








Thermal insulation



LA range

new industrial sandwich panels for cold stores, catering, processing areas...

The title 'TABLE OF CONTENTS' in a bold, orange, sans-serif font, preceded by a thick orange horizontal bar.

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The perfect merging of performance and safety

The agro-food industries, which process and preserve food, must ensure that quality is maintained at all times and avoid the risk of proliferation of dangerous bacteria for consumers.

This means preparing and storing food at controlled temperatures and respecting strict hygienic rules. In order to guarantee these conditions, premises must be made of insulating materials in accordance with current sanitary standards. (HACCP)

Polyurethane (PUR) foam core sandwich panel systems are currently the best way of matching these conditions. They combine one of the highest insulation coefficients with good mechanical strength. One of the main properties of PUR is that it is not affected by moisture (no internal damage or capillarity effect).

Our LA panel is designed to meet the most stringent hygiene standards. It comes in different thicknesses in order to optimise heat insulation according to the inside temperature required.

New fire regulations

Euroclasses have been developed to harmonise the classification of the reaction to fire performance of products on a European level. Euroclass certification is based on several strict parameters, such as flammability, smoke toxicity, falling of residue, etc.

Nowaday many buildings are still destroyed by fire every year. In order to facilitate the access of fire fighters and the evacuation of occupants and to limit the propagation of flames insofar as possible, insurance companies have defined design criteria for construction panels and regulations for using them.

Private half and full-scale tests consider special building details (corners, junctions, ceilings, etc.) and test fire propagation.

Our T14-A document, produced by the French federation of insurance companies (FFSA, ex-APSAD), defines fire performance tests and rules for using insulating panels.

The LA panel, used for both walls and ceilings (suspended by a loadbearing T-section), has passed the different tests successfully.

HIGH-PERFORMANCE PANELS

Dagard has been present on the agro-food market for many years with its unrivalled GL product range. Today, our new LA range completes its offering.

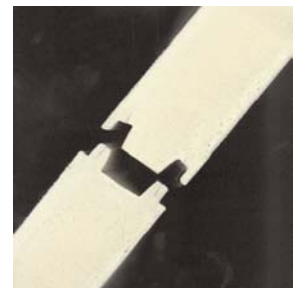
The panels, available in large lengths and numerous thicknesses, can be used to build premises of every shape and size, from catering kitchens to industrial production and storage facilities.

The new LA panel with its steel-on-steel interlock system is classified Pa2 (Report n° PN 03 6485 indices 1, 2 and 3) for its heat insulation foam.



The steel-faced panels are joined by overlapping interlock joints to prevent flames from directly attacking the insulating material in the event of a fire.

The groove is designed to reinforce the mechanical rigidity of the panel. Assembly is very simple. The panels are automatically aligned after interlocking without being forced and the resulting partition is perfectly flat. Different joint sealing and finishing solutions are available depending on the atmosphere and classification of the room.



LA sandwich panels consist of an insulating PUR foam core injected between 2 metal facings.

Suitable for internal partitions, external façades and internal ceilings, they can adapt to every architectural, technical and environmental requirement.

The panel thickness is chosen according to the specific inside working temperatures of the agro-food industries: preparation rooms at positive temperatures (chiller), storage above and below freezing, tunnel freezers, etc.

LA services panels are designed to route wiring and piping (power supply, evacuation, etc.) and thus eliminate visible utilities networks.

Special finishing accessories, (rounded PVC covings, PVC skirtings, water eaves, etc.) facilitate cleaning while protective accessories (handrails, tubular barriers, etc.) guard our panel against damage from operator impacts.



A complete range of doors (hinged, sliding, flip-flap, strip curtains, etc.) has been developed to form a coherent whole and optimise traffic inside buildings: through traffic from staff, fork lift trucks, etc. of varying intensity.



Glazing helps to improve the comfort of working premises while maintaining their technical functions of insulation (single, double or triple glazing) and safety (laminated or toughened glass). A large range of dimensions, colours and materials combine attractiveness with performance.



TECHNICAL FEATURES

Type	LA 40	LA 60	LA 80	LA 100	LA 120	LA 140	LA 160	LA 180	LA 200
Thickness (mm)	40	60	80	100	120	140	160	180	200
Weight per m ² (kg/m ²)	9,8	10,6	11,4	12,2	13	13,8	14,7	15,5	16,3
Uniformity coefficient Uc (W/m.°C) (1)	0,69	0,46	0,35	0,28	0,24	0,20	0,17	0,16	0,14

Width :

- 1160 mm

Length :

- on request, in 1 cm increments

The panel lengths are determined according to the mechanical properties of the panels and transport requirements. Usual maximum length: 13m.

Facings :

En standard

- Pebble White (near RAL 9002) 25 micron **polyester** powder-coated on a 0.53 mm thick galvanised sheet steel, **slightly ribbed** (0.6 mm depth))

Optional

- Pebble White (near RAL 9002) 25 micron **polyester** powder-coated on a 0.63 mm thick galvanised sheet steel, **smooth finish** or slightly ribbed (0.6 mm depth)

- Pebble White (near RAL 9002) 25 micron **polyester** powder-coated on a 0.75 mm thick galvanised sheet steel, **smooth finish** or slightly ribbed (0.6 mm depth)

- 0.63 mm thick **304** stainless steel, slightly ribbed

- 0.63 mm thick **304** or 316 stainless steel + white (near RAL 9010) 35 micron PVDF coating, smooth or slightly ribbed finish

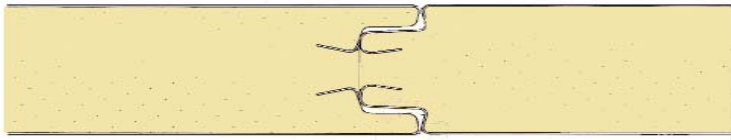
- 0.75 mm thick **304** stainless steel, smooth finish

- 0.63 mm thick galvanised sheet steel + Pebble White (near RAL 9002) 35 micron **PVDF** coating

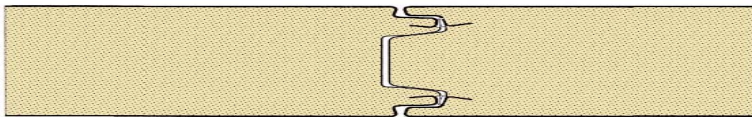
- 0.63 mm thick galvanised sheet steel + **PET** coating (polyester coating + anti-scratch, anti-corrosion PET film), 55 microns or 150 microns thick, smooth or slightly ribbed finish

The facings can be either the same or different on the two sides of the panel. All facings surface material are food safe (FDA)

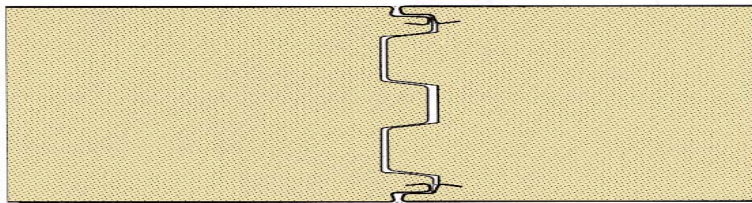
Perfect interlock panel joints:
 - steel-to-steel overlapping interlock joints



Efficient double interlock for 40 mm thick panels



Efficient double interlock for 40, 60, 80, 100, 120 and 140 mm thick panels



Secured triple interlock for 160, 180, 200 and 220 mm thick panels

Friendly environment H-CFC free core:
 - press-injected PUR foam: without flame rating or non-flammable (fire resistant)(Bs3d0)

thermal conductivity: k -value = 0.029 W/m°C

Heat transmission coefficient :

panel thickness in mm	U-value in W/m ² .K
40	0.69
60	0.46
80	0.35
100	0.28
120	0.24
140	0.20
160	0.17
180	0.16
200	0.14
220	0.13

SEALING AND FINISHING SYSTEMS

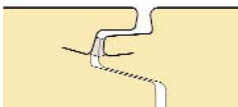
Panel joints must be treated to meet two criteria :

Watertightness: The transfer of water vapour must be limited and moisture must be prevented from getting inside the joint. The solution used depends on the location of the partition and the atmosphere on either side.

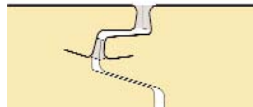
Finishing: the type of finishing is determined by the cleaning and hygiene requirements and the industrial design.

Assembly: depending on the specifications and accessibility on each side of the panel, the following solutions can be adopted or combined:

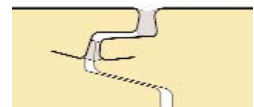
- Application of a gasket or sealant on the edge of the steel facings (position 1)



no joint

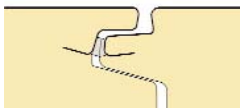


soft PVC gasket (built in from our factory)

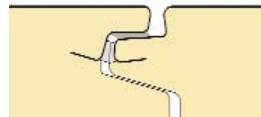


silicone mastic
(to be extruded on site)

- Application of mastic at the bottom of the interlock groove (position 2)



no mastic

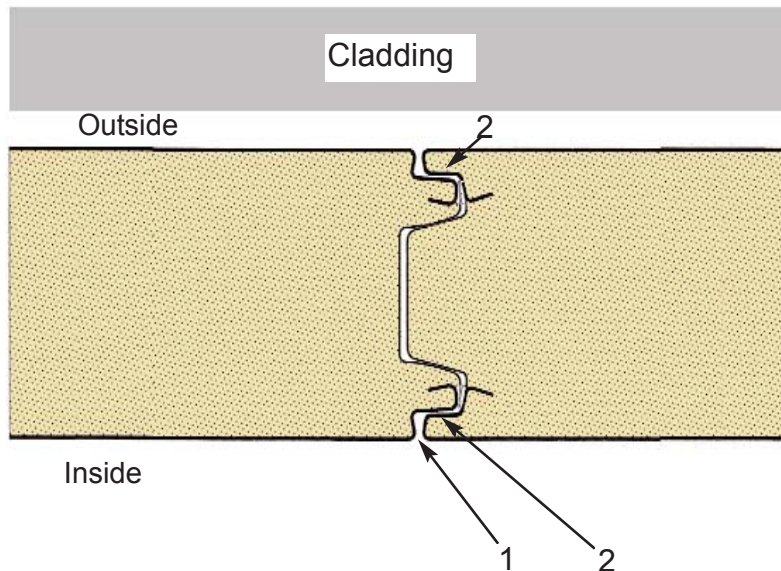


butyl mastic

Classification of room atmosphere

Relative humidity	Temperature (°C)								
	<0	1 < 5	6 < 10	11 < 15	16 < 20	21 < 25	26 < 30	31 < 35	36 < 40
5 %	Atmosphere A								
10 %									
15 %									
20 %									
25 %									
30 %									
35 %									
40 %									
45 %									
50 %									
55 %	Atmosphere B				Atmosphere C				
60 %									
65 %									
70 %									
75 %									
80 %									
85 %									
90 %									
95 %									
100 %									

Case N°1 : Partition against external cladding façade

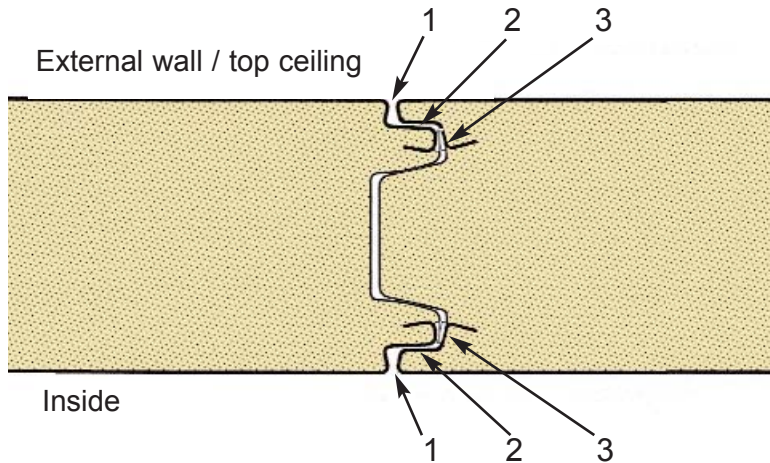


Position 1 : at edge of steel
Position 2 : at bottom of groove

Sealing and finishing solutions

Atmosphere	Inside sealing joint		outside joint
	no cleaning	pressurised and/or frequent cleaning	
A	Soft PVC gasket (in position 3)	Silicone (in position 1)	Butyl (in position 2)
B	Silicone (in position 1)	Silicone (in position 1)	Butyl (in position 2)
C	Butyl (in position 2) + PVC gasket if occasional cleaning (position 1)	Butyl (in position 2)+Silicone (in position 1)	Silicone (in position 2)

Cas N°2 : Outside wall exposed to weather or ceiling

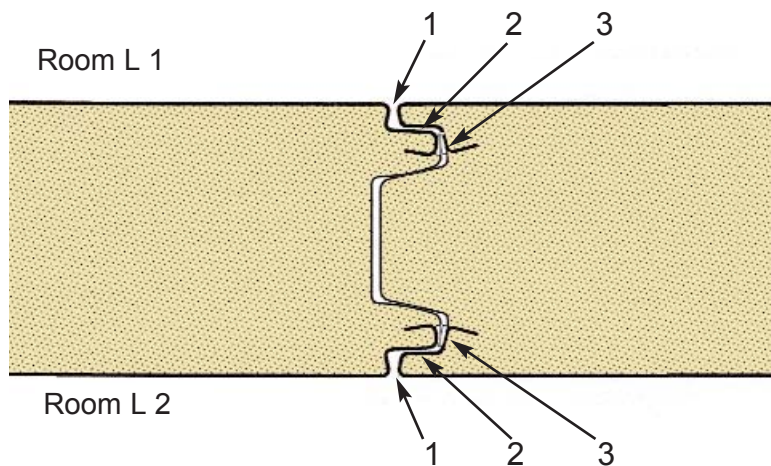


Position 1 : at edge of steel
 Position 2 : at bottom of groove
 Position 3 : PVC gasket

Sealing and finishing solutions

Inside atmosphere	inside		outside	
	no cleaning	pressurised and/or frequent cleaning	sealing	finishing solution
A	Soft PVC gasket (in position 3)	Silicone (in position 1)	Butyl (in position 2)	selection as per customer's requirement (in position 1) - no joint - PVC gasket - silicone
B	Silicone (in position 1)	Silicone (in position 1)	Butyl (in position 2)	
C	Butyl (en position 2) + PVC gasket if occasional cleaning (position 1)	Butyl (in position 2)+ Silicone (in position 1)	Silicone (in position 1)	

Case N°3 : internal partition



Position 1 : at edge of sheet steel
 Position 2 : at bottom of groove
 Position 3 : PVC gasket

Sealing and finishing solutions

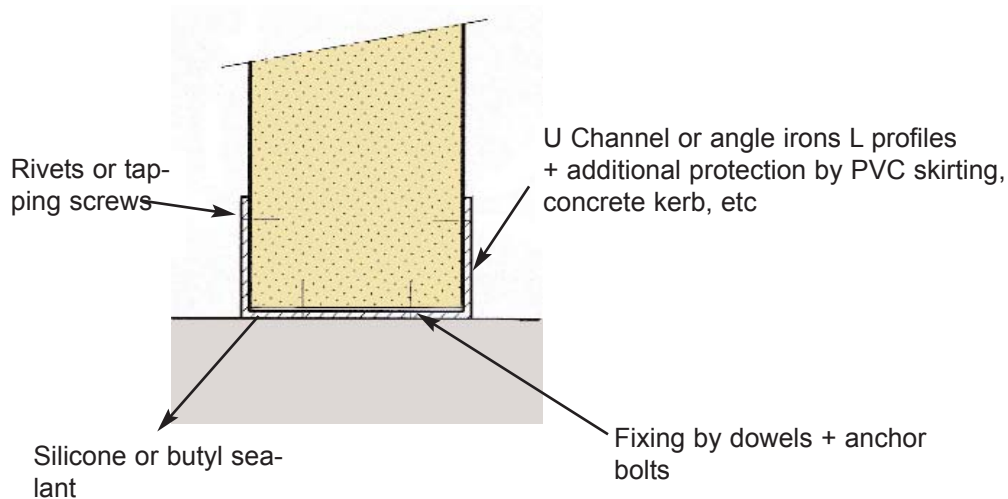
Atmosphere		Room L2		
		A	B	C
Room L1	A	L1 : soft PVC gasket (in position 3) L2: soft PVC gasket (in position 3)	L1 : soft PVC gasket (in position 3) L2: silicone (in position 1)	L1 :soft PVC gasket (in position 3) L2: butyl (in position 2) +silicone (in position 1)
	B	L1 : silicone (in position 1) L2:PVC gasket (in position 3)	L1 : silicone (in position 1) L2: silicone (in position 1)	L1 : silicone ((in position 1) L2: butyl (in position 2) +silicone (in position 1)
	C	L1 : butyl (en position 2) L2: PVC gasket (in position 3)	L1 : butyl (in position 2) L2: silicone (in position 1)	L1 : butyl (in position 2) +silicone (in position 1) L2: butyl (in position 2) +silicone (in position 1)

If a PVC gasket is used

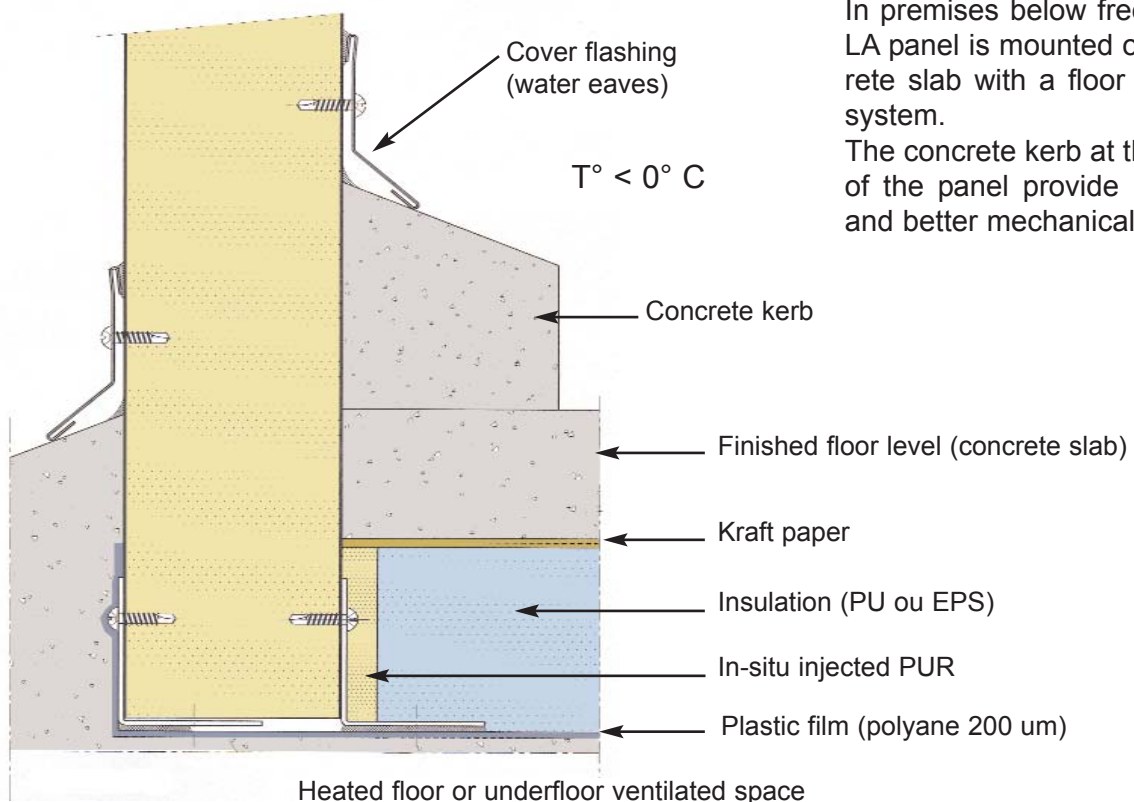
If the wall is subjected to intensive pressurised cleaning, the sealing system must be completed with a silicone sealant (position 1); if cleaning is occasional using non-aggressive techniques, a PVC gasket can be used in position 1.

Workmanship

Floor to wall connection



NB : Wedging may be necessary to make up for the difference in level either in the channel (maximum height 20 mm) or under the channel.



In premises below freezing, the LA panel is mounted on a concrete slab with a floor insulation system.

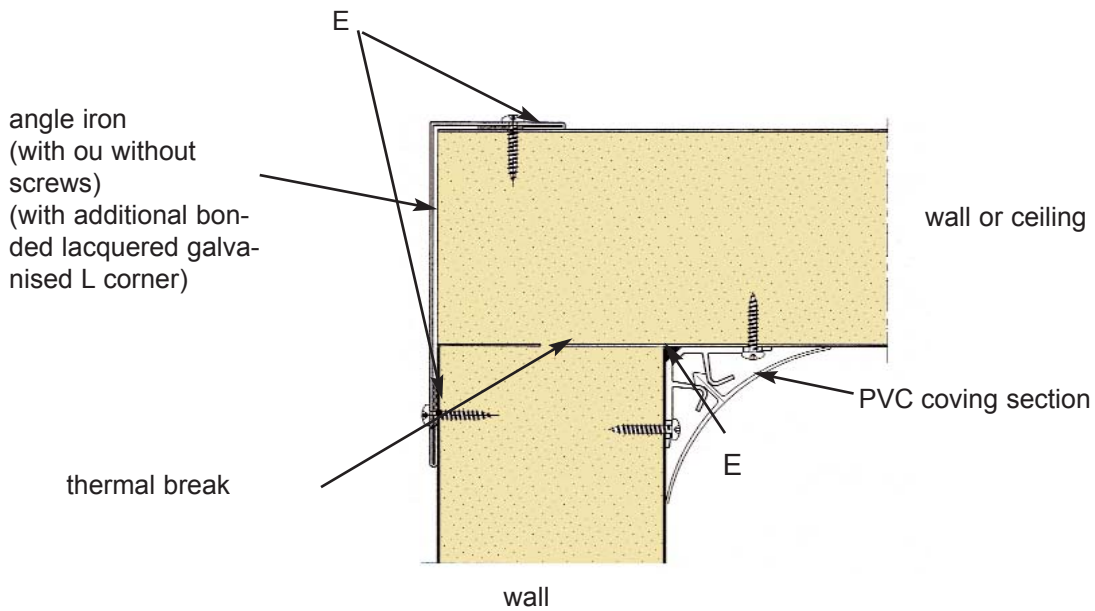
The concrete kerb at the bottom of the panel provide protection and better mechanical stability.



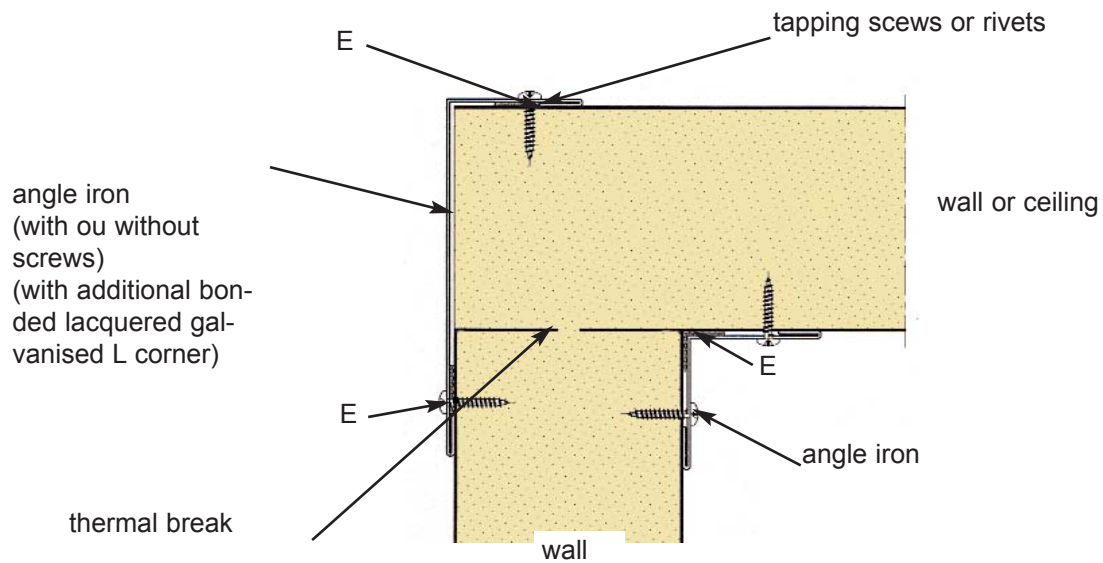
Wall to wall or wall to ceiling connection

Positive temperatures (chiller)

using coving sections



Using angle irons

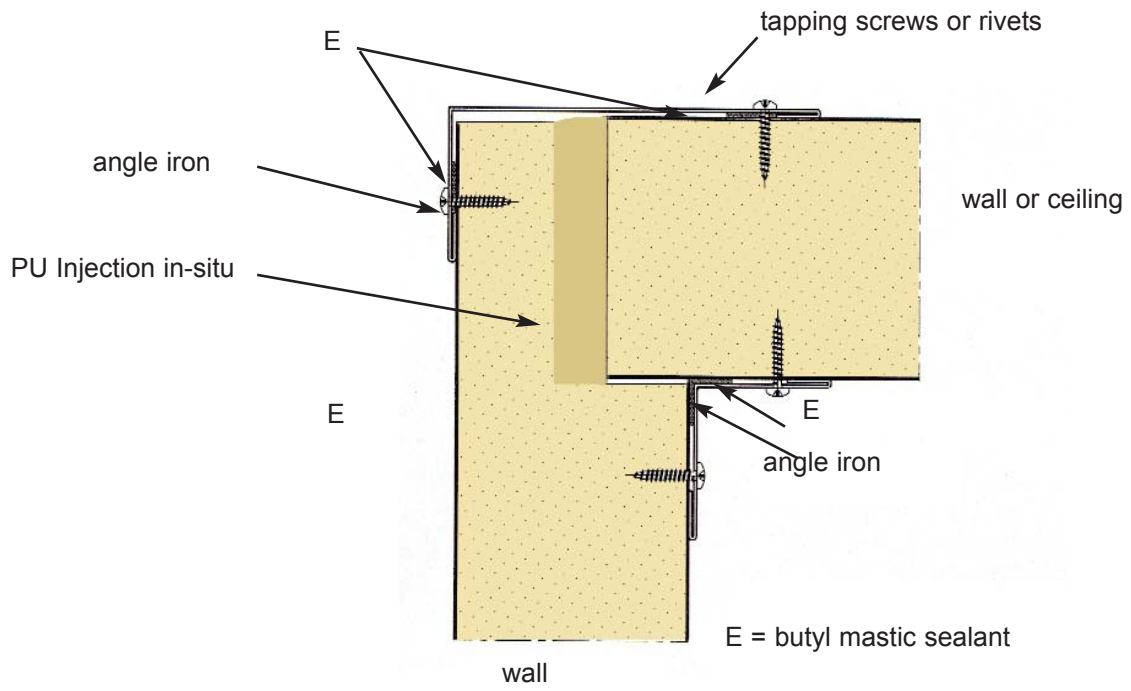


E = butyl mastic sealant

Wall-to-wall or wall-to-ceiling connection

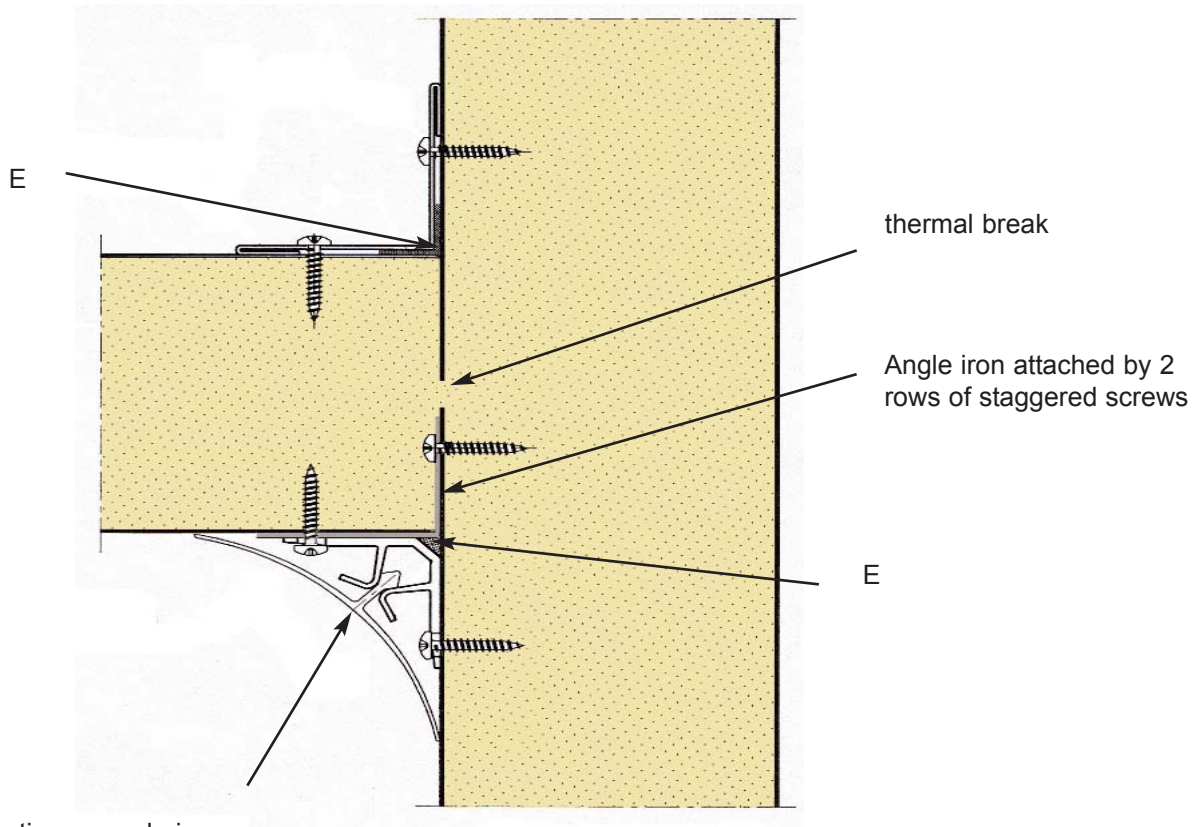
Negative temperature (freezer)

using angle irons



Ceiling connection in the middle of the wall

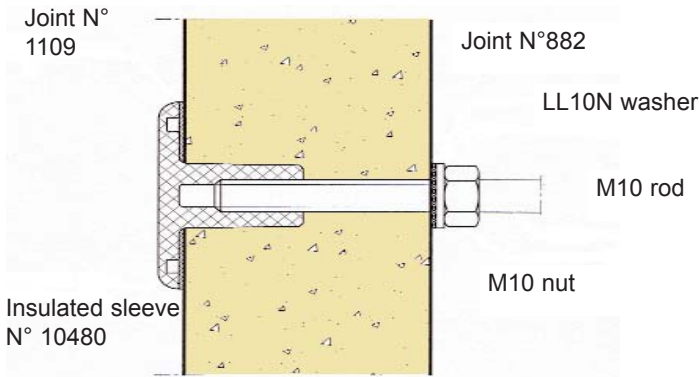
Positive temperature



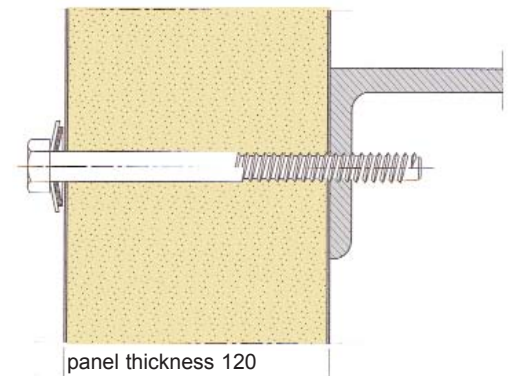
PVC coving section or angle iron

E = butyl mastic sealant

Connection of wall to beam clamp



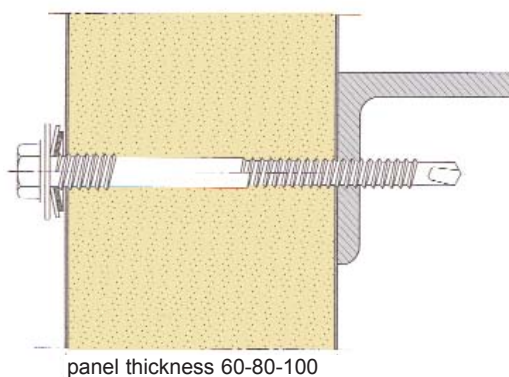
Connection by through-hole insulator (sleeve)



Connection by 6.3 x 150 mm zinc-plated self-tapping screws with metal washer and EPDM gasket

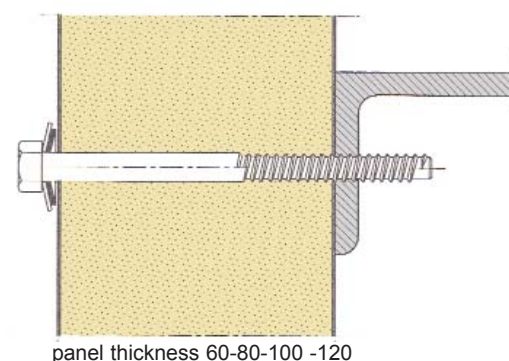
Thickness of substrate 3 to 4 mm, predrilling dia. 5.05
Thickness of substrate 4 to 8 mm, predrilling dia 5.95

No double threading
Check the torque



Connection by RAL 9010 5.5 x 100 to 125 mm duplicate-moulded zinc-plated self-tapping screws and EPDM gasket

Drilling capacity 1.5 to 5 mm



Connection by 6.3 x 100, 130 and 150 mm stainless steel self-tapping screws

Thickness of substrate 3 to 6 mm, predrilling dia. 5.65
Thickness of substrate 6 to 10 mm, predrilling dia 5.8

No double threading
Check the torque

Fixing of cladding panels

In the case of cladding panels, the choice of fixing depends on the atmosphere inside the room.

Atmosphere	Type of fixing
A	All types of through fixings
B	All types of through fixings
C	Insulation sleeves or stainless steel through screws

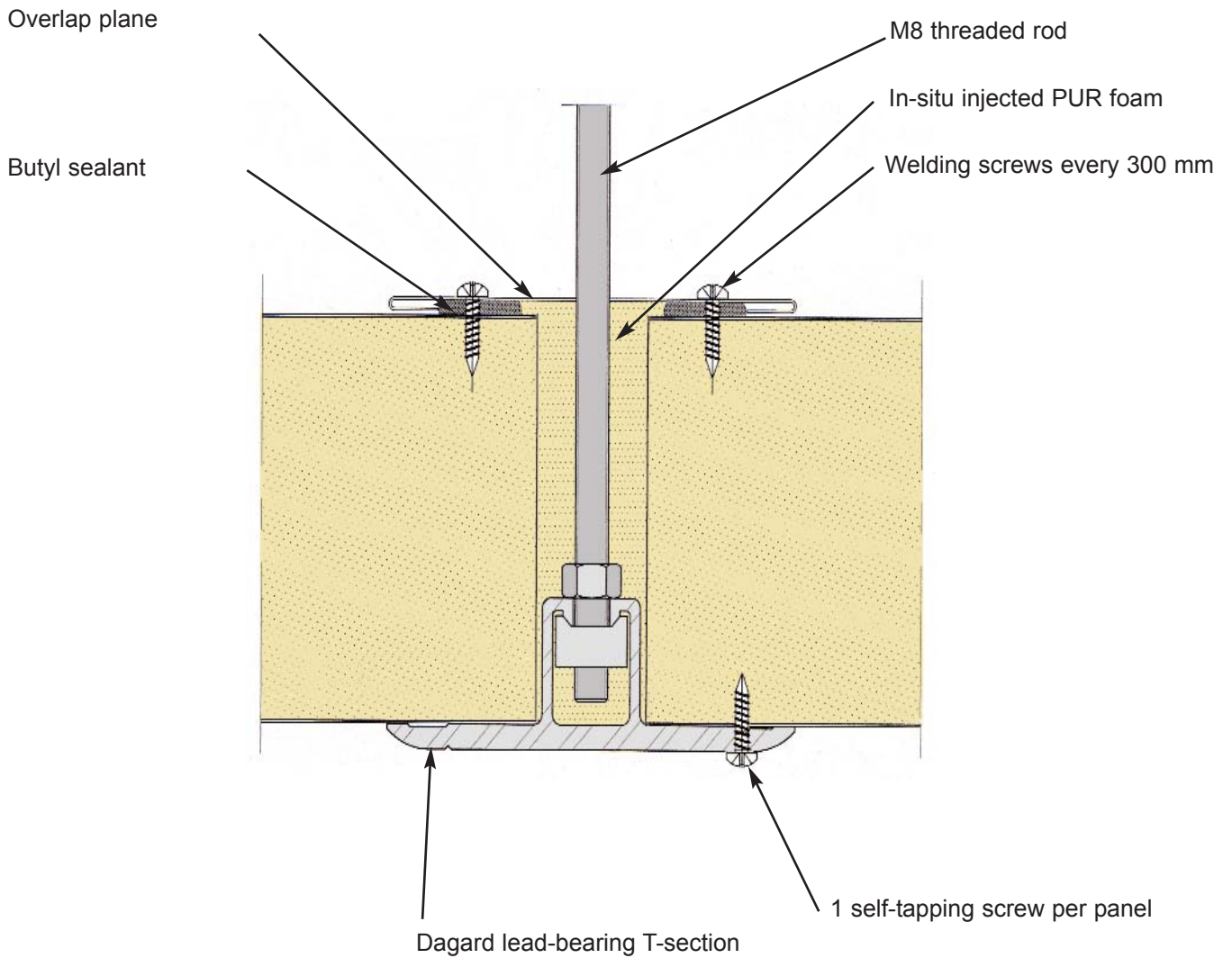
Additional precautions

Since the building frame is outside, the fixings must be protected against the weather (upper cladding, weather bar above runner, etc.)

If no precautions have been taken against the rain, the following must be used:

- either stainless steel tapping screws
- or N° 1048 sleeves with stainless steel threaded rods

Ceilings: intermediate suspension by load-bearing T-section



MECHANICAL PERFORMANCES

Bending strength of panels

Wall panels

Inside partitions

Maximum admissible height without intermediate suspension

thickness	maximum admissible height without intermediate suspension
60	6.00 m
80	7.00 m
100	8.00 m
120	9.00 m
140	9.50 m
160	10.00 m
180	11.00 m
200	12.00 m
220	12.00 m

Outside walls

The walls must be stabilised in relation to the building frame.

The following data are examples of the maximum distance between panel supports required to meet the safety regulations and determine the number and position of stabilizing runners.

Maximum admissible distances between supports on an outside wall

thickness	maximum admissible distance between supports on an outside
60	3.00 m
80	3.50 m
100	4.00 m
120	4.00 m
140	4.00 m
160	4.50 m
180	4.50 m
200	5.00 m
220	5.00 m



Ceilings

Ceilings are considered to be accessible for maintenance only. An occasional point load of 150 daN is allowed.

Heavy traffic areas must be protected if necessary, particularly during initial construction.

Maximum admissible distance between bearings,
centre-to-centre distance between suspension frames

thickness	maximum admissible distance between bearers
60	4.00 m
80	5.20 m
100	6.00 m
120	6.50 m
140	7.00 m
160	7.00 m
180	7.50 m
200	8.00 m
220	8.00 m

overload: 30 kg/m² from 60 to 100 mm
40 kg/m² from 120 to 220 mm

These values are only given by way of information. A detailed study must be carried out in each case, taking into account the region (loads due to wind) and including the mechanical strength of fixings (see detail CSTB technical documents).

A FEW REMINDERS OF STANDARDS, TESTS AND CLASSIFICATIONS

Flame spread rating

It characterises the facility with which a material catches alight (flashover) and propagates fire. Each country uses its own set of test standards. Tests are carried out on test specimens. There is no simple correspondence between the different classifications.

French regulations, which are based on the combustible mass and the length and lifetime of flames produced during testing, uses the following classification system:

- M0 non-combustible
- M1 non-flammable
- M2 low flame spread
- M3 easy flame spread
- M4 very easy flame spread

Fire resistance

It characterises the fitness of a building component to fulfil its function, even in a fire.

The international standard ISO 834 defines classifications based on three criteria expressed in terms of time

- Fire stability: mechanical strength of a component
- Flame retardance: mechanical strength + propensity to flashover
- Fire resistance: mechanical strength + propensity to flashover + thermal insulation (the temperature must not exceed 140°C on average, and 180° at any point on the surface opposite the fire).

Position of insurers: mock-up tests

To limit risks, Insurance Companies and their representatives (APSAD, FM, etc.) recommend that non-combustible materials be used whenever possible.

Half or full-scale mock-up tests are carried out in conjunction with test laboratories.

Tests carried out at the CNPP resulting in APSAD "Pa" classifications:

1st test: ignitability test on a test specimen

2nd test: full-scale test "Direct attack of flames on a full-scale mock-up".

These tests led to Pa2 classification.

Euroclasses

In order to harmonise reaction-to-fire classifications and test methods within the European Union, a European Directive has been published to coordinate the systems of member countries (94/611/EC of January 2001).

In the long term, Euroclasses will replace the classification system used by each individual country (Uno in Italy, M in France, 0 and 1 in Great Britain, etc.).

Seven classes have been defined, from A to F:

- Classes A1 and A2 are reserved for non-combustible materials
- Class B: very limited contribution to fire development
- Class C: limited contribution to fire
- Class D: acceptable contribution to fire and satisfies the SBI test
- Class E: acceptable contribution to fire and satisfies the small flame test
- Class F: no test, or materials not admitted to class E.

Five test methods are recommended:

- The non-combustibility furnace test (draft EN ISO 1182)

This test identifies products that do not contribute to fire development and covers Euroclasses 1 and 2.

- The bomb calorimeter test (draft EN ISO 1716)

This test is used to measure the gross calorific value of a material in an atmosphere of oxygen. It covers Euroclasses A1 and A2.

- The SBI or Single Burning Item test (EN ISO 9705)

This test is used to determine the contribution of a product to fire development in a scenario that simulates the combustion of an isolated object in the corner of a room.

The fire can be fully developed. This test covers Euroclasses B, C and D.

- The small flame ignitability test (draft EN ISO 11925-2)

This ignitability test is carried out before all the others. If it fails, the product is classified in Euroclass F.

Three results are calculated at the end of the test:

- FIGRA (fire growth rate index expressed in kW/s)
- SMOGRA (smoke growth rate index in m/s)
- THR (total heat release)

The Euroclass for the tested materials is determined according to the values obtained.

Euroclasses are combined with a smoke index of s1, s2 or s3 and a drop index of d0, d1 or d2.

N.B. The French classification system (M classification) and the Euroclass system will coexist up until 2006.

Correspondence table for French M classes and Euroclasses

An order signed by the Minister of the Interior on 21st November 2002 defines the new reaction to fire test methods and classifications for building products.

Requirement	Classes	Smoke index	Drip index
Non-combustible	A1		
M0	A2	s1	d0
M1	A2	s1	d1
		s2	d0
		s3	d1
	B	s1	d0 ou d1
		s2	
		s3	
M2	C	s1	d0 ou d1
		s2	
		s3	
M3 M4 (non-drip)	D	s1	d0 ou d1
s2			
s3			
M4	All classes other than e-d25 or F		

Classes as per
EN 13 501-1

N.B. The fire regulations for sandwich panels have not yet been completed. Work is being carried out on a European level. The CE marking system currently being developed should enable the specific properties of these products to be defined.



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