



Insulated Panels

Middle East, Africa, Turkey & Central Asia

Controlled Environments Coldstore Panels

High-Performance Insulated Wall & Ceiling Panels
for Controlled Environments



POWERED BY
QuadCore™
TECHNOLOGY


Kingspan®

CONTENTS

About Kingspan Group	4	Coldstore Panels	12
Kingspan Insulated Panels' Portfolio	4	KSD1100 CS	12
Kingspan MEATCA	5	KS110 CTF	14
Coldstore Panel Systems	6	KS110 NCTF	16
Planet Passionate	8	KS110 CTF LockPanel	18
Service and Support	9	KS103LMSF and KS103LSSF Clad Rack Panel	20
QuadCore™ Technology	10	Integrated Accessories	22
		Panel Profiles and Fixings	22
		Floor Insulation Board	23
		Cold Storage Doors	24
		Pressure Valves and Heating Mats	27
		Safety	28

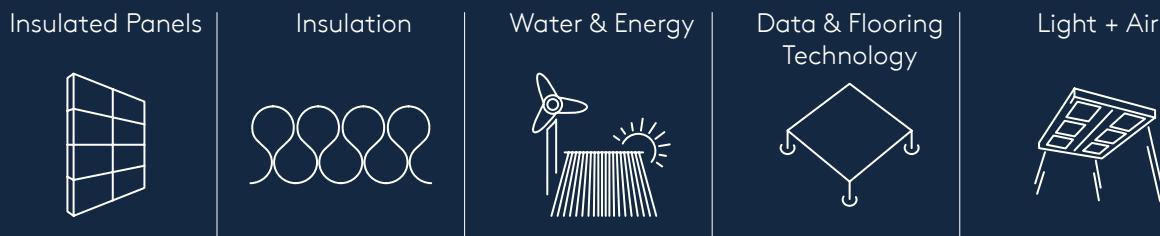


Kingspan Coatings	30	Sectoral Case Studies	50
Fire Performance	36	Transport and Containerisation Support	62
Structural Performance	40		
Thermal Performance	42		
Construction Details	43		
Internal Box in Box Insulated Self-Supporting System	44		
Internal Insulated System with Partial External Wall Cladding	48		

About Kingspan Group

Kingspan Group is a dynamic, diverse business having a comprehensive product portfolio for the built environment, with the ambition to become the world's leading provider of energy saving building systems.

Founded in the late 1960s, the Group has grown steadily to become a prominent brand within the construction industry. Today the Group has more than 120 manufacturing plants around the globe, sells in more than 70 countries and employs more than 14,000 people worldwide. The Group comprises five divisions:



Kingspan Insulated Panels, the biggest division of the five, is a global leader in the design, development and delivery of advanced building envelope products and solutions. It is widely recognized in the industry for the high quality and performance of its products as well as its commitment to excellent customer service and technical support. Our product portfolio includes: Insulated Roof & Wall Panels; Architectural Roofing, Fabrications, Safety & Lighting Solutions; Coldstore and Cleanroom Panels; Structural Products and Façade & Roof Systems.

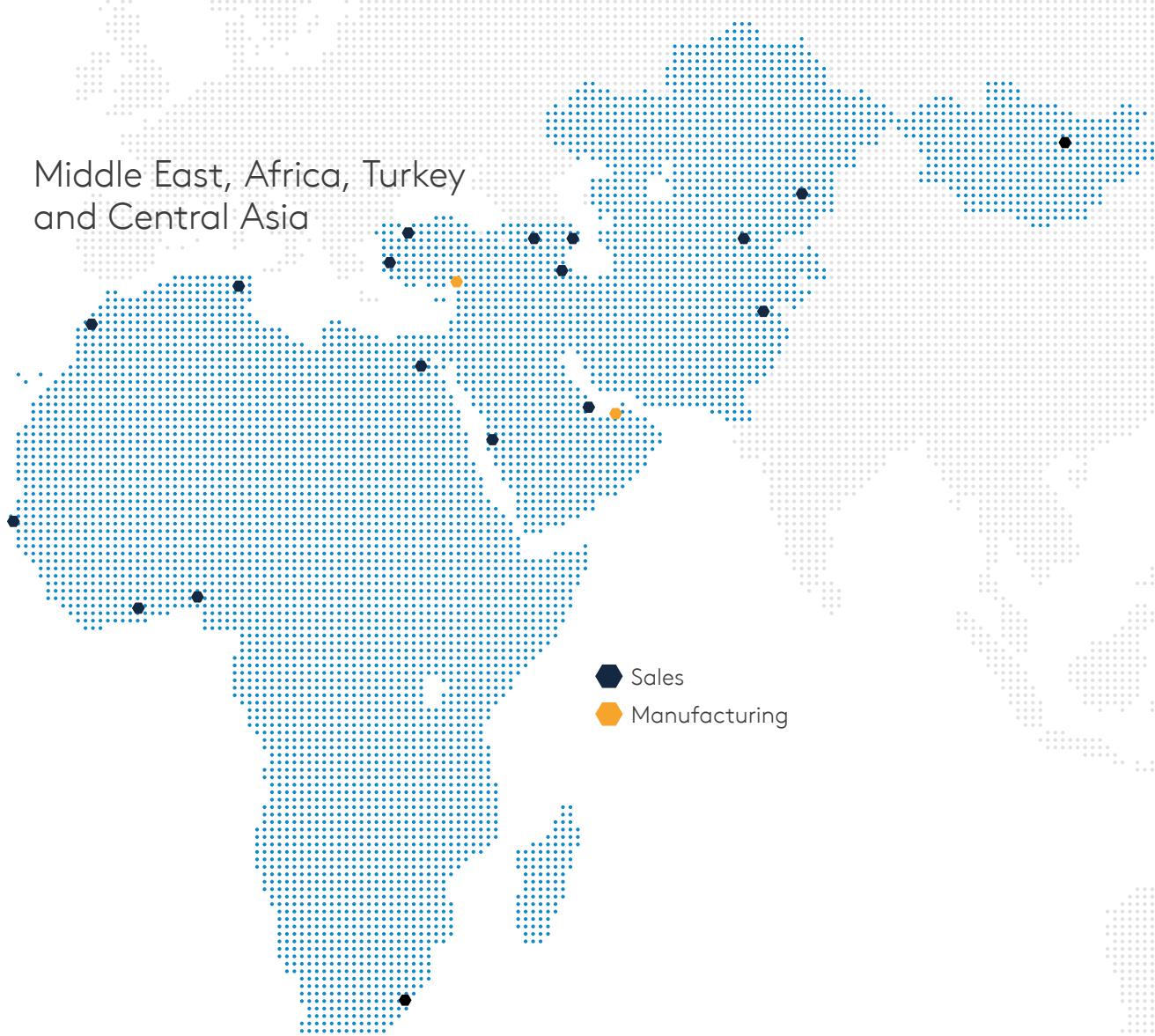
Our wide range of products allows developers, architects and contractors to meet and exceed today's construction challenges and create functional buildings that are aesthetically pleasing, energy efficient, safe, cost effective and sustainable.

Kingspan Insulated Panels' Portfolio

 Insulated Panel Systems <ul style="list-style-type: none">■ Wall Systems■ Roof Systems■ Fall Protections Systems■ Daylighting Solutions■ Fabrications■ Industrial & Hangar Door Systems	 Architectural Façade Systems <ul style="list-style-type: none">■ Panelised Façade Systems■ Rainscreen Facades	 Standing Seam Roof Systems <ul style="list-style-type: none">■ KingZip Linea■ KingZip Infiniti	 Cold Storage & Cleanrooms <ul style="list-style-type: none">■ Cold Storage Panel Series■ Cleanroom Systems■ ModularisCold System■ Cold Storage Door Systems
--	--	--	--

Kingspan MEATCA

Middle East, Africa, Turkey
and Central Asia



Kingspan Insulated Panels has been supplying into the Middle East, Africa, Turkey and Central Asia Region for over 30 years, and in the last 10 years has made acquisitions to expand its scope of regional work.

The Group has ultramodern manufacturing plants in Dubai, UAE and in Adana, Turkey with the aim of bringing the region up to date with Kingspan's latest manufacturing processes and equipment. The manufacturing plants produce the company's most advanced insulated panels using the formidable QuadCore™ Technology.

Dubai and Adana plants produce Insulated Roof & Wall Panels, Cold Store Panels, Standing Seam Architectural Roof Systems and Architectural Facade Evolution Panels. The product range also includes flashings, accessories, fabrications, cold store and industrial door sections.

We are committed to innovation, sustainability and the communities here in the MEATCA Region and we are proud to operate in these regions.

Coldstore Panel Systems

Coldstore Panels is a range of insulated wall and ceiling panels designed specifically for use within the temperature and environmental control industry, such as food manufacturing and temperature controlled storage.

Consistent Temperature Control

Kingspan's diverse controlled environment product line has the highest insulation reliability for temperature extremes – from blast freezers to pharmaceutical stability rooms.

Kingspan CLEANsafe

CLEANsafe insulated panels and doors, all washable surfaces, provide a sealed monolithic structure for maintaining hygiene safe requirements when exposed to secondary food contact and corrosive cleaning agents. The tight fitting panel joints offer superior airtightness, preventing thermal bridging and condensation.

These enhanced panels are ideal for temperature ranges of between -40 °C to ambient temperatures, and feature an innovative joint system designed to withstand high pressure washing and regular cleaning; preventing water ingress and minimising potential bacteria growth.





Precise
Thermal
Control



Superior
Coatings and
Liners



Superior
Airtightness



Low U-value



Faster Build
Speed



Internal Wall and Ceiling Systems

- 'Box within a box' solutions.
- Hygiene safe, resisting moisture ingress and any risk of toxic mould and bacterial growth.
- Insurer approved – effective fire resistance.

High Performance Solutions

- Cold, chill and cleanroom applications.
- Low air leakage minimises potential transmittance of airborne pollutants.
- Wide range of accessories.
- Incorporates a panel joint that achieves excellent thermal performance and can accommodate vapour and hygiene safe seals.

Insulated Panels

- Suitable for temperatures from -40 °C to ambient.
- Closed-cell insulation eliminates moisture ingress and performance failure.
- Large range of profiles, coatings and insulation core thicknesses to meet project specific demands.
- Available in lengths up to 15 m (subject to transport limitations).

Planet Passionate

Our Global Sustainability Programme

Planet Passionate is Kingspan's ambitious 10-year global sustainability program that aims to impact three big global issues:

- Climate change
- Circularity
- Protection of our natural world



By being Planet Passionate in our operations we aim to:



With Planet Passionate we are setting ourselves challenging goals for the next 10 years. We are committing to hard targets in the areas of energy, carbon and water reduction while enhancing the circularity of our products. This won't be easy, and will take serious leadership, commitment and effort across our group. I know we can, and must, make this happen.

Gene M. Murtagh, Chief Executive Officer, Kingspan Group

By being Planet Passionate our products will be:



Exclusive Service and Support

From project conception to handover, our dedicated team of cold store specialists with more than 25 years of know-how and experience will offer support to you for all your project needs.



Concept Design Consultation

Our technical services team provides preliminary consultation to highlight and mitigate any design related issues at conception stage. Our early stage consultation services include:

- Panel recommendation meeting project requirements
- Typical detail development
- Review of preliminary steel construction design for suitability with insulated panel construction
- Advice on feasibility, buildability, sequencing of construction



Production and Construction

Once the project moves onto the construction stage, our technical services team provides project support by generating:

- Shop drawings for installation
- Bill of quantity for panels, accessories, consumables, fasteners
- Shop drawing and cut lists for production
- On-site demonstration of product installation (optional)



Technical Support and Design

Our dedicated and bespoke design service throughout the project includes:

- Bespoke detail development
- Wall and ceiling panel load span calculations
- Fastener calculations
- Condensation analysis
- Consultancy on product compliance according to regional building codes
- Bespoke panel and coating specification development
- BIM library access



Kingspan Warranty

Our service continues on after the project is complete. With proven performance, backed by our Kingspan System warranty, you can rest assured you have chosen the ultimate coldstore solution.



Kingspan Warranty

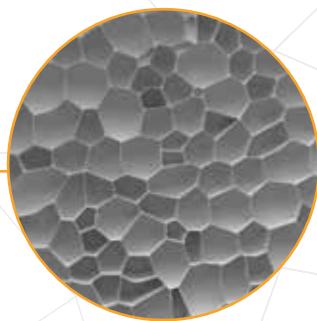
Our service continues on after the project is complete. With proven performance, backed by our Kingspan System warranty, you can rest assured you have chosen the ultimate coldstore solution.

Technical Services Team:
T: +90 (212) 236 60 32
E: kptr.technical@kingspan.com

QuadCore™ Technology

It's all in the grey cells...

QuadCore™ Technology is Kingspan's next-generation, self-blended hybrid insulation core. Across the world of insulated panels, this innovation with its distinctive grey microcells, offers superior fire protection, up to 20 % thermal enhancement and a higher environmental performance – all supported by an exceptional guarantee.



POWERED BY
QuadCore™
TECHNOLOGY



1



The Best
THERMAL
Efficiency

Lifetime performance and value benefits

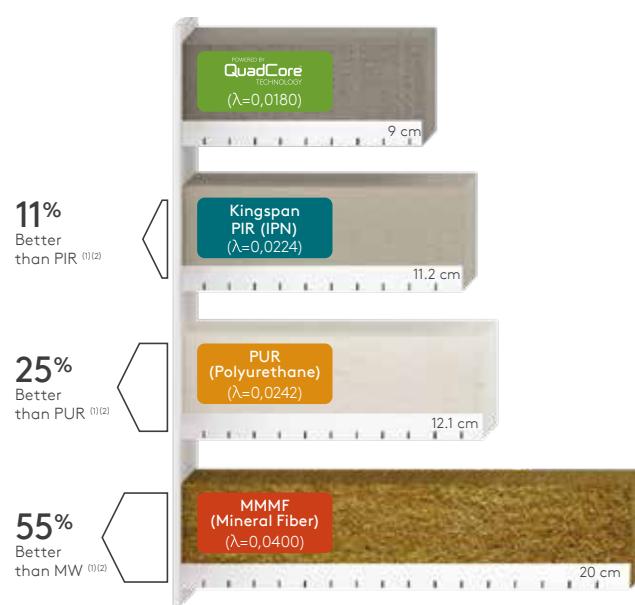
1. The class-leading aged lambda value of 0.018 W/mK means QuadCore™ Technology is certified as one of the leading thermally efficient closed cell insulation core on the market. It is almost twice as thermally efficient as mineral fibre, offering significant advantages in terms of thinner walls (resulting in more internal space and potentially higher yields).
2. QuadCore™ Technology is a more streamlined solution relative to other insulation materials with associated benefits in interior space optimisation, transport, less amount of needed flashings and ease of handling during construction.

Notes:

1) The thermal conductivity range is based on data from insulation manufacturers websites or agreement certificates.

2) Thermal conductivity (lambda) W/mK values quoted at 10 °C.

For illustrative purposes only; please refer to relevant Product Data Sheets to make accurate performance comparisons.



2



Superior
FIRE
Protection

The hybrid nature of QuadCore™ Technology delivers a range of unique improvements in fire performance.

Lifetime performance and value benefits

- QuadCore™ insulated panels KS110CTF, KSD1100CS and KS110NCTF are classified as B-s1,d0 as per EN13501-1:2007+A1:2009
- QuadCore™ insulated panels KS110CTF, KSD1100CS and KS110NCTF have been subjected to rigorous large-scale system tests and are insurer approved to FM 4880 and FM 4881 standards. (FM Standards for Class 1 Fire Rating of Building Panels for Interior and Exterior Wall Systems).
- QuadCore™ insulated panels KS110CTF, KSD1100CS and KS110NCTF also received FM4882 certification (the FM Global insurance standard for smoke sensitive occupancies).



Images shown are from an EN11925-3 comparative test using a roofer's torch as the fire source.



Non-insurer-approved PIR



QuadCore™ Technology

3



Enhanced
ENVIRONMENTAL
Credentials

The improved thermal performance of QuadCore™ Technology helps optimise resource efficiency. It is also 100 % recyclable; CFC, HCFC, HFC free and has a very low Global Warming potential.

Lifetime performance and value benefits

- Its superior material efficiency and ease of disassembly can contribute towards credits in BREEAM 2018 and other green building rating systems. The slimmer structure of a QuadCore™ envelope can also allow more natural daylight to enter a building, enhancing its health and wellbeing properties.
- The improved resource efficiency delivers better transport utilisation, which results in fewer truck movements to site.

4



Up to 40 Year Thermal
and Structural Panel
GUARANTEE

QuadCore™ closed cell insulation is unequivocally guaranteed to perform to its specified thermal performance for up to 40 years. Unlike some insulation materials, it is not subject to degradation of thermal performance over time due to moisture ingress caused by poor weather on site or indeed damage to the building structure during its lifetime.

KSD1100 CS

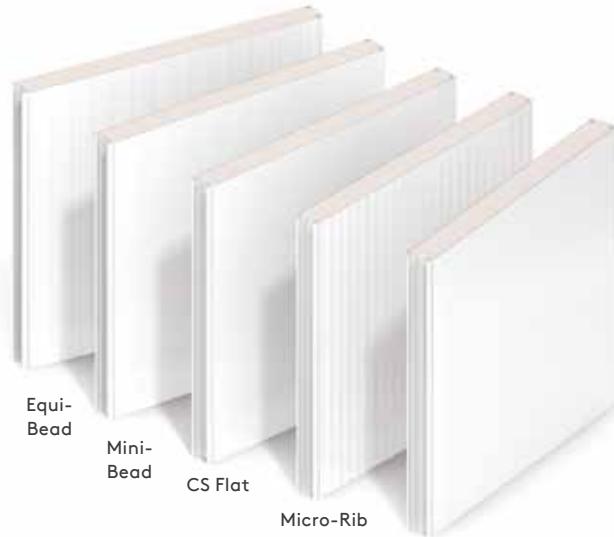
Applications

Suitable for internal wall and ceiling applications with a temperature range from -40 °C to ambient.

Available Lengths

Standard Lengths	2.0 – 11.9 m
Longer Lengths*	11.9 – 19 m
Shorter Lengths*	<2.0 m

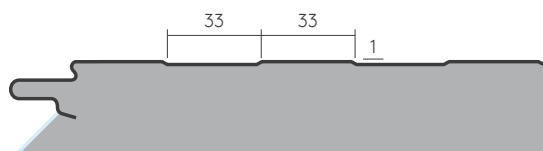
* Non-standard lengths. Additional costs and transport restrictions may apply for non-standard lengths.



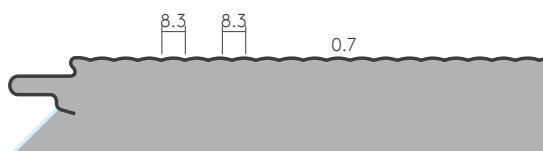
Profiles

KSD1100 CS insulated panels are available in a choice of five distinct profiles, offering a range of aesthetics to suit project-specific requirements.

Equi-Bead External / Liner Profile



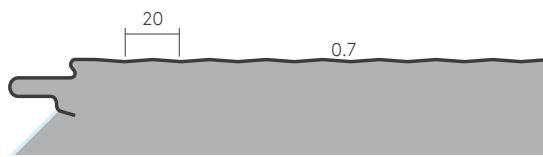
Mini-Micro External Profile



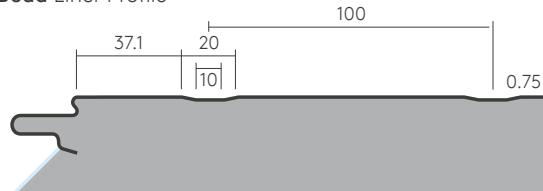
CS Flat External / Liner Profile



Micro-Rib External Profile



Mini-Bead Liner Profile



Dimensions, Weight and Thermal Performance

t - Core Thickness (mm)	80	100	125	150	175	200	220
U-value (W/m ² K)	0.23	0.18	0.15	0.12	0.10	0.09	0.08
R-value (m ² K/W)	4.35	5.56	6.67	8.33	10.00	11.00	12.5
Weight (kg/m ²) Steel 0.5 / 0.5 mm	11.80	12.60	13.60	14.60	15.60	16.60	17.40

U-values are calculated in accordance with EN14509:2013 (Section A.10.3).
R-values in Imperial units (ft².°F·hr/BTU) available upon request.

Product Specifications and Accreditations

Product Reference	Standard Environment	Temp. Control	Hygiene	High Humidity	Low Temp.	Fire Rating			
						ASTM D 1929-16	ASTM E119	EN 13501-1	FM 4880 / FM 4881 / FM 4882
KSD1100 CS	✓	✓	✓	✓	✓	✓	✓	✓	✓

Product Features

Core Type:	QuadCore™
Metal Type:	Steel / Stainless Steel
Colours and Coatings:	A large selection of external colours and coating options are available with a wide variety of finishes including metallic, matte and solid. Please consult with your local Kingspan technical team to get the best coating and finish recommendation for your project depending on its geographic location, building use /function and warranty requirements
Cover Width:	Standard width 1100 mm
Acoustic Insulation:	Approx. 25 dB across all panel thicknesses
Environmental Rating:	Zero Ozone Depleting Potential (ODP), Low Global Warming Potential (GWP) Free from CFC, HCFC & HFC, free from halogenated flame retardants
Seals:	Site applied

Fire Performance

This QuadCore™ hybrid insulation core system has passed all the requirements of:

- ASTM D 1929-16: Self Ignition above 343 °C
- BS EN 13501-1:2007 + A1:2009: B-s1, d0
- ASTM E 119: achieved 30 mins fire integrity and insulation (100 mm panel)
- EN 13501-2:2016: Achieved 120 mins fire integrity and 60 mins insulation performance (200 mm panel only)
- FM 4880 / FM 4881 / FM 4882 – Class 1



POWERED BY
QuadCore™
TECHNOLOGY



KS110 CTF

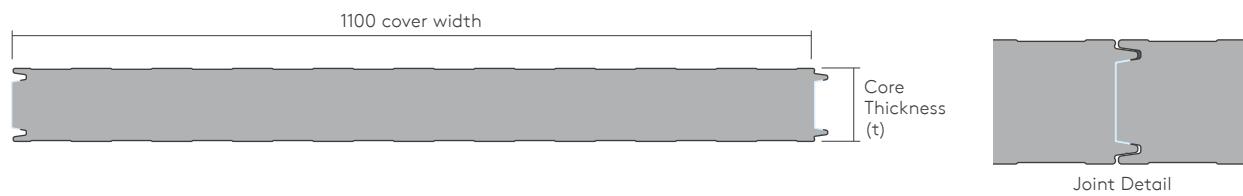
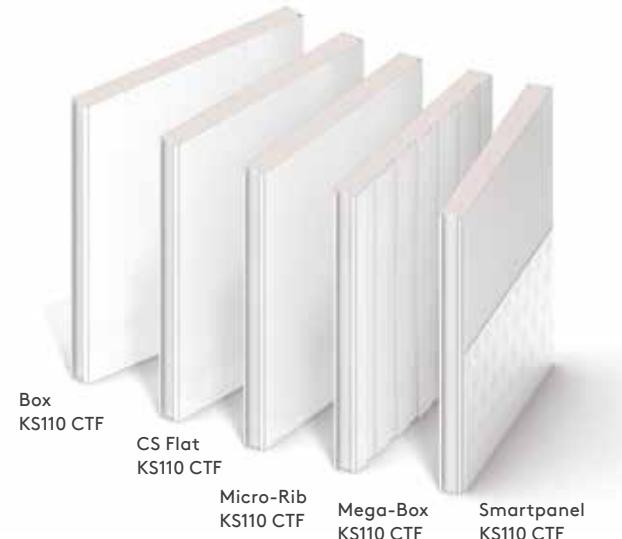
Applications

Suitable for internal wall and ceiling applications with a temperature range from -40 °C to ambient.

Available Lengths

Standard Lengths	2.0 – 11.9 m
Longer Lengths*	11.9 – 19 m
Shorter Lengths*	<2.0 m

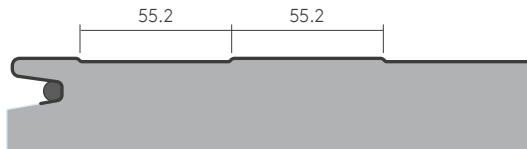
* Non-standard lengths. Additional costs and transport restrictions may apply for non-standard lengths.



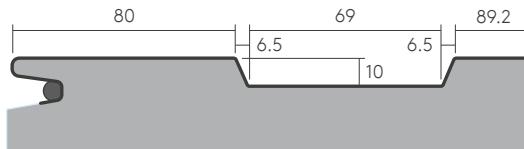
Profiles

KS110 CTF insulated panels are available in a choice of five distinct profiles suitable for all types of buildings where there are low internal temperature conditions.

Box (Izocold) External / Liner Profile



Mega-Box (Megacold) External Profile



CS Flat (Pharmacold) External / Liner Profile

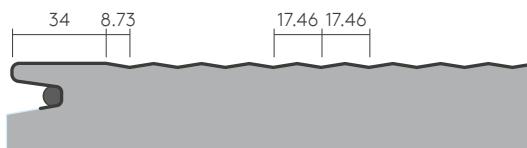


Smart Panel External Profile

Suitable for internal walls in high-impact and corrosive areas.



Micro-Rib (Microcold) External Profile



Dimensions, Weight and Thermal Performance

t - Core Thickness (mm)	45	50	60	80	100	120	140	150	170	200
U-value (W/m ² K)	0.40	0.37	0.30	0.22	0.18	0.15	0.13	0.12	0.11	0.09
R-value (m ² K/W)	2.50	2.70	3.33	4.55	5.56	6.67	7.69	8.33	9.09	11.11
Weight (kg/m ²) Steel 0.5 / 0.5 mm*	11.26	11.49	11.69	12.53	13.36	14.20	15.04	15.45	16.29	17.54
U-value (W/m ² K) Megacold	-	-	-	0.24	0.19	0.16	0.13	0.12	0.11	0.09
R-value (m ² K/W) Megacold	-	-	-	4.17	5.26	6.25	7.69	8.33	9.09	11.11
Weight* (kg/m ²) Megacold Steel 0.5 / 0.5 mm	-	-	-	12.65	13.48	14.32	15.15	15.57	16.41	17.66

U-values are calculated in accordance with EN14509:2013 (Section A.10.3).

* Allow for 6.8 kg/m² additional weight from Smartpanel stainless steel skirting cladding panel surface.

Product Specifications and Accreditations

Product Reference	Standard Environment	Temp. Control	Hygiene	High Humidity	Low Temp.	Fire Rating		
						EN13501-1	EN 13501-2	FM 4880 / FM 4881 / FM 4882
KS110 CTF	✓	✓	✓	✓	✓	✓	✓	✓

Product Features

Core Type:	QuadCore™
Metal Type:	Steel /Stainless Steel
Colours and Coatings:	A large selection of external colours and coating options are available with a wide variety of finishes including metallic, matte and solid. Please consult with your local Kingspan technical team to get the best coating and finish recommendation for your project depending on its geographic location, building use / function and warranty requirements
Cover Width:	Standard width 1100 mm
Acoustic Insulation:	Approx. 25 dB across all panel thicknesses
Environmental Rating:	Zero Ozone Depleting Potential (ODP), Low Global Warming Potential (GWP) Free from CFC, HCFC & HFC, free from halogenated flame retardants
Seals:	Site applied

Fire Performance

This QuadCore™ hybrid insulation core system has passed all the requirements of:

- TS EN 13501-1:2007 + A1:2009: B-s1, d0
- TS EN 13501-2:
achieved E30 & EI45 (120 mm panel) – vertically applied wall application
achieved E60 & EI60 (200 mm panel) – vertically applied wall application
- FM 4880 / FM 4881 / FM 4882 – Class 1



POWERED BY
QuadCore™
TECHNOLOGY



KS110 NCTF

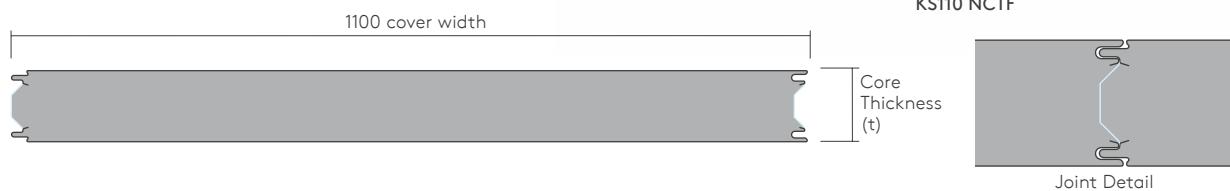
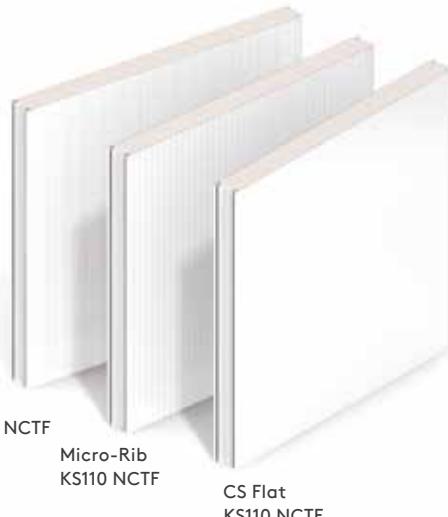
Applications

Suitable for internal wall and ceiling applications with a temperature range from -40 °C to ambient.

Available Lengths

Standard Lengths	2.0 – 11.9 m
Longer Lengths*	11.9 – 19 m
Shorter Lengths*	<2.0 m

* Non-standard lengths. Additional costs and transport restrictions may apply for non-standard lengths.



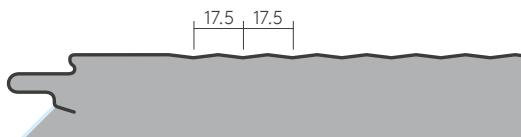
Profiles

These hygienic and fibre free insulated wall panel systems are available in three profiles, suitable for internal and external walls and ceilings, including 'box within a box' applications.

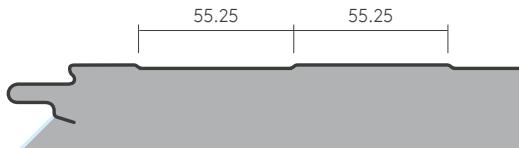
CS Flat (Pharmacold) External / Liner Profile



Micro-Rib (Microcold) External Profile



Box (Izocold) External / Liner Profile



Dimensions, Weight and Thermal Performance

t - Core Thickness (mm)	100	150	200
U-value (W/m ² K)	0.18	0.12	0.09
R-value (m ² K/W)	5.56	8.33	11.11
Weight (kg/m ²) Steel 0.5 / 0.5 mm	13.36	15.45	17.54

U-values are calculated in accordance with EN14509:2013 (Section A.10.3).
R-values in Imperial units (ft².°F·hr/BTU) available upon request.

Product Specifications and Accreditations

Product Reference	Standard Environment	Temp. Control	Hygiene	High Humidity	Low Temp.	Fire Rating		
						EN 13501-1	EN 13501-2	FM 4880 / FM 4881 / FM 4882
KS110 NCTF	✓	✓	✓	✓	✓	✓	✓	✓

Product Features

Core Type:	QuadCore™
Metal Type:	Steel / Stainless Steel
Colours and Coatings:	A large selection of external colours and coating options are available with a wide variety of finishes including metallic, matte and solid. Please consult with your local Kingspan technical team to get the best coating and finish recommendation for your project depending on its geographic location, building use / function and warranty requirements
Cover Width:	1100 mm
Acoustic Insulation:	Approx. 25 dB across all panel thicknesses
Environmental Rating:	Zero Ozone Depleting Potential (ODP), Low Global Warming Potential (GWP) Free from CFC, HCFC & HFC, free from halogenated flame retardants
Seals:	Site applied

Fire Performance

This QuadCore™ hybrid insulation core system has passed all the requirements of:

- TS EN 13501-1:2007 + A1:2009: B-s1, d0
- TS EN 13501-2 achieved EI20 & EI20 (100 mm panel) – vertically applied wall application
- FM 4880 / FM 4881 / FM 4882 – Class 1



POWERED BY
QuadCore™
TECHNOLOGY



KS110 CTF LockPanel

Camlock

Applications

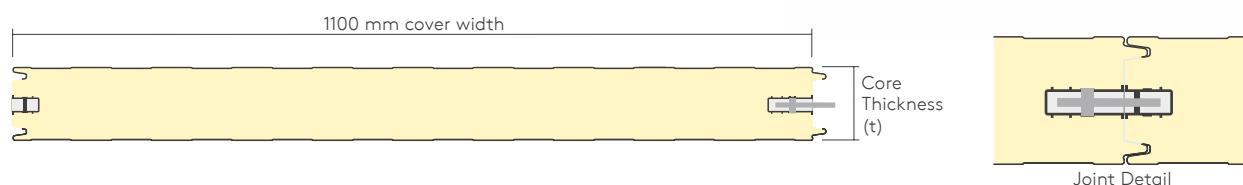
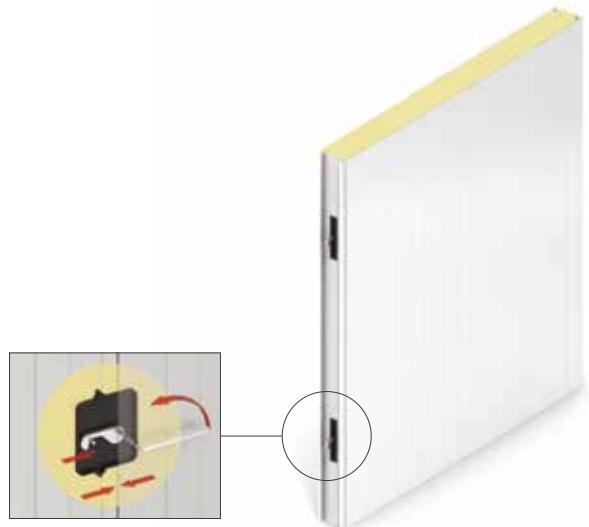
Suitable for internal wall and ceiling applications with a temperature range from -40 °C to ambient.

Specially designed lock mechanism ensures airtight joints and, if required, easy disassembly and reassembly of panels when required.

Available Lengths

Standard Lengths	2.0 – 11.9 m
Longer Lengths*	11.9 – 19 m
Shorter Lengths*	<2.0 m

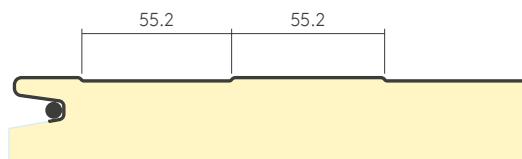
* Non-standard lengths. Additional costs and transport restrictions may apply for non-standard lengths.



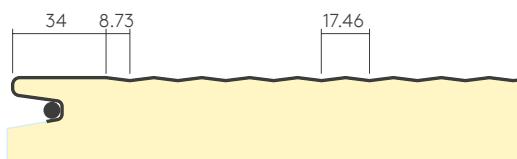
Profiles

The Kingspan KS110 CTF Lockpanel cold store system is supplied with the unique Kingspan Camlock interlocking system and is available in three profiles.

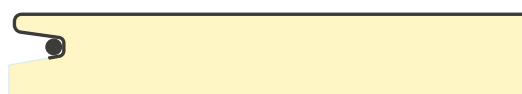
Box (Izocold) External / Liner Profile



Micro-Rib (Microcold) External Profile



CS-Flat (Pharmacold) External / Liner Profile



Dimensions, Weight and Thermal Performance

t - Core Thickness (mm)	80	100	120	150	200
U-value (W/m ² K)	0.25	0.20	0.17	0.13	0.10
R-value (m ² K/W)	4.00	5.00	5.88	7.69	10.00
Weight (kg/m ²) Steel 0.5 / 0.5 mm	12.53	13.36	14.20	15.45	17.54

U-values are calculated in accordance with EN14509:2013 (Section A.10.3).
R-values in Imperial units (ft².°F·hr/BTU) available upon request.

Product Specifications and Accreditations

Product Reference	Standard Environment	Temp. Control	Hygiene	High Humidity	Low Temp.	Fire Rating	
						EN 13501-1	FM 4880 / FM 4881
LockPanel KS110 CTF (Camlock)		✓	✓	✓	✓	✓	✓

Product Features

Core Type:	Kingspan PIR (IPN)
Metal Type:	Steel
Colours and Coatings:	A large selection of external colours and coating options are available with a wide variety of finishes including metallic, matte and solid. Please consult with your local Kingspan technical team to get the best coating and finish recommendation for your project depending on its geographic location, building use /function and warranty requirements
Cover Width:	1100 mm
Acoustic Insulation:	Approx. 25 dB across all panel thicknesses
Environmental Rating:	Environmental Rating: Zero Ozone Depleting Potential (ODP), Low Global Warming Potential (GWP) Free from CFC, HCFC & HFC, free from halogenated flame retardants
Seals:	Site applied

Fire

This PIR insulation core system has passed all the requirements of:

- TS EN 13501-1:2007 + A1:2009: B-s1,d0
- FM 4880 / FM 4881 – Class 1



KS103LMSF and KS103LSSF Clad Rack Panel

Kingspan Clad Rack Panel is specifically designed for use in industrial structures where external cladding rack systems and high-level thermal insulation are needed. It is a secret-fix system available in a 200 mm insulation depth, offering economical but aesthetic solutions to designers, contractors and clients alike. Suitable for horizontal and vertical applications.

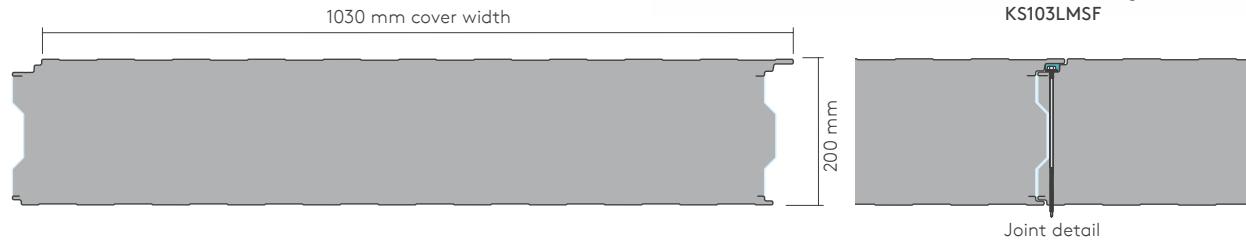
Applications

Suitable for industrial structures where external cladding rack systems and high-level thermal insulation are needed. Designed for installations with temperature range from -40 °C to ambient.

Available Lengths

Standard Lengths	2.0 – 11.9 m
Longer Lengths*	11.9 – 19 m
Shorter Lengths*	<2.0 m

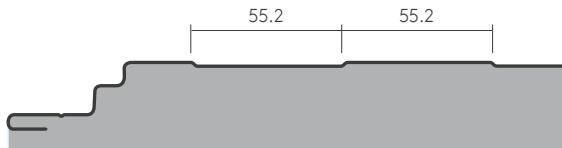
* Non-standard lengths. Additional costs and transport restrictions may apply for non-standard lengths.



Profiles

Kingspan Clad Rack Panel is specifically designed for use in industrial structures where external cladding rack systems and high-level thermal insulation are needed and is available in three profiles.

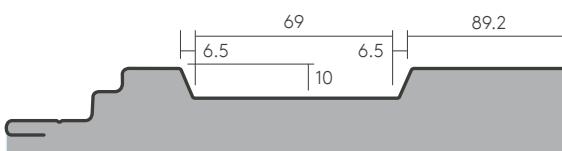
Clad Rack Super KS103LSSF External / Liner Profile



Clad Rack Micro KS103LSSF External Profile



Clad Rack Mega KS103LMSF External Profile



Dimensions, Weight and Thermal Performance

t - Core Thickness (mm)	200
U-value (W/m ² K)	0.09
R-value (m ² K/W)	11.11
Weight (kg/m ²) (KS 103 LMSF) Steel 0.6 / 0.6 mm	18.52
Weight (kg/m ²) (KS 103 LSSF) Steel 0.6 / 0.6 mm	18.58

U-values are calculated in accordance with EN14509:2013 (Section A.10.3).

R-values in Imperial units (ft².°F·hr/BTU) available upon request.

Product Specifications and Accreditations

Product Reference	Standard Environment	Temp. Control	Hygiene	High Humidity	Low Temp.
KS 103 LSSF / LMSF	✓	✓	✓	✓	✓

Product Features

Core Type:	QuadCore™ (Contact Kingspan Technical Team for Kingspan PIR core option availability in your region)
Fixing Detail:	Secret-fix
Metal Type:	Steel
Colours and Coatings:	A large selection of external colours and coating options are available with a wide variety of finishes including metallic, matte and solid. Please consult with your local Kingspan technical team to get the best coating and finish recommendation for your project depending on its geographic location, building use/function and warranty requirements
Cover Width:	1030 mm
Spanning Capability:	Clad Rack – up to 8.2 m, frame to frame
Product Standard:	EN 14509
Acoustic Insulation:	Approx. 25 dB across all panel thicknesses
Environmental Rating:	Zero Ozone Depleting Potential (ODP), Low Global Warming Potential (GWP) Free from CFC, HCFC & HFC, free from halogenated flame retardants
Seals:	Site applied



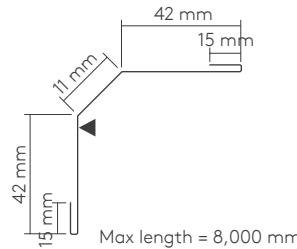
POWERED BY
QuadCore™
TECHNOLOGY

Integrated Accessories

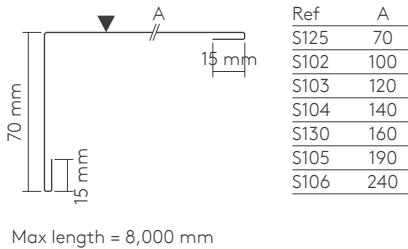
Panel Profiles and Fixings

To compliment our range of insulated panels, we have a selection of ancillaries for a fully-integrated, bespoke temperature controlled solution. Our optional equipment offering includes loading systems, cold storage doors, safety products, pressure valves, as well as floor insulation, which will create added value for your project.

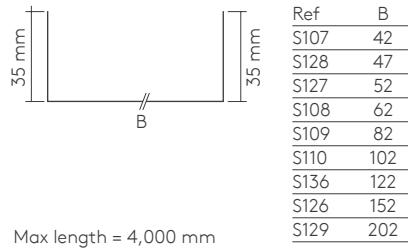
S101
Inner corner profile



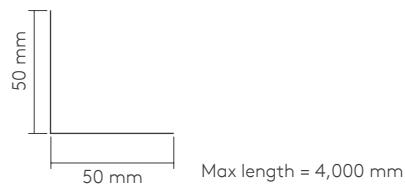
S102
Outer corner profile



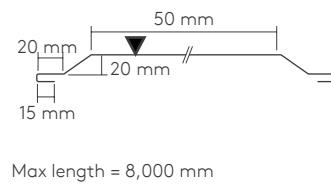
S107
Floor U profile



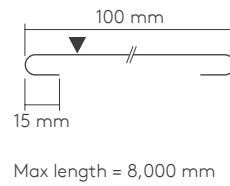
S111
Floor L profile



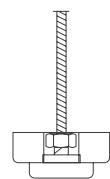
S121
Cover profile 3



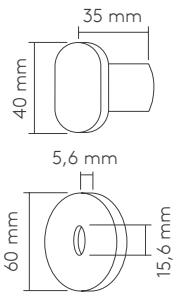
S120
Cover profile 2



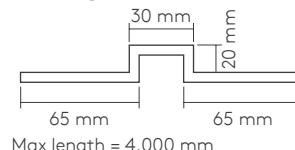
S119
PVC nut



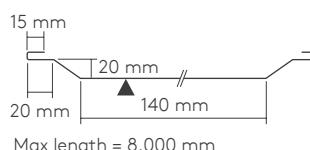
S119-1
PVC washer



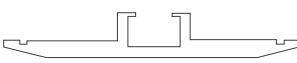
S112
Ceiling suspension profile



S113
Cover profile

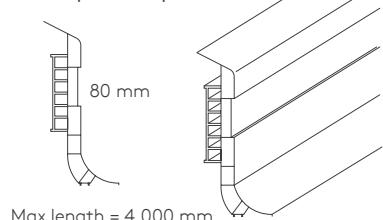


S115
Ceiling suspension profile

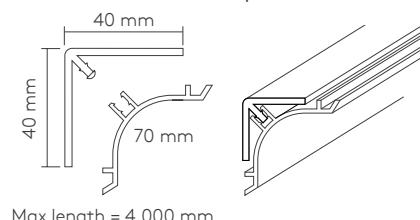


Max length = 6,000 mm

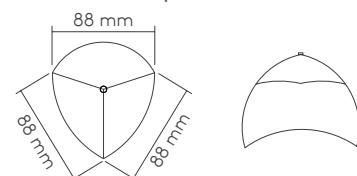
S118
PVC plinth profile



S116
PVC inner corner profile



S116-1
PVC corner profile



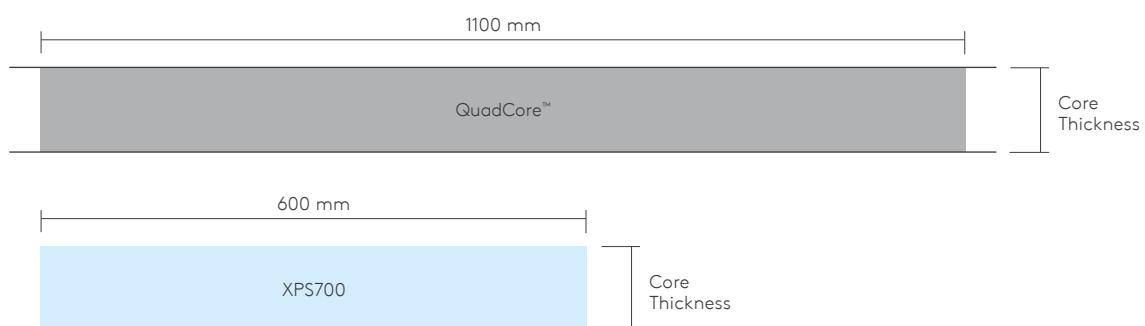
Floor Insulation Board

Kingspan Floor Insulation Board

The Kingspan Floor Insulation Board is a high compressive strength insulation board suitable for floors, partitions and inverted roof areas of cold stores.

It is available in two core options:

- QuadCore™ option is recommended when high thermal performance is required due to it's excellent thermal conductivity.
- XPS700 core option is recommended when very high compressive strength performance is required due to increased structural loads (e.g. – high bay coldstores and warehouses).



Thermal Performance, Dimensions & Weight

Core Type	QuadCore™	XPS700
Available Thickness (mm)	50/60/80	50/60/100
Foil Facing	Kraft paper – alukraft paper	N/A
Cover Width (mm)	1100	600
Standard Lengths (m)	up to 6m*	1.2
Thermal Conductivity λ (W/(m.k))	0.018	0.0349
Compressive Strength (kPa)	≥ 150	≥ 700
Water Absorption (% by volume)	≤ 2	≤ 0.2

* Longer lengths up to 11.9 m available upon request.

Integrated Accessories

Cold Storage Doors

Hinged Doors



Hinged doors are insulated and airtight elements which play a critical role in maintaining consistent temperatures in coldrooms.

These doors are generally used at entrance or exits of storage depots where stored goods are lifted out manually or at fire exits of rooms with large openings.

Sliding Doors



Sliding doors are generally used in environments where temperature control is needed and when an opening width of 1200 mm or more is required in order to save space, as they open offset to the wall, occupying minimum corridor / room area when opened.

These steel-faced doors have insulating properties with beehive cells, perfect adhesion and door heating elements installed for defrosting.

Thermal Performance and Dimensions

Temperature range:	-40° / ambient
Dimensions:	Single leaf: Min: 800 x 2000 mm, Max: 1500 x 2500 mm Double leaf: Min: 1400 x 2000 mm, Max: 2400 x 3000 mm
Thickness:	90 mm, 100 mm, 120 mm, 140 mm
U-value:	0.30 – 0.20 (W.K/m ²) depending on thickness
Finishes:	Plastisol and INOX

Thermal Performance and Dimensions

Temperature range:	-40° / ambient
Dimensions:	Min: 800 x 2000 mm, Max: 3000 x 6000 mm
Thickness:	90 mm, 100 mm, 120 mm, 140 mm
U-value:	0.30 – 0.20 (W.K/m ²) depending on thickness
Finishes:	Plastisol and INOX

Multipurpose Flip Flap Doors



The Flip Flap doors are single or double leaf doors having polyethylene sheets with stable oval porthole (fixed window) and protective bars to absorb shocks from carts, pallet trucks and forklifts.

These doors are extremely durable and are used in areas where employees will constantly pass through with trolleys or forklifts. They are generally used to separate private and public areas e.g. a kitchen and the front of house area of a restaurant or a production line and storage corridor.

Thermal Performance and Dimensions

Temperature range:	Ambient
Dimensions:	Min: 900 x 2000 mm, Max: 2500 x 2500 mm
Thickness:	15 mm

Insulated Rapid Speed PVC Door



Insulated Rapid Speed PVC Doors are designed to be used at interior passage ways of heavy traffic coldstores.

They prevent heat loss by minimising the time that the passage is open during the transit of goods coming in and out of the coldstores providing substantial savings in energy consumption.

Thermal Performance and Dimensions

Temperature range:	-30° / ambient
Dimensions:	Min: 800 x 2000 mm, Max: 4000 x 4000 mm. Custom sizes available upon request
U-value:	3.3 (W.K/m ²)
Finishes:	PVC canvas

Integrated Accessories

Dock Levellers and Shelters

Dock Levellers



Dock levellers are electro-hydraulic moving dock equipment that corrects height differences and eliminates the gap between warehouse facilities and transport vehicles creating a passable section during the loading and unloading of materials and goods.

Depending on configuration, they can be embedded, self-hanging, boxed or constructed with pre-cast structured metal frame. The hydraulic dock levellers are available at load capacities of 6 or 10 tons as standard and can bridge any type of transportation vehicle, from a small truck (W1820 mm) all the way to a flat rack container protecting a span.

Dimensions & Weight

Temperature Range:	-20 / +68 °C
Platform Dimensions:	Min. 1800 x 2000 mm, max. 2200 x 4000 mm
Capacity:	6 tons, 10 tons static
Key Features:	CE marking, non-skid platform, self-diagnostic motor, 'dead man' lift, compatible with new-generation fork lifts, safety barrier available supplied with prefabricated frame and protection bumpers, hinged lip or telescopic lip options available

Dock Shelters



Dock shelters provide safe loading and unloading conditions in all weather conditions. Heat loss during loading is minimized and sealing between loading track and shelter provides appropriate conditions mainly isolating dust and rain.

Dimensions can vary depending on the size of loading trucks, dock station door size and placement of the door in reference to ground level. These shelters seal the dock doors to providing thermal insulation to inside while protecting the building from outside.

Thermal Performance and Dimensions

Temperature range:	30 / +80
Shelter Dimensions:	According to door
Key Features:	Dual steel frame from Galvanized steel, Foldable PVC Cover, Flaps made from 2 ply Polyester with PVC top cover on both sides

Pressure Valves and Heating Mats

Pressure Valves

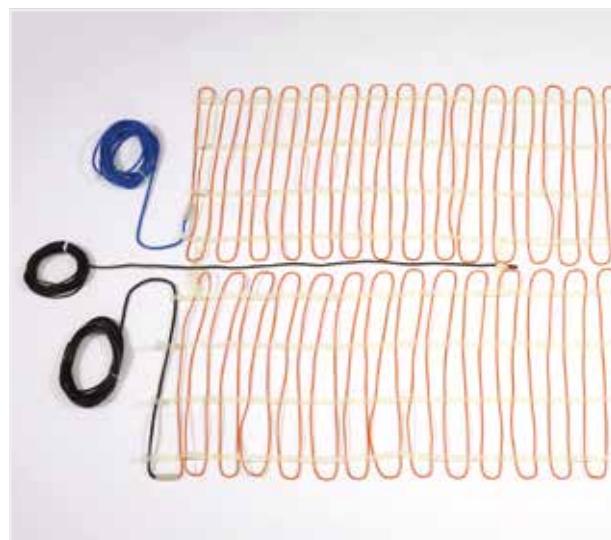


Well sealed cold stores may suffer structural damage due to pressure caused by changes in internal and external temperatures if not adequately vented to atmosphere.

Kingspan offers a wide selection of pressure valves to keep the internal and external pressures of cold stores in balance.

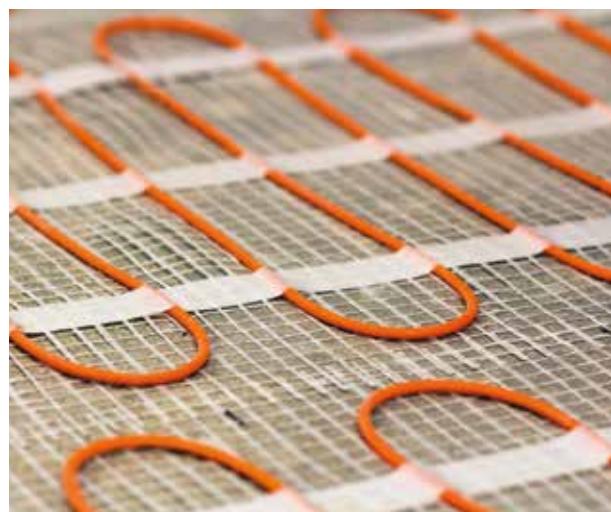


Heating Mats



Cold air released from the internal environment of cold stores may freeze the moisture contained within the soil underneath their foundation. This may result in expansion of the ground soil causing damage to the foundation and floor of the cold stores.

Kingspan offers heating mats for cold stores as a preventative measure against frost damage and dampness.



Integrated Accessories

Safety

KPSGoalpost



KPSGoalpost is a proven door perimeter protection system that features FLEXsafe technology.

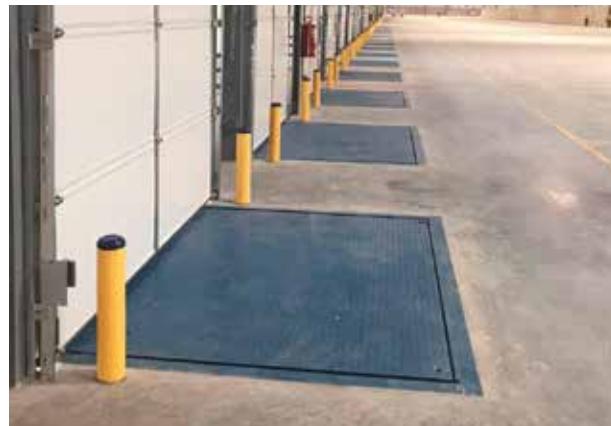
Its unique design, provides maximum protection for internal or external door systems. Designed to safely "flex" upon impact that ensures impact resistance, KPSGoalpost is tailored and manufactured to specific door sizes.

KPSGoalpost can be mechanically fixed to a range of substrates including insulated panel systems and concrete walls. Fixing methods, training and installation support is available from Kingspan free of charge.

FLEXsafe

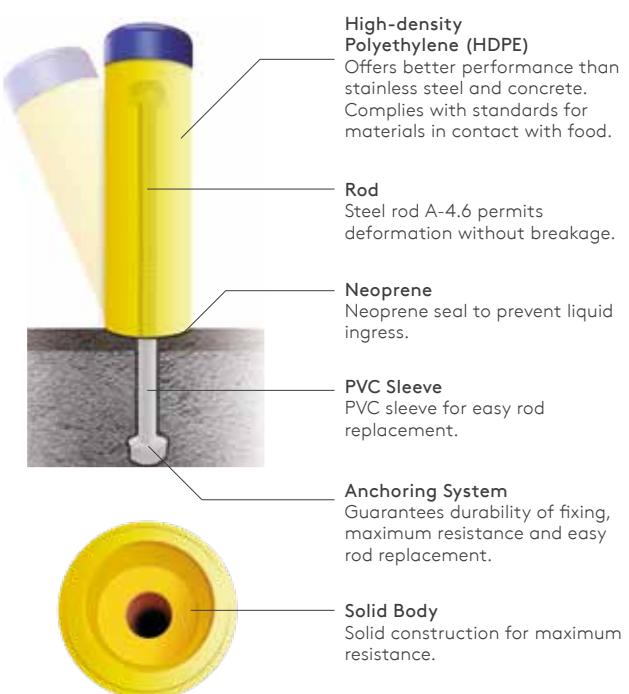


High Density Polyethylene (HDPE) Barrier Post



HDPE Barrier Posts provide a high-performance solution for the protection of building corners, inner and outer door areas and walls, as well as smaller surface areas.

HDPE Barrier Posts are manufactured from solid polyethylene to provide maximum impact resistance and, as they are self-coloured as opposed to painted, they offer superior resistance to UV rays.



Solid Polyethylene Barrier



Due to extremely secure anchoring, Solid Polyethylene Barriers provide high impact resistance offering the best solution for the protection of walls and objects at varying heights.

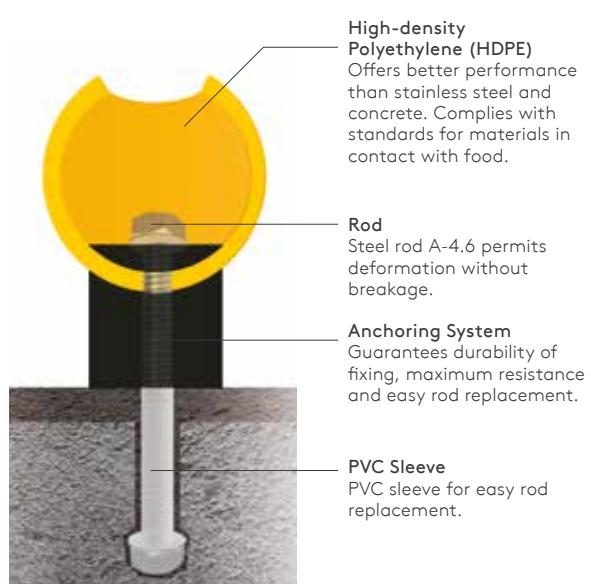
Manufactured from solid polyethylene to provide maximum protection and impact resistance.

Hollow Polyethylene Barrier



Hollow Polyethylene Barriers offer combine excellent impact resistance with high flexibility.

Manufactured from polyethylene, the hollow construction provides a robust yet highly flexible barrier system that is both easy to assemble and replace.



Kingspan Coatings

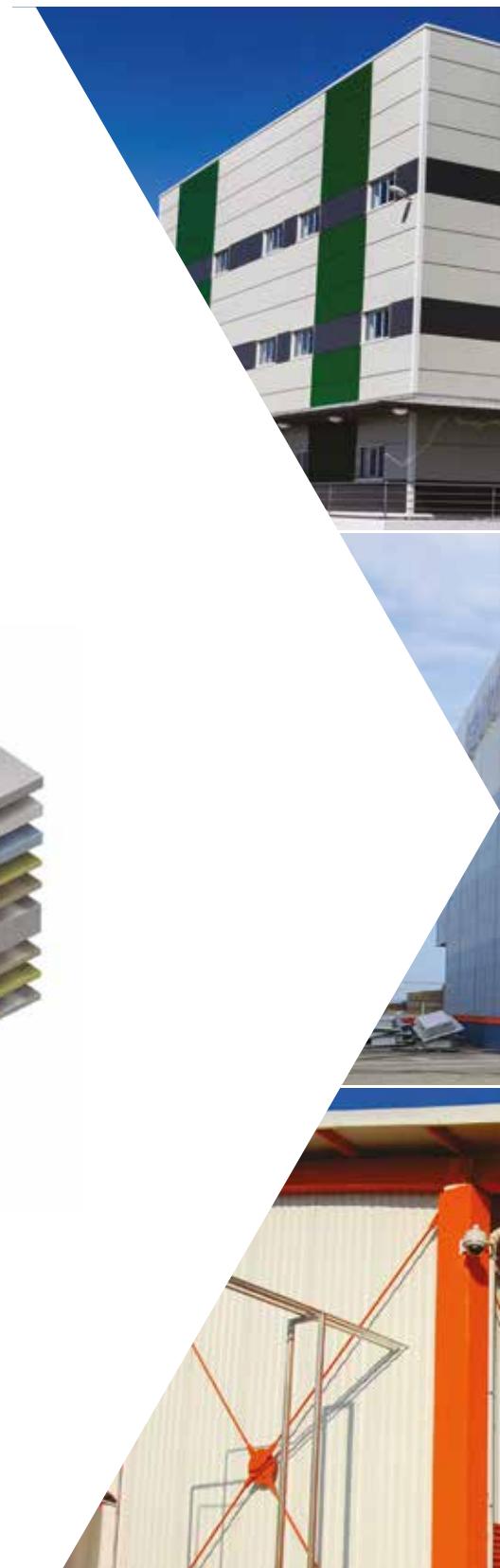
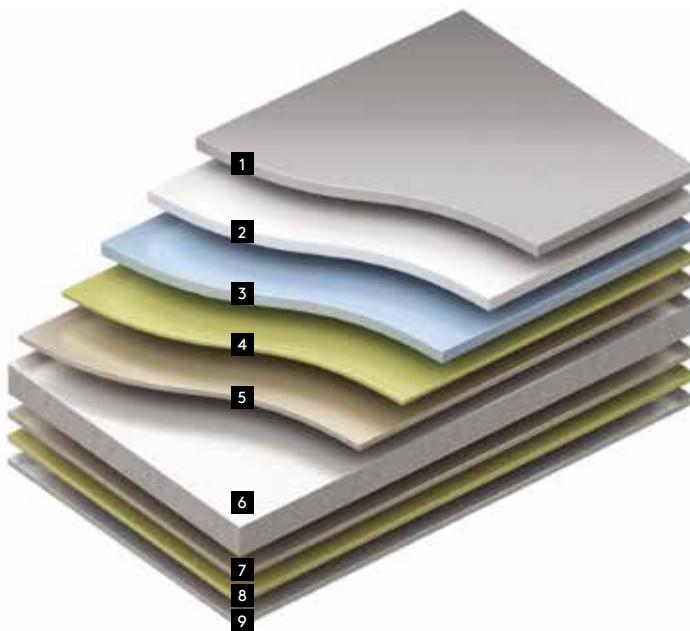
Kingspan coatings are designed specifically for controlled environments. Each coating has specific properties suited to different environments and it is therefore important to choose the right coating to meet the appropriate classification of corrosive environment and type of activities.

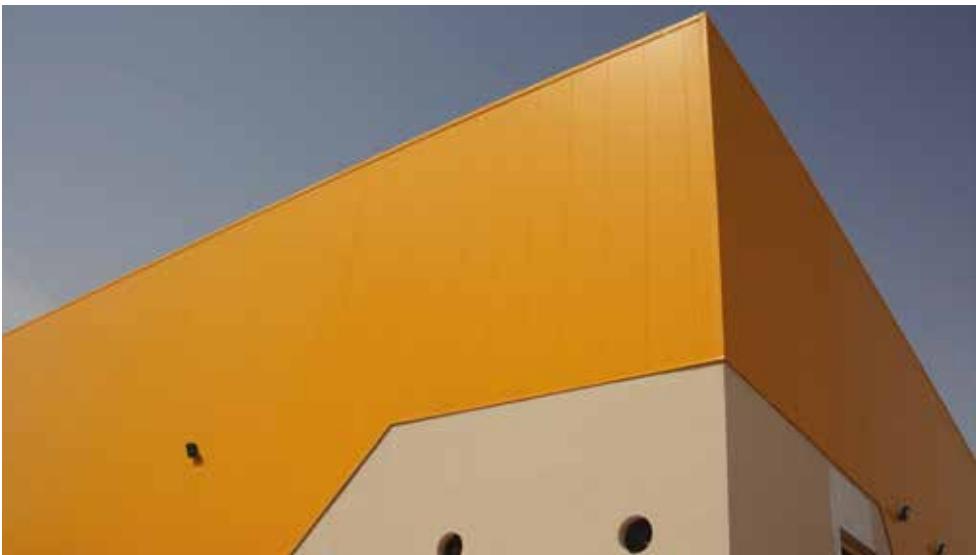
Pre-painted metal is obtained by painting galvanized steel in a continuous production line with coil coating technique. The colours desired as a final coat are selected from the RAL catalogue. With Coil Coating technique, a uniform paint thickness is obtained at every point of the steel surface. Kingspan coatings and steel do not contain any SVHC substances such as chromium or similar.

The production of insulated panels from steel coils of different producers can result in colour differences in the top sheets.

Colour differences can even occur within one batch.
Colour tolerances have to be inquired about and clarified beforehand.

- 1 Top coat
- 2 Base coat
- 3 Primer
- 4 Pre-treatment
- 5 Metallic protect
- 6 Metal substrate
- 7 Metallic protect
- 8 Pre-treatment
- 9 Back coat





Kingspan Coatings

Controlled environments take many different forms and the performance and functionality (in-use) will depend on the requirements of the specific project. The internal environment will also be subjected to a variety of conditions which could affect the performance of materials and systems.

EN ISO 12944-2 defines and grades corrosive environments in five classes (C1 –C5) depending on their exposure to corrosion factors and is an indication of the conditions that the coating is designed to resist for extended periods.

The corrosive factors of an internal environment are determined by the presence of corrosive chemicals and / or micro-organisms in the internal atmosphere, relative humidity and also by the frequency of cleaning, aggressiveness of the cleaners, degreasers, and sanitisers, as well as the methods of cleaning.

Corrosiveness Factors	
C1 – Very low	Dry environment with no attack from corrosive chemicals and / or micro-organisms. Routine cleaning (not more than once a month) using neutral cleaning agents.
C2 – Low	Environment where condensation may occur, with no attack from corrosive chemicals and / or micro-organisms although the walls may occasionally be splashed with slightly corrosive liquids. Routine cleaning (not more than once a month) using neutral cleaning agents.
C3 – Medium	Environment with frequently high humidity and where corrosive chemicals and / or micro-organisms are present. Non-intensive cleaning (not more than once a week) using higher pH cleaning agents (pH 5-9).
C4 – High	Environment with constant high humidity and where high concentrations of corrosive chemicals and / or micro-organisms are present. Intensive cleaning (not more than once a day) using higher pH cleaning agents (pH 5-9).
C5 – Very High	Environment with permanent condensation and where high corrosive chemicals and / or microorganisms are present. Intensive cleaning (not more than once a day) using higher pH cleaning agents (pH 5-9).

The table below shows examples of types of facilities, recommended inspection periods and the suitability of the coating for each corrosive environment classification. Technical data on each of the coatings can be found on pages 34 – 35.

	Corrosiveness	Inspection Period	Type of Application	CLEANSafe 25	PVDF 25	PVDF 55	INOX
C1	Very low	Annually	Storage of dry packaged products, freezers (except unpacked fish)	✓	✓	✓	✓
C2	Low	Annually	CA storage, chill stores, sorting and packing of fruit and vegetables, storage of packed meat and dairy products, banana ripening rooms, potato & onion storage	✓	✓	✓	✓
C3	Medium	Every 6 months	Food production and preparation areas, refrigeration of meat products, ice cream production, butter production, breweries, dairies, wine cellars, processing of meat (cold cuts), bread-making labs, hatcheries	✗	✓	✓	✓
C4	High	Every 3 months	Dishwashing areas, industrial kitchens, storage of unpacked fish, slaughterhouses, incubation rooms, abattoirs, mushroom industry, cheese maturing rooms, meat or fish cuttings, scalding and evisceration	✗	✗	✓	✓
C5	Very high	Every 3 months	A high humidity or aggressive atmosphere for example the preparation of tripe, pickling, coking, preparation of marine produce, climatic maturing rooms, deboning, canned product processing, chemical cleaning rooms	✗	✗	✗	✓



Corrosion damage on ceiling panels caused by inadequate coating selection.



Correct selection of coating depending on coldstore application will provide long lasting protection to coldstore panels.

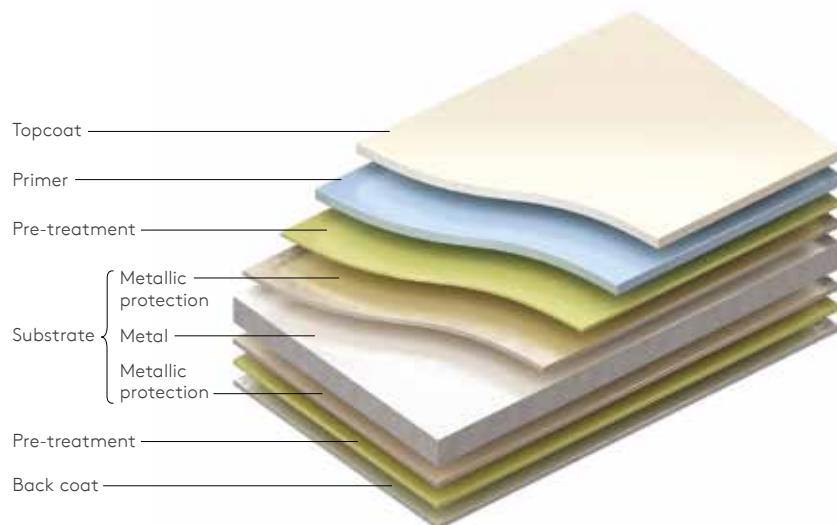
Kingspan Coatings

CLEANsafe 25

CLEANsafe 25 is a chemically inert polyester paint, applied to pre-treated metal, and specifically developed for controlled environments.

Characteristics

- Easy to clean
- Resistant to staining, mould growth and surface extraction
- Good robustness
- Good chemical and humidity corrosion resistance
- Non-toxic
- Resistant to impact and surface wear

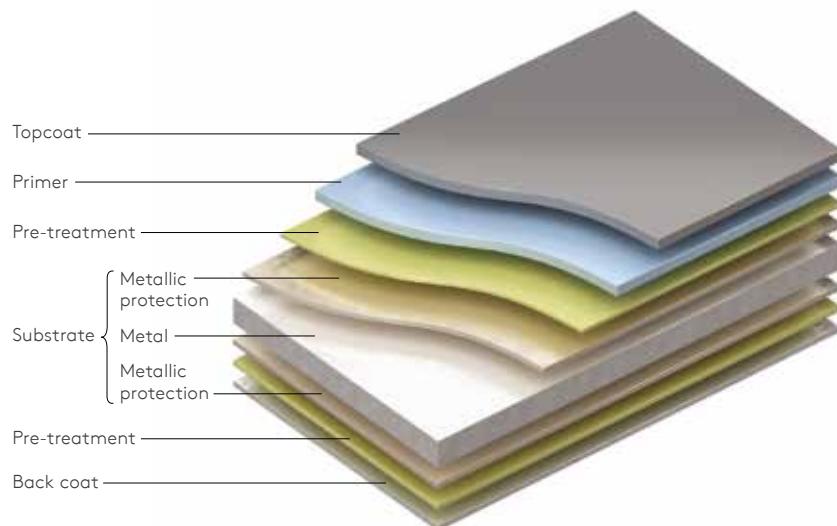


PVDF 25

Kingspan PVDF 25 is a technically advanced polyvinylidene fluoride coating system featuring, strength, resistance and stability. They are specifically developed for humid and aggressive internal environments.

Characteristics

- Available in FOODsafe option – suitable for surfaces immediately behind food preparation, processing surfaces or equipment
- Easy to clean
- Resistant to staining, mould growth and surface extraction
- Excellent robustness
- Excellent chemical and humidity corrosion resistance
- Non-toxic
- Resistant to impact and surface wear

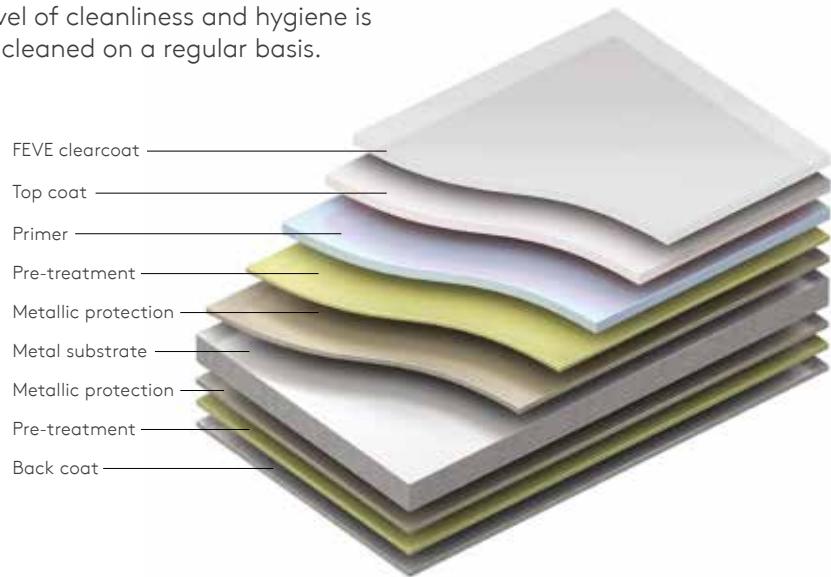


PVDF 55

Kingspan PVDF 55 is a high-performance multi-layer polyvinylidene fluoride coating system featuring strength, resistance and stability. They are specifically developed for humid and aggressive internal environments and where a high level of cleanliness and hygiene is required, and the panels are to be cleaned on a regular basis.

Characteristics

- Available in FOODsafe option – suitable for surfaces immediately behind food preparation, processing surfaces or equipment
- Easy to clean
- Resistant to staining, mould growth and surface extraction
- Excellent robustness
- Excellent chemical and humidity corrosion resistance
- Non-toxic
- Resistant to impact and surface wear

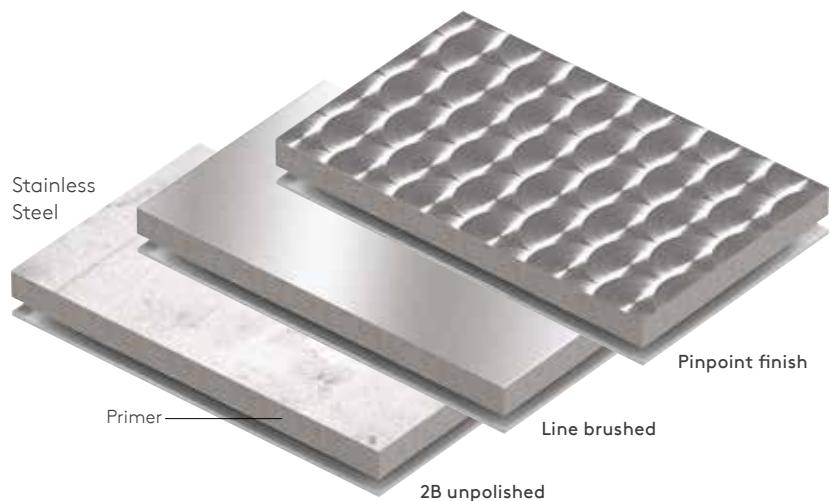


INOX

CLEANsafe INOX is chemically inert, crevice free austenitic stainless steel, specifically developed for controlled environments and high corrosive environments.

Characteristics

- FOODsafe – suitable for slaughter houses, mushroom cultivation, cooking rooms, drying rooms for cheese, laboratories for bread making
- Easy to clean
- Excellent chemical and humidity corrosion resistance
- Non-toxic
- Resistant to impact and surface wear



Fire Performance

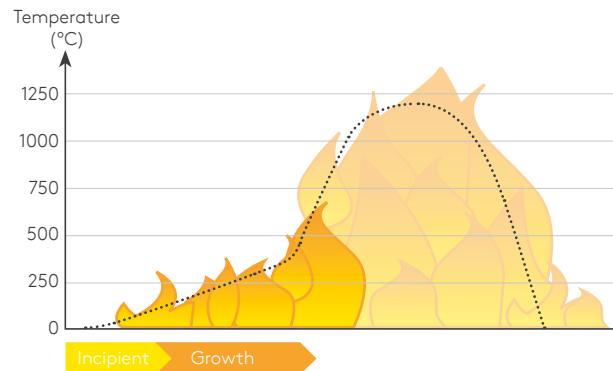
Kingspan Insulated Panels

Kingspan is committed to fire-safety, and dedicated to delivering high-performance, innovative building solutions that are underpinned by extensive fire testing, including large-scale system testing.

Reaction to Fire Performance

Reaction to fire is the response of a product in contributing, by its own decomposition, to a fire to which it is exposed. It relates to the combustibility and ignitability of building materials and can be used to determine how much energy they contribute to the growth of a fire. It is therefore important during the early stages of a fire.

Fire Development Curve



In terms of reaction to fire, and in accordance with EN 13501-1 Euroclass system, Kingspan QuadCore™ insulated panel systems can be classified as B-s1,d0, which is the highest possible performance for a material that is 'combustible'.

EN 13501-1: B-s1, d0 can be achieved to EN 13501 specifications.



Test setup



During test



Inspection of protective char formation after test

POWERED BY
QuadCore™
TECHNOLOGY



Insurance Industry Approved Fire Performance

Stringent insurance industry requirements have led to the development of specific insurer-driven large-scale fire tests, in order to assess the reaction to fire performance of insulated panels with different cores. FM Approvals is one of the most renowned insurance and risk management enterprise providing testing and certification services for property loss prevention products and services used in commercial and industrial facilities. FM Approved panels are subjected to a significantly more rigorous test regime than non-approved panels, and their mark is recognised and respected worldwide.

FM 4880 and 4881 standards are the foundation of FM Approvals' approach to determining the fire performance, and assessing the risk, of the insulated panel systems being tested.

FM 4880 / FM 4881. The 50 ft test shown below forms part of the assessment requirements for approval to Class 1 Internal wall and ceiling panels with no height restriction (FM 4880) and external walls with no height restriction (FM 4881).



POWERED BY
QuadCore™
TECHNOLOGY



FM Approved sandwich panels, for example, have a superior fire rating and prevent the spread of fire within the panel itself and, as such, can be compared to non-combustible panels for protection purposes.

FM4882 standard is the only testing regime in the world that certifies the use of insulated panels for smoke sensitive occupancies.

FM 4882. The FM parallel panel test shown below is used to measure smoke emissions from the panels and delivers certification for smoke sensitive occupancies. QuadCore™ panel systems can achieve 'Class 1 interior wall and ceiling panels' and help deliver certification for pharmaceutical manufacturing, food preparation and storage areas or similar occupancies.



POWERED BY
QuadCore™
TECHNOLOGY



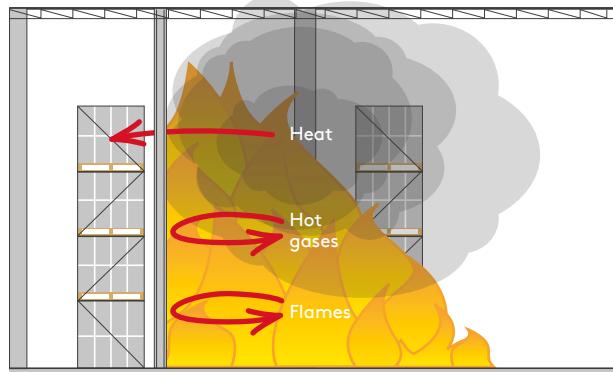
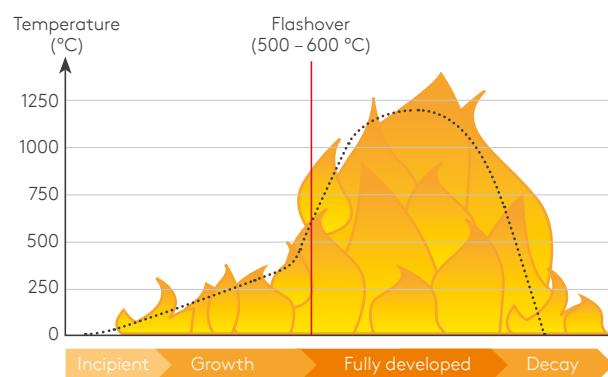
Fire Performance

Kingspan Insulated Panels

Fire Resistance Performance

Fire resistance is the property of a material (such as insulation) or assembly to withstand fire and continue to perform its given function and/or provide containment of a fire for a specified period of time.

Fire Development Curve



Fire resistance is classified through the European Standard BS EN 13501-2.

Insulated panel systems with high-fire resistance properties can help to contain the fire through two key elements:

- Integrity, referred to as E in BS EN 13501-2, is the ability to withstand fire exposure on one side whilst stopping the passage of flames and hot gases through to the unexposed side for a period of time.
- With the addition of Insulation, referred to as I in BS EN 13501-2, the building element will also be able to stop the passage of heat through to the unexposed side. The period of time certified for insulation is the time it takes to produce an average increase in temperature of 140 °C above the initial temperature or an increase in temperature at one point of 180 °C above the initial temperature on the unexposed side of the system. This rise in temperature is measured with multiple thermocouples, which are monitored carefully during the test.

You may see fire resistance, following European Standard BS EN 13501-2, referred to as a combination of letters with a normalised duration of time. For example, a wall system with EI60 will provide certified integrity (E) and insulation (I) performance for 60 minutes.

Different factors, such as jurisdiction and application, determine the level of fire resistance required by different building regulations.

The following Kingspan Coldstore Panel Systems have been classified as per EN 13501-2:

- KS110 CTF with QuadCore™ 120 mm Panel – achieved EI45 vertically applied wall application
- KS110 CTF with QuadCore™ 200 mm Panel – achieved EI60 vertically applied wall application

The following Kingspan Coldstore Panel Systems have been classified as per EN 13501-2:

- KSD1100CS with QuadCore™ 200 mm Panel – achieved E120 and EI60 vertically applied wall application

Kingspan is continuously carrying out fire resistance tests to add to its fire certification. Please contact your local Kingspan Technical Team to findout the latest fire resistance test and certification information.

Real Fire Case Studies

Food Processing Warehouse, Turkey

The fire broke out in the afternoon when electrical panels short circuited, igniting flammable cooking oils stored at a food processing warehouse in Turkey.

The fire originated in the refined food processing section of the warehouse at around 3.45 pm, as footage from the warehouse security cameras show the sparks igniting into flames. By the time the employees noticed the fire and contacted the fire department at around 4.00 pm, the flames had already reached the ceiling panels. As per the fire department's official log, the fire response team began trying to extinguish the flames at around 4.18 pm. The records indicate that the fire was completely extinguished by 5.23 pm, putting the total duration of the fire at around 1.5 hours.

Firefighters identified the cause of the fire as the short circuiting of electrical panels located in the cooking oil storage room, as shown in Photograph 2. The contact of fire sparks with flammable cooking oils accelerated the spread of fire, causing the flames to rapidly grow higher and come into direct contact with Kingspan's PIR-insulated ceiling panels. Photograph 1 shows the location of the distribution box where the fire first broke out, with visible damage to the ceiling.

Conclusions:

- During the 1.5 hours between the fire originating and it being extinguished, Kingspan's PIR-insulated ceiling panels maintained their structural integrity and insulation performance. By helping to contain the fire to its original location, the ceiling panels prevented the fire from reaching the plenum space.
- Only minor deformations, delamination and smoke marks were observed on the surface of panels near the point of origin which were not directly exposed to fire.
- Similarly, the adjacent rooms in the warehouse, separated by Kingspan's PIR-insulated panels maintained their workable conditions and continued their operation right after the fire was extinguished.



Photograph 1



Photograph 2



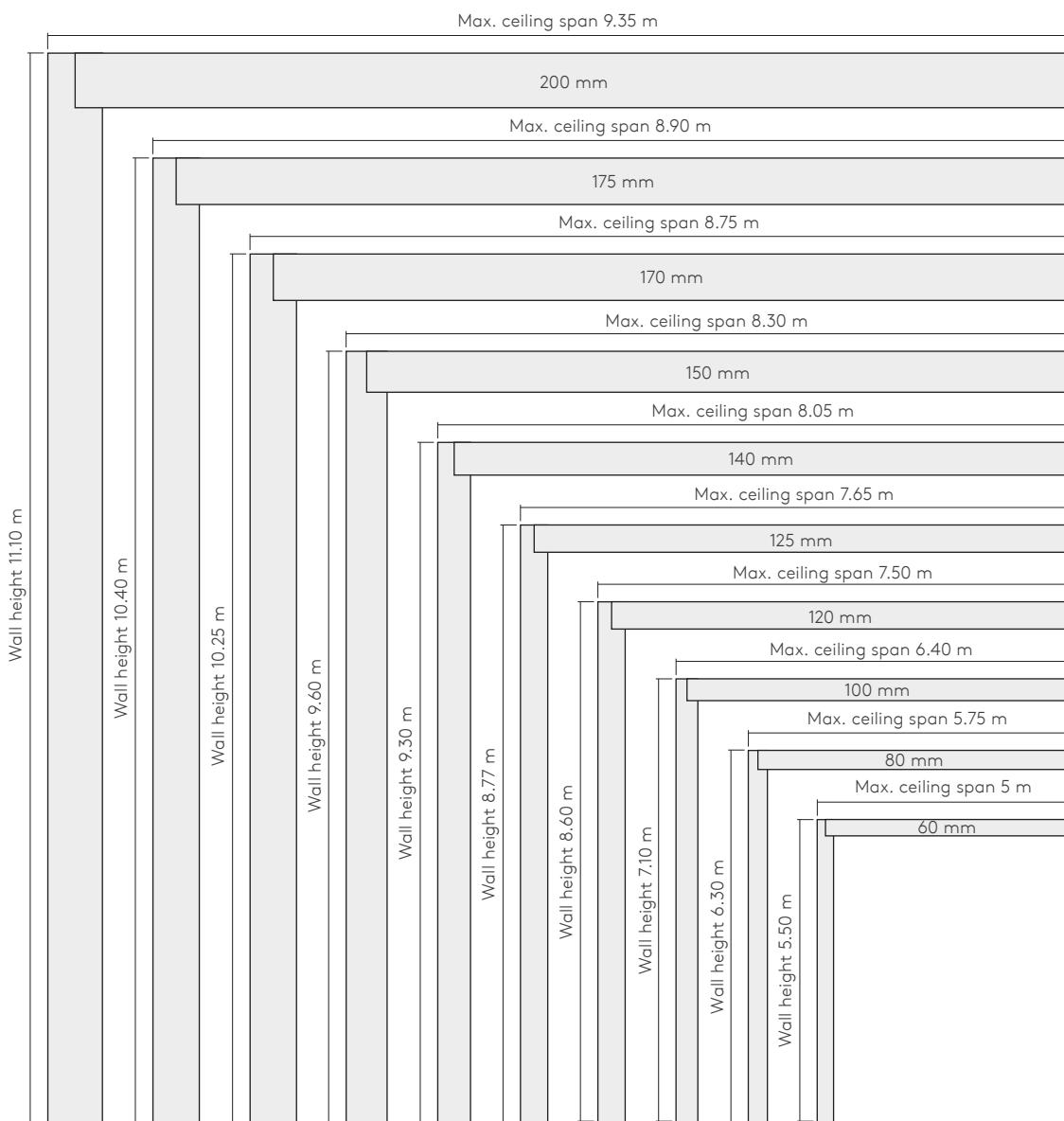
Charred PIR-insulated panel sample collected from the site



Ceiling panels maintain structural integrity after exposure to fire

Structural Performance

Self Supporting Internal Wall and Ceiling Spans



General notes:

1. Values have been calculated using the method described in EN 14509: 2013 – self-supporting double skin metal faced insulated panels.
2. The allowable steelwork tolerance between bearing planes of adjacent supports is +/- 5 mm.
3. All panel thicknesses have been calculated with a minimum support width of 50 mm, larger support widths are available.
4. The ability of the panel to resist the imposed load, is dependent on the end support connection i.e. support bearing width, number of fasteners used and the support thickness, as well as the type of fastener.
5. Wall and ceiling panel fixing systems and the supporting framework shall be designed and installed to avoid serious progressive collapse in the event of accidental damage.
6. Excessive loading on the insulating panels in areas such as those occupied by control equipment shall be avoided; suitable walkways, supported by the structural frame, should be provided above the insulation panels.
7. The ability of the panel to resist the imposed load is dependent on the end support connection i.e. support bearing width, number of fasteners used and the support thickness as well as the type of fastener.
8. These tables apply to short term imposed loads on simply supported panels (supported at each end of the panel) generally used for ceilings.
9. Please contact Kingspan Technical Team for custom calculations for different load and temperature parameters required for your project.

Self Supporting Internal Wall Spans

	Core Thickness (mm)										
	60	80	100	120	125	140	150	170	175	200	220
KS110 CTF	5.50	6.30	7.10	8.60	—	9.30	9.60	10.25	—	11.10	—
KSD1100 CS	—	6.30	7.10	—	8.77	—	9.60	—	10.40	11.10	11.67
KS110 NCTF	—	—	7.10	—	—	—	9.60	—	—	11.10	—

Wall Panels: 60, 80, 100 mm

- 60, 80, 100 mm panels are considered 0.5 mm metal internal and 0.5 mm metal external facings.
- External +25 °C and internal 5 °C, Δt: 20 °C temperature difference is considered
- The maximum allowable spans have been calculated with 0.3 kN/m² as an internal air pressure.
- Maximum deflection: short term: L/100 / long term: L/100.

Wall Panels: 120, 125, 140, 150, 170, 175, 200, 220 mm

- 120, 125, 140, 150, 170, 175, 200, 220 mm panels are considered 0.6 mm metal internal and 0.6 mm metal external facings.
- External +25 °C and internal -25 °C, Δt: 50 °C temperature difference is considered.
- The maximum allowable spans have been calculated with 0.3 kN/m² as an internal air pressure.
- Maximum deflection: short term L/100 / long term L/100.

Self Supporting Internal Ceiling Spans

	Core Thickness (mm)										
	60	80	100	120	125	140	150	170	175	200	220
KS110 CTF	5	5.75	6.40	7.50	—	8.05	8.30	8.75	—	9.35	—
KSD1100 CS	—	5.75	6.40	—	7.65	—	8.30	—	8.90	9.35	9.65
KS110 NCTF	—	—	6.40	—	—	—	8.30	—	—	9.35	—

Ceiling Panels: 60, 80, 100 mm

- 60, 80, 100 mm panels are considered 0.5 mm metal internal and 0.5 mm metal external facings.
- External +25 °C and internal 5 °C, Δt: 20 °C temperature difference is considered
- The maximum allowable spans have been calculated with 0.25 kN/m² as a maintenance load.
- Maximum deflection: short-term: L/200 / long-term: L/100.

Ceiling Panels: 120, 125, 140, 150, 170, 175, 200, 220 mm

- 120, 125, 140, 150, 170, 175, 200, 220 mm panels are considered 0.6 mm metal internal and 0.6 mm metal external facings.
- External +25 °C and internal -25 °C, Δt: 50 °C temperature difference is considered.
- The maximum allowable spans have been calculated with 0.25 kN/m² as a maintenance load.
- Maximum deflection: short-term is L/200 / long-term is L/100.

Thermal Performance

Heat Transmission QuadCore™

QuadCore™ is Kingspan's next generation of hybrid microcell insulation technology. This technological innovation provides superior fire protection, up to 20 % thermal enhancement, a higher environmental performance, and is supported by a building guarantee of up to 40 years. QuadCore™ delivers an exceptional thermal conductivity coefficient of $\lambda = 0.018 \text{ W/m.K}$.

QuadCore™ Heat Flow (w/m²)

The heat gain by conduction should be limited to 10 W/m² (see Code of Practice for the Design of Coldstore Envelopes). For enhanced energy performance, the heat gain by conduction should be limited to 8 W/m².

Shaded area denotes typical thicknesses for cold storage applications (0°C to -40°C).

Recommended minimum insulation thickness for 10 W/m² heat gain

Heat Transmission
 $D = (\lambda \times \Delta t) / Q$

Thermal conductivity of the panel
 λ value for QuadCore™ = 0.018 W/mK,
 D = Panel thickness (m)

D = Panel thickness (m)
 Δt = Difference between internal and external temperatures
 Q = 10 W/m² design heat flow for refrigeration

Recommended Thicknesses

Temperature (°C)	Panel Thickness (mm)
-40	170 - 220
-18 - 28	120 - 170
0	80 - 100
+5 +15	60 - 80

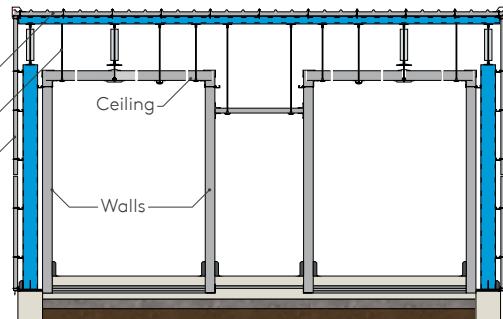
Construction Types

Construction Solutions

Internal Box in Box Insulated Self-Supporting System

Applications: Chilled and Cold Storage
Main structure: Portal or truss construction

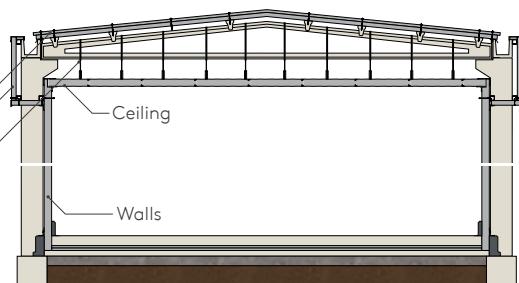
Kingspan insulated roof panels
Kingspan suspension system
Kingspan insulated wall panels



Internal Insulated System with Partial External Wall Cladding

Applications: Chilled and Cold Storage
Main structure: Portal or truss construction

Kingspan insulated roof panels
Kingspan insulated wall panels
Kingspan suspension system



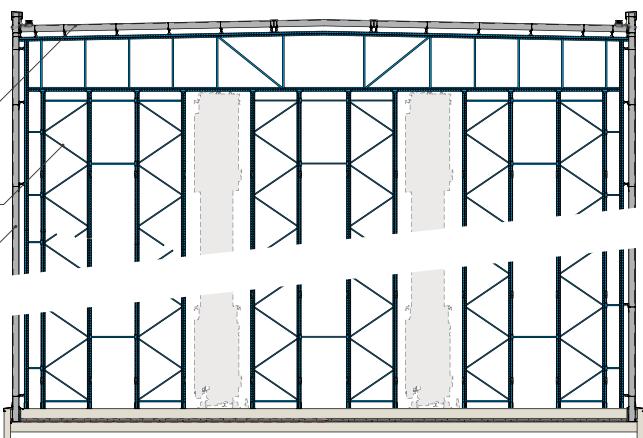
External Insulated System – Clad Rack

Applications: Chilled storage
Main structure: Portal or truss construction

Coldstore insulated panels and single ply
membrane external weathering system

Structural frame with racking

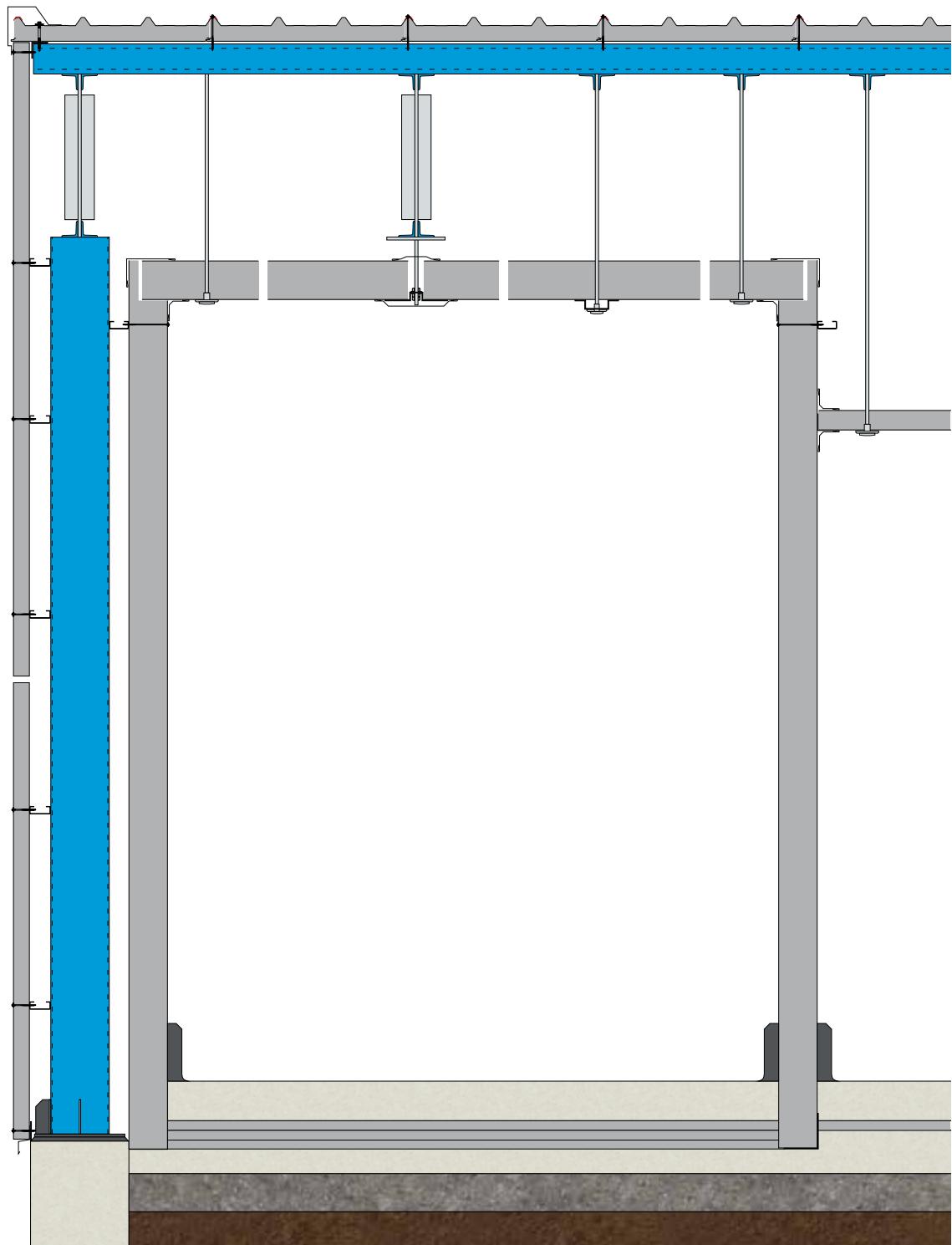
Coldstore insulated panels



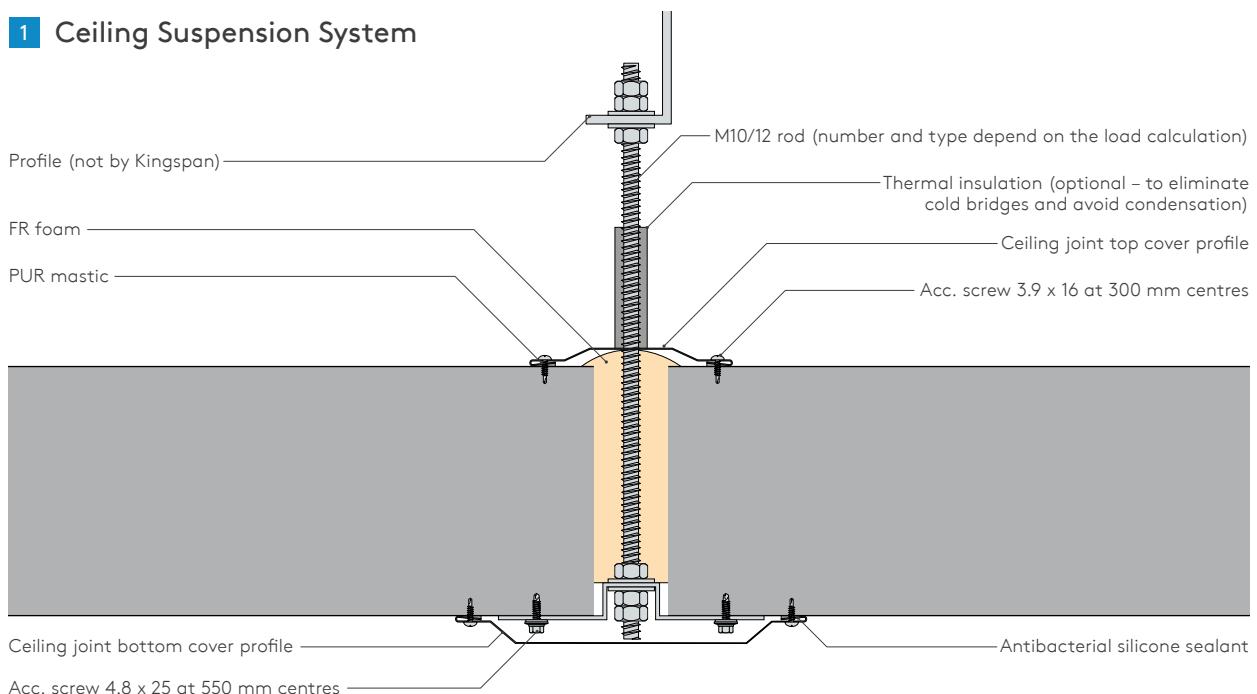
Scan the QR code for more
information on Kingspan
Clad Rack Solutions

Construction Types

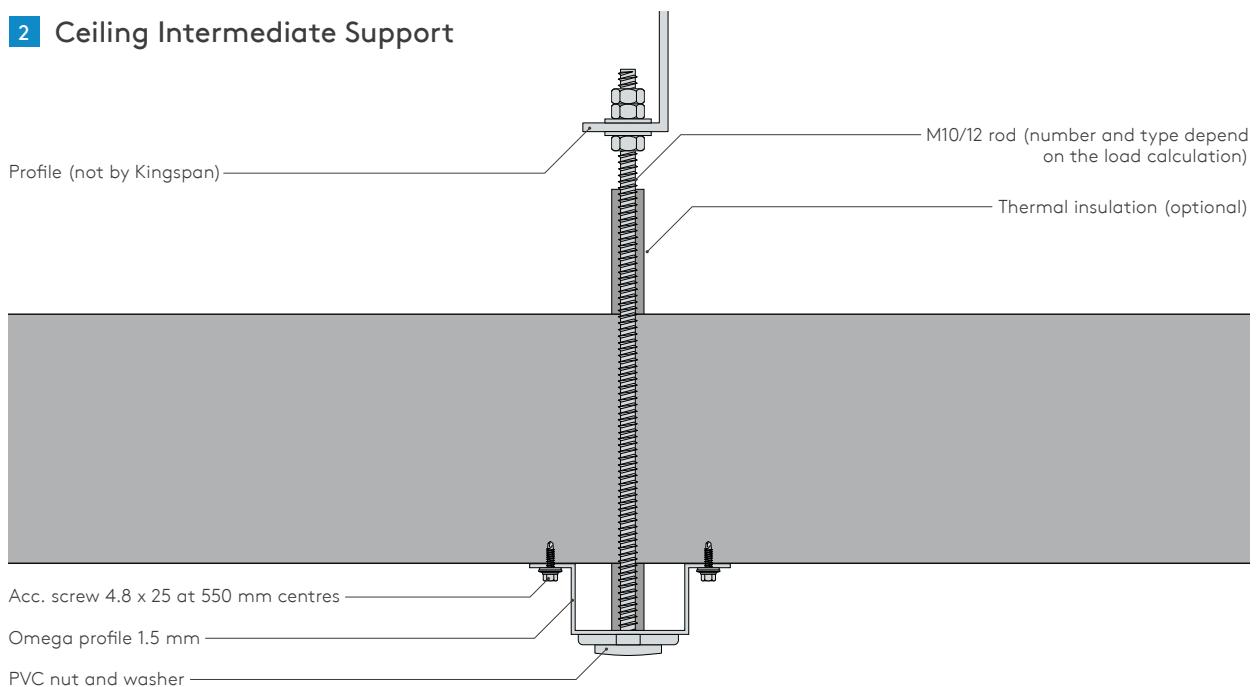
Internal Box in Box Insulated
Self-Supporting System



1 Ceiling Suspension System



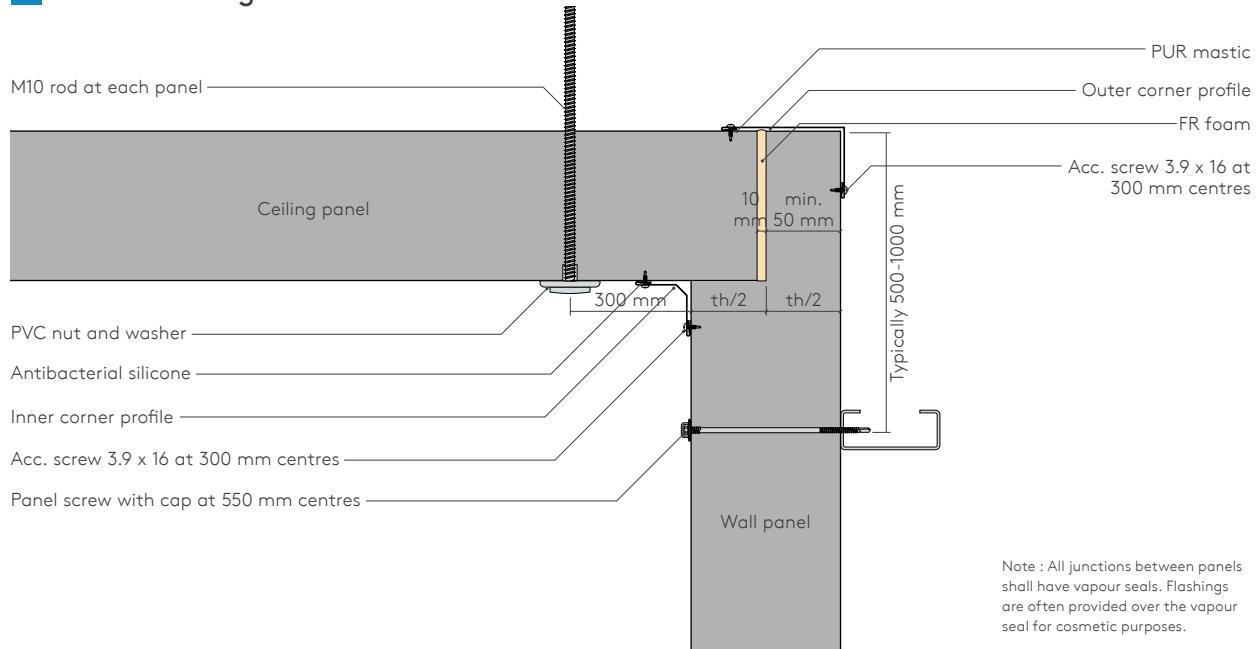
2 Ceiling Intermediate Support



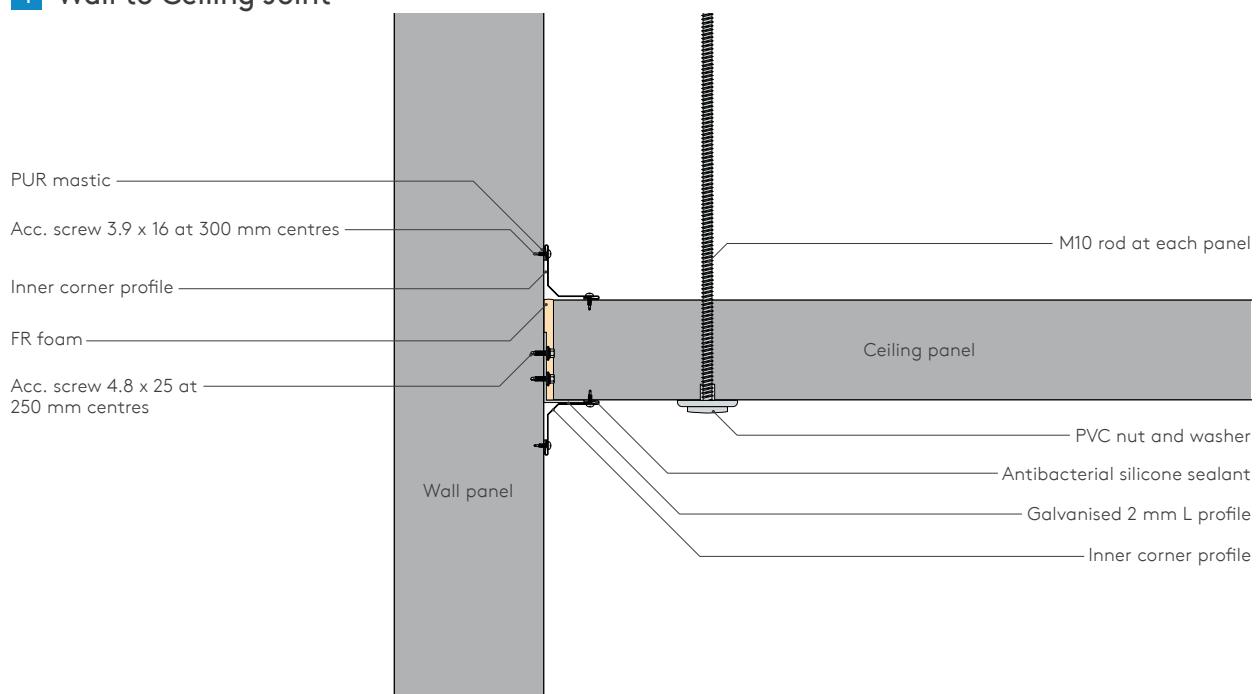
Construction Types

Internal Box in Box Insulated Self-Supporting System

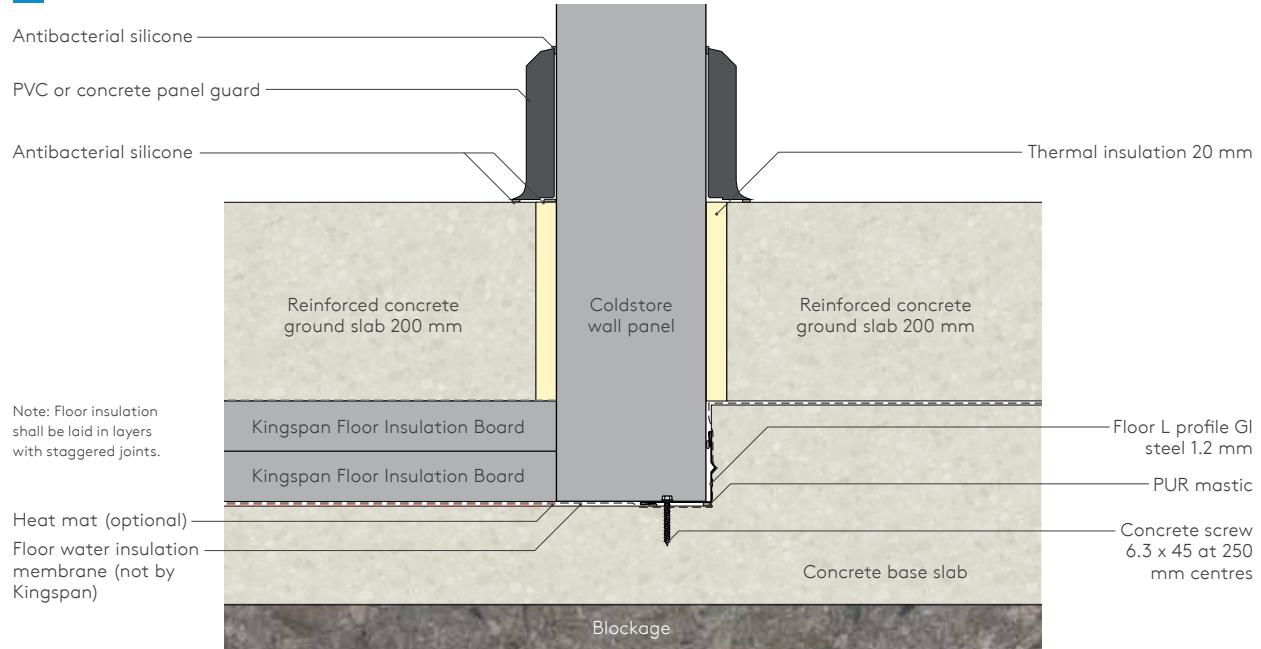
3 Wall to Ceiling Connection



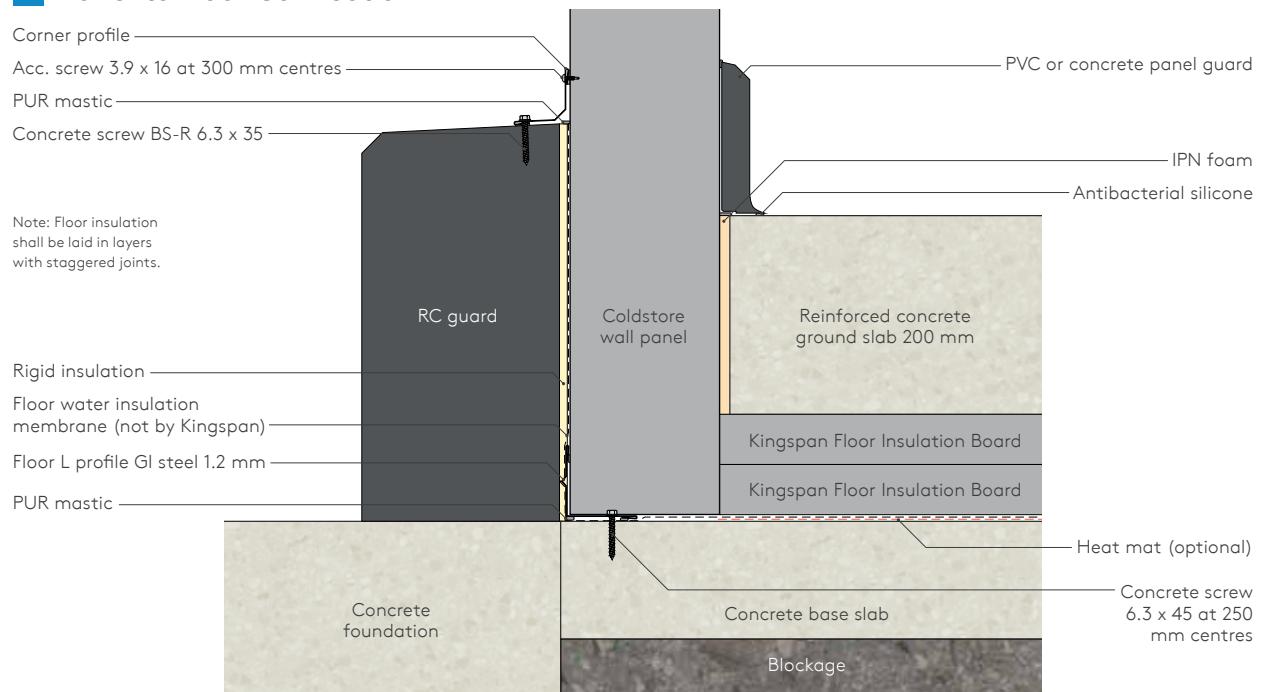
4 Wall to Ceiling Joint



5 Wall to Floor Connection

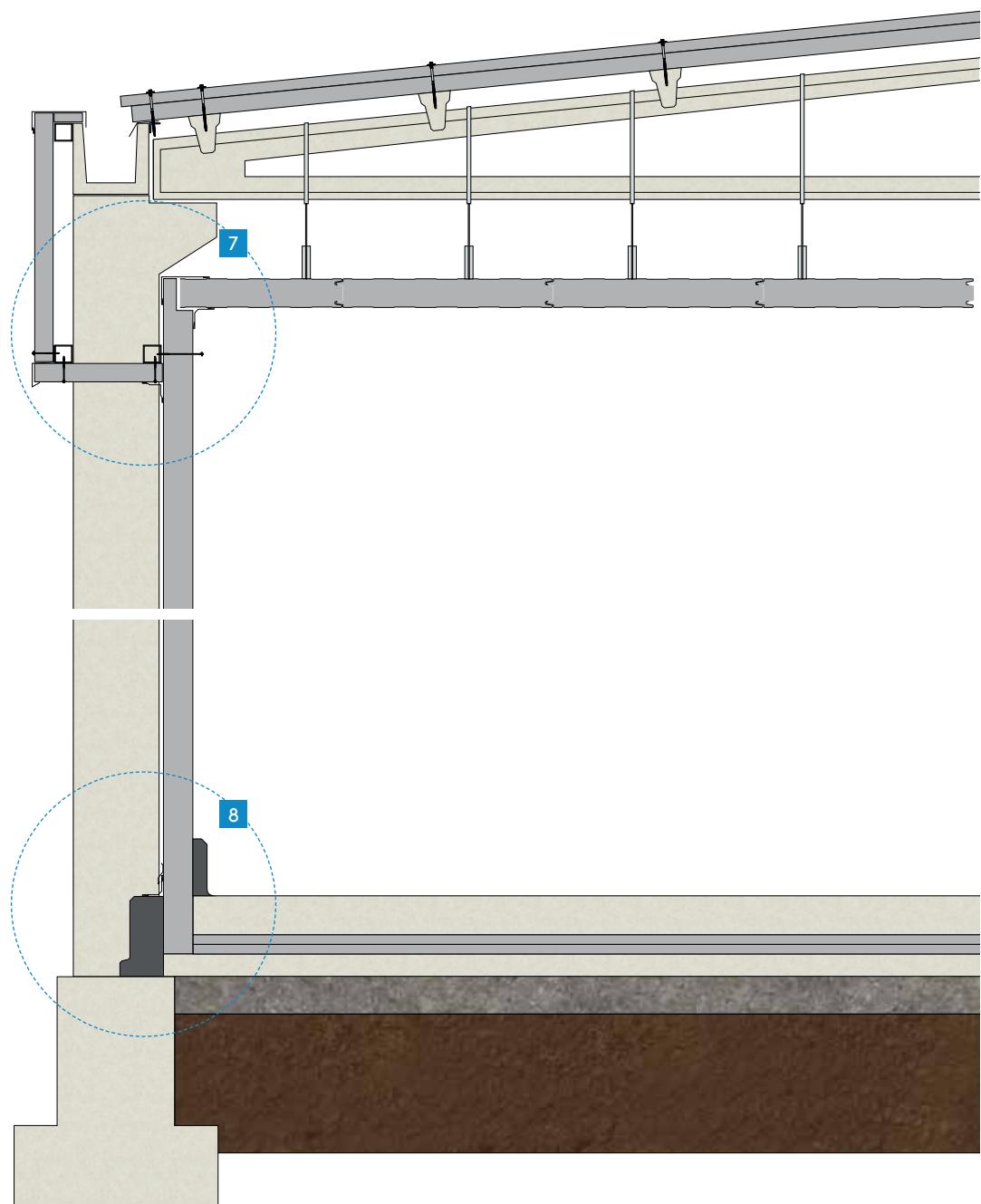


6 Panel to Floor Connection

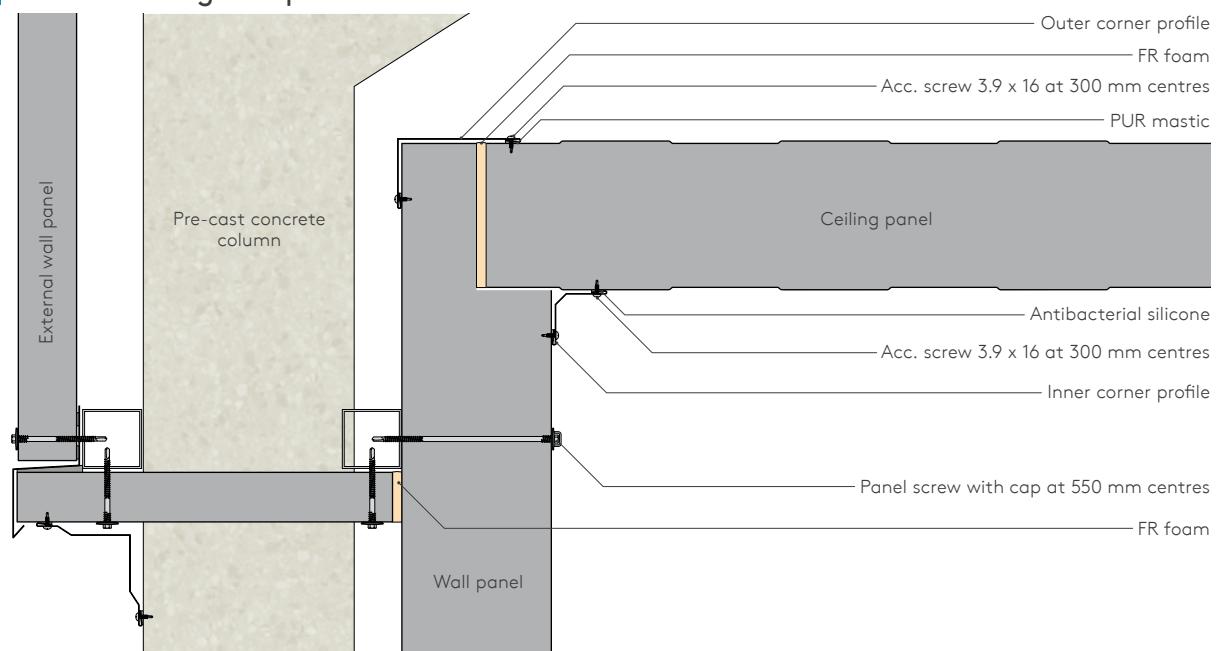


Construction Types

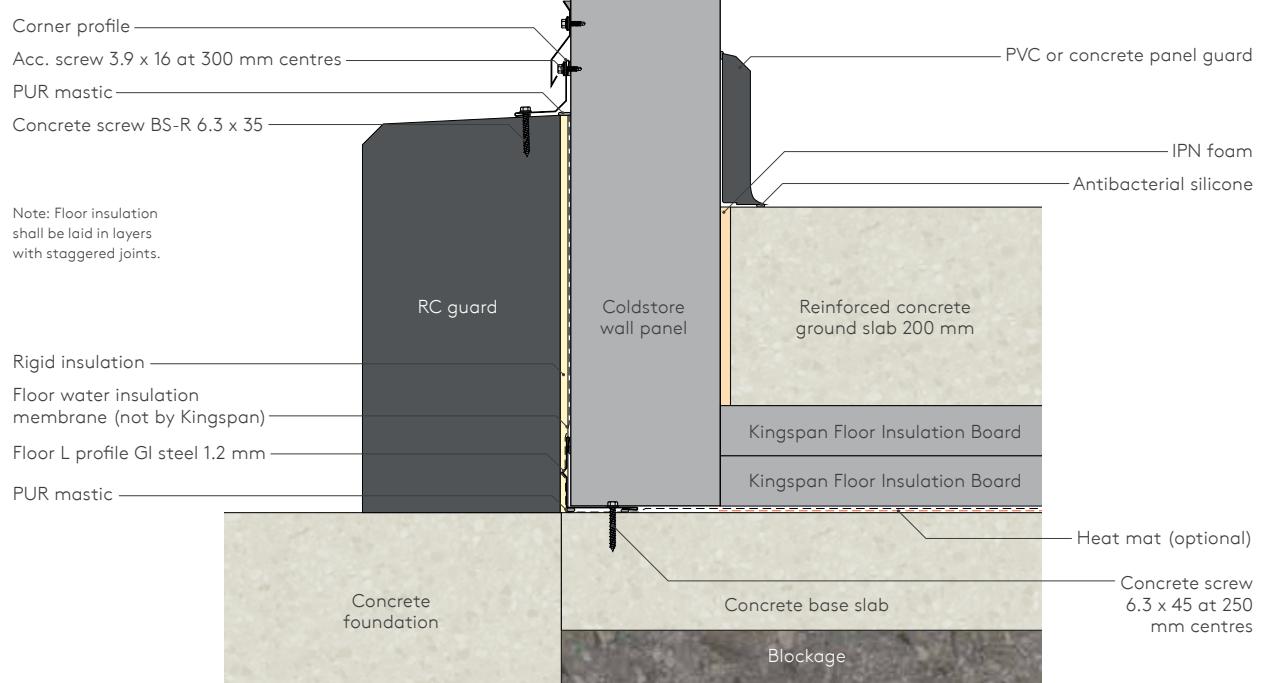
Internal Insulated System with Partial External Wall Cladding



7 Wall to Ceiling Parapet Connection



8 Panel to Floor Connection



Sectoral Case Studies

Fresh Produce and Cold Storage

Fresh fruits and vegetables are easily perishable products and they need precise temperature control and optimal storage conditions for maintaining good product quality.

Fresh produce must be precooled as quickly as possible following harvest with the help of ventilation. Precooling must quickly be followed by chilled storage to extend the shelf life of the produce and minimize wastage. These type of facilities also require cold stores with different storage temperatures and working principles which can be achieved by multiple panel thicknesses and connection details. Kingspan technical team provides tailor made solutions to solve complex details of these rooms to combine panels of different thicknesses without forming any thermal bridges.

Special consideration also needs to be made on selecting the most suitable coatings depending on the functionality of the storage spaces. The use of thermal energy in a typical fruit and vegetable processing plant accounts for 70 – 80 % of total energy consumed by the building. QuadCore™ technology of Kingspan cold store panels, having superior thermal insulation performance than other available cores in the market will minimize the energy consumption and carbon footprint of the storage facility.

Plant temperature ranges: -5 to +5 °C

Panel types: KSD1100 CS, KS110 CTF, KS110 NCTF Smartpanel

Panel thickness: 80 – 150 mm

Door types: Polidoor Sectional Doors + Dock Shelter, Fast PVC Doors, Hinged Doors, Sliding Doors

Complementary product options: SafeDefence Barrier System, Pressure Valve, PVC Hygienic and Metal Accessories

Recommended Coating Types: CLEANsafe 25 / PVDF 25



Clad Rack Warehouses

Clad rack warehouses can be made up of any type of storage system as their main feature is for the racking to form part of the building structure. In this system, the racking not only supports the load of the stored goods, but also the load of the building envelope, as well as external forces such as wind or snow. This is the reason why clad rack warehouses represent the concept of optimum use of a warehouse: in the construction process, first the racking is assembled, and then the building envelope is built around this structure until the warehouse is complete.

Kingspan Clad Rack panel is specifically designed for use in industrial structures where external cladding rack systems and high-level thermal insulation are needed. It is a secret-fix system and is available in a 200 mm insulation depth and offers economic but aesthetic solutions to designers, contractors and clients alike and suitable for horizontal and vertical applications.

Plant temperature ranges:	-28 °C to ambient
Panel types:	KS103 LSSF / LMSF – Clad Rack
Door types:	Sectional Doors + Dock Shelter, Sliding Doors, Hinged Doors, High Speed PVC Door
Complementary product options:	LED Energy Efficient Lighting, Panel Guard Barrier, Day-Lite Architectural Lighting System, Smoke Ventilation, Safety System
Recommended Coating Types:	CLEANsafe 25 / PVDF25



Sectoral Case Studies

Controlled Atmosphere Storage

A controlled atmosphere is an agricultural storage method in which the concentrations of oxygen, carbon dioxide and nitrogen, as well as the temperature and humidity of a storage room are regulated. Both dry commodities and fresh fruit and vegetables can be stored in controlled atmospheres. As an example, storing fresh apples in controlled atmosphere storage improves the shelf life of the produce by an additional 4-5 months. Increasing commercial use of this technology over recent years in both the short and long term has been in response to market demand for the supply of all types of fresh fruits and vegetables at all seasons.

In controlled atmosphere storages, the most important issue is the impermeability and resistance to pressure. The number of joints and accessories used for jointing must be minimized to avoid any risk of leakage. Kingspan cold store panels provides the perfect seal without any thermal bridges thanks to its unique airtight male / female connection detail between the two joining surfaces.

Plant temperature ranges: -2 to +5 °C

Panel types: KSD1100 CS, KS110 NCTF, KS110CTF Lockpanel

Panel thickness: 100 – 150 mm

Door types: Polidoor Atmosphere Controlled Sliding Door, Dock Shelter, Sliding Door

Complementary product options: SafeDefence Barrier System, Kingspan IPN Floor Insulation Board, Smart Panel Application

Recommended Coating Types: CLEANsafe 25 / PVDF 25



Potatoes and Onion Storage

Potato storage process consists of 4 phases: Drying, cooling, humidifying, ventilation. The basic pre-requisites for optimum potato storage are good thermal insulation of the building envelope, no illuminated areas, consistently low storage temperatures, as well as a dry warehouse. Furthermore, appropriate technical equipment for drying, cooling and ventilation is required so that there is no degradation in quality of the produce.

Storage capacity is determined by how high the produce can be loosely piled which is generally estimated to be around 3.5 m. Designing the external walls of up to 4.5 m height provides an additional 1.0 m space above the stored piles which is sufficient for air circulation. External wall heights can be increased to 6-7 m if special palletized crates or bins with 300 – 400 kg capacity are used for storage.

Onion storage process consists of 3 phases: drying, cooling, ventilation. The requirements of the onion storage facility are similar to the potato – no daylight, building covering is insulated, insulated angle support walls, closed and airtight. Humidity control is very important in onion storage. Low humidity can cause dehydration and excess humidity may cause mould formation. Storage temperature is required to be between -1 °C to +1 °C with a relative humidity of 65 – 75 %.

Also, for optimum storage conditions, under-floor ventilation is necessary to ensure consistent low temperatures in the facility. Kingspan technical team offers tailor-made design solutions for potato and onion storages for specific customer requirements if desired.

Post treatment touring:	
Plant temperature ranges:	10 –15 °C max, 14 Days
	Storage temperature: 4 °C (5-8 month storage sleep)
Panel types:	KS110 CTF, KSD1100 CS, KS110 NCTF
Panel thickness:	100 mm
Door types:	Polidoor Sectional Doors + Dock Shelter, Sliding Doors, Hinged Doors
Complementary product options:	Panel Guard Barrier, Day-Lite Architectural Lighting System, Smoke Ventilation, SafeDefence Barrier System
Recommended Coating Types:	CLEANsafe 25 / PVDF 25



Sectoral Case Studies

Hatcheries

Hatcheries have a one-way process direction from egg to chick and are required to have the highest level of hygiene standards at every level. They need to be designed and constructed so that they can be easily washed and disinfected.

The walls and floors of hatcheries must be waterproof and must have easily cleanable surfaces. They must be covered with solid, smooth, light coloured and easily washable finishes.

The wall-to-floor connection details must be specially designed to make sure that it does not collect any dirt. The door and window frames must be made of durable stainless steel material. Ventilation and steam evacuation systems must be carefully designed. Synthetic filter systems must be used to keep indoor-outdoor air supply uninterrupted. The roof also needs to be built out of smooth and easily cleanable components. PVC based accessories should be used in conjunction with PVC laminated insulated panels facing internal environments of the hatchery facilities.

Plant temperature ranges: +5 to +15 °C

Panel types: KSD1100 CS, KS110 CTF, KS110 NCTF

Panel thickness: 60 – 100 mm

Door types: Sectional Doors + Dock Shelter, Sliding Doors, Hinged Doors

Complementary product options: SafeDefence Barrier System, Day-Lite Architectural Lighting System, PVC Hygienic Accessories

Recommended Coating Types: CLEANsafe 25 / PVDF 25



Poultry

Poultry processing facilities are large scale plants having high operational traffic. Panels having high fire resistance performance should be selected for such facilities due to their large size and the high number of operational staff requirements.

In addition to passive fire protection measures, all active firefighting precautions must be considered for the processing areas. Careful planning must be made to enable the fastest possible time for freezing followed by immediate storage of processed products. Cold storage section floor area must also be maximized for efficiency. Hygiene is also critical in poultry processing plants. It is very important to construct the wall to floor / floor to ceiling panel connection details as per international hygiene standards at every stage of the plant.

Panel coatings must have 20 years resistance to surface wear that can be caused by intensive cleaning and washing with chemicals. The panels located in processing areas is recommended to be installed over 100 cm concrete plinths to protect them from damage that can be caused by forklifts etc. The ceiling plenum should be designed as a horizontal shaft during planning and the substructure for its construction must be installed accordingly before panel installation commences. Fresh air circulation must be arranged with a good ventilation system design to eliminate any condensation that can occur on ceiling panel surfaces in high temperature areas of the processing plant.

Plant temperature ranges: -22 to +10 °C

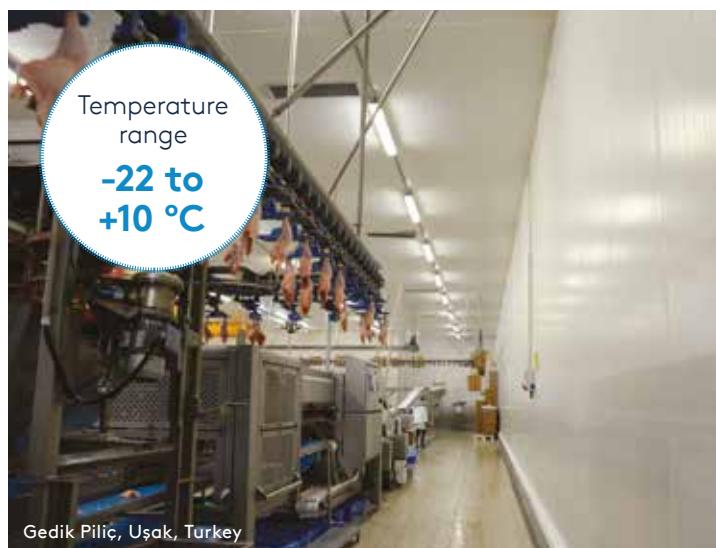
Panel types: KSD1100 CS, KS110 CTF

Panel thickness: 80 / 150 mm

Door types: Polidoor Hinged Door, Sectional Door, Dock Shelter, Rapid Speed PVC Door

Complementary product options: SafeDefence Barrier System, Smoke Ventilation, PVC Hygenic Accessories

Recommended Coating Types: CLEANsafe 25 / PVDF 25 / PVDF 55 / INOX



Sectoral Case Studies

Meat Processing and Slaughter Houses

The slaughter of livestock involves three distinct stages: pre-slaughter handling, stunning, and slaughtering. Meat must be stored at 10 °C within 10 hours after slaughter to avoid any bacteria formation.

The relative humidity during storage must be kept at 85 – 95 % levels for the processed meat to stay hydrated and not to dry out. Every station in slaughterhouses require extensive use of disinfectants and water for maintaining high levels of hygiene standards at all times. Due to this reason, panel surfaces are required to have a high resistance to corrosion in these facilities.

Selection of suitable coating types and panels thicknesses at the appropriate locations is key to having resilient, long lasting, hygienic facilities with low carbon footprint. Proper installation technique and correct choice of auxiliary accessories will also increase the energy efficiency of the building.

Plant temperature ranges: -28 to +10 °C

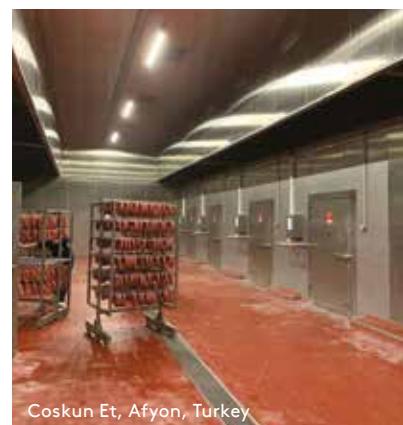
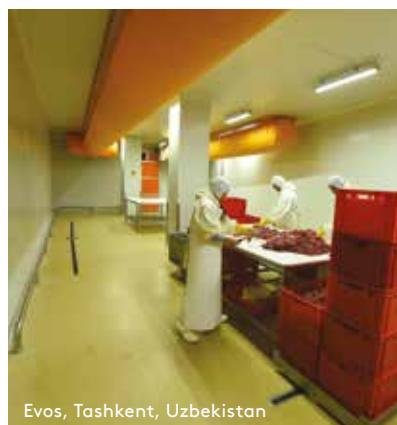
Panel types: KSD100 CS, KS110 CTF, KS110 NCTF, Smart Panel

Panel thickness: 80 – 200 mm

Door types: Polidoor Sectional Doors + Dock Shelter, Fast PVC Doors, Hinged Doors, Sliding Doors, Office Hinged Doors

Complementary product options: Day-Lite Architectural Lighting System, Smoke Ventilation, SafeDefence Barrier System

Recommended Coating Types: CLEANsafe 25 / PVDF 25 / PVDF 55 / INOX



Dairy Product Facilities

Dairy processing is rising rapidly around the globe to meet the increasing appetite for milk and milk products from an ever-growing population. The storage temperature in dairy plants are generally not required to be below 0 °C (except in cream and fat storage rooms). For this reason it is generally sufficient to use panel thicknesses of 80 – 100 mm in these types of facilities unless customers have special requirements.

Dairy production facilities should be designed by taking consideration of temperature differences, corrosion risks, hygiene standards and wear conditions. The panel surfaces of incubation rooms, forced air cooling zones and corridors around these sections are exposed to high levels of anti-bacterial chemicals and need to be produced with stainless steel facings. All accessories required in these areas are also required to be produced out of stainless steel.

Kingspan CLEANsafe25 coating is sufficient for other production and processing areas of the facility. Flat surface panels and Smart Panel options are generally recommended for these type of facilities. Kingspan technical team can guide clients on selecting the right panel thicknesses, coating types and detailing for dairy plant constructions.

Plant temperature ranges: +5 to +15 °C

Panel types: KSD1100 CS, KS110 CTF, KS110 NCTF, Smartpanel

Panel thickness: 80 – 100 mm

Door types: Polidoor Flip Flap Doors, Rapid Speed PVC Doors, Sectional Doors + Dock Shelter, Sliding Doors, Hinged Doors

Complementary product options: Panel Guard Barrier, Day-Lite Architectural Lighting System, PVC Hygienic Accessories, SafeDefence Barrier System, Stainless Steel Accessories

Recommended Coating Types: CLEANsafe 25 / PVDF 25 / PVDF 55 / INOX



Sectoral Case Studies

Seafood Facilities

Seafood processing facilities require a wide range of operating temperature zones along with different operating conditions at every stage. This type of infrastructure can only be achieved by multiple panel thicknesses ranging from 80 – 200 mm. Careful consideration needs to be made on detailing the interfaces of different panel thicknesses to avoid thermal bridges.

Additionally, walls and ceilings of the processing areas must be impermeable, easy to clean / disinfect and should be made from smooth and light coloured material. Ceiling equipment should not cause condensation and should be carefully positioned so that it does not cause direct or indirect contamination of raw or processed products below. The ceiling should be designed to easily ventilate the steam and smoke used in processing of seafood.

Correct selection of coatings is essential to avoid corrosion and maintain high levels of hygiene throughout the facility. Kingspan PVDF 55 FOODsafe and CLEANsafe coatings will meet all food hygiene standards required by these type of facilities. Smartpanel application in processing and corridor areas are also highly recommended to extend the lifespan of insulation materials used in these areas.

Plant temperature ranges: -28 to +4 °C

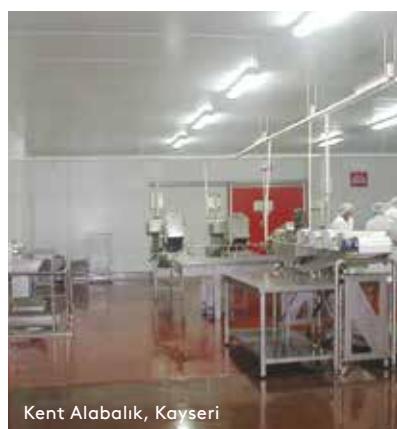
Panel types: KSD1100 CS, KS110 CTF, KS110 NCTF, Smartpanel

Panel thickness: 80 – 200 mm

Door types: Polidoor Sectional Doors + Dock Shelter, Sliding Doors, Hinged Doors

Complementary product options: SafeDefence Barrier System, Day-Lite Architectural Lighting System, PVC Hygienic Accessories, Pressure Valves, Smoke Ventilation System

Recommended Coating Types: CLEANsafe 25 / PVDF 25 / PVDF 55 / INOX



Mushroom Farms

Mushrooms do not have seeds and are grown from spores. Spores need moist and humid environments and they become cottony structures called mycelium. Mycelium must be kept in dark and moist environments where temperatures range is +18 to +23 °C with a relative humidity of 80 – 90 %.

These type of facilities require constant misting to maintain the dampness and must also be protected from harmful bacteria so easy to wash FOODsafe and CLEANsafe coated panels are recommended to be used on walls and ceilings. Minimum wall heights is recommended to be 2.5 m.

One of the main differentiating requirements of growing mushrooms vs other plants is that they must not be exposed to any sunlight during any stage of cultivation. Mushroom farms needs to be completely protected from sunlight. Kingspan technical team can guide clients on selecting the right panel thicknesses, coating types and detailing for mushroom farms.

Plant temperature ranges: +18 to 23 °C

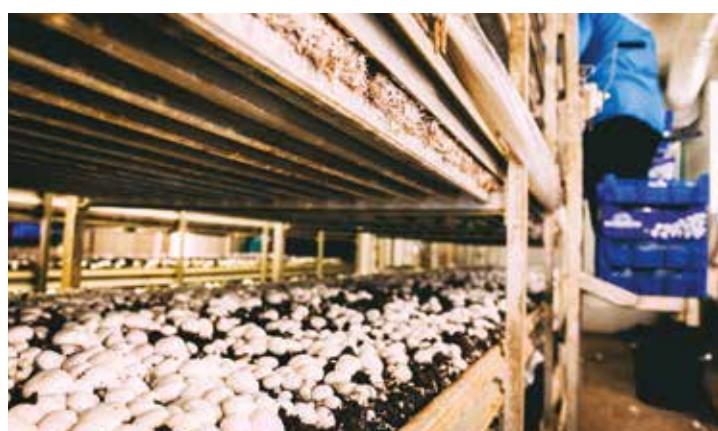
Panel types: KSD1100 CS, KS110 CTF

Panel thickness: 80 mm

Door types: Polidoor Hinged Door, Sectional Door, Dock Shelter, Rapid Speed PVC Door

Complementary product options: SafeDefence Barrier System, Smoke Ventilation, PVC Hygenic Accessories

Recommended Coating Types: CLEANsafe 25 / PVDF 25 / PVDF 55 / INOX



Sectoral Case Studies

Banana Ripening Conditions

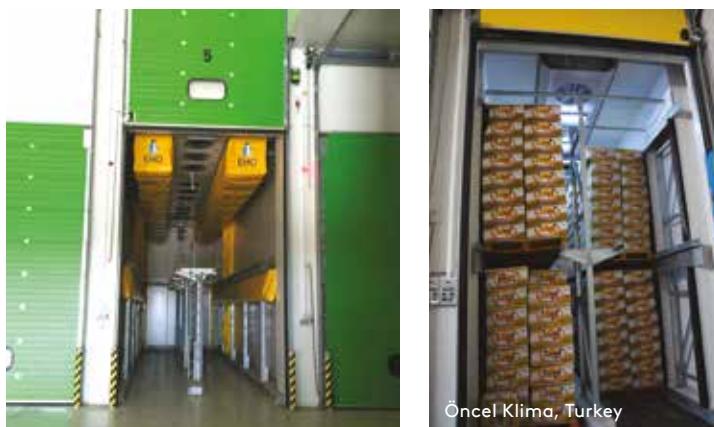
Banana ripening is the process of improving only the color of the outer skin of the fruit and bringing the fruit to the desired taste, color and quality.

Ripening process requires storage temperature range of 14 to 20 °C with a relative humidity of 85-95 %. Ethylene gas with 100 to 1000 ppm is applied to the ripening rooms and the bananas are left for ripening for 48 to 96 hours to get the best results. After 24 hours, the room must be ventilated for a homogenous ripening. The CO₂ concentration in the room should not be increased above 1 %.

For best results, coolers and cooling system should be designed to keep product moisture loss to a minimum. Also airtight-automatic sectional doors should be utilized. Recommended cold store panel thickness for banana ripening rooms is 100 mm. Kingspan CLEANsafe 25 coating is sufficient for such applications.

Plant temperature ranges: 14 to 20 °C

Panel types:	KS110 CTF, KSD1100 CS, KS110 NCTF
Panel thickness:	100 mm
Door types:	Polidoor Atmosphere Controlled Doors, Automatic Sectional Doors
Complementary product options:	KPS SafeDefence Barriers, Smartpanel application
Recommended Coating Types:	CLEANsafe 25



Modular Cold Stores – Modularis

It is estimated that almost 20 % of global food loss is caused by an incomplete cold chain.

Quick cooling of fresh produce on-site significantly improves its quality and shelf-life. Fast track and easy to install modular cold store solutions have become the new trend in the industry for post-harvest cooling solutions.

Kingspan's Modularis Cold solution utilises load bearing capacity of the insulated panels which form the internal and external roof and walls of the cold store, eliminating the need for any structural steel framework. Modular cold stores are mainly preferred as on-site pre-cooling storage units or when time and speed of installation is of essence.

Plant temperature ranges: -28 °C to ambient

Panel types: KS110 CTF

Panel thickness: 150 – 200 mm

Door types: Polidoor Hinged Door,
Polidoor Sliding Door

Complementary product options:
Panel Guard Barrier,
SafeDefence Barrier System

Recommended Coating Types:
CLEANSafe 25

Temperature range
-28 to ambient



Scan the QR code for more information on Kingspan Modularis Solutions



Transport and Containerisation Support

The safe, reliable international transit of Kingspan panels is a key part of our commitment to quality. We take the packing, loading and securing of our products very seriously so that we can guarantee their condition on arrival.

We have developed a unique system which enables us to use the common, back-loading containers for all sizes of panels. The benefits to this include:

- No increase in cost to transport larger panels as there is no need to hire an open-top container;
- Quick loading using our bespoke system allows up to six containers to be packed per day;
- Container can be delivered to all ports, bypassing the restrictions placed on open-top containers; and
- A very high packing specification that protects and secures the load within the container.

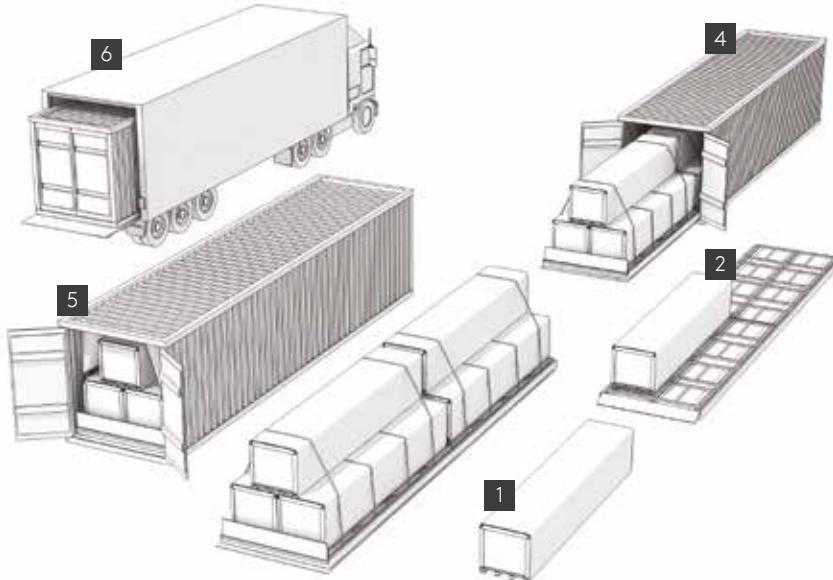
The system works through a series of pallets fastened to a rig, which allow our experienced teams to load the panels in the regular way. Cardboard protective sheets are then attached to the panels and the whole load is rolled onto the container. After the fitting of inflatable airbags at key points, straps are used to secure the panels in place and the container is sealed. The whole process is also photographed for our customers' peace of mind.

We have fine-tuned this process so that we can be confident the hundreds of containers we despatch internationally every year deliver the product at the same quality standard as when it left our factory.

Other options include the use of Heat-Treated Timber Pallets in accordance with ISPM 15, which are available at an extra cost and overland transport where appropriate. Ex-works is also available, should customers wish to make their own arrangements. We can advise customers on the most cost-effective, efficient way to transport the panels. Due to the different sizes, profiles and depths of our panels, the number that can be taken by one container will vary. The tables on the next page give an indication of the variation in quantity on some of our most popular insulated panels. Please be aware that containers limit the length of panels to 11.8 m internally.

For more detailed information on specific panel requirements, please contact us (details on the back cover page of the brochure).

- 1 Product is manufactured to export packaging specification, which includes additional protection around the corners and sides with heat-treated pallets where required.
- 2 A mobile loading platform (skate) is constructed from pallets and connectors on hydraulic loading platform.
- 3 The load is constructed on the skate in the way a standard trailer would be loaded and is banded to the skate.
- 4 The container is brought up to the platform and the entire load and skate is wheeled into the container.
- 5 The load is secured with restraining straps and air bags inflated around it to prevent movement and damage.
- 6 The container is closed and sealed, ready for transport to port of exit.



Containerisation Tables

From these tables the number of insulated panels that can be transported by a container can be calculated. We have selected our most popular insulated panels; however, for a more detailed quote or for another type of product, please contact us (details on the back cover page of the brochure).

The tables show the average number of panels found in a pack and containers can accommodate approximately four packs. So for an approximate calculation, multiply the given number by four.

For a more exact number, the weights of the panels can be used. Containers cannot exceed 2000 kg and the maximum length for a container is around 11.5 m. The weight of every panel can be calculated by multiplying the weight per kg/m² by the length. Then divide this number by 500 kg to see how many panels can fit exactly into a pack and then multiply by 4 to get the number of packs per container.

Loading Information

KS110 CTF and KS110 NCTF Cold Storage Panel

Panel Thickness (mm)	Pack Qty	Total Piece	Weight per kg/m ²
45	15	88	11.26
50	14	84	11.49
60	11	64	11.69
80	13	52	12.53
100	10	42	13.36
120	9	36	14.20
140	7	30	15.04
150	7	28	15.45
170	6	24	16.29
200	5	20	17.54

KSD110 CS Cold Storage Panel

Panel Thickness (mm)	Pack Qty	Total Piece	Weight per kg/m ²
80	13	52	11.80
100	11	44	12.60
125	8	32	13.60
150	7	28	14.60
175	6	24	15.60
200	5	20	16.60

Contact Details

Turkey

Kingspan Yapı Elemanları A.Ş.

Çırağan Cad. No: 97
Ortaköy 34347 Beşiktaş
İstanbul, Turkey

T: +90 (212) 236 60 32 (pbx)
E: info.turkey@kingspan.com
www.kingspanpanels.tc

UAE

Kingspan Insulated Panels
Manufacturing LLC

P.O. Box 60493,
Dubai Investments Park,
Jebel Ali, Dubai, UAE

T: +971 (0) 4-8854 232
E: info@kingspanpanels.ae
www.kingspanpanels.ae



Scan the QR code to access
the Regional Contacts list.

For the product offering in other markets please contact your local sales
representative or visit www.kingspan.com

Care has been taken to ensure that the contents of this publication are accurate, but
Kingspan Limited and its subsidiary companies do not accept responsibility for errors
or for information that is found to be misleading. Suggestions for, or description of,
the end use or application of products or methods of working are for information only
and Kingspan Limited and its subsidiaries accept no liability in respect thereof.

