

為何要做帷幕牆週邊防火工程?



案例一：上海集合式住宅大樓(2010年)



Firefighters try to extinguish a fire at a 28-story apartment building in Shanghai, Monday Nov. 15th, 2010. The blaze killed 53, and sent over 70 to hospitals.
Preliminary

CLOSE X

案例二：北京中央電視台(2009年)



案例三：西班牙馬德里(2005年)



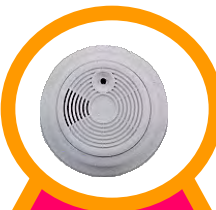
案例三：西班牙馬德里(2005年)



建築物 防火三大要素



警報系統



被動式
帷幕牆防火系統
貫穿部防火系統



主動式 滅火系統



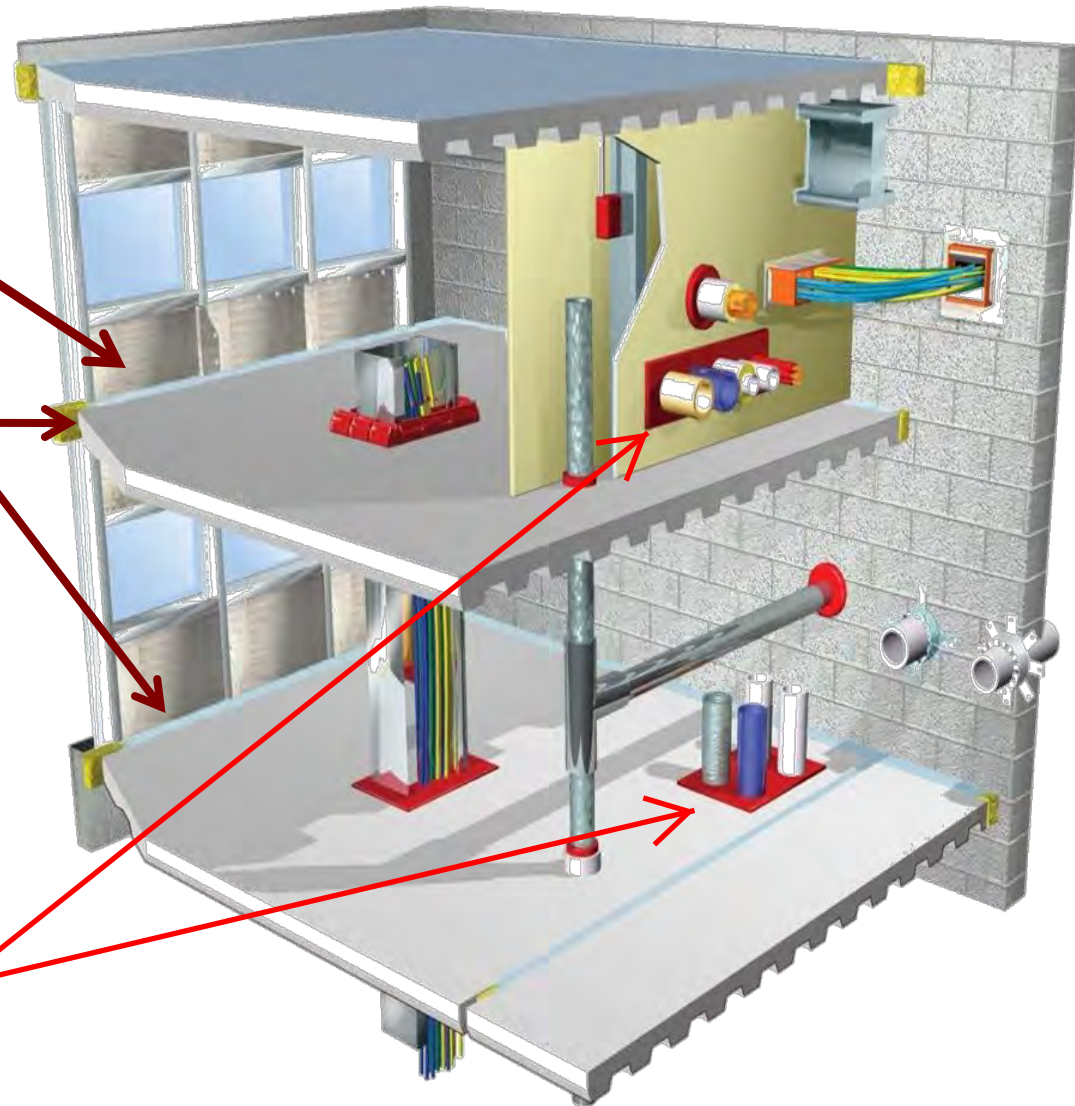
被動式防火系統工程



防火隔熱材岩棉

防火層間塞岩棉
+防火阻煙膠

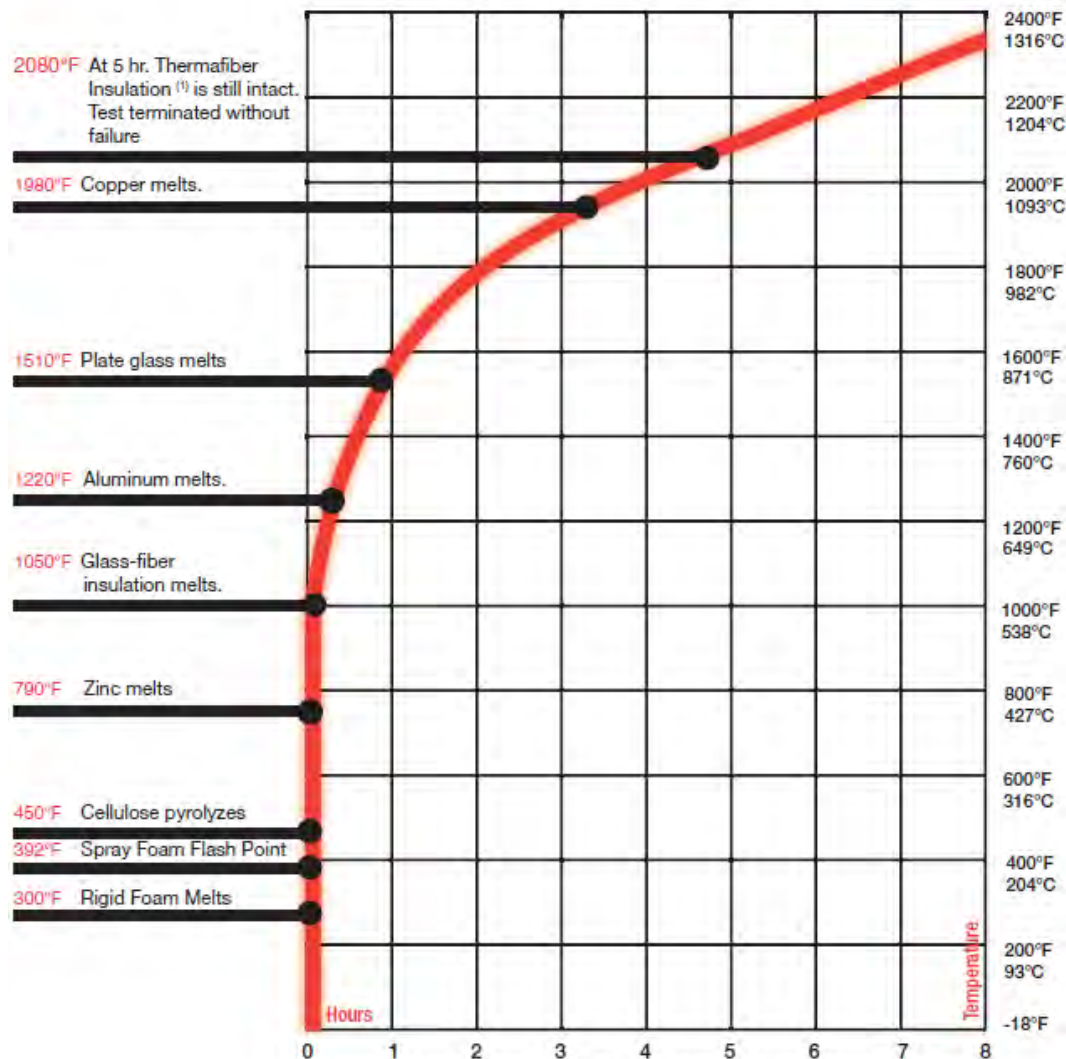
貫穿部防火填塞



防火時效 - 溫度曲線



根據 ASTM E 119測試



(1) Not for service operation at this temperature. Refer to the appropriate Thermafiber insulation literature which states recommended maximum service temperature limits of individual products.
Time-temperature curve from "Standard of Methods of Fire Tests of Building Constructions and Materials." (ASTM E119-81)

ASTM E 119 – 測試前



ASTM E 119 – 測試後

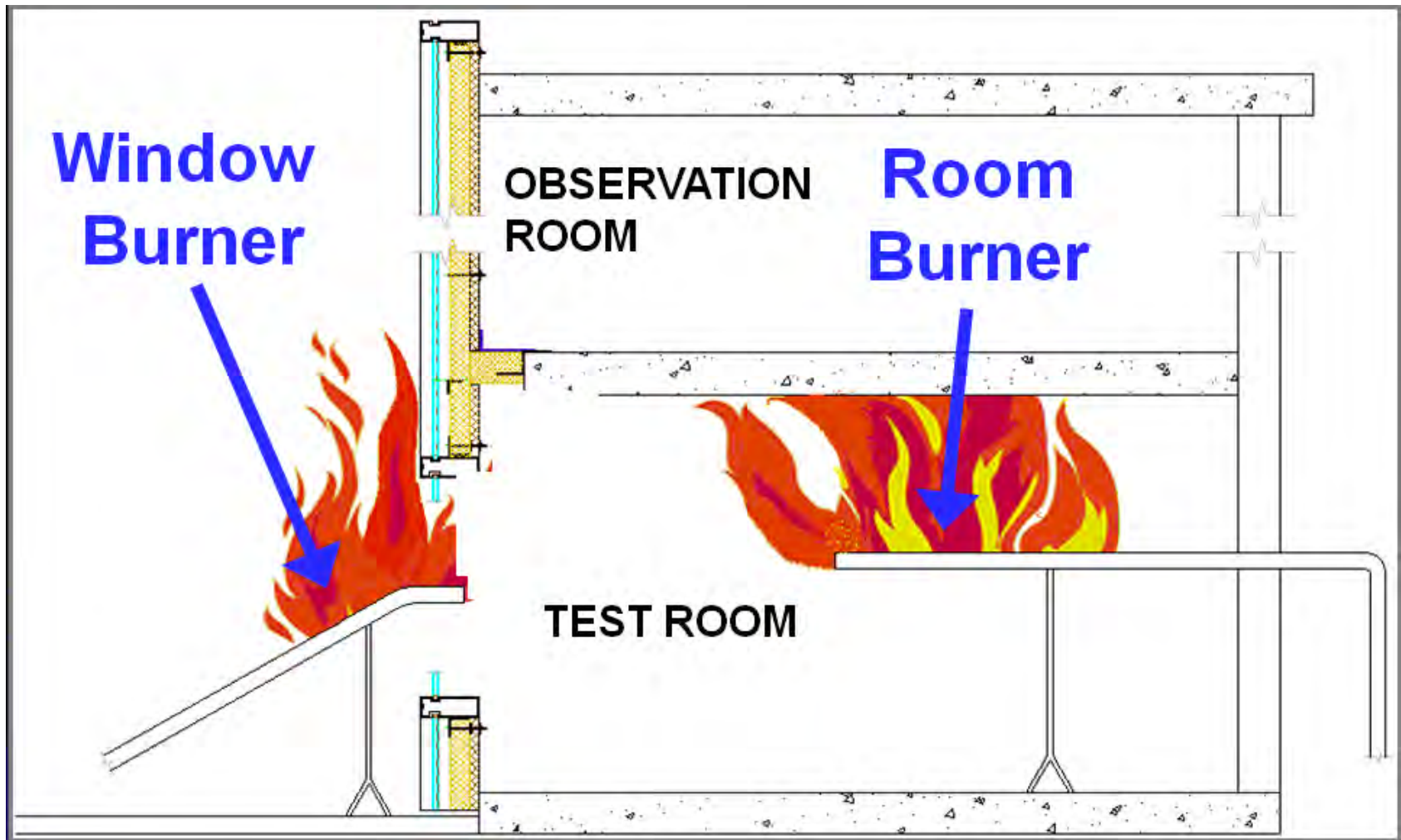


火災現場



火災發生時，
帷幕玻璃因高溫壓力下
破裂

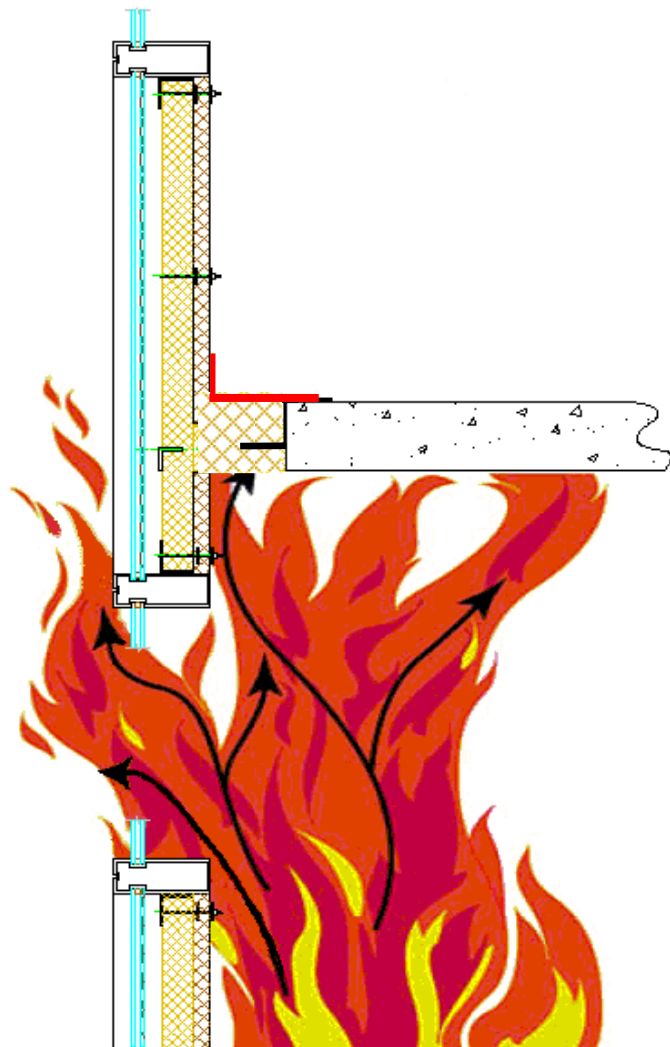
ASTM E 2307



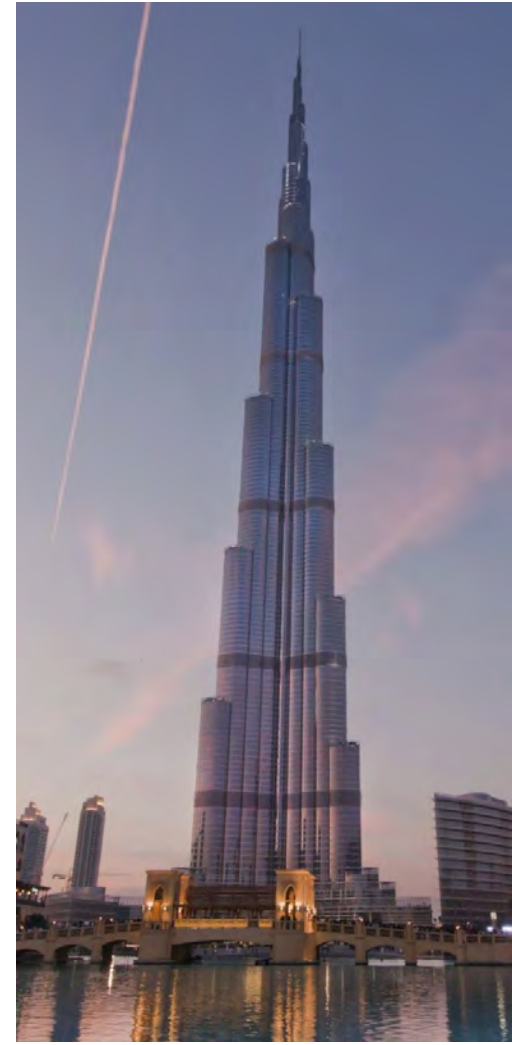
火災現場之火舌路徑



已施作 帷幕牆週邊防火工程



世界高樓大廈 代表作



Thermafiber FireSpan 40 & FireSpan 90 中文說明

帷幕牆防火背襯板岩棉

1. 增加週邊防火系統之效能
2. 提供各項專業機構之防火時效認證
3. 耐火溫度可高達 2,000°F(1,093°C)
4. 具有節能減碳，符合綠建築環保設計
5. 帷幕牆隔熱材質具高度可回收性
6. 防濕氣、抗黴菌
7. 控制噪音

簡述	Thermafiber 提供週邊防火系統之層間塞產品。包含隔音及防火。依不同產品組合，防火時效可達 1~3 小時之等級。							
產品種類	FireSpan 40 及 FireSpan 90 兩種規格							
技術資料					Tested to ASTM E 84			
			Tested to ASTM C 518		Unfaced		Foil Faced	
	Product Designation	Actual Density	"k" @ 75° [24°C] BTU.in/hr.sq. ft. °F	"R" value per inch of thickness***	Flame Spread	Smoke Developed	Flame Spread	Smoke Developed
	FireSpan 40	4.0 pcf	0.24	'R'= 4.2	0	0	25	0
	FireSpan 90	6.0~8.0 pcf	0.24	'R'= 4.2	0	0	25	0
***R = thickness divided by 'k'								
防火測試符合 ASTM E2307 規範	包含鋁、鐵、玻璃、花崗岩、混凝土等材質測試。							
符合標準規範	FireSpan 40 and FireSpan 90 meets the following: ASTM C 665 Non-corrosive, Type I, III ASTM C 612 Type IA, IB, II ASTM C 612 Type IA, IB, II, III ASTM E 136 Rated Non-combustible per NFPA Standard 220 ASTM E 96 Unfaced, 50 Perms as tested ASTM E 96 Foil Faced, 0.02 Perms as tested ASTM C 1104 Absorbs less than 1% by volume ASTM C 356 Linear Shrinkage <2% @ 1200°F(650°C) ICC ES Report ER-2331							

Curtain Wall Insulation FireSpan®90 & FireSpan®40

- + Exceptional performance in Perimeter Fire Containment Systems
- + Provides fire protection in rated assemblies
- + Fire resistant to temperatures above 2,000°F (1,093°C)
- + Conserves energy, reduces greenhouse gas emissions
- + Mold resistant
- + Controls noise and sound
- + Natural dark color provides shadowing in glass spandrels

LEED® v2009 Green Building Credits				
Minimum 70% Recycled Content ¹	Energy & Atmosphere	Materials & Resources	Indoor Environmental Quality	Innovation in Design
	1	2.1, 2.2 4.1, 4.2 5.1, 5.2	9	1



Thermafiber insulation provides the critical components of the perimeter fire containment system in the Trump International Hotel and Tower in Chicago.



Firespan insulation is designed for use with Thermafiber Inc.'s patented, labor saving, Impasse® Curtain Wall Insulation System.



Thermafiber® FireSpan® 90 & FireSpan® 40 Insulations

Description:

THERMAFIBER® FireSpan® products are designed to provide fire protection in curtain wall and perimeter fire containment systems. These products are noncombustible, moisture-resistant, noncorrosive, nondeteriorating, mildew-proof and vermin-proof. Its natural dark color provides shadowing in glass spandrels. FireSpan® 40 & 90 insulations provide thermal insulation, fire protection, acoustical and vapor control in many different fire containment assemblies of 1, 2, and 3-hr ratings.

Product Options:

- FireSpan® 40, 2" or greater thickness, is available with a vapor retarding foil facing.
 - FireSpan® 90, 1" or greater thickness, is available with a vapor retarding foil facing.
 - Recycled Content Options¹:
 - EPA Choice Fiber (US Government Buildings)..... Minimum 75%
 - Standard Fiber..... 70%
- ¹Recycled content options other than Standard must be specified at time of order.

Installation:

FireSpan® products should be mechanically attached to horizontal and vertical mullions with architect approved insulation fasteners. Reinforce FireSpan insulation on the outer insulation surface at the sifting line. Typical reinforcement members include hat channels, "L" angles, and "T" bars. Thermafiber Inc.'s patented Impasse system is designed to quickly and easily mechanically attach FireSpan insulation to curtain wall systems.

Standard Sizes:

	Thickness*	Widths**	Lengths**
FireSpan 40	2" - 7"	24", 36", 72"	48", 60", 72"
FireSpan 90	1" - 7"	24", 36", 72"	48", 60", 72"
Tolerances	+1/4", - 1/8"	± 1/8"	+3/4", - 1/4"

*Thicknesses are available in 1/2" increments. **Consult sales representative for custom size options.

Technical Data:

Product Designation	Nominal Density	Tested to ASTM C 518		Tested to ASTM E 84			
		"k" @ 75° [24°C] BTU.in/hr.sq. ft. °F	"R" value per inch of thickness***	Unfaced		Foil Faced	
				Flame Spread	Smoke Developed	Flame Spread	Smoke Developed
FireSpan 40	4.0 pcf	0.24	'R' = 4.2	0	0	25	0
FireSpan 90	8.0 pcf	0.24	'R' = 4.2	0	0	25	0

***R = thickness divided by 'k'

Fire-Containment Tests Per ASTM E 2307

FireSpan® insulation is the insulation for perimeter fire containment. Thermafiber has performed decades of testing in all of the containment systems listed below. For more complete test information, see SA707, THERMAFIBER Life-Safety Fire Containment Systems technical catalog or UL and Intertek (formerly OPL) Directories. For a full listing of containment systems visit www.thermafiber.com and click on Fire Rated Assemblies.

- Aluminum Spandrel Curtain Wall Fire Containment
- Steel Stud-Framed/Gypsum Sheathing Curtain Wall Fire Containment
- Glass Spandrel Curtain Wall Fire Containment
- Granite Spandrel Curtain Wall Fire Containment
- Precast Concrete Spandrel

Standards Compliance:

FireSpan® 40 and 90 meet the following:

- ASTM C 665** Type I, III (Class A, Category 1)
- ASTM C 612** FireSpan 40 Type IA, IB, II, III, IVA
- ASTM C 612** FireSpan 90 Type IA, IB, II, III, IVA
- ASTM E 136** Rated Non-combustible per NFPA Standard 220
- CAN/ULC S114** Complies
- ASTM E 96** Unfaced, 50 Perms as tested
- ASTM E 96** Foil Faced, 0.02 Perms as tested
- ASTM C 1104** Sorption less than 1% by volume
- ASTM C 356** Linear Shrinkage <2% @ 1200° F (650° C)
- CAN/ULC S102** Flame Spread 0, Smoke Developed 0
- ICC ES Report** ER-2331

Curtain wall products are approved by: **New York City Board of Standards & Appeals** – (under BSA 214-73-SM & accepted by MEA-209-82, Vol. II). Also, MEA-189-93-M and MEA-190-93-M.

Thermafiber Insolutions®:

Thermafiber offers industry leading technical and engineering assistance to architects, specifiers, and contractors. These services include CAD drawings, engineering judgments, LEED® Credit Information, and product recommendations. Contact our technical services department at 1-888-834-2371, or email technicalservice@owenscorning.com

For Further Information:

For additional information about these or other Thermafiber® products contact us at 1-888-834-2371 or visit our website www.thermafiber.com.

Notice:

THERMAFIBER, Inc. shall not be liable for incidental and consequential damages, directly or indirectly sustained, nor for any loss caused by application of these goods not in accordance with current printed instructions or for other than the intended use. THERMAFIBER liability is expressly limited to replacement of defective goods. Any claim shall be deemed waived unless made in writing within thirty (30) days from date it was or reasonably should have been discovered.

Submittal Approvals:

Job Name	
Contractor	Date



Thermafiber Safing 中文資料說明

防火層間塞岩棉

1. 增加週邊防火系統之效能
2. 提供各項專業機構之防火時效認證
3. 耐火溫度可高達 2,000°F(1,093°C)
4. 對穿樓板斷火之工程，組裝容易
5. 具有節能減碳，符合綠建築環保設計
6. 防濕氣、抗黴菌
7. 控制噪音

簡述	Thermafiber 提供週邊防火系統之層間塞產品。包含隔音及防火。依不同產品組合，防火時效可達 1~3 小時之等級。									
產品種類	4.0 pcf 及 6.0 pcf 兩種規格									
技術資料					Tested to ASTM E 84					
					Tested to ASTM C 518		Unfaced		Foil Faced	
	Product Designation	Actual Density	"k" @ 75° [24°C] BTU.in/hr.sq. ft. °F	"R" value per inch of thickness***	Flame Spread	Smoke Developed	Flame Spread	Smoke Developed		
	Safing	4.0 pcf	0.24	'R'= 4.2	0	0	25	0		
	Safing	6.0 pcf	0.24	'R'= 4.2	0	0	25	0		
***R = thickness divided by 'k'										
防火測試符合 ASTM E2307 規範	包含鋁、鐵、玻璃、花崗岩、混凝土等材質測試。									
符合標準規範	Safing Insulation meets the following: ASTM C 665 Non-corrosive, Type I, III ASTM C 612 Type IA, IB, II ASTM E 136 Rated Non-combustible per NFPA Standard 220 ASTM E 96 Unfaced, 50 Perms as tested ASTM E 96 Foil Faced, 0.02 Perms as tested ASTM C 1104 Absorbs less than 1% by volume									

Fire Containment Insulation

Thermafiber® Safing™

- + Exceptional performance in Perimeter Fire Containment Systems
- + Provides life saving fire protection in rated assemblies
- + Fire resistant to temperatures above 2,000°F (1,093°C)
- + Easy to fabricate for through penetrations and firestopping
- + Conserves energy, reduces greenhouse gas emissions
- + Resists moisture
- + Controls noise and sound

LEED® v2009 Green Building Credits				
Minimum 70% Recycled Content ¹	Energy & Atmosphere	Materials & Resources	Indoor Environmental Quality	Innovation in Design
	1	2.1, 2.2 4.1, 4.2 5.1, 5.2	9	1



Thermafiber Safing and FireSpan® insulation provide the critical components of the perimeter fire containment system in the 111 South Wacker Building in Chicago, IL. Thermafiber insulation also contributed to the building's LEED® Gold Rating.



Thermafiber® Safing™ is compression fitted between FireSpan® insulation and the concrete slab edge to create a perimeter fire containment system.



Thermafiber® Safing™ Insulation

Description:

THERMAFIBER Safing™ products are designed to provide life saving fire protection in perimeter fire containment systems, floor and wall penetrations, construction joints, and other firestopping applications. These products are noncombustible, moisture-resistant, noncorrosive, nondeteriorating, mildew-proof and vermin-proof. Thermafiber Safing provides thermal insulation, fire protection, and acoustical control in many different UL and Intertek (formerly OPL) listed fire containment assemblies of 1, 2, and 3-hr ratings.

Product Options:

- Safing 4.0 pcf, 2" or greater thickness, is available with or without a vapor retarding foil facing.
 - Safing 6.0 pcf, 1.5" or greater thickness, is available with or without a vapor retarding foil facing.
 - Recycled Content Options¹:
 - EPA Choice Fiber (US Government Buildings)..... Minimum 75%
 - Standard Fiber..... 70%
- ¹Recycled content options other than Standard must be specified at time of order.

Installation:

All firestopping insulation should be installed per the architectural specification or system specific test description. All firestopping Safing insulation should be installed per the listed assembly.

- Perimeter Installation: Safing™ insulation should be compression fitted between the slab edge and the FireSpan curtain wall insulation, leaving no voids.
- Penetration Application: Safing insulation should be cut slightly larger than the opening and compression fitted into the opening, leaving no voids.
- Construction Joint Application: Safing insulation should be compression fitted into the joint opening, leaving no voids.

Standard Sizes:

	Thickness*	Widths**	Lengths**
Safing 4.0 pcf	1" - 7"	16", 24", 36"	48", 60"
Safing 6.0 pcf	1" - 7"	16", 24", 36"	48", 60"
Tolerances	+1/4" - 1/8"	±1/8"	±1/2"

*Thicknesses are available in 1/2" increments. **Custom sizes are available upon request.

Technical Data:

Product Designation	Actual Density	Tested to ASTM C 518		Tested to ASTM E 84			
		"k" @ 75° [24°C] BTU.in/hr.sq. ft. °F	"R" value per inch of thickness***	Unfaced		Foil Faced	
				Flame Spread	Smoke Developed	Flame Spread	Smoke Developed
Safing	4.0 pcf	0.24	'R'= 4.2	0	0	25	0
Safing	6.0 pcf	0.24	'R'= 4.2	0	0	25	0

***R = thickness divided by 'k'

Fire-Containment Tests Per ASTM E 2307

Safing™ insulation is a critical component of any perimeter fire containment system. Thermafiber® has performed decades of testing in all of the containment systems listed below. For more complete test information, see SA707, THERMAFIBER Life-Safety Fire Containment Systems technical catalog or UL® and Intertek® (formerly OPL) Directories. For a full listing of containment systems visit www.thermafiber.com and click on Fire Rated Assemblies. UL Reference = TYPE SAF

- Aluminum Spandrel Curtain Wall Fire Containment
- Steel Stud-Framed/Gypsum Sheathing Curtain Wall Fire Containment
- Glass Spandrel Curtain Wall Fire Containment
- Granite Spandrel Curtain Wall Fire Containment
- Precast Concrete Spandrel

Standards Compliance:

Safing™ Insulation meets the following:

ASTM C 665	Non-corrosive, Type I, III
ASTM C 612	Type IA, IB, II
ASTM E 136	Rated Non-combustible per NFPA Standard 220
CAN/ULC S114	Complies
ASTM E 96	Unfaced, 50 Perms as tested
ASTM E 96	Foil Faced, 0.02 Perms as tested
ASTM C 1104	Absorbs less than 1% by volume
CAN/ULC S102	Flame Spread 0, Smoke Developed 0
ASTM E 814 or UL 1479	Safing Insulation used in conjunction with an approved fill, void, or cavity material sealant or other approved material in through – penetration firestop systems - Complies
UL 2079	Safing Insulation used in conjunction with an approved fill, void or cavity material in construction joint systems - Complies
CAN/ULC S115	Complies

Safing products are approved by: **New York City Board of Standards & Appeals** – (under BSA 39-74-SM & accepted by MEA-209-82-M, Vol. 4).

Thermafiber® Insolutions®:

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Submittal Approvals:

Job Name	
Contractor	Date





Firestop 5100SP

吸熱型防火密封噴膠

產品說明

Firestop 5100SP 一種水性樹乳脂。來防止火焰、煙霧和濃烈毒氣經由貫穿隙擴散出去，吸熱型 5100SP 防火密封乳膠經過和空氣接觸後，表面會形一層成具有彈性而耐久的防火密封層。

應用範圍

Firestop 5100SP 吸熱型密封防火乳膠，為伸縮縫接合處提供有效的防火阻隔，適用範圍包含樓板、樓板與牆、牆與牆、牆頂、鋼層板與牆接縫、帷幕牆與樓板等接縫處及伸縮縫處位置。

Firestop 5100SP 吸熱型密封防火乳膠可與木材、混凝土、空心磚牆、帷幕牆及石膏板等材料接合，形成密封的防火保護層。

產品優點

1. 吸熱功能—遇熱或火燒時，材料吸收熱能釋放水蒸氣，並形成固態炭化表層，阻止火焰、濃煙的貫穿蔓延。
2. 系統設計—在小面積或大型伸縮縫上噴塗，5100SP 吸熱型密封噴膠設計成與防火岩棉相互結合成複合體，形成最佳防火材料，發揮最大的防火功效。
3. 彈性變位—Firestop 5100SP 吸熱型密封噴膠使用於伸縮縫位置時，表面伸張及壓縮量可達 33% 的優越彈性變位，養護完成後的材料表面具備彈性及防水效能。



防火測試及認證單位

Firestop 5100SP 吸熱型密封噴膠已通過多項防火工法測試，材料通過防火試驗機構，產品取得防火認證的單位包括：

ASTM	美國材料測試協會
UL	美國保險業聯合實驗室
FM	美國工廠互助保險協會
ULC	加拿大保險業聯合實驗室
ICBO	國家材料研究中心

符合防火標準

UL 1479	建築物貫穿部防火測試
UL 2079	建築物間隙防火性能測試
ASTM E814	防火材料防火性能試驗
ASTM E84	防火材料表面燃燒測試
ASTM E90	建築隔間隔音測試
ASTM E119	建築物與防火材防火測試
ASTM E1399	防火材地震變位反覆測試
ASTM E1966	建築物間隙防火性能測試

技術諮詢請聯絡

睿怡實業股份有限公司
電話：(02)2940-3530
傳真：(02)2940-3531

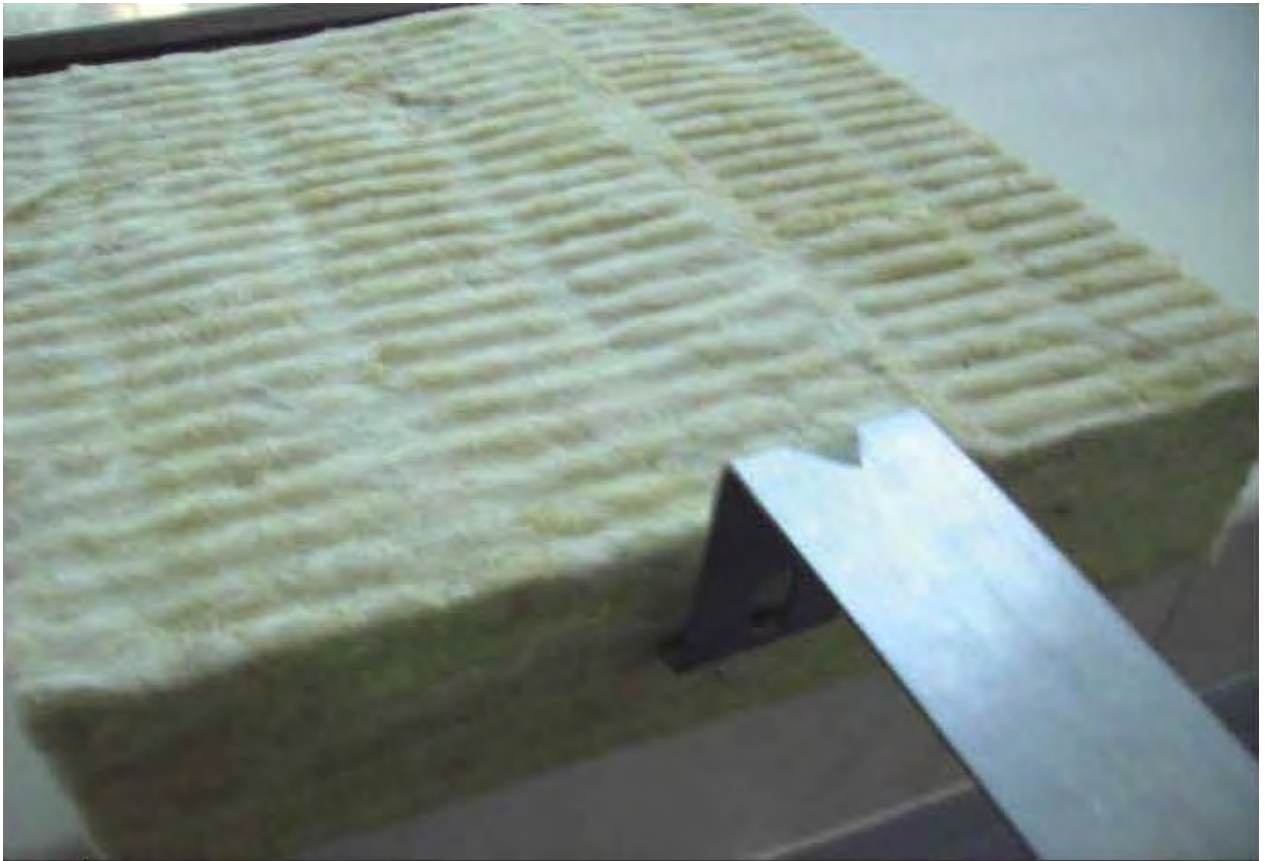
施工流程(1)



說明

1.清理樓板與帷幕之間的小碎石。

施工流程(2)



- | | |
|----|--|
| 說明 | <ol style="list-style-type: none">1. 裁切防火岩棉符合間隙寬度。2. 將 Z-Clip 插入防火岩棉約 2/3 的位置，間距約小於 45cm。(Z-Clip 材質厚度 1.2t) |
|----|--|

施工流程(3)



說明

1. 將裁切好的防火岩棉和 Z-Clip 填塞至間隙中。
2. 並將 Z-Clip 固定於樓板。

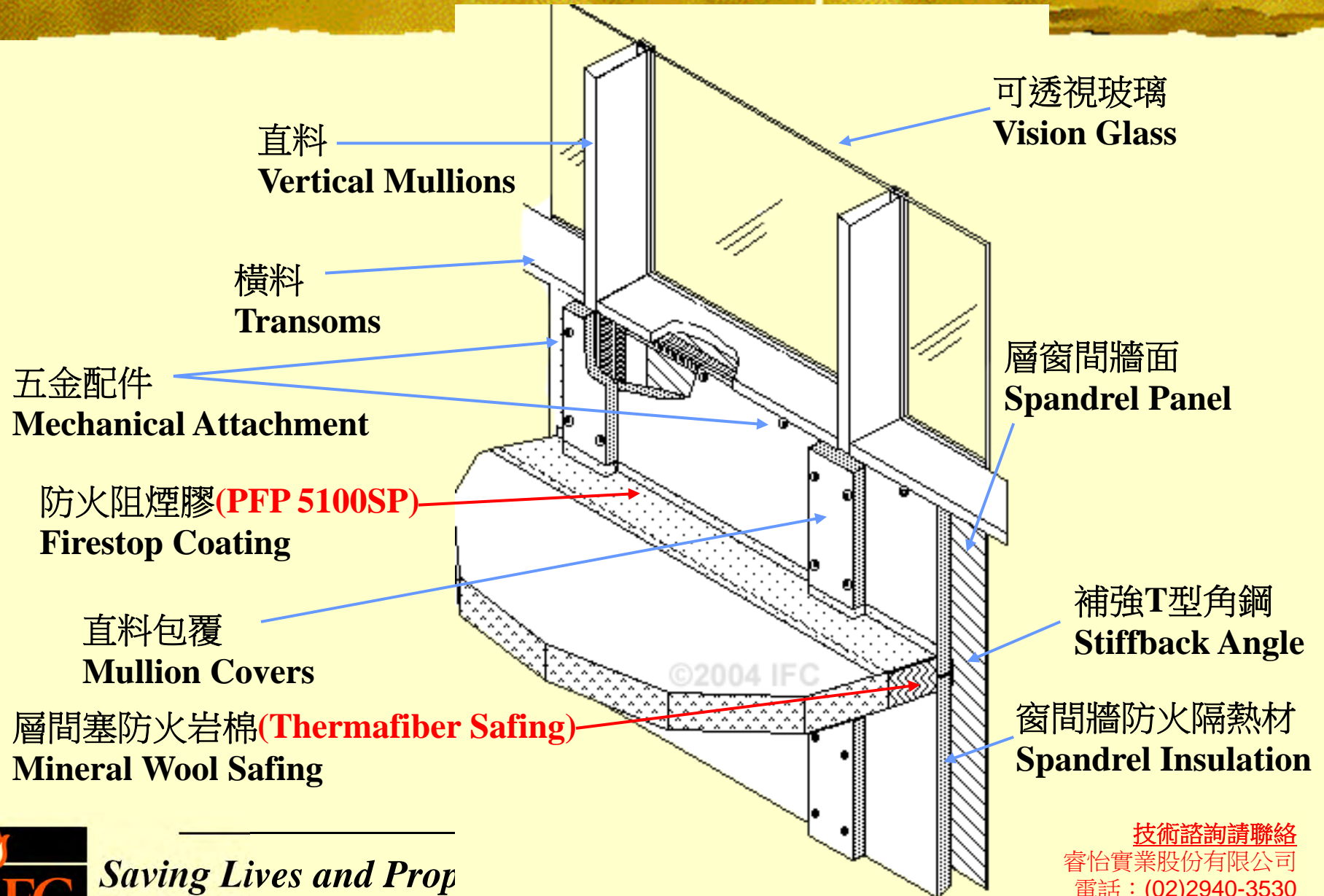
施工流程(4)



說
明

1. 將 5100SP 防火膠均勻填塗四周間隙保持氣密，即完成施作。







International Firestop Council







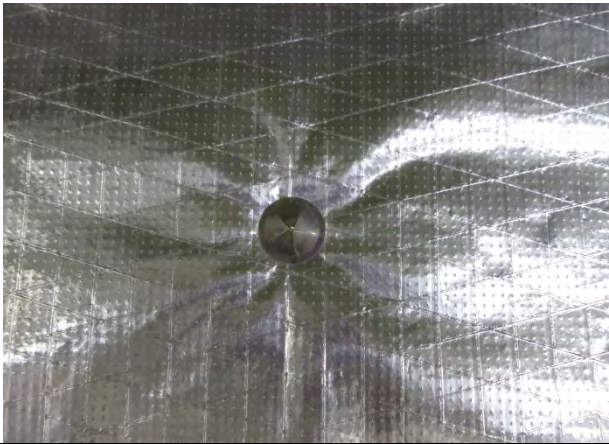

*Saving Lives and Prop
Through Fire and Smoke Containment*

技術諮詢請聯絡
睿怡實業股份有限公司
電話：(02)2940-3530
傳真：(02)2940-3531

層間塞防火施工流程(金屬帷幕)

施工流程(1)		施工流程(2)	
			
說明	清理帷幕與樓板週邊的粉塵雜物小碎路。	說明	裁切防火岩棉符合間隙寬度。
施工流程(3)		施工流程(4)	
			
說明	將 Z-Clip 插入防火岩棉約 2/3 的位置，間距小於 45cm。	說明	將裁切好的防火岩棉和 Z-Clip 填塞至間隙中。
施工流程(5)		施工流程(6)	
			
說明	將 Z-Clip 固定於樓板。	說明	將阻煙膠均勻塗滿防火岩棉及週邊間隙以保持氣密，即完成施作。

帷幕牆隔熱材防火施工流程

施工流程(1)		施工流程(2)	
			
說明	清理帷幕背襯板週邊的粉塵雜物。	說明	將青銅針黏貼於背襯板上。
施工流程(3)		施工流程(4)	
			
說明	將裁切好的 Thermafiber 防火岩棉，安裝至背襯板上刺穿過青銅針。	說明	將裁切好的 LAMTEC 針孔鋁箔，鋪在 Thermafiber 防火岩棉表面上刺穿過青銅針。
施工流程(5)		施工流程(6)	
			
說明	將青銅針套上華司來固定 Thermafiber 防火岩棉及 LAMTEC 針孔鋁箔浮貼於背襯板上。	說明	將 LAMTEC 針孔鋁箔週邊接縫於直橫料上、華司穿孔表面及其他破洞處均以加強鋁箔貼布黏貼覆蓋之，即完工。