0,0	0,0	0,0

Données supplémentaires

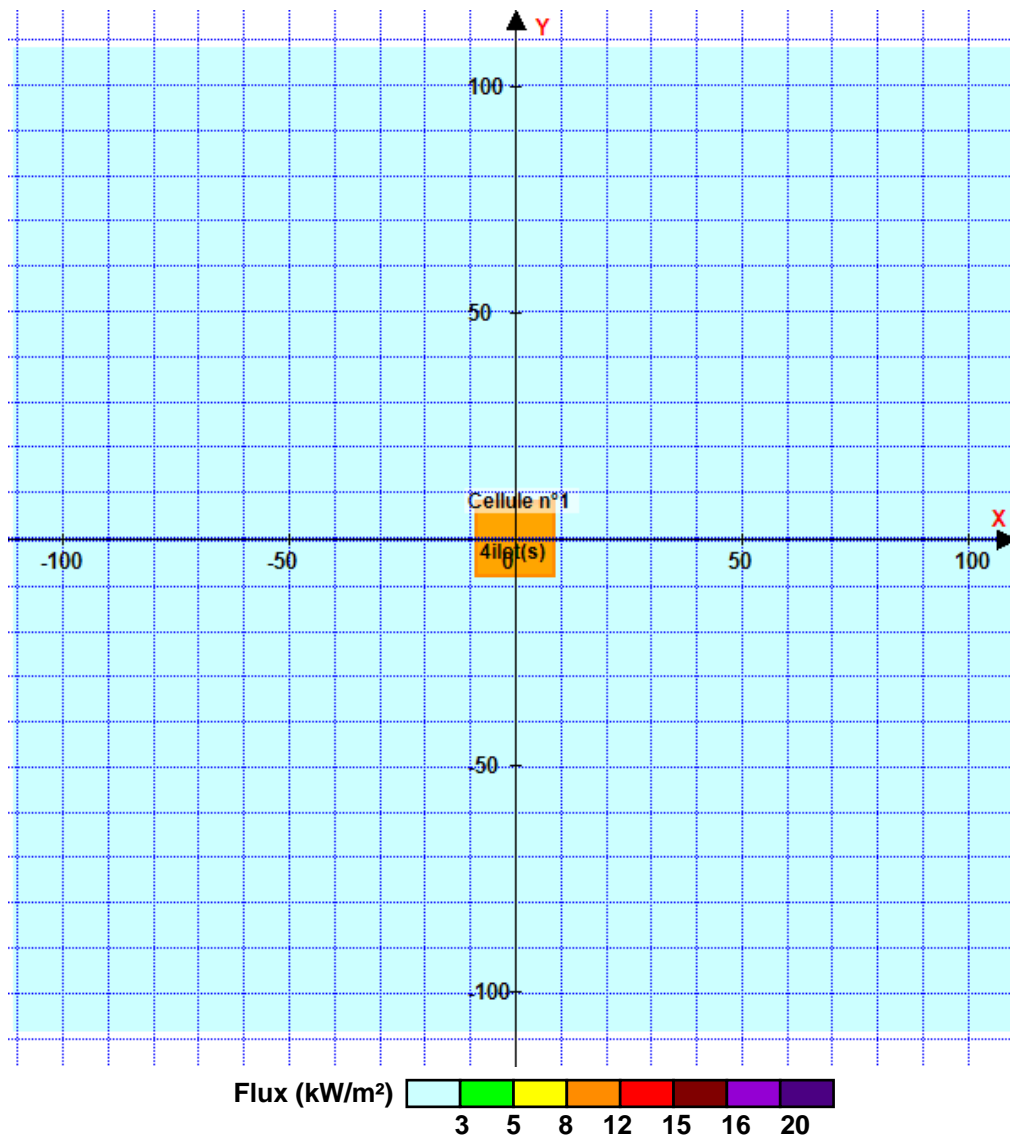
Durée de combustion de la palette :	45,0 min
Puissance dégagée par la palette :	Adaptée aux dimensions de la palette
Rappel : les dimensions standards d'une Palette type 1510 sont de 1,2 m * 0,8 m x 1,5 m, sa puissance est de 1525,0 kW	

II. RESULTATS :

Départ de l'incendie dans la cellule : **Cellule n°1**

Durée de l'incendie dans la cellule : Cellule n°1 **65,0** min

Distance d'effets des flux maximum



Pour information : Dans l'environnement proche de la flamme, le transfert convectif de chaleur ne peut être négligé. Il est donc préconisé pour de faibles distances d'effets comprises entre 1 et 5 m de retenir une distance d'effets de 5 m et pour celles comprises entre 6 m et 10 m de retenir 10 m.

FLUMilog

Interface graphique v.5.4.0.5

Outil de calculV5.4

Flux Thermiques Détermination des distances d'effets

Utilisateur :	gparis
Société :	Evolutys
Nom du Projet :	PESCANOVA_emballages_local2_talus_non_rognee_1
Cellule :	
Commentaire :	
Création du fichier de données d'entrée :	07/12/2020 à 17:25:48 avec l'interface graphique v. 5.4.0.5
Date de création du fichier de résultats :	7/12/20

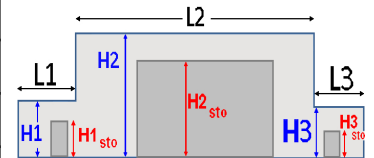
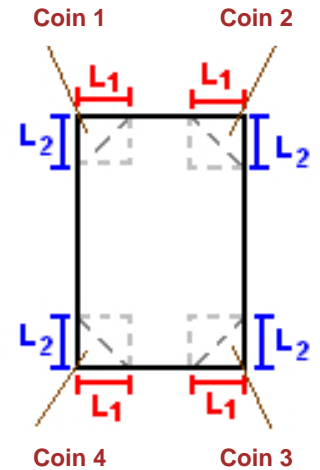
I. DONNEES D'ENTREE :

Donnée Cible

Hauteur de la cible : **2,5** m

Géométrie Cellule1

Nom de la Cellule :Cellule n°1				
Longueur maximum de la cellule (m)		16,2		
Largeur maximum de la cellule (m)		17,5		
Hauteur maximum de la cellule (m)		3,7		
Coin 1	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 2	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 3	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 4	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Hauteur complexe				
	1	2	3	
L (m)	0,0	0,0	0,0	
H (m)	0,0	0,0	0,0	
H sto (m)	0,0	0,0	0,0	



Toiture

Résistance au feu des poutres (min)	15
Résistance au feu des pannes (min)	15
Matériaux constituant la couverture	metallicque multicouches
Nombre d'exutoires	2
Longueur des exutoires (m)	1,4
Largeur des exutoires (m)	1,4

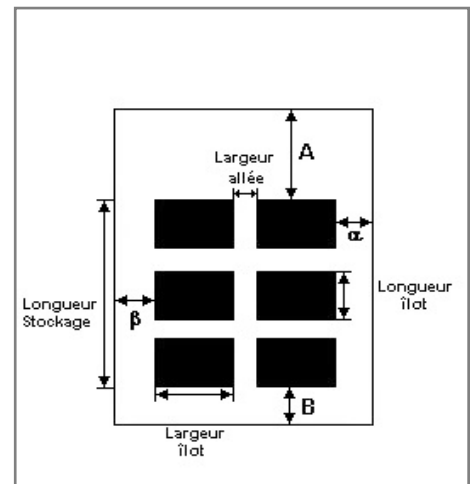
Stockage de la cellule : Cellule n°1

Mode de stockage

Masse

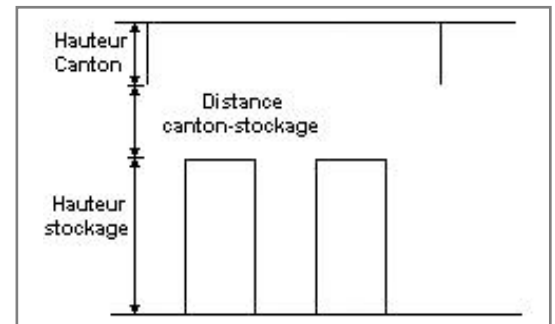
Dimensions

Longueur de préparation A	0,1 m
Longueur de préparation B	0,1 m
Déport latéral a	0,1 m
Déport latéral b	0,1 m
Hauteur du canton	0,0 m



Stockage en masse

Nombre d'îlots dans le sens de la longueur	2
Nombre d'îlots dans le sens de la largeur	2
Largeur des îlots	7,7 m
Longueur des îlots	7,0 m
Hauteur des îlots	1,5 m
Largeur des allées entre îlots	2,0 m



Palette type de la cellule Cellule n°1

Dimensions Palette

Longueur de la palette :	Adaptée aux dimensions de la palette
Largeur de la palette :	Adaptée aux dimensions de la palette
Hauteur de la palette :	Adaptée aux dimensions de la palette
Volume de la palette :	Adaptée aux dimensions de la palette
Nom de la palette :	Palette type 1510

Poids total de la palette : **Par défaut**

Composition de la Palette (Masse en kg)

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC
0,0	0,0	0,0	0,0

Données supplémentaires

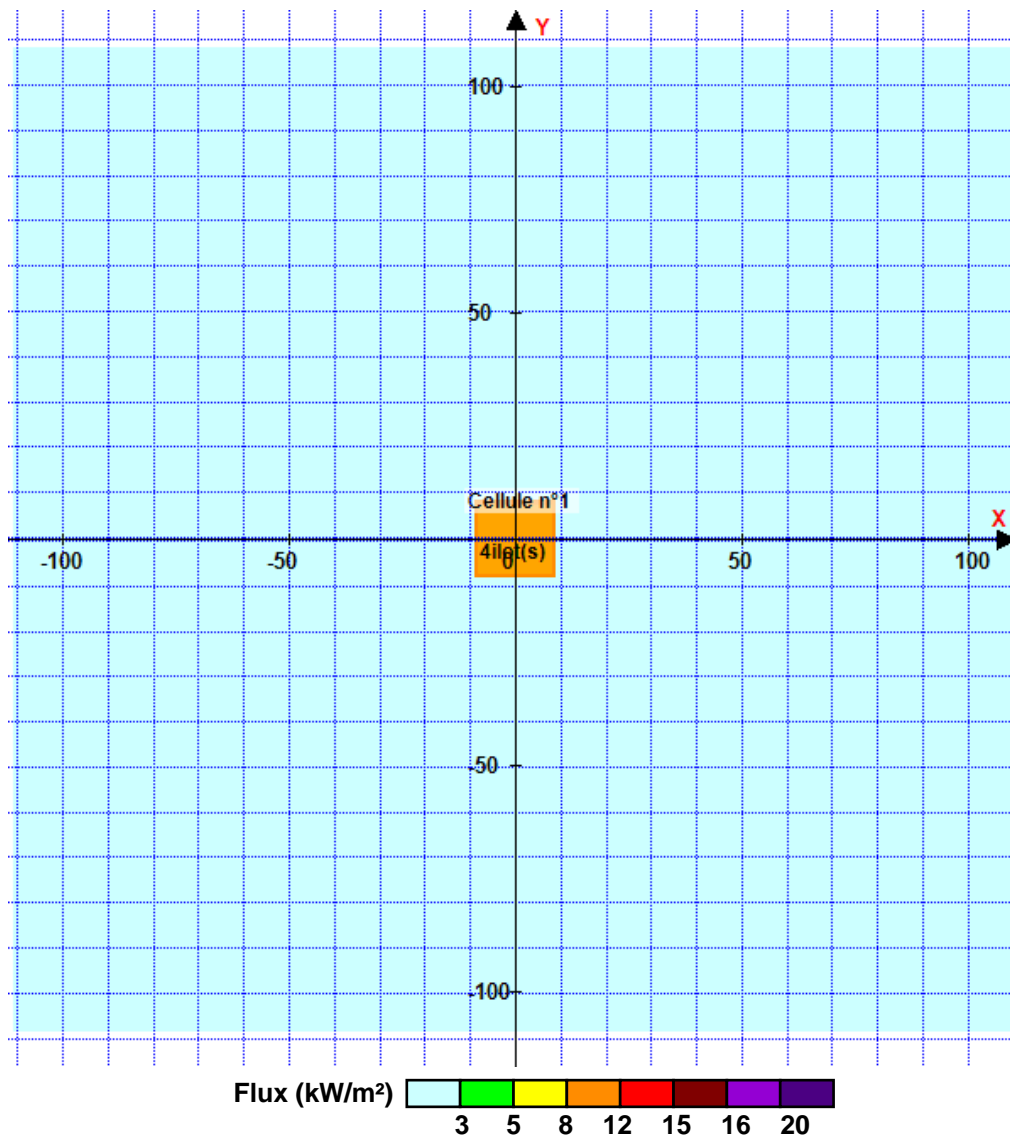
Durée de combustion de la palette :	45,0 min
Puissance dégagée par la palette :	Adaptée aux dimensions de la palette
Rappel : les dimensions standards d'une Palette type 1510 sont de 1,2 m * 0,8 m x 1,5 m, sa puissance est de 1525,0 kW	

II. RESULTATS :

Départ de l'incendie dans la cellule : **Cellule n°1**

Durée de l'incendie dans la cellule : Cellule n°1 **65,0** min

Distance d'effets des flux maximum



Pour information : Dans l'environnement proche de la flamme, le transfert convectif de chaleur ne peut être négligé. Il est donc préconisé pour de faibles distances d'effets comprises entre 1 et 5 m de retenir une distance d'effets de 5 m et pour celles comprises entre 6 m et 10 m de retenir 10 m.

FLUMilog

Interface graphique v.5.4.0.5

Outil de calculV5.4

Flux Thermiques Détermination des distances d'effets

Utilisateur :	gparis
Société :	Evolutys
Nom du Projet :	PESCANOVA_emballages_local3_Constantine_1
Cellule :	
Commentaire :	
Création du fichier de données d'entrée :	07/12/2020 à 14:12:22 avec l'interface graphique v. 5.4.0.5
Date de création du fichier de résultats :	7/12/20

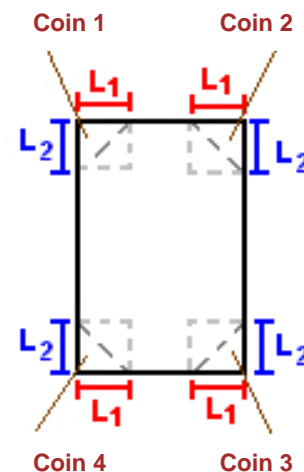
I. DONNEES D'ENTREE :

Donnée Cible

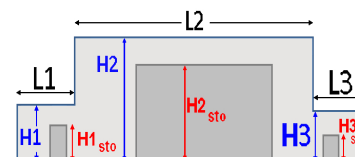
Hauteur de la cible : **-2,5 m**

Géométrie Cellule1

Nom de la Cellule :Cellule n°1				
Longueur maximum de la cellule (m)		11,0		
Largeur maximum de la cellule (m)		17,5		
Hauteur maximum de la cellule (m)		3,7		
Coin 1	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 2	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 3	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 4	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	



Hauteur complexe			
	1	2	3
L (m)	0,0	0,0	0,0
H (m)	0,0	0,0	0,0
H sto (m)	0,0	0,0	0,0



Toiture

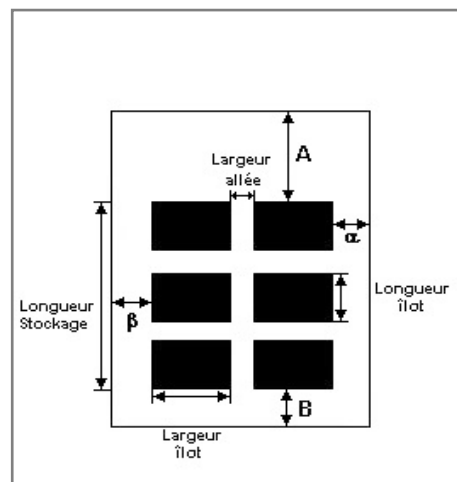
Résistance au feu des poutres (min)	15
Résistance au feu des pannes (min)	15
Matériaux constituant la couverture	metallicque multicouches
Nombre d'exutoires	2
Longueur des exutoires (m)	1,4
Largeur des exutoires (m)	1,4

Stockage de la cellule : Cellule n°1

Mode de stockage **Masse**

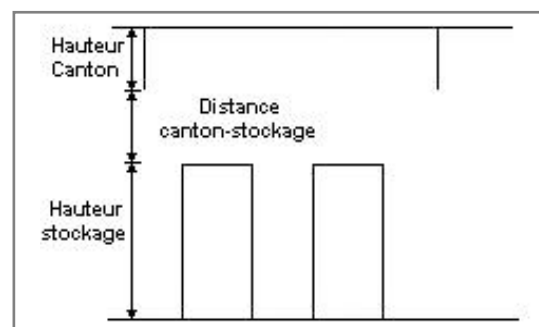
Dimensions

Longueur de préparation A **0,1 m**
 Longueur de préparation B **0,1 m**
 Déport latéral a **0,1 m**
 Déport latéral b **0,1 m**
 Hauteur du canton **0,0 m**



Stockage en masse

Nombre d'îlots dans le sens de la longueur **2**
 Nombre d'îlots dans le sens de la largeur **2**
 Largeur des îlots **7,7 m**
 Longueur des îlots **4,4 m**
 Hauteur des îlots **1,5 m**
 Largeur des allées entre îlots **2,0 m**



Palette type de la cellule Cellule n°1

Dimensions Palette

Longueur de la palette : **Adaptée aux dimensions de la palette**
 Largeur de la palette : **Adaptée aux dimensions de la palette**
 Hauteur de la palette : **Adaptée aux dimensions de la palette**
 Volume de la palette : **Adaptée aux dimensions de la palette**
 Nom de la palette : **Palette type 1510**

Poids total de la palette : **Par défaut**

Composition de la Palette (Masse en kg)

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC
0,0	0,0	0,0	0,0

Données supplémentaires

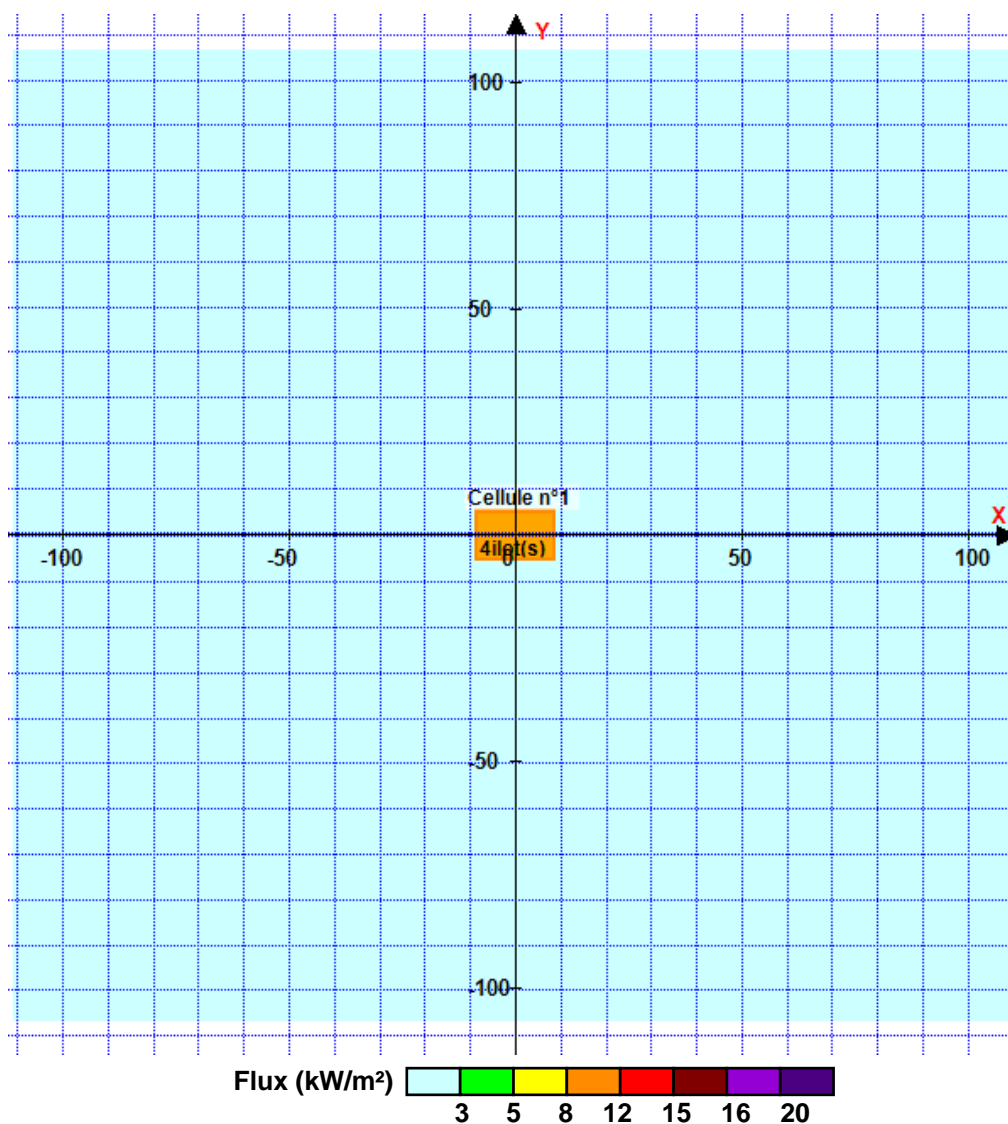
Durée de combustion de la palette : **45,0 min**
 Puissance dégagée par la palette : **Adaptée aux dimensions de la palette**
 Rappel : les dimensions standards d'une Palette type 1510 sont de 1,2 m * 0,8 m x 1,5 m, sa puissance est de 1525,0 kW

II. RESULTATS :

Départ de l'incendie dans la cellule : **Cellule n°1**

Durée de l'incendie dans la cellule : Cellule n°1 **64,0** min

Distance d'effets des flux maximum



Pour information : Dans l'environnement proche de la flamme, le transfert convectif de chaleur ne peut être négligé. Il est donc préconisé pour de faibles distances d'effets comprises entre 1 et 5 m de retenir une distance d'effets de 5 m et pour celles comprises entre 6 m et 10 m de retenir 10 m.

FLUMilog

Interface graphique v.5.4.0.5

Outil de calculV5.4

Flux Thermiques Détermination des distances d'effets

Utilisateur :	gparis
Société :	Evolutys
Nom du Projet :	PESCANOVA_emballages_local3_talus_1
Cellule :	
Commentaire :	
Création du fichier de données d'entrée :	07/12/2020 à 14:11:54 avec l'interface graphique v. 5.4.0.5
Date de création du fichier de résultats :	7/12/20

I. DONNEES D'ENTREE :

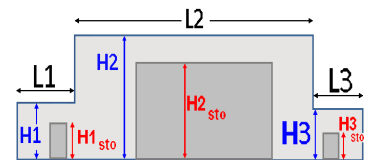
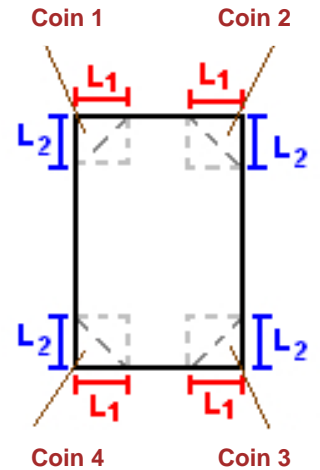
Donnée Cible

Hauteur de la cible : **2,5 m**

Géométrie Cellule1

Nom de la Cellule :Cellule n°1				
Longueur maximum de la cellule (m)		11,0		
Largeur maximum de la cellule (m)		17,5		
Hauteur maximum de la cellule (m)		3,7		
Coin 1	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 2	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 3	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 4	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	

Hauteur complexe			
	1	2	3
L (m)	0,0	0,0	0,0
H (m)	0,0	0,0	0,0
H sto (m)	0,0	0,0	0,0



Toiture

Résistance au feu des poutres (min)	15
Résistance au feu des pannes (min)	15
Matériaux constituant la couverture	metallicque multicouches
Nombre d'exutoires	2
Longueur des exutoires (m)	1,4
Largeur des exutoires (m)	1,4

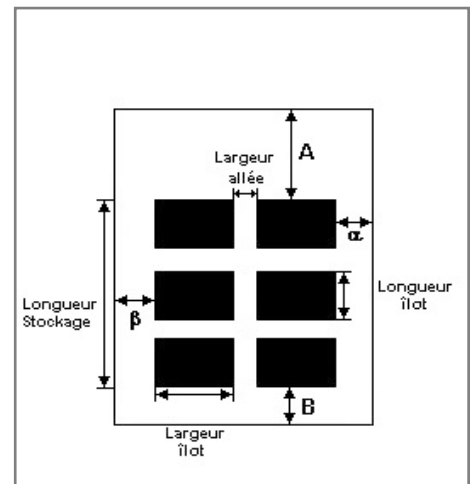
Stockage de la cellule : Cellule n°1

Mode de stockage

Masse

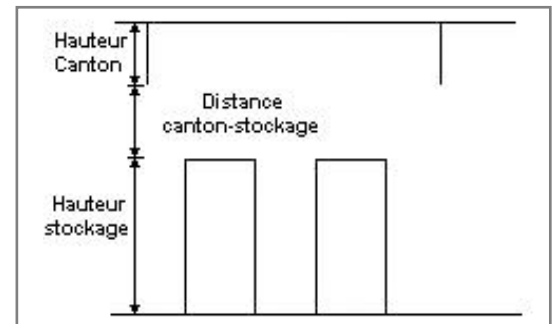
Dimensions

Longueur de préparation A	0,1 m
Longueur de préparation B	0,1 m
Déport latéral a	0,1 m
Déport latéral b	0,1 m
Hauteur du canton	0,0 m



Stockage en masse

Nombre d'îlots dans le sens de la longueur	2
Nombre d'îlots dans le sens de la largeur	2
Largeur des îlots	7,7 m
Longueur des îlots	4,4 m
Hauteur des îlots	1,5 m
Largeur des allées entre îlots	2,0 m



Palette type de la cellule Cellule n°1

Dimensions Palette

Longueur de la palette :	Adaptée aux dimensions de la palette
Largeur de la palette :	Adaptée aux dimensions de la palette
Hauteur de la palette :	Adaptée aux dimensions de la palette
Volume de la palette :	Adaptée aux dimensions de la palette
Nom de la palette :	Palette type 1510

Poids total de la palette : **Par défaut**

Composition de la Palette (Masse en kg)

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC
0,0	0,0	0,0	0,0

Données supplémentaires

Durée de combustion de la palette : **45,0** min

Puissance dégagée par la palette : **Adaptée aux dimensions de la palette**

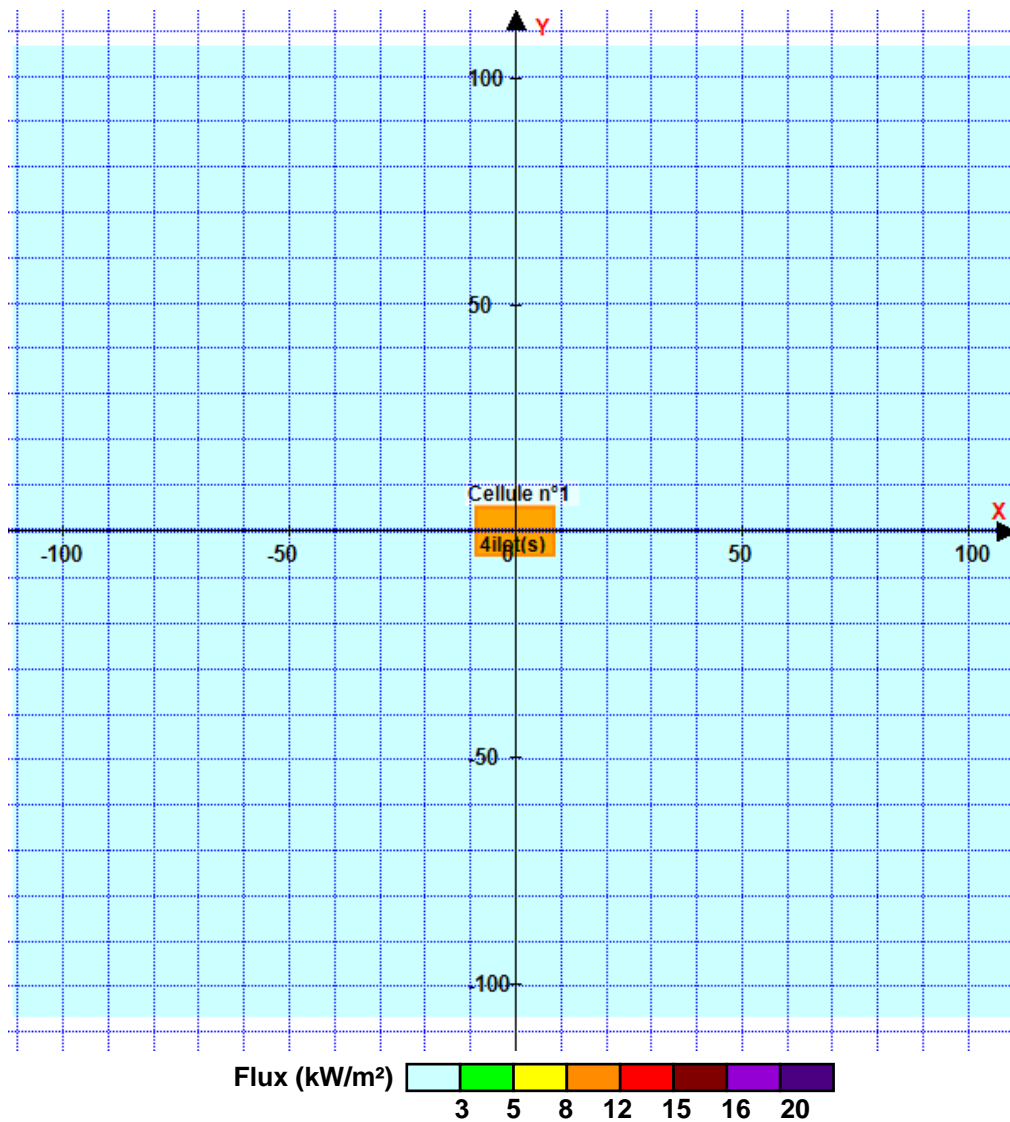
Rappel : les dimensions standards d'une Palette type 1510 sont de 1,2 m * 0,8 m x 1,5 m, sa puissance est de 1525,0 kW

II. RESULTATS :

Départ de l'incendie dans la cellule : **Cellule n°1**

Durée de l'incendie dans la cellule : Cellule n°1 **64,0** min

Distance d'effets des flux maximum



Pour information : Dans l'environnement proche de la flamme, le transfert convectif de chaleur ne peut être négligé. Il est donc préconisé pour de faibles distances d'effets comprises entre 1 et 5 m de retenir une distance d'effets de 5 m et pour celles comprises entre 6 m et 10 m de retenir 10 m.

FLUMilog

Interface graphique v.5.4.0.5

Outil de calculV5.4

Flux Thermiques Détermination des distances d'effets

Utilisateur :	gparis
Société :	Evolutys
Nom du Projet :	PESCANOVA_zoneProd_PF_1
Cellule :	
Commentaire :	
Création du fichier de données d'entrée :	07/12/2020 à 15:01:00 avec l'interface graphique v. 5.4.0.5
Date de création du fichier de résultats :	7/12/20

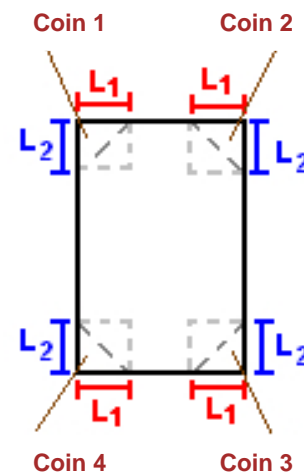
I. DONNEES D'ENTREE :

Donnée Cible

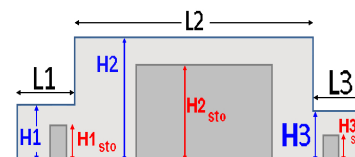
Hauteur de la cible : **1,8** m

Géométrie Cellule1

Nom de la Cellule :Cellule n°1				
Longueur maximum de la cellule (m)		49,4		
Largeur maximum de la cellule (m)		51,0		
Hauteur maximum de la cellule (m)		4,3		
Coin 1	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 2	tronqué en équerre	L1 (m)	9,9	
		L2 (m)	16,4	
Coin 3	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	
Coin 4	non tronqué	L1 (m)	0,0	
		L2 (m)	0,0	



Hauteur complexe			
	1	2	3
L (m)	0,0	0,0	0,0
H (m)	0,0	0,0	0,0
H sto (m)	0,0	0,0	0,0



Toiture

Résistance au feu des poutres (min)	15
Résistance au feu des pannes (min)	15
Matériaux constituant la couverture	Dalle beton
Nombre d'exutoires	0
Longueur des exutoires (m)	0,0
Largeur des exutoires (m)	0,0
Résistance au feu de la dalle (min)	60

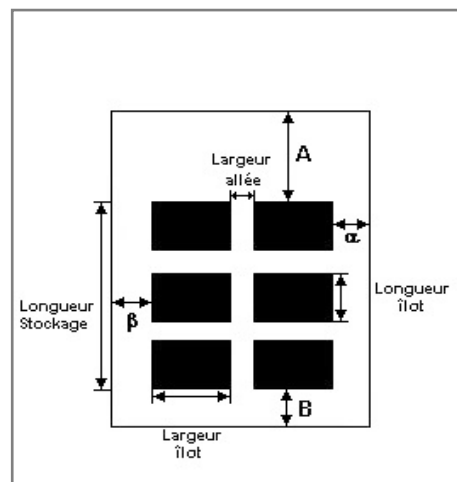
Stockage de la cellule : Cellule n°1

Mode de stockage

Masse

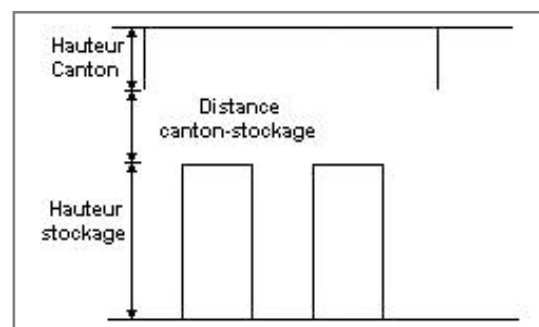
Dimensions

Longueur de préparation A	21,5 m
Longueur de préparation B	11,4 m
Déport latéral a	34,4 m
Déport latéral b	0,1 m
Hauteur du canton	0,0 m



Stockage en masse

Nombre d'îlots dans le sens de la longueur	2
Nombre d'îlots dans le sens de la largeur	2
Largeur des îlots	7,0 m
Longueur des îlots	7,0 m
Hauteur des îlots	1,5 m
Largeur des allées entre îlots	2,5 m



Palette type de la cellule Cellule n°1

Dimensions Palette

Longueur de la palette :	1,2 m
Largeur de la palette :	0,8 m
Hauteur de la palette :	1,5 m
Volume de la palette :	1,4 m ³
Nom de la palette :	

Poids total de la palette : 0,0 kg

Composition de la Palette (Masse en kg)

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC	NC	NC	NC
0,0	0,0	0,0	0,0	0,0	0,0	0,0

NC	NC	NC	NC
0,0	0,0	0,0	0,0

Données supplémentaires

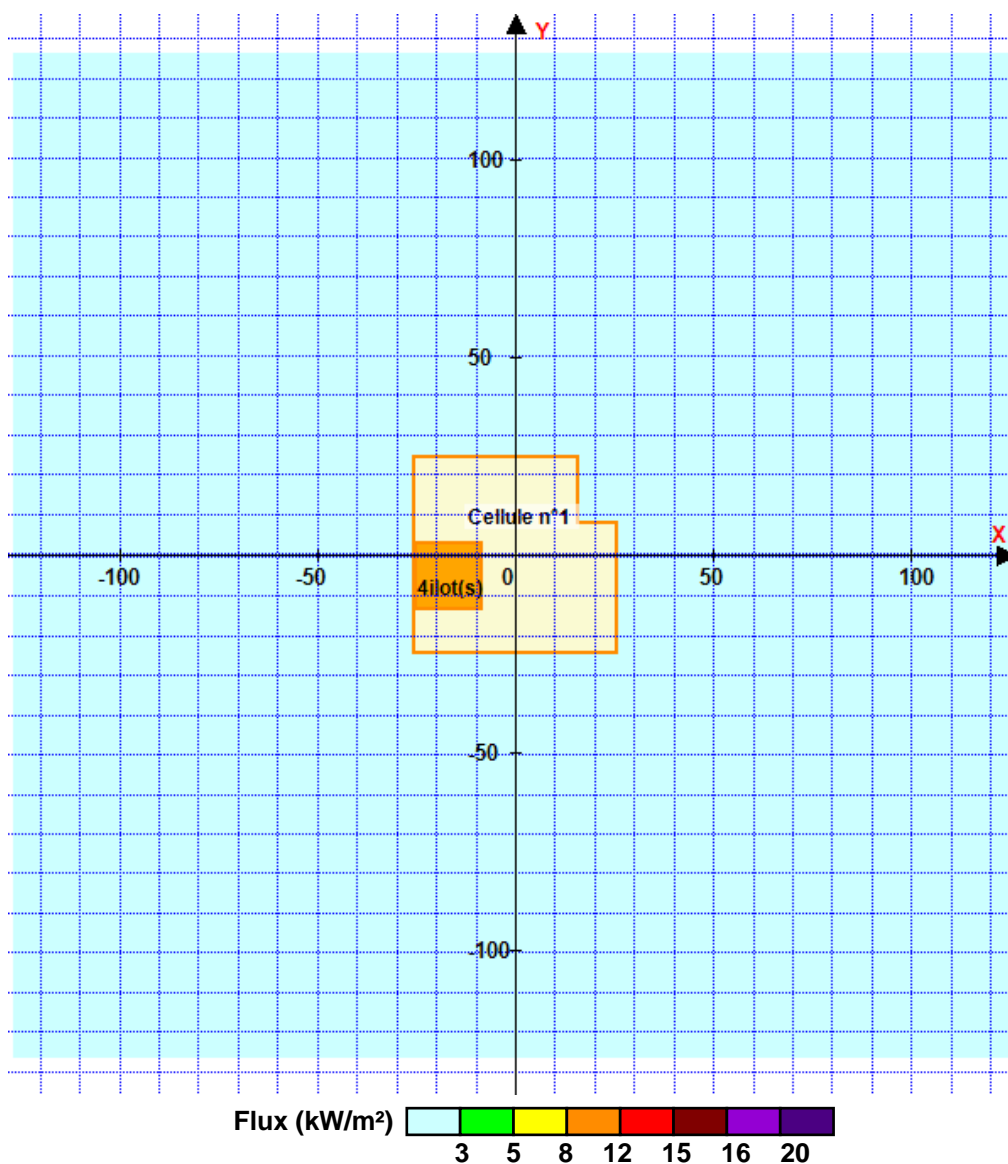
Durée de combustion de la palette :	25,0 min
Puissance dégagée par la palette :	750,0 kW

II. RESULTATS :

Départ de l'incendie dans la cellule : **Cellule n°1**

Durée de l'incendie dans la cellule : Cellule n°1 **64,0** min

Distance d'effets des flux maximum



Pour information : Dans l'environnement proche de la flamme, le transfert convectif de chaleur ne peut être négligé. Il est donc préconisé pour de faibles distances d'effets comprises entre 1 et 5 m de retenir une distance d'effets de 5 m et pour celles comprises entre 6 m et 10 m de retenir 10 m.

Pièce jointe n°7 – Annexe 2

Proposition technique de l'entreprise Protective Coating et guide
d'application



Société NUEVA PESCANOVA GROUP

4 -10 rue Constantine
62 200 BOULOGNE SUR MER
France.

A STEENBECQUE, le 8 Avril 2021

Nos réf : XW 18 01 2021 C 006 Rev1

OBJET : Remise en état, traitement anticorrosion et intumescent en R15 sur la charpente métal et galva

A l'attention de Mr HERBEZ .

Monsieur,

Suite à votre demande référencée en objet dont nous vous remercions vivement, nous vous prions de trouver ci-dessous notre proposition technique et commerciale pour la Remise en état, traitement anticorrosion et intumescent en R15 sur la charpente métal et galva

PROPOSITION TECHNIQUE

Zone d'intervention :

Bâtiment extension structure galva.

Bâtiment A et B structure métal, structure porteuse uniquement.



Local chaufferie, local machine, local supprimeur, local salle carrelée.



PROTECTIVE COATING – 15 Rue Latérale Côté Gare, Zone Industrielle 59189 STEENBECQUE

Email : contact@protective-coating.fr

SAS AU CAPITAL DE 37 000€ - RCS DUNKERQUE 821 323 011 – SIRET : 821 323 011 00014 – APE : 2561Z

TVA intracommunautaire : FR 71 821323011 – Références bancaires : CIC IBAN FR76 3002 7170 1700 0203 5660 135



Matériel à traiter et Traitement sur site:

Le système de peintures Uliprim'o / Hensotherm 421 KS / Hensotop 84 AQ est destiné à la protection des profilés de constructions métalliques de type I, H, U, T ou L, en intérieur ou en extérieur abrité (Classe Y).

C'est un système de peintures mono composantes en phase aqueuse pour la protection des profilés de constructions métalliques.

Bénéficie du procès verbal de résistance au feu suivant les normes européennes DIN EN 13381- 8 et DIN EN 13501-2. **Intérieur - Extérieur abrité, pour** Profilés métalliques de structure en acier ou galva de type I, H, U, T, L et profilés creux préparés suivant les recommandations du **Guide d'application SYSTEME 421KS**.

Le système 421KS est composé impérativement d'un primaire, d'une peinture intumescente et d'une finition. Il stoppe la propagation de la chaleur et la progression du feu par formation d'une mousse microporeuse isolante et dégagement de gaz extincteurs. Permet d'atteindre une résistance au feu de 15 à 150 min selon les profilés et leurs configurations et dans votre cas de figure pour le traitement de votre ouvrage le **SYSTEME 421KS** est élaboré pour une tenue R15 et selon votre demande.

- ↪ Installation du chantier
- ↪ Mise en place du matériel adéquate pour la prestation de préparation de surface et d'application du revêtement intumescent.
- ↪ Mise en place par les cordistes des lignes de vie et de filets sur les parties dédiées et non accessibles.
- ↪ Mise en place des procédures de sécurités.
- ↪ Protection des organes sensible.
- ↪ Préparation de surface par grattage et brossage, ponçage mécanique de l'ancien revêtement sur les charpentes métalliques.
- ↪ Préparation de surface par dérochage sur la charpente galva.
- ↪ Séchage et Dépoussiérage soigné du support.
- ↪ Ramassage des agrégats et mise en big bag, et mise en décharge par vos soins
- ↪ Application d'un système peinture système de peintures intumescent Uliprim'o / Hensotherm 421 KS / Hensotop 84 AQ
- ↪ Ral à définir.
- ↪ Nettoyage et repli de chantier



Nota :

- Le travail devra s'effectuer, à l'aide des moyens d'accès appropriés.
- Les travaux de préparation de surface et peinture devront être réalisées en période climatique approprié et prévoyons 8 semaines de travail, entre l'installation du chantier, et l'application du revêtement peinture intumescent.
- Il conviendra de laisser la place libre le temps de nous laisser traiter les parties non accessibles, tout ceci afin de ne pas gêner la prestation et d'éviter la co-activité.

NOTRE POLITIQUE HSE

Hygiène :

- Une visite médicale renforcée est établie pour chacun de nos salariés.
- L'ensemble des protections collectives et individuelles sont mis en place en fonction des chantiers.

Sécurité :

- Un Mode Opérateur Sécurité établi par nos soins est transmis au donneur d'ordre pour validation avant chaque chantier. Celui-ci ainsi que les fiches de données sécurités des produits appliqués restera sur le chantier à disposition de nos compagnons.
- La réalisation de causeries et d'audits.

PROTECTIVE COATING – 15 Rue Latérale Côté Gare, Zone Industrielle 59189 STEENBECQUE

Email : contact@protective-coating.fr

SAS AU CAPITAL DE 37 000€ - RCS DUNKERQUE 821 323 011 – SIRET : 821 323 011 00014 – APE : 2561Z

TVA intracommunautaire : FR 71 821323011 – Références bancaires : CIC IBAN FR76 3002 7170 1700 0203 5660 135



Environnement :

- L'identification de nos déchets (abrasif, peinture, solvant...) est effectuée puis traitée par des filières légales
- La récupération des eaux de pluies pour les opérations de nettoyage
- La filtration des poussières liées au décapage à l'abrasif au sein de notre atelier de production

Une démarche de certification MASE en 2017 à été décidé par la direction.

CONDITIONS COMMERCIALES

TVA au taux de 20%

Acompte de 30% à la commande

Délais : à convenir

Paielement 30 jours après fin de travaux

En espérant que ces conditions correspondront à vos attentes, nous resterons à votre disposition pour tous compléments d'information.

Xavier WAYMEL



DESCRIPTION GENERALE DU SYSTEME

- 🔥 Système de trois peintures permettant d'apporter aux ouvrages une protection des structures métalliques en cas d'incendie
- 🔥 Approuvé suivant les dernières normes européennes en vigueur : EN13501-2 et EN13381-8
- 🔥 Permet d'obtenir une résistance au feu allant de 15 min à 150 min
- 🔥 Peut s'appliquer en intérieur ou en extérieur abrité sans altérer la qualité esthétique du produit
- 🔥 Permet de protéger les charpentes en acier brut ou galvanisé
- 🔥 La finition peut être mise à la teinte en usine (teinte pastel, nous consulter).

Il est impératif de demander une préconisation pour le Système 421KS sur simple demande détaillant la nature des supports à traiter. N'hésitez pas à contacter votre responsable commercial pour avoir toutes les informations nécessaires.

Nous tenons à souligner que ce système est applicable uniquement sur des structures métalliques porteuses. Les portes, les conduits d'aérations et autres éléments non porteurs sont soumis à d'autres exigences réglementaires.

Le système est composé de :

- 🔥 Primaire anticorrosion pour acier brut :
- référence COMUS obligatoire : ULIPRIM'O
- 🔥 Primaire anticorrosion pour acier galvanisé :
- référence COMUS obligatoire : ULIPRIM'O
- 🔥 HENSOTHERM 421KS : Peinture intumescente en phase aqueuse applicable entre 1 à 4 couches avec un minimum de 24 h de séchage entre les couches, en fonction des conditions climatiques.
- 🔥 HENSOTOP 84 AQ : Peinture de protection et de décoration d'aspect satin. La mise à la teinte est faite en usine et à la demande (teintes pastel, nous consulter).

PRECAUTION POUR LA SANTE ET LA SECURITE

- 🔥 L'application d'une peinture nécessite toujours un équipement de protection personnel (vêtements adaptés, lunettes, gants et masques)
- 🔥 Avant toute utilisation, lire la fiche technique et la fiche de données de sécurité.

Fiches de Données de Sécurité disponible sur www.quickfds.com

STOCKAGE

- 🔥 Les peintures doivent être conservées dans leur emballage d'origine fermé.
- 🔥 Les peintures craignent le gel.
- 🔥 La durée de vie en pot de ces peintures est de 12 mois après la fabrication. Se reporter à la DLU mentionnée sur l'emballage.



CARACTERISTIQUES DU CHANTIER

Se reporter au DTU 59.5 : Exécution des peintures intumescentes sur structures métalliques

CONDITIONS CLIMATIQUES

Le chantier doit être réalisé à l'abri des intempéries. Les conditions d'application suivantes doivent être respectées :

- 🔥 Température : appliquer le système lorsque la température est comprise entre 10 et 25°C. En dessous de 10 °C, un système de chauffage devra être mis en place afin de relever la température.
- 🔥 Humidité : l'humidité relative ne doit pas excéder 80%. Le support doit être sec.

EQUIPEMENT

- 🔥 Primaire : Se reporter à la fiche technique de l'ULIPRIM'O
- 🔥 HENSOTHERM 421 KS :
 - AIRLESS : Pression : 200 – 250 bar
Buse : 0,017" – 0,025"
Retirer le tamis et le filtre
 - BROSSE : Spécial phase aqueuse.
 - ROULEAU : Rouleau 12 à 16 mm spécial phase aqueuse
- 🔥 HENSOTOP 84 AQ :
 - AIRLESS : Pression : 200 – 250 bar
Buse : 0,009" – 0,013"
Retirer le tamis et le filtre
 - BROSSE : Spécial phase aqueuse.
 - ROULEAU : A poils courts spécial phase aqueuse

Remarque : une application par pulvérisation est recommandée pour une finition soignée.

PREPARATION DE SURFACE

- 🔥 Profilé en acier brut non revêtu : Sablage SA 2,5 et application de l'ULIPRIM'O COMUS.
- 🔥 Profilé en acier galvanisé non revêtu : Dérochage chimique avec DEROCHANT ALUMINIUM COMUS MARINE, et application de l'ULIPRIM'O COMUS.
- 🔥 Poutres pré-peintes : s'assurer de la nature du primaire appliqué et de la propreté du support (nous consulter).

APPLICATION

PRIMAIRE ANTICORROSION

Acier brut : **ULIPRIM'O** (24h avant recouvrabilité)

Acier galvanisé : **ULIPRIM'O** (24h avant recouvrabilité)



INTUMESCENT METAL 421 KS (HENSOTHERM 421KS)

- 🔥 **HENSOTHERM 421KS** peut, si nécessaire, être dilué avec 3% maximum d'eau pour une application au pistolet Airless et est prêt à l'emploi pour une application à la brosse ou au rouleau. Bien mélanger la peinture mécaniquement afin d'homogénéiser le contenu des bidons.
- 🔥 Temps de séchage à respecter entre chaque couche : 24 heures minimum en conditions normales d'application (air ambiant : 20°C / %HR : 65%)
- 🔥 1^{ère} couche sur primaire : 500µm humide (350µm sec)
- 🔥 Couches suivantes : 1000µm humide (500µm sec)

Pour retrouver approximativement l'épaisseur sèche à partir de l'épaisseur humide : $ép_{sèche} = 0,5 \times ép_{humide}$

Appliquer le nombre de couches de peinture intumescente correspondant à l'épaisseur préconisée sur votre calcul de consommation.

L'épaisseur à déposer sur les profilés dépend de la température critique, de la durée de résistance au feu demandée et du coefficient de massivité des éléments de la structure. Tous les éléments ne reçoivent donc pas la même épaisseur de peinture intumescente.

⇒ **Il est important de respecter les épaisseurs préconisées sur votre calcul de consommation pour être couvert par le procès-verbal de notre système.**

FINITION 421KS (= HENSOTOP 84 AQ)

Appliquer la peinture de finition **HENSOTOP 84 AQ** de préférence par pulvérisation :

- 🔥 une couche de 125 - 150 µm humide (-> 150 – 180 g/m² au total).

Remarque : Appliquer le système 421KS sur chantier car la sensibilité du système aux chocs rend difficile le transport. Par contre, les primaires peuvent être appliqués en atelier. Une vérification et des réparations éventuelles devront être faites avant la mise en œuvre du système 421KS.

FIN DE CHANTIER

- 🔥 Nettoyage du matériel : à l'eau immédiatement après application.
- 🔥 Ne pas jeter les résidus à l'évier.

Les recommandations contenues dans cette fiche technique sont destinées aux personnes expérimentées ayant l'habileté requise. Elles sont fondées sur des essais réalisés conformément aux normes conventionnelles en vigueur et à la norme NF P 74-201 1 et 2 référence DTU 59.1 (09/94). Ces recommandations n'ont qu'une valeur indicative et ne sauraient, en aucune façon, suppléer à une préconisation spécifique au chantier. De ce fait, aucune responsabilité ni dommages ne peuvent être imputés à COMUS pour les résultats obtenus lors d'un travail qui se fait aux risques et périls de l'utilisateur.

COMUS - 2 rue Henri Rol Tanguy - 91180 St Germain Lès Arpajon - Tél : 01.69.88.13.10 - www.solutions-comus.com

Pièce jointe n°7 – Annexe 3

Certificats de calibration des mesureurs

Certificate of Calibration

Certificate Number: 20-645445

Nomenclature: Dew Point Meter
Manufacturer: DeFelsko Corporation
Model: PosiTector DPM
Probe Serial No: 305024
Note: Probe serial # on connector

Laboratory Environment
Temperature: $23 \pm 5^\circ\text{C}$
Relative Humidity: Up to 95%
Atmospheric Pressure: 1010mbar
Date of Calibration: December 01, 2020
Date in Service†:

To be completed by the end user, in ink

Test Method: This instrument was calibrated to manufacturer's specifications according to procedure MP 2581 using Reference Standards and test equipment calibrated by an accredited laboratory and traceable to NIST.

Reference	Units	Set Point	Test Equipment Reading	Gage Reading	Gage Accuracy	Allowable Tolerance
Relative Humidity Low	%RH	35	34.8	33.8	-1.0	± 3.0
Relative Humidity High	%RH	65	65.0	67.2	2.2	± 3.0
Surface Temperature Low	$^\circ\text{C}$	40	39.7	39.9	0.2	± 0.5
Surface Temperature High	$^\circ\text{C}$	100	99.2	99.1	-0.1	± 1.5
Air Temperature	$^\circ\text{C}$	N/A	22.3	22.3	0.0	± 0.5

Calibration Performed by: Charles Pothier



Technician

DeFelsko Corporation operates under Management Procedures intended to implement the requirements of ISO 9001, ISO 10012-1, ISO 17025 and ANSI/NC SL Z540-1. This document certifies that the instrument has met published specifications indicated below.

Parameter	Specification	Standard Uncertainty
Surface Temperature	$-40 \text{ to } 80^\circ\text{C} \pm 0.5^\circ\text{C}$	$\pm 0.14^\circ\text{C}$
Surface Temperature	$80 \text{ to } 190^\circ\text{C} \pm 1.5^\circ\text{C}$	$\pm 0.14^\circ\text{C}$
Air Temperature	$-40 \text{ to } 80^\circ\text{C} \pm 0.5^\circ\text{C}$	$\pm 0.15^\circ\text{C}$
Relative Humidity	$0 \text{ to } 100\% \pm 3.0\%$	$\pm 0.5\%$

†There are no components in this product which have a specific shelf life. Therefore, the calibration interval of this instrument begins on the date that the product is first put into service by the end user. Calibration interval will vary based on usage, handling and storage conditions.

This certificate shall not be reproduced, except in full, without the written approval of DeFelsko Corporation.

Declaration of Conformity

Application of Council Directive: 2014/30/EU EMC
2014/35/EU LVD [AT-A, AIR, HHD and LPD only]
2014/53/EU [wireless products only]

Standards to which Conformity is declared:

EMC: EN 61326-1:2013
ETSI EN 301 489-1
ETSI EN 301 489-17

Safety: EN 61010-1:2017



Manufacturer DeFelsko Corporation
Address: 800 Proctor Avenue
Ogdensburg, NY USA 13669-2205

Type of Equipment: Handheld Inspection Equipment
Model No: 6000, 200, DFT, DPM, UTG, SPG, AT,
IRT, AIR, RTR, SHD, SST, CMM IS, BHI,
HHD, LPD, OTL & SmartLink Series

Year of Manufacture: 2020

***The undersigned, hereby declares that the equipment specified
above conforms to the listed Directive and Standards***

A handwritten signature in black ink, appearing to read 'David E. Snyder', written over a horizontal line.

Signature
David E. Snyder - Chief Inspector

August 1, 2020

Date
Ogdensburg, New York USA



DeFelsko Corporation
 800 Proctor Avenue
 Ogdensburg, New York 13669-2205 USA

Certificate of Calibration

Certificate Number: 20-647421

Nomenclature: Coating Thickness Instrument	Laboratory Environment
Manufacturer: DeFelsko Corporation	Temperature: 23 ± 5°C
Model: PosiTector 6000 FTS Probe	Relative Humidity: Up to 95%
Probe Serial No: 408858	Date of Calibration: December 15, 2020
Note: Probe serial # on connector	Date in Service†: _____
	<small>To be completed by the end user, in ink</small>

Test Method: This coating thickness instrument was calibrated to manufacturer's specifications according to procedure MP 2529 using Certified Thickness Standards traceable to NIST by certificate T0051.

Thickness Standard Serial #	Min	Standard Thickness* (mm)	Max	Instrument Reading (mm)
013764F	0.366	0.380	0.394	0.37
08145F	1.979	2.009	2.039	2.02
08132F	4.531	4.681	4.831	4.64
013742F	6.072	6.270	6.468	6.29

*Uncertainty ± (2.5µm + 0.05% of thickness)

Calibration Performed by: Stephen House

 Technician

DeFelsko Corporation operates under Management Procedures intended to implement the requirements of ISO 9001, ISO 10012-1, ISO 17025 and ANSI/NCSL Z540-1. This document certifies that the instrument met published specifications of:

- 0-2.5mm ± (0.01mm + 1% of reading)
- >2.5mm ± (0.01mm + 3% of reading)

†There are no components in this product which have a specific shelf life. Therefore, the calibration interval of this instrument begins on the date that the product is first put into service by the end user. Calibration interval will vary based on usage, handling and storage conditions.

Declaration of Conformity

Application of Council Directive: 2014/30/EU EMC
2014/35/EU LVD [AT-A, AIR, HHD and LPD only]
2014/53/EU [wireless products only]

Standards to which Conformity is declared:

EMC: EN 61326-1:2013
ETSI EN 301 489-1
ETSI EN 301 489-17

Safety: EN 61010-1:2017



Manufacturer DeFelsko Corporation
Address: 800 Proctor Avenue
Ogdensburg, NY USA 13669-2205

Type of Equipment: Handheld Inspection Equipment
Model No: 6000, 200, DFT, DPM, UTG, SPG, AT,
IRT, AIR, RTR, SHD, SST, CMM IS, BHI,
HHD, LPD, OTL & SmartLink Series

Year of Manufacture: 2020

***The undersigned, hereby declares that the equipment specified
above conforms to the listed Directive and Standards***

A handwritten signature in black ink, appearing to read 'David E. Snyder', is written over a horizontal line.

Signature

David E. Snyder - Chief Inspector

August 1, 2020

Date

Ogdensburg, New York USA

Certificate of Calibration

Certificate Number: 20-645445

Nomenclature: Dew Point Meter
Manufacturer: DeFelsko Corporation
Model: PosiTector DPM
Probe Serial No: 305024
Note: Probe serial # on connector

Laboratory Environment
Temperature: $23 \pm 5^\circ\text{C}$
Relative Humidity: Up to 95%
Atmospheric Pressure: 1010mbar
Date of Calibration: December 01, 2020
Date in Service†:

To be completed by the end user, in ink

Test Method: This instrument was calibrated to manufacturer's specifications according to procedure MP 2581 using Reference Standards and test equipment calibrated by an accredited laboratory and traceable to NIST.

Reference	Units	Set Point	Test Equipment Reading	Gage Reading	Gage Accuracy	Allowable Tolerance
Relative Humidity Low	%RH	35	34.8	33.8	-1.0	± 3.0
Relative Humidity High	%RH	65	65.0	67.2	2.2	± 3.0
Surface Temperature Low	$^\circ\text{C}$	40	39.7	39.9	0.2	± 0.5
Surface Temperature High	$^\circ\text{C}$	100	99.2	99.1	-0.1	± 1.5
Air Temperature	$^\circ\text{C}$	N/A	22.3	22.3	0.0	± 0.5

Calibration Performed by: Charles Pothier



Technician

DeFelsko Corporation operates under Management Procedures intended to implement the requirements of ISO 9001, ISO 10012-1, ISO 17025 and ANSI/NCSS Z540-1. This document certifies that the instrument has met published specifications indicated below.

Parameter	Specification	Standard Uncertainty
Surface Temperature	-40 to $80^\circ\text{C} \pm 0.5^\circ\text{C}$	$\pm 0.14^\circ\text{C}$
Surface Temperature	80 to $190^\circ\text{C} \pm 1.5^\circ\text{C}$	$\pm 0.14^\circ\text{C}$
Air Temperature	-40 to $80^\circ\text{C} \pm 0.5^\circ\text{C}$	$\pm 0.15^\circ\text{C}$
Relative Humidity	0 to $100\% \pm 3.0\%$	$\pm 0.5\%$

†There are no components in this product which have a specific shelf life. Therefore, the calibration interval of this instrument begins on the date that the product is first put into service by the end user. Calibration interval will vary based on usage, handling and storage conditions.

This certificate shall not be reproduced, except in full, without the written approval of DeFelsko Corporation.

Declaration of Conformity

Application of Council Directive: 2014/30/EU EMC
2014/35/EU LVD [AT-A, AIR, HHD and LPD only]
2014/53/EU [wireless products only]

Standards to which Conformity is declared:

EMC: EN 61326-1:2013
ETSI EN 301 489-1
ETSI EN 301 489-17

Safety: EN 61010-1:2017



Manufacturer: DeFelsko Corporation
Address: 800 Proctor Avenue
Ogdensburg, NY USA 13669-2205

Type of Equipment: Handheld Inspection Equipment
Model No: 6000, 200, DFT, DPM, UTG, SPG, AT,
IRT, AIR, RTR, SHD, SST, CMM IS, BHI,
HHD, LPD, OTL & SmartLink Series

Year of Manufacture: 2020

***The undersigned, hereby declares that the equipment specified
above conforms to the listed Directive and Standards***

A handwritten signature in black ink, appearing to read 'David E. Snyder', written over a horizontal line.

Signature
David E. Snyder - Chief Inspector

August 1, 2020

Date
Ogdensburg, New York USA

Out-of-Tolerance Notification

Number: 20-645270

Nomenclature: Dew Point Meter
Manufacturer: DeFelsko Corporation
Model: PosiTector DPM
Probe Serial No: 305024
Note: Probe serial # on connector

Laboratory Environment
Temperature: 23 ± 5°C
Relative Humidity: Up to 95%
Atmospheric Pressure: 1010mbar
Date of Calibration: November 30, 2020

Test Method: This instrument was calibrated to manufacturer's specifications according to procedure MP 2581 using Reference Standards and test equipment calibrated by an accredited laboratory and traceable to NIST.

Reference	Units	Set Point	Test Equipment Reading	Gage Reading	Gage Accuracy	Allowable Tolerance
Relative Humidity Low	%RH	35	35.0	37.7	2.7	± 3.0
Relative Humidity High	%RH	65	65.0	69.1	4.1	± 3.0
Surface Temperature Low	°C	40	39.7	39.8	0.1	± 0.5
Surface Temperature High	°C	100	98.9	98.7	-0.2	± 1.5
Air Temperature	°C	N/A	21.4	21.3	-0.1	± 0.5

Calibration Performed by: Charles Pothier



Technician

This document serves as notification that during calibration the indicated product failed to meet all the specifications indicated below:

Parameter	Specification	Standard Uncertainty
Surface Temperature	-40 to 80 °C ± 0.5 °C	± 0.14 °C
Surface Temperature	80 to 190 °C ± 1.5 °C	± 0.14 °C
Air Temperature	-40 to 80 °C ± 0.5 °C	± 0.15 °C
Relative Humidity	0 to 100% ± 3.0%	± 0.5%

REPORT D'INTERVENTION N° 242379

Date: 15/12/2020
La Société: PROTECTIVE COATING
La Ville: STEENBECQUE
Département: 59
Pays: France
Le Demandeur: Monsieur bart
Votre référence:
Appareil: Sonde DPM SN: 305024
Vos observations: Demande de vérification
Nos remarques: Sonde seule
Objectif à atteindre: Vérification
Mode opératoire: Constructeur
Commentaire: Retour usine
Préconisations: Vérification annuelle
Notre intervention:

Sonde Dpm non conforme à réception

**Certificat Defelsko N° 20-645270 mesure avant
Certificat Defelsko N° 20-645445 mesure après**

Technicien: C. PLUMEREZ
Téléphone: 01.48.09.66.10
Email: c.plumerez@labomat.com

Signature:



Siège social :

LABOMAT ESSOR
37 bd Anatole France
93287 SAINT DENIS CEDEX
Tél. : 01.48.09.66.11
Fax : 01.48.09.68.84 (SAV)

Agence Nord / Belgique :

LABOMAT ESSOR
4 Vlamingstraat
B-8560 WEVELGEM
Tél. : 00.32.56.43.28.13
Fax : 00.32.56.43.28.14

CONSTAT DE VERIFICATION

N° 242379

(Suivant la norme NF X 07-011)

Date de vérification : 19 novembre 2020

Demandeur : PROTECTIVE COATING

A : STEENBECQUE

Instrument vérifié : MESUREUR D'ÉPAISSEUR DEFELSKO

Modèle : ADV/FS

N° Série : 800277

Sonde : 299853

CONFORME

NON CONFORME

Nombre de pages avec annexes : 3

Documents annexes joints à ce constat de vérification :

➤ Copie des certificats des jeux de cales certifiées

Nom du technicien : C. PLUMEREZ

Signature :



- La reproduction de ce constat n'est autorisée que sous la forme de fac-similé photographique intégral
- Ce document ne peut pas être utilisé en lieu et place d'un certificat d'étalonnage
- Ce document est réalisé conformément à la norme NF X 07-011 définissant le constat de vérification

Siège social :

LABOMAT ESSOR
37 bd Anatole France
93287 SAINT DENIS CEDEX
Tél. : 01.48.09.66.11
Fax : 01.48.09.68.84 (SAV)

Agence Nord / Belgique :

LABOMAT ESSOR
4 Vlamingstraat
B-8560 WEVELGEM
Tél. : 00.32.56.43.28.13
Fax : 00.32.56.43.28.14

Procédure pour le Contrôle d'étalonnage

L'étalonnage du mesureur d'épaisseur est contrôlé sur étalons de précision type acier (F).

Le Zéro du mesureur d'épaisseur à vérifier est fait sur le substrat nu.

Le relevé des mesures effectuées pour chaque feuille étalon permet de valider l'appareil.

Métaux Ferreux

Nous certifions par la présente que la fonction mesure sur Métaux Ferreux du mesureur d'épaisseur référencé ci-dessus a été vérifiée sur le jeu de plaques étalon N° S512240 (dont l'incertitude de mesure est de $\pm 0.43\mu\text{m}$).

La précision de l'appareil sur Métaux Ferreux est de $\pm (1\mu\text{m} + 1\%$ de la lecture) pour les mesures jusqu'à $50\mu\text{m}$ et de $\pm (2\mu\text{m} + 1\%$ de la lecture) pour les mesures supérieures.

FONCTION FERREUX (F)

ETALON (μm)	SOMMES DES INCERTITUDES	MINIMUM (Avec somme des incertitudes)	MAXIMUM (Avec somme des incertitudes)	MESURES EFFECTUEES	CONFORMITE
PLAQUE NUE	$\pm 1.00\mu\text{m}$	- 1.0 μm	1.0 μm	-0.2 μm	OUI
65.72	$\pm 3.09\mu\text{m}$	62.6 μm	68.8 μm	64.5 μm	OUI
254.90	$\pm 4.98\mu\text{m}$	249.9 μm	259.9 μm	257.2 μm	OUI
1504.03	$\pm 17.47\mu\text{m}$	1486.6 μm	1521.5 μm	1512 μm	OUI

Conclusion :

L'appareil est exempt de défaut mécanique, en bon état de fonctionnement, et conforme aux spécifications du constructeur dans les conditions normales d'utilisation.

DeFelsko[®]

DeFelsko Corporation
800 Proctor Avenue
Ogdensburg, New York 13669-2205 USA

Certificate of Calibration

Certificate Number: 20-609301

Nomenclature: Coating Thickness Standards
Manufacturer: DeFelsko Corporation
Model: SI Standards
Set Serial No: S512240

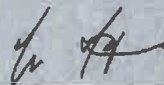
Laboratory Environment
Temperature: 24 ± 1°C
Relative Humidity: Up to 95%
Date of Calibration: March 04, 2020
Date in Service†:

To be completed by the end user, in ink

Test Method: This set of Coating Thickness Standards was calibrated to manufacturer's specifications according to procedure MP 2592 using calibrated equipment traceable to PTB through certificates 40151 PTB 11, 74055 PTB 15, 74056 PTB 15, 02759052 D-K-15105 2016-11 and 0591 D-K-19342 2016-11.

Serial Number	Thickness (microns)	Thickness (mils)
33100	65.72	2.587
33016	254.90	10.035
33068	1504.03	59.214

Calibration Performed by: Tina House



Technician

DeFelsko Corporation operates under Management Procedures intended to implement the requirements of ISO 9001, ISO 10012-1, ISO 17025 and ANSI/NCCL Z540-1. The maximum uncertainty of the Coating Thickness Standards is listed below.

± 0.43 microns

± 0.017 mils

†There are no components in this product which have a specific shelf life. Therefore, the calibration interval of this instrument begins on the date that the product is first put into service by the end user. Calibration interval will vary based on usage, handling and storage conditions.

This certificate shall not be reproduced, except in full, without the written approval of DeFelsko Corporation.

Page 1 of 1

Management Form 2007.03-7/2009

Siège social :

LABOMAT ESSOR
37 bd Anatole France
93287 SAINT DENIS CEDEX
Tél. : 01.48.09.66.11
Fax : 01.48.09.68.84 (SAV)

Agence Nord / Belgique :

LABOMAT ESSOR
4 Vlamingstraat
B-8560 WEVELGEM
Tél. : 00.32.56.43.28.13
Fax : 00.32.56.43.28.14

CONSTAT DE VERIFICATION

N° 242379

(Suivant la norme NF X 07-011)

Date de vérification : 19 novembre 2020

Demandeur : PROTECTIVE COATING

A : STEENBECQUE

Instrument vérifié : MESUREUR D'ÉPAISSEUR DEFELSKO

Modèle : ADV/FS

N° Série : 800277

Sonde : 299853

CONFORME

NON CONFORME

Nombre de pages avec annexes : 3

Documents annexes joints à ce constat de vérification :

➤ Copie des certificats des jeux de cales certifiées

Nom du technicien : C. PLUMEREZ

Signature :



- La reproduction de ce constat n'est autorisée que sous la forme de fac-similé photographique intégral
- Ce document ne peut pas être utilisé en lieu et place d'un certificat d'étalonnage
- Ce document est réalisé conformément à la norme NF X 07-011 définissant le constat de vérification

Siège social :

LABOMAT ESSOR
37 bd Anatole France
93287 SAINT DENIS CEDEX
Tél. : 01.48.09.66.11
Fax : 01.48.09.68.84 (SAV)

Agence Nord / Belgique :

LABOMAT ESSOR
4 Vlamingstraat
B-8560 WEVELGEM
Tél. : 00.32.56.43.28.13
Fax : 00.32.56.43.28.14

Procédure pour le Contrôle d'étalonnage

L'étalonnage du mesureur d'épaisseur est contrôlé sur étalons de précision type acier (F).

Le Zéro du mesureur d'épaisseur à vérifier est fait sur le substrat nu.

Le relevé des mesures effectuées pour chaque feuille étalon permet de valider l'appareil.

Métaux Ferreux

Nous certifions par la présente que la fonction mesure sur Métaux Ferreux du mesureur d'épaisseur référencé ci-dessus a été vérifiée sur le jeu de plaques étalon N° S512240 (dont l'incertitude de mesure est de $\pm 0.43\mu\text{m}$).

La précision de l'appareil sur Métaux Ferreux est de $\pm (1\mu\text{m} + 1\%$ de la lecture) pour les mesures jusqu'à $50\mu\text{m}$ et de $\pm (2\mu\text{m} + 1\%$ de la lecture) pour les mesures supérieures.

FONCTION FERREUX (F)

ETALON (μm)	SOMMES DES INCERTITUDES	MINIMUM (Avec somme des incertitudes)	MAXIMUM (Avec somme des incertitudes)	MESURES EFFECTUEES	CONFORMITE
PLAQUE NUE	$\pm 1.00\mu\text{m}$	$- 1.0\mu\text{m}$	$1.0\mu\text{m}$	$-0.2\mu\text{m}$	OUI
65.72	$\pm 3.09\mu\text{m}$	$62.6\mu\text{m}$	$68.8\mu\text{m}$	$64.5\mu\text{m}$	OUI
254.90	$\pm 4.98\mu\text{m}$	$249.9\mu\text{m}$	$259.9\mu\text{m}$	$257.2\mu\text{m}$	OUI
1504.03	$\pm 17.47\mu\text{m}$	$1486.6\mu\text{m}$	$1521.5\mu\text{m}$	$1512\mu\text{m}$	OUI

Conclusion :

L'appareil est exempt de défaut mécanique, en bon état de fonctionnement, et conforme aux spécifications du constructeur dans les conditions normales d'utilisation.



DeFelsko Corporation
800 Proctor Avenue
Ogdensburg, New York 13669-2205 USA

Certificate of Calibration

Certificate Number: 20-609301

Nomenclature: Coating Thickness Standards	Laboratory Environment
Manufacturer: DeFelsko Corporation	Temperature: 24 ± 1°C
Model: SI Standards	Relative Humidity: Up to 95%
Set Serial No: S512240	Date of Calibration: March 04, 2020
	Date in Service†:

To be completed by the end user, in ink

Test Method: This set of Coating Thickness Standards was calibrated to manufacturer's specifications according to procedure MP 2592 using calibrated equipment traceable to PTB through certificates 40151 PTB 11, 74055 PTB 15, 74056 PTB 15, 02759052 D-K-15105 2016-11 and 0591 D-K-19342 2016-11.

Serial Number	Thickness (microns)	Thickness (mils)
33100	65.72	2.587
33016	254.90	10.035
33068	1504.03	59.214

Calibration Performed by: Tina House

Technician

DeFelsko Corporation operates under Management Procedures intended to implement the requirements of ISO 9001, ISO 10012-1, ISO 17025 and ANSI/NCSL Z540-1. The maximum uncertainty of the Coating Thickness Standards is listed below.

± 0.43 microns

± 0.017 mils

†There are no components in this product which have a specific shelf life. Therefore, the calibration interval of this instrument begins on the date that the product is first put into service by the end user. Calibration interval will vary based on usage, handling and storage conditions.

This certificate shall not be reproduced, except in full, without the written approval of DeFelsko Corporation.

Page 1 of 1

Management Form 2007.03-7/2009

Pièce jointe n°7 – Annexe 4

Fiche de contrôle d'épaisseur

Pièce jointe n°7 – Annexe 5

Certificat de compatibilité de l'apprêt ULIPRIM'O

Certificat z-1439



Le présent certificat fournit des informations relatives à la compatibilité d'une couche ou d'un système d'apprêt pour l'application des revêtements de protection incendie HENSOTHERM®.

Il n'est pas possible de classer les revêtements de protection incendie en association avec les systèmes de protection anticorrosion conformément à DIN EN ISO 12944-5.

La couche / le système d'apprêt stipulé ci-dessous de l'entreprise

Comus SAS, ZA des Loges, 2 rue Henri Rol-Tanguy, 91180 Saint Germain Les Arpajon, France

ULIPRIM'O	épaisseur nominale du film à sec NDFT [μm]	épaisseur maximale du film à sec [μm]
	50	70

L'épaisseur du film à sec (DFT) du système de protection anticorrosion stipulée ci-dessous est à prendre en compte et doit être respectée. La DFT stipulée ci-dessus ne prend pas en compte le facteur de correction pour les surfaces brutes en conformité avec ISO 19840. La DFT nominale (NDFT) ne doit pas excéder celle stipulée dans EN ISO 12944-7.

**peut être utilisé avec les revêtements de protection incendie HENSOTHERM®
suivants en conformité avec EN 13501-1:**

HENSOTHERM® 410 KS	oui
HENSOTHERM® 420 KS	oui
HENSOTHERM® 421 KS	oui

Après le séchage complet du système de revêtement sont contrôlés l'adhésion, la compatibilité ainsi que le comportement en cas d'incendie.

Le temps de séchage de la couche d'apprêt à l'épaisseur nominale du film à sec (NDFT) stipulée ci-dessus doit être au moins de **7 journées** avant l'application du revêtement de protection incendie HENSOTHERM®.

Si le temps de séchage excède **4 semaines**, l'adhésion du revêtement de protection incendie à la couche d'apprêt doit être testée sur une zone d'échantillonnage. De plus, il peut s'avérer nécessaire d'améliorer l'adhésion en décapant la surface de la couche d'apprêt.

Tous les produits à la surface dégradée ou contaminée suite à des temps d'exposition prolongés sont à remplacer soigneusement. Toutes les informations fournies dans les fiches techniques en vigueur actuellement doivent être prises en compte durant l'application des produits.

La couche / le système d'apprêt testé ci-dessus convient uniquement à l'usage sur des surfaces d'acier préparées par sablage abrasif à Sa 2½ en conformité avec ISO 8501-1:2007. L'application de couche / système d'apprêt sur les surfaces en acier galvanisé est proscrit.

Le présent certificat se réfère uniquement au couche/système d'apprêt stipulé et aux échantillons fournis par nos soins aux fins de test.

Le présent certificat se substitue aux certificats parus précédemment qui perdent ainsi leur validité. La validité du présent certificat est de 3 ans et s'achèvera le 12.02.2023.

Börnsen, 13.02.2020

ppa. Till Waterstradt

RUDOLF HENSEL GMBH

Lack- und Farbenfabrik

Lauenburger Landstraße 11
21039 Börnsen | Germany

Tel. +49 (0) 40/72 10 62-10
Fax +49 (0) 40/72 10 62-52

E-Mail: info@rudolf-hensel.de
Internet: www.rudolf-hensel.de



Pièce jointe n°7 – Annexe 6

Test par quadrillage et arrachage

Technical Data Sheet

Testing of pre-coatings on steel-constructions

HENSOTHERM® fire protection coatings for steel are basically applied as a coating system together with a corrosion protecting HENSOGRUND primer. Other primers or pre-coatings have to be tested regarding their coating- and fire-protecting-properties to assure their suitability as a primer for HENSOTHERM®. The following issues have to be tested and recorded.

The substrate has to be clean, free of dust, soot, rolling skin, rust, grease and moisture. All substances that could interfere subsequent coating layers have to be removed before the test.

Adhesion test, fire test and tolerability test have to be positive. Only then the pre-coating can be used as a primer for HENSOTHERM®.

1. Assessment of the surface

- Remove loose, flaky and cracked coatings
- Remove rust

2. Film thickness measuring

- Measuring DFT of the existing coating
- Recording of the measured data

3. Adhesion test

Cross cutting test according to EN ISO 2409





Norm	thickness (µm)	Number of cuts x distance (mm)
DIN EN ISO 2409	0–60	6 x 1
	60–120	6 x 2
	120–250	6 x 3

After the cuts brush back and forth with a soft brush along the diagonals a few times or press an adhesive tape tesaband® 4651 with a length of 10 cm on the sample and remove with a jerk.

Visual examination of the test.

Depending on the number of flaked squares and the visual appearance a specific value, the "cross-cut rating" is determined.

Cross cutting test according to DIN EN ISO 2409

Cross-cut rating (Gt)	Description	Surface
Gt 0	The edges of the cuts are completely smooth; none of the squares of the lattice is detached.	–
Gt 1	Detachment of small flakes of the coating at the intersections of the cuts. A cross-cut area not greater than 5% is affected.	
Gt 2	The coating has flaked along the edges and/or at the intersections of the cuts. A cross-cut area greater than 5% but not greater than 15% is affected.	
Gt 3	The coating has flaked along the edges of the cuts partly or wholly in large ribbons, and/or it has flaked partly or wholly on different parts of the squares. A cross-cut area greater than 15%, but not greater than 35% is affected.	
Gt 4	The coating has flaked along the edges of the cuts in large ribbons and/or some squares have detached partly or wholly. A cross-cut area greater than 35%, but not greater than 65%, is affected.	
Gt 5	Any degree of flaking that cannot even be classified by classification Gt 4.	–

**If the cross-cut rating (Gt) is >3 the adhesion is not sufficient.
The existing pre-coating has to be removed completely and replaced by a primer like HENSOGRUND.**

4. Fire test

Heat up the existing surface with a Bunsen burner flame for about **5 – 10** minutes.
Blistering, detaching, run off or drip off of the existing coating = existing coating is unsuitable.

5. Tolerability test / Test surface

- Apply the **HENSOTHERM®** fire protection coating on the existing coating on a test surface of at least 20 x 20 cm:
 - At least **450 µm** wet film thickness and 3 days drying time for **R30**
 - At least **700 – 1.000 µm wet film thickness** and 5 days drying time for **R60 to R120**
 - The same kind of application which shall be used subsequently (rolling, painting, spraying) is recommended.
- Wait until a complete drying is achieved.** Degree of dryness has to be tested with fingernail check.
- Heat up the test surface with a Bunsen burner flame.
 - **Hp/A < 160 m²: 10 minutes and Hp/A > 160 m²: 5 minutes**
 - Slip off of the coating, $GT > 3$, blistering, cracks = existing coating is unsuitable. The existing coating has to be removed completely and replaced by a primer with **HENSOGRUND**.

The dry film thickness (dft) min. / max. / average of primer +
HENSOTHERM® fire protection coating system have to be recorded!

Pre-coating suitable

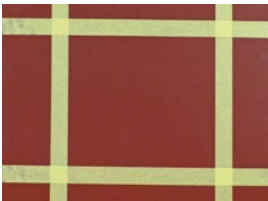
Provided that the pre-coating regarding cross cutting test, tolerability test and fire test is suitable, all damages have to be repaired before applying the fire protection coating with **HENSOGRUND** (see technical data sheets).

When to use „Cross Cutting Test“ and when to use „X-cut“?

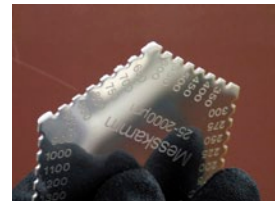
Use the Cross Cutting Test for primers and pre-coatings with a dry film thickness of < 250 µm.

Use the X-cut for intumescent coatings, primers and pre-coatings with a dry film thickness of > 250 µm.

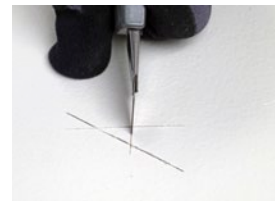
Set up a test surface



Measuring of the wet film thickness



X-cut



The information given herein is not intended to be exhaustive but for your guidance only. It is based upon the results of controlled tests and experience obtained in the application of this product by Rudolf Hensel GmbH. Any person using this product for any purpose other than that specifically recommended without first obtaining written confirmation from us does so at their own risk and Rudolf Hensel GmbH can accept no liability for the performance of the product or for any loss or damage arising out of such use. Former versions of this data sheet are no longer valid. It is the user's responsibility to check that this document is current prior to using the product.

© Rudolf Hensel GmbH 03/16

RUDOLF HENSEL GMBH

Lack- und Farbenfabrik

Lauenburger Landstraße 11
21039 Börnsen | Germany

Tel. +49 (0) 40/72 10 62-10
Fax +49 (0) 40/72 10 62-52

E-Mail: info@rudolf-hensel.de
Internet: www.rudolf-hensel.de





Saint-Germain, le 26 novembre 2021

RAPPORT TECHNIQUE

Le Système 421 KS est composé impérativement d'un primaire, d'une peinture intumescente et d'une finition.

Le primaire : **ULIPRIM'O**
La peinture intumescente : **HENSOTHERM 421KS**
La finition : **HENSOTOP 84 AQ**

L'Uliprim'o est un primaire antirouille pour la protection des métaux ferreux.

Après avoir effectué le test de l'adhérence par quadrillage sur 3 points des structures métalliques avec un résultat plus que positif, nous confirmons que le primaire est compatible avec le système Hensotherm 421 KS.

Cette compatibilité est valable uniquement si les supports seront poncés, dégraissés, sain parfaitement sec, propre et exempt de poussière avant l'application du primaire ULIPRIM'O.

Comus ne prend pas la responsabilité de la performance du primaire déjà en place.

Cordialement,

Responsable Laboratoire

COMUS
2 rue Henri Rol Tanguy
BP 19 - 91291 ARPAJON CEDEX
Tél. : +33(0)1 69 88 13 10
Fax : +33(0)1 60 84 04 81

Pièce jointe n°7 – Annexe 7

ETA 20/1228 du 02/02/2021



Element Materials Technology
 Rotterdam B.V.
 Zekeringstraat 33
 1014 BV Amsterdam
 Netherlands
 Tel: +31 (0) 20-55633555
www.element.com



Member of



www.eota.eu

European Technical Assessment

ETA - 20/1228
of 02/02/2021

General Part

Technical Assessment Body Issuing the European Technical Assessment:	Element Materials Technology Rotterdam B.V.
Trade Name of the Construction Product:	HENSOTHERM® 421 KS
Product Family to Which the Construction Product Belongs:	35. Fire Protective Products Reactive Coating for the Fire Protection of Steel Elements
Manufacturer:	Rudolf Hensel GmbH Lauenburger Landstr 11, D-21039 Börnsen, Germany
Manufacturing Plant(s):	Rudolf Hensel GmbH Lauenburger Landstr 11, D-21039 Börnsen, Germany
This European Technical Assessment Contains:	50 pages including 1 Annex which form an integral part of this assessment.
This European Technical Assessment is Issued in Accordance with Regulation (EU) No 305/2011, On the Basis Of:	EAD 350402-00-1106 Fire Protective Products: Reactive Coatings For Fire Protection of Steel Elements.
This Version is a Corrigendum To:	ETA 20/1228, issued on 16/12/2020 Note: ETA 20/1228 of 16/12/2020 replaced ETA 16/0251 of 2020/11/19

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es) referred to above). However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

COMUS France

1. Technical Description of the Product

HENSOTHERM® 421 KS is a spray or brush/roller applied intumescent paint formulated for the fire protection of structural steel elements.

In accordance with EAD 350402-00-1106, HENSOTHERM® 421 KS may be considered as a reactive coating kit that includes one or more primers and/or topcoats (Option 3).

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.

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.

2. Specification of the Intended Use(s) in Accordance with the Applicable European Assessment Document (hereinafter EAD)

The intended use of HENSOTHERM® 421 KS is to fire protect various sizes of structural steel 'I/H' shaped sections (beams and columns) and hollow sections (circular and rectangular/square hollow columns as well as rectangular/square hollow beams) up to fire resistance classifications of R120 and R180, respectively. The analyses considered design temperatures in the range from 350°C to 750°C.

HENSOTHERM® 421 KS has been tested and assessed as being capable on maintaining fire resistance performance on 'I/H' shaped sections up to 150 minutes. Therefore, table of results for additional fire resistance periods that are not foreseen by the standard classification classes also form part of the evaluation.

The fire protection coating in conjunction with HENSOGRUND 1966E, HENSOGRUND 2K, HENSOGRUND AQ, HENSOGRUND WB Green and HENSOGRUND WB Green/ HENSOTOP WB Green primers and HENSOTOP 84, HENSOTOP 84 AQ and HENSOTOP WB Green topcoats has a performance determined for a reaction to fire classification in accordance with EN 13501-1 of Class E.

The provisions made in this ETA are based on an assumed working life of the applied coating for the intended use of 10 years, for environmental categories Types Z₁, X and Y. EAD 350402-00-1106 also allows to assume 25 years working life where the ETA applicant can offer sufficient additional documented proof for the technical examination. Rudolf Hensel GmbH have supplied additional information for Type Z₂ to both Warringtonfire and BAM, who have both independently verified that the data supplied demonstrates the use of HENSOTHERM® 421 KS for a working life of 25 years in environmental condition Type Z₂. Therefore, 25 years working life is assumed for environmental category Type Z₂. The above provisions are made 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.

HENSOTHERM® 421 KS has been assessed as being compatible with the following primers:

Primers				
Primer Reference	Primer Type	Tested Nominal Primer DFT (mm)	Permitted Primer Thickness Range (mm). ¹	
			Minimum	Maximum
TEKNOLAC PRIMER 0168-00 ²	Alkyd resin, solvent based ²	0.056	0.028	0.084
TEKNOCRYL AQUA COMBI 2780 ³	Water-borne primer based on acrylate dispersion and alkyd ³	0.038	0.019	0.057
HENSOGRUND 1966E ²	Short oil alkyd ²	0.08	0.04	0.12
HENSOGRUND 2K ²	Two component epoxy ²	0.075	0.038	0.113
HENSOGRUND AQ ²	Water-based acrylic ²	0.06	0.03	0.09
HENSOGRUND 2K (Galvanized) ⁴	Two component epoxy ⁴	0.05	0.025	0.075
HENSOGRUND AQ (Galvanized) ⁴	Water-based acrylic ⁴	0.05	0.025	0.075
HENSOGRUND WB Green	Water Based Acrylic ²	0.066	0.033	0.204
HENSOGRUND WB Green	Water Based Acrylic ²	0.136	0.033	0.204
HENSOGRUND WB Green/HENSOTOP WB Green	Water Based Acrylic ² /Water Based Acrylic ²	0.09/0.09	0.045/0.045	0.135/0.135
HENSOGRUND WB Green (Galvanized)	Water Based Acrylic ⁴	0.066	0.033	0.099

¹ The permitted theoretical minimum and maximum DFTs can not be less or exceed the DFT for each product as recommended by the manufacturer. The practical information given by the manufacturer must be followed

² The generic approval is applicable to other primers from the same generic group. The approval does not cover galvanized steel

³ The approval is applicable to the specific primer. The approval does not cover galvanized steel

⁴ The approval is applicable to the specific primer. The approval covers galvanized steel

HENSOTHERM® 421 KS has been assessed as being compatible with the following top coats:

Top Coat				
Top Coat Reference ¹	Top Coat Description	Tested Nominal Top Coat DFT (mm)	Permitted Top Coat Thickness Range (mm)	
			Minimum	Maximum ²
BIORA 20	Acrylic resin, water based	0.061	0.061	0.091
HENSOTOP 84 AQ	Acrylic resin, water based	0.05	0.05	0.075
HENSOTOP 84	Acrylic resin, solvent based	0.05	0.05	0.075
HENSOTOP SB (up to Type Y exposure)	Acrylic resin, solvent based	0.055	0.055	0.082
HENSOTOP SB (up to Type X exposure)	Acrylic resin, solvent based	0.095	0.095	0.142
HENSOTOP WB	Acrylic resin, water based	0.05	0.05	0.075
TEKNOCRYL 100	Acrylic, modified	0.05	0.05	0.075
HENSOTOP 2K PU	Acrylic polyurethan, solvent based	0.07	0.07	0.105
HENSOTOP WB Green	Water Based Acrylic	0.076	0.076	0.114

¹ The approval is limited to the specific product

² The permitted theoretical maximum DFT cannot exceed the DFT for each product as recommended by the manufacturer. The practical information given by the manufacturer must be followed

HENSOTHERM® 421 KS has been assessed as having passed the requirements for durability according to EAD 350402-00-1106 with and without the following top coats:

Top Coat Reference ¹	Top Coat Description	Approved Top Coat Colours	Durability Approvals Based On The Carried Out Testing			
			Type Z ₂	Type Z ₁	Type Y	Type X
BIORA 20	Acrylic resin, water based	All Colours	✓	✓		
HENSOTOP 84 AQ	Acrylic resin, water based	All Colours	✓	✓		
HENSOTOP 84	Acrylic resin, solvent based	All Colours	✓	✓		
No Top Coat	-	-	✓	✓	✓	
HENSOTOP WB	Acrylic resin, water based	All Colours	✓	✓	✓	
HENSOTOP WB Green	Water Based Acrylic	All colours	✓	✓	✓	
TEKNOCRYL 100	Acrylic modified top coat	All Colours	✓	✓	✓	
HENSOTOP SB	Acrylic resin, solvent based	All Colours	✓	✓	✓	✓
HENSOTOP 2K PU	Acrylic polyurethan, solvent based	All Colours	✓	✓	✓	✓

¹The approval is limited to the specific product.

HENSOTHERM® 421 KS was subjected to the identification testing in accordance with the methods of identification defined in Table 4 of EAD 350402-00-1106. Test for technical characterisation has been done as described in Annex E (Thermoanalytical analyses (TG) and Infrared spectroscopy analyses (IR)).

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																															
Assessment method	Essential characteristic	Product performance																															
BASIC WORKS REQUIREMENT 2: SAFETY IN CASE OF FIRE																																	
EN 13501-1	Reaction to fire	Class E																															
EN 13501-2	Fire resistance	(R15 to R120) - IncSlow (I/H Beams and Columns) and (R15 to R180) - IncSlow (Circular and Rectangular/Square Hollow Column as well as Rectangular/Square Hollow Beams) (see Annex A)*																															
BASIC WORKS REQUIREMENT 3: HYGIENE, HEALTH AND THE ENVIRONMENT																																	
Manufacturer's declaration and EN 16516	Content, emission and or release of dangerous substances	Product specification doesn't contain dangerous substances given in Annex XVII of REACH and the ECHA Candidate List of Substances of Very High Concern Use categories: IA1 and S/W2 Results for reactive coating to EN 16516 after 3 and 28 days:																															
		<table border="1"> <thead> <tr> <th></th> <th colspan="2">3 Days</th> <th colspan="2">28 Days</th> </tr> <tr> <th></th> <th>Restriction</th> <th>HENSOTHERM® 421 KS</th> <th>Restriction</th> <th>HENSOTHERM® 421 KS</th> </tr> </thead> <tbody> <tr> <td>R-Value</td> <td>N/A</td> <td>-</td> <td>≤1</td> <td>≤1</td> </tr> <tr> <td>TVOC</td> <td>≤10000µg/m³</td> <td>≤10000µg/m³</td> <td>≤1000µg/m³</td> <td>≤1000µg/m³</td> </tr> <tr> <td>TSVOC</td> <td>N/A</td> <td>-</td> <td>≤100µg/m³</td> <td>≤100µg/m³</td> </tr> <tr> <td>Total VOC without NIK</td> <td>N/A</td> <td>-</td> <td>≤100µg/m³</td> <td>≤100µg/m³</td> </tr> </tbody> </table>			3 Days		28 Days			Restriction	HENSOTHERM® 421 KS	Restriction	HENSOTHERM® 421 KS	R-Value	N/A	-	≤1	≤1	TVOC	≤10000µg/m ³	≤10000µg/m ³	≤1000µg/m ³	≤1000µg/m ³	TSVOC	N/A	-	≤100µg/m ³	≤100µg/m ³	Total VOC without NIK	N/A	-	≤100µg/m ³	≤100µg/m ³
	3 Days		28 Days																														
	Restriction	HENSOTHERM® 421 KS	Restriction	HENSOTHERM® 421 KS																													
R-Value	N/A	-	≤1	≤1																													
TVOC	≤10000µg/m ³	≤10000µg/m ³	≤1000µg/m ³	≤1000µg/m ³																													
TSVOC	N/A	-	≤100µg/m ³	≤100µg/m ³																													
Total VOC without NIK	N/A	-	≤100µg/m ³	≤100µg/m ³																													
BASIC WORKS REQUIREMENT 4: SAFETY AND ACCESSIBILITY IN USE																																	
EAD 350402-00-1106 Clause 2.2.4 and Clause 2.2.5	Adhesion and Durability	<ul style="list-style-type: none"> • Primer and top coat compatibility • Type X durability • Type Y durability • Type Z₁ durability • Type Z₂ durability 																															
EAD 350402-00-1106 Clause 2.3.5	Identification	Thermoanalytical analyses (TG) and Infrared spectroscopy analyses (IR)																															

* Table of results for additional fire resistance periods that are not foreseen by the standard classification classes also form part of this ETA.

4. Assessment and Verification of Constancy of Performance (hereinafter AVCP) System Applied, with reference 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 Element Materials Technology Rotterdam B.V.

Issued in Amsterdam, Netherlands on 02/02/2021

By

A handwritten signature in black ink, appearing to read "Paul Duggan". The signature is written in a cursive style with a large initial 'P' and a stylized 'D'.

Paul Duggan
Deputy TAB Manager

COMUS France

Annex A - Product Performance: Fire Resistance

- 1 This Annex relates to the use of HENSOTHERM® 421 KS for the fire protection of 'I/H' shaped sections (beams and columns) and hollow sections (circular and rectangular/square hollow columns as well as rectangular/square hollow beams). The precise scope is given in Tables 1 to 41 which show the total dry film thickness of HENSOTHERM® 421 KS (excluding primer and top coat) required to provide classifications of R15 to R120 for I/H sections and R15 to R180 for Hollow sections for various design temperatures and section factors. HENSOTHERM® 421 KS has been tested and assessed as being capable on maintaining fire resistance performance on 'I' and 'H' shaped sections up to 150 minutes. Therefore, table of results for additional fire resistance periods that are not foreseen by the standard classification classes also form part of this European Technical Assessment.
- 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.
- 3 The data presented in the tables in this Annex refers to both beams (three-sided fire exposure) and columns (four sided exposure).
- 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 listed in this ETA. The compatible primers and top coats, and their permitted dry film thicknesses are provided in the body of this ETA. The data is also applicable to galvanized steel sections with the compatible primers.
- 5 The data for the 'I' and 'H' shaped beams and columns applies also to other shaped steel sections that have re-entrant details such as channels, angles and tees.
6. HENSOTHERM® 421 KS has been exposed to the slow heating regime (IncSlow) defined in Annex A of EN 13381-8: 2013 and has satisfied the requirements to provide classification according to EN 13501-2.

Tables of Results

Table 1: I/H-Beam Sections 15 Minutes												
Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of											
	350°C	400°C	450°C	470°C	500°C	550°C	570°C	600°C	620°C	650°C	700°C	750°C
50	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
55	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
60	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
65	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
70	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
75	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
80	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
85	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
90	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
95	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
100	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
105	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
110	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
115	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
120	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
125	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
130	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
135	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
140	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
145	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
150	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
155	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
160	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
165	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
170	0.272	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
175	0.278	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
180	0.283	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
185	0.289	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
190	0.295	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
195	0.300	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
200	0.306	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
205	0.312	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
210	0.317	0.275	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
215	0.323	0.280	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
220	0.329	0.284	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
225	0.335	0.288	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
230	0.340	0.293	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
235	0.346	0.297	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
240	0.352	0.302	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
245	0.357	0.306	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
250	0.363	0.310	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
255	0.369	0.315	0.273	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
260	0.375	0.319	0.276	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
265	0.380	0.324	0.280	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
270	0.386	0.328	0.283	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
275	0.392	0.333	0.287	0.274	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
280	0.397	0.337	0.290	0.277	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
285	0.403	0.341	0.294	0.280	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
290	0.409	0.346	0.298	0.284	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
295	0.415	0.350	0.301	0.287	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
300	0.420	0.355	0.305	0.290	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
305	0.426	0.359	0.308	0.293	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
310	0.432	0.363	0.312	0.297	0.274	0.271	0.271	0.271	0.271	0.271	0.271	0.271
315	0.437	0.368	0.315	0.300	0.277	0.271	0.271	0.271	0.271	0.271	0.271	0.271
320	0.443	0.372	0.319	0.303	0.280	0.271	0.271	0.271	0.271	0.271	0.271	0.271
325	0.449	0.377	0.322	0.306	0.283	0.271	0.271	0.271	0.271	0.271	0.271	0.271
330	0.454	0.381	0.326	0.310	0.286	0.271	0.271	0.271	0.271	0.271	0.271	0.271
335	0.460	0.385	0.330	0.313	0.289	0.271	0.271	0.271	0.271	0.271	0.271	0.271
340	0.466	0.390	0.333	0.316	0.291	0.271	0.271	0.271	0.271	0.271	0.271	0.271
345	0.472	0.394	0.337	0.319	0.294	0.271	0.271	0.271	0.271	0.271	0.271	0.271
350	0.477	0.399	0.340	0.323	0.297	0.271	0.271	0.271	0.271	0.271	0.271	0.271
355	0.483	0.403	0.344	0.326	0.300	0.271	0.271	0.271	0.271	0.271	0.271	0.271
360	0.489	0.408	0.347	0.329	0.303	0.271	0.271	0.271	0.271	0.271	0.271	0.271
365	0.494	0.412	0.351	0.333	0.306	0.271	0.271	0.271	0.271	0.271	0.271	0.271
370	0.500	0.416	0.354	0.336	0.309	0.271	0.271	0.271	0.271	0.271	0.271	0.271
375	0.506	0.421	0.358	0.339	0.311	0.272	0.271	0.271	0.271	0.271	0.271	0.271
380	0.512	0.425	0.362	0.342	0.314	0.274	0.271	0.271	0.271	0.271	0.271	0.271
385	0.517	0.430	0.365	0.346	0.317	0.276	0.271	0.271	0.271	0.271	0.271	0.271
390	0.523	0.434	0.369	0.349	0.320	0.278	0.271	0.271	0.271	0.271	0.271	0.271
395	0.529	0.438	0.372	0.352	0.323	0.281	0.271	0.271	0.271	0.271	0.271	0.271
400	0.534	0.443	0.376	0.355	0.326	0.283	0.271	0.271	0.271	0.271	0.271	0.271
405	0.540	0.447	0.379	0.359	0.329	0.285	0.271	0.271	0.271	0.271	0.271	0.271
410	0.546	0.452	0.383	0.362	0.332	0.287	0.271	0.271	0.271	0.271	0.271	0.271
415	0.551	0.456	0.386	0.365	0.334	0.290	0.271	0.271	0.271	0.271	0.271	0.271
420	0.557	0.461	0.390	0.368	0.337	0.292	0.271	0.271	0.271	0.271	0.271	0.271
425	0.563	0.465	0.394	0.372	0.340	0.294	0.271	0.271	0.271	0.271	0.271	0.271
430	0.569	0.469	0.397	0.375	0.343	0.296	0.271	0.271	0.271	0.271	0.271	0.271
435	0.574	0.474	0.401	0.378	0.346	0.298	0.271	0.271	0.271	0.271	0.271	0.271
440	0.580	0.478	0.404	0.381	0.349	0.301	0.271	0.271	0.271	0.271	0.271	0.271
445	0.586	0.483	0.408	0.385	0.352	0.303	0.271	0.271	0.271	0.271	0.271	0.271
450	0.591	0.487	0.411	0.388	0.354	0.305	0.271	0.271	0.271	0.271	0.271	0.271

Thickness is intumescent only.

Results apply to I/H-section beams with concrete slabs with 3 sided fire exposure.

Table 2: I/H-Beam Sections 20 Minutes

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of											
	350°C	400°C	450°C	470°C	500°C	550°C	570°C	600°C	620°C	650°C	700°C	750°C
50	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
55	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
60	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
65	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
70	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
75	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
80	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
85	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
90	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
95	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
100	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
105	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
110	0.277	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
115	0.284	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
120	0.291	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
125	0.299	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
130	0.306	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
135	0.313	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
140	0.321	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
145	0.328	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
150	0.335	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
155	0.342	0.277	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
160	0.350	0.283	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
165	0.357	0.289	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
170	0.364	0.295	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
175	0.371	0.301	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
180	0.379	0.307	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
185	0.386	0.313	0.274	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
190	0.393	0.319	0.279	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
195	0.400	0.325	0.284	0.272	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
200	0.408	0.331	0.288	0.276	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
205	0.415	0.337	0.293	0.281	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
210	0.422	0.344	0.298	0.286	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
215	0.430	0.350	0.303	0.290	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
220	0.437	0.356	0.308	0.295	0.275	0.271	0.271	0.271	0.271	0.271	0.271	0.271
225	0.444	0.362	0.313	0.299	0.279	0.271	0.271	0.271	0.271	0.271	0.271	0.271
230	0.451	0.368	0.318	0.304	0.283	0.271	0.271	0.271	0.271	0.271	0.271	0.271
235	0.459	0.374	0.323	0.308	0.287	0.271	0.271	0.271	0.271	0.271	0.271	0.271
240	0.466	0.380	0.328	0.313	0.291	0.271	0.271	0.271	0.271	0.271	0.271	0.271
245	0.473	0.386	0.333	0.317	0.295	0.271	0.271	0.271	0.271	0.271	0.271	0.271
250	0.480	0.392	0.338	0.322	0.299	0.271	0.271	0.271	0.271	0.271	0.271	0.271
255	0.488	0.398	0.343	0.327	0.303	0.271	0.271	0.271	0.271	0.271	0.271	0.271
260	0.495	0.404	0.348	0.331	0.307	0.274	0.271	0.271	0.271	0.271	0.271	0.271
265	0.502	0.410	0.353	0.336	0.311	0.277	0.271	0.271	0.271	0.271	0.271	0.271
270	0.510	0.416	0.357	0.340	0.316	0.280	0.271	0.271	0.271	0.271	0.271	0.271
275	0.517	0.422	0.362	0.345	0.320	0.284	0.271	0.271	0.271	0.271	0.271	0.271
280	0.524	0.428	0.367	0.349	0.324	0.287	0.273	0.271	0.271	0.271	0.271	0.271
285	0.531	0.434	0.372	0.354	0.328	0.290	0.276	0.271	0.271	0.271	0.271	0.271
290	0.539	0.440	0.377	0.358	0.332	0.293	0.279	0.271	0.271	0.271	0.271	0.271
295	0.546	0.446	0.382	0.363	0.336	0.297	0.282	0.271	0.271	0.271	0.271	0.271
300	0.553	0.452	0.387	0.368	0.340	0.300	0.285	0.271	0.271	0.271	0.271	0.271
305	0.560	0.458	0.392	0.372	0.344	0.303	0.288	0.271	0.271	0.271	0.271	0.271
310	0.568	0.464	0.397	0.377	0.348	0.306	0.291	0.271	0.271	0.271	0.271	0.271
315	0.575	0.470	0.402	0.381	0.352	0.310	0.294	0.273	0.271	0.271	0.271	0.271
320	0.582	0.477	0.407	0.386	0.356	0.313	0.297	0.275	0.271	0.271	0.271	0.271
325	0.589	0.483	0.412	0.390	0.360	0.316	0.300	0.278	0.271	0.271	0.271	0.271
330	0.597	0.489	0.417	0.395	0.364	0.319	0.303	0.280	0.271	0.271	0.271	0.271
335	0.604	0.495	0.421	0.399	0.368	0.323	0.306	0.283	0.271	0.271	0.271	0.271
340	0.611	0.501	0.426	0.404	0.372	0.326	0.309	0.286	0.271	0.271	0.271	0.271
345	0.619	0.507	0.431	0.409	0.376	0.329	0.312	0.288	0.271	0.271	0.271	0.271
350	0.626	0.513	0.436	0.413	0.380	0.333	0.315	0.291	0.271	0.271	0.271	0.271
355	0.633	0.519	0.441	0.418	0.384	0.336	0.318	0.293	0.274	0.271	0.271	0.271
360	0.640	0.525	0.446	0.422	0.388	0.339	0.321	0.296	0.276	0.271	0.271	0.271
365	0.648	0.531	0.451	0.427	0.392	0.342	0.324	0.298	0.278	0.271	0.271	0.271
370	0.655	0.537	0.456	0.431	0.396	0.346	0.326	0.301	0.281	0.271	0.271	0.271
375	0.662	0.543	0.461	0.436	0.400	0.349	0.329	0.303	0.283	0.271	0.271	0.271
380	0.669	0.549	0.466	0.440	0.405	0.352	0.332	0.306	0.285	0.271	0.271	0.271
385	0.677	0.555	0.471	0.445	0.409	0.355	0.335	0.309	0.288	0.271	0.271	0.271
390	0.684	0.561	0.476	0.450	0.413	0.359	0.338	0.311	0.290	0.271	0.271	0.271
395	0.691	0.567	0.481	0.454	0.417	0.362	0.341	0.314	0.292	0.271	0.271	0.271
400	0.699	0.573	0.485	0.459	0.421	0.365	0.344	0.316	0.294	0.271	0.271	0.271
405	0.706	0.579	0.490	0.463	0.425	0.368	0.347	0.319	0.297	0.271	0.271	0.271
410	0.720	0.585	0.495	0.468	0.429	0.372	0.350	0.321	0.299	0.271	0.271	0.271
415	0.735	0.591	0.500	0.472	0.433	0.375	0.353	0.324	0.301	0.271	0.271	0.271
420	0.751	0.597	0.505	0.477	0.437	0.378	0.356	0.326	0.304	0.271	0.271	0.271
425	0.766	0.603	0.510	0.481	0.441	0.382	0.359	0.329	0.306	0.271	0.271	0.271
430	0.782	0.610	0.515	0.486	0.445	0.385	0.362	0.332	0.308	0.271	0.271	0.271
435	0.797	0.616	0.520	0.491	0.449	0.388	0.365	0.334	0.311	0.271	0.271	0.271
440	0.813	0.622	0.525	0.495	0.453	0.391	0.368	0.337	0.313	0.271	0.271	0.271
445	0.828	0.628	0.530	0.500	0.457	0.395	0.371	0.339	0.315	0.271	0.271	0.271
450	0.844	0.634	0.535	0.504	0.461	0.398	0.374	0.342	0.318	0.271	0.271	0.271

Thickness is intumescent only.

Results apply to I/H-section beams with concrete slabs with 3 sided fire exposure.

Table 3: I/H-Beam Sections 30 Minutes												
Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of											
	350°C	400°C	450°C	470°C	500°C	550°C	570°C	600°C	620°C	650°C	700°C	750°C
50	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
55	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
60	0.286	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
65	0.309	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
70	0.331	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
75	0.353	0.281	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
80	0.376	0.292	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
85	0.398	0.303	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
90	0.420	0.314	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
95	0.443	0.325	0.274	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
100	0.465	0.336	0.281	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
105	0.487	0.347	0.288	0.272	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
110	0.510	0.358	0.295	0.279	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
115	0.532	0.370	0.302	0.286	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
120	0.554	0.381	0.310	0.292	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
125	0.577	0.392	0.317	0.299	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
130	0.599	0.403	0.324	0.306	0.277	0.271	0.271	0.271	0.271	0.271	0.271	0.271
135	0.621	0.414	0.331	0.313	0.283	0.271	0.271	0.271	0.271	0.271	0.271	0.271
140	0.644	0.425	0.338	0.319	0.289	0.271	0.271	0.271	0.271	0.271	0.271	0.271
145	0.666	0.436	0.345	0.326	0.295	0.271	0.271	0.271	0.271	0.271	0.271	0.271
150	0.688	0.447	0.352	0.333	0.302	0.271	0.271	0.271	0.271	0.271	0.271	0.271
155	0.710	0.459	0.359	0.339	0.308	0.271	0.271	0.271	0.271	0.271	0.271	0.271
160	0.724	0.470	0.366	0.346	0.314	0.274	0.271	0.271	0.271	0.271	0.271	0.271
165	0.739	0.481	0.373	0.353	0.320	0.280	0.271	0.271	0.271	0.271	0.271	0.271
170	0.753	0.492	0.380	0.359	0.326	0.285	0.274	0.271	0.271	0.271	0.271	0.271
175	0.768	0.503	0.387	0.366	0.333	0.290	0.279	0.271	0.271	0.271	0.271	0.271
180	0.783	0.514	0.394	0.373	0.339	0.296	0.284	0.271	0.271	0.271	0.271	0.271
185	0.797	0.525	0.401	0.380	0.345	0.301	0.289	0.273	0.271	0.271	0.271	0.271
190	0.812	0.536	0.408	0.386	0.351	0.306	0.294	0.278	0.271	0.271	0.271	0.271
195	0.827	0.548	0.416	0.393	0.358	0.312	0.298	0.282	0.271	0.271	0.271	0.271
200	0.841	0.559	0.423	0.400	0.364	0.317	0.303	0.286	0.272	0.271	0.271	0.271
205	0.856	0.570	0.430	0.406	0.370	0.322	0.308	0.291	0.276	0.271	0.271	0.271
210	0.871	0.581	0.437	0.413	0.376	0.328	0.313	0.295	0.280	0.271	0.271	0.271
215	0.885	0.592	0.444	0.420	0.383	0.333	0.318	0.299	0.284	0.271	0.271	0.271
220	0.893	0.603	0.451	0.426	0.389	0.338	0.323	0.304	0.288	0.271	0.271	0.271
225	0.901	0.614	0.458	0.433	0.395	0.344	0.328	0.308	0.292	0.272	0.271	0.271
230	0.910	0.625	0.465	0.440	0.401	0.349	0.333	0.312	0.296	0.275	0.271	0.271
235	0.918	0.637	0.472	0.447	0.408	0.354	0.338	0.317	0.300	0.279	0.271	0.271
240	0.926	0.648	0.479	0.453	0.414	0.360	0.343	0.321	0.304	0.282	0.271	0.271
245	0.935	0.659	0.486	0.460	0.420	0.365	0.348	0.326	0.308	0.286	0.271	0.271
250	0.943	0.670	0.493	0.467	0.426	0.370	0.353	0.330	0.312	0.289	0.271	0.271
255	0.951	0.681	0.500	0.473	0.432	0.376	0.358	0.334	0.316	0.293	0.271	0.271
260	0.960	0.692	0.507	0.480	0.439	0.381	0.362	0.339	0.320	0.296	0.271	0.271
265	0.968	0.703	0.514	0.487	0.445	0.386	0.367	0.343	0.324	0.300	0.271	0.271
270	0.977	0.715	0.521	0.493	0.451	0.392	0.372	0.347	0.329	0.303	0.271	0.271
275	0.985	0.727	0.529	0.500	0.457	0.397	0.377	0.352	0.333	0.307	0.271	0.271
280	0.993	0.739	0.536	0.507	0.464	0.402	0.382	0.356	0.337	0.310	0.272	0.271
285	1.002	0.751	0.543	0.514	0.470	0.408	0.387	0.360	0.341	0.314	0.274	0.271
290	1.010	0.764	0.550	0.520	0.476	0.413	0.392	0.365	0.345	0.318	0.277	0.271
295	1.018	0.776	0.557	0.527	0.482	0.418	0.397	0.369	0.349	0.321	0.280	0.271
300	1.027	0.788	0.564	0.534	0.489	0.424	0.402	0.373	0.353	0.325	0.282	0.271
305	1.035	0.800	0.571	0.540	0.495	0.429	0.407	0.378	0.357	0.328	0.285	0.271
310	1.043	0.812	0.578	0.547	0.501	0.434	0.412	0.382	0.361	0.332	0.288	0.271
315	1.052	0.824	0.585	0.554	0.507	0.439	0.417	0.387	0.365	0.335	0.290	0.271
320	1.060	0.836	0.592	0.560	0.514	0.445	0.422	0.391	0.369	0.339	0.293	0.271
325	1.068	0.848	0.599	0.567	0.520	0.450	0.426	0.395	0.373	0.342	0.296	0.271
330	1.077	0.861	0.606	0.574	0.526	0.455	0.431	0.400	0.377	0.346	0.298	0.271
335	1.085	0.873	0.613	0.581	0.532	0.461	0.436	0.404	0.381	0.349	0.301	0.271
340	1.093	0.885	0.620	0.587	0.538	0.466	0.441	0.408	0.385	0.353	0.304	0.271
345	1.102	0.895	0.627	0.594	0.545	0.471	0.446	0.413	0.389	0.357	0.307	0.271
350	1.110	0.906	0.634	0.601	0.551	0.477	0.451	0.417	0.393	0.360	0.309	0.271
355	1.118	0.916	0.642	0.607	0.557	0.482	0.456	0.421	0.397	0.364	0.312	0.271
360	1.127	0.926	0.649	0.614	0.563	0.487	0.461	0.426	0.401	0.367	0.315	0.271
365	1.135	0.937	0.656	0.621	0.570	0.493	0.466	0.430	0.405	0.371	0.317	0.271
370	1.143	0.947	0.663	0.627	0.576	0.498	0.471	0.434	0.409	0.374	0.320	0.271
375	1.152	0.958	0.670	0.634	0.582	0.503	0.476	0.439	0.414	0.378	0.323	0.271
380	1.160	0.968	0.677	0.641	0.588	0.509	0.481	0.443	0.418	0.381	0.325	0.271
385	1.169	0.979	0.684	0.648	0.595	0.514	0.486	0.448	0.422	0.385	0.328	0.273
390	1.177	0.989	0.691	0.654	0.601	0.519	0.490	0.452	0.426	0.388	0.331	0.275
395	1.185	0.999	0.698	0.661	0.607	0.525	0.495	0.456	0.430	0.392	0.333	0.277
400	1.194	1.010	0.705	0.668	0.613	0.530	0.500	0.461	0.434	0.395	0.336	0.279
405	1.207	1.020	0.720	0.674	0.620	0.535	0.505	0.465	0.438	0.399	0.339	0.281
410	1.232	1.031	0.738	0.681	0.626	0.541	0.510	0.469	0.442	0.403	0.342	0.283
415	1.256	1.041	0.756	0.688	0.632	0.546	0.515	0.474	0.446	0.406	0.344	0.285
420	1.281	1.052	0.774	0.694	0.638	0.551	0.520	0.478	0.450	0.410	0.347	0.286
425	1.305	1.062	0.792	0.701	0.644	0.557	0.525	0.482	0.454	0.413	0.350	0.288
430	1.330	1.073	0.810	0.709	0.651	0.562	0.530	0.487	0.458	0.417	0.352	0.290
435	1.354	1.083	0.828	0.727	0.657	0.567	0.535	0.491	0.462	0.420	0.355	0.292
440	1.379	1.093	0.846	0.745	0.663	0.573	0.540	0.495	0.466	0.424	0.358	0.294
445	1.403	1.104	0.864	0.763	0.669	0.578	0.545	0.500	0.470	0.427	0.360	0.296
450	1.428	1.114	0.882	0.780	0.676	0.583	0.550	0.504	0.474	0.431	0.363	0.298

Thickness is intumescent only.

Results apply to I/H-section beams with concrete slabs with 3 sided fire exposure.

Table 4: I/H-Beam Sections 45 Minutes												
Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of											
	350°C	400°C	450°C	470°C	500°C	550°C	570°C	600°C	620°C	650°C	700°C	750°C
50	0.476	0.356	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
55	0.525	0.390	0.294	0.276	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
60	0.575	0.423	0.317	0.296	0.272	0.271	0.271	0.271	0.271	0.271	0.271	0.271
65	0.624	0.457	0.340	0.315	0.287	0.271	0.271	0.271	0.271	0.271	0.271	0.271
70	0.674	0.491	0.364	0.334	0.301	0.272	0.271	0.271	0.271	0.271	0.271	0.271
75	0.725	0.524	0.387	0.353	0.315	0.280	0.271	0.271	0.271	0.271	0.271	0.271
80	0.778	0.558	0.410	0.373	0.330	0.288	0.278	0.271	0.271	0.271	0.271	0.271
85	0.832	0.591	0.433	0.392	0.344	0.296	0.285	0.271	0.271	0.271	0.271	0.271
90	0.886	0.625	0.456	0.411	0.359	0.304	0.292	0.275	0.271	0.271	0.271	0.271
95	0.969	0.659	0.479	0.431	0.373	0.312	0.299	0.281	0.271	0.271	0.271	0.271
100	1.052	0.692	0.503	0.450	0.388	0.320	0.306	0.288	0.272	0.271	0.271	0.271
105	1.135	0.720	0.526	0.469	0.402	0.328	0.314	0.294	0.278	0.271	0.271	0.271
110	1.204	0.744	0.549	0.489	0.417	0.336	0.321	0.301	0.285	0.271	0.271	0.271
115	1.225	0.768	0.572	0.508	0.431	0.344	0.328	0.308	0.291	0.271	0.271	0.271
120	1.246	0.792	0.595	0.527	0.445	0.352	0.335	0.314	0.297	0.271	0.271	0.271
125	1.268	0.816	0.619	0.546	0.460	0.360	0.342	0.321	0.303	0.276	0.271	0.271
130	1.289	0.840	0.642	0.566	0.474	0.368	0.349	0.327	0.310	0.282	0.271	0.271
135	1.310	0.864	0.665	0.585	0.489	0.376	0.356	0.334	0.316	0.288	0.271	0.271
140	1.331	0.890	0.688	0.604	0.503	0.384	0.363	0.340	0.322	0.293	0.271	0.271
145	1.353	0.924	0.710	0.624	0.518	0.392	0.370	0.347	0.328	0.299	0.271	0.271
150	1.374	0.958	0.726	0.643	0.532	0.399	0.377	0.353	0.334	0.305	0.271	0.271
155	1.395	0.993	0.741	0.662	0.547	0.407	0.384	0.360	0.341	0.311	0.272	0.271
160	1.416	1.027	0.757	0.681	0.561	0.415	0.391	0.366	0.347	0.316	0.277	0.271
165	1.438	1.061	0.773	0.701	0.575	0.423	0.399	0.373	0.353	0.322	0.282	0.271
170	1.459	1.095	0.789	0.717	0.590	0.431	0.406	0.379	0.359	0.328	0.287	0.271
175	1.480	1.129	0.804	0.731	0.604	0.439	0.413	0.386	0.366	0.334	0.292	0.271
180	1.501	1.163	0.820	0.745	0.619	0.447	0.420	0.392	0.372	0.340	0.296	0.271
185	1.523	1.198	0.836	0.759	0.633	0.455	0.427	0.399	0.378	0.345	0.301	0.273
190	1.544	1.210	0.851	0.774	0.648	0.463	0.434	0.405	0.384	0.351	0.306	0.277
195	1.565	1.222	0.867	0.788	0.662	0.471	0.441	0.412	0.391	0.357	0.311	0.281
200	1.586	1.234	0.883	0.802	0.677	0.479	0.448	0.418	0.397	0.363	0.316	0.285
205	1.608	1.246	0.893	0.816	0.691	0.487	0.455	0.425	0.403	0.369	0.321	0.289
210	1.629	1.257	0.903	0.831	0.706	0.495	0.462	0.431	0.409	0.374	0.326	0.293
215	1.650	1.269	0.913	0.845	0.719	0.503	0.469	0.438	0.416	0.380	0.331	0.297
220	1.671	1.281	0.922	0.859	0.732	0.511	0.477	0.445	0.422	0.386	0.336	0.301
225	1.693	1.293	0.932	0.873	0.745	0.519	0.484	0.451	0.428	0.392	0.340	0.305
230	1.714	1.304	0.942	0.886	0.758	0.527	0.491	0.458	0.434	0.398	0.345	0.309
235	1.735	1.316	0.951	0.895	0.772	0.535	0.498	0.464	0.441	0.403	0.350	0.313
240	1.756	1.328	0.961	0.904	0.785	0.543	0.505	0.471	0.447	0.409	0.355	0.317
245	1.780	1.340	0.971	0.913	0.798	0.551	0.512	0.477	0.453	0.415	0.360	0.321
250	1.805	1.351	0.981	0.921	0.811	0.559	0.519	0.484	0.459	0.421	0.365	0.324
255	1.829	1.363	0.990	0.930	0.825	0.567	0.526	0.490	0.466	0.427	0.370	0.328
260	1.854	1.375	1.000	0.939	0.838	0.575	0.533	0.497	0.472	0.432	0.375	0.332
265	1.879	1.387	1.010	0.948	0.851	0.583	0.540	0.503	0.478	0.438	0.379	0.336
270	1.903	1.398	1.020	0.956	0.864	0.590	0.547	0.510	0.484	0.444	0.384	0.340
275	1.928	1.410	1.029	0.965	0.877	0.598	0.555	0.516	0.491	0.450	0.389	0.344
280	1.953	1.422	1.039	0.974	0.889	0.606	0.562	0.523	0.497	0.455	0.394	0.348
285	1.977	1.434	1.049	0.983	0.898	0.614	0.569	0.529	0.503	0.461	0.399	0.352
290	2.002	1.445	1.059	0.991	0.907	0.622	0.576	0.536	0.509	0.467	0.404	0.356
295	2.026	1.457	1.068	1.000	0.916	0.630	0.583	0.542	0.516	0.473	0.409	0.360
300	2.051	1.469	1.078	1.009	0.925	0.638	0.590	0.549	0.522	0.479	0.414	0.364
305	2.076	1.481	1.088	1.018	0.935	0.646	0.597	0.555	0.528	0.484	0.418	0.368
310	2.100	1.493	1.098	1.026	0.944	0.654	0.604	0.562	0.534	0.490	0.423	0.372
315	2.125	1.504	1.107	1.035	0.953	0.662	0.611	0.568	0.541	0.496	0.428	0.376
320	2.149	1.516	1.117	1.044	0.962	0.670	0.618	0.575	0.547	0.502	0.433	0.380
325	2.174	1.528	1.127	1.053	0.971	0.678	0.625	0.582	0.553	0.508	0.438	0.383
330	2.199	1.540	1.137	1.061	0.981	0.686	0.632	0.588	0.559	0.513	0.443	0.387
335	2.223	1.551	1.146	1.070	0.990	0.694	0.640	0.595	0.566	0.519	0.448	0.391
340	2.248	1.563	1.156	1.079	0.999	0.702	0.647	0.601	0.572	0.525	0.453	0.395
345	2.273	1.575	1.166	1.088	1.008	0.717	0.654	0.608	0.578	0.531	0.458	0.399
350	2.297	1.587	1.176	1.096	1.017	0.725	0.661	0.614	0.584	0.537	0.462	0.403
355	2.322	1.598	1.185	1.105	1.027	0.733	0.668	0.621	0.591	0.542	0.467	0.407
360	2.346	1.610	1.195	1.114	1.036	0.740	0.675	0.627	0.597	0.548	0.472	0.411
365	2.371	1.622	1.212	1.123	1.045	0.748	0.682	0.634	0.603	0.554	0.477	0.415
370	2.396	1.634	1.235	1.131	1.054	0.756	0.689	0.640	0.609	0.560	0.482	0.419
375	2.420	1.645	1.257	1.140	1.064	0.764	0.696	0.647	0.616	0.566	0.487	0.423
380	2.445	1.657	1.280	1.149	1.073	0.772	0.703	0.653	0.622	0.571	0.492	0.427
385	2.470	1.669	1.303	1.158	1.082	0.780	0.710	0.660	0.628	0.577	0.497	0.431
390	2.494	1.681	1.325	1.167	1.091	0.788	0.717	0.666	0.634	0.583	0.501	0.435
395	2.522	1.692	1.348	1.175	1.100	0.796	0.724	0.673	0.641	0.589	0.506	0.438
400	2.565	1.704	1.370	1.184	1.110	0.804	0.731	0.679	0.647	0.594	0.511	0.442
405	2.609	1.716	1.393	1.193	1.119	0.812	0.738	0.686	0.653	0.600	0.516	0.446
410	2.652	1.728	1.416	1.206	1.128	0.820	0.745	0.692	0.659	0.606	0.521	0.450
415	2.696	1.740	1.438	1.230	1.137	0.828	0.752	0.699	0.666	0.612	0.526	0.454
420	2.739	1.751	1.461	1.255	1.146	0.836	0.759	0.705	0.672	0.618	0.531	0.458
425	2.783	1.773	1.483	1.279	1.156	0.844	0.766	0.712	0.678	0.623	0.536	0.462
430	2.827	1.892	1.506	1.303	1.165	0.852	0.773	0.719	0.684	0.629	0.541	0.466
435	2.870	2.011	1.528	1.327	1.174	0.860	0.780	0.726	0.691	0.635	0.545	0.470
440	2.914	2.130	1.551	1.351	1.183	0.868	0.787	0.733	0.697	0.641	0.550	0.474
445	2.957	2.249	1.574	1.376	1.192	0.876	0.794	0.740	0.703	0.647	0.555	0.478
450	3.001	2.368	1.596	1.400	1.206	0.884	0.801	0.747	0.710	0.652	0.560	0.482

Thickness is intumescent only.

Results apply to I/H-section beams with concrete slabs with 3 sided fire exposure.

Table 5: I/H-Beam Sections 60 Minutes

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of											
	350°C	400°C	450°C	470°C	500°C	550°C	570°C	600°C	620°C	650°C	700°C	750°C
50	0.745	0.561	0.439	0.403	0.355	0.293	0.274	0.271	0.271	0.271	0.271	0.271
55	0.808	0.616	0.480	0.440	0.385	0.315	0.294	0.273	0.271	0.271	0.271	0.271
60	0.871	0.672	0.521	0.476	0.416	0.338	0.313	0.288	0.275	0.271	0.271	0.271
65	0.935	0.733	0.563	0.512	0.446	0.360	0.332	0.302	0.287	0.273	0.271	0.271
70	0.998	0.805	0.604	0.549	0.477	0.382	0.351	0.317	0.299	0.281	0.271	0.271
75	1.061	0.877	0.645	0.585	0.507	0.404	0.370	0.332	0.312	0.290	0.271	0.271
80	1.125	0.979	0.686	0.622	0.538	0.427	0.390	0.346	0.324	0.298	0.271	0.271
85	1.188	1.083	0.724	0.658	0.568	0.449	0.409	0.361	0.336	0.306	0.278	0.271
90	1.251	1.188	0.760	0.694	0.599	0.471	0.428	0.376	0.348	0.315	0.284	0.271
95	1.315	1.223	0.796	0.726	0.629	0.493	0.447	0.390	0.360	0.323	0.291	0.271
100	1.378	1.250	0.831	0.755	0.660	0.516	0.466	0.405	0.372	0.331	0.297	0.271
105	1.441	1.277	0.867	0.784	0.690	0.538	0.485	0.420	0.384	0.340	0.304	0.274
110	1.504	1.305	0.914	0.814	0.717	0.560	0.505	0.434	0.396	0.348	0.310	0.280
115	1.568	1.332	0.974	0.843	0.740	0.582	0.524	0.449	0.408	0.356	0.317	0.285
120	1.631	1.359	1.033	0.872	0.763	0.605	0.543	0.464	0.420	0.365	0.324	0.291
125	1.694	1.386	1.093	0.910	0.786	0.627	0.562	0.478	0.432	0.373	0.330	0.297
130	1.758	1.413	1.152	0.954	0.809	0.649	0.581	0.493	0.444	0.382	0.337	0.302
135	1.797	1.440	1.203	0.998	0.832	0.671	0.601	0.508	0.456	0.390	0.343	0.308
140	1.835	1.467	1.224	1.042	0.855	0.694	0.620	0.522	0.468	0.398	0.350	0.314
145	1.873	1.494	1.244	1.086	0.878	0.714	0.639	0.537	0.480	0.407	0.356	0.320
150	1.911	1.521	1.264	1.131	0.903	0.732	0.658	0.551	0.492	0.415	0.363	0.325
155	1.949	1.548	1.284	1.175	0.930	0.750	0.677	0.566	0.504	0.423	0.369	0.331
160	1.987	1.575	1.304	1.206	0.957	0.767	0.696	0.581	0.516	0.432	0.376	0.337
165	2.025	1.603	1.324	1.221	0.984	0.785	0.715	0.595	0.528	0.440	0.382	0.342
170	2.063	1.630	1.344	1.237	1.010	0.803	0.731	0.610	0.541	0.449	0.389	0.348
175	2.101	1.657	1.365	1.252	1.037	0.821	0.748	0.625	0.553	0.457	0.395	0.354
180	2.139	1.684	1.385	1.268	1.064	0.838	0.765	0.639	0.565	0.465	0.402	0.359
185	2.177	1.711	1.405	1.283	1.090	0.856	0.782	0.654	0.577	0.474	0.408	0.365
190	2.215	1.738	1.425	1.299	1.117	0.874	0.799	0.669	0.589	0.482	0.415	0.371
195	2.253	1.765	1.445	1.314	1.144	0.888	0.816	0.683	0.601	0.490	0.421	0.377
200	2.291	1.791	1.465	1.330	1.170	0.898	0.832	0.698	0.613	0.499	0.428	0.382
205	2.329	1.817	1.486	1.345	1.197	0.908	0.849	0.714	0.625	0.507	0.434	0.388
210	2.367	1.843	1.506	1.361	1.212	0.918	0.866	0.731	0.637	0.515	0.441	0.394
215	2.405	1.869	1.526	1.376	1.225	0.928	0.883	0.749	0.649	0.524	0.447	0.399
220	2.443	1.895	1.546	1.392	1.239	0.938	0.892	0.766	0.661	0.532	0.454	0.405
225	2.481	1.921	1.566	1.407	1.253	0.947	0.900	0.784	0.673	0.541	0.460	0.411
230	2.519	1.947	1.586	1.423	1.266	0.957	0.909	0.801	0.685	0.549	0.467	0.417
235	2.559	1.973	1.606	1.438	1.280	0.967	0.917	0.819	0.697	0.557	0.473	0.422
240	2.599	1.999	1.627	1.454	1.294	0.977	0.926	0.836	0.711	0.566	0.480	0.428
245	2.639	2.025	1.647	1.469	1.307	0.987	0.934	0.854	0.732	0.574	0.486	0.434
250	2.679	2.051	1.667	1.485	1.321	0.997	0.943	0.871	0.752	0.582	0.493	0.439
255	2.719	2.077	1.687	1.500	1.334	1.007	0.951	0.886	0.773	0.591	0.499	0.445
260	2.759	2.103	1.707	1.516	1.348	1.016	0.959	0.895	0.793	0.599	0.506	0.451
265	2.799	2.128	1.727	1.531	1.362	1.026	0.968	0.904	0.814	0.607	0.512	0.456
270	2.839	2.154	1.748	1.547	1.375	1.036	0.976	0.912	0.835	0.616	0.519	0.462
275	2.879	2.180	1.772	1.562	1.389	1.046	0.985	0.921	0.855	0.624	0.525	0.468
280	2.919	2.206	1.808	1.578	1.403	1.056	0.993	0.929	0.876	0.633	0.532	0.474
285	2.959	2.232	1.845	1.593	1.416	1.066	1.002	0.938	0.889	0.641	0.538	0.479
290	2.998	2.258	1.881	1.609	1.430	1.076	1.010	0.946	0.898	0.649	0.545	0.485
295	3.038	2.284	1.917	1.624	1.444	1.085	1.019	0.955	0.907	0.658	0.551	0.491
300	3.078	2.310	1.953	1.640	1.457	1.095	1.027	0.964	0.915	0.666	0.558	0.496
305	3.118	2.336	1.989	1.655	1.471	1.105	1.035	0.972	0.924	0.674	0.564	0.502
310	3.158	2.362	2.025	1.671	1.485	1.115	1.044	0.981	0.933	0.683	0.571	0.508
315	3.198	2.388	2.062	1.686	1.498	1.125	1.052	0.989	0.942	0.691	0.577	0.513
320	3.238	2.414	2.098	1.702	1.512	1.135	1.061	0.998	0.950	0.700	0.584	0.519
325	3.278	2.440	2.134	1.717	1.526	1.145	1.069	1.006	0.959	0.715	0.590	0.525
330	3.318	2.466	2.170	1.733	1.539	1.155	1.078	1.015	0.968	0.788	0.597	0.531
335	3.358	2.492	2.206	1.748	1.553	1.164	1.086	1.024	0.976	0.862	0.603	0.536
340	3.398	2.521	2.242	1.770	1.566	1.174	1.095	1.032	0.985	0.891	0.610	0.542
345	3.438	2.574	2.279	1.840	1.580	1.184	1.103	1.041	0.994	0.900	0.616	0.548
350	3.478	2.626	2.315	1.909	1.594	1.194	1.111	1.049	1.002	0.909	0.623	0.553
355	3.518	2.679	2.351	1.979	1.607	1.211	1.120	1.058	1.011	0.919	0.629	0.559
360	3.558	2.731	2.387	2.049	1.621	1.236	1.128	1.066	1.020	0.928	0.636	0.565
365	3.598	2.784	2.423	2.119	1.635	1.261	1.137	1.075	1.029	0.938	0.642	0.571
370	3.637	2.836	2.459	2.189	1.648	1.286	1.145	1.084	1.037	0.947	0.649	0.576
375	3.677	2.889	2.496	2.258	1.662	1.310	1.154	1.092	1.046	0.957	0.655	0.582
380	3.717	2.941	2.537	2.328	1.676	1.335	1.162	1.101	1.055	0.966	0.662	0.588
385	3.757	2.994	2.585	2.398	1.689	1.360	1.171	1.109	1.063	0.976	0.668	0.593
390	3.797	3.046	2.633	2.468	1.703	1.385	1.179	1.118	1.072	0.985	0.675	0.599
395	3.837	3.099	2.681	2.530	1.717	1.410	1.187	1.126	1.081	0.994	0.681	0.605
400	3.877	3.151	2.729	2.578	1.730	1.435	1.196	1.135	1.089	1.004	0.688	0.610
405	3.917	3.204	2.777	2.625	1.744	1.459	1.219	1.144	1.098	1.013	0.694	0.616
410	3.957	3.256	2.825	2.673	1.757	1.484	1.251	1.152	1.107	1.023	0.701	0.622
415	3.997	3.309	2.873	2.720	1.762	1.509	1.283	1.161	1.116	1.032	0.711	0.628
420	4.037	3.361	2.921	2.768	1.776	1.534	1.315	1.169	1.124	1.042	0.716	0.633
425	4.077	3.414	2.969	2.815	1.785	1.559	1.348	1.178	1.133	1.051	0.721	0.639
430	4.117	3.466	3.017	2.863	1.794	1.583	1.380	1.187	1.142	1.060	0.726	0.645
435	4.157	3.519	3.065	2.910	1.803	1.608	1.412	1.195	1.150	1.070	0.731	0.650
440	4.197	3.571	3.113	2.958	1.812	1.633	1.444	1.204	1.159	1.079	0.736	0.656
445	4.236	3.624	3.161	3.005	1.821	1.658	1.476	1.213	1.168	1.088	0.741	0.662
450	4.276	3.677	3.209	3.053	1.830	1.683	1.508	1.222	1.177	1.097	0.746	0.667

Thickness is intumescent only.

Results apply to I/H-section beams with concrete slabs with 3 sided fire exposure.

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of											
	350°C	400°C	450°C	470°C	500°C	550°C	570°C	600°C	620°C	650°C	700°C	750°C
50	1.035	0.790	0.614	0.565	0.501	0.420	0.393	0.351	0.325	0.288	0.271	0.271
55	1.127	0.857	0.633	0.618	0.547	0.456	0.425	0.378	0.349	0.308	0.271	0.271
60	1.220	0.924	0.749	0.672	0.593	0.491	0.457	0.405	0.373	0.328	0.284	0.271
65	1.312	0.991	0.846	0.732	0.639	0.527	0.488	0.431	0.397	0.348	0.297	0.271
70	1.404	1.058	0.948	0.803	0.685	0.562	0.520	0.458	0.420	0.367	0.310	0.278
75	1.497	1.125	1.053	0.875	0.733	0.598	0.552	0.485	0.444	0.387	0.323	0.289
80	1.589	1.192	1.158	0.964	0.783	0.633	0.584	0.512	0.468	0.407	0.336	0.301
85	1.681	1.259	1.221	1.055	0.833	0.669	0.616	0.539	0.492	0.426	0.349	0.312
90	1.769	1.325	1.258	1.147	0.882	0.705	0.647	0.566	0.516	0.446	0.362	0.324
95	1.819	1.392	1.294	1.212	0.954	0.738	0.679	0.593	0.540	0.466	0.374	0.335
100	1.870	1.459	1.331	1.243	1.025	0.771	0.711	0.620	0.564	0.486	0.387	0.347
105	1.921	1.526	1.367	1.275	1.097	0.804	0.740	0.647	0.588	0.505	0.400	0.358
110	1.972	1.593	1.404	1.306	1.169	0.837	0.769	0.674	0.612	0.525	0.413	0.370
115	2.022	1.660	1.440	1.337	1.216	0.870	0.798	0.701	0.636	0.545	0.426	0.381
120	2.073	1.727	1.477	1.368	1.244	0.908	0.827	0.727	0.660	0.565	0.439	0.393
125	2.124	1.783	1.513	1.399	1.273	0.948	0.856	0.753	0.684	0.584	0.452	0.404
130	2.175	1.828	1.550	1.430	1.301	0.989	0.885	0.778	0.708	0.604	0.465	0.416
135	2.225	1.872	1.586	1.462	1.329	1.029	0.917	0.804	0.733	0.624	0.477	0.427
140	2.276	1.916	1.623	1.493	1.358	1.070	0.949	0.830	0.757	0.644	0.490	0.439
145	2.327	1.960	1.660	1.524	1.386	1.111	0.981	0.855	0.781	0.663	0.503	0.450
150	2.378	2.004	1.696	1.555	1.415	1.151	1.013	0.881	0.806	0.683	0.516	0.461
155	2.429	2.048	1.733	1.586	1.443	1.192	1.045	0.902	0.830	0.703	0.529	0.473
160	2.479	2.093	1.770	1.617	1.472	1.217	1.077	0.922	0.855	0.725	0.542	0.484
165	2.528	2.137	1.813	1.648	1.500	1.238	1.109	0.942	0.879	0.749	0.555	0.496
170	2.573	2.181	1.856	1.680	1.529	1.259	1.141	0.962	0.895	0.772	0.568	0.507
175	2.618	2.225	1.899	1.711	1.557	1.281	1.173	0.982	0.909	0.796	0.581	0.519
180	2.663	2.269	1.942	1.742	1.586	1.302	1.202	1.002	0.923	0.819	0.593	0.530
185	2.707	2.313	1.985	1.774	1.614	1.323	1.221	1.022	0.937	0.842	0.606	0.542
190	2.752	2.357	2.028	1.807	1.643	1.344	1.239	1.042	0.951	0.866	0.619	0.553
195	2.797	2.402	2.070	1.840	1.671	1.366	1.258	1.062	0.965	0.886	0.632	0.565
200	2.842	2.446	2.113	1.873	1.699	1.387	1.276	1.082	0.979	0.894	0.645	0.576
205	2.886	2.490	2.156	1.906	1.728	1.408	1.295	1.102	0.993	0.902	0.658	0.588
210	2.931	2.534	2.199	1.938	1.756	1.430	1.313	1.122	1.007	0.910	0.671	0.599
215	2.976	2.578	2.242	1.971	1.787	1.451	1.332	1.142	1.021	0.918	0.684	0.611
220	3.021	2.622	2.285	2.004	1.819	1.472	1.350	1.162	1.035	0.926	0.696	0.622
225	3.065	2.665	2.328	2.037	1.850	1.494	1.369	1.182	1.049	0.934	0.712	0.634
230	3.110	2.709	2.370	2.070	1.882	1.515	1.387	1.201	1.063	0.942	0.742	0.645
235	3.155	2.753	2.413	2.103	1.913	1.536	1.406	1.217	1.077	0.950	0.771	0.656
240	3.200	2.797	2.456	2.136	1.945	1.558	1.424	1.232	1.091	0.958	0.801	0.668
245	3.244	2.841	2.499	2.169	1.977	1.579	1.443	1.248	1.105	0.966	0.830	0.679
250	3.289	2.885	2.542	2.202	2.008	1.600	1.461	1.263	1.119	0.974	0.859	0.691
255	3.334	2.928	2.585	2.235	2.040	1.622	1.480	1.279	1.133	0.982	0.885	0.702
260	3.379	2.972	2.629	2.268	2.071	1.643	1.498	1.294	1.147	0.990	0.893	0.714
265	3.423	3.016	2.672	2.301	2.103	1.664	1.517	1.309	1.161	0.998	0.901	0.725
270	3.468	3.060	2.715	2.334	2.134	1.686	1.535	1.325	1.175	1.006	0.910	0.737
275	3.513	3.104	2.759	2.367	2.166	1.707	1.554	1.340	1.189	1.014	0.918	0.748
280	3.558	3.147	2.802	2.400	2.197	1.728	1.572	1.356	1.204	1.022	0.926	0.760
285	3.602	3.191	2.845	2.433	2.229	1.750	1.591	1.371	1.223	1.030	0.934	0.771
290	3.647	3.235	2.889	2.465	2.260	1.783	1.609	1.387	1.241	1.038	0.942	0.783
295	3.692	3.279	2.932	2.498	2.292	1.833	1.628	1.402	1.259	1.046	0.950	0.794
300	3.737	3.323	2.975	2.542	2.323	1.883	1.646	1.418	1.278	1.054	0.958	0.806
305	3.781	3.366	3.018	2.596	2.355	1.934	1.665	1.433	1.296	1.062	0.966	0.817
310	3.826	3.410	3.062	2.650	2.386	1.984	1.684	1.449	1.314	1.070	0.974	0.829
315	3.871	3.454	3.105	2.704	2.418	2.034	1.702	1.464	1.333	1.078	0.982	0.840
320	3.916	3.498	3.148	2.758	2.449	2.084	1.721	1.480	1.351	1.086	0.990	0.851
325	3.960	3.542	3.192	2.812	2.481	2.134	1.739	1.495	1.370	1.094	0.998	0.863
330	4.005	3.586	3.235	2.866	2.512	2.184	1.758	1.511	1.388	1.102	1.007	0.874
335	4.050	3.629	3.278	2.920	2.567	2.234	1.825	1.526	1.406	1.110	1.015	0.885
340	4.094	3.673	3.322	2.974	2.624	2.284	1.907	1.542	1.425	1.118	1.023	0.894
345	4.139	3.717	3.365	3.028	2.680	2.334	1.989	1.557	1.443	1.126	1.031	0.903
350	4.184	3.761	3.408	3.082	2.737	2.385	2.072	1.572	1.462	1.134	1.039	0.912
355	4.229	3.805	3.451	3.136	2.793	2.435	2.154	1.588	1.480	1.142	1.047	0.921
360	4.273	3.848	3.495	3.190	2.850	2.485	2.236	1.603	1.498	1.150	1.055	0.930
365	-	3.892	3.538	3.244	2.906	2.537	2.319	1.619	1.517	1.159	1.063	0.939
370	-	3.936	3.581	3.298	2.963	2.591	2.401	1.634	1.535	1.167	1.071	0.948
375	-	3.980	3.625	3.352	3.020	2.645	2.483	1.650	1.553	1.175	1.079	0.957
380	-	4.024	3.668	3.406	3.076	2.700	2.548	1.665	1.572	1.183	1.087	0.966
385	-	4.067	3.711	3.461	3.133	2.754	2.602	1.681	1.590	1.191	1.095	0.975
390	-	4.111	3.755	3.515	3.189	2.809	2.656	1.696	1.609	1.199	1.103	0.984
395	-	4.155	3.798	3.569	3.246	2.863	2.710	1.762	1.627	1.236	1.112	0.993
400	-	4.199	3.841	3.623	3.302	2.918	2.764	1.764	1.645	1.274	1.120	1.002
405	-	4.243	3.884	3.677	3.359	2.972	2.818	1.764	1.664	1.312	1.128	1.011
410	-	4.287	3.928	3.731	3.415	3.027	2.872	1.762	1.683	1.351	1.136	1.020
415	-	-	3.971	3.785	3.472	3.081	2.926	1.762	1.699	1.389	1.144	1.029
420	-	-	4.014	3.839	3.529	3.136	2.981	1.762	1.716	1.428	1.152	1.038
425	-	-	4.058	3.893	3.585	3.190	3.035	1.762	1.732	1.466	1.160	1.047
430	-	-	4.101	3.947	3.642	3.244	3.089	1.762	1.748	1.505	1.168	1.056
435	-	-	4.144	4.001	3.698	3.299	3.143	1.762	1.764	1.543	1.176	1.065
440	-	-	4.188	4.055	3.755	3.353	3.197	1.762	1.780	1.582	1.184	1.074
445	-	-	4.231	4.109	3.811	3.408	3.251	1.762	1.796	1.620	1.192	1.083
450	-	-	4.274	4.163	3.868	3.462	3.305	1.762	1.812	1.658	1.200	1.092

Thickness is intumescent only.

Results apply to I/H-section beams with concrete slabs with 3 sided fire exposure.

Table 7: I/H-Beam Sections 90 Minutes

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of											
	350°C	400°C	450°C	470°C	500°C	550°C	570°C	600°C	620°C	650°C	700°C	750°C
50	1.325	1.037	0.819	0.743	0.651	0.550	0.515	0.464	0.432	0.389	0.326	0.272
55	1.447	1.129	0.895	0.811	0.718	0.599	0.560	0.503	0.467	0.419	0.349	0.290
60	1.568	1.221	0.971	0.878	0.827	0.648	0.604	0.542	0.502	0.449	0.373	0.308
65	1.690	1.312	1.047	0.946	0.936	0.697	0.649	0.581	0.537	0.479	0.396	0.325
70	1.828	1.404	1.123	1.045	1.045	0.763	0.693	0.619	0.573	0.510	0.419	0.343
75	1.991	1.496	1.199	1.154	1.154	0.834	0.748	0.658	0.608	0.540	0.443	0.360
80	2.154	1.588	1.275	1.225	1.225	0.905	0.806	0.697	0.643	0.570	0.466	0.378
85	2.318	1.679	1.351	1.269	1.269	0.979	0.864	0.743	0.678	0.600	0.489	0.395
90	2.481	1.767	1.427	1.313	1.313	1.053	0.927	0.791	0.715	0.630	0.512	0.413
95	2.550	1.823	1.503	1.357	1.357	1.127	0.992	0.839	0.759	0.661	0.536	0.430
100	2.594	1.878	1.579	1.418	1.401	1.200	1.058	0.887	0.803	0.691	0.559	0.448
105	2.638	1.933	1.655	1.486	1.445	1.235	1.123	0.937	0.847	0.725	0.582	0.466
110	2.683	1.988	1.731	1.553	1.489	1.271	1.189	0.987	0.890	0.763	0.606	0.483
115	2.727	2.044	1.790	1.621	1.533	1.307	1.226	1.038	0.931	0.801	0.629	0.501
120	2.771	2.099	1.838	1.688	1.577	1.342	1.259	1.088	0.972	0.840	0.652	0.518
125	2.815	2.154	1.886	1.756	1.621	1.378	1.292	1.138	1.012	0.878	0.676	0.536
130	2.860	2.209	1.934	1.805	1.665	1.413	1.325	1.188	1.053	0.908	0.699	0.553
135	2.904	2.265	1.981	1.853	1.709	1.449	1.357	1.221	1.094	0.937	0.726	0.571
140	2.948	2.320	2.029	1.901	1.753	1.485	1.390	1.249	1.135	0.966	0.756	0.588
145	2.992	2.375	2.077	1.949	1.799	1.520	1.423	1.278	1.176	0.994	0.786	0.606
150	3.036	2.430	2.125	1.997	1.846	1.556	1.455	1.306	1.210	1.023	0.816	0.624
155	3.081	2.486	2.173	2.045	1.893	1.592	1.488	1.334	1.235	1.052	0.846	0.641
160	3.125	2.538	2.220	2.093	1.939	1.627	1.521	1.363	1.261	1.081	0.877	0.659
165	3.169	2.586	2.268	2.141	1.986	1.663	1.553	1.391	1.287	1.109	0.894	0.676
170	3.213	2.634	2.316	2.189	2.033	1.699	1.586	1.419	1.312	1.138	0.907	0.694
175	3.258	2.682	2.364	2.236	2.080	1.734	1.619	1.447	1.338	1.167	0.920	0.714
180	3.302	2.730	2.411	2.284	2.127	1.774	1.651	1.476	1.363	1.196	0.932	0.741
185	3.346	2.778	2.459	2.332	2.173	1.828	1.684	1.504	1.389	1.218	0.945	0.768
190	3.390	2.826	2.507	2.380	2.220	1.882	1.717	1.532	1.415	1.240	0.958	0.795
195	3.434	2.874	2.555	2.428	2.267	1.937	1.749	1.560	1.440	1.262	0.971	0.822
200	3.479	2.922	2.603	2.476	2.314	1.991	1.785	1.589	1.466	1.283	0.984	0.849
205	3.523	2.970	2.651	2.524	2.361	2.045	1.823	1.617	1.491	1.305	0.997	0.876
210	3.567	3.018	2.699	2.572	2.407	2.099	1.860	1.645	1.517	1.327	1.010	0.890
215	3.611	3.066	2.747	2.621	2.454	2.154	1.898	1.674	1.543	1.348	1.023	0.897
220	3.656	3.115	2.795	2.670	2.501	2.208	1.936	1.702	1.568	1.370	1.036	0.905
225	3.700	3.163	2.842	2.718	2.548	2.262	1.974	1.730	1.594	1.392	1.049	0.913
230	3.744	3.211	2.890	2.767	2.596	2.316	2.011	1.758	1.619	1.414	1.061	0.921
235	3.788	3.259	2.938	2.816	2.643	2.370	2.049	1.797	1.645	1.435	1.074	0.929
240	3.832	3.307	2.986	2.864	2.691	2.425	2.087	1.836	1.671	1.457	1.087	0.937
245	3.877	3.355	3.034	2.913	2.739	2.479	2.125	1.876	1.696	1.479	1.100	0.945
250	3.921	3.403	3.082	2.962	2.786	2.531	2.162	1.916	1.722	1.500	1.113	0.953
255	3.965	3.451	3.130	3.010	2.834	2.577	2.200	1.956	1.747	1.522	1.126	0.961
260	4.009	3.499	3.178	3.059	2.881	2.624	2.238	1.995	1.782	1.544	1.139	0.969
265	4.054	3.547	3.226	3.107	2.929	2.670	2.276	2.035	1.827	1.566	1.152	0.976
270	4.098	3.595	3.274	3.156	2.976	2.717	2.313	2.075	1.873	1.587	1.165	0.984
275	4.142	3.643	3.322	3.205	3.024	2.764	2.351	2.114	1.919	1.609	1.178	0.992
280	4.186	3.692	3.370	3.253	3.072	2.810	2.389	2.154	1.965	1.631	1.191	1.000
285	4.230	3.740	3.418	3.302	3.119	2.857	2.427	2.194	2.011	1.652	1.219	1.008
290	4.275	3.788	3.465	3.351	3.167	2.903	2.464	2.234	2.057	1.674	1.275	1.016
295	-	3.836	3.513	3.399	3.214	2.950	2.502	2.273	2.103	1.696	1.332	1.024
300	-	3.884	3.561	3.448	3.262	2.997	2.554	2.313	2.149	1.718	1.388	1.032
305	-	3.932	3.609	3.496	3.309	3.043	2.613	2.353	2.195	1.739	1.444	1.040
310	-	3.980	3.657	3.545	3.357	3.090	2.672	2.393	2.240	1.761	1.501	1.048
315	-	4.028	3.705	3.594	3.405	3.136	2.731	2.432	2.286	1.834	1.557	1.055
320	-	4.076	3.753	3.642	3.452	3.183	2.790	2.472	2.332	1.910	1.614	1.063
325	-	4.124	3.801	3.691	3.500	3.230	2.849	2.512	2.378	1.986	1.670	1.071
330	-	4.172	3.849	3.740	3.547	3.276	2.908	2.573	2.424	2.062	1.727	1.079
335	-	4.220	3.897	3.788	3.595	3.323	2.967	2.637	2.470	2.138	1.783	1.087
340	-	4.268	3.945	3.837	3.642	3.370	3.026	2.701	2.516	2.213	1.839	1.095
345	-	-	3.993	3.885	3.690	3.416	3.085	2.764	2.580	2.289	1.896	1.103
350	-	-	4.041	3.934	3.738	3.463	3.144	2.828	2.644	2.365	1.952	1.111
355	-	-	4.088	3.983	3.785	3.509	3.203	2.891	2.709	2.441	2.009	1.119
360	-	-	4.136	4.031	3.833	3.556	3.262	2.955	2.773	2.516	2.065	1.127
365	-	-	4.184	4.080	3.880	3.603	3.320	3.018	2.837	2.580	2.122	1.134
370	-	-	4.232	4.129	3.928	3.649	3.379	3.082	2.901	2.644	2.178	1.142
375	-	-	4.280	4.177	3.975	3.696	3.438	3.146	2.966	2.707	2.235	1.150
380	-	-	-	4.226	4.023	3.742	3.497	3.209	3.030	2.771	2.291	1.158
385	-	-	-	4.275	4.071	3.789	3.556	3.273	3.094	2.834	2.347	1.166
390	-	-	-	-	4.118	3.836	3.615	3.336	3.158	2.898	2.404	1.174
395	-	-	-	-	4.166	3.882	3.674	3.400	3.222	2.961	2.460	1.182
400	-	-	-	-	4.213	3.929	3.733	3.463	3.287	3.025	2.517	1.190
405	-	-	-	-	4.261	3.975	3.792	3.527	3.351	3.088	2.580	1.198
410	-	-	-	-	-	4.022	3.851	3.591	3.415	3.152	2.642	1.322
415	-	-	-	-	-	4.069	3.910	3.654	3.479	3.216	2.705	1.470
420	-	-	-	-	-	4.115	3.969	3.718	3.543	3.279	2.767	1.618
425	-	-	-	-	-	4.162	4.028	3.781	3.608	3.343	2.830	1.767
430	-	-	-	-	-	4.208	4.087	3.845	3.672	3.406	2.893	1.915
435	-	-	-	-	-	4.255	4.146	3.908	3.736	3.470	2.955	2.063
440	-	-	-	-	-	4.302	4.205	3.972	3.800	3.533	3.018	2.212
445	-	-	-	-	-	-	4.264	4.035	3.865	3.597	3.081	2.360
450	-	-	-	-	-	-	-	4.099	3.929	3.661	3.143	2.508

Thickness is intumescent only.

Results apply to I/H-section beams with concrete slabs with 3 sided fire exposure.

Table 8: I/H-Beam Sections 105 Minutes

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of											
	350°C	400°C	450°C	470°C	500°C	550°C	570°C	600°C	620°C	650°C	700°C	750°C
50	1.616	1.285	1.043	0.956	0.843	0.681	0.640	0.579	0.541	0.491	0.420	0.343
55	1.767	1.401	1.142	1.045	0.925	0.775	0.657	0.630	0.588	0.532	0.453	0.393
60	1.969	1.518	1.240	1.133	1.007	0.890	0.791	0.681	0.634	0.572	0.486	0.443
65	2.170	1.634	1.339	1.222	1.089	1.004	0.892	0.760	0.681	0.613	0.520	0.493
70	2.371	1.751	1.437	1.311	1.171	1.119	0.993	0.867	0.748	0.654	0.553	0.543
75	2.572	1.925	1.536	1.400	1.253	1.214	1.094	0.947	0.841	0.695	0.593	0.593
80	2.773	2.106	1.634	1.489	1.336	1.264	1.195	1.022	0.920	0.760	0.643	0.643
85	2.975	2.286	1.733	1.577	1.418	1.314	1.244	1.097	0.987	0.836	0.693	0.693
90	3.176	2.467	1.806	1.666	1.500	1.365	1.291	1.172	1.055	0.904	0.719	0.719
95	3.377	2.560	1.868	1.755	1.582	1.415	1.338	1.225	1.122	0.959	0.735	0.735
100	3.578	2.622	1.930	1.814	1.664	1.465	1.385	1.267	1.189	1.014	0.773	0.752
105	3.780	2.684	1.991	1.871	1.746	1.515	1.431	1.308	1.232	1.069	0.821	0.768
110	3.981	2.746	2.053	1.928	1.805	1.565	1.478	1.349	1.271	1.124	0.870	0.785
115	4.182	2.808	2.115	1.985	1.857	1.615	1.525	1.391	1.310	1.179	0.909	0.801
120	-	2.870	2.177	2.042	1.910	1.666	1.572	1.432	1.349	1.222	0.943	0.818
125	-	2.932	2.239	2.099	1.962	1.716	1.619	1.474	1.388	1.258	0.977	0.834
130	-	2.994	2.301	2.156	2.015	1.766	1.666	1.515	1.427	1.294	1.011	0.850
135	-	3.056	2.363	2.213	2.068	1.816	1.713	1.556	1.466	1.329	1.045	0.867
140	-	3.118	2.425	2.270	2.120	1.867	1.759	1.598	1.506	1.365	1.079	0.883
145	-	3.179	2.487	2.327	2.173	1.917	1.811	1.639	1.545	1.401	1.113	0.903
150	-	3.241	2.543	2.384	2.225	1.967	1.862	1.680	1.584	1.437	1.147	0.923
155	-	3.303	2.593	2.441	2.278	2.018	1.914	1.722	1.623	1.473	1.181	0.943
160	-	3.365	2.644	2.498	2.330	2.068	1.965	1.764	1.662	1.509	1.213	0.964
165	-	3.427	2.695	2.551	2.383	2.118	2.017	1.820	1.701	1.545	1.242	0.984
170	-	3.489	2.745	2.604	2.436	2.169	2.068	1.876	1.740	1.581	1.271	1.004
175	-	3.551	2.796	2.656	2.488	2.219	2.120	1.933	1.788	1.617	1.301	1.024
180	-	3.613	2.846	2.708	2.540	2.269	2.171	1.989	1.848	1.653	1.330	1.044
185	-	3.675	2.897	2.761	2.592	2.320	2.223	2.046	1.909	1.689	1.359	1.064
190	-	3.737	2.948	2.813	2.644	2.370	2.274	2.102	1.969	1.725	1.389	1.084
195	-	3.798	2.998	2.865	2.696	2.420	2.326	2.159	2.029	1.761	1.418	1.104
200	-	3.860	3.049	2.917	2.747	2.471	2.377	2.215	2.089	1.830	1.447	1.124
205	-	3.922	3.099	2.970	2.799	2.521	2.429	2.272	2.150	1.901	1.476	1.145
210	-	3.984	3.150	3.022	2.851	2.574	2.481	2.328	2.210	1.972	1.506	1.165
215	-	4.046	3.201	3.074	2.902	2.626	2.532	2.385	2.270	2.043	1.535	1.185
220	-	4.108	3.251	3.127	2.954	2.678	2.584	2.441	2.331	2.113	1.564	1.204
225	-	4.170	3.302	3.179	3.006	2.730	2.636	2.498	2.391	2.184	1.594	1.223
230	-	4.232	3.352	3.231	3.058	2.783	2.688	2.551	2.451	2.255	1.623	1.241
235	-	4.294	3.403	3.283	3.109	2.835	2.740	2.602	2.511	2.325	1.652	1.260
240	-	-	3.453	3.336	3.161	2.887	2.793	2.654	2.563	2.396	1.682	1.278
245	-	-	3.504	3.388	3.213	2.940	2.845	2.705	2.614	2.467	1.711	1.297
250	-	-	3.555	3.440	3.265	2.992	2.897	2.756	2.664	2.531	1.740	1.315
255	-	-	3.605	3.493	3.316	3.044	2.949	2.808	2.715	2.580	1.774	1.334
260	-	-	3.656	3.545	3.368	3.096	3.001	2.859	2.766	2.630	1.820	1.352
265	-	-	3.706	3.597	3.420	3.149	3.053	2.911	2.817	2.680	1.866	1.371
270	-	-	3.757	3.649	3.471	3.201	3.105	2.962	2.868	2.729	1.912	1.390
275	-	-	3.808	3.702	3.523	3.253	3.157	3.013	2.919	2.779	1.957	1.408
280	-	-	3.858	3.754	3.575	3.306	3.209	3.065	2.969	2.829	2.003	1.427
285	-	-	3.909	3.806	3.627	3.358	3.261	3.116	3.020	2.878	2.049	1.445
290	-	-	3.959	3.859	3.678	3.410	3.313	3.168	3.071	2.928	2.095	1.464
295	-	-	4.010	3.911	3.730	3.462	3.365	3.219	3.122	2.978	2.141	1.482
300	-	-	4.061	3.963	3.782	3.515	3.417	3.270	3.173	3.027	2.187	1.501
305	-	-	4.111	4.015	3.834	3.567	3.469	3.322	3.224	3.077	2.233	1.519
310	-	-	4.162	4.068	3.885	3.619	3.521	3.373	3.274	3.127	2.279	1.538
315	-	-	4.212	4.120	3.937	3.672	3.573	3.425	3.325	3.176	2.325	1.556
320	-	-	4.263	4.172	3.989	3.724	3.625	3.476	3.376	3.226	2.371	1.575
325	-	-	-	4.225	4.040	3.776	3.677	3.527	3.427	3.276	2.417	1.593
330	-	-	-	4.277	4.092	3.828	3.729	3.579	3.478	3.325	2.463	1.612
335	-	-	-	-	4.144	3.881	3.782	3.630	3.528	3.375	2.509	1.630
340	-	-	-	-	4.196	3.933	3.834	3.682	3.579	3.425	2.579	1.649
345	-	-	-	-	4.247	3.985	3.886	3.733	3.630	3.474	2.654	1.667
350	-	-	-	-	4.299	4.038	3.938	3.784	3.681	3.524	2.728	1.686
355	-	-	-	-	-	4.090	3.990	3.836	3.732	3.574	2.803	1.704
360	-	-	-	-	-	4.142	4.042	3.887	3.783	3.623	2.878	1.723
365	-	-	-	-	-	4.194	4.094	3.939	3.833	3.673	2.952	1.741
370	-	-	-	-	-	4.247	4.146	3.990	3.884	3.723	3.027	1.760
375	-	-	-	-	-	4.299	4.198	4.041	3.935	3.772	3.102	2.526
380	-	-	-	-	-	-	4.250	4.093	3.986	3.822	3.176	2.599
385	-	-	-	-	-	-	4.302	4.144	4.037	3.872	3.251	2.672
390	-	-	-	-	-	-	-	4.196	4.087	3.921	3.325	2.744
395	-	-	-	-	-	-	-	4.247	4.138	3.971	3.400	2.817
400	-	-	-	-	-	-	-	4.298	4.189	4.020	3.475	2.890
405	-	-	-	-	-	-	-	-	4.240	4.070	3.549	2.963
410	-	-	-	-	-	-	-	-	4.291	4.120	3.624	3.036
415	-	-	-	-	-	-	-	-	-	4.169	3.699	3.109
420	-	-	-	-	-	-	-	-	-	4.219	3.773	3.181
425	-	-	-	-	-	-	-	-	-	4.269	3.848	3.254
430	-	-	-	-	-	-	-	-	-	-	3.922	3.327
435	-	-	-	-	-	-	-	-	-	-	3.997	3.400
440	-	-	-	-	-	-	-	-	-	-	4.072	3.473
445	-	-	-	-	-	-	-	-	-	-	4.146	3.546
450	-	-	-	-	-	-	-	-	-	-	4.221	3.619

Thickness is intumescent only.

Results apply to I/H-section beams with concrete slabs with 3 sided fire exposure.

Table 9: I/H-Beam Sections 120 Minutes												
Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of											
	350°C	400°C	450°C	470°C	500°C	550°C	570°C	600°C	620°C	650°C	700°C	750°C
50	3.156	1.532	1.269	1.168	1.047	0.864	0.797	0.697	0.652	0.594	0.515	0.443
55	3.382	1.674	1.389	1.278	1.150	0.951	0.879	0.771	0.713	0.645	0.558	0.480
60	3.607	1.848	1.510	1.389	1.253	1.038	0.961	0.844	0.827	0.697	0.601	0.516
65	3.833	2.078	1.631	1.499	1.355	1.125	1.042	0.940	0.940	0.707	0.644	0.552
70	4.059	2.308	1.752	1.609	1.458	1.212	1.124	1.054	1.054	0.956	0.688	0.588
75	4.285	2.538	1.944	1.719	1.560	1.299	1.206	1.167	1.167	1.030	0.760	0.625
80	-	2.768	2.143	1.847	1.663	1.386	1.288	1.237	1.237	1.104	0.855	0.661
85	-	2.998	2.341	1.988	1.765	1.473	1.370	1.289	1.289	1.178	0.924	0.697
90	-	3.229	2.527	2.128	1.843	1.560	1.452	1.342	1.342	1.235	0.981	0.750
95	-	3.459	2.622	2.268	1.921	1.647	1.534	1.394	1.394	1.286	1.038	0.808
100	-	3.689	2.717	2.408	1.999	1.734	1.616	1.447	1.447	1.336	1.095	0.867
105	-	3.919	2.812	2.533	2.077	1.801	1.698	1.508	1.499	1.386	1.152	0.913
110	-	4.149	2.906	2.609	2.156	1.858	1.774	1.582	1.552	1.437	1.207	0.954
115	-	-	3.001	2.686	2.234	1.915	1.830	1.655	1.605	1.487	1.253	0.995
120	-	-	3.096	2.762	2.312	1.972	1.886	1.729	1.657	1.537	1.298	1.036
125	-	-	3.191	2.839	2.390	2.029	1.941	1.793	1.710	1.587	1.344	1.076
130	-	-	3.286	2.915	2.469	2.086	1.997	1.848	1.762	1.638	1.389	1.117
135	-	-	3.381	2.991	2.536	2.142	2.053	1.904	1.817	1.688	1.435	1.158
140	-	-	3.476	3.068	2.587	2.199	2.109	1.960	1.871	1.738	1.481	1.199
145	-	-	3.571	3.144	2.638	2.256	2.164	2.015	1.926	1.790	1.526	1.236
150	-	-	3.666	3.220	2.689	2.313	2.220	2.071	1.980	1.844	1.572	1.273
155	-	-	3.761	3.297	2.741	2.370	2.276	2.126	2.035	1.898	1.618	1.310
160	-	-	3.856	3.373	2.792	2.427	2.332	2.182	2.089	1.952	1.663	1.347
165	-	-	3.951	3.449	2.843	2.484	2.388	2.238	2.144	2.005	1.709	1.383
170	-	-	4.045	3.526	2.894	2.541	2.443	2.293	2.198	2.059	1.754	1.420
175	-	-	4.140	3.602	2.945	2.597	2.499	2.349	2.253	2.113	1.813	1.457
180	-	-	4.235	3.679	2.996	2.652	2.555	2.404	2.307	2.166	1.874	1.494
185	-	-	-	3.755	3.048	2.708	2.611	2.460	2.362	2.220	1.936	1.531
190	-	-	-	3.831	3.099	2.764	2.667	2.516	2.416	2.274	1.997	1.568
195	-	-	-	3.908	3.150	2.820	2.723	2.572	2.471	2.327	2.058	1.605
200	-	-	-	3.984	3.201	2.876	2.779	2.628	2.525	2.381	2.119	1.642
205	-	-	-	4.060	3.252	2.932	2.835	2.685	2.582	2.435	2.181	1.679
210	-	-	-	4.137	3.304	2.988	2.892	2.741	2.638	2.489	2.242	1.716
215	-	-	-	4.213	3.355	3.043	2.948	2.798	2.695	2.544	2.303	1.753
220	-	-	-	4.290	3.406	3.099	3.004	2.854	2.752	2.600	2.365	1.807
225	-	-	-	-	3.457	3.155	3.060	2.910	2.808	2.656	2.426	1.869
230	-	-	-	-	3.508	3.211	3.116	2.967	2.865	2.713	2.487	1.951
235	-	-	-	-	3.559	3.267	3.172	3.023	2.921	2.769	2.544	2.010
240	-	-	-	-	3.611	3.323	3.228	3.079	2.978	2.825	2.598	2.069
245	-	-	-	-	3.662	3.378	3.284	3.136	3.034	2.882	2.652	2.128
250	-	-	-	-	3.713	3.434	3.340	3.192	3.091	2.938	2.706	2.187
255	-	-	-	-	3.764	3.490	3.396	3.249	3.147	2.994	2.760	2.246
260	-	-	-	-	3.815	3.546	3.452	3.305	3.204	3.051	2.814	2.305
265	-	-	-	-	3.867	3.602	3.508	3.361	3.260	3.107	2.868	2.364
270	-	-	-	-	3.918	3.658	3.564	3.418	3.317	3.163	2.922	2.423
275	-	-	-	-	3.969	3.713	3.620	3.474	3.373	3.219	2.976	2.482
280	-	-	-	-	4.020	3.769	3.676	3.531	3.430	3.276	3.029	2.541
285	-	-	-	-	4.071	3.825	3.733	3.587	3.486	3.332	3.083	2.600
290	-	-	-	-	4.122	3.881	3.789	3.643	3.543	3.388	3.137	2.659
295	-	-	-	-	4.174	3.937	3.845	3.700	3.599	3.445	3.191	2.718
300	-	-	-	-	4.225	3.993	3.901	3.756	3.656	3.501	3.245	2.777
305	-	-	-	-	4.276	4.049	3.957	3.812	3.712	3.557	3.299	2.836
310	-	-	-	-	-	4.104	4.013	3.869	3.769	3.614	3.353	2.895
315	-	-	-	-	-	4.160	4.069	3.925	3.825	3.670	3.407	2.954
320	-	-	-	-	-	4.216	4.125	3.982	3.882	3.726	3.461	3.013
325	-	-	-	-	-	4.272	4.181	4.038	3.939	3.783	3.515	3.072
330	-	-	-	-	-	-	4.237	4.094	3.995	3.839	3.568	3.131
335	-	-	-	-	-	-	4.293	4.151	4.052	3.895	3.622	3.190
340	-	-	-	-	-	-	-	4.207	4.108	3.952	3.676	3.249
345	-	-	-	-	-	-	-	4.264	4.165	4.008	3.730	3.308
350	-	-	-	-	-	-	-	-	4.221	4.064	3.784	3.367
355	-	-	-	-	-	-	-	-	4.278	4.121	3.838	3.426
360	-	-	-	-	-	-	-	-	-	4.177	3.892	3.484
365	-	-	-	-	-	-	-	-	-	4.233	3.946	3.543
370	-	-	-	-	-	-	-	-	-	4.290	4.000	3.602
375	-	-	-	-	-	-	-	-	-	-	4.054	3.661
380	-	-	-	-	-	-	-	-	-	-	4.107	3.720
385	-	-	-	-	-	-	-	-	-	-	4.161	3.779
390	-	-	-	-	-	-	-	-	-	-	4.215	3.838
395	-	-	-	-	-	-	-	-	-	-	4.269	3.897
400	-	-	-	-	-	-	-	-	-	-	-	3.956
405	-	-	-	-	-	-	-	-	-	-	-	4.015
410	-	-	-	-	-	-	-	-	-	-	-	4.074
415	-	-	-	-	-	-	-	-	-	-	-	4.133
420	-	-	-	-	-	-	-	-	-	-	-	4.192
425	-	-	-	-	-	-	-	-	-	-	-	4.251
430	-	-	-	-	-	-	-	-	-	-	-	-
435	-	-	-	-	-	-	-	-	-	-	-	-
440	-	-	-	-	-	-	-	-	-	-	-	-
445	-	-	-	-	-	-	-	-	-	-	-	-
450	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only.

Results apply to I/H-section beams with concrete slabs with 3 sided fire exposure.

Table 10: I/H-Beam Sections 150 Minutes												
Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of											
	350°C	400°C	450°C	470°C	500°C	550°C	570°C	600°C	620°C	650°C	700°C	750°C
50	-	-	1.599	1.456	1.456	1.240	1.163	1.045	0.978	0.881	0.720	0.625
55	-	-	2.203	1.634	1.599	1.364	1.282	1.153	1.085	0.985	0.817	0.680
60	-	-	2.807	2.207	1.743	1.489	1.400	1.261	1.191	1.089	0.915	0.759
65	-	-	3.410	2.701	1.762	1.614	1.518	1.370	1.297	1.193	1.013	0.861
70	-	-	4.014	3.194	2.731	1.738	1.637	1.478	1.403	1.297	1.111	0.964
75	-	-	-	3.688	2.951	1.980	1.755	1.586	1.509	1.401	1.209	1.067
80	-	-	-	4.182	3.172	2.250	1.945	1.695	1.615	1.505	1.307	1.169
85	-	-	-	-	3.392	2.518	2.138	1.810	1.722	1.609	1.405	1.254
90	-	-	-	-	3.612	2.681	2.332	1.935	1.818	1.713	1.503	1.330
95	-	-	-	-	3.833	2.844	2.523	2.060	1.908	1.793	1.601	1.407
100	-	-	-	-	4.053	3.007	2.669	2.185	1.998	1.852	1.699	1.484
105	-	-	-	-	4.273	3.170	2.814	2.310	2.088	1.911	1.781	1.561
110	-	-	-	-	-	3.333	2.960	2.436	2.178	1.969	1.834	1.638
115	-	-	-	-	-	3.496	3.106	2.560	2.268	2.028	1.888	1.714
120	-	-	-	-	-	3.659	3.251	2.682	2.358	2.087	1.941	1.781
125	-	-	-	-	-	3.822	3.397	2.804	2.449	2.146	1.995	1.830
130	-	-	-	-	-	3.985	3.543	2.925	2.544	2.205	2.048	1.880
135	-	-	-	-	-	4.148	3.688	3.047	2.652	2.264	2.102	1.930
140	-	-	-	-	-	-	3.834	3.169	2.761	2.322	2.155	1.979
145	-	-	-	-	-	-	3.980	3.291	2.870	2.381	2.208	2.029
150	-	-	-	-	-	-	4.125	3.413	2.979	2.440	2.262	2.078
155	-	-	-	-	-	-	4.271	3.535	3.088	2.499	2.315	2.128
160	-	-	-	-	-	-	-	3.657	3.197	2.579	2.369	2.178
165	-	-	-	-	-	-	-	3.779	3.306	2.668	2.422	2.227
170	-	-	-	-	-	-	-	3.900	3.415	2.757	2.475	2.277
175	-	-	-	-	-	-	-	4.022	3.524	2.846	2.532	2.326
180	-	-	-	-	-	-	-	4.144	3.633	2.935	2.596	2.376
185	-	-	-	-	-	-	-	4.266	3.742	3.024	2.660	2.425
190	-	-	-	-	-	-	-	-	3.851	3.113	2.725	2.475
195	-	-	-	-	-	-	-	-	3.960	3.202	2.789	2.527
200	-	-	-	-	-	-	-	-	4.069	3.291	2.853	2.591
205	-	-	-	-	-	-	-	-	4.178	3.380	2.918	2.654
210	-	-	-	-	-	-	-	-	4.287	3.469	2.982	2.717
215	-	-	-	-	-	-	-	-	-	3.558	3.046	2.780
220	-	-	-	-	-	-	-	-	-	3.647	3.111	2.844
225	-	-	-	-	-	-	-	-	-	3.735	3.175	2.907
230	-	-	-	-	-	-	-	-	-	3.824	3.239	2.970
235	-	-	-	-	-	-	-	-	-	3.913	3.304	3.034
240	-	-	-	-	-	-	-	-	-	4.002	3.368	3.097
245	-	-	-	-	-	-	-	-	-	4.091	3.432	3.160
250	-	-	-	-	-	-	-	-	-	4.180	3.497	3.223
255	-	-	-	-	-	-	-	-	-	4.269	3.561	3.287
260	-	-	-	-	-	-	-	-	-	-	3.625	3.350
265	-	-	-	-	-	-	-	-	-	-	3.690	3.413
270	-	-	-	-	-	-	-	-	-	-	3.754	3.477
275	-	-	-	-	-	-	-	-	-	-	3.818	3.540
280	-	-	-	-	-	-	-	-	-	-	3.883	3.603
285	-	-	-	-	-	-	-	-	-	-	3.947	3.667
290	-	-	-	-	-	-	-	-	-	-	4.011	3.730
295	-	-	-	-	-	-	-	-	-	-	4.075	3.793
300	-	-	-	-	-	-	-	-	-	-	4.140	3.856
305	-	-	-	-	-	-	-	-	-	-	4.204	3.920
310	-	-	-	-	-	-	-	-	-	-	4.268	3.983
315	-	-	-	-	-	-	-	-	-	-	-	4.046
320	-	-	-	-	-	-	-	-	-	-	-	4.110
325	-	-	-	-	-	-	-	-	-	-	-	4.173
330	-	-	-	-	-	-	-	-	-	-	-	4.236
335	-	-	-	-	-	-	-	-	-	-	-	4.299
340	-	-	-	-	-	-	-	-	-	-	-	-
345	-	-	-	-	-	-	-	-	-	-	-	-
350	-	-	-	-	-	-	-	-	-	-	-	-
355	-	-	-	-	-	-	-	-	-	-	-	-
360	-	-	-	-	-	-	-	-	-	-	-	-
365	-	-	-	-	-	-	-	-	-	-	-	-
370	-	-	-	-	-	-	-	-	-	-	-	-
375	-	-	-	-	-	-	-	-	-	-	-	-
380	-	-	-	-	-	-	-	-	-	-	-	-
385	-	-	-	-	-	-	-	-	-	-	-	-
390	-	-	-	-	-	-	-	-	-	-	-	-
395	-	-	-	-	-	-	-	-	-	-	-	-
400	-	-	-	-	-	-	-	-	-	-	-	-
405	-	-	-	-	-	-	-	-	-	-	-	-
410	-	-	-	-	-	-	-	-	-	-	-	-
415	-	-	-	-	-	-	-	-	-	-	-	-
420	-	-	-	-	-	-	-	-	-	-	-	-
425	-	-	-	-	-	-	-	-	-	-	-	-
430	-	-	-	-	-	-	-	-	-	-	-	-
435	-	-	-	-	-	-	-	-	-	-	-	-
440	-	-	-	-	-	-	-	-	-	-	-	-
445	-	-	-	-	-	-	-	-	-	-	-	-
450	-	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only.

Results apply to I/H-section beams with concrete slabs with 3 sided fire exposure.

Table 11: I/H-Column Sections 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	575°C	600°C	650°C	700°C	750°C
30	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
35	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
40	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
45	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
50	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
55	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
60	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
65	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
70	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
75	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
80	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
85	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
90	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
95	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
100	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
105	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
110	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
115	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
120	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
125	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
130	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
135	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
140	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
145	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
150	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
155	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
160	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
165	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
170	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
175	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
180	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
185	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
190	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
195	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
200	0.257	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
205	0.266	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
210	0.276	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
215	0.285	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
220	0.295	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
225	0.304	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
230	0.313	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
235	0.323	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
240	0.332	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
245	0.342	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
250	0.351	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
255	0.361	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
260	0.370	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
265	0.379	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
270	0.389	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
275	0.398	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
280	0.408	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
285	0.417	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
290	0.426	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
295	0.436	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
300	0.445	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
305	0.455	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
310	0.464	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
315	0.474	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
320	0.483	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
325	0.492	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
330	0.502	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
335	0.511	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
340	0.521	0.257	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
345	0.530	0.267	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
350	0.539	0.276	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
355	0.549	0.286	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
360	0.558	0.296	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
365	0.568	0.306	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
370	0.577	0.316	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
375	0.587	0.325	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
380	0.596	0.335	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
385	0.605	0.345	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
390	0.615	0.355	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
395	0.624	0.365	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
400	0.634	0.374	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
405	0.643	0.384	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
410	0.652	0.394	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
415	0.662	0.404	0.252	0.251	0.251	0.251	0.251	0.251	0.251	0.251
420	0.671	0.414	0.260	0.251	0.251	0.251	0.251	0.251	0.251	0.251
425	0.681	0.423	0.268	0.251	0.251	0.251	0.251	0.251	0.251	0.251
430	0.690	0.433	0.276	0.251	0.251	0.251	0.251	0.251	0.251	0.251
435	0.699	0.443	0.284	0.251	0.251	0.251	0.251	0.251	0.251	0.251
440	0.709	0.453	0.292	0.251	0.251	0.251	0.251	0.251	0.251	0.251
445	0.718	0.463	0.300	0.251	0.251	0.251	0.251	0.251	0.251	0.251
450	0.728	0.472	0.308	0.251	0.251	0.251	0.251	0.251	0.251	0.251
455	0.737	0.482	0.316	0.251	0.251	0.251	0.251	0.251	0.251	0.251

Thickness is intumescent only. Results also apply to I/H-section beams exposed on all four sides up to the maximum dry film thickness of 4.306mm.

Table 12: I/H-Column Sections 20 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	575°C	600°C	650°C	700°C	750°C
30	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
35	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
40	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
45	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
50	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
55	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
60	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
65	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
70	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
75	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
80	0.260	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
85	0.269	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
90	0.278	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
95	0.287	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
100	0.297	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
105	0.307	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
110	0.316	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
115	0.326	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
120	0.336	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
125	0.346	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
130	0.355	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
135	0.365	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
140	0.375	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
145	0.384	0.256	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
150	0.394	0.265	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
155	0.404	0.274	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
160	0.414	0.283	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
165	0.423	0.292	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
170	0.433	0.301	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
175	0.443	0.309	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
180	0.452	0.318	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
185	0.462	0.327	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
190	0.472	0.336	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
195	0.481	0.345	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
200	0.491	0.354	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
205	0.501	0.363	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
210	0.511	0.372	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
215	0.520	0.381	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
220	0.530	0.390	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
225	0.540	0.399	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
230	0.549	0.408	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
235	0.559	0.416	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
240	0.569	0.425	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
245	0.579	0.434	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
250	0.588	0.443	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
255	0.598	0.452	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
260	0.608	0.461	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
265	0.617	0.470	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
270	0.627	0.479	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
275	0.637	0.488	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
280	0.647	0.497	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
285	0.656	0.506	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
290	0.666	0.515	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
295	0.676	0.524	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
300	0.685	0.532	0.254	0.251	0.251	0.251	0.251	0.251	0.251	0.251
305	0.695	0.541	0.265	0.251	0.251	0.251	0.251	0.251	0.251	0.251
310	0.705	0.550	0.276	0.251	0.251	0.251	0.251	0.251	0.251	0.251
315	0.715	0.559	0.287	0.251	0.251	0.251	0.251	0.251	0.251	0.251
320	0.724	0.568	0.298	0.251	0.251	0.251	0.251	0.251	0.251	0.251
325	0.734	0.577	0.309	0.251	0.251	0.251	0.251	0.251	0.251	0.251
330	0.744	0.586	0.320	0.251	0.251	0.251	0.251	0.251	0.251	0.251
335	0.753	0.595	0.331	0.251	0.251	0.251	0.251	0.251	0.251	0.251
340	0.763	0.604	0.342	0.251	0.251	0.251	0.251	0.251	0.251	0.251
345	0.773	0.613	0.353	0.251	0.251	0.251	0.251	0.251	0.251	0.251
350	0.782	0.622	0.364	0.251	0.251	0.251	0.251	0.251	0.251	0.251
355	0.792	0.631	0.376	0.251	0.251	0.251	0.251	0.251	0.251	0.251
360	0.802	0.640	0.387	0.255	0.251	0.251	0.251	0.251	0.251	0.251
365	0.853	0.648	0.398	0.264	0.251	0.251	0.251	0.251	0.251	0.251
370	0.915	0.657	0.409	0.273	0.251	0.251	0.251	0.251	0.251	0.251
375	0.978	0.666	0.420	0.282	0.251	0.251	0.251	0.251	0.251	0.251
380	1.040	0.675	0.431	0.291	0.251	0.251	0.251	0.251	0.251	0.251
385	1.103	0.684	0.442	0.300	0.251	0.251	0.251	0.251	0.251	0.251
390	1.165	0.693	0.453	0.310	0.251	0.251	0.251	0.251	0.251	0.251
395	1.228	0.702	0.464	0.319	0.251	0.251	0.251	0.251	0.251	0.251
400	1.290	0.711	0.475	0.328	0.251	0.251	0.251	0.251	0.251	0.251
405	1.353	0.720	0.487	0.337	0.251	0.251	0.251	0.251	0.251	0.251
410	1.374	0.729	0.498	0.346	0.251	0.251	0.251	0.251	0.251	0.251
415	1.384	0.738	0.509	0.355	0.251	0.251	0.251	0.251	0.251	0.251
420	1.394	0.747	0.520	0.365	0.251	0.251	0.251	0.251	0.251	0.251
425	1.404	0.755	0.531	0.374	0.251	0.251	0.251	0.251	0.251	0.251
430	1.414	0.764	0.542	0.383	0.252	0.251	0.251	0.251	0.251	0.251
435	1.423	0.773	0.553	0.392	0.260	0.251	0.251	0.251	0.251	0.251
440	1.433	0.782	0.564	0.401	0.268	0.251	0.251	0.251	0.251	0.251
445	1.443	0.791	0.575	0.410	0.276	0.251	0.251	0.251	0.251	0.251
450	1.453	0.800	0.586	0.419	0.284	0.251	0.251	0.251	0.251	0.251
455	1.462	0.833	0.598	0.429	0.291	0.251	0.251	0.251	0.251	0.251

Thickness is intumescent only. Results also apply to I/H-section beams exposed on all four sides up to the maximum dry film thickness of 4.306mm.

Table 13: I/H-Column Sections 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	575°C	600°C	650°C	700°C	750°C
30	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
35	0.273	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
40	0.295	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
45	0.317	0.252	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
50	0.339	0.266	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
55	0.361	0.280	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
60	0.383	0.294	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
65	0.405	0.308	0.251	0.251	0.251	0.251	0.251	0.251	0.251	0.251
70	0.427	0.321	0.257	0.251	0.251	0.251	0.251	0.251	0.251	0.251
75	0.449	0.335	0.267	0.251	0.251	0.251	0.251	0.251	0.251	0.251
80	0.471	0.348	0.277	0.251	0.251	0.251	0.251	0.251	0.251	0.251
85	0.492	0.362	0.287	0.251	0.251	0.251	0.251	0.251	0.251	0.251
90	0.514	0.375	0.297	0.251	0.251	0.251	0.251	0.251	0.251	0.251
95	0.536	0.388	0.306	0.251	0.251	0.251	0.251	0.251	0.251	0.251
100	0.558	0.402	0.316	0.251	0.251	0.251	0.251	0.251	0.251	0.251
105	0.579	0.415	0.326	0.254	0.251	0.251	0.251	0.251	0.251	0.251
110	0.601	0.429	0.336	0.263	0.251	0.251	0.251	0.251	0.251	0.251
115	0.623	0.442	0.345	0.272	0.251	0.251	0.251	0.251	0.251	0.251
120	0.645	0.456	0.355	0.281	0.251	0.251	0.251	0.251	0.251	0.251
125	0.666	0.469	0.365	0.290	0.251	0.251	0.251	0.251	0.251	0.251
130	0.688	0.483	0.374	0.298	0.251	0.251	0.251	0.251	0.251	0.251
135	0.710	0.496	0.384	0.307	0.251	0.251	0.251	0.251	0.251	0.251
140	0.732	0.509	0.394	0.316	0.251	0.251	0.251	0.251	0.251	0.251
145	0.754	0.523	0.403	0.325	0.251	0.251	0.251	0.251	0.251	0.251
150	0.775	0.536	0.413	0.334	0.251	0.251	0.251	0.251	0.251	0.251
155	0.797	0.550	0.423	0.343	0.251	0.251	0.251	0.251	0.251	0.251
160	0.830	0.563	0.432	0.351	0.251	0.251	0.251	0.251	0.251	0.251
165	0.868	0.577	0.442	0.360	0.251	0.251	0.251	0.251	0.251	0.251
170	0.907	0.590	0.452	0.369	0.251	0.251	0.251	0.251	0.251	0.251
175	0.945	0.604	0.461	0.378	0.251	0.251	0.251	0.251	0.251	0.251
180	0.983	0.617	0.471	0.387	0.251	0.251	0.251	0.251	0.251	0.251
185	1.021	0.630	0.481	0.396	0.251	0.251	0.251	0.251	0.251	0.251
190	1.060	0.644	0.490	0.404	0.258	0.251	0.251	0.251	0.251	0.251
195	1.098	0.657	0.500	0.413	0.267	0.251	0.251	0.251	0.251	0.251
200	1.136	0.671	0.510	0.422	0.276	0.251	0.251	0.251	0.251	0.251
205	1.174	0.684	0.519	0.431	0.285	0.251	0.251	0.251	0.251	0.251
210	1.213	0.698	0.529	0.440	0.295	0.251	0.251	0.251	0.251	0.251
215	1.251	0.711	0.539	0.449	0.304	0.251	0.251	0.251	0.251	0.251
220	1.289	0.725	0.549	0.457	0.313	0.251	0.251	0.251	0.251	0.251
225	1.327	0.738	0.558	0.466	0.322	0.251	0.251	0.251	0.251	0.251
230	1.366	0.751	0.568	0.475	0.331	0.251	0.251	0.251	0.251	0.251
235	1.379	0.765	0.578	0.484	0.340	0.251	0.251	0.251	0.251	0.251
240	1.392	0.778	0.587	0.493	0.349	0.251	0.251	0.251	0.251	0.251
245	1.405	0.792	0.597	0.502	0.358	0.251	0.251	0.251	0.251	0.251
250	1.417	0.807	0.607	0.510	0.367	0.251	0.251	0.251	0.251	0.251
255	1.430	0.843	0.616	0.519	0.376	0.251	0.251	0.251	0.251	0.251
260	1.443	0.878	0.626	0.528	0.385	0.251	0.251	0.251	0.251	0.251
265	1.456	0.913	0.636	0.537	0.395	0.251	0.251	0.251	0.251	0.251
270	1.468	0.949	0.645	0.546	0.404	0.251	0.251	0.251	0.251	0.251
275	1.481	0.984	0.655	0.555	0.413	0.251	0.251	0.251	0.251	0.251
280	1.494	1.020	0.665	0.564	0.422	0.251	0.251	0.251	0.251	0.251
285	1.507	1.055	0.674	0.572	0.431	0.252	0.251	0.251	0.251	0.251
290	1.519	1.090	0.684	0.581	0.440	0.263	0.251	0.251	0.251	0.251
295	1.532	1.126	0.694	0.590	0.449	0.274	0.251	0.251	0.251	0.251
300	1.545	1.161	0.703	0.599	0.458	0.285	0.251	0.251	0.251	0.251
305	1.558	1.197	0.713	0.608	0.467	0.297	0.251	0.251	0.251	0.251
310	1.570	1.232	0.723	0.617	0.476	0.308	0.253	0.251	0.251	0.251
315	1.583	1.267	0.732	0.625	0.486	0.319	0.263	0.251	0.251	0.251
320	1.596	1.303	0.742	0.634	0.495	0.330	0.273	0.251	0.251	0.251
325	1.608	1.338	0.752	0.643	0.504	0.341	0.283	0.251	0.251	0.251
330	1.621	1.370	0.761	0.652	0.513	0.352	0.293	0.251	0.251	0.251
335	1.634	1.383	0.771	0.661	0.522	0.363	0.303	0.251	0.251	0.251
340	1.647	1.397	0.781	0.670	0.531	0.374	0.314	0.251	0.251	0.251
345	1.659	1.410	0.791	0.678	0.540	0.385	0.324	0.251	0.251	0.251
350	1.672	1.424	0.800	0.687	0.549	0.396	0.334	0.251	0.251	0.251
355	1.685	1.437	0.847	0.696	0.558	0.407	0.344	0.251	0.251	0.251
360	1.698	1.451	0.917	0.705	0.567	0.418	0.354	0.251	0.251	0.251
365	1.710	1.464	0.987	0.714	0.576	0.429	0.364	0.251	0.251	0.251
370	1.723	1.478	1.057	0.723	0.586	0.441	0.374	0.255	0.251	0.251
375	1.736	1.492	1.127	0.731	0.595	0.452	0.384	0.263	0.251	0.251
380	1.749	1.505	1.197	0.740	0.604	0.463	0.395	0.271	0.251	0.251
385	1.761	1.519	1.267	0.749	0.613	0.474	0.405	0.279	0.251	0.251
390	1.774	1.532	1.337	0.758	0.622	0.485	0.415	0.287	0.251	0.251
395	1.787	1.546	1.374	0.767	0.631	0.496	0.425	0.295	0.251	0.251
400	1.799	1.559	1.386	0.776	0.640	0.507	0.435	0.304	0.251	0.251
405	1.812	1.573	1.398	0.784	0.649	0.518	0.445	0.312	0.251	0.251
410	1.825	1.587	1.410	0.793	0.658	0.529	0.455	0.320	0.251	0.251
415	1.838	1.600	1.422	0.802	0.667	0.540	0.466	0.328	0.251	0.251
420	1.850	1.614	1.434	0.854	0.676	0.551	0.476	0.337	0.251	0.251
425	1.863	1.627	1.446	0.917	0.686	0.562	0.486	0.345	0.251	0.251
430	1.876	1.641	1.458	0.980	0.695	0.573	0.496	0.353	0.251	0.251
435	1.889	1.654	1.470	1.043	0.704	0.584	0.506	0.361	0.251	0.251
440	1.901	1.668	1.482	1.106	0.713	0.596	0.516	0.370	0.251	0.251
445	1.914	1.681	1.494	1.169	0.722	0.607	0.526	0.378	0.251	0.251
450	1.927	1.695	1.506	1.232	0.731	0.618	0.536	0.386	0.251	0.251
455	1.940	1.709	1.519	1.295	0.740	0.629	0.547	0.394	0.251	0.251

Thickness is intumescent only. Results also apply to I/H-section beams exposed on all four sides up to the maximum dry film thickness of 4.306mm.

Table 14: I/H-Column Sections 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	575°C	600°C	650°C	700°C	750°C
30	0.391	0.330	0.282	0.251	0.251	0.251	0.251	0.251	0.251	0.251
35	0.434	0.361	0.304	0.259	0.251	0.251	0.251	0.251	0.251	0.251
40	0.476	0.392	0.327	0.275	0.251	0.251	0.251	0.251	0.251	0.251
45	0.519	0.423	0.350	0.292	0.251	0.251	0.251	0.251	0.251	0.251
50	0.562	0.454	0.373	0.308	0.256	0.251	0.251	0.251	0.251	0.251
55	0.604	0.485	0.396	0.325	0.267	0.251	0.251	0.251	0.251	0.251
60	0.647	0.516	0.419	0.342	0.279	0.251	0.251	0.251	0.251	0.251
65	0.690	0.547	0.441	0.358	0.290	0.256	0.251	0.251	0.251	0.251
70	0.732	0.578	0.464	0.375	0.302	0.276	0.256	0.251	0.251	0.251
75	0.775	0.609	0.487	0.391	0.313	0.286	0.265	0.251	0.251	0.251
80	0.822	0.640	0.510	0.408	0.325	0.296	0.275	0.251	0.251	0.251
85	0.877	0.671	0.533	0.424	0.336	0.306	0.284	0.251	0.251	0.251
90	0.932	0.702	0.556	0.441	0.348	0.316	0.294	0.251	0.251	0.251
95	0.987	0.733	0.578	0.457	0.359	0.326	0.303	0.251	0.251	0.251
100	1.043	0.764	0.601	0.474	0.371	0.336	0.313	0.253	0.251	0.251
105	1.098	0.795	0.624	0.491	0.382	0.346	0.322	0.262	0.251	0.251
110	1.153	0.826	0.647	0.507	0.394	0.356	0.332	0.270	0.251	0.251
115	1.208	0.859	0.670	0.524	0.405	0.366	0.341	0.279	0.251	0.251
120	1.264	0.891	0.693	0.540	0.417	0.376	0.351	0.288	0.251	0.251
125	1.319	0.923	0.716	0.557	0.428	0.386	0.360	0.296	0.251	0.251
130	1.372	0.956	0.738	0.573	0.440	0.396	0.370	0.305	0.251	0.251
135	1.407	0.988	0.761	0.590	0.451	0.406	0.379	0.314	0.251	0.251
140	1.443	1.020	0.784	0.607	0.463	0.416	0.389	0.323	0.251	0.251
145	1.478	1.052	0.808	0.623	0.474	0.426	0.398	0.331	0.251	0.251
150	1.514	1.085	0.844	0.640	0.486	0.436	0.408	0.340	0.251	0.251
155	1.549	1.117	0.880	0.656	0.497	0.446	0.417	0.349	0.251	0.251
160	1.585	1.149	0.915	0.673	0.509	0.456	0.427	0.357	0.251	0.251
165	1.620	1.182	0.951	0.689	0.520	0.466	0.436	0.366	0.251	0.251
170	1.656	1.214	0.986	0.706	0.532	0.476	0.446	0.375	0.258	0.251
175	1.692	1.246	1.022	0.722	0.543	0.486	0.455	0.383	0.267	0.251
180	1.727	1.279	1.057	0.739	0.555	0.496	0.465	0.392	0.275	0.251
185	1.763	1.311	1.093	0.756	0.566	0.506	0.474	0.401	0.283	0.251
190	1.798	1.343	1.128	0.772	0.578	0.516	0.484	0.410	0.292	0.251
195	1.834	1.373	1.164	0.789	0.589	0.526	0.493	0.418	0.300	0.251
200	1.869	1.395	1.200	0.807	0.601	0.536	0.502	0.427	0.308	0.251
205	1.905	1.418	1.235	0.843	0.612	0.546	0.512	0.436	0.317	0.251
210	1.940	1.440	1.271	0.879	0.624	0.556	0.521	0.444	0.325	0.251
215	1.976	1.463	1.306	0.915	0.635	0.566	0.531	0.453	0.333	0.251
220	2.012	1.485	1.342	0.950	0.647	0.576	0.540	0.462	0.341	0.251
225	2.050	1.508	1.372	0.986	0.658	0.586	0.550	0.470	0.350	0.251
230	2.087	1.530	1.387	1.022	0.670	0.596	0.559	0.479	0.358	0.251
235	2.125	1.553	1.403	1.058	0.681	0.606	0.569	0.488	0.366	0.251
240	2.162	1.575	1.418	1.094	0.693	0.616	0.578	0.497	0.375	0.251
245	2.200	1.598	1.434	1.130	0.704	0.626	0.588	0.505	0.383	0.251
250	2.237	1.620	1.449	1.166	0.716	0.636	0.597	0.514	0.391	0.251
255	2.275	1.643	1.465	1.202	0.727	0.646	0.607	0.523	0.399	0.251
260	2.312	1.665	1.481	1.238	0.738	0.656	0.616	0.531	0.408	0.251
265	2.350	1.688	1.496	1.274	0.750	0.666	0.626	0.540	0.416	0.251
270	2.387	1.710	1.512	1.309	0.761	0.676	0.635	0.549	0.424	0.251
275	2.425	1.733	1.527	1.345	0.773	0.686	0.645	0.557	0.433	0.251
280	2.462	1.755	1.543	1.373	0.784	0.696	0.654	0.566	0.441	0.251
285	2.500	1.778	1.559	1.388	0.796	0.706	0.664	0.575	0.449	0.251
290	2.537	1.800	1.574	1.403	0.820	0.716	0.673	0.584	0.457	0.251
295	2.575	1.822	1.590	1.418	0.874	0.726	0.683	0.592	0.466	0.251
300	2.612	1.845	1.605	1.433	0.928	0.736	0.692	0.601	0.474	0.251
305	2.649	1.867	1.621	1.448	0.983	0.746	0.702	0.610	0.482	0.251
310	2.687	1.890	1.637	1.463	1.037	0.756	0.711	0.618	0.491	0.252
315	2.724	1.912	1.652	1.478	1.091	0.766	0.721	0.627	0.499	0.261
320	2.762	1.935	1.668	1.493	1.145	0.776	0.730	0.636	0.507	0.269
325	2.799	1.957	1.683	1.508	1.199	0.786	0.740	0.645	0.515	0.278
330	2.837	1.980	1.699	1.523	1.253	0.796	0.749	0.653	0.524	0.287
335	2.874	2.008	1.715	1.538	1.307	0.822	0.758	0.662	0.532	0.295
340	2.912	2.055	1.730	1.553	1.361	0.917	0.768	0.671	0.540	0.304
345	2.949	2.102	1.746	1.568	1.380	1.011	0.777	0.679	0.549	0.312
350	2.987	2.149	1.761	1.583	1.394	1.106	0.787	0.688	0.557	0.321
355	3.024	2.196	1.777	1.598	1.409	1.201	0.796	0.697	0.565	0.330
360	3.062	2.244	1.793	1.613	1.423	1.296	0.822	0.705	0.573	0.338
365	3.099	2.291	1.808	1.628	1.437	1.370	0.914	0.714	0.582	0.347
370	3.137	2.338	1.824	1.643	1.452	1.384	1.005	0.723	0.590	0.356
375	3.174	2.385	1.839	1.658	1.466	1.397	1.097	0.732	0.598	0.364
380	3.212	2.432	1.855	1.673	1.481	1.410	1.189	0.740	0.607	0.373
385	3.249	2.479	1.870	1.688	1.495	1.424	1.280	0.749	0.615	0.382
390	3.287	2.526	1.886	1.703	1.509	1.437	1.368	0.758	0.623	0.390
395	3.324	2.573	1.902	1.718	1.524	1.450	1.380	0.766	0.631	0.399
400	3.361	2.620	1.917	1.733	1.538	1.463	1.392	0.775	0.640	0.408
405	3.399	2.667	1.933	1.748	1.553	1.477	1.404	0.784	0.648	0.416
410	3.436	2.714	1.948	1.763	1.567	1.490	1.417	0.792	0.656	0.425
415	3.474	2.762	1.964	1.778	1.581	1.503	1.429	0.801	0.665	0.434
420	3.511	2.809	1.980	1.793	1.596	1.517	1.441	0.861	0.673	0.442
425	3.549	2.856	1.995	1.808	1.610	1.530	1.453	0.945	0.681	0.451
430	3.586	2.903	2.048	1.823	1.625	1.543	1.466	1.029	0.689	0.460
435	3.635	2.950	2.105	1.838	1.639	1.557	1.478	1.113	0.698	0.468
440	3.709	2.997	2.162	1.853	1.653	1.570	1.490	1.197	0.706	0.477
445	3.782	3.044	2.220	1.868	1.668	1.583	1.502	1.281	0.714	0.486
450	3.856	3.091	2.277	1.883	1.682	1.596	1.514	1.365	0.723	0.494
455	3.930	3.138	2.334	1.898	1.697	1.610	1.527	1.376	0.731	0.503

Thickness is intumescent only. Results also apply to I/H-section beams exposed on all four sides up to the maximum dry film thickness of 4.306mm.

Table 15: I/H-Column Sections 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	575°C	600°C	650°C	700°C	750°C
30	0.442	0.442	0.379	0.329	0.289	0.269	0.251	0.251	0.251	0.251
35	0.490	0.490	0.416	0.358	0.312	0.289	0.266	0.251	0.251	0.251
40	0.538	0.538	0.454	0.388	0.335	0.309	0.283	0.251	0.251	0.251
45	0.649	0.586	0.492	0.417	0.358	0.330	0.301	0.256	0.251	0.251
50	0.769	0.634	0.529	0.447	0.381	0.350	0.318	0.269	0.251	0.251
55	0.889	0.682	0.567	0.476	0.405	0.371	0.336	0.282	0.251	0.251
60	1.009	0.730	0.604	0.506	0.428	0.391	0.353	0.295	0.251	0.251
65	1.129	0.778	0.642	0.535	0.451	0.412	0.371	0.308	0.257	0.251
70	1.249	0.840	0.680	0.565	0.474	0.432	0.388	0.321	0.267	0.251
75	1.368	0.921	0.717	0.594	0.497	0.452	0.405	0.334	0.277	0.251
80	1.440	1.002	0.755	0.624	0.520	0.473	0.423	0.347	0.287	0.251
85	1.512	1.083	0.793	0.653	0.544	0.493	0.440	0.360	0.297	0.251
90	1.584	1.164	0.836	0.683	0.567	0.514	0.458	0.373	0.306	0.251
95	1.656	1.245	0.882	0.712	0.590	0.534	0.475	0.386	0.316	0.251
100	1.728	1.326	0.928	0.742	0.613	0.554	0.493	0.399	0.326	0.259
105	1.800	1.388	0.974	0.771	0.636	0.575	0.510	0.412	0.336	0.268
110	1.871	1.430	1.020	0.801	0.660	0.595	0.527	0.425	0.345	0.276
115	1.943	1.471	1.066	0.833	0.683	0.616	0.545	0.438	0.355	0.285
120	2.010	1.513	1.112	0.865	0.706	0.636	0.562	0.451	0.365	0.294
125	2.059	1.555	1.158	0.898	0.729	0.656	0.580	0.464	0.375	0.302
130	2.109	1.597	1.204	0.930	0.752	0.677	0.597	0.477	0.385	0.311
135	2.159	1.639	1.250	0.962	0.776	0.697	0.614	0.490	0.394	0.320
140	2.208	1.681	1.296	0.995	0.799	0.718	0.632	0.503	0.404	0.329
145	2.258	1.723	1.342	1.027	0.832	0.738	0.649	0.516	0.414	0.337
150	2.308	1.764	1.385	1.060	0.867	0.759	0.667	0.529	0.424	0.346
155	2.358	1.806	1.424	1.092	0.903	0.779	0.684	0.542	0.433	0.355
160	2.407	1.848	1.463	1.125	0.939	0.799	0.702	0.554	0.443	0.363
165	2.457	1.890	1.502	1.157	0.975	0.836	0.719	0.567	0.453	0.372
170	2.505	1.932	1.541	1.189	1.010	0.878	0.736	0.580	0.463	0.381
175	2.541	1.974	1.580	1.222	1.046	0.919	0.754	0.593	0.472	0.389
180	2.577	2.015	1.620	1.254	1.082	0.960	0.771	0.606	0.482	0.398
185	2.613	2.056	1.659	1.287	1.117	1.002	0.789	0.619	0.492	0.407
190	2.649	2.097	1.698	1.319	1.153	1.043	0.809	0.632	0.502	0.415
195	2.686	2.137	1.737	1.352	1.189	1.085	0.854	0.645	0.512	0.424
200	2.722	2.178	1.776	1.380	1.225	1.126	0.898	0.658	0.521	0.433
205	2.758	2.219	1.815	1.404	1.260	1.168	0.943	0.671	0.531	0.441
210	2.794	2.260	1.855	1.429	1.296	1.209	0.987	0.684	0.541	0.450
215	2.830	2.300	1.894	1.454	1.332	1.250	1.032	0.697	0.551	0.459
220	2.866	2.341	1.933	1.478	1.367	1.292	1.076	0.710	0.560	0.467
225	2.902	2.382	1.972	1.503	1.384	1.333	1.121	0.723	0.570	0.476
230	2.939	2.423	2.012	1.527	1.402	1.370	1.165	0.736	0.580	0.485
235	2.975	2.463	2.054	1.552	1.419	1.385	1.210	0.749	0.590	0.494
240	3.011	2.504	2.096	1.577	1.436	1.400	1.254	0.762	0.600	0.502
245	3.047	2.545	2.139	1.601	1.453	1.415	1.299	0.775	0.609	0.511
250	3.083	2.586	2.181	1.626	1.470	1.430	1.344	0.788	0.619	0.520
255	3.119	2.627	2.223	1.650	1.487	1.446	1.374	0.801	0.629	0.528
260	3.156	2.667	2.265	1.675	1.504	1.461	1.389	0.838	0.639	0.537
265	3.192	2.708	2.307	1.700	1.521	1.476	1.403	0.883	0.648	0.546
270	3.228	2.749	2.349	1.724	1.539	1.491	1.418	0.927	0.658	0.554
275	3.264	2.790	2.391	1.749	1.556	1.506	1.432	0.971	0.668	0.563
280	3.300	2.830	2.434	1.773	1.573	1.521	1.447	1.015	0.678	0.572
285	3.336	2.871	2.476	1.798	1.590	1.536	1.462	1.059	0.688	0.580
290	3.372	2.912	2.518	1.823	1.607	1.552	1.476	1.104	0.697	0.589
295	3.409	2.953	2.560	1.847	1.624	1.567	1.491	1.148	0.707	0.598
300	3.445	2.993	2.602	1.872	1.641	1.582	1.506	1.192	0.717	0.606
305	3.481	3.034	2.644	1.896	1.658	1.597	1.520	1.236	0.727	0.615
310	3.517	3.075	2.686	1.921	1.676	1.612	1.535	1.281	0.736	0.624
315	3.553	3.116	2.728	1.946	1.693	1.627	1.549	1.325	0.746	0.632
320	3.589	3.157	2.771	1.970	1.710	1.642	1.564	1.368	0.756	0.641
325	3.649	3.197	2.813	1.995	1.727	1.658	1.579	1.381	0.766	0.650
330	3.747	3.238	2.855	2.051	1.744	1.673	1.593	1.395	0.775	0.658
335	3.846	3.279	2.897	2.110	1.761	1.688	1.608	1.408	0.785	0.667
340	3.945	3.320	2.939	2.169	1.778	1.703	1.622	1.422	0.795	0.676
345	4.044	3.360	2.981	2.228	1.795	1.718	1.637	1.436	0.816	0.685
350	4.142	3.401	3.023	2.287	1.813	1.733	1.652	1.449	0.960	0.693
355	4.241	3.442	3.065	2.346	1.830	1.748	1.666	1.463	1.104	0.702
360	4.340	3.483	3.108	2.405	1.847	1.764	1.681	1.476	1.247	0.711
365	4.439	3.523	3.150	2.464	1.864	1.779	1.696	1.490	1.369	0.719
370	4.537	3.564	3.192	2.523	1.881	1.794	1.710	1.504	1.381	0.728
375	4.636	3.605	3.234	2.582	1.898	1.809	1.725	1.517	1.392	0.737
380	4.735	3.689	3.276	2.641	1.915	1.824	1.739	1.531	1.404	0.745
385	4.834	3.783	3.318	2.700	1.932	1.839	1.754	1.544	1.416	0.754
390	4.932	3.876	3.360	2.759	1.950	1.855	1.769	1.558	1.428	0.763
395	5.031	3.970	3.402	2.818	1.967	1.870	1.783	1.571	1.439	0.771
400	5.130	4.063	3.445	2.877	1.984	1.885	1.798	1.585	1.451	0.780
405	5.229	4.156	3.487	2.936	2.015	1.900	1.813	1.599	1.463	0.789
410	5.327	4.250	3.529	2.995	2.090	1.915	1.827	1.612	1.474	0.797
415	5.426	4.343	3.571	3.054	2.166	1.930	1.842	1.626	1.486	0.805
420	5.504	4.436	3.614	3.113	2.242	1.945	1.856	1.639	1.498	1.038
425	5.569	4.530	3.704	3.172	2.318	1.961	1.871	1.653	1.510	1.226
430	5.634	4.623	3.794	3.232	2.394	1.976	1.886	1.667	1.521	1.370
435	5.699	4.716	3.883	3.291	2.470	1.991	1.900	1.680	1.533	1.380
440	5.764	4.810	3.973	3.350	2.546	2.046	1.915	1.694	1.545	1.390
445	5.829	4.903	4.062	3.409	2.622	2.129	1.930	1.707	1.557	1.401
450	5.894	4.997	4.152	3.468	2.698	2.211	1.944	1.721	1.568	1.411
455	5.959	5.090	4.242	3.527	2.774	2.294	1.959	1.735	1.580	1.422

Thickness is intumescent only. Results also apply to I/H-section beams exposed on all four sides up to the maximum dry film thickness of 4.306mm.

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of									
	350°C	400°C	450°C	500°C	550°C	575°C	600°C	650°C	700°C	750°C
30	0.412	0.412	0.412	0.412	0.364	0.341	0.315	0.279	0.251	0.251
35	0.454	0.454	0.454	0.454	0.399	0.372	0.342	0.301	0.263	0.251
40	0.600	0.584	0.496	0.496	0.434	0.404	0.370	0.323	0.280	0.251
45	0.863	0.713	0.539	0.539	0.468	0.435	0.397	0.345	0.297	0.251
50	1.126	0.842	0.581	0.581	0.503	0.467	0.424	0.368	0.315	0.251
55	1.390	0.971	0.658	0.623	0.538	0.498	0.452	0.390	0.332	0.256
60	1.653	1.101	0.761	0.665	0.573	0.530	0.479	0.412	0.349	0.269
65	1.916	1.230	0.864	0.707	0.607	0.561	0.506	0.434	0.366	0.281
70	2.048	1.359	0.957	0.749	0.642	0.592	0.533	0.457	0.384	0.293
75	2.122	1.436	1.050	0.792	0.677	0.624	0.561	0.479	0.401	0.305
80	2.196	1.510	1.143	0.847	0.712	0.655	0.588	0.501	0.418	0.317
85	2.269	1.584	1.235	0.908	0.746	0.687	0.615	0.524	0.435	0.329
90	2.343	1.658	1.328	0.969	0.781	0.718	0.643	0.546	0.453	0.341
95	2.417	1.732	1.403	1.030	0.819	0.749	0.670	0.568	0.470	0.353
100	2.490	1.806	1.466	1.091	0.862	0.781	0.697	0.590	0.487	0.365
105	2.553	1.880	1.528	1.152	0.906	0.814	0.724	0.613	0.504	0.377
110	2.614	1.954	1.590	1.213	0.949	0.851	0.752	0.635	0.522	0.389
115	2.675	2.027	1.652	1.274	0.992	0.888	0.779	0.657	0.539	0.402
120	2.735	2.099	1.715	1.335	1.036	0.925	0.807	0.679	0.556	0.414
125	2.796	2.171	1.777	1.387	1.079	0.962	0.840	0.702	0.574	0.426
130	2.857	2.243	1.839	1.430	1.123	0.999	0.872	0.724	0.591	0.438
135	2.918	2.316	1.901	1.472	1.166	1.035	0.905	0.746	0.608	0.450
140	2.979	2.388	1.964	1.515	1.209	1.072	0.938	0.768	0.625	0.462
145	3.039	2.460	2.017	1.557	1.253	1.109	0.971	0.791	0.643	0.474
150	3.100	2.516	2.059	1.599	1.296	1.146	1.004	0.820	0.660	0.486
155	3.161	2.553	2.101	1.642	1.340	1.183	1.037	0.859	0.677	0.498
160	3.222	2.590	2.144	1.684	1.382	1.220	1.069	0.899	0.694	0.510
165	3.283	2.627	2.186	1.727	1.421	1.257	1.102	0.938	0.712	0.522
170	3.343	2.663	2.228	1.769	1.461	1.294	1.135	0.977	0.729	0.534
175	3.404	2.700	2.270	1.812	1.500	1.331	1.168	1.017	0.746	0.547
180	3.465	2.737	2.313	1.854	1.540	1.368	1.201	1.056	0.764	0.559
185	3.526	2.773	2.355	1.897	1.580	1.406	1.234	1.096	0.781	0.571
190	3.587	2.810	2.397	1.939	1.619	1.444	1.267	1.135	0.798	0.583
195	3.650	2.847	2.440	1.981	1.659	1.482	1.299	1.175	0.836	0.595
200	3.716	2.884	2.482	2.027	1.698	1.520	1.332	1.214	0.885	0.607
205	3.782	2.920	2.524	2.075	1.738	1.558	1.365	1.254	0.934	0.619
210	3.849	2.957	2.567	2.123	1.778	1.595	1.391	1.293	0.983	0.631
215	3.915	2.994	2.609	2.170	1.817	1.633	1.417	1.333	1.032	0.643
220	3.981	3.030	2.651	2.218	1.857	1.671	1.443	1.369	1.080	0.655
225	4.047	3.067	2.694	2.266	1.896	1.709	1.468	1.384	1.129	0.667
230	4.113	3.104	2.736	2.314	1.936	1.747	1.494	1.399	1.178	0.680
235	4.179	3.141	2.778	2.361	1.975	1.785	1.520	1.414	1.227	0.692
240	4.245	3.177	2.820	2.409	2.019	1.823	1.546	1.429	1.276	0.704
245	4.311	3.214	2.863	2.457	2.068	1.861	1.571	1.445	1.325	0.716
250	4.377	3.251	2.905	2.505	2.117	1.898	1.597	1.460	1.369	0.728
255	4.443	3.287	2.947	2.552	2.167	1.936	1.623	1.475	1.382	0.740
260	4.509	3.324	2.990	2.600	2.216	1.974	1.648	1.490	1.396	0.752
265	4.575	3.361	3.032	2.648	2.265	2.017	1.674	1.505	1.409	0.764
270	4.641	3.398	3.074	2.696	2.314	2.069	1.700	1.520	1.423	0.776
275	4.707	3.434	3.117	2.743	2.363	2.120	1.726	1.535	1.436	0.788
280	4.773	3.471	3.159	2.791	2.412	2.171	1.751	1.550	1.450	0.800
285	4.839	3.508	3.201	2.839	2.461	2.223	1.777	1.565	1.463	0.856
290	4.905	3.544	3.244	2.886	2.510	2.274	1.803	1.581	1.477	0.930
295	4.971	3.581	3.286	2.934	2.559	2.325	1.828	1.596	1.490	1.004
300	5.037	3.617	3.328	2.982	2.609	2.377	1.854	1.611	1.503	1.078
305	5.103	3.748	3.371	3.030	2.658	2.428	1.880	1.626	1.517	1.152
310	5.169	3.865	3.413	3.077	2.707	2.480	1.906	1.641	1.530	1.226
315	5.235	3.983	3.455	3.125	2.756	2.531	1.931	1.656	1.544	1.300
320	5.301	4.100	3.497	3.173	2.805	2.582	1.957	1.671	1.557	1.368
325	5.367	4.217	3.540	3.221	2.854	2.634	1.983	1.686	1.571	1.382
330	5.433	4.334	3.582	3.268	2.903	2.685	2.029	1.702	1.584	1.396
335	5.508	4.452	3.645	3.316	2.952	2.736	2.100	1.717	1.598	1.410
340	5.589	4.569	3.758	3.364	3.001	2.788	2.172	1.732	1.611	1.424
345	5.671	4.686	3.871	3.412	3.050	2.839	2.243	1.747	1.625	1.438
350	5.752	4.804	3.984	3.459	3.100	2.890	2.315	1.762	1.638	1.452
355	5.834	4.921	4.096	3.507	3.149	2.942	2.386	1.777	1.651	1.466
360	5.915	5.038	4.209	3.555	3.198	2.993	2.458	1.792	1.665	1.480
365	5.997	5.155	4.322	3.602	3.247	3.044	2.529	1.807	1.678	1.494
370	6.078	5.273	4.435	3.701	3.296	3.096	2.601	1.822	1.692	1.508
375	6.160	5.390	4.548	3.811	3.345	3.147	2.672	1.838	1.705	1.522
380	6.241	5.490	4.661	3.922	3.394	3.198	2.744	1.853	1.719	1.536
385	6.323	5.559	4.773	4.033	3.443	3.250	2.815	1.868	1.732	1.550
390	6.404	5.629	4.886	4.143	3.492	3.301	2.887	1.883	1.746	1.564
395	6.486	5.698	4.999	4.254	3.541	3.352	2.958	1.898	1.759	1.578
400	6.567	5.767	5.112	4.364	3.591	3.404	3.030	1.913	1.773	1.592
405	6.649	5.837	5.225	4.475	3.675	3.455	3.101	1.928	1.786	1.606
410	6.730	5.906	5.338	4.586	3.786	3.506	3.173	1.943	1.800	1.620
415	6.812	5.975	5.451	4.696	3.897	3.558	3.244	1.959	1.813	1.634
420	6.893	6.044	5.525	4.807	4.008	3.609	3.316	1.974	1.826	1.648
425	6.975	6.114	5.593	4.918	4.119	3.717	3.387	1.989	1.840	1.662
430	7.056	6.183	5.662	5.028	4.230	3.828	3.459	2.061	1.853	1.675
435	7.138	6.252	5.730	5.139	4.341	3.939	3.530	2.201	1.867	1.689
440	7.219	6.322	5.799	5.250	4.453	4.050	3.602	2.341	1.880	1.703
445	-	6.391	5.868	5.360	4.564	4.162	3.708	2.481	1.894	1.717
450	-	6.460	5.936	5.469	4.675	4.273	3.821	2.621	1.907	1.731
455	-	6.530	6.005	5.538	4.786	4.384	3.933	2.761	1.921	1.745

Thickness is intumescent only. Results also apply to I/H-section beams exposed on all four sides up to the maximum dry film thickness of 4.306mm.

Table 17: I/H-Column Sections 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	575°C	600°C	650°C	700°C	750°C
30	1.717	0.507	0.507	0.507	0.440	0.414	0.379	0.340	0.303	0.254
35	1.811	0.559	0.559	0.559	0.486	0.456	0.416	0.371	0.329	0.276
40	1.905	0.635	0.635	0.612	0.532	0.498	0.453	0.402	0.356	0.297
45	1.999	0.843	0.769	0.664	0.578	0.540	0.490	0.434	0.382	0.318
50	2.093	1.121	0.904	0.716	0.623	0.582	0.527	0.465	0.408	0.339
55	2.188	1.400	1.039	0.768	0.669	0.624	0.564	0.496	0.434	0.360
60	2.282	1.678	1.173	0.837	0.715	0.666	0.601	0.528	0.460	0.381
65	2.376	1.956	1.308	0.943	0.761	0.708	0.638	0.559	0.487	0.402
70	2.470	2.064	1.418	1.049	0.808	0.750	0.675	0.590	0.513	0.423
75	2.585	2.143	1.508	1.156	0.881	0.792	0.712	0.622	0.539	0.444
80	2.709	2.221	1.599	1.262	0.953	0.848	0.749	0.653	0.565	0.465
85	2.834	2.300	1.690	1.367	1.026	0.911	0.786	0.684	0.591	0.486
90	2.958	2.378	1.781	1.436	1.098	0.973	0.835	0.716	0.618	0.507
95	3.083	2.457	1.871	1.504	1.171	1.035	0.893	0.747	0.644	0.528
100	3.208	2.533	1.962	1.572	1.243	1.098	0.951	0.778	0.670	0.549
105	3.332	2.607	2.048	1.640	1.316	1.160	1.010	0.812	0.696	0.570
110	3.457	2.681	2.132	1.708	1.380	1.222	1.068	0.854	0.722	0.591
115	3.581	2.754	2.215	1.776	1.425	1.285	1.126	0.897	0.749	0.613
120	3.659	2.828	2.298	1.844	1.469	1.347	1.185	0.939	0.775	0.634
125	3.721	2.902	2.382	1.912	1.513	1.396	1.243	0.982	0.801	0.655
130	3.783	2.976	2.465	1.980	1.558	1.439	1.301	1.024	0.834	0.676
135	3.845	3.050	2.527	2.035	1.602	1.481	1.360	1.067	0.868	0.697
140	3.907	3.123	2.575	2.085	1.647	1.524	1.403	1.110	0.902	0.718
145	3.969	3.197	2.622	2.135	1.691	1.567	1.444	1.152	0.937	0.739
150	4.031	3.271	2.669	2.185	1.736	1.609	1.485	1.195	0.971	0.760
155	4.093	3.345	2.717	2.235	1.780	1.652	1.527	1.237	1.005	0.781
160	4.155	3.418	2.764	2.285	1.824	1.695	1.568	1.280	1.039	0.802
165	4.217	3.492	2.811	2.335	1.869	1.738	1.609	1.322	1.073	0.843
170	4.279	3.566	2.858	2.385	1.913	1.780	1.650	1.365	1.108	0.886
175	4.342	3.637	2.906	2.435	1.958	1.823	1.692	1.405	1.142	0.929
180	4.404	3.703	2.953	2.485	2.003	1.866	1.733	1.445	1.176	0.972
185	4.466	3.768	3.000	2.532	2.056	1.908	1.774	1.484	1.210	1.015
190	4.528	3.834	3.048	2.578	2.109	1.951	1.815	1.524	1.244	1.058
195	4.590	3.900	3.095	2.624	2.162	1.994	1.856	1.564	1.278	1.101
200	4.652	3.965	3.142	2.669	2.215	2.046	1.898	1.603	1.313	1.145
205	4.714	4.031	3.189	2.715	2.268	2.100	1.939	1.643	1.347	1.188
210	4.776	4.097	3.237	2.761	2.321	2.153	1.980	1.683	1.379	1.231
215	4.838	4.162	3.284	2.807	2.374	2.207	2.029	1.723	1.408	1.274
220	4.900	4.228	3.331	2.852	2.427	2.261	2.082	1.762	1.437	1.317
225	4.962	4.294	3.379	2.898	2.480	2.314	2.136	1.802	1.466	1.360
230	5.024	4.360	3.426	2.944	2.533	2.368	2.190	1.842	1.494	1.380
235	5.086	4.425	3.473	2.990	2.586	2.421	2.244	1.882	1.523	1.395
240	5.148	4.491	3.520	3.036	2.639	2.475	2.298	1.921	1.552	1.410
245	5.210	4.557	3.568	3.081	2.692	2.528	2.351	1.961	1.581	1.425
250	5.273	4.622	3.618	3.127	2.745	2.582	2.405	2.002	1.610	1.440
255	5.335	4.688	3.716	3.173	2.797	2.635	2.459	2.057	1.639	1.455
260	5.397	4.754	3.813	3.219	2.850	2.689	2.513	2.112	1.668	1.470
265	5.459	4.819	3.910	3.265	2.903	2.743	2.567	2.167	1.697	1.485
270	5.522	4.885	4.008	3.310	2.956	2.796	2.620	2.222	1.726	1.500
275	5.584	4.951	4.105	3.356	3.009	2.850	2.674	2.277	1.755	1.515
280	5.714	5.017	4.203	3.402	3.062	2.903	2.728	2.332	1.784	1.531
285	5.800	5.082	4.300	3.448	3.115	2.957	2.782	2.387	1.812	1.546
290	5.885	5.148	4.398	3.494	3.168	3.010	2.836	2.442	1.841	1.561
295	5.971	5.214	4.495	3.539	3.221	3.064	2.889	2.497	1.870	1.576
300	6.057	5.279	4.593	3.585	3.274	3.117	2.943	2.552	1.899	1.591
305	6.143	5.345	4.690	3.667	3.327	3.171	2.997	2.607	1.928	1.606
310	6.229	5.411	4.788	3.801	3.380	3.225	3.051	2.662	1.957	1.621
315	6.315	5.479	4.885	3.935	3.433	3.278	3.105	2.717	1.986	1.636
320	6.401	5.563	4.983	4.068	3.486	3.332	3.158	2.772	2.038	1.651
325	6.486	5.646	5.080	4.202	3.539	3.385	3.212	2.827	2.106	1.666
330	6.572	5.730	5.177	4.336	3.592	3.439	3.266	2.882	2.173	1.682
335	6.658	5.813	5.275	4.469	3.695	3.492	3.320	2.937	2.241	1.697
340	6.744	5.897	5.372	4.603	3.830	3.546	3.374	2.992	2.308	1.712
345	6.830	5.980	5.469	4.737	3.964	3.599	3.427	3.047	2.375	1.727
350	6.916	6.064	5.552	4.870	4.099	3.715	3.481	3.102	2.443	1.742
355	7.001	6.147	5.634	5.004	4.234	3.851	3.535	3.157	2.510	1.757
360	7.087	6.230	5.717	5.138	4.368	3.986	3.589	3.212	2.577	1.772
365	7.173	6.314	5.800	5.272	4.503	4.121	3.690	3.267	2.645	1.787
370	7.259	6.397	5.882	5.405	4.638	4.256	3.827	3.322	2.712	1.802
375	-	6.481	5.965	5.511	4.772	4.391	3.963	3.377	2.780	1.817
380	-	6.564	6.048	5.595	4.907	4.526	4.100	3.432	2.847	1.833
385	-	6.648	6.130	5.678	5.042	4.661	4.237	3.487	2.914	1.848
390	-	6.731	6.213	5.761	5.176	4.796	4.374	3.542	2.982	1.863
395	-	6.814	6.296	5.845	5.311	4.932	4.511	3.597	3.049	1.878
400	-	6.898	6.378	5.928	5.446	5.067	4.647	3.715	3.116	1.893
405	-	6.981	6.461	6.012	5.539	5.202	4.784	3.854	3.184	1.908
410	-	7.065	6.544	6.095	5.625	5.337	4.921	3.993	3.251	1.923
415	-	7.148	6.626	6.179	5.711	5.470	5.058	4.133	3.319	1.938
420	-	7.232	6.709	6.262	5.797	5.556	5.195	4.272	3.386	1.953
425	-	-	6.792	6.345	5.883	5.643	5.332	4.411	3.453	1.968
430	-	-	6.874	6.429	5.969	5.730	5.467	4.551	3.521	1.983
435	-	-	6.957	6.512	6.055	5.817	5.558	4.690	3.588	1.999
440	-	-	7.040	6.596	6.141	5.904	5.649	4.829	3.706	2.014
445	-	-	7.122	6.679	6.227	5.991	5.740	4.969	3.851	2.177
450	-	-	7.205	6.763	6.313	6.077	5.831	5.108	3.996	2.339
455	-	-	-	6.846	6.399	6.164	5.922	5.247	4.141	2.501

Thickness is intumescent only. Results also apply to I/H-section beams exposed on all four sides up to the maximum dry film thickness of 4.306mm.

Section Factor up to m^{-1}	Thickness (mm) Required for a Design Temperature of									
	350°C	400°C	450°C	500°C	550°C	575°C	600°C	650°C	700°C	750°C
30	1.905	1.692	0.485	0.485	0.485	0.485	0.444	0.400	0.361	0.313
35	2.024	1.786	0.537	0.537	0.537	0.537	0.490	0.440	0.396	0.343
40	2.143	1.880	0.659	0.659	0.589	0.589	0.537	0.480	0.431	0.373
45	2.263	1.974	0.803	0.803	0.642	0.642	0.583	0.520	0.466	0.403
50	2.382	2.067	0.946	0.946	0.694	0.694	0.629	0.560	0.501	0.433
55	2.501	2.161	1.090	1.090	0.804	0.746	0.676	0.601	0.536	0.463
60	2.683	2.255	1.479	1.233	0.921	0.798	0.722	0.641	0.571	0.492
65	2.882	2.349	2.010	1.375	1.037	0.895	0.768	0.681	0.606	0.522
70	3.081	2.443	2.094	1.490	1.154	0.998	0.826	0.721	0.641	0.552
75	3.280	2.551	2.178	1.605	1.270	1.100	0.920	0.761	0.676	0.582
80	3.479	2.682	2.262	1.720	1.379	1.202	1.014	0.802	0.711	0.612
85	3.646	2.813	2.346	1.836	1.452	1.304	1.108	0.867	0.745	0.642
90	3.748	2.945	2.431	1.951	1.525	1.394	1.203	0.934	0.780	0.671
95	3.851	3.076	2.516	2.049	1.597	1.464	1.297	1.001	0.820	0.701
100	3.953	3.207	2.607	2.135	1.670	1.534	1.378	1.068	0.870	0.731
105	4.055	3.338	2.699	2.221	1.742	1.604	1.423	1.135	0.920	0.761
110	4.158	3.469	2.790	2.308	1.815	1.674	1.468	1.202	0.969	0.791
115	4.260	3.600	2.881	2.394	1.887	1.744	1.513	1.269	1.019	0.822
120	4.362	3.678	2.972	2.481	1.960	1.814	1.558	1.336	1.069	0.855
125	4.465	3.751	3.064	2.553	2.031	1.884	1.603	1.399	1.119	0.888
130	4.567	3.823	3.155	2.621	2.100	1.954	1.648	1.458	1.169	0.921
135	4.670	3.896	3.246	2.689	2.169	2.016	1.693	1.517	1.218	0.954
140	4.772	3.968	3.338	2.758	2.238	2.065	1.738	1.577	1.268	0.986
145	4.874	4.041	3.429	2.826	2.307	2.114	1.783	1.636	1.318	1.019
150	4.977	4.113	3.520	2.894	2.376	2.163	1.828	1.695	1.368	1.052
155	5.079	4.186	3.612	2.962	2.445	2.213	1.873	1.755	1.415	1.085
160	5.181	4.259	3.678	3.031	2.510	2.262	1.917	1.814	1.462	1.118
165	5.284	4.331	3.745	3.099	2.560	2.311	1.962	1.873	1.509	1.151
170	5.386	4.404	3.811	3.167	2.609	2.360	2.009	1.933	1.556	1.183
175	5.510	4.476	3.878	3.235	2.659	2.409	2.060	1.992	1.603	1.216
180	5.706	4.549	3.944	3.304	2.708	2.459	2.112	2.043	1.650	1.249
185	5.902	4.622	4.010	3.372	2.758	2.508	2.163	2.094	1.697	1.282
190	6.098	4.694	4.077	3.440	2.807	2.558	2.215	2.145	1.744	1.315
195	6.294	4.767	4.143	3.508	2.857	2.609	2.266	2.195	1.791	1.348
200	6.489	4.839	4.210	3.577	2.906	2.660	2.318	2.246	1.838	1.384
205	6.685	4.912	4.276	3.651	2.955	2.710	2.369	2.297	1.885	1.425
210	6.881	4.984	4.342	3.731	3.005	2.761	2.421	2.347	1.932	1.466
215	7.077	5.057	4.409	3.812	3.054	2.811	2.472	2.398	1.979	1.507
220	7.273	5.130	4.475	3.893	3.104	2.862	2.529	2.448	2.030	1.548
225	-	5.202	4.542	3.973	3.153	2.912	2.591	2.499	2.084	1.589
230	-	5.275	4.608	4.054	3.203	2.963	2.653	2.550	2.138	1.630
235	-	5.347	4.674	4.135	3.252	3.013	2.715	2.600	2.192	1.671
240	-	5.420	4.741	4.215	3.302	3.064	2.777	2.651	2.246	1.712
245	-	5.493	4.807	4.296	3.351	3.114	2.839	2.702	2.300	1.753
250	-	5.566	4.874	4.376	3.400	3.165	2.901	2.752	2.354	1.794
255	-	5.639	4.940	4.457	3.450	3.215	2.963	2.803	2.408	1.835
260	-	5.712	5.006	4.538	3.499	3.266	3.025	2.854	2.462	1.876
265	-	5.785	5.073	4.618	3.549	3.316	3.087	2.904	2.515	1.917
270	-	5.859	5.139	4.699	3.598	3.367	3.149	2.955	2.569	1.958
275	-	5.932	5.206	4.779	3.708	3.417	3.211	3.006	2.623	2.000
280	-	6.005	5.272	4.860	3.841	3.468	3.273	3.056	2.677	2.063
285	-	6.078	5.339	4.941	3.974	3.518	3.335	3.107	2.731	2.127
290	-	6.151	5.405	5.021	4.107	3.569	3.397	3.157	2.785	2.190
295	-	6.224	5.474	5.102	4.239	3.635	3.459	3.208	2.839	2.253
300	-	6.298	5.571	5.182	4.372	3.794	3.521	3.259	2.893	2.316
305	-	6.371	5.668	5.263	4.505	3.953	3.583	3.309	2.947	2.380
310	-	6.444	5.765	5.344	4.638	4.112	3.697	3.360	3.001	2.443
315	-	6.517	5.861	5.424	4.771	4.271	3.858	3.411	3.055	2.506
320	-	6.590	5.958	5.513	4.904	4.430	4.019	3.461	3.109	2.569
325	-	6.663	6.055	5.611	5.037	4.589	4.180	3.512	3.163	2.632
330	-	6.737	6.152	5.709	5.170	4.748	4.342	3.563	3.217	2.696
335	-	6.810	6.248	5.807	5.303	4.907	4.503	3.616	3.270	2.759
340	-	6.883	6.345	5.905	5.435	5.066	4.664	3.781	3.324	2.822
345	-	6.956	6.442	6.003	5.544	5.225	4.825	3.946	3.378	2.885
350	-	7.029	6.539	6.100	5.645	5.384	4.987	4.111	3.432	2.949
355	-	7.102	6.635	6.198	5.746	5.515	5.148	4.276	3.486	3.012
360	-	7.175	6.732	6.296	5.847	5.617	5.309	4.441	3.540	3.075
365	-	7.249	6.829	6.394	5.948	5.719	5.468	4.606	3.594	3.138
370	-	-	6.926	6.492	6.049	5.821	5.576	4.771	3.727	3.202
375	-	-	7.022	6.589	6.150	5.924	5.683	4.936	3.900	3.265
380	-	-	7.119	6.687	6.251	6.026	5.790	5.100	4.073	3.328
385	-	-	7.216	6.785	6.352	6.128	5.897	5.265	4.246	3.391
390	-	-	-	6.883	6.453	6.230	6.004	5.430	4.419	3.454
395	-	-	-	6.981	6.554	6.332	6.111	5.555	4.592	3.518
400	-	-	-	7.078	6.655	6.434	6.218	5.669	4.765	3.581
405	-	-	-	7.176	6.756	6.536	6.325	5.783	4.938	3.701
410	-	-	-	7.274	6.857	6.639	6.433	5.896	5.111	3.877
415	-	-	-	-	6.958	6.741	6.540	6.010	5.284	4.052
420	-	-	-	-	7.059	6.843	6.647	6.124	5.457	4.227
425	-	-	-	-	7.160	6.945	6.754	6.238	5.579	4.403
430	-	-	-	-	7.261	7.047	6.861	6.352	5.697	4.578
435	-	-	-	-	-	7.149	6.968	6.466	5.816	4.754
440	-	-	-	-	-	7.252	7.075	6.579	5.935	4.929
445	-	-	-	-	-	-	7.183	6.693	6.054	5.105
450	-	-	-	-	-	-	-	6.807	6.172	5.280
455	-	-	-	-	-	-	-	6.921	6.291	5.455

Thickness is intumescent only. Results also apply to I/H-section beams exposed on all four sides up to the maximum dry film thickness of 4.306mm.

Table 19: I/H-Column Sections 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	575°C	600°C	650°C	700°C	750°C
30	2.008	1.871	1.674	0.455	0.455	0.455	0.455	0.455	0.418	0.372
35	2.237	1.982	1.769	0.545	0.545	0.505	0.505	0.505	0.462	0.410
40	2.467	2.093	1.865	0.696	0.696	0.581	0.554	0.554	0.505	0.449
45	2.696	2.204	1.961	0.846	0.846	0.720	0.603	0.603	0.549	0.487
50	2.925	2.315	2.057	1.035	0.997	0.860	0.653	0.653	0.592	0.525
55	3.155	2.427	2.153	1.229	1.148	1.000	0.760	0.702	0.636	0.564
60	3.384	2.566	2.249	1.423	1.298	1.139	0.913	0.751	0.679	0.602
65	3.613	2.763	2.344	1.617	1.444	1.279	1.066	0.801	0.723	0.640
70	3.757	2.959	2.440	1.811	1.585	1.403	1.218	0.904	0.766	0.679
75	3.901	3.155	2.553	2.005	1.725	1.500	1.369	1.011	0.814	0.717
80	4.045	3.351	2.695	2.209	1.866	1.598	1.446	1.117	0.885	0.756
85	4.188	3.547	2.837	2.397	2.003	1.695	1.523	1.224	0.956	0.794
90	4.332	3.687	2.979	2.584	2.090	1.793	1.600	1.331	1.026	0.840
95	4.476	3.799	3.121	2.591	2.178	1.890	1.676	1.415	1.097	0.889
100	4.620	3.911	3.262	2.701	2.265	1.987	1.753	1.487	1.168	0.938
105	4.764	4.023	3.404	2.811	2.352	2.081	1.830	1.559	1.239	0.987
110	4.908	4.135	3.546	2.921	2.439	2.174	1.907	1.631	1.310	1.036
115	5.052	4.247	3.660	3.031	2.525	2.267	1.984	1.702	1.380	1.085
120	5.196	4.359	3.750	3.141	2.609	2.360	2.069	1.774	1.446	1.133
125	5.339	4.471	3.840	3.251	2.694	2.453	2.156	1.846	1.512	1.182
130	5.483	4.583	3.930	3.361	2.778	2.537	2.243	1.918	1.578	1.231
135	5.627	4.695	4.020	3.471	2.863	2.613	2.329	1.990	1.643	1.280
140	5.771	4.807	4.110	3.582	2.947	2.689	2.416	2.038	1.709	1.329
145	5.915	4.919	4.200	3.665	3.032	2.765	2.503	2.084	1.775	1.377
150	6.059	5.031	4.290	3.738	3.116	2.841	2.571	2.130	1.841	1.420
155	6.203	5.144	4.380	3.812	3.200	2.917	2.639	2.176	1.907	1.464
160	6.347	5.256	4.470	3.885	3.285	2.993	2.707	2.221	1.973	1.507
165	6.490	5.368	4.559	3.958	3.369	3.068	2.776	2.267	2.030	1.551
170	6.634	5.495	4.649	4.032	3.454	3.144	2.844	2.313	2.083	1.595
175	6.778	5.729	4.739	4.105	3.538	3.220	2.912	2.359	2.135	1.638
180	6.922	5.962	4.829	4.178	3.622	3.296	2.980	2.404	2.187	1.682
185	7.066	6.195	4.919	4.252	3.701	3.372	3.049	2.450	2.240	1.726
190	7.210	6.429	5.009	4.325	3.779	3.448	3.117	2.496	2.292	1.769
195	-	6.662	5.099	4.398	3.858	3.524	3.185	2.551	2.344	1.813
200	-	6.895	5.189	4.471	3.937	3.600	3.253	2.607	2.397	1.857
205	-	7.129	5.279	4.545	4.016	3.685	3.321	2.663	2.449	1.900
210	-	-	5.369	4.618	4.095	3.773	3.390	2.719	2.502	1.944
215	-	-	5.459	4.691	4.173	3.861	3.458	2.774	2.554	1.988
220	-	-	5.550	4.765	4.252	3.948	3.526	2.830	2.606	2.047
225	-	-	5.641	4.838	4.331	4.036	3.594	2.886	2.659	2.110
230	-	-	5.731	4.911	4.410	4.123	3.688	2.942	2.711	2.172
235	-	-	5.822	4.985	4.489	4.211	3.790	2.998	2.764	2.235
240	-	-	5.913	5.058	4.568	4.298	3.892	3.054	2.816	2.298
245	-	-	6.004	5.131	4.646	4.386	3.995	3.110	2.868	2.361
250	-	-	6.095	5.205	4.725	4.474	4.097	3.166	2.921	2.424
255	-	-	6.186	5.278	4.804	4.561	4.199	3.222	2.973	2.487
260	-	-	6.277	5.351	4.883	4.649	4.301	3.277	3.026	2.550
265	-	-	6.368	5.425	4.962	4.736	4.404	3.333	3.078	2.613
270	-	-	6.459	5.509	5.040	4.824	4.506	3.389	3.130	2.676
275	-	-	6.550	5.608	5.119	4.912	4.608	3.445	3.183	2.739
280	-	-	6.641	5.707	5.198	4.999	4.710	3.501	3.235	2.802
285	-	-	6.732	5.805	5.277	5.087	4.813	3.557	3.288	2.865
290	-	-	6.823	5.904	5.356	5.174	4.915	3.615	3.340	2.928
295	-	-	6.914	6.003	5.434	5.262	5.017	3.673	3.392	2.991
300	-	-	7.005	6.102	5.536	5.350	5.119	3.731	3.445	3.054
305	-	-	7.095	6.200	5.652	5.437	5.222	3.789	3.497	3.117
310	-	-	7.186	6.299	5.768	5.545	5.324	3.847	3.550	3.180
315	-	-	7.277	6.398	5.884	5.663	5.426	3.905	3.602	3.243
320	-	-	-	6.497	6.000	5.780	5.542	3.963	3.654	3.306
325	-	-	-	6.595	6.116	5.897	5.665	4.021	3.706	3.369
330	-	-	-	6.694	6.232	6.015	5.788	4.079	3.758	3.432
335	-	-	-	6.793	6.348	6.132	5.912	4.137	3.810	3.495
340	-	-	-	6.891	6.464	6.250	6.035	4.195	3.862	3.558
345	-	-	-	6.990	6.580	6.367	6.158	4.253	3.914	3.621
350	-	-	-	7.089	6.696	6.485	6.282	4.311	3.966	3.684
355	-	-	-	7.188	6.812	6.602	6.405	4.369	4.018	3.747
360	-	-	-	-	6.929	6.720	6.528	4.427	4.070	3.810
365	-	-	-	-	7.045	6.837	6.652	4.485	4.122	3.873
370	-	-	-	-	7.161	6.955	6.775	4.543	4.174	3.936
375	-	-	-	-	7.277	7.072	6.898	4.601	4.226	4.000
380	-	-	-	-	-	7.190	7.022	6.555	5.959	5.075
385	-	-	-	-	-	-	7.145	6.686	6.096	5.280
390	-	-	-	-	-	-	7.268	6.818	6.234	5.484
395	-	-	-	-	-	-	-	6.949	6.372	5.678
400	-	-	-	-	-	-	-	7.081	6.510	5.872
405	-	-	-	-	-	-	-	7.212	6.648	6.066
410	-	-	-	-	-	-	-	-	6.786	6.260
415	-	-	-	-	-	-	-	-	6.923	6.454
420	-	-	-	-	-	-	-	-	7.061	6.648
425	-	-	-	-	-	-	-	-	7.199	6.843
430	-	-	-	-	-	-	-	-	-	7.037
435	-	-	-	-	-	-	-	-	-	7.231
440	-	-	-	-	-	-	-	-	-	-
445	-	-	-	-	-	-	-	-	-	-
450	-	-	-	-	-	-	-	-	-	-
455	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results also apply to I/H-section beams exposed on all four sides up to the maximum dry film thickness of 4.306mm.

Table 20: I/H-Column Sections 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	575°C	600°C	650°C	700°C	750°C
30	-	3.207	1.827	1.827	1.664	1.570	1.465	0.488	0.488	0.488
35	-	3.357	1.937	1.937	1.763	1.665	1.556	0.543	0.543	0.543
40	-	3.506	2.102	2.047	1.862	1.760	1.648	0.613	0.597	0.597
45	-	3.656	2.335	2.157	1.961	1.855	1.739	0.812	0.651	0.651
50	-	3.806	2.568	2.267	2.060	1.950	1.830	1.011	0.770	0.706
55	-	3.956	2.801	2.376	2.159	2.045	1.922	1.210	0.924	0.760
60	-	4.106	3.034	2.486	2.258	2.140	2.013	1.405	1.077	0.825
65	-	4.256	3.267	2.677	2.357	2.235	2.105	1.584	1.231	0.932
70	-	4.406	3.500	2.878	2.456	2.330	2.196	1.762	1.378	1.040
75	-	4.556	3.700	3.079	2.589	2.425	2.288	1.941	1.475	1.147
80	-	4.705	3.869	3.281	2.749	2.530	2.379	2.058	1.572	1.254
85	-	4.855	4.038	3.482	2.909	2.678	2.471	2.148	1.669	1.362
90	-	5.005	4.208	3.664	3.069	2.825	2.596	2.237	1.766	1.433
95	-	5.155	4.377	3.810	3.229	2.972	2.736	2.326	1.863	1.503
100	-	5.305	4.547	3.957	3.389	3.120	2.877	2.416	1.960	1.573
105	-	5.455	4.716	4.103	3.549	3.267	3.018	2.507	2.053	1.643
110	-	5.605	4.885	4.250	3.690	3.415	3.159	2.636	2.145	1.712
115	-	5.754	5.055	4.396	3.817	3.562	3.300	2.764	2.236	1.782
120	-	5.904	5.224	4.542	3.944	3.691	3.441	2.893	2.327	1.852
125	-	6.054	5.393	4.689	4.072	3.810	3.582	3.021	2.419	1.922
130	-	6.204	5.563	4.835	4.199	3.929	3.698	3.150	2.514	1.992
135	-	6.354	5.732	4.982	4.327	4.048	3.807	3.279	2.640	2.051
140	-	6.504	5.901	5.128	4.454	4.167	3.916	3.407	2.766	2.109
145	-	6.654	6.071	5.274	4.582	4.286	4.026	3.536	2.892	2.167
150	-	6.804	6.240	5.421	4.709	4.405	4.135	3.650	3.018	2.225
155	-	6.953	6.409	5.567	4.837	4.524	4.244	3.744	3.144	2.283
160	-	7.103	6.579	5.714	4.964	4.643	4.353	3.838	3.271	2.341
165	-	7.253	6.748	5.860	5.091	4.762	4.463	3.932	3.397	2.399
170	-	-	6.917	6.006	5.219	4.881	4.572	4.026	3.523	2.457
175	-	-	7.087	6.153	5.346	4.999	4.681	4.119	3.637	2.534
180	-	-	7.256	6.299	5.476	5.118	4.791	4.213	3.721	2.665
185	-	-	-	6.446	5.640	5.237	4.900	4.307	3.805	2.797
190	-	-	-	6.592	5.803	5.356	5.009	4.401	3.889	2.929
195	-	-	-	6.738	5.967	5.478	5.119	4.495	3.973	3.060
200	-	-	-	6.885	6.130	5.627	5.228	4.589	4.057	3.192
205	-	-	-	7.031	6.294	5.776	5.337	4.682	4.142	3.324
210	-	-	-	7.178	6.458	5.924	5.446	4.776	4.226	3.456
215	-	-	-	-	6.621	6.073	5.589	4.870	4.310	3.587
220	-	-	-	-	6.785	6.222	5.738	4.964	4.394	3.699
225	-	-	-	-	6.948	6.371	5.888	5.058	4.478	3.807
230	-	-	-	-	7.112	6.520	6.037	5.152	4.562	3.914
235	-	-	-	-	7.275	6.668	6.186	5.245	4.646	4.021
240	-	-	-	-	-	6.817	6.336	5.339	4.731	4.129
245	-	-	-	-	-	6.966	6.485	5.433	4.815	4.236
250	-	-	-	-	-	7.115	6.634	5.568	4.899	4.344
255	-	-	-	-	-	7.264	6.784	5.723	4.983	4.451
260	-	-	-	-	-	-	6.933	5.879	5.067	4.558
265	-	-	-	-	-	-	7.082	6.034	5.151	4.666
270	-	-	-	-	-	-	7.232	6.190	5.236	4.773
275	-	-	-	-	-	-	-	6.346	5.320	4.881
280	-	-	-	-	-	-	-	6.501	5.404	4.988
285	-	-	-	-	-	-	-	6.657	5.518	5.095
290	-	-	-	-	-	-	-	6.813	5.712	5.203
295	-	-	-	-	-	-	-	6.968	5.907	5.310
300	-	-	-	-	-	-	-	7.124	6.101	5.417
305	-	-	-	-	-	-	-	7.279	6.295	5.605
310	-	-	-	-	-	-	-	-	6.489	5.856
315	-	-	-	-	-	-	-	-	6.684	6.107
320	-	-	-	-	-	-	-	-	6.878	6.358
325	-	-	-	-	-	-	-	-	7.072	6.609
330	-	-	-	-	-	-	-	-	7.266	6.860
335	-	-	-	-	-	-	-	-	-	7.111
340	-	-	-	-	-	-	-	-	-	-
345	-	-	-	-	-	-	-	-	-	-
350	-	-	-	-	-	-	-	-	-	-
355	-	-	-	-	-	-	-	-	-	-
360	-	-	-	-	-	-	-	-	-	-
365	-	-	-	-	-	-	-	-	-	-
370	-	-	-	-	-	-	-	-	-	-
375	-	-	-	-	-	-	-	-	-	-
380	-	-	-	-	-	-	-	-	-	-
385	-	-	-	-	-	-	-	-	-	-
390	-	-	-	-	-	-	-	-	-	-
395	-	-	-	-	-	-	-	-	-	-
400	-	-	-	-	-	-	-	-	-	-
405	-	-	-	-	-	-	-	-	-	-
410	-	-	-	-	-	-	-	-	-	-
415	-	-	-	-	-	-	-	-	-	-
420	-	-	-	-	-	-	-	-	-	-
425	-	-	-	-	-	-	-	-	-	-
430	-	-	-	-	-	-	-	-	-	-
435	-	-	-	-	-	-	-	-	-	-
440	-	-	-	-	-	-	-	-	-	-
445	-	-	-	-	-	-	-	-	-	-
450	-	-	-	-	-	-	-	-	-	-
455	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results also apply to I/H-section beams exposed on all four sides up to the maximum dry film thickness of 4.306mm.

Table 21: Circular and Rectangular/Square Hollow Column Sections 15 Minutes

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of										
	350°C	400°C	450°C	500°C	520°C	550°C	570°C	600°C	650°C	700°C	750°C
50	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
55	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
60	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
65	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
70	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
75	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
80	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
85	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
90	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
95	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
100	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
105	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
110	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
115	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
120	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
125	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
130	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
135	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
140	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
145	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
150	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
155	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
160	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
165	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
170	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
175	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
180	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
185	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
190	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
195	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
200	0.256	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
205	0.275	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
210	0.294	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
215	0.313	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
220	0.333	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
225	0.352	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
230	0.371	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
235	0.390	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
240	0.409	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
245	0.428	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
250	0.447	0.243	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
255	0.467	0.259	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
260	0.486	0.275	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
265	0.505	0.291	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
270	0.524	0.307	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
275	0.543	0.324	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
280	0.562	0.340	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
285	0.582	0.356	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
290	0.601	0.373	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
295	0.620	0.389	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
300	0.639	0.405	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
305	0.658	0.421	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
310	0.677	0.438	0.254	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
315	0.697	0.454	0.268	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
320	0.716	0.470	0.282	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
325	0.735	0.486	0.295	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
330	0.754	0.503	0.309	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
335	0.773	0.519	0.323	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
340	0.792	0.535	0.337	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
345	0.812	0.551	0.350	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
350	0.831	0.568	0.364	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
355	0.850	0.584	0.378	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
360	0.869	0.600	0.392	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
365	0.888	0.616	0.405	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
370	0.907	0.633	0.419	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
375	0.926	0.649	0.433	0.242	0.241	0.241	0.241	0.241	0.241	0.241	0.241
380	0.946	0.665	0.447	0.254	0.241	0.241	0.241	0.241	0.241	0.241	0.241
385	0.965	0.681	0.461	0.266	0.241	0.241	0.241	0.241	0.241	0.241	0.241
390	0.984	0.698	0.474	0.278	0.241	0.241	0.241	0.241	0.241	0.241	0.241
395	1.003	0.714	0.488	0.289	0.241	0.241	0.241	0.241	0.241	0.241	0.241
400	1.022	0.730	0.502	0.300	0.244	0.241	0.241	0.241	0.241	0.241	0.241
405	1.041	0.747	0.516	0.311	0.254	0.241	0.241	0.241	0.241	0.241	0.241
410	1.061	0.763	0.529	0.322	0.264	0.241	0.241	0.241	0.241	0.241	0.241
415	1.080	0.779	0.543	0.333	0.274	0.241	0.241	0.241	0.241	0.241	0.241
420	1.099	0.795	0.557	0.344	0.284	0.241	0.241	0.241	0.241	0.241	0.241
425	1.118	0.812	0.571	0.355	0.294	0.241	0.241	0.241	0.241	0.241	0.241

Thickness is intumescent only. Results also apply to rectangular/square hollow beams exposed on all four sides up to the maximum dry film thickness of 5.250mm and section factor of 165m

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of										
	350°C	400°C	450°C	500°C	520°C	550°C	570°C	600°C	650°C	700°C	750°C
50	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
55	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
60	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
65	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
70	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
75	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
80	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
85	0.257	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
90	0.276	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
95	0.295	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
100	0.314	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
105	0.332	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
110	0.351	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
115	0.370	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
120	0.389	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
125	0.408	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
130	0.426	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
135	0.445	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
140	0.464	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
145	0.483	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
150	0.502	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
155	0.521	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
160	0.539	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
165	0.558	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
170	0.577	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
175	0.596	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
180	0.615	0.250	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
185	0.633	0.271	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
190	0.652	0.293	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
195	0.671	0.315	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
200	0.690	0.337	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
205	0.709	0.358	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
210	0.728	0.380	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
215	0.746	0.402	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
220	0.765	0.424	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
225	0.784	0.446	0.259	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
230	0.803	0.467	0.278	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
235	0.822	0.489	0.297	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
240	0.841	0.511	0.317	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
245	0.859	0.533	0.336	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
250	0.878	0.555	0.355	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
255	0.897	0.576	0.374	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
260	0.916	0.598	0.393	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
265	0.935	0.620	0.412	0.244	0.241	0.241	0.241	0.241	0.241	0.241	0.241
270	0.953	0.642	0.431	0.260	0.241	0.241	0.241	0.241	0.241	0.241	0.241
275	0.972	0.663	0.450	0.276	0.241	0.241	0.241	0.241	0.241	0.241	0.241
280	0.991	0.685	0.469	0.291	0.244	0.241	0.241	0.241	0.241	0.241	0.241
285	1.010	0.707	0.488	0.307	0.258	0.241	0.241	0.241	0.241	0.241	0.241
290	1.029	0.729	0.507	0.323	0.273	0.241	0.241	0.241	0.241	0.241	0.241
295	1.048	0.751	0.526	0.338	0.287	0.241	0.241	0.241	0.241	0.241	0.241
300	1.066	0.772	0.545	0.354	0.301	0.241	0.241	0.241	0.241	0.241	0.241
305	1.085	0.794	0.564	0.370	0.316	0.241	0.241	0.241	0.241	0.241	0.241
310	1.104	0.816	0.583	0.386	0.330	0.241	0.241	0.241	0.241	0.241	0.241
315	1.129	0.838	0.603	0.401	0.344	0.244	0.241	0.241	0.241	0.241	0.241
320	1.154	0.860	0.622	0.417	0.358	0.257	0.241	0.241	0.241	0.241	0.241
325	1.180	0.881	0.641	0.433	0.373	0.269	0.241	0.241	0.241	0.241	0.241
330	1.205	0.903	0.660	0.449	0.387	0.282	0.241	0.241	0.241	0.241	0.241
335	1.231	0.925	0.679	0.464	0.401	0.295	0.241	0.241	0.241	0.241	0.241
340	1.256	0.947	0.698	0.480	0.416	0.307	0.248	0.241	0.241	0.241	0.241
345	1.282	0.968	0.717	0.496	0.430	0.320	0.260	0.241	0.241	0.241	0.241
350	1.308	0.990	0.736	0.512	0.444	0.333	0.271	0.241	0.241	0.241	0.241
355	1.333	1.012	0.755	0.527	0.459	0.345	0.283	0.241	0.241	0.241	0.241
360	1.359	1.034	0.774	0.543	0.473	0.358	0.295	0.241	0.241	0.241	0.241
365	1.384	1.056	0.793	0.559	0.487	0.371	0.306	0.241	0.241	0.241	0.241
370	1.410	1.077	0.812	0.575	0.502	0.383	0.318	0.241	0.241	0.241	0.241
375	1.435	1.099	0.831	0.590	0.516	0.396	0.330	0.241	0.241	0.241	0.241
380	1.461	1.123	0.850	0.606	0.530	0.409	0.341	0.247	0.241	0.241	0.241
385	1.486	1.147	0.869	0.622	0.545	0.422	0.353	0.257	0.241	0.241	0.241
390	1.512	1.171	0.888	0.638	0.559	0.434	0.365	0.267	0.241	0.241	0.241
395	1.537	1.195	0.908	0.653	0.573	0.447	0.376	0.277	0.241	0.241	0.241
400	1.563	1.220	0.927	0.669	0.588	0.460	0.388	0.287	0.241	0.241	0.241
405	1.589	1.244	0.946	0.685	0.602	0.472	0.399	0.297	0.241	0.241	0.241
410	1.614	1.268	0.965	0.701	0.616	0.485	0.411	0.307	0.241	0.241	0.241
415	1.640	1.292	0.984	0.716	0.630	0.498	0.423	0.317	0.241	0.241	0.241
420	1.665	1.317	1.003	0.732	0.645	0.510	0.434	0.327	0.241	0.241	0.241
425	1.691	1.341	1.022	0.748	0.659	0.523	0.446	0.337	0.241	0.241	0.241

Thickness is intumescent only. Results also apply to rectangular/square hollow beams exposed on all four sides up to the maximum dry film thickness of 5.250mm and section factor of 165m¹

1.

Table 23: Circular and Rectangular/Square Hollow Column Sections 30 Minutes

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of										
	350°C	400°C	450°C	500°C	520°C	550°C	570°C	600°C	650°C	700°C	750°C
50	0.503	0.284	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
55	0.572	0.330	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
60	0.641	0.375	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
65	0.710	0.420	0.243	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
70	0.779	0.466	0.269	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
75	0.849	0.511	0.295	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
80	0.918	0.556	0.321	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
85	0.987	0.601	0.347	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
90	1.056	0.647	0.373	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
95	1.114	0.692	0.399	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
100	1.141	0.737	0.425	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
105	1.169	0.782	0.451	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
110	1.197	0.828	0.477	0.241	0.241	0.241	0.241	0.241	0.241	0.241	0.241
115	1.225	0.873	0.503	0.255	0.241	0.241	0.241	0.241	0.241	0.241	0.241
120	1.252	0.918	0.529	0.273	0.241	0.241	0.241	0.241	0.241	0.241	0.241
125	1.280	0.963	0.555	0.292	0.241	0.241	0.241	0.241	0.241	0.241	0.241
130	1.308	1.009	0.581	0.311	0.241	0.241	0.241	0.241	0.241	0.241	0.241
135	1.336	1.054	0.607	0.330	0.241	0.241	0.241	0.241	0.241	0.241	0.241
140	1.363	1.099	0.633	0.349	0.242	0.241	0.241	0.241	0.241	0.241	0.241
145	1.391	1.123	0.659	0.368	0.262	0.241	0.241	0.241	0.241	0.241	0.241
150	1.419	1.143	0.685	0.387	0.281	0.241	0.241	0.241	0.241	0.241	0.241
155	1.446	1.163	0.711	0.406	0.300	0.241	0.241	0.241	0.241	0.241	0.241
160	1.474	1.183	0.737	0.425	0.320	0.241	0.241	0.241	0.241	0.241	0.241
165	1.502	1.203	0.764	0.444	0.339	0.241	0.241	0.241	0.241	0.241	0.241
170	1.530	1.223	0.790	0.463	0.358	0.241	0.241	0.241	0.241	0.241	0.241
175	1.557	1.243	0.816	0.482	0.378	0.241	0.241	0.241	0.241	0.241	0.241
180	1.585	1.263	0.842	0.501	0.397	0.241	0.241	0.241	0.241	0.241	0.241
185	1.613	1.283	0.868	0.520	0.417	0.241	0.241	0.241	0.241	0.241	0.241
190	1.641	1.303	0.894	0.539	0.436	0.241	0.241	0.241	0.241	0.241	0.241
195	1.668	1.323	0.920	0.558	0.455	0.252	0.241	0.241	0.241	0.241	0.241
200	1.696	1.343	0.946	0.577	0.475	0.272	0.241	0.241	0.241	0.241	0.241
205	1.724	1.363	0.972	0.596	0.494	0.293	0.247	0.241	0.241	0.241	0.241
210	1.752	1.383	0.998	0.615	0.513	0.314	0.266	0.241	0.241	0.241	0.241
215	1.779	1.403	1.024	0.634	0.533	0.334	0.285	0.241	0.241	0.241	0.241
220	1.807	1.423	1.050	0.653	0.552	0.355	0.305	0.241	0.241	0.241	0.241
225	1.835	1.443	1.076	0.672	0.571	0.376	0.324	0.255	0.241	0.241	0.241
230	1.863	1.463	1.102	0.690	0.591	0.396	0.343	0.272	0.241	0.241	0.241
235	1.890	1.483	1.127	0.709	0.610	0.417	0.362	0.289	0.241	0.241	0.241
240	1.918	1.503	1.153	0.728	0.630	0.438	0.382	0.306	0.241	0.241	0.241
245	1.946	1.523	1.178	0.747	0.649	0.459	0.401	0.323	0.241	0.241	0.241
250	1.973	1.543	1.203	0.766	0.668	0.479	0.420	0.340	0.241	0.241	0.241
255	2.001	1.563	1.228	0.785	0.688	0.500	0.440	0.357	0.241	0.241	0.241
260	2.029	1.583	1.254	0.804	0.707	0.521	0.459	0.374	0.243	0.241	0.241
265	2.058	1.603	1.279	0.823	0.726	0.541	0.478	0.391	0.257	0.241	0.241
270	2.086	1.623	1.304	0.842	0.746	0.562	0.497	0.408	0.270	0.241	0.241
275	2.114	1.643	1.330	0.861	0.765	0.583	0.517	0.425	0.284	0.241	0.241
280	2.142	1.663	1.355	0.880	0.784	0.603	0.536	0.442	0.298	0.241	0.241
285	2.171	1.683	1.380	0.899	0.804	0.624	0.555	0.459	0.311	0.241	0.241
290	2.199	1.703	1.406	0.918	0.823	0.645	0.574	0.476	0.325	0.241	0.241
295	2.227	1.723	1.431	0.937	0.842	0.665	0.594	0.493	0.339	0.241	0.241
300	2.255	1.743	1.456	0.956	0.862	0.686	0.613	0.510	0.352	0.241	0.241
305	2.284	1.763	1.482	0.975	0.881	0.707	0.632	0.527	0.366	0.241	0.241
310	2.312	1.783	1.507	0.994	0.901	0.727	0.651	0.544	0.380	0.241	0.241
315	2.340	1.803	1.532	1.013	0.920	0.748	0.671	0.561	0.393	0.241	0.241
320	2.369	1.823	1.558	1.032	0.939	0.769	0.690	0.578	0.407	0.245	0.241
325	2.397	1.843	1.583	1.051	0.959	0.790	0.709	0.595	0.421	0.256	0.241
330	2.425	1.863	1.608	1.070	0.978	0.810	0.728	0.612	0.434	0.266	0.241
335	2.453	1.883	1.634	1.089	0.997	0.831	0.748	0.629	0.448	0.277	0.241
340	2.482	1.903	1.659	1.109	1.017	0.852	0.767	0.646	0.462	0.288	0.241
345	2.510	1.923	1.684	1.146	1.036	0.872	0.786	0.663	0.476	0.298	0.241
350	2.538	1.943	1.710	1.184	1.055	0.893	0.806	0.680	0.489	0.309	0.241
355	2.566	1.963	1.735	1.221	1.075	0.914	0.825	0.697	0.503	0.320	0.241
360	2.595	1.983	1.760	1.259	1.094	0.934	0.844	0.714	0.517	0.330	0.241
365	2.624	2.006	1.785	1.296	1.121	0.955	0.863	0.731	0.530	0.341	0.241
370	2.660	2.073	1.811	1.334	1.159	0.976	0.883	0.748	0.544	0.352	0.241
375	2.697	2.141	1.836	1.371	1.197	0.996	0.902	0.765	0.558	0.362	0.241
380	2.733	2.208	1.861	1.409	1.235	1.017	0.921	0.782	0.571	0.373	0.241
385	2.770	2.275	1.887	1.446	1.273	1.038	0.940	0.799	0.585	0.384	0.241
390	2.807	2.343	1.912	1.484	1.311	1.058	0.960	0.816	0.599	0.394	0.241
395	2.843	2.410	1.937	1.521	1.349	1.079	0.979	0.833	0.612	0.405	0.241
400	2.880	2.477	1.963	1.559	1.387	1.100	0.998	0.850	0.626	0.416	0.241
405	2.917	2.545	1.988	1.596	1.425	1.136	1.017	0.867	0.640	0.426	0.241
410	2.953	2.612	2.032	1.634	1.463	1.179	1.037	0.884	0.653	0.437	0.241
415	2.990	2.650	2.100	1.671	1.501	1.222	1.056	0.901	0.667	0.448	0.241
420	3.026	2.684	2.168	1.709	1.539	1.265	1.075	0.918	0.681	0.458	0.241
425	3.063	2.718	2.236	1.746	1.576	1.308	1.095	0.935	0.694	0.469	0.241

Thickness is intumescent only. Results also apply to rectangular/square hollow beams exposed on all four sides up to the maximum dry film thickness of 5.250mm and section factor of 165m

Table 24: Circular and Rectangular/Square Hollow Column Sections 45 Minutes

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of										
	350°C	400°C	450°C	500°C	520°C	550°C	570°C	600°C	650°C	700°C	750°C
50	1.177	0.925	0.693	0.478	0.401	0.275	0.241	0.241	0.241	0.241	0.241
55	1.241	1.037	0.778	0.540	0.454	0.317	0.246	0.241	0.241	0.241	0.241
60	1.305	1.126	0.863	0.601	0.507	0.360	0.281	0.241	0.241	0.241	0.241
65	1.369	1.179	0.949	0.662	0.560	0.402	0.316	0.241	0.241	0.241	0.241
70	1.433	1.231	1.034	0.723	0.612	0.444	0.351	0.252	0.241	0.241	0.241
75	1.496	1.283	1.113	0.784	0.665	0.486	0.387	0.276	0.241	0.241	0.241
80	1.560	1.336	1.157	0.846	0.718	0.528	0.422	0.300	0.241	0.241	0.241
85	1.624	1.388	1.202	0.907	0.771	0.571	0.457	0.323	0.241	0.241	0.241
90	1.688	1.441	1.246	0.968	0.824	0.613	0.492	0.347	0.241	0.241	0.241
95	1.752	1.493	1.291	1.029	0.876	0.655	0.527	0.371	0.241	0.241	0.241
100	1.816	1.545	1.335	1.091	0.929	0.697	0.562	0.394	0.241	0.241	0.241
105	1.880	1.598	1.379	1.134	0.982	0.740	0.597	0.418	0.241	0.241	0.241
110	1.943	1.650	1.424	1.172	1.035	0.782	0.632	0.442	0.258	0.241	0.241
115	2.005	1.703	1.468	1.209	1.088	0.824	0.667	0.466	0.276	0.241	0.241
120	2.048	1.755	1.513	1.247	1.129	0.866	0.702	0.489	0.295	0.241	0.241
125	2.090	1.807	1.557	1.285	1.165	0.909	0.737	0.513	0.313	0.241	0.241
130	2.132	1.860	1.602	1.322	1.201	0.951	0.772	0.537	0.331	0.241	0.241
135	2.175	1.912	1.646	1.360	1.237	0.993	0.807	0.560	0.350	0.241	0.241
140	2.217	1.965	1.690	1.398	1.273	1.035	0.843	0.584	0.368	0.241	0.241
145	2.259	2.013	1.735	1.435	1.308	1.077	0.878	0.608	0.387	0.241	0.241
150	2.302	2.051	1.779	1.473	1.344	1.118	0.913	0.632	0.405	0.241	0.241
155	2.344	2.088	1.824	1.510	1.380	1.156	0.948	0.655	0.423	0.241	0.241
160	2.386	2.126	1.868	1.548	1.416	1.194	0.983	0.679	0.442	0.241	0.241
165	2.429	2.164	1.913	1.586	1.452	1.232	1.018	0.703	0.460	0.253	0.241
170	2.471	2.202	1.957	1.623	1.488	1.270	1.053	0.726	0.479	0.271	0.241
175	2.513	2.240	2.002	1.661	1.524	1.309	1.088	0.750	0.497	0.290	0.241
180	2.556	2.277	2.035	1.699	1.559	1.347	1.125	0.774	0.515	0.308	0.241
185	2.598	2.315	2.069	1.736	1.595	1.385	1.165	0.797	0.534	0.326	0.241
190	2.647	2.353	2.103	1.774	1.631	1.423	1.204	0.821	0.552	0.344	0.241
195	2.702	2.391	2.137	1.811	1.667	1.461	1.243	0.845	0.570	0.363	0.241
200	2.757	2.429	2.171	1.849	1.703	1.499	1.283	0.869	0.589	0.381	0.241
205	2.812	2.466	2.204	1.887	1.739	1.537	1.322	0.892	0.607	0.399	0.241
210	2.867	2.504	2.238	1.924	1.774	1.575	1.361	0.916	0.626	0.417	0.241
215	2.923	2.542	2.272	1.962	1.810	1.613	1.400	0.940	0.644	0.435	0.241
220	2.978	2.580	2.306	2.000	1.846	1.651	1.440	0.963	0.662	0.454	0.241
225	3.033	2.618	2.340	2.028	1.882	1.689	1.479	0.987	0.681	0.472	0.241
230	3.088	2.656	2.373	2.055	1.918	1.727	1.518	1.011	0.699	0.490	0.241
235	3.143	2.695	2.407	2.083	1.954	1.765	1.558	1.035	0.718	0.508	0.241
240	3.199	2.734	2.441	2.111	1.989	1.803	1.597	1.058	0.736	0.527	0.241
245	3.254	2.772	2.475	2.138	2.019	1.841	1.636	1.082	0.754	0.545	0.241
250	3.309	2.811	2.509	2.166	2.045	1.879	1.676	1.106	0.773	0.563	0.241
255	3.364	2.850	2.542	2.194	2.070	1.917	1.715	1.155	0.791	0.581	0.245
260	3.420	2.889	2.576	2.221	2.096	1.955	1.754	1.205	0.809	0.600	0.261
265	3.475	2.927	2.610	2.249	2.122	1.993	1.794	1.256	0.828	0.618	0.277
270	3.530	2.966	2.647	2.276	2.148	2.026	1.833	1.306	0.846	0.636	0.293
275	3.585	3.005	2.686	2.304	2.174	2.058	1.872	1.356	0.865	0.654	0.309
280	3.640	3.043	2.725	2.332	2.200	2.089	1.912	1.406	0.883	0.672	0.325
285	3.696	3.082	2.764	2.359	2.225	2.120	1.951	1.456	0.901	0.691	0.341
290	3.751	3.121	2.802	2.387	2.251	2.152	1.990	1.506	0.920	0.709	0.357
295	3.806	3.160	2.841	2.414	2.277	2.183	2.027	1.556	0.938	0.727	0.373
300	3.861	3.198	2.880	2.442	2.303	2.215	2.062	1.606	0.957	0.745	0.389
305	3.916	3.237	2.919	2.470	2.329	2.246	2.097	1.657	0.975	0.764	0.405
310	3.972	3.276	2.958	2.497	2.355	2.277	2.133	1.707	0.993	0.782	0.422
315	4.027	3.314	2.996	2.525	2.380	2.309	2.168	1.757	1.012	0.800	0.438
320	4.082	3.353	3.035	2.553	2.406	2.340	2.203	1.807	1.030	0.818	0.454
325	4.137	3.392	3.074	2.580	2.432	2.372	2.238	1.857	1.048	0.837	0.470
330	4.193	3.430	3.113	2.608	2.458	2.403	2.273	1.907	1.067	0.855	0.486
335	4.248	3.469	3.152	2.644	2.484	2.434	2.309	1.957	1.085	0.873	0.502
340	4.303	3.508	3.190	2.688	2.510	2.466	2.344	2.007	1.104	0.891	0.518
345	4.358	3.547	3.229	2.731	2.535	2.497	2.379	2.056	1.180	0.909	0.534
350	4.413	3.585	3.268	2.774	2.561	2.529	2.414	2.105	1.265	0.928	0.550
355	4.469	3.624	3.307	2.818	2.587	2.560	2.450	2.154	1.350	0.946	0.566
360	4.524	3.663	3.346	2.861	2.613	2.591	2.485	2.202	1.434	0.964	0.582
365	4.579	3.701	3.385	2.905	2.654	2.623	2.520	2.251	1.519	0.982	0.598
370	4.634	3.740	3.423	2.948	2.700	2.661	2.555	2.300	1.604	1.001	0.614
375	4.689	3.779	3.462	2.992	2.747	2.699	2.591	2.349	1.689	1.019	0.630
380	4.745	3.818	3.501	3.035	2.794	2.737	2.626	2.397	1.773	1.037	0.647
385	4.800	3.856	3.540	3.078	2.840	2.775	2.662	2.446	1.858	1.055	0.663
390	4.855	3.895	3.579	3.122	2.887	2.813	2.698	2.495	1.943	1.073	0.679
395	4.910	3.934	3.617	3.165	2.933	2.851	2.734	2.544	2.019	1.092	0.695
400	4.965	3.972	3.656	3.209	2.980	2.889	2.771	2.592	2.076	1.131	0.711
405	5.021	4.011	3.695	3.252	3.027	2.927	2.807	2.634	2.133	1.246	0.727
410	5.076	4.050	3.734	3.295	3.073	2.964	2.843	2.667	2.189	1.362	0.743
415	5.131	4.089	3.773	3.339	3.120	3.002	2.879	2.701	2.246	1.477	0.759
420	5.186	4.127	3.811	3.382	3.166	3.040	2.915	2.734	2.303	1.592	0.775
425	5.242	4.166	3.850	3.426	3.213	3.078	2.952	2.767	2.360	1.708	0.791

Thickness is intumescent only. Results also apply to rectangular/square hollow beams exposed on all four sides up to the maximum dry film thickness of 5.250mm and section factor of 165m⁻¹.

Table 25: Circular and Rectangular/Square Hollow Column Sections 60 Minutes

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of										
	350°C	400°C	450°C	500°C	520°C	550°C	570°C	600°C	650°C	700°C	750°C
50	1.540	1.348	1.195	0.988	0.888	0.743	0.652	0.514	0.241	0.241	0.241
55	1.637	1.431	1.268	1.101	0.992	0.834	0.735	0.586	0.277	0.241	0.241
60	1.734	1.515	1.341	1.167	1.095	0.925	0.818	0.658	0.335	0.241	0.241
65	1.831	1.598	1.414	1.230	1.159	1.016	0.901	0.729	0.393	0.241	0.241
70	1.927	1.681	1.487	1.293	1.219	1.106	0.983	0.801	0.451	0.241	0.241
75	2.024	1.764	1.560	1.356	1.278	1.165	1.066	0.873	0.509	0.272	0.241
80	2.119	1.847	1.633	1.419	1.338	1.223	1.135	0.945	0.567	0.308	0.241
85	2.214	1.930	1.706	1.482	1.398	1.281	1.192	1.017	0.624	0.344	0.241
90	2.309	2.010	1.779	1.545	1.457	1.340	1.248	1.089	0.682	0.379	0.241
95	2.404	2.069	1.853	1.608	1.517	1.398	1.305	1.147	0.740	0.415	0.241
100	2.499	2.128	1.926	1.671	1.577	1.456	1.361	1.201	0.798	0.450	0.241
105	2.594	2.186	1.999	1.734	1.636	1.515	1.417	1.254	0.856	0.486	0.241
110	2.695	2.245	2.045	1.797	1.696	1.573	1.474	1.308	0.914	0.521	0.241
115	2.798	2.304	2.090	1.860	1.756	1.631	1.530	1.362	0.972	0.557	0.241
120	2.901	2.362	2.135	1.923	1.815	1.689	1.587	1.416	1.030	0.592	0.241
125	3.005	2.421	2.180	1.986	1.875	1.748	1.643	1.469	1.088	0.628	0.241
130	3.108	2.480	2.226	2.033	1.935	1.806	1.700	1.523	1.142	0.663	0.256
135	3.211	2.538	2.271	2.075	1.994	1.864	1.756	1.577	1.196	0.699	0.276
140	3.314	2.597	2.316	2.117	2.037	1.923	1.813	1.630	1.249	0.734	0.296
145	3.418	2.680	2.361	2.158	2.078	1.981	1.869	1.684	1.303	0.770	0.316
150	3.521	2.778	2.406	2.200	2.118	2.030	1.925	1.738	1.356	0.806	0.336
155	3.624	2.876	2.451	2.242	2.159	2.074	1.982	1.792	1.409	0.841	0.355
160	3.727	2.975	2.496	2.283	2.199	2.118	2.029	1.845	1.463	0.877	0.375
165	3.831	3.073	2.541	2.325	2.239	2.162	2.071	1.899	1.516	0.912	0.395
170	3.948	3.172	2.586	2.367	2.280	2.206	2.113	1.953	1.570	0.948	0.415
175	4.068	3.270	2.642	2.408	2.320	2.250	2.154	2.005	1.623	0.983	0.435
180	4.188	3.368	2.728	2.450	2.361	2.293	2.196	2.043	1.676	1.019	0.455
185	4.309	3.467	2.814	2.492	2.401	2.337	2.238	2.082	1.730	1.054	0.475
190	4.429	3.565	2.900	2.533	2.442	2.381	2.280	2.120	1.783	1.090	0.494
195	4.549	3.664	2.986	2.575	2.482	2.425	2.321	2.158	1.837	1.148	0.514
200	4.670	3.762	3.071	2.617	2.523	2.469	2.363	2.196	1.890	1.225	0.534
205	4.790	3.861	3.157	2.674	2.563	2.513	2.405	2.234	1.943	1.301	0.554
210	4.910	3.968	3.243	2.733	2.604	2.557	2.447	2.272	1.997	1.378	0.574
215	5.031	4.075	3.329	2.793	2.650	2.601	2.489	2.311	2.030	1.455	0.594
220	5.151	4.182	3.415	2.852	2.701	2.641	2.530	2.349	2.062	1.532	0.614
225	5.271	4.289	3.501	2.911	2.753	2.679	2.572	2.387	2.093	1.608	0.633
230	5.392	4.396	3.587	2.970	2.804	2.716	2.614	2.425	2.125	1.685	0.653
235	5.512	4.502	3.673	3.029	2.855	2.754	2.651	2.463	2.156	1.762	0.673
240	5.632	4.609	3.758	3.088	2.906	2.792	2.687	2.501	2.187	1.839	0.693
245	5.753	4.716	3.844	3.147	2.957	2.829	2.724	2.540	2.219	1.915	0.713
250	5.873	4.823	3.947	3.207	3.008	2.867	2.760	2.578	2.250	1.992	0.733
255	-	4.930	4.052	3.266	3.059	2.905	2.796	2.616	2.281	2.026	0.752
260	-	5.037	4.156	3.325	3.110	2.942	2.833	2.652	2.313	2.054	0.772
265	-	5.144	4.261	3.384	3.161	2.980	2.869	2.689	2.344	2.082	0.792
270	-	5.251	4.366	3.443	3.213	3.018	2.905	2.725	2.376	2.110	0.812
275	-	5.357	4.470	3.502	3.264	3.055	2.942	2.761	2.407	2.137	0.832
280	-	5.464	4.575	3.561	3.315	3.093	2.978	2.797	2.438	2.165	0.852
285	-	5.571	4.679	3.621	3.366	3.131	3.014	2.833	2.470	2.193	0.872
290	-	5.678	4.784	3.680	3.417	3.168	3.051	2.870	2.501	2.221	0.891
295	-	5.785	4.888	3.739	3.468	3.206	3.087	2.906	2.533	2.249	0.911
300	-	5.892	4.993	3.798	3.519	3.244	3.123	2.942	2.564	2.276	0.931
305	-	-	5.098	3.857	3.570	3.281	3.160	2.978	2.595	2.304	0.951
310	-	-	5.202	3.916	3.621	3.319	3.196	3.014	2.628	2.332	0.971
315	-	-	5.307	3.975	3.673	3.357	3.232	3.051	2.665	2.360	0.991
320	-	-	5.411	4.034	3.724	3.394	3.269	3.087	2.702	2.388	1.011
325	-	-	5.516	4.094	3.775	3.432	3.305	3.123	2.739	2.416	1.030
330	-	-	5.620	4.153	3.826	3.470	3.341	3.159	2.777	2.443	1.050
335	-	-	5.725	4.212	3.877	3.507	3.378	3.196	2.814	2.471	1.070
340	-	-	5.830	4.271	3.928	3.545	3.414	3.232	2.851	2.499	1.090
345	-	-	-	4.330	3.979	3.583	3.450	3.268	2.888	2.527	1.138
350	-	-	-	4.389	4.030	3.620	3.487	3.304	2.925	2.555	1.308
355	-	-	-	4.448	4.081	3.658	3.523	3.340	2.962	2.582	1.477
360	-	-	-	4.508	4.133	3.696	3.559	3.377	3.000	2.610	1.646
365	-	-	-	4.567	4.184	3.733	3.596	3.413	3.037	2.644	1.815
370	-	-	-	4.626	4.235	3.771	3.632	3.449	3.074	2.681	1.984
375	-	-	-	4.685	4.286	3.809	3.668	3.485	3.111	2.718	2.054
380	-	-	-	4.744	4.337	3.846	3.705	3.521	3.148	2.755	2.112
385	-	-	-	4.803	4.388	3.884	3.741	3.558	3.185	2.791	2.170
390	-	-	-	4.862	4.439	3.922	3.777	3.594	3.223	2.828	2.228
395	-	-	-	4.922	4.490	3.959	3.814	3.630	3.260	2.865	2.287
400	-	-	-	4.981	4.541	3.997	3.850	3.666	3.297	2.902	2.345
405	-	-	-	5.040	4.593	4.035	3.886	3.703	3.334	2.939	2.403
410	-	-	-	5.099	4.644	4.072	3.923	3.739	3.371	2.976	2.461
415	-	-	-	5.158	4.695	4.110	3.959	3.775	3.408	3.013	2.519
420	-	-	-	5.217	4.746	4.148	3.995	3.811	3.446	3.050	2.577
425	-	-	-	5.276	4.797	4.185	4.032	3.847	3.483	3.087	2.627

Thickness is intumescent only. Results also apply to rectangular/square hollow beams exposed on all four sides up to the maximum dry film thickness of 5.250mm and section factor of 165m¹

Table 26: Circular and Rectangular/Square Hollow Column Sections 75 Minutes											
Section Factor up to m⁻¹	Thickness (mm) Required for a Design Temperature of										
	350°C	400°C	450°C	500°C	520°C	550°C	570°C	600°C	650°C	700°C	750°C
50	1.886	1.669	1.495	1.321	1.257	1.169	1.112	0.970	0.682	0.373	0.241
55	2.022	1.781	1.596	1.409	1.341	1.250	1.189	1.088	0.788	0.468	0.241
60	2.216	1.894	1.696	1.498	1.426	1.331	1.267	1.168	0.895	0.562	0.256
65	2.410	2.007	1.797	1.586	1.510	1.412	1.345	1.240	1.001	0.656	0.306
70	2.604	2.131	1.897	1.675	1.594	1.493	1.423	1.313	1.107	0.751	0.356
75	2.747	2.254	1.998	1.763	1.678	1.575	1.500	1.386	1.173	0.845	0.406
80	2.886	2.378	2.088	1.852	1.762	1.656	1.578	1.458	1.239	0.940	0.457
85	3.024	2.502	2.177	1.940	1.846	1.737	1.656	1.531	1.304	1.034	0.507
90	3.163	2.626	2.267	2.022	1.931	1.818	1.734	1.603	1.370	1.121	0.557
95	3.301	2.750	2.356	2.087	2.011	1.899	1.811	1.676	1.436	1.184	0.607
100	3.439	2.874	2.446	2.151	2.068	1.980	1.889	1.749	1.502	1.246	0.657
105	3.578	2.999	2.535	2.216	2.125	2.037	1.967	1.821	1.567	1.309	0.708
110	3.716	3.123	2.626	2.281	2.182	2.084	2.027	1.894	1.633	1.372	0.758
115	3.855	3.247	2.740	2.346	2.239	2.131	2.073	1.966	1.699	1.434	0.808
120	3.993	3.371	2.855	2.411	2.297	2.178	2.119	2.025	1.765	1.497	0.858
125	4.132	3.496	2.970	2.475	2.354	2.225	2.165	2.069	1.831	1.560	0.908
130	4.270	3.620	3.084	2.540	2.411	2.273	2.211	2.113	1.896	1.622	0.958
135	4.409	3.744	3.199	2.605	2.468	2.320	2.257	2.158	1.962	1.685	1.009
140	4.547	3.877	3.313	2.699	2.525	2.367	2.303	2.202	2.018	1.748	1.059
145	4.686	4.067	3.428	2.802	2.582	2.414	2.349	2.246	2.059	1.811	1.110
150	4.824	4.256	3.542	2.905	2.654	2.461	2.396	2.291	2.100	1.873	1.170
155	4.962	4.446	3.657	3.008	2.752	2.509	2.442	2.335	2.142	1.936	1.230
160	5.101	4.636	3.772	3.111	2.851	2.556	2.488	2.379	2.183	1.999	1.290
165	5.239	4.825	3.906	3.214	2.950	2.603	2.534	2.424	2.224	2.053	1.350
170	5.378	5.015	4.087	3.317	3.048	2.679	2.580	2.468	2.265	2.107	1.410
175	5.516	5.205	4.269	3.420	3.147	2.771	2.630	2.512	2.306	2.162	1.470
180	5.655	5.394	4.450	3.523	3.246	2.863	2.710	2.557	2.347	2.216	1.531
185	5.793	5.584	4.631	3.626	3.344	2.955	2.790	2.601	2.388	2.270	1.591
190	-	5.774	4.813	3.729	3.443	3.047	2.870	2.658	2.429	2.324	1.651
195	-	-	4.994	3.832	3.542	3.140	2.950	2.723	2.471	2.378	1.711
200	-	-	5.175	3.995	3.640	3.232	3.030	2.789	2.512	2.433	1.771
205	-	-	5.357	4.172	3.739	3.324	3.110	2.855	2.553	2.487	1.831
210	-	-	5.538	4.350	3.838	3.416	3.190	2.921	2.594	2.541	1.891
215	-	-	5.719	4.528	4.005	3.508	3.270	2.987	2.637	2.595	1.951
220	-	-	5.901	4.706	4.184	3.600	3.351	3.053	2.684	2.638	2.009
225	-	-	-	4.884	4.363	3.692	3.431	3.118	2.731	2.671	2.056
230	-	-	-	5.061	4.542	3.785	3.511	3.184	2.778	2.704	2.103
235	-	-	-	5.239	4.721	3.904	3.591	3.250	2.825	2.737	2.150
240	-	-	-	5.417	4.900	4.097	3.671	3.316	2.872	2.770	2.196
245	-	-	-	5.595	5.079	4.290	3.751	3.382	2.919	2.803	2.243
250	-	-	-	5.773	5.258	4.483	3.831	3.447	2.965	2.836	2.290
255	-	-	-	-	5.437	4.677	4.006	3.513	3.012	2.869	2.336
260	-	-	-	-	5.616	4.870	4.216	3.579	3.059	2.902	2.383
265	-	-	-	-	5.795	5.063	4.426	3.645	3.106	2.935	2.430
270	-	-	-	-	-	5.256	4.635	3.711	3.153	2.968	2.476
275	-	-	-	-	-	5.450	4.845	3.776	3.200	3.001	2.523
280	-	-	-	-	-	5.643	5.054	3.842	3.247	3.034	2.570
285	-	-	-	-	-	5.836	5.264	4.075	3.294	3.068	2.617
290	-	-	-	-	-	-	5.473	4.336	3.341	3.101	2.649
295	-	-	-	-	-	-	5.683	4.598	3.387	3.134	2.681
300	-	-	-	-	-	-	5.892	4.860	3.434	3.167	2.712
305	-	-	-	-	-	-	-	5.121	3.481	3.200	2.744
310	-	-	-	-	-	-	-	5.383	3.528	3.233	2.775
315	-	-	-	-	-	-	-	5.645	3.575	3.266	2.807
320	-	-	-	-	-	-	-	5.906	3.622	3.299	2.838
325	-	-	-	-	-	-	-	-	3.669	3.332	2.870
330	-	-	-	-	-	-	-	-	3.716	3.365	2.901
335	-	-	-	-	-	-	-	-	3.763	3.398	2.933
340	-	-	-	-	-	-	-	-	3.810	3.431	2.964
345	-	-	-	-	-	-	-	-	3.981	3.464	2.996
350	-	-	-	-	-	-	-	-	5.353	3.497	3.027
355	-	-	-	-	-	-	-	-	-	3.530	3.059
360	-	-	-	-	-	-	-	-	-	3.563	3.090
365	-	-	-	-	-	-	-	-	-	3.596	3.122
370	-	-	-	-	-	-	-	-	-	3.629	3.153
375	-	-	-	-	-	-	-	-	-	3.662	3.185
380	-	-	-	-	-	-	-	-	-	3.695	3.216
385	-	-	-	-	-	-	-	-	-	3.728	3.248
390	-	-	-	-	-	-	-	-	-	3.761	3.279
395	-	-	-	-	-	-	-	-	-	3.794	3.311
400	-	-	-	-	-	-	-	-	-	3.827	3.342
405	-	-	-	-	-	-	-	-	-	3.860	3.374
410	-	-	-	-	-	-	-	-	-	3.894	3.405
415	-	-	-	-	-	-	-	-	-	3.927	3.437
420	-	-	-	-	-	-	-	-	-	3.960	3.468
425	-	-	-	-	-	-	-	-	-	3.993	3.500

Thickness is intumescent only. Results also apply to rectangular/square hollow beams exposed on all four sides up to the maximum dry film thickness of 5.250mm and section factor of 165m

Table 27: Circular and Rectangular/Square Hollow Column Sections 90 Minutes											
Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of										
	350°C	400°C	450°C	500°C	520°C	550°C	570°C	600°C	650°C	700°C	750°C
50	2.716	1.999	1.786	1.593	1.522	1.429	1.366	1.277	1.127	0.878	0.541
55	2.866	2.198	1.912	1.706	1.630	1.534	1.467	1.371	1.210	1.025	0.638
60	3.016	2.396	2.047	1.819	1.738	1.638	1.568	1.465	1.293	1.140	0.735
65	3.166	2.595	2.200	1.932	1.846	1.743	1.669	1.559	1.376	1.214	0.832
70	3.316	2.754	2.352	2.045	1.954	1.848	1.770	1.654	1.459	1.289	0.930
75	3.466	2.908	2.505	2.158	2.059	1.953	1.870	1.748	1.542	1.363	1.027
80	3.617	3.062	2.655	2.272	2.160	2.047	1.971	1.842	1.625	1.438	1.117
85	3.767	3.216	2.795	2.385	2.261	2.132	2.056	1.936	1.708	1.512	1.177
90	3.917	3.370	2.936	2.498	2.362	2.217	2.134	2.023	1.791	1.587	1.236
95	4.067	3.524	3.076	2.611	2.463	2.302	2.211	2.091	1.874	1.662	1.296
100	4.217	3.678	3.217	2.736	2.564	2.386	2.289	2.159	1.957	1.736	1.355
105	4.367	3.832	3.358	2.861	2.674	2.471	2.366	2.228	2.028	1.811	1.414
110	4.517	3.986	3.498	2.987	2.794	2.556	2.444	2.296	2.083	1.885	1.474
115	4.667	4.140	3.639	3.112	2.914	2.648	2.521	2.364	2.139	1.960	1.533
120	4.817	4.294	3.779	3.238	3.034	2.760	2.599	2.433	2.194	2.024	1.593
125	4.967	4.448	3.920	3.363	3.153	2.872	2.697	2.501	2.250	2.075	1.652
130	5.117	4.602	4.060	3.489	3.273	2.984	2.802	2.570	2.305	2.126	1.712
135	5.267	4.756	4.201	3.614	3.393	3.095	2.908	2.645	2.361	2.177	1.771
140	5.417	4.910	4.341	3.740	3.513	3.207	3.013	2.742	2.417	2.228	1.831
145	5.568	5.064	4.482	3.878	3.633	3.319	3.119	2.839	2.472	2.278	1.890
150	5.718	5.218	4.623	4.126	3.753	3.431	3.224	2.936	2.528	2.329	1.950
155	5.868	5.372	4.763	4.374	3.894	3.543	3.330	3.032	2.583	2.380	2.008
160	-	5.525	4.904	4.623	4.139	3.655	3.436	3.129	2.648	2.431	2.059
165	-	5.679	5.044	4.871	4.385	3.767	3.541	3.226	2.730	2.482	2.111
170	-	5.833	5.185	5.119	4.630	3.912	3.647	3.322	2.812	2.533	2.162
175	-	-	5.368	5.368	4.876	4.162	3.752	3.419	2.894	2.584	2.213
180	-	-	5.616	5.616	5.121	4.412	3.866	3.516	2.977	2.638	2.265
185	-	-	5.864	5.864	5.366	4.662	4.123	3.612	3.059	2.703	2.316
190	-	-	-	-	5.612	4.912	4.380	3.709	3.141	2.767	2.367
195	-	-	-	-	5.857	5.162	4.638	3.806	3.223	2.832	2.418
200	-	-	-	-	-	5.412	4.895	3.997	3.305	2.896	2.470
205	-	-	-	-	-	5.662	5.152	4.277	3.388	2.961	2.521
210	-	-	-	-	-	5.912	5.409	4.557	3.470	3.025	2.572
215	-	-	-	-	-	-	5.667	4.836	3.552	3.090	2.629
220	-	-	-	-	-	-	5.924	5.116	3.634	3.154	2.758
225	-	-	-	-	-	-	-	5.395	3.716	3.219	2.888
230	-	-	-	-	-	-	-	5.675	3.799	3.283	3.017
235	-	-	-	-	-	-	-	-	3.986	3.348	3.147
240	-	-	-	-	-	-	-	-	4.368	3.412	3.276
245	-	-	-	-	-	-	-	-	4.750	3.477	3.406
250	-	-	-	-	-	-	-	-	5.132	3.541	3.535
255	-	-	-	-	-	-	-	-	5.514	3.605	3.665
260	-	-	-	-	-	-	-	-	5.896	3.669	3.794
265	-	-	-	-	-	-	-	-	-	3.924	3.924
270	-	-	-	-	-	-	-	-	-	4.053	4.053
275	-	-	-	-	-	-	-	-	-	4.183	4.183
280	-	-	-	-	-	-	-	-	-	4.312	4.312
285	-	-	-	-	-	-	-	-	-	4.442	4.442
290	-	-	-	-	-	-	-	-	-	-	4.571
295	-	-	-	-	-	-	-	-	-	-	4.701
300	-	-	-	-	-	-	-	-	-	-	4.830
305	-	-	-	-	-	-	-	-	-	-	4.960
310	-	-	-	-	-	-	-	-	-	-	5.089
315	-	-	-	-	-	-	-	-	-	-	5.219
320	-	-	-	-	-	-	-	-	-	-	5.348
325	-	-	-	-	-	-	-	-	-	-	5.478
330	-	-	-	-	-	-	-	-	-	-	5.607
335	-	-	-	-	-	-	-	-	-	-	5.737
340	-	-	-	-	-	-	-	-	-	-	5.866
345	-	-	-	-	-	-	-	-	-	-	-
350	-	-	-	-	-	-	-	-	-	-	-
355	-	-	-	-	-	-	-	-	-	-	-
360	-	-	-	-	-	-	-	-	-	-	-
365	-	-	-	-	-	-	-	-	-	-	-
370	-	-	-	-	-	-	-	-	-	-	-
375	-	-	-	-	-	-	-	-	-	-	-
380	-	-	-	-	-	-	-	-	-	-	-
385	-	-	-	-	-	-	-	-	-	-	-
390	-	-	-	-	-	-	-	-	-	-	-
395	-	-	-	-	-	-	-	-	-	-	-
400	-	-	-	-	-	-	-	-	-	-	-
405	-	-	-	-	-	-	-	-	-	-	-
410	-	-	-	-	-	-	-	-	-	-	-
415	-	-	-	-	-	-	-	-	-	-	-
420	-	-	-	-	-	-	-	-	-	-	-
425	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results also apply to rectangular/square hollow beams exposed on all four sides up to the maximum dry film thickness of 5.250mm and section factor of 165m¹

Table 28: Circular and Rectangular/Square Hollow Column Sections 105 Minutes

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of										
	350°C	400°C	450°C	500°C	520°C	550°C	570°C	600°C	650°C	700°C	750°C
50	-	-	2.143	1.857	1.779	1.682	1.614	1.516	1.348	1.213	0.980
55	-	-	2.352	1.993	1.910	1.809	1.737	1.631	1.451	1.305	1.114
60	-	-	2.561	2.161	2.048	1.937	1.861	1.747	1.554	1.396	1.184
65	-	-	2.740	2.332	2.202	2.066	1.984	1.863	1.657	1.487	1.253
70	-	-	2.908	2.503	2.355	2.196	2.104	1.979	1.760	1.579	1.322
75	-	-	3.077	2.668	2.509	2.327	2.224	2.087	1.863	1.670	1.391
80	-	-	3.245	2.818	2.660	2.457	2.343	2.193	1.966	1.762	1.460
85	-	-	3.413	2.968	2.804	2.587	2.463	2.300	2.059	1.853	1.529
90	-	-	3.581	3.118	2.947	2.721	2.582	2.406	2.146	1.944	1.599
95	-	-	3.749	3.269	3.091	2.855	2.707	2.512	2.233	2.029	1.668
100	-	-	3.918	3.419	3.234	2.989	2.835	2.619	2.320	2.104	1.737
105	-	-	4.086	3.569	3.378	3.124	2.962	2.737	2.408	2.178	1.806
110	-	-	4.254	3.719	3.521	3.258	3.090	2.855	2.495	2.252	1.875
115	-	-	4.422	3.870	3.665	3.392	3.217	2.973	2.582	2.326	1.944
120	-	-	4.590	4.020	3.808	3.526	3.345	3.091	2.679	2.401	2.012
125	-	-	4.759	4.170	3.952	3.661	3.472	3.209	2.783	2.475	2.073
130	-	-	4.927	4.320	4.095	3.795	3.600	3.327	2.888	2.549	2.135
135	-	-	5.095	4.471	4.239	3.929	3.727	3.445	2.992	2.624	2.196
140	-	-	5.263	4.621	4.382	4.063	3.855	3.564	3.096	2.715	2.257
145	-	-	5.431	4.771	4.526	4.198	3.982	3.682	3.200	2.806	2.319
150	-	-	5.599	4.921	4.669	4.332	4.110	3.800	3.304	2.897	2.380
155	-	-	5.768	5.072	4.813	4.466	4.237	4.029	3.409	2.988	2.441
160	-	-	-	5.222	4.956	4.601	4.365	4.346	3.513	3.078	2.503
165	-	-	-	5.372	5.100	4.735	4.664	4.664	3.617	3.169	2.564
170	-	-	-	5.522	5.243	4.981	4.981	4.981	3.721	3.260	2.626
175	-	-	-	5.673	5.387	5.299	5.299	5.299	3.825	3.351	2.694
180	-	-	-	5.823	5.616	5.616	5.616	5.616	4.108	3.442	2.763
185	-	-	-	-	-	-	-	-	4.451	3.532	2.831
190	-	-	-	-	-	-	-	-	4.795	3.623	2.899
195	-	-	-	-	-	-	-	-	5.138	3.714	2.967
200	-	-	-	-	-	-	-	-	5.481	3.805	3.036
205	-	-	-	-	-	-	-	-	5.825	4.020	3.104
210	-	-	-	-	-	-	-	-	-	4.369	3.172
215	-	-	-	-	-	-	-	-	-	4.719	3.241
220	-	-	-	-	-	-	-	-	-	5.068	3.309
225	-	-	-	-	-	-	-	-	-	5.418	3.377
230	-	-	-	-	-	-	-	-	-	5.767	3.445
235	-	-	-	-	-	-	-	-	-	-	3.514
240	-	-	-	-	-	-	-	-	-	-	3.582
245	-	-	-	-	-	-	-	-	-	-	3.650
250	-	-	-	-	-	-	-	-	-	-	3.718
255	-	-	-	-	-	-	-	-	-	-	3.787
260	-	-	-	-	-	-	-	-	-	-	3.887
265	-	-	-	-	-	-	-	-	-	-	4.683
270	-	-	-	-	-	-	-	-	-	-	5.479
275	-	-	-	-	-	-	-	-	-	-	-
280	-	-	-	-	-	-	-	-	-	-	-
285	-	-	-	-	-	-	-	-	-	-	-
290	-	-	-	-	-	-	-	-	-	-	-
295	-	-	-	-	-	-	-	-	-	-	-
300	-	-	-	-	-	-	-	-	-	-	-
305	-	-	-	-	-	-	-	-	-	-	-
310	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-	-	-
335	-	-	-	-	-	-	-	-	-	-	-
340	-	-	-	-	-	-	-	-	-	-	-
345	-	-	-	-	-	-	-	-	-	-	-
350	-	-	-	-	-	-	-	-	-	-	-
355	-	-	-	-	-	-	-	-	-	-	-
360	-	-	-	-	-	-	-	-	-	-	-
365	-	-	-	-	-	-	-	-	-	-	-
370	-	-	-	-	-	-	-	-	-	-	-
375	-	-	-	-	-	-	-	-	-	-	-
380	-	-	-	-	-	-	-	-	-	-	-
385	-	-	-	-	-	-	-	-	-	-	-
390	-	-	-	-	-	-	-	-	-	-	-
395	-	-	-	-	-	-	-	-	-	-	-
400	-	-	-	-	-	-	-	-	-	-	-
405	-	-	-	-	-	-	-	-	-	-	-
410	-	-	-	-	-	-	-	-	-	-	-
415	-	-	-	-	-	-	-	-	-	-	-
420	-	-	-	-	-	-	-	-	-	-	-
425	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results also apply to rectangular/square hollow beams exposed on all four sides up to the maximum dry film thickness of 5.250mm and section factor of 165m⁻¹.

Table 29: Circular and Rectangular/Square Hollow Column Sections 120 Minutes

Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of										
	350°C	400°C	450°C	500°C	520°C	550°C	570°C	600°C	650°C	700°C	750°C
50	-	-	-	2.204	2.072	1.924	1.854	1.749	1.564	1.412	1.219
55	-	-	-	2.419	2.273	2.103	2.000	1.885	1.686	1.521	1.302
60	-	-	-	2.632	2.474	2.282	2.167	2.024	1.808	1.630	1.385
65	-	-	-	2.808	2.666	2.461	2.334	2.173	1.931	1.739	1.468
70	-	-	-	2.983	2.834	2.637	2.502	2.323	2.054	1.848	1.552
75	-	-	-	3.159	3.002	2.795	2.664	2.472	2.177	1.958	1.635
80	-	-	-	3.335	3.170	2.952	2.815	2.621	2.300	2.064	1.718
85	-	-	-	3.511	3.338	3.110	2.965	2.762	2.423	2.169	1.802
90	-	-	-	3.687	3.506	3.268	3.115	2.902	2.546	2.274	1.885
95	-	-	-	3.862	3.674	3.425	3.266	3.042	2.671	2.378	1.968
100	-	-	-	4.038	3.842	3.583	3.416	3.182	2.797	2.483	2.059
105	-	-	-	4.214	4.010	3.740	3.566	3.323	2.924	2.588	2.154
110	-	-	-	4.390	4.178	3.898	3.717	3.463	3.050	2.699	2.249
115	-	-	-	4.566	4.346	4.055	3.867	3.603	3.177	2.812	2.344
120	-	-	-	4.741	4.514	4.213	4.017	3.744	3.304	2.926	2.440
125	-	-	-	4.917	4.682	4.371	4.168	3.884	3.430	3.040	2.535
130	-	-	-	5.093	4.850	4.528	4.318	4.024	3.557	3.154	2.630
135	-	-	-	5.269	5.018	4.686	4.468	4.165	3.683	3.267	2.719
140	-	-	-	5.445	5.186	4.843	4.619	4.305	3.810	3.381	2.808
145	-	-	-	5.620	5.354	5.001	4.769	4.445	3.936	3.495	2.897
150	-	-	-	5.796	5.523	5.159	4.919	4.586	4.063	3.609	2.987
155	-	-	-	-	5.691	5.316	5.070	4.726	4.189	3.722	3.076
160	-	-	-	-	5.859	5.474	5.220	4.866	4.316	3.836	3.165
165	-	-	-	-	-	5.631	5.370	5.007	4.442	4.108	3.254
170	-	-	-	-	-	5.789	5.521	5.147	4.569	4.404	3.343
175	-	-	-	-	-	-	5.671	5.287	4.701	4.701	3.433
180	-	-	-	-	-	-	5.821	5.428	4.998	4.998	3.522
185	-	-	-	-	-	-	-	5.568	5.295	5.295	3.611
190	-	-	-	-	-	-	-	5.708	5.592	5.592	3.700
195	-	-	-	-	-	-	-	5.889	5.889	5.889	3.789
200	-	-	-	-	-	-	-	-	-	-	3.934
205	-	-	-	-	-	-	-	-	-	-	4.207
210	-	-	-	-	-	-	-	-	-	-	4.480
215	-	-	-	-	-	-	-	-	-	-	4.753
220	-	-	-	-	-	-	-	-	-	-	5.027
225	-	-	-	-	-	-	-	-	-	-	5.300
230	-	-	-	-	-	-	-	-	-	-	5.573
235	-	-	-	-	-	-	-	-	-	-	5.846
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	-	-	-	-	-	-	-	-	-	-	-
375	-	-	-	-	-	-	-	-	-	-	-
380	-	-	-	-	-	-	-	-	-	-	-
385	-	-	-	-	-	-	-	-	-	-	-
390	-	-	-	-	-	-	-	-	-	-	-
395	-	-	-	-	-	-	-	-	-	-	-
400	-	-	-	-	-	-	-	-	-	-	-
405	-	-	-	-	-	-	-	-	-	-	-
410	-	-	-	-	-	-	-	-	-	-	-
415	-	-	-	-	-	-	-	-	-	-	-
420	-	-	-	-	-	-	-	-	-	-	-
425	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results also apply to rectangular/square hollow beams exposed on all four sides up to the maximum dry film thickness of 5.250mm and section factor of 165m⁻¹.

Table 30: Circular and Rectangular/Square Hollow Column Sections 150 Minutes											
Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of										
	350°C	400°C	450°C	500°C	520°C	550°C	570°C	600°C	650°C	700°C	750°C
50	-	-	-	-	-	-	-	2.308	1.992	1.795	1.537
55	-	-	-	-	-	-	-	2.530	2.191	1.938	1.649
60	-	-	-	-	-	-	-	2.730	2.389	2.098	1.761
65	-	-	-	-	-	-	-	2.916	2.587	2.271	1.873
70	-	-	-	-	-	-	-	3.101	2.763	2.444	1.985
75	-	-	-	-	-	-	-	3.287	2.935	2.617	2.161
80	-	-	-	-	-	-	-	3.472	3.106	2.777	2.348
85	-	-	-	-	-	-	-	3.658	3.278	2.936	2.536
90	-	-	-	-	-	-	-	3.843	3.449	3.096	2.691
95	-	-	-	-	-	-	-	4.029	3.621	3.256	2.820
100	-	-	-	-	-	-	-	4.214	3.793	3.415	2.950
105	-	-	-	-	-	-	-	4.400	3.964	3.575	3.079
110	-	-	-	-	-	-	-	4.585	4.136	3.735	3.208
115	-	-	-	-	-	-	-	4.771	4.307	3.894	3.338
120	-	-	-	-	-	-	-	4.956	4.479	4.054	3.467
125	-	-	-	-	-	-	-	5.142	4.650	4.214	3.596
130	-	-	-	-	-	-	-	5.327	4.822	4.373	3.726
135	-	-	-	-	-	-	-	5.513	4.994	4.533	3.857
140	-	-	-	-	-	-	-	5.698	5.165	4.693	4.062
145	-	-	-	-	-	-	-	5.884	5.337	4.853	4.266
150	-	-	-	-	-	-	-	-	5.508	5.012	4.471
155	-	-	-	-	-	-	-	-	5.680	5.172	4.676
160	-	-	-	-	-	-	-	-	5.851	5.332	4.881
165	-	-	-	-	-	-	-	-	-	5.491	5.085
170	-	-	-	-	-	-	-	-	-	5.651	5.290
175	-	-	-	-	-	-	-	-	-	5.811	5.495
180	-	-	-	-	-	-	-	-	-	-	5.700
185	-	-	-	-	-	-	-	-	-	-	5.904
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	-	-	-	-	-	-	-	-	-	-	-
375	-	-	-	-	-	-	-	-	-	-	-
380	-	-	-	-	-	-	-	-	-	-	-
385	-	-	-	-	-	-	-	-	-	-	-
390	-	-	-	-	-	-	-	-	-	-	-
395	-	-	-	-	-	-	-	-	-	-	-
400	-	-	-	-	-	-	-	-	-	-	-
405	-	-	-	-	-	-	-	-	-	-	-
410	-	-	-	-	-	-	-	-	-	-	-
415	-	-	-	-	-	-	-	-	-	-	-
420	-	-	-	-	-	-	-	-	-	-	-
425	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results also apply to rectangular/square hollow beams exposed on all four sides up to the maximum dry film thickness of 5.250mm and section factor of 165m⁻¹.

Table 31: Circular and Rectangular/Square Hollow Column Sections 180 Minutes											
Section Factor up to m ⁻¹	Thickness (mm) Required for a Design Temperature of										
	350°C	400°C	450°C	500°C	520°C	550°C	570°C	600°C	650°C	700°C	750°C
50	-	-	-	-	-	-	-	-	-	2.251	1.843
55	-	-	-	-	-	-	-	-	-	2.482	1.983
60	-	-	-	-	-	-	-	-	-	2.703	2.266
65	-	-	-	-	-	-	-	-	-	2.909	2.571
70	-	-	-	-	-	-	-	-	-	3.114	2.762
75	-	-	-	-	-	-	-	-	-	3.320	2.932
80	-	-	-	-	-	-	-	-	-	3.525	3.101
85	-	-	-	-	-	-	-	-	-	3.731	3.271
90	-	-	-	-	-	-	-	-	-	3.937	3.440
95	-	-	-	-	-	-	-	-	-	4.142	3.610
100	-	-	-	-	-	-	-	-	-	4.348	3.779
105	-	-	-	-	-	-	-	-	-	4.554	3.949
110	-	-	-	-	-	-	-	-	-	4.759	4.118
115	-	-	-	-	-	-	-	-	-	4.965	4.288
120	-	-	-	-	-	-	-	-	-	5.171	4.458
125	-	-	-	-	-	-	-	-	-	5.376	4.627
130	-	-	-	-	-	-	-	-	-	5.582	4.797
135	-	-	-	-	-	-	-	-	-	5.787	4.966
140	-	-	-	-	-	-	-	-	-	-	5.136
145	-	-	-	-	-	-	-	-	-	-	5.305
150	-	-	-	-	-	-	-	-	-	-	5.475
155	-	-	-	-	-	-	-	-	-	-	5.644
160	-	-	-	-	-	-	-	-	-	-	5.814
165	-	-	-	-	-	-	-	-	-	-	-
170	-	-	-	-	-	-	-	-	-	-	-
175	-	-	-	-	-	-	-	-	-	-	-
180	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-
375	-	-	-	-	-	-	-	-	-	-	-
380	-	-	-	-	-	-	-	-	-	-	-
385	-	-	-	-	-	-	-	-	-	-	-
390	-	-	-	-	-	-	-	-	-	-	-
395	-	-	-	-	-	-	-	-	-	-	-
400	-	-	-	-	-	-	-	-	-	-	-
405	-	-	-	-	-	-	-	-	-	-	-
410	-	-	-	-	-	-	-	-	-	-	-
415	-	-	-	-	-	-	-	-	-	-	-
420	-	-	-	-	-	-	-	-	-	-	-
425	-	-	-	-	-	-	-	-	-	-	-

Thickness is intumescent only. Results also apply to rectangular/square hollow beams exposed on all four sides up to the maximum dry film thickness of 5.250mm and section factor of 165m⁻¹.

Table 32 RHS/SHS beams 15 minutes											
Section Factor (m)	Required Thickness (mm) for a Design Temperature (°C)										
	350	400	450	500	520	550	570	600	650	700	750
45	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
50	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
55	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
60	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
65	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
70	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
75	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
80	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
85	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
90	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
95	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
100	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
105	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
110	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
115	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
120	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
125	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
130	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
135	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
140	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
145	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
150	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
155	0.226	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
160	0.240	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
165	0.254	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
170	0.269	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
175	0.283	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
180	0.297	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
185	0.312	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
190	0.326	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
195	0.340	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
200	0.355	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
205	0.369	0.226	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
210	0.383	0.236	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
215	0.398	0.246	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
220	0.412	0.256	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
225	0.426	0.266	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
230	0.441	0.277	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
235	0.455	0.287	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
240	0.469	0.297	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
245	0.484	0.307	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
250	0.498	0.317	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
255	0.512	0.327	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
260	0.527	0.337	0.227	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
265	0.541	0.347	0.235	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
270	0.555	0.357	0.244	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
275	0.570	0.367	0.252	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
280	0.584	0.377	0.261	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
285	0.598	0.387	0.269	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
290	0.613	0.397	0.278	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
295	0.627	0.408	0.286	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
300	0.641	0.418	0.294	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
305	0.656	0.428	0.303	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
310	0.670	0.438	0.311	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
315	0.684	0.448	0.320	0.229	0.224	0.224	0.224	0.224	0.224	0.224	0.224

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

Table 33 RHS/SHS beams 30 minutes											
Section Factor (m)	Required Thickness (mm) for a Design Temperature (°C)										
	350	400	450	500	520	550	570	600	650	700	750
45	0.299	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
50	0.333	0.225	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
55	0.368	0.242	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
60	0.402	0.260	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
65	0.437	0.277	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
70	0.472	0.294	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
75	0.507	0.311	0.228	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
80	0.541	0.329	0.243	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
85	0.576	0.346	0.259	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
90	0.611	0.363	0.274	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
95	0.645	0.381	0.289	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
100	0.680	0.398	0.305	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
105	0.715	0.415	0.320	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
110	0.750	0.432	0.335	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224
115	0.784	0.450	0.350	0.237	0.224	0.224	0.224	0.224	0.224	0.224	0.224
120	0.819	0.467	0.366	0.251	0.224	0.224	0.224	0.224	0.224	0.224	0.224
125	0.854	0.484	0.381	0.265	0.224	0.224	0.224	0.224	0.224	0.224	0.224
130	0.888	0.502	0.396	0.279	0.224	0.224	0.224	0.224	0.224	0.224	0.224
135	0.923	0.519	0.412	0.294	0.226	0.224	0.224	0.224	0.224	0.224	0.224
140	0.958	0.536	0.427	0.308	0.240	0.224	0.224	0.224	0.224	0.224	0.224
145	0.993	0.554	0.442	0.322	0.254	0.224	0.224	0.224	0.224	0.224	0.224
150	1.027	0.571	0.458	0.336	0.268	0.224	0.224	0.224	0.224	0.224	0.224
155	1.062	0.588	0.473	0.350	0.282	0.224	0.224	0.224	0.224	0.224	0.224
160	1.097	0.605	0.488	0.364	0.296	0.225	0.224	0.224	0.224	0.224	0.224
165	1.148	0.623	0.503	0.378	0.310	0.239	0.224	0.224	0.224	0.224	0.224
170	1.201	0.640	0.519	0.392	0.324	0.252	0.228	0.224	0.224	0.224	0.224
175	1.255	0.657	0.534	0.407	0.338	0.265	0.241	0.224	0.224	0.224	0.224
180	1.308	0.675	0.549	0.421	0.352	0.279	0.253	0.224	0.224	0.224	0.224
185	1.362	0.692	0.565	0.435	0.366	0.292	0.266	0.228	0.224	0.224	0.224
190	1.415	0.709	0.580	0.449	0.380	0.305	0.278	0.239	0.224	0.224	0.224
195	1.468	0.726	0.595	0.463	0.394	0.319	0.291	0.251	0.224	0.224	0.224
200	1.522	0.744	0.611	0.477	0.408	0.332	0.304	0.262	0.224	0.224	0.224
205	1.575	0.761	0.626	0.491	0.422	0.345	0.316	0.273	0.224	0.224	0.224
210	1.629	0.778	0.641	0.506	0.436	0.359	0.329	0.285	0.224	0.224	0.224
215	1.682	0.796	0.657	0.520	0.450	0.372	0.341	0.296	0.224	0.224	0.224
220	1.736	0.813	0.672	0.534	0.465	0.385	0.354	0.307	0.228	0.224	0.224
225	1.789	0.830	0.687	0.548	0.479	0.399	0.366	0.319	0.239	0.224	0.224
230	1.842	0.848	0.702	0.562	0.493	0.412	0.379	0.330	0.251	0.224	0.224
235	1.896	0.865	0.718	0.576	0.507	0.425	0.391	0.342	0.262	0.224	0.224
240	1.949	0.882	0.733	0.590	0.521	0.439	0.404	0.353	0.274	0.224	0.224
245	2.003	0.899	0.748	0.604	0.535	0.452	0.416	0.364	0.286	0.224	0.224
250	2.056	0.917	0.764	0.619	0.549	0.466	0.429	0.376	0.297	0.224	0.224
255	2.109	0.934	0.779	0.633	0.563	0.479	0.441	0.387	0.309	0.224	0.224
260	2.163	0.951	0.794	0.647	0.577	0.492	0.454	0.398	0.320	0.224	0.224
265	2.216	0.969	0.810	0.661	0.591	0.506	0.466	0.410	0.332	0.224	0.224
270	2.270	0.986	0.825	0.675	0.605	0.519	0.479	0.421	0.343	0.225	0.224
275	2.323	1.003	0.840	0.689	0.619	0.532	0.491	0.432	0.355	0.233	0.224
280	2.377	1.020	0.855	0.703	0.633	0.546	0.504	0.444	0.367	0.242	0.224
285	2.430	1.038	0.871	0.718	0.647	0.559	0.516	0.455	0.378	0.250	0.224
290	2.483	1.055	0.886	0.732	0.661	0.572	0.529	0.467	0.390	0.259	0.224
295	2.527	1.072	0.901	0.746	0.675	0.586	0.541	0.478	0.401	0.268	0.224
300	2.553	1.090	0.917	0.760	0.689	0.599	0.554	0.489	0.413	0.276	0.224
305	2.578	1.172	0.932	0.774	0.703	0.612	0.567	0.501	0.424	0.285	0.224
310	2.603	1.379	0.947	0.788	0.717	0.626	0.579	0.512	0.436	0.293	0.224
315	2.628	1.587	0.963	0.802	0.731	0.639	0.592	0.523	0.448	0.302	0.224

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

Table 34 RHS/SHS beams 45 minutes											
Section Factor (m)	Required Thickness (mm) for a Design Temperature (°C)										
	350	400	450	500	520	550	570	600	650	700	750
45	0.607	0.438	0.332	0.262	0.236	0.224	0.224	0.224	0.224	0.224	0.224
50	0.677	0.480	0.363	0.283	0.254	0.224	0.224	0.224	0.224	0.224	0.224
55	0.746	0.522	0.393	0.305	0.273	0.240	0.224	0.224	0.224	0.224	0.224
60	0.816	0.565	0.424	0.326	0.291	0.257	0.237	0.224	0.224	0.224	0.224
65	0.885	0.607	0.454	0.348	0.310	0.274	0.253	0.224	0.224	0.224	0.224
70	0.955	0.649	0.485	0.369	0.328	0.291	0.269	0.234	0.224	0.224	0.224
75	1.025	0.692	0.516	0.391	0.346	0.308	0.286	0.249	0.224	0.224	0.224
80	1.094	0.734	0.546	0.412	0.365	0.325	0.302	0.265	0.224	0.224	0.224
85	1.159	0.777	0.577	0.434	0.383	0.342	0.318	0.280	0.224	0.224	0.224
90	1.224	0.819	0.607	0.455	0.402	0.359	0.334	0.295	0.224	0.224	0.224
95	1.288	0.861	0.638	0.476	0.420	0.376	0.351	0.311	0.225	0.224	0.224
100	1.353	0.904	0.668	0.498	0.439	0.393	0.367	0.326	0.242	0.224	0.224
105	1.417	0.946	0.699	0.519	0.457	0.410	0.383	0.342	0.259	0.224	0.224
110	1.482	0.988	0.730	0.541	0.476	0.426	0.400	0.357	0.276	0.224	0.224
115	1.546	1.031	0.760	0.562	0.494	0.443	0.416	0.373	0.293	0.224	0.224
120	1.611	1.073	0.791	0.584	0.513	0.460	0.432	0.388	0.310	0.224	0.224
125	1.675	1.123	0.821	0.605	0.531	0.477	0.449	0.404	0.327	0.224	0.224
130	1.740	1.188	0.852	0.627	0.549	0.494	0.465	0.419	0.344	0.224	0.224
135	1.804	1.252	0.882	0.648	0.568	0.511	0.481	0.434	0.361	0.224	0.224
140	1.869	1.317	0.913	0.670	0.586	0.528	0.498	0.450	0.378	0.224	0.224
145	1.933	1.382	0.944	0.691	0.605	0.545	0.514	0.465	0.395	0.235	0.224
150	1.997	1.446	0.974	0.713	0.623	0.562	0.530	0.481	0.412	0.250	0.224
155	2.076	1.511	1.005	0.734	0.642	0.579	0.546	0.496	0.429	0.265	0.224
160	2.155	1.576	1.035	0.756	0.660	0.596	0.563	0.512	0.445	0.280	0.224
165	2.234	1.640	1.066	0.777	0.679	0.613	0.579	0.527	0.462	0.295	0.224
170	2.314	1.705	1.096	0.799	0.697	0.630	0.595	0.542	0.479	0.310	0.224
175	2.393	1.769	1.153	0.820	0.715	0.647	0.612	0.558	0.496	0.325	0.224
180	2.472	1.834	1.213	0.842	0.734	0.664	0.628	0.573	0.513	0.341	0.224
185	2.534	1.899	1.274	0.863	0.752	0.681	0.644	0.589	0.530	0.356	0.224
190	2.570	1.963	1.334	0.884	0.771	0.698	0.661	0.604	0.547	0.371	0.224
195	2.605	2.048	1.395	0.906	0.789	0.715	0.677	0.620	0.564	0.386	0.232
200	2.641	2.158	1.456	0.927	0.808	0.732	0.693	0.635	0.581	0.401	0.245
205	2.677	2.269	1.516	0.949	0.826	0.749	0.710	0.651	0.598	0.416	0.258
210	2.713	2.379	1.577	0.970	0.845	0.766	0.726	0.666	0.615	0.431	0.271
215	2.749	2.490	1.638	0.992	0.863	0.783	0.742	0.681	0.632	0.447	0.285
220	2.785	2.544	1.698	1.013	0.881	0.800	0.758	0.697	0.649	0.462	0.298
225	2.821	2.578	1.759	1.035	0.900	0.817	0.775	0.712	0.666	0.477	0.311
230	2.857	2.612	1.820	1.056	0.918	0.834	0.791	0.728	0.683	0.492	0.325
235	2.893	2.646	1.880	1.078	0.937	0.851	0.807	0.743	0.700	0.507	0.338
240	2.929	2.680	1.941	1.099	0.955	0.868	0.824	0.759	0.716	0.522	0.351
245	2.965	2.714	2.012	1.252	0.974	0.885	0.840	0.774	0.733	0.537	0.364
250	3.001	2.748	2.451	1.416	0.992	0.902	0.856	0.789	0.750	0.553	0.378
255	3.037	2.781	2.546	1.580	1.011	0.919	0.873	0.805	0.767	0.568	0.391
260	3.072	2.815	2.578	1.745	1.029	0.935	0.889	0.820	0.784	0.583	0.404
265	3.108	2.849	2.610	1.909	1.048	0.952	0.905	0.836	0.801	0.598	0.417
270	3.144	2.883	2.642	2.073	1.066	0.969	0.922	0.851	0.818	0.613	0.431
275	3.180	2.917	2.674	2.238	1.084	0.986	0.938	0.867	0.835	0.628	0.444
280	3.216	2.951	2.706	2.402	1.144	1.003	0.954	0.882	0.852	0.643	0.457
285	3.252	2.985	2.738	2.527	1.563	1.020	0.970	0.898	0.869	0.659	0.471
290	3.288	3.019	2.770	2.557	1.983	1.037	0.987	0.913	0.886	0.674	0.484
295	3.324	3.053	2.801	2.586	2.403	1.054	1.003	0.928	0.903	0.689	0.497
300	3.360	3.087	2.833	2.616	2.539	1.071	1.019	0.944	0.920	0.704	0.510
305	3.396	3.121	2.865	2.645	2.568	1.088	1.036	0.959	0.937	0.719	0.524
310	3.432	3.155	2.897	2.674	2.596	1.287	1.052	0.975	0.954	0.734	0.537
315	3.468	3.189	2.929	2.704	2.624	2.045	1.068	0.990	0.971	0.749	0.550

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

Table 35 RHS/SHS beams 60 minutes											
Required Thickness (mm) for a Design Temperature (°C)											
Section Factor (m)	350	400	450	500	520	550	570	600	650	700	750
45	0.919	0.678	0.539	0.443	0.409	0.363	0.334	0.291	0.224	0.224	0.224
50	1.024	0.747	0.593	0.485	0.448	0.396	0.363	0.316	0.239	0.224	0.224
55	1.126	0.817	0.647	0.527	0.486	0.429	0.393	0.341	0.266	0.224	0.224
60	1.223	0.886	0.701	0.569	0.524	0.462	0.423	0.367	0.293	0.224	0.224
65	1.319	0.955	0.754	0.611	0.562	0.495	0.453	0.392	0.320	0.240	0.224
70	1.416	1.025	0.808	0.653	0.600	0.528	0.482	0.418	0.347	0.258	0.224
75	1.512	1.094	0.862	0.695	0.638	0.560	0.512	0.443	0.375	0.277	0.224
80	1.609	1.184	0.916	0.737	0.676	0.593	0.542	0.469	0.402	0.295	0.224
85	1.705	1.277	0.970	0.779	0.714	0.626	0.572	0.494	0.429	0.314	0.224
90	1.802	1.369	1.024	0.821	0.752	0.659	0.601	0.519	0.456	0.332	0.224
95	1.898	1.461	1.078	0.863	0.790	0.692	0.631	0.545	0.483	0.351	0.224
100	1.995	1.553	1.149	0.904	0.828	0.725	0.661	0.570	0.510	0.369	0.238
105	2.076	1.645	1.232	0.946	0.866	0.758	0.691	0.596	0.538	0.388	0.256
110	2.155	1.737	1.315	0.988	0.904	0.791	0.720	0.621	0.565	0.406	0.274
115	2.235	1.830	1.399	1.030	0.942	0.824	0.750	0.646	0.592	0.425	0.292
120	2.315	1.922	1.482	1.072	0.980	0.857	0.780	0.672	0.619	0.443	0.309
125	2.395	2.012	1.566	1.125	1.018	0.889	0.810	0.697	0.646	0.462	0.327
130	2.475	2.089	1.649	1.200	1.056	0.922	0.839	0.723	0.673	0.480	0.345
135	2.553	2.166	1.732	1.276	1.094	0.955	0.869	0.748	0.701	0.499	0.362
140	2.629	2.243	1.816	1.351	1.162	0.988	0.899	0.774	0.728	0.518	0.380
145	2.705	2.320	1.899	1.426	1.235	1.021	0.929	0.799	0.755	0.536	0.398
150	2.780	2.397	1.983	1.502	1.308	1.054	0.958	0.824	0.782	0.555	0.415
155	2.856	2.474	2.064	1.577	1.381	1.087	0.988	0.850	0.809	0.573	0.433
160	2.932	2.537	2.146	1.653	1.454	1.141	1.018	0.875	0.836	0.592	0.451
165	3.008	2.582	2.227	1.728	1.527	1.211	1.048	0.901	0.864	0.610	0.469
170	3.084	2.627	2.308	1.804	1.600	1.281	1.077	0.926	0.891	0.629	0.486
175	3.160	2.671	2.390	1.879	1.673	1.351	1.115	0.951	0.918	0.647	0.504
180	3.236	2.716	2.471	1.954	1.746	1.421	1.184	0.977	0.945	0.666	0.522
185	3.312	2.761	2.536	2.043	1.819	1.491	1.253	1.002	0.972	0.684	0.539
190	3.387	2.805	2.579	2.153	1.892	1.561	1.322	1.028	0.999	0.703	0.557
195	3.463	2.850	2.621	2.263	1.965	1.631	1.391	1.053	1.027	0.721	0.575
200	3.539	2.894	2.663	2.372	2.072	1.701	1.460	1.079	1.054	0.740	0.593
205	3.615	2.939	2.705	2.482	2.211	1.771	1.529	1.116	1.081	0.758	0.610
210	3.691	2.984	2.748	2.545	2.350	1.841	1.598	1.241	1.123	0.777	0.628
215	3.767	3.028	2.790	2.584	2.490	1.911	1.666	1.367	1.209	0.795	0.646
220	3.842	3.073	2.832	2.623	2.549	1.981	1.735	1.493	1.294	0.814	0.663
225	3.917	3.118	2.874	2.663	2.587	2.187	1.804	1.619	1.379	0.832	0.681
230	3.992	3.162	2.917	2.702	2.625	2.442	1.873	1.744	1.464	0.851	0.699
235	4.068	3.207	2.959	2.741	2.663	2.544	1.942	1.870	1.549	0.869	0.717
240	4.143	3.252	3.001	2.781	2.701	2.580	2.092	1.996	1.634	0.888	0.734
245	4.218	3.296	3.043	2.820	2.738	2.616	2.528	2.122	1.719	0.906	0.752
250	4.293	3.341	3.086	2.859	2.776	2.653	2.563	2.248	1.804	0.925	0.770
255	4.368	3.386	3.128	2.898	2.814	2.689	2.598	2.373	1.889	0.943	0.787
260	4.444	3.430	3.170	2.938	2.852	2.725	2.633	2.499	1.974	0.962	0.805
265	4.519	3.475	3.212	2.977	2.890	2.761	2.669	2.547	2.060	0.980	0.823
270	4.594	3.519	3.255	3.016	2.928	2.797	2.704	2.580	2.145	0.999	0.840
275	4.669	3.564	3.297	3.055	2.966	2.833	2.739	2.613	2.230	1.017	0.858
280	4.744	3.609	3.339	3.095	3.004	2.869	2.774	2.646	2.315	1.036	0.876
285	4.820	3.653	3.381	3.134	3.042	2.905	2.809	2.679	2.400	1.054	0.894
290	4.895	3.698	3.423	3.173	3.080	2.941	2.844	2.712	2.485	1.073	0.911
295	4.970	3.743	3.466	3.212	3.118	2.978	2.879	2.746	2.537	1.092	0.929
300	5.045	3.791	3.508	3.252	3.156	3.014	2.914	2.779	2.566	1.187	0.947
305	5.120	4.269	3.550	3.291	3.194	3.050	2.949	2.812	2.596	1.363	0.964
310	5.196	4.568	3.592	3.330	3.231	3.086	2.985	2.845	2.625	1.540	0.982
315	-	4.866	3.635	3.370	3.269	3.122	3.020	2.878	2.655	1.716	1.000

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

Table 36 RHS/SHS beams 75 minutes											
Required Thickness (mm) for a Design Temperature (°C)											
Section Factor (m)	350	400	450	500	520	550	570	600	650	700	750
45	1.229	0.919	0.747	0.625	0.584	0.528	0.492	0.441	0.362	0.276	0.224
50	1.357	1.016	0.824	0.688	0.642	0.579	0.540	0.484	0.404	0.307	0.224
55	1.484	1.116	0.902	0.750	0.700	0.631	0.588	0.526	0.448	0.340	0.224
60	1.611	1.237	0.979	0.813	0.757	0.682	0.636	0.569	0.492	0.373	0.247
65	1.739	1.357	1.056	0.876	0.815	0.734	0.683	0.611	0.536	0.407	0.274
70	1.866	1.478	1.147	0.938	0.873	0.785	0.731	0.653	0.580	0.440	0.300
75	1.994	1.598	1.256	1.001	0.931	0.837	0.779	0.696	0.624	0.473	0.326
80	2.187	1.719	1.365	1.063	0.988	0.888	0.826	0.738	0.668	0.506	0.352
85	2.384	1.840	1.473	1.140	1.046	0.940	0.874	0.781	0.712	0.539	0.378
90	2.581	1.960	1.582	1.237	1.106	0.991	0.922	0.823	0.756	0.572	0.404
95	2.778	2.088	1.691	1.335	1.199	1.043	0.969	0.866	0.800	0.605	0.430
100	2.975	2.220	1.800	1.432	1.293	1.094	1.017	0.908	0.844	0.638	0.457
105	3.171	2.351	1.908	1.530	1.387	1.178	1.065	0.951	0.888	0.671	0.483
110	3.368	2.482	2.012	1.627	1.480	1.265	1.121	0.993	0.932	0.704	0.509
115	3.565	2.614	2.086	1.725	1.574	1.353	1.206	1.035	0.976	0.737	0.535
120	3.759	2.745	2.161	1.823	1.667	1.441	1.290	1.078	1.020	0.770	0.561
125	3.864	2.877	2.236	1.920	1.761	1.529	1.374	1.138	1.064	0.803	0.587
130	3.969	3.008	2.310	2.014	1.854	1.616	1.459	1.218	1.110	0.836	0.614
135	4.074	3.140	2.385	2.091	1.948	1.704	1.543	1.299	1.165	0.869	0.640
140	4.180	3.271	2.459	2.169	2.036	1.792	1.627	1.380	1.221	0.902	0.666
145	4.285	3.403	2.538	2.246	2.117	1.880	1.712	1.460	1.276	0.935	0.692
150	4.390	3.534	2.631	2.324	2.197	1.967	1.796	1.541	1.332	0.968	0.718
155	4.495	3.665	2.724	2.401	2.278	2.055	1.880	1.621	1.388	1.001	0.744
160	4.601	3.817	2.818	2.478	2.359	2.142	1.965	1.702	1.443	1.034	0.770
165	4.706	4.013	2.911	2.543	2.440	2.229	2.053	1.783	1.499	1.067	0.797
170	4.811	4.208	3.004	2.592	2.520	2.316	2.143	1.863	1.554	1.100	0.823
175	4.916	4.404	3.097	2.642	2.568	2.402	2.234	1.944	1.610	1.156	0.849
180	5.021	4.599	3.191	2.692	2.615	2.489	2.324	2.032	1.666	1.212	0.875
185	5.127	4.795	3.284	2.741	2.663	2.549	2.415	2.136	1.721	1.269	0.901
190	5.232	4.990	3.377	2.791	2.711	2.595	2.506	2.239	1.777	1.325	0.927
195	-	5.186	3.470	2.841	2.758	2.640	2.557	2.343	1.832	1.382	0.953
200	-	-	3.564	2.890	2.806	2.686	2.601	2.447	1.888	1.438	0.980
205	-	-	3.657	2.940	2.853	2.731	2.646	2.532	1.943	1.495	1.006
210	-	-	3.750	2.990	2.901	2.777	2.690	2.574	1.999	1.551	1.032
215	-	-	3.912	3.039	2.949	2.822	2.734	2.616	2.157	1.608	1.058
220	-	-	4.078	3.089	2.996	2.868	2.779	2.658	2.317	1.664	1.084
225	-	-	4.243	3.139	3.044	2.914	2.823	2.700	2.477	1.721	1.132
230	-	-	4.409	3.189	3.092	2.959	2.867	2.742	2.547	1.777	1.221
235	-	-	4.575	3.238	3.139	3.005	2.912	2.785	2.585	1.834	1.309
240	-	-	4.740	3.288	3.187	3.050	2.956	2.827	2.623	1.890	1.397
245	-	-	4.906	3.338	3.235	3.096	3.000	2.869	2.661	1.947	1.486
250	-	-	5.071	3.387	3.282	3.141	3.045	2.911	2.700	2.018	1.574
255	-	-	5.237	3.437	3.330	3.187	3.089	2.953	2.738	2.361	1.662
260	-	-	-	3.487	3.377	3.232	3.134	2.995	2.776	2.537	1.751
265	-	-	-	3.536	3.425	3.278	3.178	3.037	2.814	2.571	1.839
270	-	-	-	3.586	3.473	3.324	3.222	3.079	2.852	2.605	1.927
275	-	-	-	3.636	3.520	3.369	3.267	3.121	2.890	2.639	2.015
280	-	-	-	3.685	3.568	3.415	3.311	3.163	2.928	2.673	2.104
285	-	-	-	3.735	3.616	3.460	3.355	3.205	2.966	2.707	2.192
290	-	-	-	4.043	3.663	3.506	3.400	3.248	3.004	2.741	2.280
295	-	-	-	4.523	3.711	3.551	3.444	3.290	3.043	2.775	2.369
300	-	-	-	5.003	3.798	3.597	3.488	3.332	3.081	2.809	2.457
305	-	-	-	-	4.386	3.642	3.533	3.374	3.119	2.843	2.528
310	-	-	-	-	4.974	3.688	3.577	3.416	3.157	2.877	2.558
315	-	-	-	-	-	3.734	3.621	3.458	3.195	2.911	2.587

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

Table 37 RHS/SHS beams 90 minutes											
Section Factor (m)	Required Thickness (mm) for a Design Temperature (°C)										
	350	400	450	500	520	550	570	600	650	700	750
45	1.522	1.182	0.956	0.809	0.760	0.693	0.652	0.593	0.509	0.409	0.285
50	1.679	1.323	1.057	0.892	0.837	0.764	0.718	0.652	0.570	0.456	0.318
55	1.836	1.473	1.177	0.975	0.915	0.834	0.784	0.712	0.631	0.505	0.358
60	1.993	1.622	1.312	1.059	0.992	0.904	0.849	0.771	0.692	0.553	0.398
65	2.365	1.772	1.447	1.160	1.070	0.974	0.915	0.831	0.753	0.601	0.438
70	2.748	1.922	1.582	1.281	1.171	1.045	0.981	0.890	0.814	0.649	0.478
75	3.130	2.128	1.716	1.402	1.286	1.122	1.046	0.950	0.875	0.697	0.518
80	3.513	2.396	1.851	1.523	1.402	1.230	1.119	1.009	0.936	0.745	0.558
85	3.841	2.664	1.986	1.644	1.518	1.339	1.222	1.069	0.997	0.794	0.598
90	4.076	2.931	2.169	1.765	1.634	1.447	1.326	1.146	1.057	0.842	0.638
95	4.311	3.199	2.358	1.886	1.749	1.555	1.429	1.244	1.122	0.890	0.678
100	4.547	3.467	2.546	2.004	1.865	1.663	1.533	1.341	1.194	0.938	0.718
105	4.782	3.734	2.735	2.080	1.981	1.771	1.636	1.439	1.267	0.986	0.758
110	5.017	4.110	2.923	2.156	2.063	1.879	1.739	1.536	1.340	1.034	0.798
115	-	4.496	3.112	2.231	2.139	1.988	1.843	1.634	1.413	1.082	0.838
120	-	4.881	3.300	2.307	2.215	2.068	1.946	1.731	1.485	1.142	0.878
125	-	-	3.489	2.382	2.291	2.144	2.037	1.829	1.558	1.209	0.918
130	-	-	3.677	2.458	2.367	2.221	2.113	1.927	1.631	1.276	0.958
135	-	-	3.972	2.556	2.443	2.297	2.189	2.019	1.703	1.343	0.998
140	-	-	4.342	2.747	2.519	2.373	2.265	2.098	1.776	1.409	1.038
145	-	-	4.711	2.938	2.662	2.450	2.341	2.177	1.849	1.476	1.078
150	-	-	5.080	3.129	2.804	2.528	2.417	2.255	1.921	1.543	1.125
155	-	-	-	3.320	2.947	2.625	2.493	2.334	1.994	1.610	1.184
160	-	-	-	3.512	3.089	2.721	2.569	2.412	2.081	1.677	1.243
165	-	-	-	3.703	3.231	2.818	2.645	2.491	2.170	1.743	1.301
170	-	-	-	3.991	3.374	2.914	2.720	2.552	2.258	1.810	1.360
175	-	-	-	4.315	3.516	3.011	2.796	2.604	2.347	1.877	1.419
180	-	-	-	4.639	3.659	3.107	2.871	2.657	2.435	1.944	1.478
185	-	-	-	4.964	3.862	3.203	2.947	2.709	2.521	2.018	1.536
190	-	-	-	-	4.190	3.300	3.023	2.761	2.568	2.130	1.595
195	-	-	-	-	4.518	3.396	3.098	2.813	2.615	2.242	1.654
200	-	-	-	-	4.846	3.493	3.174	2.865	2.661	2.355	1.712
205	-	-	-	-	5.174	3.589	3.249	2.917	2.708	2.467	1.771
210	-	-	-	-	-	3.686	3.325	2.969	2.755	2.541	1.830
215	-	-	-	-	-	3.845	3.400	3.021	2.801	2.583	1.889
220	-	-	-	-	-	4.160	3.476	3.073	2.848	2.625	1.947
225	-	-	-	-	-	4.476	3.552	3.125	2.895	2.667	2.017
230	-	-	-	-	-	4.791	3.627	3.177	2.941	2.709	2.185
235	-	-	-	-	-	5.107	3.703	3.229	2.988	2.750	2.352
240	-	-	-	-	-	-	3.841	3.281	3.035	2.792	2.519
245	-	-	-	-	-	-	4.120	3.333	3.081	2.834	2.556
250	-	-	-	-	-	-	4.399	3.385	3.128	2.876	2.593
255	-	-	-	-	-	-	4.678	3.437	3.175	2.918	2.630
260	-	-	-	-	-	-	4.957	3.489	3.221	2.959	2.667
265	-	-	-	-	-	-	5.236	3.541	3.268	3.001	2.704
270	-	-	-	-	-	-	-	3.593	3.315	3.043	2.741
275	-	-	-	-	-	-	-	3.645	3.361	3.085	2.778
280	-	-	-	-	-	-	-	3.697	3.408	3.127	2.815
285	-	-	-	-	-	-	-	3.749	3.455	3.168	2.852
290	-	-	-	-	-	-	-	4.457	3.501	3.210	2.889
295	-	-	-	-	-	-	-	5.249	3.548	3.252	2.926
300	-	-	-	-	-	-	-	-	3.595	3.294	2.963
305	-	-	-	-	-	-	-	-	3.641	3.336	3.000
310	-	-	-	-	-	-	-	-	3.688	3.377	3.037
315	-	-	-	-	-	-	-	-	3.735	3.419	3.074

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

Table 38 RHS/SHS beams 105 minutes											
Required Thickness (mm) for a Design Temperature (°C)											
Section Factor (m)	350	400	450	500	520	550	570	600	650	700	750
45	1.916	1.485	1.202	0.993	0.936	0.860	0.813	0.745	0.659	0.543	0.404
50	2.013	1.639	1.344	1.097	1.034	0.949	0.896	0.822	0.737	0.606	0.452
55	2.649	1.817	1.506	1.241	1.144	1.038	0.980	0.898	0.815	0.669	0.505
60	3.286	1.996	1.668	1.385	1.282	1.139	1.064	0.975	0.893	0.733	0.559
65	3.860	2.455	1.829	1.530	1.421	1.268	1.170	1.052	0.971	0.796	0.612
70	4.260	2.921	1.991	1.675	1.560	1.398	1.294	1.142	1.049	0.860	0.666
75	4.661	3.386	2.319	1.820	1.698	1.527	1.418	1.258	1.131	0.923	0.719
80	5.061	3.876	2.657	1.965	1.837	1.656	1.541	1.374	1.221	0.986	0.773
85	-	4.459	2.995	2.185	1.975	1.786	1.665	1.490	1.311	1.050	0.827
90	-	5.043	3.332	2.429	2.175	1.915	1.788	1.606	1.401	1.116	0.880
95	-	-	3.670	2.673	2.389	2.060	1.912	1.722	1.491	1.195	0.934
100	-	-	4.174	2.918	2.603	2.235	2.022	1.838	1.581	1.274	0.987
105	-	-	4.733	3.162	2.817	2.410	2.097	1.954	1.671	1.353	1.041
110	-	-	-	3.406	3.031	2.584	2.173	2.046	1.761	1.432	1.094
115	-	-	-	3.651	3.245	2.759	2.248	2.121	1.851	1.511	1.163
120	-	-	-	4.063	3.458	2.934	2.324	2.197	1.941	1.590	1.234
125	-	-	-	4.600	3.672	3.109	2.399	2.272	2.027	1.669	1.305
130	-	-	-	5.136	4.100	3.283	2.475	2.348	2.106	1.748	1.376
135	-	-	-	-	4.662	3.458	2.628	2.424	2.185	1.828	1.448
140	-	-	-	-	5.224	3.633	2.893	2.499	2.264	1.907	1.519
145	-	-	-	-	-	3.932	3.158	2.640	2.344	1.986	1.590
150	-	-	-	-	-	4.519	3.422	2.804	2.423	2.077	1.661
155	-	-	-	-	-	5.105	3.687	2.968	2.502	2.170	1.732
160	-	-	-	-	-	-	4.165	3.132	2.584	2.264	1.803
165	-	-	-	-	-	-	4.716	3.296	2.668	2.358	1.874
170	-	-	-	-	-	-	-	3.460	2.751	2.451	1.945
175	-	-	-	-	-	-	-	3.624	2.834	2.533	2.025
180	-	-	-	-	-	-	-	3.872	2.917	2.582	2.131
185	-	-	-	-	-	-	-	4.443	3.001	2.632	2.238
190	-	-	-	-	-	-	-	5.015	3.084	2.682	2.345
195	-	-	-	-	-	-	-	-	3.167	2.731	2.452
200	-	-	-	-	-	-	-	-	3.250	2.781	2.536
205	-	-	-	-	-	-	-	-	3.334	2.831	2.580
210	-	-	-	-	-	-	-	-	3.417	2.880	2.624
215	-	-	-	-	-	-	-	-	3.500	2.930	2.668
220	-	-	-	-	-	-	-	-	3.584	2.979	2.712
225	-	-	-	-	-	-	-	-	3.667	3.029	2.756
230	-	-	-	-	-	-	-	-	3.750	3.079	2.800
235	-	-	-	-	-	-	-	-	3.862	3.128	2.844
240	-	-	-	-	-	-	-	-	3.976	3.178	2.888
245	-	-	-	-	-	-	-	-	4.090	3.227	2.933
250	-	-	-	-	-	-	-	-	4.204	3.277	2.977
255	-	-	-	-	-	-	-	-	4.318	3.327	3.021
260	-	-	-	-	-	-	-	-	4.432	3.376	3.065
265	-	-	-	-	-	-	-	-	4.546	3.426	3.109
270	-	-	-	-	-	-	-	-	4.660	3.476	3.153
275	-	-	-	-	-	-	-	-	4.774	3.525	3.197
280	-	-	-	-	-	-	-	-	4.888	3.575	3.241
285	-	-	-	-	-	-	-	-	5.002	3.624	3.285
290	-	-	-	-	-	-	-	-	5.116	3.674	3.329
295	-	-	-	-	-	-	-	-	5.230	3.724	3.374
300	-	-	-	-	-	-	-	-	-	3.839	3.418
305	-	-	-	-	-	-	-	-	-	4.068	3.462
310	-	-	-	-	-	-	-	-	-	4.297	3.506
315	-	-	-	-	-	-	-	-	-	4.526	3.550

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

Table 39 RHS/SHS beams 120 minutes											
Required Thickness (mm) for a Design Temperature (°C)											
Section Factor (m)	350	400	450	500	520	550	570	600	650	700	750
45	3.145	1.789	1.484	1.228	1.138	1.016	0.974	0.898	0.810	0.678	0.523
50	3.499	1.947	1.637	1.372	1.277	1.148	1.076	0.992	0.905	0.756	0.586
55	4.158	2.551	1.825	1.541	1.439	1.299	1.210	1.086	1.000	0.835	0.653
60	4.752	3.291	2.039	1.711	1.601	1.450	1.354	1.214	1.095	0.914	0.720
65	-	4.051	2.585	1.881	1.764	1.601	1.498	1.349	1.202	0.992	0.787
70	-	4.841	3.130	2.119	1.926	1.752	1.642	1.484	1.309	1.071	0.854
75	-	-	3.676	2.520	2.192	1.903	1.786	1.619	1.416	1.158	0.922
80	-	-	4.400	2.922	2.546	2.106	1.930	1.754	1.524	1.250	0.989
85	-	-	5.154	3.323	2.901	2.400	2.134	1.889	1.631	1.342	1.056
90	-	-	-	3.724	3.255	2.694	2.394	2.038	1.738	1.434	1.129
95	-	-	-	4.435	3.609	2.988	2.653	2.250	1.846	1.526	1.213
100	-	-	-	5.171	4.204	3.282	2.913	2.463	1.953	1.618	1.297
105	-	-	-	-	4.968	3.576	3.172	2.676	2.044	1.709	1.381
110	-	-	-	-	-	4.066	3.432	2.889	2.123	1.801	1.465
115	-	-	-	-	-	4.856	3.691	3.102	2.202	1.893	1.549
120	-	-	-	-	-	-	4.336	3.315	2.281	1.985	1.633
125	-	-	-	-	-	-	5.107	3.528	2.360	2.077	1.717
130	-	-	-	-	-	-	-	3.741	2.438	2.168	1.801
135	-	-	-	-	-	-	-	4.557	2.517	2.258	1.885
140	-	-	-	-	-	-	-	-	2.758	2.349	1.969
145	-	-	-	-	-	-	-	-	3.003	2.440	2.061
150	-	-	-	-	-	-	-	-	3.248	2.534	2.158
155	-	-	-	-	-	-	-	-	3.493	2.640	2.254
160	-	-	-	-	-	-	-	-	3.738	2.747	2.351
165	-	-	-	-	-	-	-	-	3.892	2.853	2.448
170	-	-	-	-	-	-	-	-	4.040	2.959	2.532
175	-	-	-	-	-	-	-	-	4.187	3.066	2.584
180	-	-	-	-	-	-	-	-	4.335	3.172	2.635
185	-	-	-	-	-	-	-	-	4.482	3.279	2.686
190	-	-	-	-	-	-	-	-	4.630	3.385	2.737
195	-	-	-	-	-	-	-	-	4.777	3.492	2.788
200	-	-	-	-	-	-	-	-	4.925	3.598	2.840
205	-	-	-	-	-	-	-	-	5.072	3.705	2.891
210	-	-	-	-	-	-	-	-	5.220	3.811	2.942
215	-	-	-	-	-	-	-	-	-	3.916	2.993
220	-	-	-	-	-	-	-	-	-	4.022	3.044
225	-	-	-	-	-	-	-	-	-	4.127	3.096
230	-	-	-	-	-	-	-	-	-	4.232	3.147
235	-	-	-	-	-	-	-	-	-	4.338	3.198
240	-	-	-	-	-	-	-	-	-	4.443	3.249
245	-	-	-	-	-	-	-	-	-	4.549	3.301
250	-	-	-	-	-	-	-	-	-	4.654	3.352
255	-	-	-	-	-	-	-	-	-	4.759	3.403
260	-	-	-	-	-	-	-	-	-	4.865	3.454
265	-	-	-	-	-	-	-	-	-	4.970	3.505
270	-	-	-	-	-	-	-	-	-	5.076	3.557
275	-	-	-	-	-	-	-	-	-	5.181	3.608
280	-	-	-	-	-	-	-	-	-	-	3.659
285	-	-	-	-	-	-	-	-	-	-	3.710
290	-	-	-	-	-	-	-	-	-	-	3.784
295	-	-	-	-	-	-	-	-	-	-	4.011
300	-	-	-	-	-	-	-	-	-	-	4.238
305	-	-	-	-	-	-	-	-	-	-	4.465
310	-	-	-	-	-	-	-	-	-	-	4.692
315	-	-	-	-	-	-	-	-	-	-	4.920

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

Table 40 RHS/SHS beams 150 minutes											
Required Thickness (mm) for a Design Temperature (°C)											
Section Factor (m)	350	400	450	500	520	550	570	600	650	700	750
45	-	4.692	2.852	1.749	1.641	1.491	1.398	1.265	1.122	0.949	0.761
50	-	4.986	3.130	1.904	1.795	1.644	1.548	1.411	1.258	1.059	0.855
55	-	-	4.197	2.500	2.017	1.840	1.735	1.586	1.400	1.174	0.950
60	-	-	-	3.391	2.807	2.120	1.922	1.761	1.542	1.292	1.045
65	-	-	-	4.430	3.598	2.785	2.348	1.936	1.684	1.411	1.146
70	-	-	-	-	4.693	3.449	2.942	2.317	1.826	1.529	1.256
75	-	-	-	-	-	4.401	3.536	2.815	1.968	1.648	1.366
80	-	-	-	-	-	-	4.504	3.313	2.288	1.766	1.477
85	-	-	-	-	-	-	-	3.904	2.659	1.885	1.587
90	-	-	-	-	-	-	-	5.224	3.031	2.008	1.698
95	-	-	-	-	-	-	-	-	3.402	2.285	1.808
100	-	-	-	-	-	-	-	-	3.775	2.562	1.919
105	-	-	-	-	-	-	-	-	4.183	2.840	2.046
110	-	-	-	-	-	-	-	-	4.590	3.117	2.222
115	-	-	-	-	-	-	-	-	4.998	3.395	2.399
120	-	-	-	-	-	-	-	-	-	3.672	2.575
125	-	-	-	-	-	-	-	-	-	4.009	2.751
130	-	-	-	-	-	-	-	-	-	4.371	2.927
135	-	-	-	-	-	-	-	-	-	4.733	3.103
140	-	-	-	-	-	-	-	-	-	5.095	3.279
145	-	-	-	-	-	-	-	-	-	-	3.456
150	-	-	-	-	-	-	-	-	-	-	3.632
155	-	-	-	-	-	-	-	-	-	-	3.825
160	-	-	-	-	-	-	-	-	-	-	4.059
165	-	-	-	-	-	-	-	-	-	-	4.293
170	-	-	-	-	-	-	-	-	-	-	4.528
175	-	-	-	-	-	-	-	-	-	-	4.762
180	-	-	-	-	-	-	-	-	-	-	4.996
185	-	-	-	-	-	-	-	-	-	-	5.230
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	-	-	-	-	-	-	-	-	-	-	-

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

Table 41 RHS/SHS beams 180 minutes											
Required Thickness (mm) for a Design Temperature (°C)											
Section Factor (m)	350	400	450	500	520	550	570	600	650	700	750
45	-	-	-	4.350	3.373	2.572	2.064	1.697	1.473	1.226	1.000
50	-	-	-	4.632	3.756	2.765	2.117	1.852	1.626	1.368	1.130
55	-	-	-	-	-	3.969	3.225	2.304	1.801	1.515	1.267
60	-	-	-	-	-	-	4.591	3.278	1.977	1.662	1.405
65	-	-	-	-	-	-	-	4.665	2.649	1.808	1.542
70	-	-	-	-	-	-	-	-	3.397	1.955	1.679
75	-	-	-	-	-	-	-	-	4.158	2.422	1.816
80	-	-	-	-	-	-	-	-	4.932	3.032	1.953
85	-	-	-	-	-	-	-	-	-	3.643	2.256
90	-	-	-	-	-	-	-	-	-	4.414	2.644
95	-	-	-	-	-	-	-	-	-	5.221	3.033
100	-	-	-	-	-	-	-	-	-	-	3.421
105	-	-	-	-	-	-	-	-	-	-	3.860
110	-	-	-	-	-	-	-	-	-	-	4.609
115	-	-	-	-	-	-	-	-	-	-	-
120	-	-	-	-	-	-	-	-	-	-	-
125	-	-	-	-	-	-	-	-	-	-	-
130	-	-	-	-	-	-	-	-	-	-	-
135	-	-	-	-	-	-	-	-	-	-	-
140	-	-	-	-	-	-	-	-	-	-	-
145	-	-	-	-	-	-	-	-	-	-	-
150	-	-	-	-	-	-	-	-	-	-	-
155	-	-	-	-	-	-	-	-	-	-	-
160	-	-	-	-	-	-	-	-	-	-	-
165	-	-	-	-	-	-	-	-	-	-	-
170	-	-	-	-	-	-	-	-	-	-	-
175	-	-	-	-	-	-	-	-	-	-	-
180	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-

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