NIKKEI PANEL SYSTEM

https://www.nikkeipanel.co.jp

NIKKEI PANEL SYSTEM

Company name Nikkei Panel System Co., Ltd.

Head office

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Nikkei Siam Aluminium

Company name Nikkei Siam Aluminium Ltd.

Sales Office

Address 54, BB Building, 7th Floor, Unit No.3404, Sukhumvit 21 (Asoke) Road, Klongtoei Nua, Wattana, Bangkok 10110, THAILAND

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Panel Plant

Address Amata City Chonburi Industrial Estate 700/180 Moo1, Bankao, Panthong, Chonburi 20160, THAILAND

Tel +66-0-3846-8450

Business fields Manufacturing and sales of insulation panels or cold room and clean room.

NIKKEI PANEL SYSTEM VIETNAM

Company name Nikkei Panel System Vietnam Co., Ltd.

Address Unit 1202,12th Fl., Dai Minh Convention Tower, 77 Hoang Van Thai St., Tan Phu Ward, Dist. 7, Ho Chi Minh City, VIETNAM

Tel +84-28-5416-8080

Business fields Sales and import / Export of insulation panels for cold room, clean room and related products.

⚠ **Safety Precautions** *Please read the "Instruction Manual" carefully before use.

202103

PRODUCT CATALOGUE

General Catalogue

- Prefabricated refrigerator and freezer
- Insulated panel for food factory
- Insulated panel for industrial Clean Room
- Insulated panel for medical Clean Room

Achieving solutions through development

NIKKEI PANEL SYSTEM

Non HCFC Insulated Panel

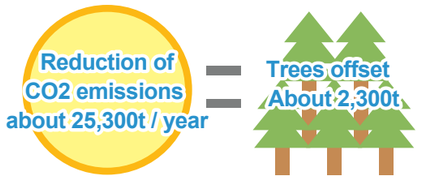
We use cyclopentane as form blowing agent to expand polyurethane foam.
Non HCFC Insulated Panel is designed to be cost effective solution and higher performance than that of HCFC insulated panel.
It can also yield substantial improvement in the environmental impact.
We are the first and only one manufacturer of Non-HCFC Panel in Thailand. (by our research)

Environmental Conservation

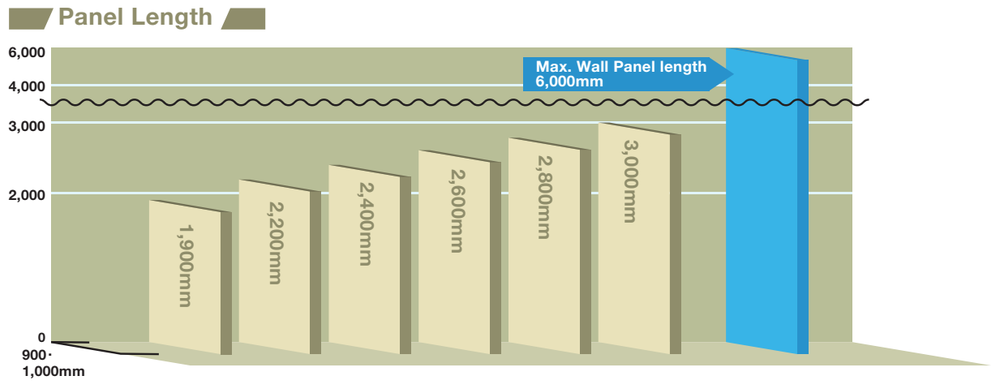
Comparing to conventional HCFC-141b blowing agent, Cyclopentane has superior performance for environmental properties of Ozone Depletion Potential (ODP) of zero and Global Warming Potential (GWP) of one.

Blowing agent	ODP	GWP
Cycbpentane	0	11
HFC-245fa	0	1030
HCFC-141b	0.11	725

Non-HCFC Panel produced in Nikkei Siam Aluminium can be equivalent to avoiding the carbon dioxide (CO_2) emissions of 25,300 t anually.



Product Details



Specification

Panel thickness/ Model	42mm・・・・・RH	125mm・・・FP
	75mm・・・・・FR	150mm・・・FT
	100mm・・・FS	200mm・・・FF
Panel width	900・1,000mm	
Wall panel length	6,000mm	
Max Ceiling panel length	42mm 3,000mm adove 75mm 3,600mm	

Surfece Sheet	Colored steel sheet / SUS / Antistatic Steel Sheet / Fluorine laminated Steel Sheet / Antibacterial Colored Steel Sheet
Core meterial	Polyurethane foam
Joint System	PVC frame engagement system
Sealing	Antibacterial silicorn sealant

＊Wall plugs or switch boxes can be panel-embedded.
＊Do not use for for foothold during construction. Ceiling panels may be used to walk on for inspection purposes.

Panel Performance

Insulation Performance

Panel Thickness	K-Value W/m²・K(Kcal/m²・h・℃)	Temperature Range	Replaced by EPS
42mm	0.50(0.43)	≤268K(-5℃)	75mm
75mm	0.28(0.24)	≤253K(-20℃)	125mm
100mm	0.21(0.18)	≤238K(-35℃)	175mm
125mm	0.17(0.15)	≤228K(-45℃)	225mm
150mm	0.14(0.12)	≤218K(-55℃)	260mm
200mm	0.11(0.09)	≤213K(-60℃)	340mm

‣ Temperature range is as reference value. It depends on the scale, the usage or area.
‣ Thermal conductivity(W/m²・K(Kcal/m²・h・℃)):Polyurethane foam = 0.021(0.018), EPS=0.037(0.032)

Thermal Conductivity and Density(g/cm³)

Material		Thermal conductivity λ (W/m・K)	Density(g/cm³)
PU insulating boad	Class2, No.2	≤0.024	≥0.025
EPS	No.1	≤0.036	≥0.03
XPS insulating boad	Class2	≤0.034	≥0.025
Grass wool insulating boad	24K	≤0.049	0.022~0.026
Rock wool insulating boad	No.1	≤0.044	0.04~0.1
ALC		≤0.17	0.5~0.7

‣ In accordance with JIS Standard.

Surface Material Lineup

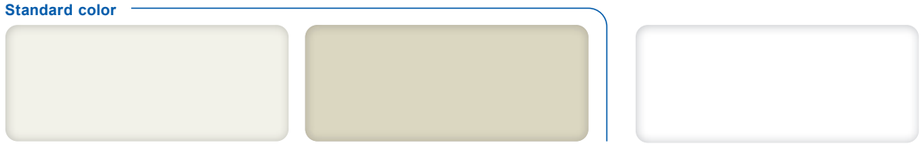
Surface Material Specifications

* Please note that the following colors for reference may differ from those of actual products because they are printed on paper.
* JIS : Japanese Industrial Standard

Colored steel sheet

Excellent in wear resistance, impact resistance, and processing performance; and often used for interior panels.

Standard color



White gray　Ivory　White

Original sheet material	Surface treatment	Coatin		Coating conditions	Color (Munsell No.)		
		Front	Back				
JIS G3302	Galvanization	Thermosetting polyester resin	Thermosetting epoxy resin	2coats 2bakes	Ivory (1.1GY-8.3/1.6)	White gray (8.1Y-8.6/0.7)	White (6.6G 8.3/0.2)

Stainless steel sheet(SUS304)

Stainless steel is essential to kitchens and food factories.
It keeps food-handling environments more hygienic.

Original sheet material	Surface treatment	Finishing		Coating conditions	Color (Munsell No.)
		Front	Back		
JIS G4305	—	No. 4 finish	Thermosetting epoxy resin	—	—

Antistatic steel sheet

Color
White gray

Antistatic Property		Test Method
Surface resistivity(ρs)	≤10^8Ω/sq	JIS K-6911
Initial Charge	10-30V	JIS L-1094
Half-life period	≤1second	

Colored steel sheet with antibacterial V-coats

Antibacterial, antifungal, and deodorizing effects provide security and safety for the human body.
The specifications meet more advanced HACCP needs.

Original sheet material	Surface treatment	Coating		Coating conditions	Color (Munsell No.)
		Front	Back		
JIS G3302	Galvanization	Thermosetting polyester resin	Thermosetting epoxy resin	—	Ivory (1.2GY-8.3/1.6)

Fluorine laminated steel sheet

Color (Munsell No.)
Silver gray (7.7GY-7.4/0.6)

* The surface material color sample book is available for you to check the color tones of actual surface materials. For details, please contact our representative.
* The Munsell No. is an actually measured value. It is not available for color matching.
* It is not possible to combine the colored aluminum and the other surface material, because a difference in the linear expansion coefficient will cause such a panel to become warped badly.

Surface Material Properties

We will offer various surface materials that have cleared severe tests at a higher level.

Surface material performance list for comparison

Criteria ○: Not changed △: Slightly changed ×: Completely changed

Item			Test conditions and details	Colored steel sheet		Stainless steel sheet	Colored steel sheet with antibacterial V-coats	Fluorine laminated steel sheet
				White gray	Ivory			
Primary physical properties	Cross-cut		Compliant with JISK4706	○	○	—	○	○
	Bending	90°	Compliant with JISK5400 1.5R	○	○	○	○	○
		180°		○	○	○	○	○
	Impact resistance	Front	Compliant with JISK5400	○	○	○	○	○
		Back		○	○	○	○	○
Secondary physical properties	Erichsen after cross-cut adhesion	5	Pushed out to 5 and 9 with an Erichsen tester, after a cross-cut adhesion test.	○	○	○	○	○
		9		○	○	○	○	○
	High-temperature impact	333K(60°C)	Impact test compliant with JISK5400, after 3hours for each temperature	○	○	○	○	○
		353K(80°C)		○	○	○	○	○
		373K(100°C)		○	○	○	○	○
	Low-temperature impact	243K(-30°C)	Impact test compliant with JISK5400, after 24hours	○	○	○	○	○
Salt spray for 1,000hours		General section	Compliant with JISZ2371	○	○	○	○	○
		Cut section		△	△	△	△	○
		Bent section		△	△	○	△	○
Weather meter for 1,000 hours			Weather meter (air spray accelerating test)	○	○	○	○	○
Light resistance			Germicidal light irradiation 15W, 300H x 168 hours	△	△	○	△	○
Odor		293K(20°C)	Sensory test by five persons	○	○	○	○	○
		313K(40°C)		○	○	○	○	○
		373K(100°C)		○	○	○	○	○
Contamination test		Lipstick	Wiping in 2hours after application of lipstick and magic marker	△	△	○	△	○
		Magic marker		×	×	○	×	×
Silicone adhesion			Peeling test in two days after application of silicone	○	○	○	○	○
Authorization as incombustible			—	Passed	Passed	Passed	Passed	Passed
Food hygiene test			—	Passed	Passed	Passed	Passed	Passed
Chemical resistance	Sulfuric acid	5%	293K(20°C)×24hours	△	△	○	△	○
	Hydrochloric acid	5%		×	×	×	×	○
	Caustic soda	10%		△	△	○	△	○
	Sodium hypochlorite	1%		○	○	○	○	○
		5%		○	○	△	○	△
	Toluene		293K(20°C)×168hours	△	△	○	△	○
	Gasoline			○	○	○	○	○
	Methanol			○	○	○	○	○
	Formalin 35%		293K(20°C)×24hours	○	○	○	○	○
	Benzalkonium chloride invert soap			○	○	○	○	○
	Ethanol 99%			○	○	○	○	○
	Phenol solution2%			○	○	○	○	○
	Methyl alcohol			○	○	○	○	○
	Alkyldiaminoethylglycine15%			○	○	○	○	○

* These test results are based on official grounds or in-house criteria, not intending that any of them be guaranteed.
* If using them in a room where any chemical is used, you will be recommended to conduct verification in actual concentrations beforehand.

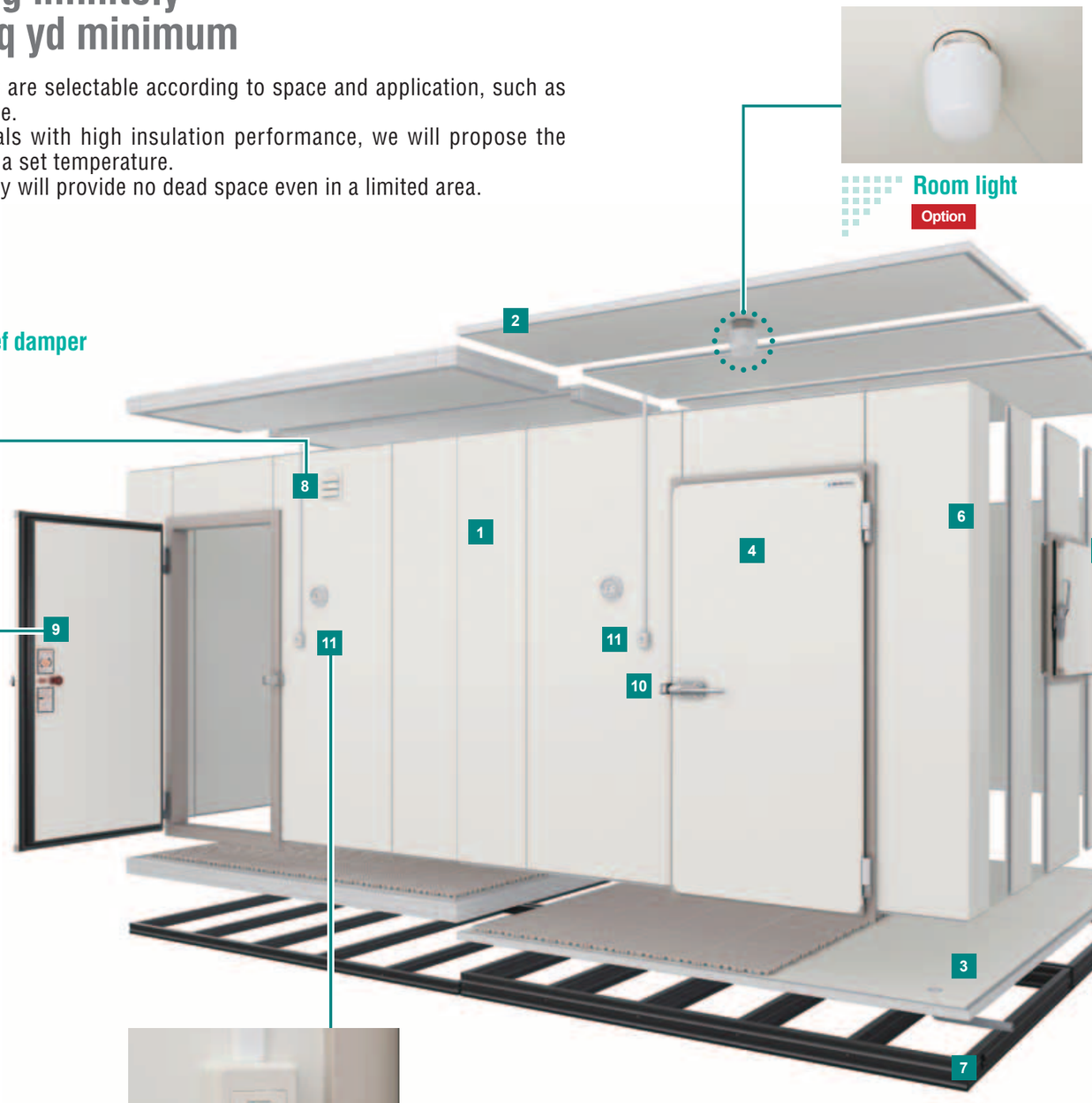
Prefabricated Refrigerator and Freezer

Schematic Diagram

Potential expanding infinitely from an area of 2sq yd minimum

Various "optimum" configurations are selectable according to space and application, such as area, height, and temperature zone.
Having adopted the core materials with high insulation performance, we will propose the most suitable panel thickness for a set temperature.
Securing efficient internal capacity will provide no dead space even in a limited area.

Relief damper



Push rod

The push rod is used for opening a door from inside. It comes with emergency escape equipment, allowing you to escape outside in the event of a failure.

Room light

Option

Exposed firefly switch

(for Room light)

Option

Example construction

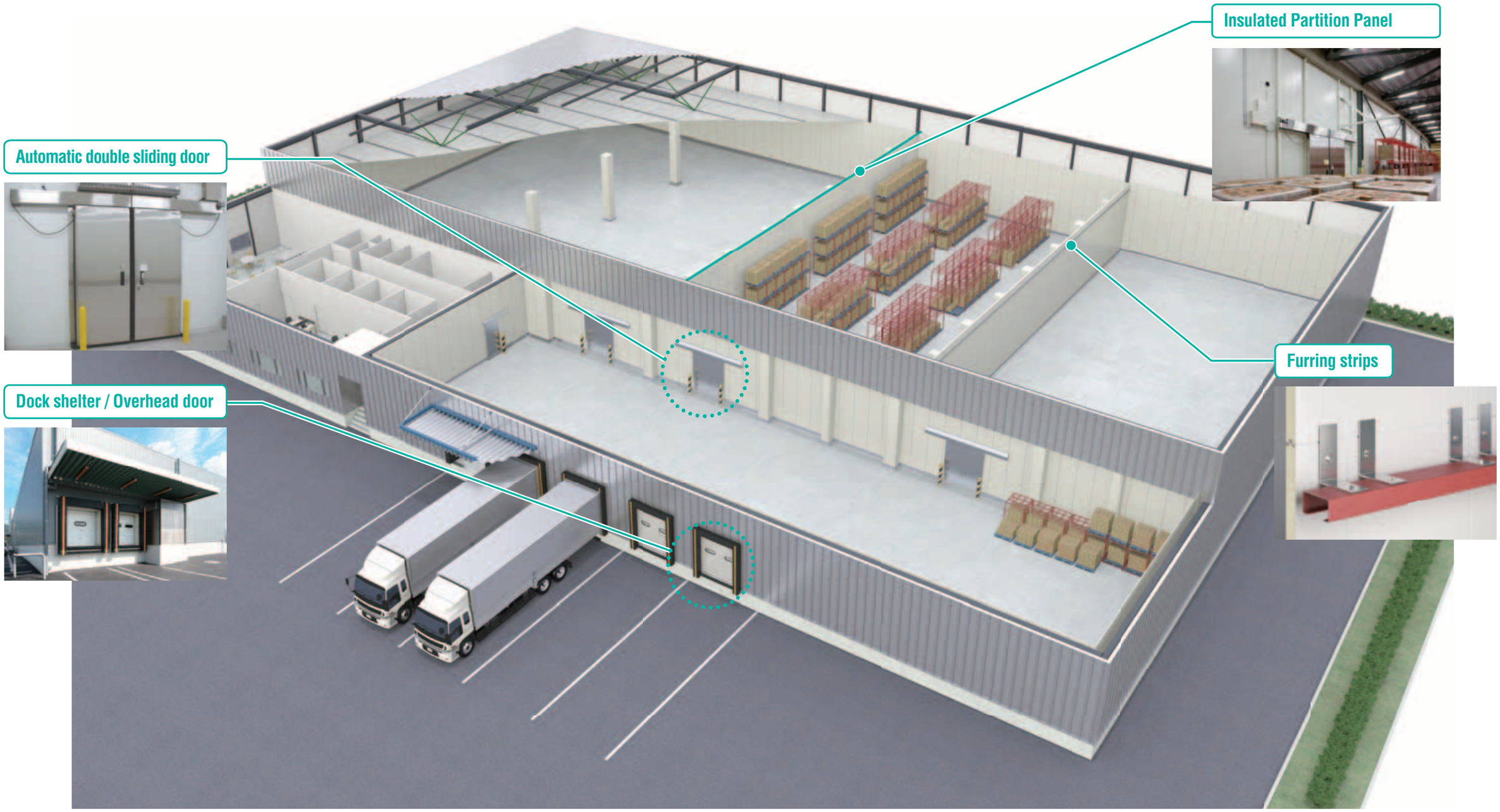
1	Wall panel
2	Ceiling panel
3	Floor panel
4	Door panel (Single hinged door)
5	Door panel (Small door)
6	Corner panel
7	Resin base frame
8	Relief damper (Pressure control damper)
9	Push rod
10	Latch (Handle)
11	Room light swtich

Refrigerator-Freezer Warehouse

Brand leader products and reliable know-how supporting logistics network bases

Against a background of the expansion of online shopping and convenience store networks, a distribution warehouse is required to meet various needs, including shortening delivery time, maintaining freshness, and reinforcing efficient storage capacity. It is a key to the cold chain that connects producers and consumers. As business for outpacing the cost competition, the products and know-how of NIKKEI PANEL SYSTEM contribute to the establishment of an efficient delivery system.

Refrigerator Warehouse

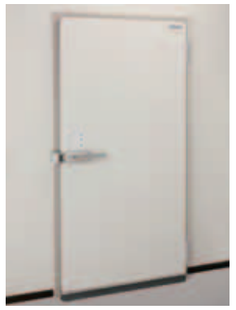


Insulated Door VQ Door Series

Core material	Rigid polyurethane foam
Surface material	Colored steel sheet, Colored aluminum sheet (*1), Stainless steel sheet, PVC laminated steel sheet
Entrance frame	High-strength foam resin frame (*2)

(*1) It is not possible to combine the colored aluminum and the other surface material.
(*2) For the FT Entrance frame, the high-strength foam resin frame is covered with the same surface material as that of a wall panel inner plate.

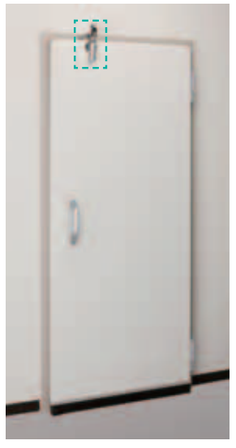
VQ Single Hinged Door



		RH	FR	FS	FP	FT
Door thickness(T) mm		50	75	100	125	150
Lowest operating temperature		Down to 268K (-5°C)	Down to 253K (-20°C)	Down to 238K (-35°C)	Down to 228K (-45°C)	Down to 218K (-55°C)
Heater wattage (standard dimension)	4-frame	Option (220V-33W)	220V-54W	220V-54W	220V-65W	220V-76W
	3-frame	Option (220V-44W)	220V-66W	220V-66W	220V-78W	220V-87W
Standard effective dimensions (mm)	4-frame	W860xH1,800				
	3-frame	W860xH1,870				
Maximum effective dimensions (mm)	4-frame	W1,200xH2,900			W1,200x H2,200	W900xH2,000
	3-frame	W1,200xH3,000				
Minimum effective dimensions (mm)	4-frame	W300xH340			W350xH340	W550xH600
	3-frame	W300xH400			W350xH400	

Remarks	Turning the emergency escape equipment knob will release a latch and let you escape out of the door. (Usually, the push rod is used for opening and closing.)
	A bottom gasket on the door is rather longer.
	If H is not less than 1,800mm and more than 2,000mm, hinges will be used at 3 and 4 points respectively.
	If H is not less than 2,000mm or W is not less than 1,100mm, it will come with internal reinforcement.

VQ Magnet Door



Door selfer

		RH	FR	FS
Door thickness(T)mm		50	75	100
Lowest operating temperature		Down to 268K (-5°C)	Down to 253K (-20°C)	Down to 238K (-35°C)
Heater wattage (standard dimension)	4-frame	Option (220V-33W)	220V-54W	
	3-frame	Option (220V-44W)	220V-66W	
Standard effective dimensions (mm)	4-frame	W860xH1,800		
	3-frame	W860xH1,870		
Maximum effective dimensions (mm)	4-frame	W860xH1,820		
	3-frame	W860xH1,870		

Remarks	If W is not more than 500mm or H is not more than 1,500mm, the door selfer will be optional.
	With a heater, the heater cap is made of aluminum.

VQ Double Hinged Door

		RH	FR	FS	FP
Door thickness(T) mm		50	75	100	125
Lowest operating temperature		Down to 268K (-5°C)	Down to 253K (-20°C)	Down to 238K (-35°C)	Down to 228K (-45°C)
Heater wattage (W/m) (220V)	4-frame	Option (Entrance frame / Meeting: 6)	Entrance frame / Meeting: 10	Entrance frame / Meeting: 10	Entrance frame / Meeting: 12
	3-frame	Option (Shifting Entrance frame / Meeting: 6 Door bottom: 10)	Entrance frame / Meeting: 10 Door bottom: 12	Entrance frame / Meeting: 10 Door bottom: 12	Entrance frame / Meeting: 12 Door bottom: 14
Maximum effective dimensions (mm)	4-frame	W2,400xH2,900			W2,200xH2,200
	3-frame	W2,400xH3,000			
Minimum effective dimensions (mm)	4-frame	W800xH1,200			
	3-frame				

Remarks	Turning the emergency escape equipment knob will release a latch and let you escape out of the door. (Usually, the push rod is used for opening and closing.)
	A bottom gasket on the door is rather longer.
	If H is not less than 1,800mm and more than 2,000mm, hinges will be used at 3 and 4 points respectively.

VQ Small Hinged Door

		RH	FR	FS	FP	FT
Door thickness(T)mm		50	75	100	125	150
Lowest operating temperature		Down to 268K (-5°C)	Down to 253K (-20°C)	Down to 238K (-35°C)	Down to 228K (-45°C)	Down to 218K (-55°C)
Heater wattage (standard dimension)		Option (220V-12W)	220V-19W	220V-19W	220V-23W	220V-31W
Maximum effective dimensions(mm)		W450xH450				W550xH500
Minimum effective dimensions (mm)	Latch handle type	W300xH340			W350xH340	
	Vertical handle type	W400xH400				

Latch handle type

Insulated Door VQ Door Series

Core material	Rigid polyurethane foam
Surface material	Colored steel sheet, Colored aluminum sheet (*), Stainless steel, PVC laminated steel sheet
Entrance frame	High-strength foam resin frame

* It is not possible to combine the colored aluminum and the other surface material.

Reach-In Magnet Door

	RH	FS
Door thickness(T)mm	50	100
Lowest operating temperature	Down to 268K (-5°C)	Down to 238K (-35°C)
Heater wattage (W/m)	Option (220V-10)	220V-18
Standard effective dimensions(mm)	W600xH800	
Maximum effective dimensions(mm)	W860xH900	
Minimum effective dimensions(mm)	W400xH400	
Handle option	Available	
Remarks	The handle can be attached to the "door top," "center," or "bottom."	
	It is possible to make up to two columns and unlimited rows of the doors.	

VQ Magnet Small Door

		RH	FR	FS
Door thickness(T)mm		50	75	100
Lowest operating temperature		Down to 268K (-5°C)	Down to 253K (-20°C)	Down to 238K (-35°C)
Heater wattage (standard dimension)	W450xH450	Option (220V-12W)	220V-19W	
	W600xH600	Option (220V-15W)	220V-25W	
Standard effective dimensions(mm)		W450xH450		
		W600xH600		
Maximum effective dimensions(mm)		W400xH400		

VQ Slide Door -Type09 (Single Sliding)

		RH	FR	FS
Door thickness(T)mm		50	100	100
Lowest operating temperature		Down to 268K (-5°C)	Down to 253K (-20°C)	Down to 238K (-35°C)
Heater wattage (standard dimension)	4-frame	Option (220V-33W)	220V-54W	
	3-frame	Option (220V-45W)	220V-78W	
Standard effective dimensions (mm)	4-frame	W860xH1,800		
	3-frame	W860xH1,875		
Maximum effective dimensions (mm)	4-frame	W1,600xH2,900		
	3-frame	W1,600xH3,000		
Minimum effective dimensions (mm)	4-frame	W450xH1,000		
	3-frame			

VQ Linear Slide Door -Type09

		RH	FS
Lowest operating temperature		50	100
Lowest operating temperature		Down to 268K (-5°C)	Down to 238K (-35°C)
Heater wattage (standard dimension)	4-frame	Option(220V-33W)	220V-54W
	3-frame	Option(220V-45W)	220V-78W
Standard effective dimensions (mm)	4-frame	W860xH1,800	
	3-frame	W860xH1,875	
Maximum effective dimensions (mm)	4-frame	W1,500xH2,000	W1,300xH2,000
	3-frame	W1,500xH2,100	W1,300xH2,100
Minimum effective dimensions(mm)	4-frame	W750xH1,000	
	3-frame		

Remarks	If it is used as a door of the partition, the freezing room temperature and the anterior room temperature must be down to -35°C and down to -5°C respectively. (Installed on anterior room side)
	The external handle is optional.
	It cannot be used under the conditions causing condensation on the actuator.

Name	Push-button Switch	Non-touch Switch (beam variable type)	Area Sensor	Non-touch Switch (Magic Switch)
Switch list				
Manufacturer name	KASUGA ELECTRIC WORKS LTD.	HOTORON	OPTEX	BEA Japan
Model	WBST 221 ON	PF-R5	OA-215V	MAGIC SWITCH J

Linear-section product specifications			
General		Power supply voltage	AC100V±10% 50·60Hz *Transformer is required if voltage is different.
		Operating temperature range	-5°C-40°C
		Power consumption	1.1kW maximum, Standby electricity: 9.2Wh
		Control system	Microprocessor control
		Type of motor	Magnet moving linear DC motor
Function		Door activation method	Dedicated switch or assist
		Door action	Ratchet action (The door opens/closes whenever the switch is pressed.) Or self-closing action (Before option shipment: Ratchet action)
		Door action range	Full open / Half open (option)
		Pinching prevention function	Microprocessor-controlled detection of pinching
		Engine protection function	Microprocessor-controlled detection of heated motor coil
		Abnormal open prevention function and trapping prevention function	Being opened by the method that is not usual, the door will close automatically in about 10 minutes with the opening left by a width of about 100mm.
Operation section	Volume control	Opening speed	0.2m/sec-0.5m/sec(Before shipment: 0.5mm/sec)
		Closing speed	0.2m/sec-0.5m/sec(Before shipment: 0.2mm/sec)
		Half open position	600mm to 1,500mm settable (Before shipment: 600mm)
	Switch activation	Full open	Full open operation
		Half open	Half open operation (option)

Swing Door

		Width (W) mm	Height (H) mm
Standard effective dimensions	Single swinging	610/710/765/815/ 915/1,015	2,005
	Double swinging	1,215/1,420/1,520/ 1,620/1,825/2,030	
Frame material		Resin frame	

* For options of the swing door, please contact our sales staff.

Lineup of Others

Automatic double sliding door

Insulated Overhead door

Sheet Shutter

In addition to them, there is a diverse lineup available. For details, please contact our sales staff.

Food Factory Schematic Diagram

Contributing to building safe and secure food factory!

As well as reducing adulteration, cross-contamination, and other risks, appropriate zoning will finely meet the needs of ensuring safety and quality in a food factory, such as contributing to energy conservation with high-insulated panels.

Schematic Food Factory

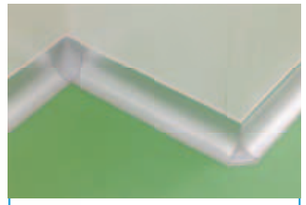
Shipping preparation room (Refrigerating room)

Anterior room (Hand-washing place)

Air shower

Passage

R baseboard



R baseboard lineup
Height (R angle)

Aluminum	40(R40)/50(R48)/ 100(R50)/120(R50)/ 250(R50)

Dock shelter / Overhead door

Shipping place

Cleaning room

Cooking room

Sheet shutter / Guard pole

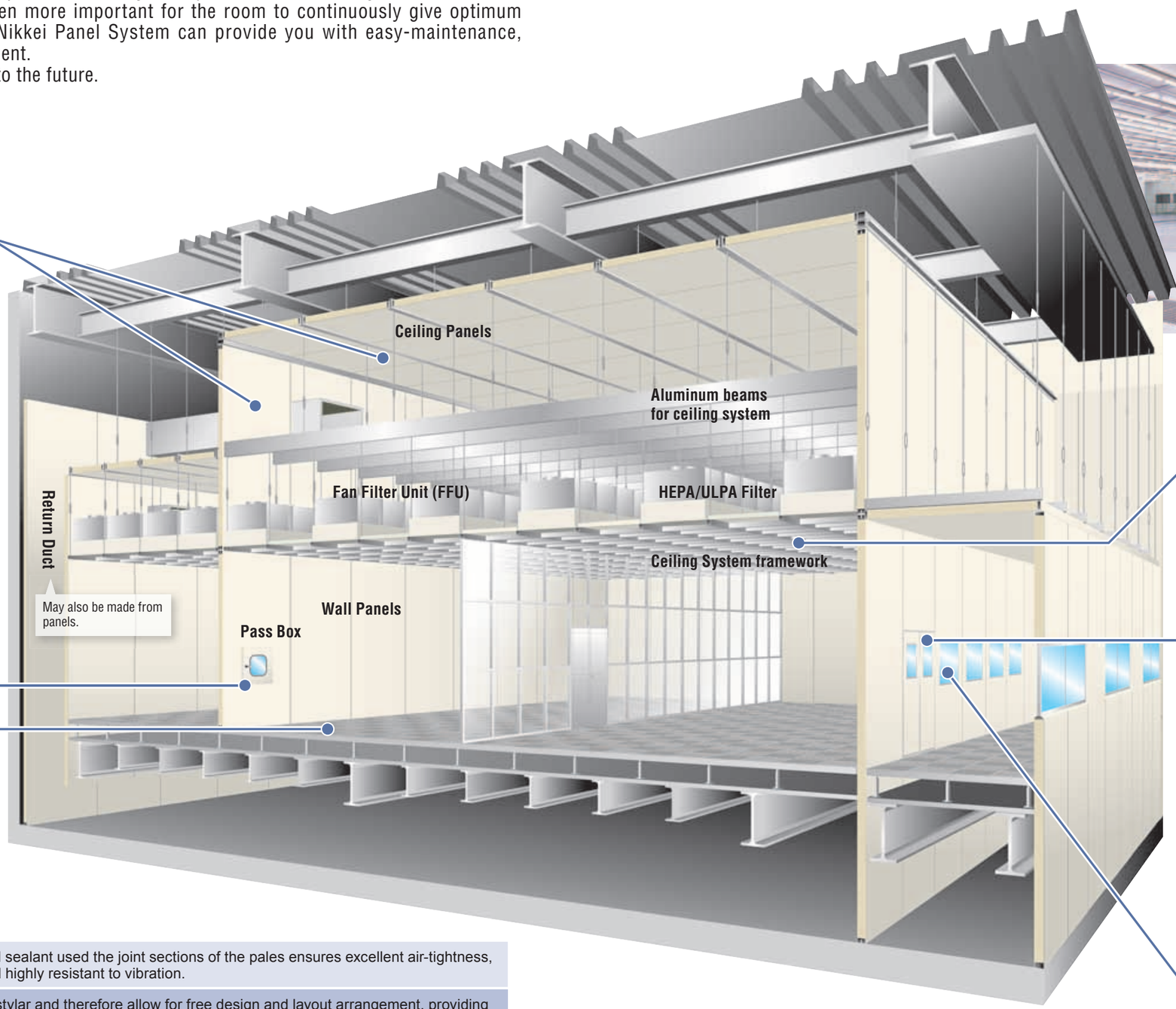
Linear slide door

SUPER CLEAN ROOM Super Cleanroom to support the Nano-tech business-Semi conductors, LCDs and PDP

Under environments where the most precise accuracy is required, it is necessary to shut out even the ultra-finest powder dust. It is even more important for the room to continuously give optimum performance after its initial stage. Nikkei Panel System can provide you with easy-maintenance, excellent-quality super clean environment.
Our products support the next step into the future.

Ceiling and Wall Panels

Partition panels, removable panels, pass-boxes may be mounted onto wall panels.



Access floor and Pass Box

Ceiling System

Single Hinged Door

Cleanroom air showers, Flush doors also available. Equipped with wide range of fixtures.

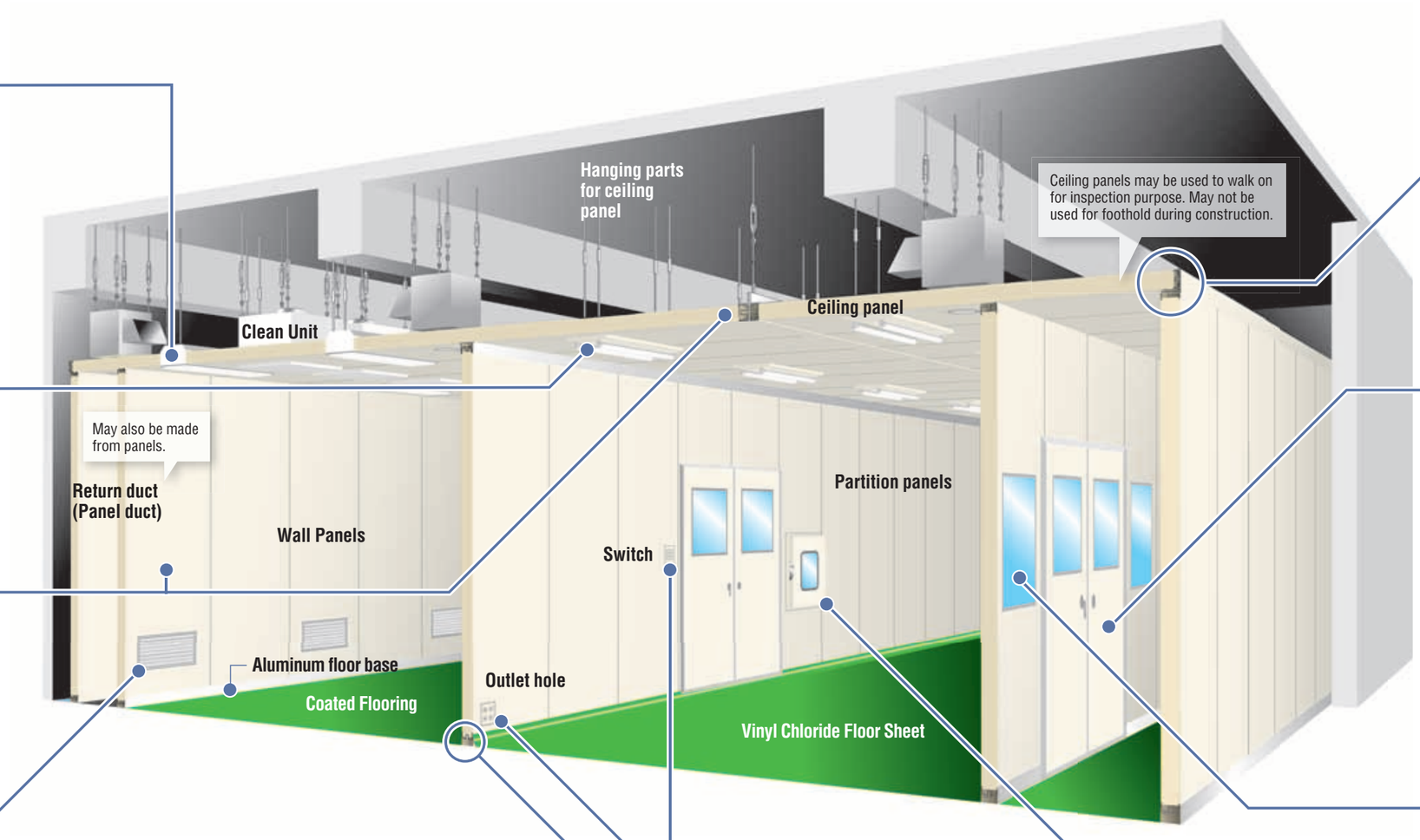
Windows

Fixed Window — Multiple windows also available.

Air-tight Enclosure	The silicon-based sealant used the joint sections of the pales ensures excellent air-tightness, strongly rigid, and highly resistant to vibration.
Maximum Floor Space	The panels are astylar and therefore allow for free design and layout arrangement, providing you with maximum space within the room. Windows, doors and plugs may be incorporated easily without decreasing the cleanroom performance.
Astylar Panels Allow for Flexibility	The double-metal sandwich panels are highly rigid and have strong resistance against erosion. As they are highly durable, they can be constructed independently, allowing for flexible construction design and layout.

CLEAN ROOM High Reputation in Chemical and Bio Technology. Design and Construct to meet your needs.

Cleanroom construction should allow for flexibility and freedom in designing the production line, but at the same time it is necessary to take into account the cleanness of the environment. In addition, maintenance and operation should be made smooth and easy.
Nikkei Panel System's Cleanroom can offer you all of these qualities, and provide you with Cleanrooms that are easy-to-manage from beginning to end.



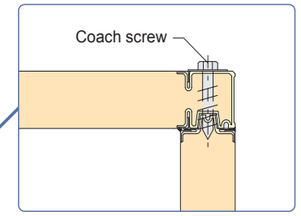
Embedded Lights

Exposed Fluorescent Lights

Ceiling and Wall Panels

Louver

See Ceiling, Wall, Floor for more detail



Double Hinged Door

Cleanroom air showers, Flush doors also available.
Equipped with wide range of fixtures.

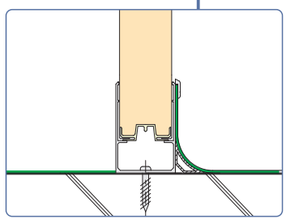
Windows

Fixed Window Multiple windows are also available.

Floor specification

Coated Flooring /
Vinyl Chloride Floor Sheet

Floor details



Based board

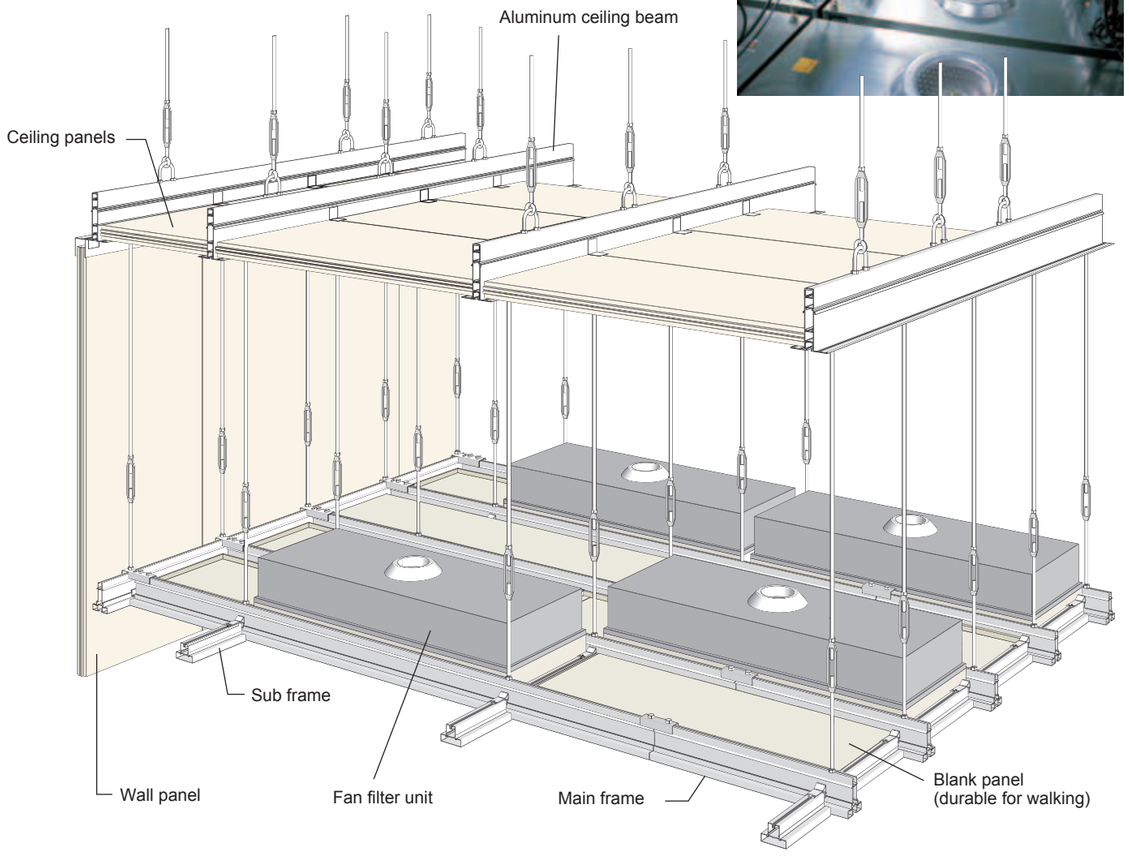
Embedded outlet and switches

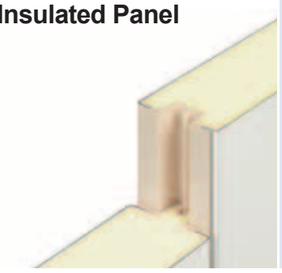
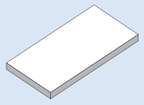
Pass Box

Pass Box

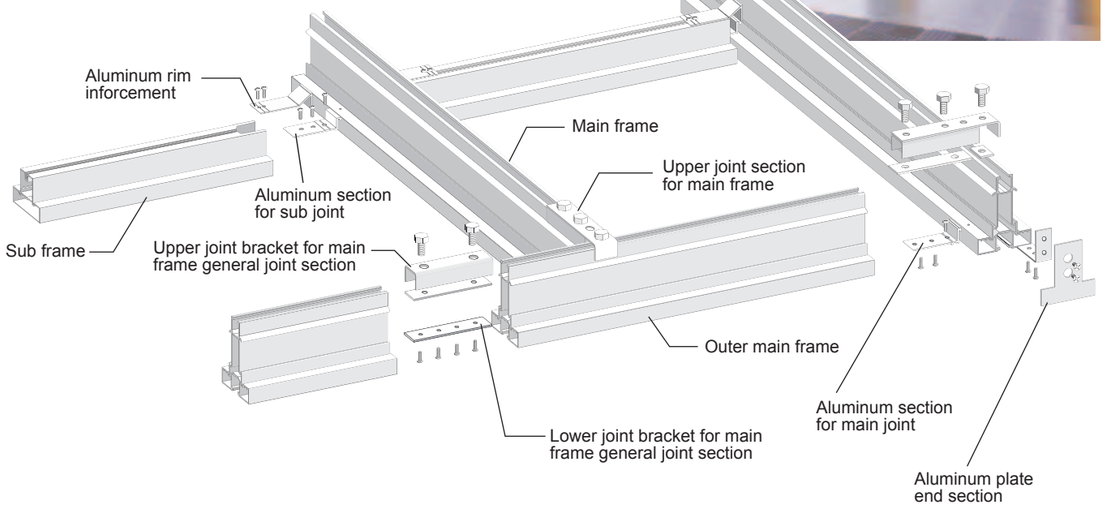
Nikkei's Ceiling System is designed to respond flexibly to any line changes.

Alminum grid ceiling system



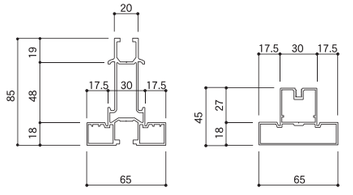
Product name	Shape	Panel thickness	Core material	Surface material	Color Front Back (Munsell No.)
Non HCFC Insulated Panel 	 Flat	42mm	Polyurethane foam	Colored steel sheet	White gray (8.1Y-8.6/0.7) Ivory (1.1GY-8.3/1.6)

Ceiling System Frame



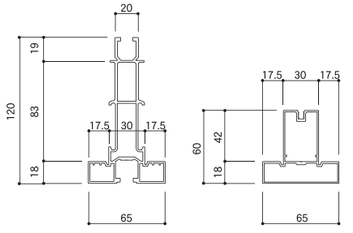
New Type

NS65



Main frame Sub frame

NS65H



Main frame Sub frame

NS65,NS65H
Lower suspension section

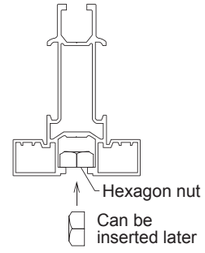


Diagram for NS65

*Also same for NS65H

Specification		NS65		NS65H	
Length	Module 600×1,200	Main section 4,800mm	Sub section 535mm	Main section 4,800mm	Sub section 535mm
	Module 750×1,500	Main section 4,500mm	Sub section 685mm	Main section 4,500mm	Sub section 685mm
	Module 1,500×1,000	Main section 5,000mm	Sub section 1,435mm	Main section 5,000mm	Sub section 1,435mm

Surface Sheet Performance

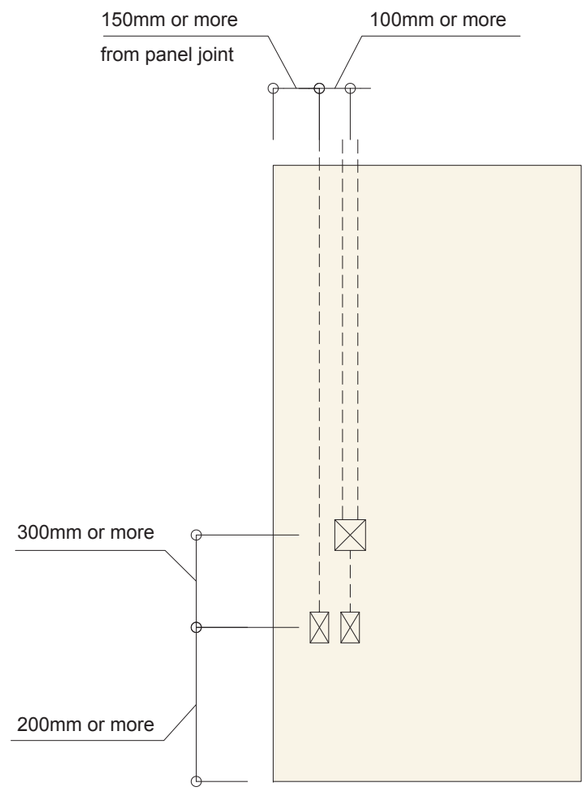
The surface sheets are tested under various severe conditions and all marked a high performance.
We are confident to meet your cleanroom needs.

Surface Material Properties

Judgment standard ○: No change in condition △: Slight change in condition ×: Complete change

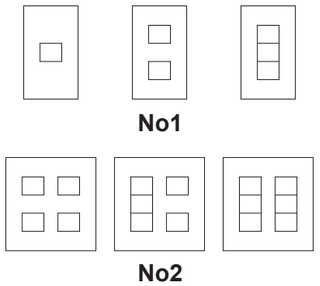
Item			Test conditions and details	Colored steel sheet		Antistatic steel sheet
				White gray	Ivory	
General Performance	Primary physical properties	Cross-cut	Compliant with JISK4706	○	○	○
		Bending 90°	Compliant with JISK5400 1.5R	○	○	○
		Bending 180°		○	○	○
		Impact resistance Front	Compliant with JISK5400	○	○	○
		Impact resistance Back		○	○	○
	Secondary physical properties	Erichsen after cross-cut adhesion 5	Pushed out to 5 and 9 with an Erichsen tester, after a cross-cut adhesion test.	○	○	○
		Erichsen after cross-cut adhesion 9		○	○	○
		High-temperature impact 333K(60°C)	Impact test compliant with JISK5400, after 3hours for each temperature	○	○	○
		High-temperature impact 353K(80°C)		○	○	○
		High-temperature impact 373K(100°C)		○	○	○
		Low-temperature impact 243K(-30°C)	Impact test compliant with JISK5400, after 24hours	○	○	○
Salt spray for 1,000hours		General section	Compliant with JISZ2371	○	○	△
		Cut section		△	△	△
		Bent section		△	△	△
Chemical resistance	Sulfuric acid	5%	293K(20°C)×24hours	△	△	△
	Hydrochloric acid	5%		×	×	×
	Caustic soda	10%		△	△	△
	Sodium hypochlorite	1%		○	○	○
	Sodium hypochlorite	5%		○	○	○
	Toluene		293K(20°C)×168hours	△	△	△
	Gasoline			○	○	○
	Methanol			○	○	○
	Formalin 35%		293K(20°C)×24hours	○	○	○
	Benzalkonium chloride invert soap			○	○	○
	Ethanol 99%			○	○	○
	Phenol solution2%			○	○	○
	Methyl alcohol			○	○	○
	Alkyldiaminoethylglycine15%			○	○	○
Weather meter for 1,000 hours			Weather meter (air spray accelerating test)	○	○	○
Light resistance			Germicidal light irradiation 15W, 300H x 168 hours	△	△	△
Odor		293K(20°C)	Sensory test by five persons	○	○	○
Odor		293K(40°C)		○	○	○
Odor		373K(100°C)		○	○	○
Contamination test		Lipstick	Wiping in 2hours after application of lipstick and magic marker	△	△	△
Contamination test		Magic marker		×	×	×
Silicone adhesion			Peeling test in two days after application of silicone	○	○	○
Food hygiene test			—	Passed	Passed	—

Diagram of panel-embedded cable box



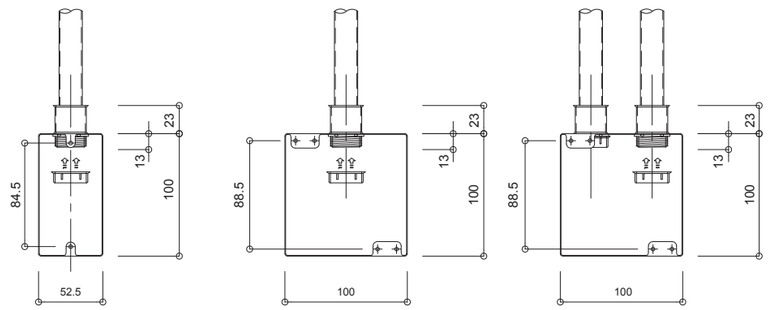
Embedded cable box
Common use for outlet an switch
No.1 ····· 1—3 cables
No.2 ····· 4—6 cables

Need to check the number of pipes



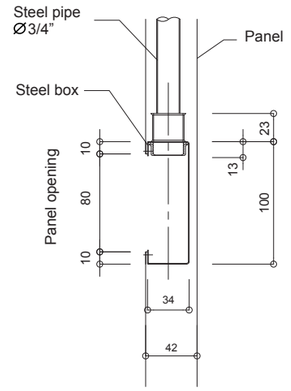
No1

No2



No.1 1pipe **No.2 1pipe** **No.2 2pipe**

(FRONT VIEW)



(SECTION)

Optimum as interior fittings for people to work in clean environment

Basic product specifications					
Surface material	Colored steel sheet / Antibacterial colored steel sheet / SUS sheet	Core material	Polyisocyanurate foam*1	Door thickness	42mm

* 1 Excluding Interior Linear Slide Door Type 05

Option			Single Hinged Door		Double Hinged Door		Access Door	Removal Panel		Self-closing Slide Door		Automatic Slide Door		Linear Slide Door
			4-way frame	3-way frame	4-way frame	3-way frame	4-way frame	4-way frame	3-way frame	Single sliding	Double sliding (Double synchronous*4)	Single sliding	Double synchronous*2	Single sliding
Handle	Cremorne handle		● *3		● *3									
	Lever Handle		● *3	● *3	● *3	● *3	●							
	Monolock		●	●	●	●	●							
	Case Handle		●	●	●	●	●							
	Quater Turn Hundle		●	●	●	●	●	●	●					
	Round Knob		●	●	●	●	●							
	Grip									●	●			
Cylinder Lock			●	●	●	●				●	●			
Window	Aluminum frame		●	●	●	●		●	●	●	●	●	●	●
	Antibacterial resin frame		●	●	●	●		●	●	●	●	●	●	●
Louver			●	●	●	●		●	●	●	●	●	●	●

*2. Mechanism that opens/closes two sliding doors synchronously *3. Electric lock attachable

Name	Non-touch Switch (beam variable type)	Area Sensor	Non-touch Switch (magic switch)
Switch list			
Manufacturer name	HOTORON	OPTEX	BEA Japan
Model	PF-R5	OA-215V	MAGIC SWITCH J

As with the insulated panel that has acquired the fire protecting material authorization, polyisocyanurate foam is used for the core material.
The single hinged door* is excellent in airtightness, because it has cleared the highest airtightness rank (class A-4) prescribed by JIS 4702.

*4-way frame single hinged door: Tested on the one with cremorne handle and no window

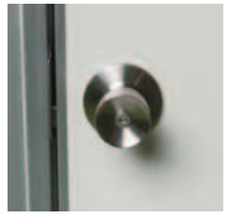
Single Hinged Door

* The frame thickness is 40mm.

Type	4-way frame	3-way frame	4-way frame	3-way frame
	Aluminum frame		Resin frame	
Standard effective dimensions (WxH)	810x2,020	810x2,060	810x2,020	810x2,060
Maximum effective dimensions (WxH)	1,200x3,000	1,200x3,000	1,200x2,500	1,200x2,500
Minimum effective dimensions (WxH)	520x820	520x860	520x820	520x860

- Type : 3-way frame
- Handle : Monolock
- Louver and Window Attached

Monolock



- Type : 4-way frame
- Handle : Case Handle

Case Handle

Double Hinged Door

* The frame thickness is 40mm.

Type	4-way frame	3-way frame	4-way frame	3-way frame
	Aluminum frame		Resin frame	
Standard effective dimensions (WxH)	1,710x2,020	1,710x2,060	1,710x2,020	1,710x2,060
Maximum effective dimensions (WxH)	2,400x3,000	2,400x3,000	2,400x2,500	2,400x2,500
Minimum effective dimensions (WxH)	720x820	720x860	720x820	720x860

- Type : 3-way frame
- Handle : Lever Handle
- Cylinder Lock, Window, and Extension Bolt Attached

Lever Handle

- Type : 4-way frame
- Handle : Round Knob
- Cylinder Lock, Window, and Extension Bolt Attached

Round Knob

Access Door

* The frame thickness is 40mm.

Type	4-way frame	
	Aluminum frame	Resin frame
Standard effective dimensions (WxH)	520x520	
Maximum effective dimensions (WxH)	1,120x920	910x920
Minimum effective dimensions (WxH)	370x320(Case handle)/270x320(Clamp handle)	370x320(Case handle)/270x320(Clamp handle)

Opening direction : Outward-opening
Handle : Quater Turn Handle

Opening direction : Inward-opening
Handle : Quater Turn Handle

Removal Panel

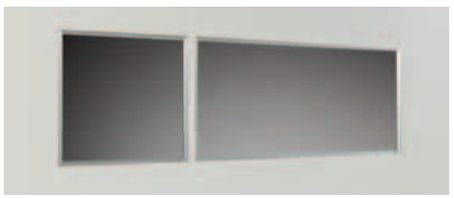
* The frame thickness is 40mm.

Type	4-way frame	3-way frame shift	4-way frame	3-way frame shift
	Aluminum frame		Resin frame	
2-gang standard effective dimensions(WxH)	1,710x2,420	1,710x2,460	1,710x2,420	1,710x2,460
3-gang standard effective dimensions(WxH)	2,610x2,420	2,610x2,460	2,610x2,420	2,610x2,460
4-gang standard effective dimensions(WxH)	3,510x2,420	3,510x2,460	3,510x2,420	3,510x2,460
Maximum effective dimensions(WxH)	6,000x3,920	6,000x3,960	6,000x3,920	6,000x3,960
Minimum effective dimensionss(WxH)	320x320	320x360	320x320	320x360

3-gang removal panel
Type : 4-way frame
Handle : Quater Turn Handle

Fixed Window for Interior -Type 16

Type	Aluminum frame	Resin frame
Standard effective dimensions (WxH)	520x520	240x240/390x390/540x540
Maximum effective dimensions (WxH)	1,020x1,890	840x840
Minimum effective dimensions (WxH)	170x170	40x40



Single fixed window / 2-gang fixed window
Frame material : Aluminum frame

Interior Self-Closing Slide Door -Type 14

Type	Single sliding
Standard effective dimensions (WxH)	900x2,100
Maximum dimensions(WxH)	1,500x3,000
Minimum dimensions(WxH)	750×x1,000*

*If W is not more than 1,000 mm, the ratio of W:H must not exceed 1:3.

Type	Double synchronous*1 / Double sliding
Standard effective dimensions (WxH)	1,800x2,100
Maximum dimensions(WxH)	3,000x3,000
Minimum dimensions(WxH)	1,400x1,000*2

*1. Mechanism that opens/closes two sliding doors synchronously
*2. If W is not more than 2,000 mm, the ratio of W:H must not exceed 1:1.5.

The aspect ratio of single sliding and that of double synchronous / double sliding is W:H=1:3 and W:H=1:1.5 respectively.

Handle : Grip

Stainless-steel grip

Interior Automatic Slide Door -Type 14

Type	Single sliding
Standard effective dimensions (WxH)	900x2,100
Maximum dimensions(WxH)	1,500x3,000
Minimum dimensions(WxH)	750x1,000

Type	Double synchronous
Standard effective dimensions (WxH)	1,800x2,100
Maximum dimensions(WxH)	3,000x3,000
Minimum dimensions(WxH)	1,400x1,000

Sensor : Area sensor

Interior Linear Slide Door -Type 05

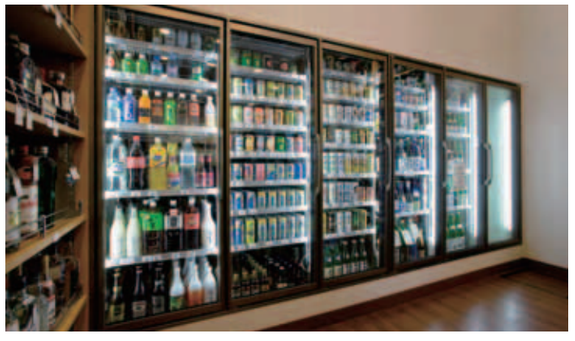
Type	Single sliding
Standard effective dimensions (WxH)	900x2,100
Maximum dimensions(WxH)	1,200x2,400
Minimum dimensions(WxH)	850x2,000

Appropriately meeting the needs of a distribution warehouse, which is a key to the cold chain

Having adopted the core materials with high insulation performance, we will propose the most suitable panel thickness for a set temperature. The utmost use will be made of internal capacity. Moreover, we will provide optimum space for the distribution warehouse with our design expertise excellent in customization and reliable construction expertise based on abundant track records, including support for the earthquake-resistant ceiling.

Achieving the optimum low-temperature space according to space and application

Efficient internal capacity is secured even in limited space. Since various insulated panels and attachment options are available, you can select a type that finely meets the desired temperature and operation conditions.



Construction Case Food Factory

1 Hand-washing place

2 Passage

3 Processing place

4 Material storage room

Product storage room

5 Opening

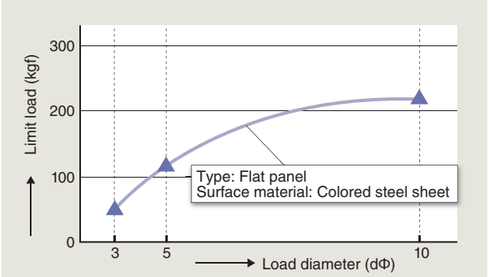
6 Anterior room for shipment

7 Shipping place

Performance of the Panel

1 Local Compressive Strength of the Panel

This strength represents how much the panel can resist against local deformations in the panel surface caused by a concentrated load or the like. The chart shows how the limit load changes according to the load's diameter.



Load with diameters of 3cm, 5cm, and 10cm are used to measure (short-term) limit loads that dent the panel surface.

2 Deflection of the Panel Caused by Load

This represents deflection caused by load of a panel that is simply placed alone.

For uniform load

Type:Flat panel : $\delta max = \frac{5\omega\ell^4}{384D} + \frac{\omega\ell^2}{8U}$

δmax = maximum deflection (cm)
ω = load per unit length (kgf/cm)
ℓ = distance between fulcrums (cm)
D = flexural rigidity (kgf·cm^2)

$= \frac{Ebf(h+c)^2}{8(1-\mu^2)}$

U = shear rigidity (kgf)

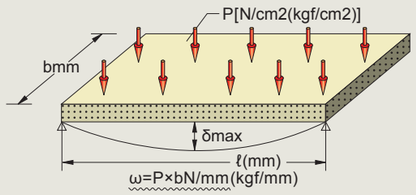
$= \frac{Gbn(h+c)}{2c}$

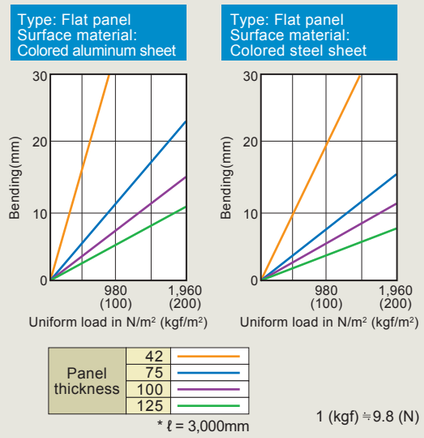
E = surface material Young's modulus (kgf/cm^2)
Aℓ = 7.0 x 10^5
Fe= 2.1 x 10^6
$\lambda = (1 - \nu^2)$
b = panel width (cm)

For Concentrated load:

$\left(\delta max = \frac{P\ell^3}{48D} + \frac{P\ell}{4U}\right)$

P = concentrated load (kgf)
f = surface material thickness (cm)
h = panel thickness (cm)
c = core material thickness (cm)
ν = Poisson's ratio
Aℓ = 0.33
Fe = 0.28
G = core material shear rigidity (40kgf/cm^2)



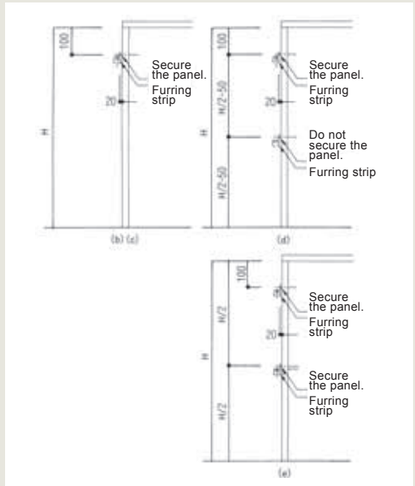


3 Design of Panel Installation

■ Conditions that require attachment of strengthening furring strips (guideline)
In a case where a (indoor) wall panel receives no wind pressure, it must be reinforced with furring strips if it exhibits a heat deformation level and a height that exceeds certain levels. The criteria for furring strip attachment are shown in the table below, which are based on the assumption that the panel is subject to no defrosting pressure or suspended load.

Category	Panel height (H)	Deflection(δ)	Number of furring strips (tiers)
(a)	H≤5,000(42mm) 6,000(75mm or higher)	δ ≤ 30	Not required
(b)	42mm: 5,000 < H 75mm or higher: 6,000*	δ ≤ 30	1
(c)		30 < δ ≤ 40	1
(d)		40 < δ ≤ 60	2
(e)		60 < δ	2 Upper part : The furring strips must be secured to the wall panel. Lower part : The furring strips need only to be attached which need not be secured to the wall panel (back furring strips)

•The criteria shown in the table above should be used only as a guideline because they do not strictly take into account the fact that different types of panels exhibit different heat deformation levels. In the design phase, a structural calculation is required each time.
•The criteria assume that the following requirement are satisfied.
1. The panel is installed indoor (not subject to any loads such as wind pressure).
2. Even for an RH refrigerator, a necessary relief dumper must be determined by calculation and installed.
3. If a load collapse defined by the Warehousing Business Act and other regulations occurs, cargos are loaded in racks, for example, and therefore do not fall on the panel.
4. Panels that use aluminum as the surface material are excluded.
5. The panel bottoms are secured based on floor embedding or floor angles (floor base are excluded).
6. Special cases such as rapid/frozen spirals should be separately considered.
7. During Installation, additional care should be exercised to ensure safety by, for example, temporarily fixing the panels.



4 Thermal Insulation Performance of the Panel

Using rigid polyurethane foam as the core material, our panel products are thin and lightweight with a high level of thermal Insulation performance. According to temperature zones, our panels are available in seven different thicknesses.

Panel thickness	U value W/m^2·k (Kcal/m^2·h·°C)	Recommended operating temperature	Thickness when as the insulating material, polystyrene foam is alternatively used
42mm	0.50 (0.43)	268 K (-5°C) or higher	70mm
75mm	0.28 (0.24)	253 K (-20°C) or higher	123mm
100mm	0.21 (0.18)	238 K (-35°C) or higher	178mm
125mm	0.17 (0.15)	228 K (-45°C) or higher	213mm
150mm	0.14 (0.12)	218 K (-55°C) or higher	267mm
200mm	0.11 (0.09)	213 K (-60°C) or higher	356mm

Remarks
■ The operating temperature values should be used only as references. The most cost-effective panel thickness depends on the scale, intended use, and/or region.
■ Thermal conductivity W/m· K (Kcal/m· h·°C): rigid polyurethane foam = 0.021 (0.018)
Polystyrene foam = 0.028 (0.024) is used.

•U = Thermal conductivity of the insulating material W/m·K (Kcal/m·h·°C) / insulating material thickness (m)
•K for the operating temperature range does not include the values after the decimal point.

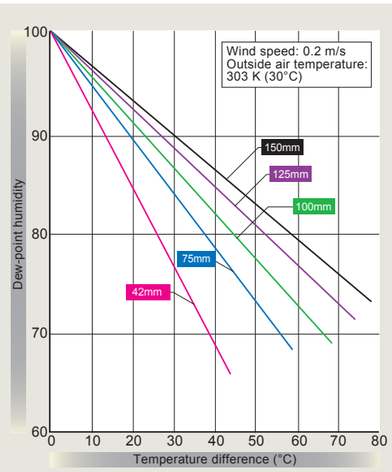
5 Thermal Conductivities and Densities of Materials (g/cm^3)

Panel thickness		Panel thickness	Panel thickness
Heat insulating board made of rigid urethane foam	Type 2, category 2	0.024 or less	0.025 or higher
Styrofoam insulation (Type-A beads method polystyrene foam)	Category 1	0.036 or less	0.03 or higher
Heat insulating board made of extruded polystyrene foam	Type 2	0.034 or less	0.025 or higher
Heat insulating board made of glass wool	24K	0.049 or less	0.022 to 0.026
Heat insulating board made of rock wool	Category 1	0.044 or less	0.04 to 0.1
Autoclaved lightweight concrete (ALC) panel		0.17	0.5 to 0.7

•The thermal conductivities above are reference values based on the JIS standards. The thermal conductivities of the products are calculated based on rigid polyurethane foam = 0.021 W/m·K (0.018 Kcal/m·h·°C).

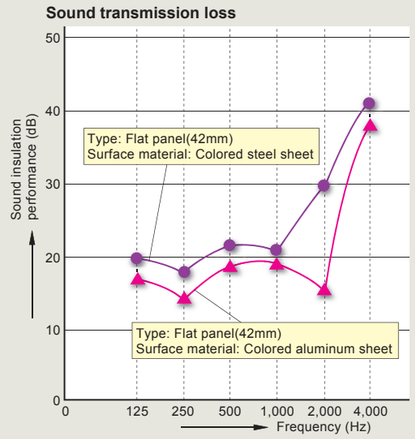
6 Condensation Characteristics of the Panel

■ If a refrigerator is used in a stuffy, hot and humid place, condensation may form on a panel surface. To prevent condensation from forming, a refrigerator should be placed in an airy, cool location.
■ The humidity is approximately 50 to 60% in a room equipped with an air conditioner, which may be as high as 80 to 95% in a kitchen or outside.
■ The dew-point humidity depends on the conditions of the site. It is greatly influenced by the wind speed outside the refrigerator. The higher the wind speed, the higher the dew-point humidity.



•The values represent humidity performance measurements made at a wind speed of 0.2m/s (nearly airless) on a panel-by-panel basis. This condition corresponds to that for a case where a refrigerator is placed near a wall. The temperature difference represents the difference between the outside air temperature and the temperature inside the refrigerator.
•All of the performance values are measurements at cloth joints (joints between the ceiling and wall and joints between the floor and wall). Near the floor, it is nearly airless.

7 Sound Insulation Performance of the Panel



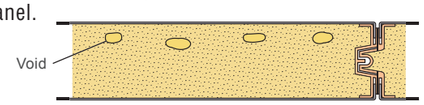
The noise from the cooler fan is large at frequencies between 250 and 2,000Hz.

To Use the Product Securely

Asperities present on a panel surface may result from a phenomenon we call a void. Although the core material has small gaps, this has almost no effect on the thermal insulation performance because it is delivered on the panel surface. In addition, asperities do not adversely affect the panel strength.

What Is a Void?

A void is a small gap present in the core material inside the panel.



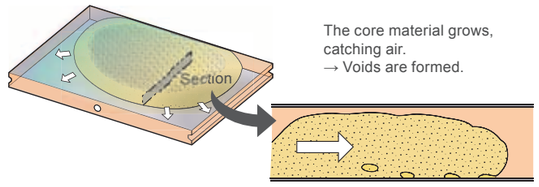
The air inside voids decreases in volume, pulling down the surface material.

The air inside voids expands, pushing up the surface material.

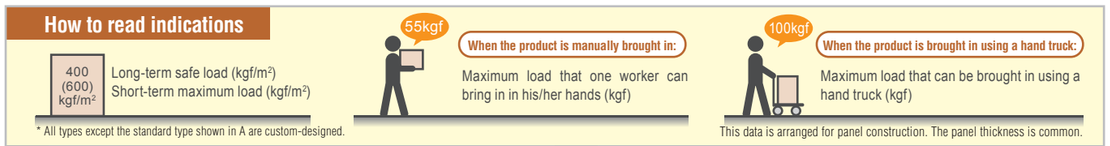
* How the surface looks depends on how it is lighted or the angle at which it is seen.

Why Are Voids Generated?

The core material grows inside the panel and catches air during the filling process, resulting in voids.



How to read indications

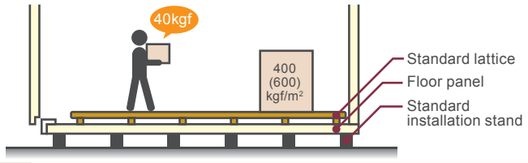


* All types except the standard type shown in A are custom-designed.

This data is arranged for panel construction. The panel thickness is common.

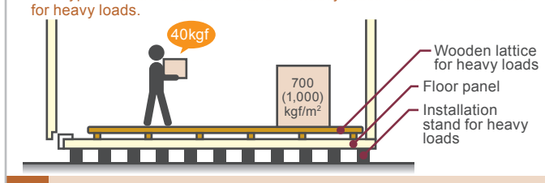
A Standard type

•The standard type is always based on the following specifications.



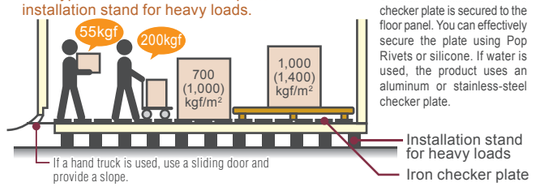
B Heavy loading type

•This type uses an installation stand for heavy loads. It also uses a lattice for heavy loads.



C Heavy loading type using an iron checker plate

•This type uses an iron checker plate and an installation stand for heavy loads.



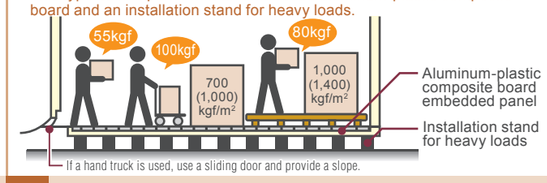
•It must be ensured that the checker plate is secured to the floor panel. You can effectively secure the plate using Pop Rivets or silicone. If water is used, the product uses an aluminum or stainless-steel checker plate.

D Aluminum-plastic composite board embedded type

•This type uses a panel with an embedded aluminum-plastic composite board and a standard installation stand.

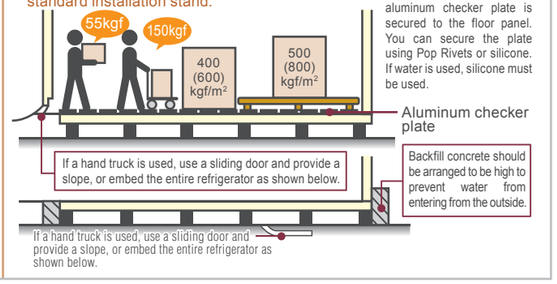
E Aluminum-plastic composite board embedded type for heavy loads

•This type uses a panel with an embedded aluminum-plastic composite board and an installation stand for heavy loads.



F Aluminum and iron checker plate bedding type

•This type uses an aluminum checker plate and a standard installation stand.

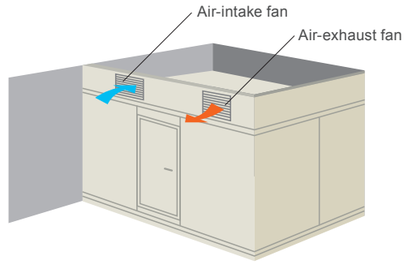


•It must be ensured that the aluminum checker plate is secured to the floor panel. You can secure the plate using Pop Rivets or silicone. If water is used, silicone must be used.

Depending on the environment, a prefabricated refrigerator/freezer may experience condensation.

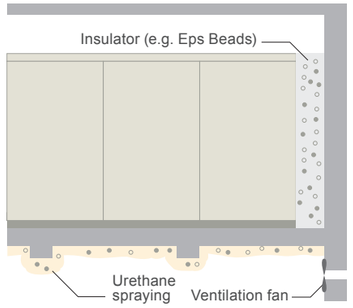
Our panel provides stable thermal insulation performance; however, in an environment where the temperature and humidity outside the refrigerator are high, in a stuffy environment, or in an environment that is likely to be affected by the outside air, the panel may be subject to condensation, a phenomenon that water droplets are formed on the panel surface. To effectively prevent condensation, keep the site well ventilated and properly insulate the site.

In periods when humidity is high, such as rainy season and summertime in particular, condensation may occur. In a case where condensation must be prevented to avoid trouble, it is required to take the following measures in advance.



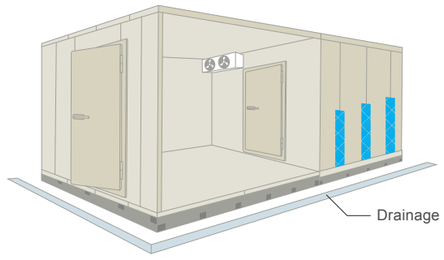
1 Ceiling

- Install ventilation fans for proper ventilation.
- Insulate the reinforcing beams.
- Spray urethane to the joint section between the freezer and refrigerator.



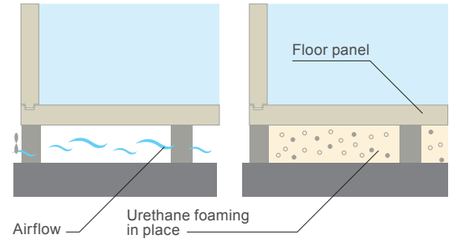
2 Environment

- To prevent condensation at panel joints:
  Equip the site with an air conditioner for proper ventilation.
- To prevent condensation near the existing wall:
  Insert an insulator between the refrigerator and wall.
- To prevent condensation on downstairs ceilings for a multilayer hierarchical structure:
  Install a thicker insulator on the floor on which the freezer/refrigerator is placed.
  Spray urethane to the downstairs ceiling.
  Install fans for proper ventilation.



3 Doors and walls

- Equip each door with a heater.
- Arrange short curtains.
- Design the structure so as not to allow air from the air conditioner to be directly applied to doors.
- Arrange a drainage around the structurer.



4 Floor

- Properly ventilate the space under the floor.
- Under the floor, foam urethane in place.

You can walk on the ceiling for checking. Sections where you often walk should be separately cured. In addition, ensure that no concentrated load is applied. Do not use the ceiling as a scaffold during construction.

Caution When Walking on the Ceiling

Walk softly using the entire soles of feet without allowing the heels of the shoes to hit the ceiling.

Do not give an impact to the ceiling.

An impact may cause the surface material to come off.

Cautions about Live Loads

Only one worker can ride on the panel. Pay attention to the weights of objects to be placed on the ceiling.

Not more than 100 kg per panel (untreated)

Objects heavier than 100 kg may break the roof.