

NOVEMBER 2019

# *Principles & Standards*

FirePro® / FP®-Steel / MultiPro® / NuClad®  
FP®-900 / FirePro-S® / MP®-1000 / NuPanel®

**FIRE RESISTING CONSTRUCTIONS**  
Solutions & Technical Manual



**SOBEN INTERNATIONAL**

High Performance Building Boards & Solutions for Sustainable Construction



# Building With Confidence

## A new benchmark for eco-friendly autoclaved cellulose fibre reinforced silicate matrix boards

Few versatile performance building boards offer both architectural envelope and strong technical specification as credible as the Soben International premium product range of eco-friendly autoclaved cellulose fibre reinforced silicate matrix boards. The line includes: fire protection calcium silicate boards, weather resistant fibre-cement boards and prefabricated panels. Since its establishment, Soben International has been a pre-eminent developer and manufacturer of high quality eco-friendly silicate matrix board solutions and has set a new benchmark for comparable products made in Asia.

With extensive product research and testing, our areas of expertise are sophisticated building solutions that tackle fire protection, multi-purpose constructions, façades and claddings where aesthetic finish and quality are of paramount importance.

Soben International high performance boards have been fully tested and certified by first class accredited laboratories and third party certification bodies to testify our commitment to performance, delivery of quality, and health and safety.

### STRIVING FOR QUALITY PRODUCTS & PROFESSIONAL EXCELLENCE

#### FIRE-SAFE

Soben International Boards are prime protectants against fire damage. The range's high levels of fire resistance has been thoroughly tested and certified by official European laboratories.

#### RELIABILITY

The Soben International team is dedicated to retaining an excellent Client Services department to ensure your needs are adhered to quickly and effectively.

Quality Control and Quality Assurance programmes are in place in all Soben International divisions to guarantee that all orders of our fully tested products and solutions follow their ISO 9001, 14001 and CE Mark standards.

Soben International's customer service team is tasked with the primary goal of providing punctual delivery of shipments and endeavour to ensure that upon receipt of goods, each client's requisition is accurate and truthful to the product description.

#### ETHICAL

Soben International places great onus on the preservation of good practice and professional conduct at all stages of the supply chain. This is upheld from the manufacturing process to the delivery of goods and throughout all communication with stakeholders and clientele.

#### ECO-FRIENDLY

Standing at the forefront of environmental innovation, Soben International is committed to sustaining and developing a commendable CSR record. Our solutions for eco building and sustainable development projects have all been certified by the appropriate Green Label authorities.

#### DISCLAIMER

Please ensure that you have the latest version of this publication by checking that the publication date corresponds with the downloadable version from our website [www.sobenboard.com](http://www.sobenboard.com). In case of doubt, please contact your local Soben International representative.

All information contained in this brochure is, to the best of our knowledge, correct at the time of printing. Soben International shall be under no liability whatsoever any loss or damages which may arise as a result of the failure to adhere to such recommendations in all aspects. Nothings in these Conditions, nor any compendiums, brochures, instructions, method statements or other documents or designs issued by or on behalf of Soben International shall create or to be deemed to create any obligation.

Soben International has a policy of continuous improvement and reserves the right to change specifications, designs of products and systems at any time without prior notice. Local authority must be consulted for compliance with local building regulations.

#### REGISTERED TRADE MARK

FP®-900, FP®-Steel, MP-1000® and NuPanel® are registered trade names for the products marketed in Europe

FirePro®, FP®-Steel, FirePro® -S, MultiPro®, and NuClad® are registered trade names for the products marketed in Asia.



# FP® FIRE RESISTING CONSTRUCTIONS

## PRINCIPLES & STANDARDS



## CONTENTS

---

<b>FP® Fire Resisting Construction</b>	Passive Fire Protection	01
<b>Principles &amp; Standards</b>	Fire Testing Standards	02
	Fire Testing Methods: Fire Load Curves	02
	Classification of Fire Resistant Materials	04
	Classification of Fire Resistance	04
	Fire Test Standards for Fire Resisting Constructions	05
	Fire Resistance Criteria	06
	Other Requirements	06

---

<b>FP® Fire Protection Board Range</b>		
<b>FP® -900/FirePro®</b>	High Performance Fire Protection Board	07
<b>FP® -Steel/FirePro®-S</b>	Blast Resistant Fire Protection Board	10
<b>MP-1000®/MultiPro®</b>	High Performance Fire Resistant Board	12
<b>NuPanel®/NuClad®</b>	Eco-Friendly Fire Resistant Board	15
<b>Safety Instruction</b>	Health, Safety & Site Work Guidance	18

---

## FP® FIRE RESISTING CONSTRUCTIONS

Compartment floors and compartment walls as fire barriers enclose a protected escape route or a place to stop fire spread in a building. To some extent the fire barriers help to contain the effects of fire, Building Regulations require fire resisting constructions to have specified periods of fire resistance. When correctly specified and installed, the fire resisting constructions may contribute substantially to the safety of the occupants of the building.

Deep-rooted in manufacturing of high performance eco-friendly calcium silicate board products and passive fire protection development with significant resources and finance input in regulating product research and accumulated fire testing of building systems over two decades, Soben International is proud to offer a range of innovative and accredited passive fire protection solutions with **FP® Fire Protection Boards** for construction industry.

The passive fire protection solutions embrace a range of FP® fire resisting systems developed for loadbearing structures, non-loadbearing ceiling, partition and external wall systems as to cope with various buildings' needs of either in new construction or refurbishment projects. Among FP® fire rated ventilation ductworks, FP® building services enclosures and FP® tunnel protection systems, these enable Soben International to deliver a complete fire-safe solution to protect lives, buildings and contents. Abiding by global building regulations, Soben International FP® fire protection products and solutions have been certified by world class accreditation bodies in fire protection industry that represents a statement of fire safety and quality assurance.

## FP® FIRE PROTECTION BOARD RANGE

FP® Fire Protection boards include a range of autoclaved cellulose fibre reinforced calcium silicate matrix board products; FP®-900/FirePro®, FP®-Steel/FirePro®-S, MP-1000®/MultiPro® and NuPanel®/NuClad® boards. They are non-combustible boards tested in terms of BS: 476: Part 4 and Euro Class A1 of EN 13501-1, the highest rank of fire resistance classification for materials. The board products are made to comply with high durability performance as prescribed in EN 12467.

All Soben International board materials are manufactured in accordance with accredited ISO 9001 quality management system and ISO 14001 environmental management system. Production process and board materials meet the stringent criteria of green product accreditations.



**SUSPENDED CEILING FIRE TEST**

## RESEARCH AND TESTING

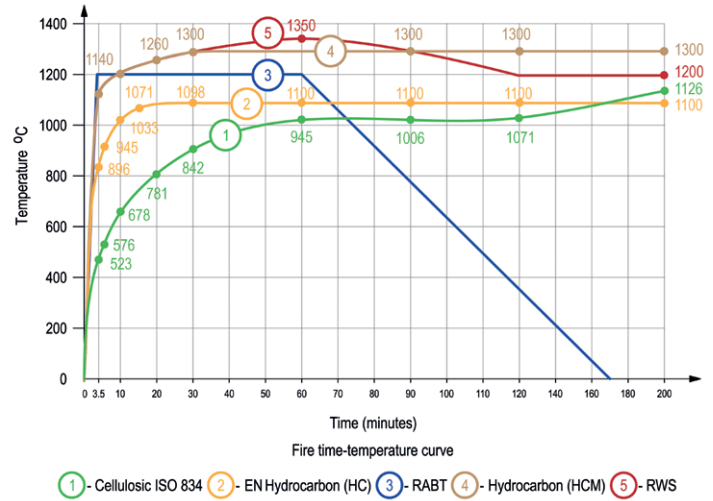
Product development drives Soben International evolving towards in response to the market changes and needs. The growth of the company not only base on quality specialist product range, but also advising a broad of range of clients on practicable design solutions for various building applications that comply with code of practice, standards and building regulations. We collaborate with research institute of the university for new material technology applied that strengthens our production and continuously refine products. Soben International Technical Department so far have been conducting a considerable number of testing on materials, products and system applications particular in fire resisting construction. A great deal of fire tests has been carried out by independent and nationally approved laboratories in Hong Kong and notified laboratories in Europe. Necessity of technical appraisals are prepared by world known fire consultants around the world ensuring adequate functionalities of the specialised fire protection solutions are fit-to-purpose of international standards. Fire safety assurance on FP® products and systems has been certified by worldwide recognised independent accreditation bodies of fire industry.

The strong proven fire resistance performance of Soben International FP® product range and fire solutions provide authentic protection of life, properties and the environment. After all it delivers peace of mind in fire-safe and confidence for clients and end users.

**FIRE TESTING METHODS: FIRE LOAD CURVES**

Fire testing is an effective measure on a fire resistance performance of a fire barrier. A fire test is conducted in a vertical or horizontal furnace where fire is loaded according to the nature of cellulosic fire or hydrocarbon fire.

Fire development in a structure is classified as two major types of fire, either cellulosic or hydrocarbon fire. The difference between two types of fire is the time it takes for the fire to reach its maximum temperature range. The burning rate of cellulosic fires is comparably slow due to general combustible building materials and building contents. On the contrary, hydrocarbon fires develop extremely fast because of high burning rate of hydrocarbon chemicals in petrochemical facilities or fuels from cars in tunnels. Under test conditions, a cellulosic fire will reach a temperature of 945°C in 60 minutes, whilst a hydrocarbon fire will take just a few minutes to reach the same level of temperature.



**Hydrocarbon fire**

Petrochemical facilities and tunnels are towards to high fire risk of high temperature fire caused by fuels. Hydrocarbon chemicals and fuels ignite with high intensive of fire and thermal radiation. Within ten minutes of ignition, the temperature of the hydrocarbon fire can reach 1000°C when a fire occurs in a confined space of tunnel. Unprotected reinforced concrete linings of the tunnel may collapse due to loss of strength and spalled concretes as their temperature increases. A few researches on hydrocarbon fire nature in tunnel had been taken place recent years. These are Hydrocarbon Eurocode I (HC), Modified Hydrocarbon (HCM), Rijkwaterstaat (RWS) and RABT fire curves with attributes of time-temperature change. The HC and RWS standards are increasingly adopted in many tunnel constructions. More details of passive fire protection solutions for tunnels, please refer to Technical Manual for FP®-900/FirePro® tunnel fire protection.

**Cellulosic fire**

In building context, standard fire tests for building elements are based on the use of cellulosic fire, a standard temperature-time curve ISO 834 as a common benchmark and defined in various national standards, e.g. BS 476: Part 20, EN 1363-1, AS 1530, DIN 4102, etc.

The ISO 834 fire load curve in the graph represents a fully developed fire in a compartment and shows that temperature increases with time at a constant rate, as defined by the following expression:  $T=20 + 345\log_{10}(8t+1)$



**EXTENSIVE FIRE TESTS FOR FP® FIRE RESISTING CONSTRUCTIONS**



**STRUCTUREL STEEL PROTECTION**



**SPANDREL WALL**



**REINFORCED CONCRETE PROTECTION**



**SMOKE EXTRACT DUCT**



**RWS & HC FIRE TUNNEL CONCRETE PROTECTION**



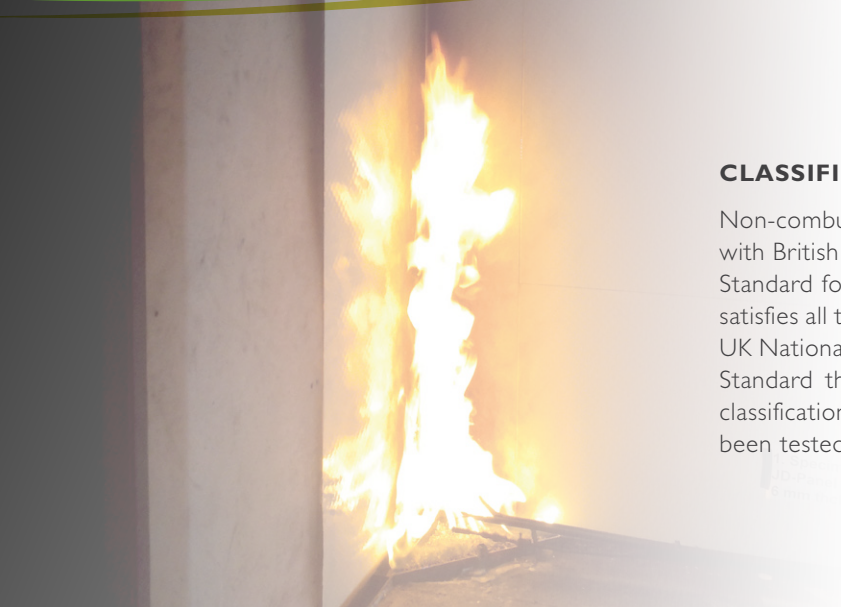
**VENTILATION DUCT**



**LOADBEARING COMPOSITE FLOOR**



**LOADBEARING TIMBER FLOOR**



### CLASSIFICATION OF FIRE RESISTANT MATERIALS

Non-combustibility of fire-resistant materials is tested in accordance with British Standard BS 476 for UK National Class or British European Standard for Euroclass of Reaction to Fire. Fire resistance of a material satisfies all test criteria of Euroclass that the material is equivalent to the UK National Class. Vice versa, a material is tested to comply with British Standard that the material does not satisfy the criteria of European classification. FP® Fire protection boards are non-combustible and have been tested in compliance with both British and European Standards.

UK		EUROPE	
National Class	British Standard	Euroclass	European Standard
Non-combustibility	BS 476: Part 4	A1	BS EN 1182 & 1716
Limited combustibility	BS 476: Part 11	A2	BS EN 1182 or 1716 & 13823
0	BS 476: Part 6 & 7	B	BS EN 13823 & 11925-2
1 & 2	BS 476: Part 7	C	BS EN 13823 & 11925-2
3	BS 476: Part 7	D	BS EN 13823 & 11925-2
4	BS 476: Part 7	E	BS EN 11925-2
Unclassifiable	No test	F	No performance

\*The above table simply summarises the equivalence of the 2 classifications during the transition period.

### CLASSIFICATION OF FIRE RESISTANCE

Fire resistance capacity of a fire resisting construction is a measure of the construction when exposed to a standardized fire test in terms of one or more of the performance criteria for loadbearing capacity, integrity and insulation of the construction against a time of heating period. Normally the fire resistance classification of the fire resisting construction is expressed by as a time limit in minutes 15, 30, 60, 90, 120, 180, 240, or 360.

Fire resistance capacity is described with various names in different countries, such as Fire Resistance Level (FRL), Fire Resistance Period (FRP), Fire Resistance Rating (FRR), Fire Resistance Class (FRC).

- Fire resistance capacity of a fire resisting construction is expressed as FRL: loadbearing capacity / integrity / insulation
- Fire resistance capacity of a ventilation duct is expressed as FRL: stability / integrity / insulation

#### Examples

1. A loadbearing steel beam with 60 minutes fire resistance FRL: 60/-/-
2. A non-loadbearing partition with 60 minutes fire resistance FRL: -/60/60
3. A loadbearing reinforced concrete floor with 60 minutes fire resistance FRL: 60/60/60
4. A ventilation duct with 60 minutes fire resistance FRL: 60/60/-
5. A ventilation duct with 60 minutes fire resistance and full insulation FRL: 60/60/60

## FIRE TEST STANDARDS FOR FIRE RESISTING CONSTRUCTIONS

Fire resistance performance of a fire resisting construction should comply with a national standard of a country. British Standard BS 476 is one of the most common fire codes used in the world. Soben International FP® Fire Resisting Construction Systems are constructed with non-combustible calcium silicate boards. The systems have been extensively tested and technically assessed for fire resistance capacity in accordance with British Standard. Some systems may have tested in compliance with European or/and Australian Standards. Please contact Soben International for further information.

FP® Fire Resisting Construction Systems for wall and floor elements in a building are tested in accordance with BS 476: Part 21, 22 and 23: 1987 where are applicable to loadbearing or non-loadbearing fire resisting constructions. In addition, where ventilation and building services ducts run through the compartments in a building may facilitate fire spread over from a compartment to others if the service ducts are not fire protected. Therefore, the smoke and ventilation ductworks must be fire resistant and tested in accordance with BS 476: Part 24: 1987 - Methods for determination of the fire resistance of ventilation duct. The building services run through compartments are encased by fire barriers in accordance with BS 476: Part 20: 1987. Further details and solutions are provided in Technical Manuals for ventilation ducts and general building services enclosure systems constructed with FP®-900/FirePro® and FP®-Steel/FirePro®-S high performance boards.

### Non-loadbearing Partitions and External Walls

Non-loadbearing partitions and external walls are commonly found in a building. Most of them are made from steel or timber framed board wall, masonry wall or lightweight concrete panel. They provide a function of space division in a building as well as stopping fire spread from one compartment to the next ones and/or adjoined buildings. These fire resisting constructions should be tested and assessed to satisfy the criteria of integrity and insulation in accordance with BS 476: 22: 1987 - Methods for determination of the fire resistance of non-loadbearing elements of construction.

### Non-loadbearing Ceilings

Concrete floors and roof slabs can be protected by suspended ceiling membranes or self-supporting ceiling membranes. These ceilings are used to provide resistance to fire attack from below or from above the ceiling void where services are contained. The ceiling membranes should be tested or assessed to satisfy the criteria of integrity and insulation in accordance with BS 476: 22: 1987 - Methods for determination of the fire resistance of non-loadbearing elements of construction.

### Loadbearing Structures

Methods for determination of the fire resistance of loadbearing elements of construction BS 476: Part 21: 1987 specifies the criteria for fire testing and procedures for loadbearing structures of all kinds. For instance, a floor slab which can be constructed with timber or concrete slab supported by steel joists. It can be protected by a fire barrier fixed to the underside of the slab and floor joists to provide a certain period of fire resistance. The protected floor structure should satisfy the criteria of



integrity, insulation and loadbearing capacity without exceeding the allowable rate of deflection when tested in accordance with BS 476: Part 21. This standard also applies on testing of fire protection to steel and reinforced concrete beams, columns and floors. Simultaneously, they should have to fulfill the criteria of structural adequacy for fire resistance of materials, for timber BS 5268: Part 2: 2002, reinforced concrete BS 8110: Part 2: 1985 or structural steelwork BS 5950: Part 8: 2003.

### Loadbearing Floors or Flat Roofs Supported by Steel Beams

A suspended ceiling membrane can be used to protect a loadbearing concrete floor or flat roof slab supported by steel beams. The steel beams are protected against fire in order not to collapse when fire attack from below. This type of ceiling should be tested and/or assessed in accordance with BS 476: Part 23 - Methods for determination of the contribution of components to fire resistance of a structure.





IMPACT & CROWD PRESSURE TESTS  
ON FP® FIRE RATED WALLS

## FIRE RESISTANCE CRITERIA

The ability of a fire resisting construction is to satisfy, for a stated period of time, the appropriate criteria specified in BS 476: Part 20 the general principles of fire resistance test and the prescribed integrity and insulation criteria are applied to vertical and horizontal fire barrier constructions when tested in accordance with BS 476: Part 21, 22 and 23.

**Integrity:** A specimen of a separating fire resisting construction when exposed to fire on one side, to prevent the passage through it of flames and to prevent the occurrence of flames, holes and cracks of certain dimensions on the unexposed side.

**Insulation:** A specimen of a separating fire resisting construction when exposed to fire on one side, to restrict the temperature rise of the unexposed face to below specified levels.

- The average temperature rise is less than 140°C above its initial value.
- The maximum temperature rise is less than of 180°C above its initial value at any positions.

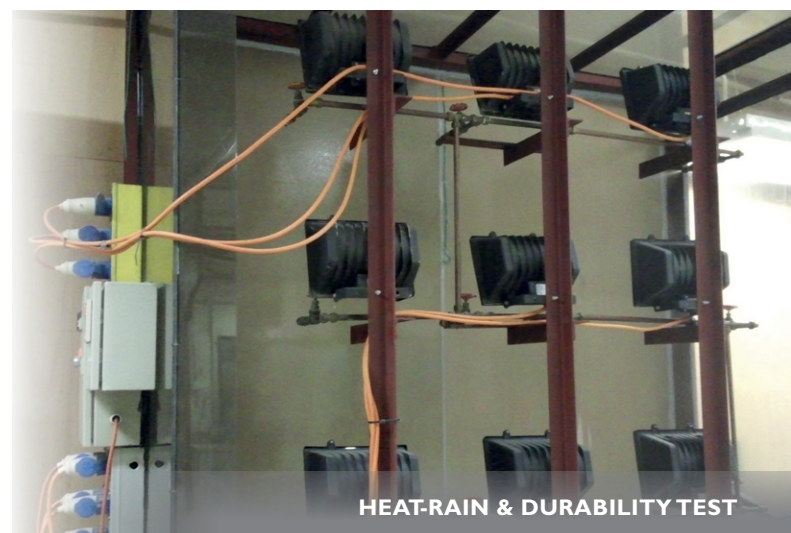
**Loadbearing Capacity:** A specimen of a loaded fire resisting construction resists a fire when exposed on one or several sides during a time period without losing its stability as well as not exceeding the limit to the rate of deformation and maximum deformation of the loaded construction.

## OTHER REQUIREMENTS

In addition to the standard fire test and relevant assessment for fire resisting constructions, pre-approval of the government and statutory criteria for quality assurance of fire safety on fire resisting constructions are enforced in some countries recent years. These ensure that the constructions are duly designed, tested and manufactured to specified codes and standards. Thus, it is capable of providing adequate fire protection for lives and buildings.

- Fire tests and assessments must be conducted by accredited fire laboratories and recognised by the local authority building control.
- Fire tests and assessments must be certified by a third party accredited body specialised on fire safety.
- Pre-approval of local authority building control for certified fire resisting constructions in some countries is a statutory requirement.
- Fire resistant materials and fire resisting constructions are manufactured with Factory Production Control (FPC) and Quality Management System ISO 9001: 2008.
- Fire resistant materials and fire resisting constructions are manufactured with Environmental Management System ISO 14001: 2004 and complies with green label product certification.
- Aging and durability test on fire resistant materials should be provided and complied with a certain standard, for an instance of CE mark EN 12467 for calcium silicate flat sheet products.

Soben International high performance FP® fire protection products and systems have been developed with respect to the above stringent criteria. Please contact Soben International or your local authorised dealers for further information.



HEAT-RAIN & DURABILITY TEST

**SPECIFIC PROPERTIES**



Non-combustible



Rot proof,  
anti-bacterial



Decorative finishes with  
tiles, paint or wall paper



Moisture resistance



Lightweight but strong



Easy to use



Dimensional stability  
Small expansion rate



Fire resistance up to  
240 minutes



Immune to attack from  
insects or vermin



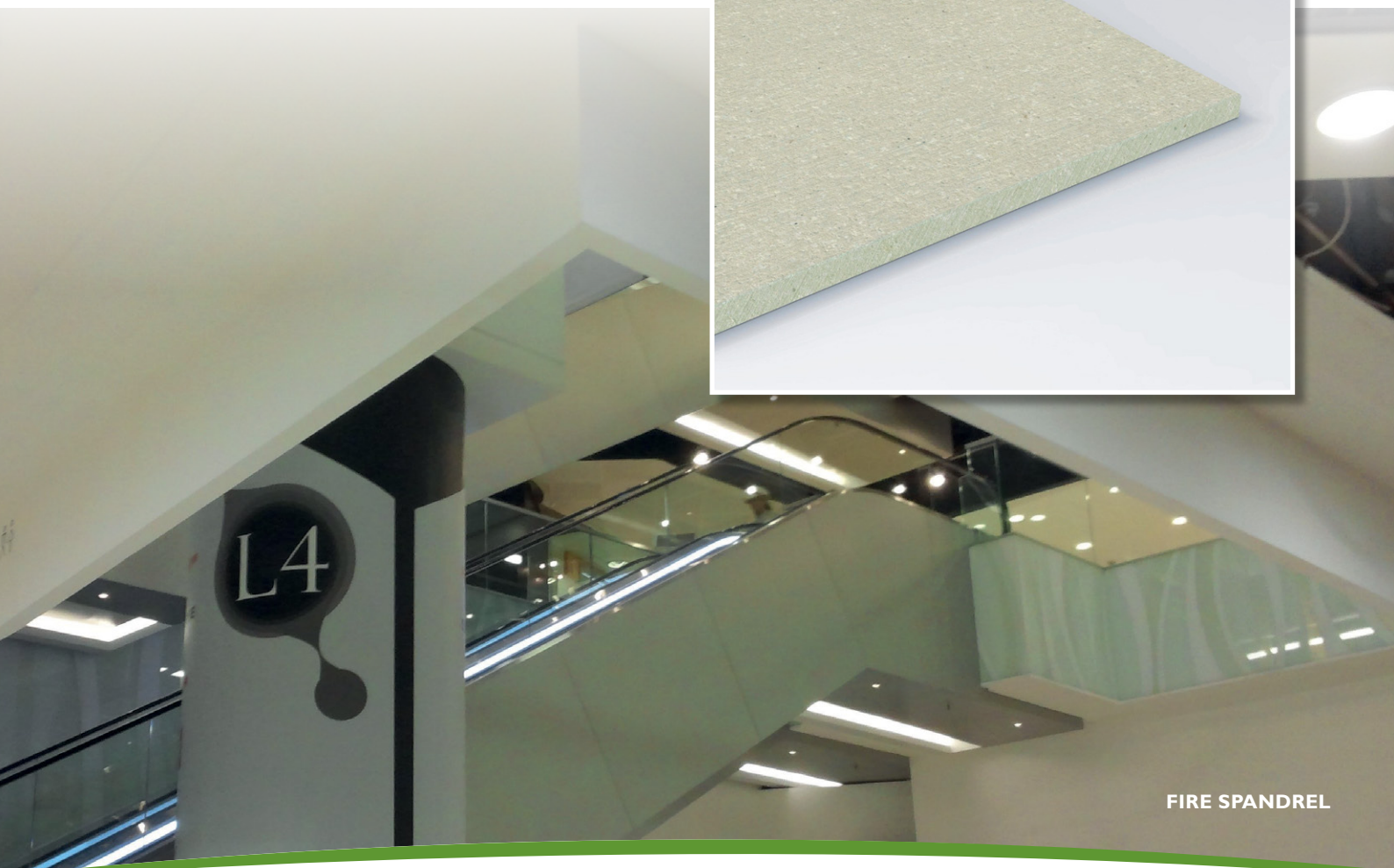
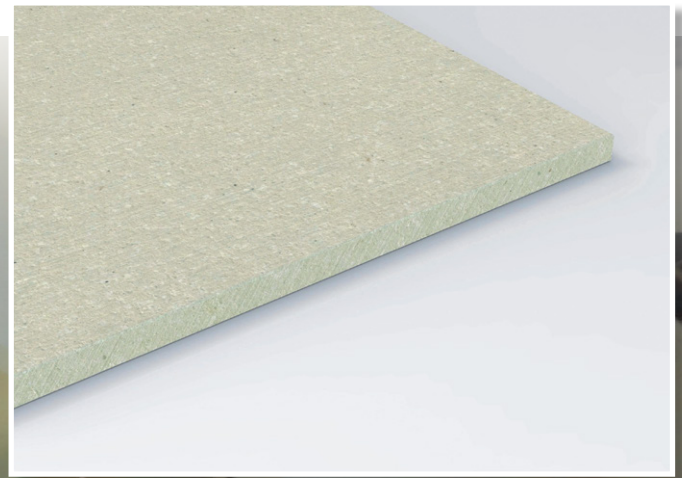
Good chemical  
resistance



Good sound insulation



Maintenance free



**FIRE SPANDEL**

**TECHNICAL PERFORMANCE**

FP®-900/FirePro® is an autoclaved cellulose fibre reinforced calcium silicate board and Eco-friendly. It is non-combustible in compliance with BS 476: Part 4 and Euro Class A1 of EN 13501-1. It has superior fire resistance performance and excellent dimensional stability when exposed to heat or severe moisture environments.

TEST	STANDARD	RESULT	
<b>Physical Properties</b>			
Density	BS EN 12467	900 kg/m <sup>3</sup> +/-10%	
Nominal weight		8.9kg/m <sup>2</sup> - 9 mm 11.9kg/m <sup>2</sup> -12mm 13.8kg/m <sup>2</sup> -14mm 14.8kg/m <sup>2</sup> -15mm 17.8kg/m <sup>2</sup> -18mm 23.7kg/m <sup>2</sup> -24mm 26.7kg/m <sup>2</sup> -27mm	
Size		1220 x 2440mm 1200 x 2400mm	
Surface alkalinity		pH 7-10	
Flexural strength	BS EN 12467 ISO/TR 1896	6.0 N/mm <sup>2</sup>	transverse
		9.5 N/mm <sup>2</sup>	longitudinal
Minimum bending radius		7.2m	- 9mm, longitudinal
		9.8m	- 12mm
Compressive strength - parallel to the plane of board	BS EN 771-2	12.5 N/mm <sup>2</sup>	
<b>Impact Strength</b>			
Stiffness & impact resistance of partition		Heavy duty	
Resistance to door slamming	BS 5234: Part 2	Heavy duty	
Resistance to crowd pressure		3kN/m	
<b>Durability &amp; Aging</b>			
Durability & strength tests	CE Mark BS EN 12467	Endurance Class: exceed Category C sheet, intended for applications where are subjected to moisture and heat	
Water permeability		No formation of drops of water after a 24-hour of test	
Soak-dry		Pass, for 25 cycles of test	
Freeze-thaw		Pass, for 25 cycles of test	
Warm water		Pass, in water at 60°C for 56 days	
<b>Moisture &amp; Water Effect</b>			
Moisture movement	ambient to saturated BS EN 12467	0.05% +0.045% @ 20°C, RH 30%~95%	
Dimensional changes in length due to relative humidity	BS EN 318	+0.01% @20°C, RH 30%~85% - 0.02% @20°C, RH 85%~30%	
Moisture content		Ex works - 15% In situ - 6%	

# FP®-900/FirePro®

## HIGH PERFORMANCE FIRE PROTECTION BOARD



TEST	STANDARD	RESULT
<b>Thermal &amp; Fire Insulation</b>		
Thermal conductivity	EN 12664	0.17 W/mK
Linear thermal expansion	BS EN ISO 10515-8	-3.06 × 1E-6/°C
Fire rated systems	AS 1530.4 BS 476: Part 20-24 BS EN1364-1 & 2	up to 240 minutes
	RWS & HC fire in tunnels	Contact Soben International
Non-combustible	AS 1530.1 BS 476: Part 4 BS EN ISO 1182	Pass
Heat of combustion	BS EN ISO 1716	Pass
Reaction to Fire - Classification	EN 13501-1	Euro Class A1
Surface spread of flame	BS 476: Part 7	Class I
Fire propagation	BS 476: Part 6	Class 0
Ignitability	BS 476: Part 5	Class P
Product certification scheme	Singapore	Class 1 & 2
<b>Acoustic Insulation</b>		
Acoustic reduction (over range 100-3150 Hz)	AS 1276.1 & 1191 ASTM E90 & E413 EN ISO 10140-3 & 717-1	STC/Rw (dB)      steel framed partition
		26                      9mm
		46                      99mm
		49                      105mm
<b>Environmental Friendly</b>		
Green labeled building board	Hong Kong Singapore	Certified no heavy metal & no harmful substance
Organic emission	ASTM D5116-06	Non toxic & No formaldehyde, satisfied the emission tests
Recyclable product	ISO 14001	Crushed down for recycle use, Products made under ISO 14001 environmental management system

Note: All physical performance values of products depicted in this technical handbook are averages based on the standard production. The figures may be changed dependent on the test method used.

### SPECIFIC PROPERTIES



Non-combustible



Up to 360-minute fire protection



Immune to attack from insects or vermin



Blast resistance  
Heavy impact resistance



Excellent dimensional stability



Maintenance-free



Moisture resistance



Good sound insulation



Lightweight but robust



### TECHNICAL PERFORMANCE

FP®-Steel/FirePro®-S provides high level of durability and reliability on fire, blast and impact protection. Excellent mechanical properties and moisture tolerant make it suitably serves for wide applications.

TEST	STANDARD	RESULT	
<b>Properties</b>			
Size		1200 x 2400mm	
Weight & thickness		21kg/m <sup>2</sup> 9.5mm	17kg/m <sup>2</sup> 6.0mm
Composition	BS EN 10346	Facing - Z275 galvanised steel sheet, 0.5mm thick Core - Compressed high density fibre cement	
Surface alkalinity		pH 9-10	
Flexural strength	BS EN 12467	103 N/mm <sup>2</sup>	
Bending Modulus	BS EN 12467	21883 N/mm <sup>2</sup>	
Impact strength	BS EN 1128	> 85 mm/mm, unaffected	
Loadbearing capacity		15 kN/m <sup>2</sup> with fire attack	
Moisture content	By weight	7- 8%	
<b>Fire Resistance</b>			
Fire rated systems	BS 476: Part 20-24 BS EN 1364-1 & 2	Tested, up to 360 minutes	
Non-combustible	BS EN ISO 1182	Pass	
Heat of combustion	BS EN ISO 1716	Pass	
Reaction to Fire - Classification	EN 13501-1	Euro Class A1/A1 <sub>FL</sub>	
Resistant to continuous heating	In house	350°C	
Blast resistance		air blast pressure 300 kN/m <sup>2</sup> , unaffected	
<b>Acoustic Insulation</b>			
Acoustic reduction (over range 100-3150 Hz)	AS 1276.1 & 1191	thickness	STC/Rw (dB)
	ASTM E90 & E413	9.5mm	32
	EN ISO 10140-3 & 717-1	6.0mm	31
<b>Environmental Friendly</b>			
Green labeled building board	Hong Kong Singapore	Fibre cement core certified, no heavy metal & no harmful substance	
Organic emission	ASTM D5116-06	Non-toxic & No formaldehyde, satisfied the emission tests	
Recyclable product	ISO 14001	Crushed down for recycle use, Products made under ISO 14001 environmental management system	

Note: All physical performance values of products depicted in this technical handbook are averages based on the standard production. The figures may be changed dependent on the test method used.

**SPECIFIC PROPERTIES**



Non-combustible



Rot proof, resistance to insects or mould growth



Excellent dimensional stability



Moisture resistance  
 Water tightness



Lightweight but strong



Bent to shape



Small expansion rate



Fire resistance up to 120 minutes



Decorative finishes with tiles, paint or wall paper



Good chemical resistance



Good sound insulation



Low maintenance



**HAN SUNG COUNTRY CLUB KOREA**

### TECHNICAL PERFORMANCE

MP®-1000/MultiPro® is eco-friendly CE Marked and non-combustible calcium silicate matrix board to EN 13501-1: Class A. It has superior fire resistance performance and excellent dimensional stability subject to heat or severe moisture environments.

TEST	STANDARD	RESULT
<b>Physical Properties</b>		
Density	BS EN 12467	1000 kg/m <sup>3</sup> +/- 10%
Nominal weight		6.6kg/m <sup>2</sup> - 6mm 9.9kg/m <sup>2</sup> - 9mm 12.6kg/m <sup>2</sup> - 12mm
Size		1220 x 2440mm 1200 x 2400mm
Surface alkalinity		pH 7-10
Flexural strength	BS EN 12467	7.0 N/mm <sup>2</sup> - transverse 10.0 N/mm <sup>2</sup> - longitudinal
Minimum bending radius		4.8m - 6mm, longitudinal 7.2m - 9mm 9.8m - 12mm
Sag when suspended at 610mm span	ambient	< 1mm
<b>Durability &amp; Aging</b>		
Durability and strength tests		Endurance Class: Category B sheet, intended for semi-exposed applications where are subjected to moisture, heat and occasional frost
Soak-dry	CE Mark BS EN 12467	Pass, for 50 cycles of test
Warm water		Pass, in water at 60°C for 56 days
Heat-rain		Pass, for 25 cycles of test
Water permeability	ASTM C 1185-08 BS EN 12467	No formation of drops of water after a 24-hour of test
<b>Moisture &amp; Water Effect</b>		
Moisture movement	Ambient to saturated	0.05%
Dimensional changes in length due to relative humidity	BS EN 318	+0.017% @20°C, RH 30%~85% - 0.017% @20°C, RH 85%~30%
Moisture content		Ex works - 15% In situ - 6%
Water absorption	by weight	~ 48%



# MP-1000®/MultiPro® HIGH PERFORMANCE FIRE RESISTANT BOARD



TEST	STANDARD	RESULT
<b>Thermal &amp; Fire Insulation</b>		
Thermal conductivity	EN 12664	0.185 W/mK
Linear thermal expansion	BS EN ISO 10515-8	-1.7×1E-6/°C
Resistance to continuous heating	In-house	100°C
Fire rated systems	BS 476: Part 22 BS EN 1363-1	up to 120 minutes
Non-combustible	AS 1530.1 BS 476: Part 4 BS EN ISO 1182 JIS A 1312	Pass  Ministry of Land & Transport, Japan. Approval No. NM-3768
Heat of combustion	BS EN ISO 1716	Pass
Reaction to fire - Classification	EN 13501-1	Euro Class A1
Surface spread of flame	BS 476: Part 7	Class I
Fire propagation	BS 476: Part 6	Class 0
Ignitability	BS 476: Part 5	Class P
Product certification scheme	Singapore	Class I & 2
<b>Acoustic insulation</b>		
Acoustic reduction (over range 100-3150 Hz)	AS 1276.1 & 1191 ASTM E90 & E413 EN ISO 10140-3 & 717-1 BS EN 12467	STC/Rw (dB)      steel framed partition
		26                      6mm
		28                      9mm
		29                      12mm
		45                      91mm
		48                      99mm
		55                      123mm
60                      214mm		
<b>Environmental friendly</b>		
Green labeled building board	Hong Kong Singapore	Certified no heavy metal & no harmful substance
Organic emission	ASTM D5116-06	Non toxic & No formaldehyde, satisfied the emission tests
Recyclable product	ISO 14001	Crushed down for recycle use, Products made under ISO 14001 environmental management system & ISO 9001 quality management system

Note: All physical performance values of products depicted in this technical handbook are averages based on the standard production. The figures may be changed dependent on the test method used.

## SPECIFIC PROPERTIES



Non-combustible



Rot proof, resistance to insects or mould growth



Excellent dimensional stability



Moisture resistance  
Water tightness



Lightweight but strong



Economic



Small expansion rate



Fire resistant wall up to 90 minutes



Decorative finishes with tiles, paint or wall paper



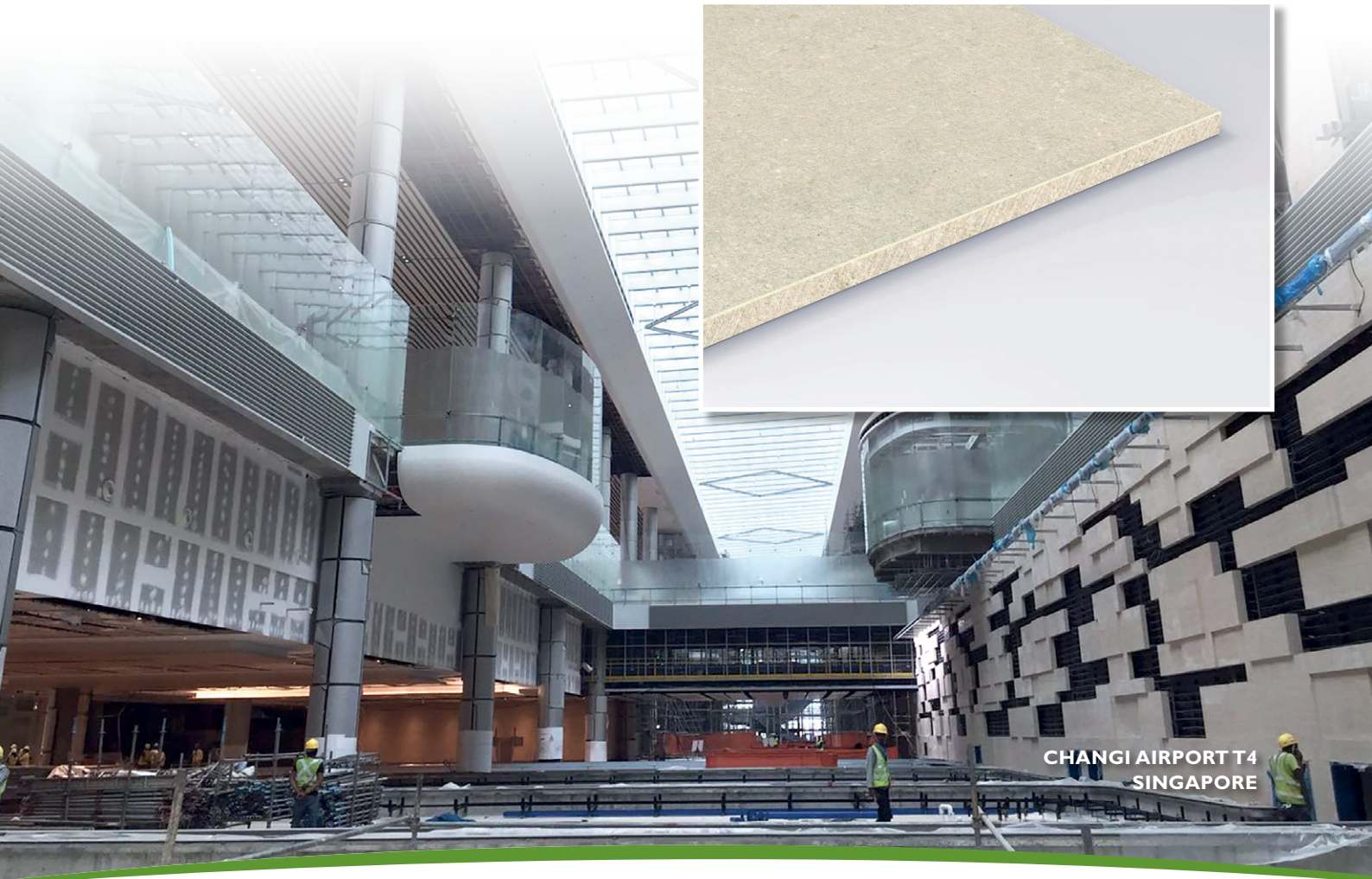
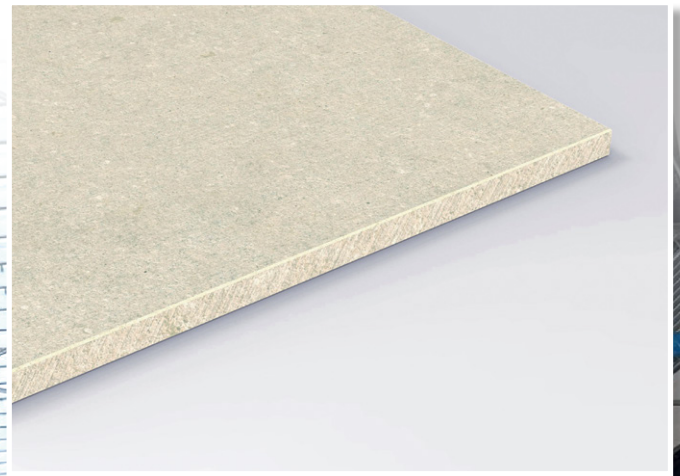
Good chemical resistance



Good sound insulation



Low maintenance



CHANGI AIRPORT T4  
SINGAPORE

### TECHNICAL PERFORMANCE

NuPanel®/NuClad® is low carbon foot print, CE marked non-combustible calcium silicate matrix board to EN 13501-1: Class A1. It has superior fire resistance performance and excellent dimensional stability at heat or severe humid environments. The crystallised monolithic structure of NuClad®/NuPanel® as a reliable substrate ensure to hold paint finishes longer than other building board at damp and wet areas.

TEST	STANDARD	RESULT
<b>Physical Properties</b>		
Density	BS EN 12467	1150 kg/m <sup>3</sup> +/-10%
Nominal weight		7.20kg/m <sup>2</sup> - 6mm 10.80kg/m <sup>2</sup> - 9mm 14.40kg/m <sup>2</sup> - 12mm
Size		1220 x 2440mm 1200 x 2400mm
Surface alkalinity		pH 7-10
Flexural strength	BS EN 12467	8.0 N/mm <sup>2</sup> - transverse 11.3 N/mm <sup>2</sup> - longitudinal
Racking stiffness on timber structure	BS EN 594	1764 N/mm - 9mm
Minimum bending radius		5.2m - 6mm, longitudinal 7.6m - 9mm 10.2m - 12mm
Sag when suspended at 610mm span	ambient	< 1mm
<b>Durability &amp; Aging</b>		
Durability and strength tests	CE Mark BS EN 12467	Endurance Class: exceed Category C sheet, intended for internal applications where are subjected to moisture and heat
Soak-dry	BS EN 12467	Pass, for 50 cycles of test
Warm water	BS EN 12467	Pass, in water at 60°C for 56 days
Water permeability	ASTM C 1185-08 BS EN 12467	No formation of drops of water after a 24-hour of test
<b>Moisture &amp; Water Effect</b>		
Moisture movement	Ambient to saturated	0.06%
Dimensional changes in length due to relative humidity	BS EN 318	+0.010% @20°C, RH 30%~85% - 0.015% @20°C, RH 85%~30%
Moisture movement	BS EN 12467	+0.05% @ 23°C, RH 30%~95%
Moisture content		Ex works - 18% In situ - 7%
Water absorption	by weight	~ 45%



TEST	STANDARD	RESULT	
<b>Thermal &amp; Fire Insulation</b>			
Thermal conductivity	EN 12664	0.188 W/mK	
Linear thermal expansion	BS EN ISO 10515-8	-1.35x1E-6/°C	
Resistance to continuous heating	In-house	80°C	
Fire rated systems	AS/NZS 1530.4 BS 476: Part 22	up to 90 minutes Timber framed or steel framed partition	
Non-combustible	BS EN ISO 1182 BS 476: Part 4	Pass	
Heat of combustion	BS EN ISO 1716 AS/NZS 3837	Pass	
Reaction to fire - Classification	EN 13501-1	Euro Class A1	
Australian classification of fire	BCA 2011	Group 1	
Product certification scheme	Singapore	Class 2	
<b>Acoustic insulation</b>			
Acoustic reduction (over range 100-3150 Hz)	AS 1276.1 & 1191 ASTM E90 & E413 EN ISO 10140-3 & 717-1	STC/Rw (dB)	steel framed partition
		26	6mm, single skin
		28	9mm, single skin
		29	12mm, single skin
		46	91mm
		54	91mm double layers
		49	99mm
		55	123mm
<b>Environmental friendly</b>			
Green labeled building board	Hong Kong Singapore	Certified no heavy metal & no harmful substance	
Organic emission	ASTM D5116-06	Non toxic & No formaldehyde, satisfied the emission tests	
Recyclable product	ISO 14001	Crushed down for recycle use, Products made under ISO 14001 environmental management system & ISO 9001 quality management system	

Note: All physical performance values of products depicted in this technical handbook are averages based on the standard production. The figures may be changed dependent on the test method used.

### HEALTH, SAFETY & SITE WORK GUIDANCE



#### HEALTHY & SAFETY

##### Processing

As for all other building materials, safety precautions must be taken into account and local laws and regulations must be observed.

Horizontal boards or ceiling boards must not be walked on as they are not designed to take additional loads between supports unless stated otherwise. If there is a risk as this occurring, warning notices should be displayed. Installers must ensure that they work from adequate and safe platform where necessary.

#### HANDLING AND STORAGE

##### Manual Handling

European or local manual handling regulations applies for any heavy loading practices in order to minimize the risk of accidents to the handlers and also the possible damage to the product.

- Always lift boards off the board below, never slide board on board or drag the stack.
- Always carry the boards on edge, but do not store on edge.
- Never carry the boards on edge horizontally, it may cause the board broken easily

##### Mechanical Handling

Mechanical handling is preferred. If machine is not available, boards can also be removed manually.

##### Personal Protective Equipments

The best practice for work safety & occupational health should be for workers to use dust masks to prevent dust inhalation. Working clothes is preferred to be long sleeve shirts, trousers and hats to prevent direct contact with skin. Gloves should be worn at all time to prevent cuts.

##### Storage

Soben International's board products are delivered with plastic protection cover on the pallet against weather conditions during transportation. They are preferred to be stored inside and undercover in a dry and flat level surface on pallets or sleepers with maximum 400 mm distance, maximum 3 pallets in a stack. Stacks of loose boards should not exceed 1m (height). If the products have to be stayed outdoor temporarily, a weatherproof tarpaulin is recommended to wrap over to provide protection.

When the products get wet, moved them to a dry area with good ventilation and let them dry out naturally. It will not degrade the board themselves.

##### Other Instructions

Further reading, instructions and details for working with FP® Board Products are available in product brochures.



**SOBEN INTERNATIONAL**

**HONG KONG**

**Soben International (Asia Pacific) Ltd**

Tel: +852 3173 2683 Fax: +852 3173 2688

Email: [international@sobenboard.com](mailto:international@sobenboard.com)

[www.sobenboard.com](http://www.sobenboard.com)

**N. IRELAND. UK**

**Soben International (Europe)**

Tel: +44 78 9423 0583

Email: [europe@sobenboard.com](mailto:europe@sobenboard.com)

**SINGAPORE**

**Soben International (Singapore)**

Tel: +65 9680 6132

Email: [sg@sobenboard.com](mailto:sg@sobenboard.com)

**PERTH, WA**

**Soben International (Australia)**

Tel: +61 (0)4 1532 3888

Email: [aus@sobenboard.com](mailto:aus@sobenboard.com)

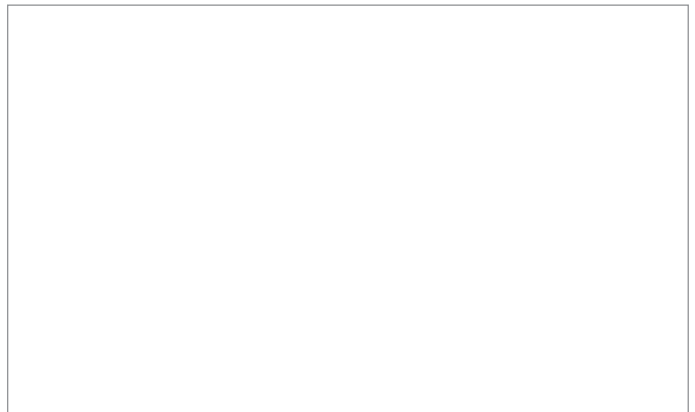
**INCHEON, KOREA**

**Soben International (Korea)**

Tel: +82 10 9015 5750

Email: [kor@sobenboard.com](mailto:kor@sobenboard.com)

**Your Local Distributor**



SALES IN HONG KONG & MACAU REGIONS

**Supreme Ecoform Limited**

Tel: +852 3741 2689 Fax: +852 3741 2690

Email: [info@hkseco.com](mailto:info@hkseco.com)