

# Fire Resistant partition LM

Metallic facings and mineral wool core



example panel with incombustible key

The LM “fire resistance” panel is industrialized panel, which answers specifically to “fire safety” properties.

Those partitions are used as well for new buildings as for layout of existing premises.

Their design in non combustible materials and their specific installation enable to get an excellent fire resistance.



## Characteristics

Width : 116 cm 3.8'

| Panels                                      | LM80                                 | LM100                                | LM120                                |
|---|--------------------------------------|--------------------------------------|--------------------------------------|
| Thicknesses mm                              | 80 3.15''                            | 100 3.94''                           | 120 4.72''                           |
| Mineral wool core Density kg/m <sup>3</sup> | 120 7.5 lb/ft <sup>3</sup>           | 120 7.5 lb/ft <sup>3</sup>           | 120 7.5 lb/ft <sup>3</sup>           |
| Weight kg/m <sup>2</sup> *                  | 17,6 3.6 lb/ft <sup>2</sup>          | 20 4.1 lb/ft <sup>2</sup>            | 22,4 4.6 lb/ft <sup>2</sup>          |
| Uc W/m <sup>2</sup> °C                      | 0,477 0.08 Btu/h.ft <sup>2</sup> /°F | 0,387 0.07 Btu/h.ft <sup>2</sup> /°F | 0,325 0.06 Btu/h.ft <sup>2</sup> /°F |
| R m <sup>2</sup> .K/W                       | 2,1                                  | 2,58                                 | 3,07                                 |

\* density 120 kg + 2 faces 6/10° (vertical panels)

## Facings

| Supports  | Coatings according to NF EN 10169  | Thicknesses (in mm) |             |            | Class according to XP P 34-301 |
|---|--|---------------------|-------------|------------|--------------------------------|
|   |  | 0,5 0.02''          | 0,6* 0.02'' | 0,8 0.03'' |                                |
| Steel sheet S280 GD, hot-dip galvanised Z225 (225g/m <sup>2</sup> of zinc on the 2 faces) or similar.<br>Smooth, ribbed (pace of 50 mm, rib depth 0,6 mm), micro ribbed (pace of 25 mm, rib depth 2 mm) | coated with polyester 25 µm lacquer  | 0,5 0.02''          | 0,6* 0.02'' | 0,8 0.03'' | IIIa                           |
|   | coated with PVDF 35 µm lacquer   |                     | 0,6         |            | IVb                            |
|   | coated with PVC 120 µm   |                     | 0,6         |            | Vc                             |
|   | coated with a complex of polyester lacquer and PET film of total thickness 55 µm |                     | 0,6         |            | Vc                             |

\* standard facing

Standard colour : iceberg white (close to RAL 9010)

NB: on request, the two facings can be of different materials on inside and outside faces (aspect, colour and/or thickness)

## Core

Mineral wool core bonded on facings with polyurethane glue.

Density : 120 kg /m<sup>3</sup> 7.5 lb/ft<sup>3</sup>

Thermal conductivity :  $\lambda = 0,041$  W/m.K. 0.024 Btu.ft/h.ft<sup>2</sup>.°F

# Fire Resistant partition LM

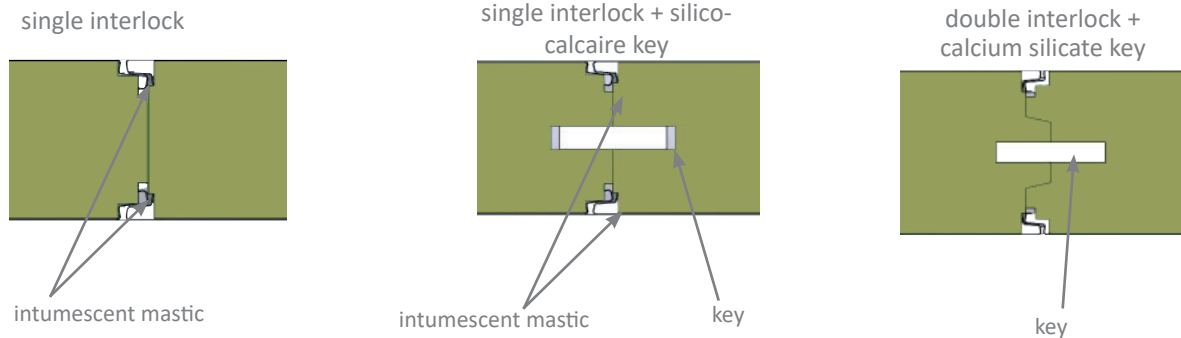
Metallic facings and mineral wool core

## Assembly according to the fire resistance class

### Vertical

#### Assembly according to the fire resistance class.

- by single interlock + intumescent mastic
- by single interlock + silico-calcaire key + fire mastic
- by double interlock + calcium silicate key



#### Finishing and tightness

- silicone caulk
- silicone caulk + butyl seal

#### Connection

Mechanical fixing by angle iron.

## Fire resistance

### Vertical or horizontal walls layout

European class according to EN13501-2 standard

| Fire resistance                                | 60 mn  |  | 90 mn  | 120 mn  |  | 180 mn   |
|--|--|--|--|---|--|--|
| class  | EI60   |  | EI90   | EI120   |  | EI180  |
| <b>PV Efectis - vertical mounting</b>          | <b>11-A-194</b><br>maxi height<br>between support<br>5,4 m 17.7' | <b>08-U-129</b><br>maxi height<br>between support<br>6,4 m 21' | <b>08-U-129</b><br>maxi height<br>between support<br>5,9 m 19.4' | <b>08-U-129</b><br>maxi height<br>between support<br>5,4 m 17.7'      | <b>11-V-101</b><br>maxi height<br>between support<br>4 m 13.1' | <b>07-V-421</b><br>maxi height<br>between support<br>4 m 13.1' |
| <b>PV Efectis - horizontal mounting</b>        |  |  |  | <b>09-G-141</b><br>maxi center<br>distance between<br>posts 6 m 19.7' |  |  |
| <b>PV horizontal mounting + metallic posts</b> |  |  |  | EFR-15-000918   |  |  |
| Panels thicknesses mini                        | LM80   | LM120  | LM120  | LM120   | LM120  | LM120  |
| Junction                                       | single + silico<br>calcaire key + fire<br>mastic                 | double + silicate of calcium key                               |  |   | single +<br>intumescent<br>mastic                              | double +<br>silicate of<br>calcium key                         |

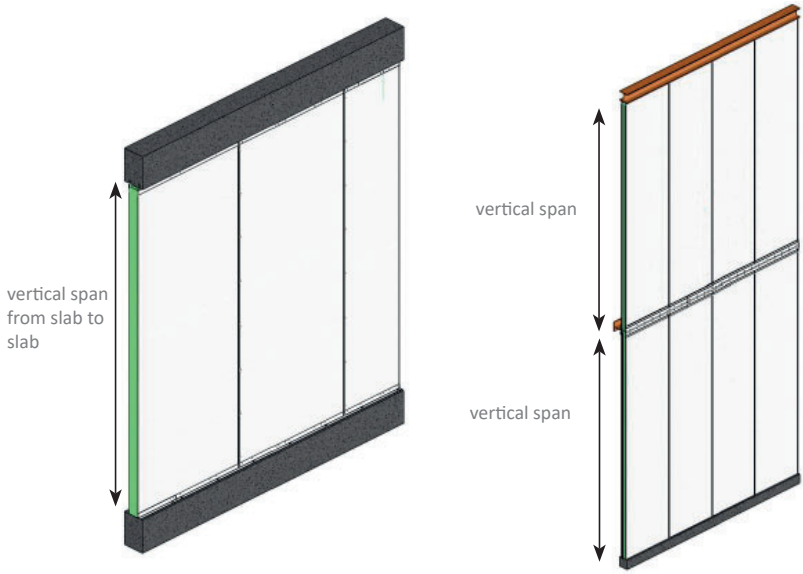
## Reports and approvals

Fire reaction : A2-s1,d0

FM global approval Standard 4880

# Connections Fire resistant LM

## Wall vertical laying



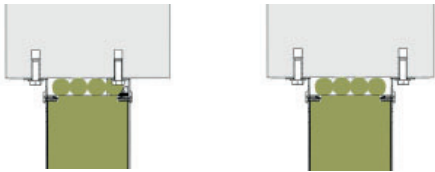
### Floor connection

with angle iron

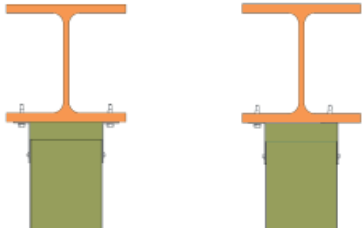


### Wall/wall or wall/ceiling connection

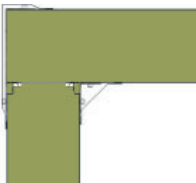
under slab



under structural steel



### Connection in vertical angle



### Connection wall/concrete wall

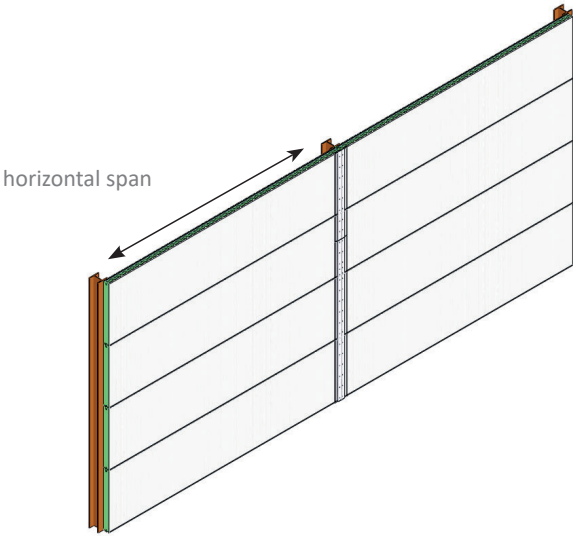


### Fixing on framework



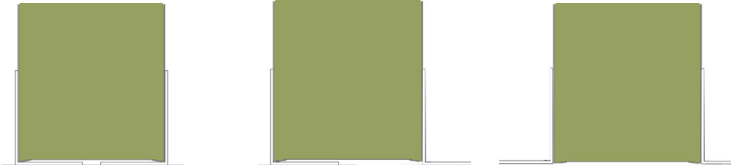
# Connections Fire resistant LM

## Wall horizontal laying



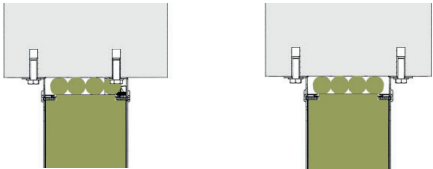
### Floor connection

with angle iron

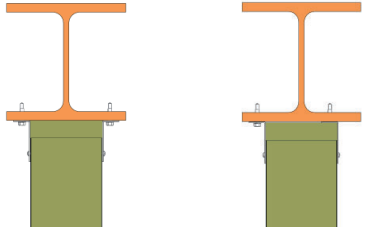


### Wall/wall or wall/ceiling connection

under slab

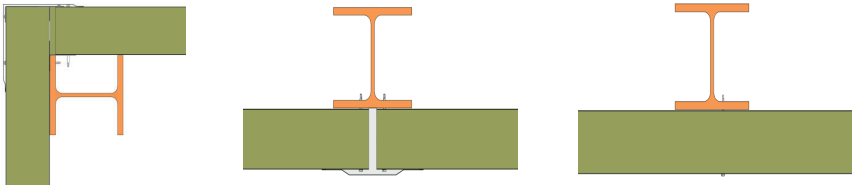


under structural steel



### Fixing on framework

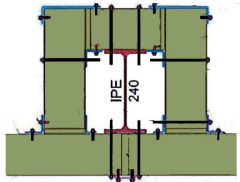
The exposed steel structure has to be protected against fire (specific paint or containment).



### Connection wall/concrete wall



### Protection of the structures with panels





The fire resistant glazings are mounted on LM80 and LM120 fire resistant panels.

## Characteristics

### Composition

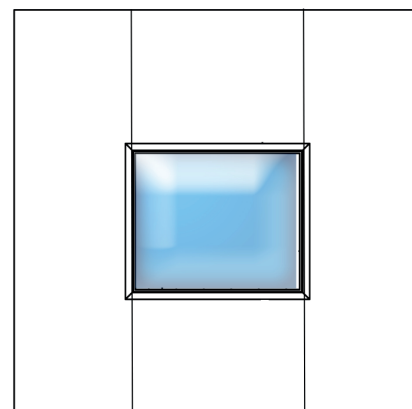
#### variant EI30

- 1 specific fire resistant glass
- 2 laminated glasses 33-2 bonded on the frame

#### variant EI60

- 1 specific fire resistant glass
- 2 hardened glasses 6 mm 0.24"

lacquered steel frame - colours according to the Dagard chart  
finishing with silicone caulk and intumescent joint



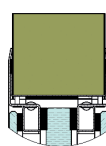
#### EI30 :

- dimensions maxi : 1000 x 1200 mm 3.28' x 3.94'
- maxi spandrel 1200 mm 3.94' from the floor

#### EI60 :

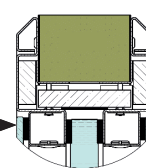
- dimensions maxi : 1200 x 1200 mm 3.94' x 3.94'
- maxi spandrel 1400 mm 4.59' from the floor

#### EI30-E45

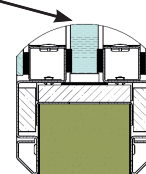
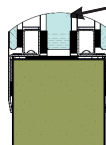


flush single glass

#### EI60



fire resistant glazing



## Fire resistance performances

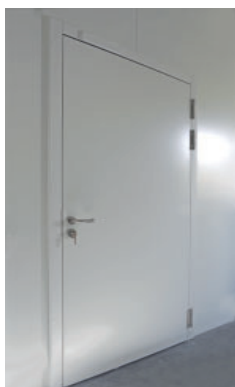
EI30-E45 or EI60

Approval on request

# Fire resistant service door DAGfeu EI<sub>2</sub>60

on fire resistant LM panels or plaster board type partitions

GSP-0706-E/B



The fire resistant service door “DAGfeu” is designed for passage of staff in rooms with similar temperatures and controlled environment.

It is hygienic and easy to clean. The materials suit common environments.

Its guaranteed (test reports) fire resistance performances meet to fire safety requirements.

The door DAGfeu is mounted on Dagard LM fire resistant panels of minimum thickness 80 mm 3.15”, or on fire resistant partitions 98/48 “gypsum” type.

## Characteristics

|          | Standard clear opening |           | Leaf         |               |                      | Cutout         |           | Overall        |           |
|----------|------------------------|-----------|--------------|---------------|----------------------|----------------|-----------|----------------|-----------|
|          | Height                 | Width     | Height       | Width         | Weight               | Height         | Width     | Height         | Width     |
| 1 leaf   | 2000<br>6.6'           | 800 2.6'  | 2012<br>6.6' | 838 2.7'      | 105,00 kg 231 lb     | 2049,5<br>6.7' | 899 2.9'  | 2094,5<br>6.9' | 989 3.2'  |
|          |                        | 900 3'    |              | 938 3.1'      | 118,10 kg 260 lb     |                | 999 3.3'  |                | 1089 3.6' |
|          |                        | 1000 3.3' |              | 1038 3.4'     | 131,20 kg 289 lb     |                | 1099 3.6' |                | 1189 3.9' |
| 2 leaves | 2000<br>6.6'           | 1600 5.2' | 2012<br>6.6' | 2 x 814 2.7'  | 2 x 105,00 kg 231 lb | 2049,5<br>6.7' | 1699 5.6' | 2094,5<br>6.9' | 1789 5.9' |
|          |                        | 1800 5.9' |              | 2 x 914 3'    | 2 x 118,10 kg 260 lb |                | 1899 6.2' |                | 1989 6.5' |
|          |                        | 2000 6.9' |              | 2 x 1014 3.3' | 2 x 131,20 kg 289 lb |                | 2099 6.9' |                | 2189 7.2' |
| 2 leaves | 2200<br>7.2'           | 1600 5.2' | 2212<br>7.3' | 2 x 814 2.7'  | 2 x 115,45 kg 254 lb | 2249,5<br>7.4' | 1699 5.6' | 2294,5<br>7.5' | 1789 5.9' |
|          |                        | 1800 5.9' |              | 2 x 914 3'    | 2 x 129,90 kg 286 lb |                | 1899 6.2' |                | 1989 6.5' |
|          |                        | 2000 6.6' |              | 2 x 1014 3.3' | 2 x 144,30 kg 318 lb |                | 2099 6.9' |                | 2189 7.2' |

## Door frame

Monobloc frame and back frame in lacquered steel 15/10<sup>th</sup>, white colour. Installation on LM panels of thickness 80 mm 3.15” or 120 mm 4.72”.

Insulation by plaster strips. Intumescent seal on 3 sides

Fixing with screws + screw-cover caps.

## Leaf

Thickness : 54 mm 2.1”

Fire resistant and semi-insulated non-combustible core (mineral wool + plaster plates). Facings in lacquered steel 10/10<sup>th</sup>, coated with a white RAL 9010 polyester 25 µm lacquer, fixed on edge with stainless steel rivets.

Intumescent seal on 4 sides.

Safety bolts.

## Metal fittings

Stainless steel hinges and hardware.

Hand opening : right or left on request, the gate is opening outside the room.

Flexible seal

## Fire resistance

Fire resistance performance : EI<sub>2</sub>60

DAS (Safety device)

# Fire resistant service door DAGfeu EI<sub>2</sub>60

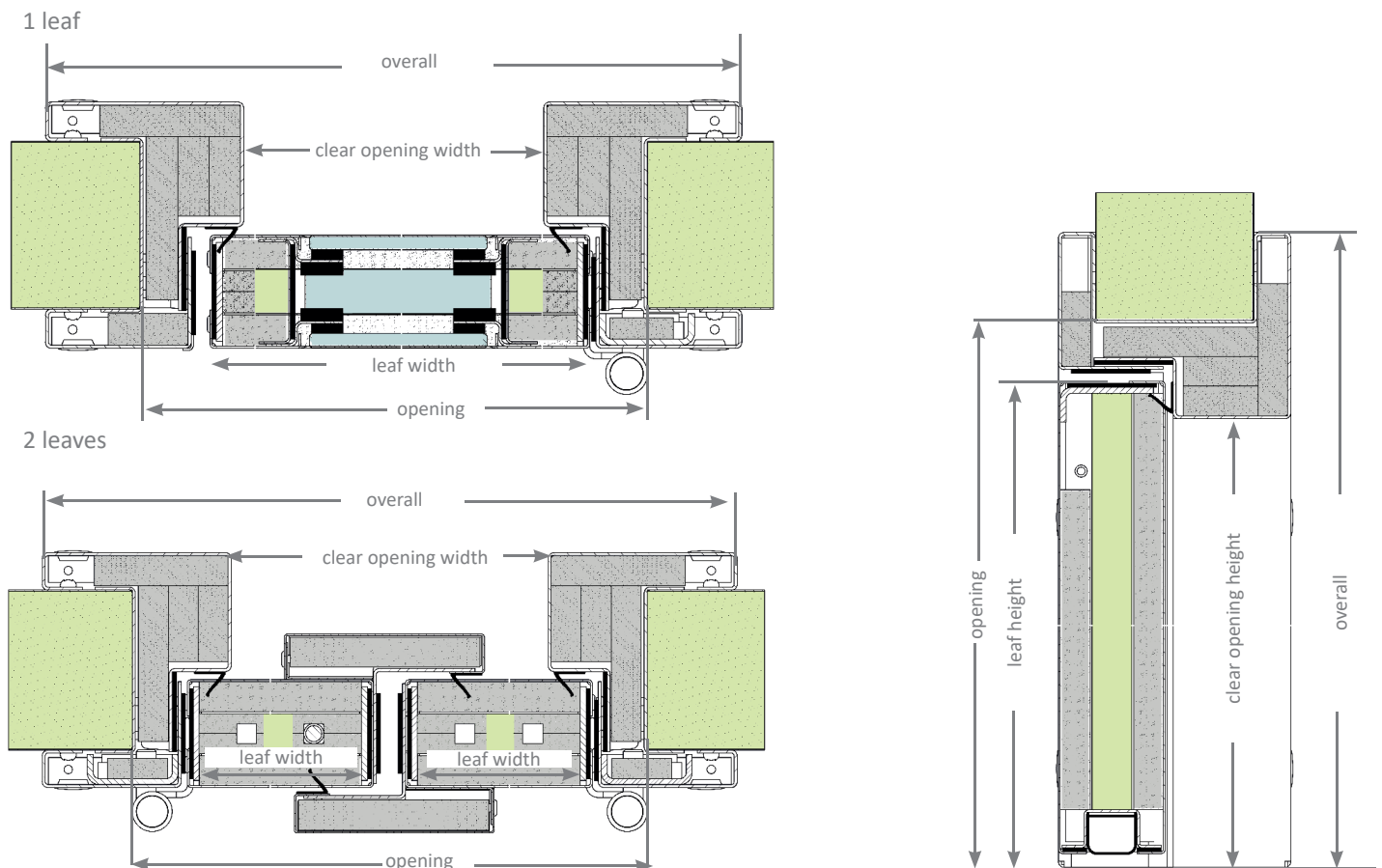
on fire resistant LM panels or plaster board type partitions

## Options

- Outside or inside stainless steel kick plate height 850 mm 2.8'
- Colour of door leaf and/or door frame according to chart
- Door closer TS93
- Flush double vision panel 600 x 300 mm 1.97' x 0.98'
- Integrated floor seal type «retractable sweeper gasket»
- Push bar type Crossbar
- Electromagnetic lock for airlock (for airlock management).
- Magnet to keep the door open
- Door frame and/or leaf in stainless steel 304 (or 316 on request, adapt the coatings according to the environment and conditions)

## Installation

- on panels or plaster board :



**Particular case: installation on «gypsum»** (according to French DTU 25-41-P1-1 Walls in plasterboard - Heavy doors) "Due to strong mechanical stresses caused by their function, the fixing of the doors must be made independently of the partition. The door frame must be fixed on a specific supporting frame, out of partition batch, the frame can be or not integrated in the partition."

Reminder of door's categories :

| category   | weight by unit                        | door DAGfeu EI <sub>2</sub> 60 | frame to provide |
|------------|---------------------------------------|--------------------------------|------------------|
| slight     | P < 50 daN 0.07 PSI                   |                                | standard         |
| heavy      | 50 daN 0.07 PSI < P < 90 daN 0.13 PSI |                                | reinforced       |
| very heavy | P > 90 daN 0.13 PSI                   | x                              | specific         |

# Fire resistant service door DAGfeu EI<sub>2</sub>60

on masonry



The fire resistant service door “DAGfeu” is designed for passage of staff in rooms with similar temperatures and controlled environment.

It is hygienic and easy to clean. The materials suit common environments.

Its guaranteed (test reports) fire resistance performances meet to fire safety requirements.

The door DAGfeu is mounted on classic masonry (thickness mini 200 mm 7.9”).

## Characteristics

### Door frame

Monobloc frame in lacquered steel 15/10<sup>th</sup>, white colour.

Insulation by plaster strips. Intumescent seal on 3 sides

Fixing with screws + screw-cover profile.

### Leaf

Thickness : 54 mm 2.1”

Fire resistant and semi-insulated non-combustible core (mineral wool + plaster plates). Facings in lacquered steel 10/10, coated with a white RAL 9010 polyester 25 µm lacquer, fixed on edge with stainless steel rivets.

Intumescent seal on 4 sides if no gasket. Safety bolts

### Metal fittings

Stainless steel hinges and hardware.

Hand opening : right or left on request, the gate is opening outside the room.

Flexible seal

### Options

- Outside or inside stainless steel kick plate height 850 mm 2.8’
- Colour of door leaf and/or door frame according to chart
- Door closer
- Flush double vision panel 600 x 300 mm 1.97’ x 0.98’
- Integrated floor seal type «retractable sweeper gasket»
- Push bar
- Electromagnetic lock for airlock (for airlock management).

Fire resistance performance : EI<sub>2</sub>60



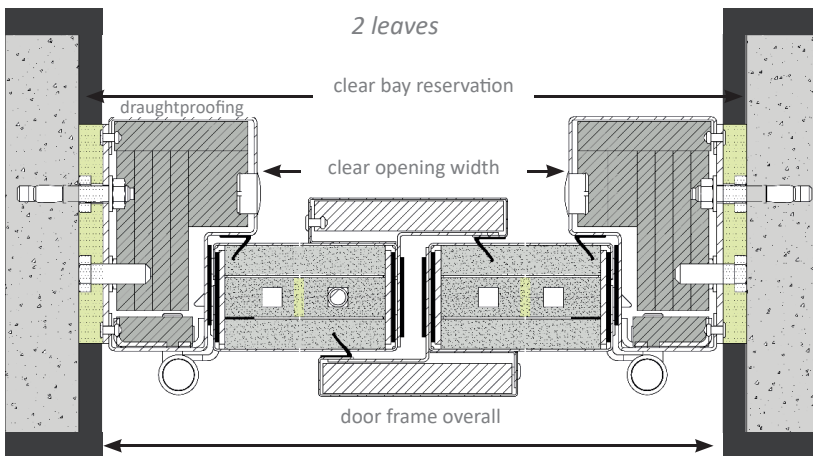
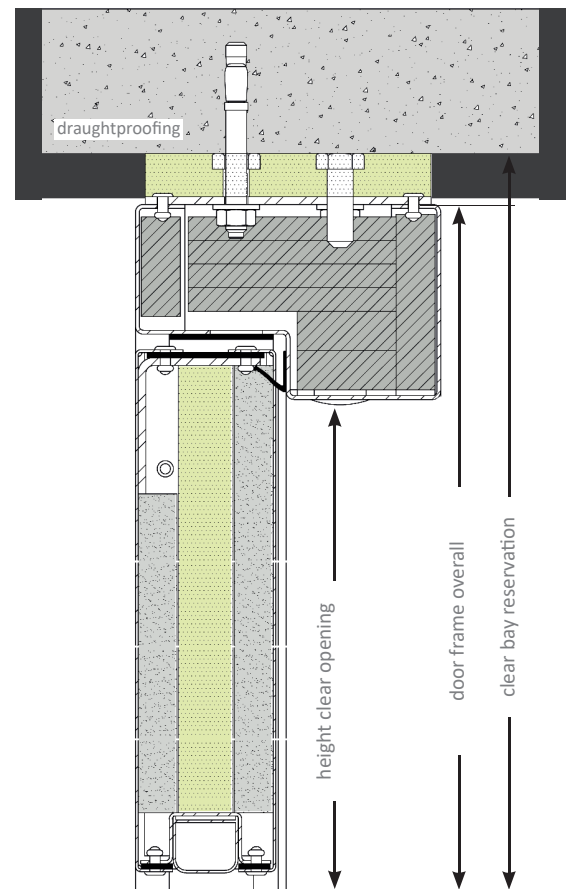
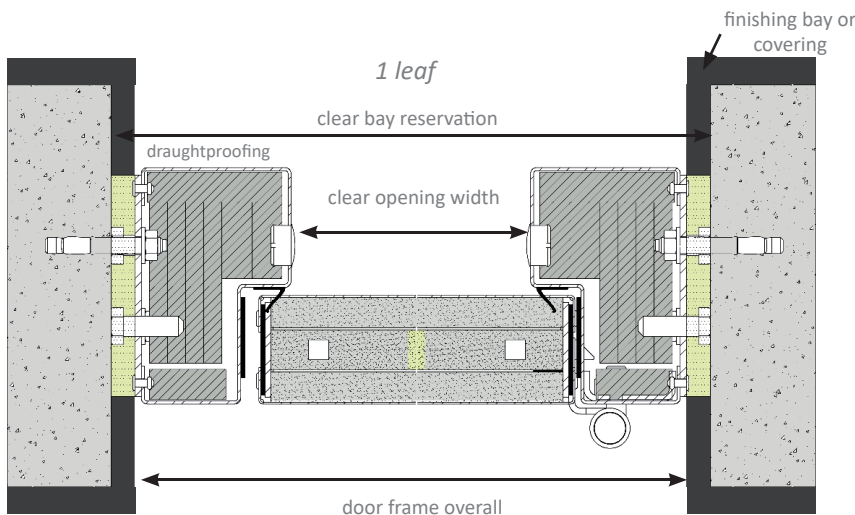
# Fire resistant service door DAGfeu EI<sub>2</sub>60

on masonry

## Assembly on board or in tunnel

Dimensions (mm)

|          | Standard clear opening |           | Leaf              | Door frame overall |            | Clear bay reservation |           |
|----------|------------------------|-----------|-------------------|--------------------|------------|-----------------------|-----------|
|          | Height                 | Width kg  | Weight kg         | Height             | Width      | Height                | Width     |
| 1 leaf   | 2000 6.6'              | 800 2.6'  | 105,00 231 lb     | 2074,5 6.8'        | 949 3.1'   | 2094 6.9'             | 979 3.2'  |
|          |                        | 900 3'    | 118,10 260 lb     |                    | 1049 3.4'  |                       | 1079 3.5' |
|          |                        | 1000 3.3' | 131,20 289 lb     |                    | 1149 3.8'  |                       | 1179 3.9' |
| 2 leaves | 2000 6.6'              | 1600 5.2' | 2 x 105,00 231 lb | 2074,5 6.8'        | 1749 5.7'  | 2094 6.9'             | 1779 5.8' |
|          |                        | 1800 5.9' | 2 x 118,10 260 lb |                    | 1949 6.4'  |                       | 1979 6.5' |
|          |                        | 2000 6.9' | 2 x 131,20 289 lb |                    | 2149 7.05' |                       | 2179 7.1' |
| 2 leaves | 2200 7.2'              | 1600 5.2' | 2 x 115,45 255 lb | 2274,5 7.5'        | 1749 5.7'  | 2294 7.5'             | 1779 5.8' |
|          |                        | 1800 5.9' | 2 x 129,90 286 lb |                    | 1949 6.4'  |                       | 1979 6.5' |
|          |                        | 2000 6.6' | 2 x 144,30 318 lb |                    | 2149 7.05' |                       | 2179 7.1' |



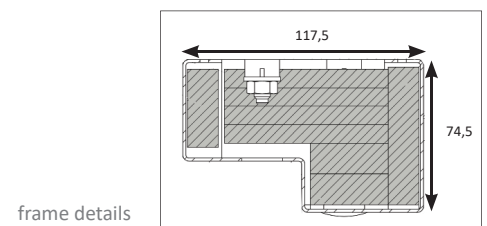
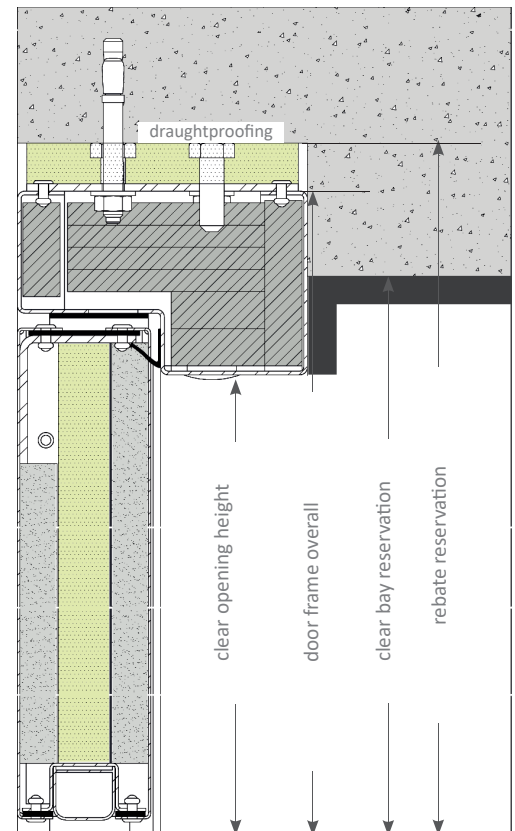
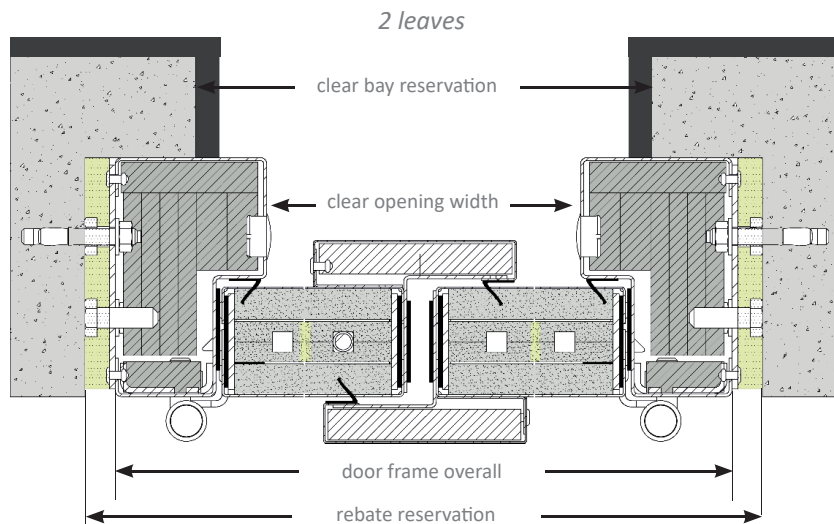
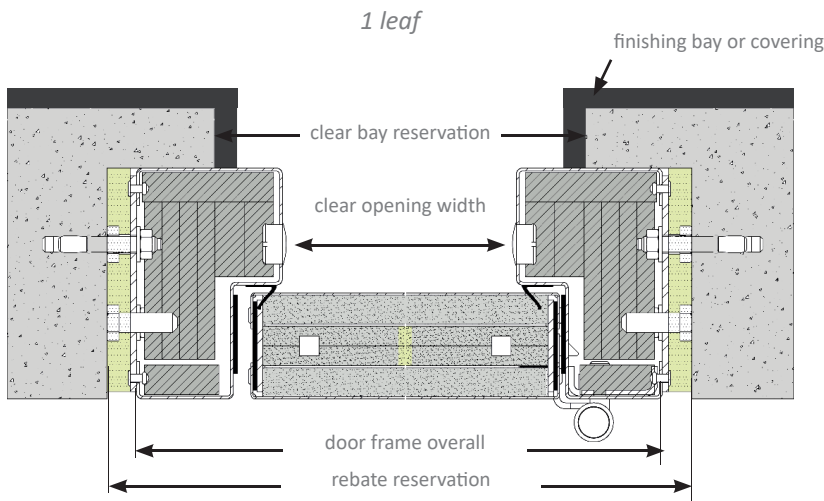
# Fire resistant service door DAGfeu EI<sub>2</sub>60

on masonry

## Assembly in rebate

Dimensions (mm)

|          | Standard clear opening |           | Leaf              | Door frame overall |            | Clear bay reservation |           | Rebate reservation |           |
|----------|------------------------|-----------|-------------------|--------------------|------------|-----------------------|-----------|--------------------|-----------|
|          | Height                 | Width     | Weight kg         | Height             | Width      | Height                | Width     | Height             | Width     |
| 1 leaf   | 2000 6.6'              | 800 2.6'  | 105,00 231 lb     | 2074,5 6.8'        | 949 3.1'   | 2040 6.7'             | 870 2.8'  | 2094 6.9'          | 979 3.2'  |
|          |                        | 900 3'    | 118,10 260 lb     |                    | 1049 3.4'  |                       | 970 3.2'  |                    | 1079 3.5' |
|          |                        | 1000 3.3' | 131,20 289 lb     |                    | 1149 3.8'  |                       | 1070 3.5' |                    | 1179 3.9' |
| 2 leaves | 2000 6.6'              | 1600 5.2' | 2 x 105,00 231 lb | 2074,5 6.8'        | 1749 5.7'  | 2040 6.7'             | 1670 5.5' | 2094 6.9'          | 1779 5.8' |
|          |                        | 1800 5.9' | 2 x 118,10 260 lb |                    | 1949 6.4'  |                       | 1870 6.1' |                    | 1979 6.5' |
|          |                        | 2000 6.9' | 2 x 131,20 289 lb |                    | 2149 7.05' |                       | 2070 6.8' |                    | 2179 7.1' |
| 2 leaves | 2200 7.2'              | 1600 5.2' | 2 x 115,45 255 lb | 2274,5 7.5'        | 1749 5.7'  | 2240 7.3'             | 1670 5.5' | 2294 7.5'          | 1779 5.8' |
|          |                        | 1800 5.9' | 2 x 129,90 286 lb |                    | 1949 6.4'  |                       | 1870 6.1' |                    | 1979 6.5' |
|          |                        | 2000 6.6' | 2 x 144,30 318 lb |                    | 2149 7.05' |                       | 2070 6.8' |                    | 2179 7.1' |





Locks for service doors DAGfeu are chosen in order to guarantee the life-span and the aesthetic of the door.

## Stainless steel handle

Stainless steel handle, with refined shape for harmonious aesthetic.

Handle length : 135 mm 5.3"

Handle diameter : 20 mm 0.8"

Rosette diameter : 52 mm 2"

Clearance : 60 mm 2.36"



## Rosette for European cylinder

Stainless steel,

Rosette diameter : 52 mm 2"



## Hinge

Non adjustable stainless steel hinge

Length 160 mm 6.3"

Axe diameter 9 mm 0.4"



# Retention suction cup

GSP-0712-E/B



Installed with fire resistant service doors DAGfeu, retention suction cups keep the doors open then in case of fire release them.

## Characteristics

Set on a fixed part, this suction cups ensure a magnetic retention of doors by the intermediate of a mounting plate. The retention is obtained by the supply of the suction cup. The release is obtained by a break of the supply or by a local control button.

Holding force : 20 daN *45 lbf*

Tension : 24 or 48 Vcc

Power : 0,6 W

Integrated signal with changeover contact

Suction cup equipped with ejector non persistent

Mounting : wall

Meets the standards NF S 61 937 and EN 1155.

## Operation principle

supplied suction cup



The retention of the piece is obtained when this one is in contact with the suction cup and we electrically supply the suction cup.

suction cup non supplied



The release of the piece is obtained by power interruption and implementation of an uncoupling effort upper than the persistent effort of the suction cup.



This fire resistant flush vision panels is set, as option, on fire resistant service doors DAGfeu.

## Characteristics

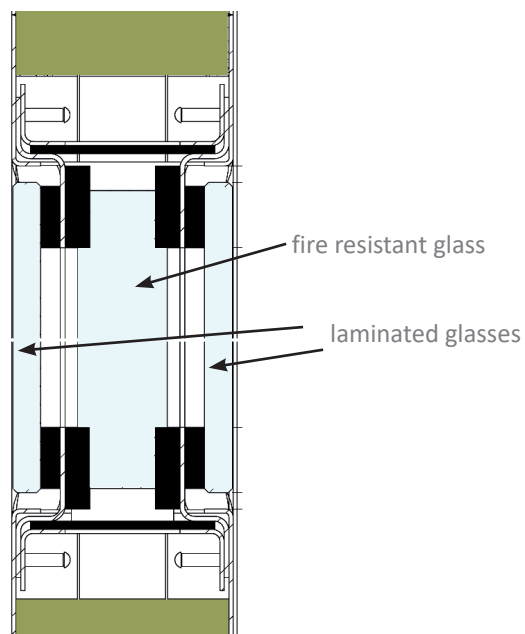
### Composition

1 fire resistant glass E160 thickness 23 mm 0.9"

2 laminated glasses 33-2 one on each side of the fire resistant glass.

The peripheral tightness is made by a silicone caulk and an intumescent seal.

Glazing clear dimensions : ht 600 x 300 mm 23.6" x 11.8"



# Fire resistant ceiling LM

Metallic facings and mineral wool core



example panel with incombustible key

The LM “fire resistance” panel is industrialized panel, which answers specifically to “fire safety” properties.

Those partitions are used as well for new buildings as for layout of existing premises.

Their design in non combustible materials and their specific installation enable to get an excellent fire resistance.



## Characteristics

Width : 116 cm

| Panels                                      | LM80                                  | LM100                                | LM120                                |
|---|---------------------------------------|--------------------------------------|--------------------------------------|
| Thicknesses mm                              | 80 3.15"                              | 100 3.94"                            | 120 4.72"                            |
| Mineral wool core Density kg/m <sup>3</sup> | 135 8.4 lb/ft <sup>3</sup>            | 135 8.4 lb/ft <sup>3</sup>           | 135 8.4 lb/ft <sup>3</sup>           |
| Weight kg/m <sup>2</sup> *                  | 19,8 4.1 lb/ft <sup>2</sup>           | 22,5 4.6 lb/ft <sup>2</sup>          | 25,2 5.2 lb/ft <sup>2</sup>          |
| Uc W/m <sup>2</sup> °C                      | 0,484 0.085 Btu/h.ft <sup>2</sup> /°F | 0,391 0.07 Btu/h.ft <sup>2</sup> /°F | 0,329 0.06 Btu/h.ft <sup>2</sup> /°F |
| R m <sup>2</sup> .K/W                       | 2,07                                  | 2,55                                 | 3,04                                 |

\* density 135 kg + 1 face 5/10e and 1 face 6/10e (ceiling panel)

## Facings

| Supports  | Coatings according to NF EN 10169  | Thicknesses (in mm) |            |           | Class according to XP P 34-301 |
|---|--|---------------------|------------|-----------|--------------------------------|
|   |  | 0,5 0.02"           | 0,6* 0.02" | 0,8 0.03" |                                |
| Steel sheet S280 GD, hot-dip galvanised Z225 (225g/m <sup>2</sup> of zinc on the 2 faces) or similar.<br>Smooth, ribbed (pace of 50 mm, rib depth 0,6 mm), micro ribbed (pace of 25 mm, rib depth 2 mm) | coated with polyester 25 µm lacquer  | 0,5 0.02"           | 0,6* 0.02" | 0,8 0.03" | IIIa                           |
|   | coated with PVDF 35 µm lacquer   |                     | 0,6        |           | IVb                            |
|   | coated with PVC 120 µm   |                     | 0,6        |           | Vc                             |
|   | coated with a complex of polyester lacquer and PET film of total thickness 55 µm |                     | 0,6        |           | Vc                             |

\* standard facing

Standard colour : iceberg white (close to RAL 9010)

NB: on request, the two facings can be of different materials on inside and outside faces (aspect, colour and/or thickness)

## Core

Mineral wool core bonded on facings with polyurethane glue.

Density :135 kg 8.4 lb/ft<sup>3</sup>

Thermal conductivity :  $\lambda = 0,041$  W/m.K. 0.024 Btu.ft/h.ft<sup>2</sup>.°F

# Fire resistant ceiling LM

Metallic facings and mineral wool core

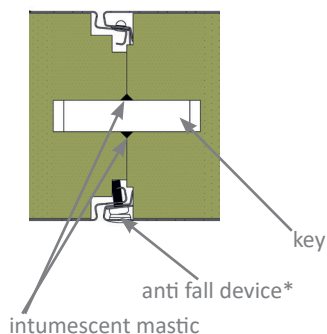
## Assembly according to the fire resistance class

### Ceiling

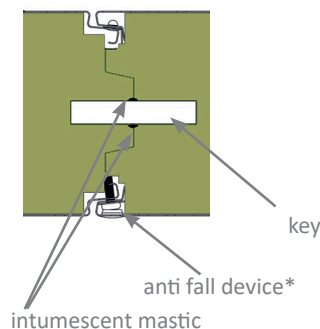
#### Assembly according to the fire resistance class.

- by single interlock + silico-calcaire key + fire mastic + anti fall device for sheets
- by double interlock + calcium silicate key + intumescent mastic + anti fall device for sheets

single interlock + silico-calcaire key +  
fire mastic + anti fall device for sheets



double interlock + calcium silicate key +  
intumescent mastic + anti fall device for  
sheets



\*Anti fall system : punctual sheet metal screws below the interlocking, with flush PVC caps.

#### Finishing and tightness

- silicone caulk
- silicone caulk + butyl seal

## Fire resistance

|                         |   |             |  |
|-------------------------|---|-------------|--|
| Fire resistance         | 60 mn   | 90 mn       | 120 mn   |
| class                   | REI 60  | REI 90      | REI 120  |
| PV Efectis              | 12 - A - 350  |             |  |
| Panels thicknesses mini | LM80  | LM100       | LM120  |
| Junction                | single + silico<br>calcaire key + fire mastic +<br>anti fall device |             | double + silicate of calcium key<br>+ intumescent mastic + anti fall<br>device |
| Maxi span (m)           | 2,5 m 8.2'<br>3 m 9.8' si non accessible                            | 3,5 m 11.5' | 3,5 m 11.5'  |

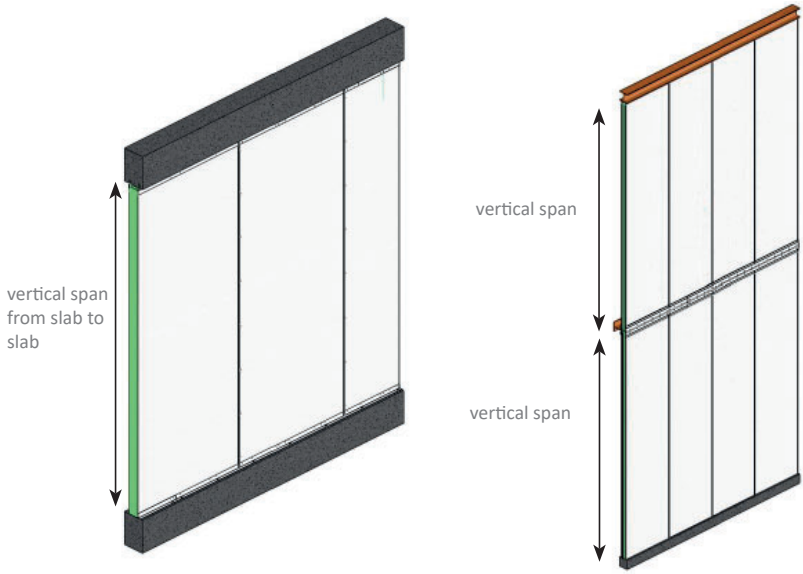
## Reports and approvals

Fire reaction : A2-s1,d0

FM global approval Standard 4880

# Connections Fire resistant LM

## Wall vertical laying



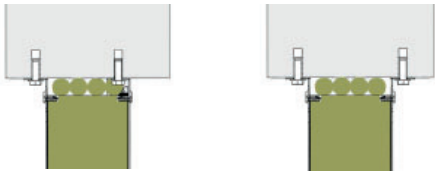
### Floor connection

with angle iron

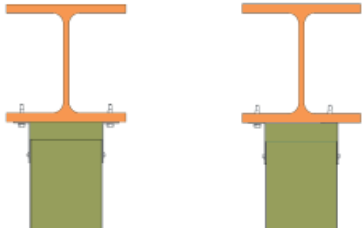


### Wall/wall or wall/ceiling connection

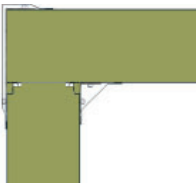
under slab



under structural steel



### Connection in vertical angle



### Connection wall/concrete wall



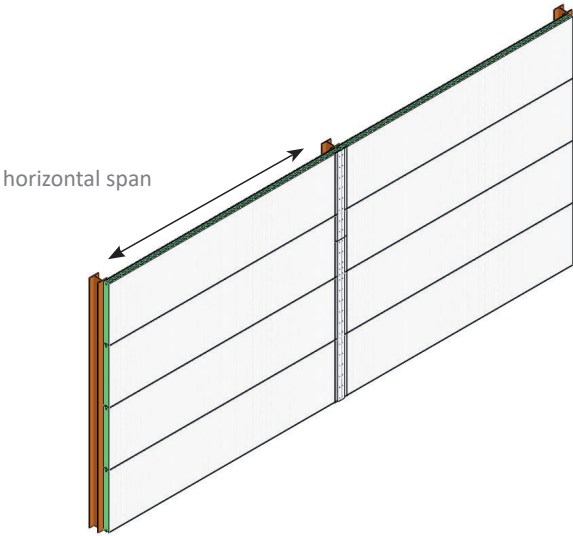
### Fixing on framework





# Connections Fire resistant LM

## Wall horizontal laying



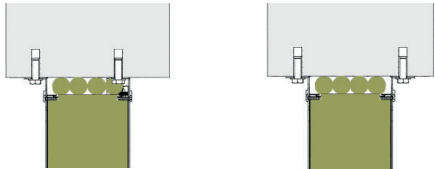
### Floor connection

with angle iron

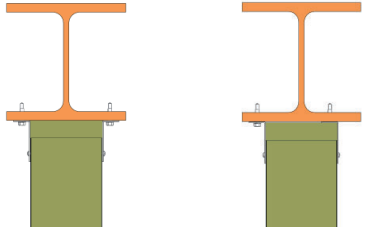


### Wall/wall or wall/ceiling connection

under slab

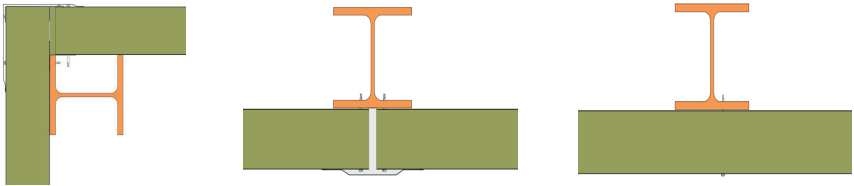


under structural steel



### Fixing on framework

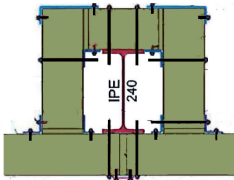
The exposed steel structure has to be protected against fire (specific paint or containment).



### Connection wall/concrete wall



### Protection of the structures with panels



You must define your project indoor and the outdoor type of atmosphere in order to select the most appropriate types of panel facings.

## Indoor atmosphere

With no clean room specific data, we have to reply on food and food processing industries classification for metallic panel facing types.

| Aggressivity                           | Cleaning                | Hygrometry | Temperature                     | Examples                          | Minimum category of appropriate coatings (NF P34.301) | Recommended coatings   |
|--|-------------------------|------------|---------------------------------|-----------------------------------|---|--|
| Ai 1<br>Non-aggressive environment     | Regular maintenance     | Low        | -40°C to +25°C<br>-40° to +77°F | Storage of wrapped dry products   | I   | Polyester 25 µm<br>PVDF 35 µm<br>PVC 120 µm<br>PET 55 µm<br>Stainless steel 304<br>Stainless steel 304 + PVC + PET |
| Ai 2<br>Non-aggressive environment     | Regular maintenance     | Average    | 0°C to +25°C<br>+32° to +77°F   | Storage in controlled atmosphere  | II  |  |
| Ai3<br>Non-aggressive environment      | No Intensive cleaning   | High       | 0°C to +25°C<br>+32° to +77°F   | Storage, processing moist ambient | IIIa  |  |
| Ai4<br>Slightly aggressive environment | No Intensive cleaning   | High       | 0°C to +30°C<br>+32° to +86°F   | Preparation of pre-cooked foods   | IVb   | PVDF 35 µm<br>PVC 120 µm<br>PET 55 µm<br>Stainless steel 304<br>Stainless steel 304 + PVC + PET                    |
| Ai5<br>Aggressive environment          | Intensive cleaning      | High       | 0°C to +35°C<br>+32° to +95°F   | Cooking rooms, dryers             | Vc  | PVC 120 µm<br>PET 55 µm<br>Stainless steel 304<br>Stainless steel 304 + PVC + PET                                  |
| Ai6<br>Very aggressive environment     | Very intensive cleaning | Saturated  | 0°C to +40°C<br>+32° to +104°F  | Showers washrooms                 | (*)   | Stainless steel 304 + PVC + PET<br>Stainless steel 316L  |

Extract from DTU 45.1 – Food handling facilities

N.B. :

- The table is provided as a guide only, the classes must be appropriate to the controlled conditions of each facility.
- A single parameter could justify the selection of ambient conditions (hygrometry, cleaning frequency, chemical aggressivity, salinity)

## Aggressivity criteria

- 1 – No aggressive ambient conditions: environment presenting no aggressivity due to corrosive chemical components and/or microorganisms.
- 2 – Slightly aggressive ambient conditions: environment with no aggressive ambient conditions but whose walls could occasionally be splashed with slightly aggressive liquids.
- 3 – aggressive ambient conditions: environment where acid, basic or saline acid vapours occur and/or with presence of microorganisms and/or likely to be subjected to disinfection.
- 4 – very aggressive ambient conditions: environment where acid, base or saline acid vapours or gas occur and/or with presence of microorganisms and/or frequent risk of splashing of walls and/or likely to be subjected to disinfection with aggressive products.

## Cleaning criteria

- 1 – regular maintenance: this involves regular supervision and occasional cleaning (frequency from one to several years according to the use of the facility) using non-aggressive methods and resources (no pressure washing).
- 2 – non-aggressive cleaning (usually on monthly basis): cleaning performed with neutral products at temperature of  $< 30^{\circ}\text{C}$   $86^{\circ}\text{F}$  and low pressure spraying of  $\leq 0.3\text{Mpa}$   $6\ 266\ \text{lbf/sq.ft.}$
- 3 – intensive cleaning (usually on daily basis): cleaning performed with neutral products (ph 5 to 9) at temperature of  $< 40^{\circ}\text{C}$   $104^{\circ}\text{F}$  and pressure of  $3.5\ \text{Mpa}$   $73\ 099\ \text{lbf/sq.ft.}$  (pressure of spray nozzle).
- 4 – very intensive cleaning (usually on daily basis): cleaning performed with occasional use of extreme pH ( $< 5$  or  $> 9$ ) and/or high temperature ( $< 60^{\circ}\text{C}$   $140^{\circ}\text{F}$ ) and/or high pressure washing (pressure  $< 5\text{Mpa}$   $104\ 430\ \text{lbf/sq.ft.}$  at output from nozzle and impact pressure  $< 0.04\text{Mpa}$   $835\ \text{lbf/sq.ft.}$ ).

## Humidity criteria

- 1 – humidity ambient conditions: ambient conditions are said to be «humid» where the hygrometry of the facility is high and if under the operating conditions of the facility there is a risk of condensation.
- 2 – very humid ambient conditions: ambient conditions are said to be very humid where the hygrometry of the facility is very high and if under the operating conditions of the facility the risk of condensation is frequent.
- 3 – saturated ambient conditions: ambient conditions are said to be saturated where the hygrometry of the facility is very high and if there is a permanent risk of condensation in the operating conditions of the premises.

## Outdoor atmosphere

Outdoor atmospheres are classified by categories in order to comply with NF P 34-301 specifications for the selection of panel facings.

|  | Rural or no polluted atmosphere<br>III | Urban or industrial atmosphere |       | Marine atmosphere                             |  |                               |       | Specific atmosphere |         |
|--|--|--------------------------------|-------|---|--|-------------------------------|-------|---------------------|---------|
|  |  | normal<br>III                  | harsh | 20 to 10 km<br><i>12.43 to 6.22 mi</i><br>III | 10 to 3 km<br><i>6.22 to 1.87 mi</i><br>IV | < 3 km<br><i>1.87 mi</i><br>V | mixte | high UV             | special |

Galvanized or coated with alloy (zinc and aluminium) steel

|   |     |     |   |     |     |   |   |   |   |
|---|-----|-----|---|-----|-----|---|---|---|---|
| Polyester 25 $\mu\text{m}$<br><i>1mil</i> | ● ● | ● ● | ● | ● ● | -   | - | - | - | ● |
| PVDF 35 $\mu\text{m}$ <i>1.3mil</i>       | ● ● | ● ● | ● | ● ● | ● ● | - | - | - | ● |

- unsuitable
- consult maker
- ● suitable

N.B.: the PET and PVC system are unsuitable for exterior use.

## Technical characteristics of the supports

- z225 hot-galvanized **pre-powder coated or lined steel sheet**, mini shade s280 GD+Z, according to standard NF EN 10326, thickness 0,50 mm *0.019"*, 0,63 mm *0.024"* or 0,75 mm *0.029"*

- **Stainless steel sheet** shades, thickness 0,60 mm *0.023"* or 0,80 mm *0.031"*

\* x5CrNi 18-10 (EN 1-4301 or AISI 304)

\* x2CrNiMo17-12-2 (EN 1-4404 or AISI 316L)

- **Pre-powder coated aluminium** shade EN AW.3004 H46 according to standard EN 1396, thickness 0,67 mm *0.026"*

## Test types and results of various panel facings on galvanized steel sheets

|   | Testing standards and conditions | Polyester powder coat 25 µm     | Conductive powder coat | PVDF powder coat 35 µm          | PVC film 120 µm                 | PET 55 µm system |
|---|----------------------------------|---------------------------------|------------------------|---------------------------------|---------------------------------|------------------|
| <b>Category</b>                               | XP P 34-301                      | IIIa                            |                        | IVb                             | Vc                              | Vc               |
| <b>Gloss</b>                                  | ISO 2813 (ECCA-T2) incidence 60° | 30 ± 6%                         | 30 ± 6%                | 30 ± 6%                         | 25%                             | 30 ± 6%          |
| <b>Shock resistance</b>                       | ISO 6272 (ECCA-T5)               | No loss of panel face adherence |                        |                                 |                                 |                  |
| <b>Adherence by bending</b>                   | ISO 1519 (ECCA-T7)               | 3t                              | 3t                     | 2t                              | 0t                              | 1t               |
| <b>Resistance to humidity</b>                 | ISO 6270 (ECCA-T9)               | ≥ 1000 h                        | ≥ 1000 h               | ≥ 1000 h                        | ≥ 1000 h                        | ≥ 1500 h         |
| <b>Resistance to neutral salt spray</b>       | ISO 7253 (ECCA-T8)               | ≥ 360 h                         | ≥ 360 h                | ≥ 500 h                         | ≥ 500 h                         | ≥ 500 h          |
| <b>Chalk hardness</b>                         | ISO 3270 (ECCA-T4)               | H                               | H                      | HB                              | 2H                              | 2H               |
| <b>Adherence to panel face (grid pattern)</b> | ISO 2409                         |                                 | Class «0»              |                                 |                                 |                  |
| <b>Panel face resistance to heat</b>          | ISO 3270 (ECCA-T13)              | 100 h to 80°C 176°F<br>ΔE ≤ 0,1 |                        | 100 h to 70°C 158°F<br>ΔE ≤ 0,1 | 100 h to 70°C 158°F<br>ΔE ≤ 0,1 |                  |
| <b>Resistance to abrasion</b>                 | ISO 7784                         | 40 mg                           | 5.6 mg                 | 30 mg                           | 10 mg                           |                  |
| <b>Reaction to fire</b>                       | NF P 92-507                      | M0                              | M0                     | M0                              | M1                              | M0               |
| <b>Surface resistivity</b>                    | ASTM D257                        | 10 <sup>11</sup> Ω/□            | 10 <sup>7</sup> Ω/□    |                                 |                                 |                  |

## Special warning for HPL panel face

Compact laminated sheets are very sensitive to hygrometry conditions : high variation of dimensions under extreme high or low ambient humidity can occur.

For that reason, several precautions must be taken at the different production or delivery stages : HPL sheets or finished HPL panels must be stored under tight controlled ambient conditions: from 10 to 30°C 50°F to 86°F and relative humidity 40 to 60 %). Finished HPL panels should not be used under high temperature and/or high relative humidity conditions.

Storage and working conditions : The 2 sides of the HPL panels must remain aerated and within the average temperature range of 10 to 30°C 50°F to 86°F and relative humidity from 40 to 60 %.

Ignoring these warnings, bending or twisting of the HPL panels may occur.

## Resistance of panel faces to chemical products

Information given as a guide only

| Coatings   |                 | Polyester lacquer | Conductive lacquer | PVDF 35 µm<br>1.38 mils | PVC 120 µm<br>4.7 mils | PET 55 µm<br>2.16 mils | Compact laminated | Stainless steel 304 + PVC + PET | Stainless steel 304 | Stainless steel 316L |
|--|-----------------|-------------------|--------------------|-------------------------|------------------------|------------------------|-------------------|---------------------------------|---------------------|----------------------|
| Chemical products  | Chemical family |                   |                    |                         |                        |                        |                   |                                 |                     |                      |
| Acetone  | Ketone          | ⊖                 | ⊖                  | ⊖                       | ⊖                      | ⊖                      | ☺                 | ☺                               | ☺                   | ☺                    |
| Acetic acid (CH <sub>3</sub> COOH) (vinegar) 10%             | Acid            | ⊖                 | ⊖                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| Hydrochloric Acid (HCl) 10%                                  | Acid            | ⊖                 | ⊖                  | ⊖                       | ⊖                      | ☺                      | ☺                 | ✓                               | ⊖                   | ☺                    |
| Nitric acid (H <sub>2</sub> NO <sub>3</sub> ) 10%            | Acid            | ⊖                 | ⊖                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| Phosphoric acid (H <sub>3</sub> PO <sub>4</sub> ) 10%        | Acid            | ⊖                 | ⊖                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| Sulphuric acid (H <sub>2</sub> SO <sub>4</sub> ) 10%         | Acid            | ⊖                 | ⊖                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| Ethyl alcohol - Methylated spirit                            | Alcohol         | ☺                 | ☺                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| Isopropyl alcohol  | Alcohol         | ☺                 | ☺                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| Ammonia - NH <sub>4</sub> OH                                 | Base            | ⊖                 | ⊖                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| Ammonium bisulphite  | Salt            | ☺                 | ☺                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| Buthanol   | Alcohol         | ☺                 | ☺                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| Sodium hypochlorite - NaClO (Javel water) high concentration |                 | ⊖                 | ⊖                  | ⊖                       | ⊖                      | ☺                      | ☺                 | ✓                               | ☺                   | ☺                    |
| Therebentine   | Alcohol         | ☺                 | ☺                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| MEK (Methyl ethyl Ketone)                                    | Ketone          | ⊖                 | ⊖                  | ⊖                       | ⊖                      | ⊖                      | ☺                 | ⊖                               | ☺                   | ☺                    |
| Methanol   | Alcohol         | ☺                 | ☺                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |

**Caption**    ⊖ Prohibited    ☺ Recommended    ✓ Suitable To be studied case by case

## Resistance of panel faces to chemical products

Information given as a guide only

| Coatings  |                 | Polyester lacquer | Conductive lacquer | PVDF 35 µm<br>1.38 mils | PVC 120 µm<br>4.7 mils | PET 55 µm<br>2.16 mils | Compact laminated | Stainless steel 304 + PVC + PET | Stainless steel 304 | Stainless steel 316L |
|---|-----------------|-------------------|--------------------|-------------------------|------------------------|------------------------|-------------------|---------------------------------|---------------------|----------------------|
| <b>Chemical products</b>                            | Chemical family |                   |                    |                         |                        |                        |                   |                                 |                     |                      |
| <b>Phenol</b>                                       | Alcohol         | ☺                 | ☺                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| <b>Potash - Potassium hydroxide - KOH - 10%</b>     | Base            | ☹                 | ☹                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| <b>Alkaline industrial soap</b>                     | Base soap       | ☹                 | ☹                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| <b>Chlorinated industrial soap</b>                  | Neutral soap    | ☹                 | ☹                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| <b>No chlorinated industrial soapé</b>              | Neutral soap    | ☺                 | ☺                  | ☺                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |
| <b>Kitchen salt (Sodium chloride - NaCl)</b>        | Salt            | ☹                 | ☹                  | ☹                       | ☹                      | ☹                      | ☺                 | ☺                               | ☺                   | ☺                    |
| <b>Kitchen salt + use of acidic cleaning agents</b> | Salt + Acid     | ☹                 | ☹                  | ☹                       | ☹                      | ☹                      | ☹                 | ☑                               | ☹                   | ☺                    |
| <b>Sodium hydroxide - NaOH - 10%</b>                | Base            | ☹                 | ☹                  | ☹                       | ☺                      | ☺                      | ☺                 | ☺                               | ☺                   | ☺                    |

## Panel face resistance to hydrogen peroxide H2O2 (oxygenated water) (fogging tests)

| Materials                        | Pre-coated sheet - polyester 25 µm<br>0.98 mil<br>- PVDF 35 µm 1.38 mil<br>- lacquer thk. ≤ 50 µm 1.97 mil | Painted sheets - paint 50 µm 1.97 mil ≤ thk. < 80 µm 3.15 mil | Painted sheets - paint thk. ≥ 80 µm 3.15 mil | Film clad sheets (process) - PET 55 µm 2.16 mil - PVC 120 µm 4.7 mils | Compact laminated | Stainless steel 304 + PVC + PET | Untreated stainless steel 304, 316L, |
|----------------------------------|--|---|--|---|-------------------|---------------------------------|--------------------------------------|
| <b>Decontamination frequency</b> |  |   |  |   |                   |                                 |                                      |
| <b>Low</b>                       | ☹  | ☹   | ☑  | ☺   | ☺                 | ☺                               | ☺                                    |
| <b>Average</b>                   | ☹  | ☹   | ☑  | ☺   | ☑                 | ☺                               | ☺                                    |
| <b>High</b>                      | ☹  | ☹   | ☹  | ☑   | ☑                 | ☑                               | ☺                                    |

Refer to Chapter 12 – Panel face shade chart for further information.



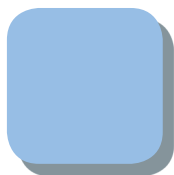
Midnight blue  
RAL 5011



Pacific blue  
RAL 5010



Horizon blue  
RAL 5015



Glacier blue  
Pantone 278C



Lagoon green  
RAL 6027



Meadow green  
RAL 6018



Forest green  
RAL 6029



Sulphur yellow  
RAL 1016



Pale orange  
Pantone 1495



Bright pink  
RAL 3015



Molten red  
RAL 3020



Canyon red  
RAL 3013



Storm grey  
RAL 7040



Pebble white  
RAL 9002



Iceberg white  
RAL 9010

Ours colours are close to RAL and Pantone references.