April 2006
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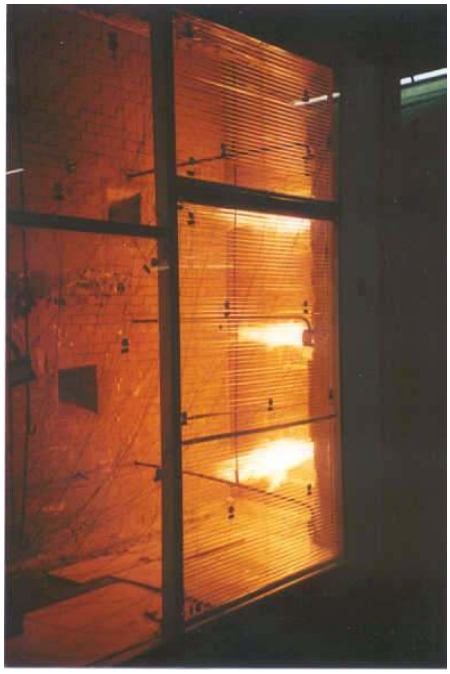
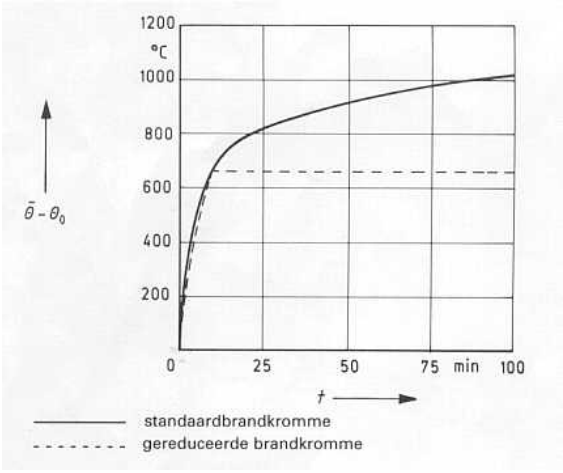
Fire safety





'Design the way you think'

Register

International Organization for Standardization

Österreichisches Normungsinstitut

Austrian Standards Institute

1- Standards

In today's Europe we make use of European harmonized standards as written down in the ETAG 003 when putting our partitioning systems to a test. National building regulation stay independent. Member state follow their own laws and rules. It will provide easier access for our products on the European market.

- Criteria

The the construction has to withstand 3 basic criteria. These are;
- Integrity (failure at ignition of cotton wool pad by hot gases through cracks or openings)
- Thermal insulation , split into; radiation measured at 1m distance of the unexposed face (failure at >15kw)
  temperature direct at the unexposed face at any point (failure at ΔT= > 180ºC)
- Stability (failure at collapse of specimen)

The most important European fire standards for partitioning kits are;
EN 1363-1 (general requirements)
EN 1363-2 (additional requirements)
EN 1364-1 (partitions)
EN 1634-1 (fire doors)
EN 1634-2 (smoke doors / hatches, Ironmongery)
EN 1634-3 (doors, smoke doors / hatches, smoke protection and toxic gases)

EN 13501-1 **Fire calcification** of building products

Spread of fire A-B-C-D-E-F	Smoke production m^2/s^2 s1, s2, s3	Flaming drops / particles d0 - d1 -d2
A1: Flashover not possible	Testing not required	Testing not required
A2: Flashover not possible B: Flashover not possible C: Flashover after 10 or more min. D: Flashover between 2 and 10 min.	s1: Minor smoke production s2: Average smoke production s3: Huge smoke production	d0: No drops d1: Drops less then 0 sec. d2: Drops more then 0 sec.
E: Flashover in less than 2 min.	Not tested	E: (not tested) or E-d2
F: Not tested	Not tested	Not tested

-Over the past the European State members had more than 30 different standards to classify their building materials upon in respect to spread of flame, smoke etc. Under the EN 13500-1 standard this has been brought down to 5 standards that regulates spread of flame, heat, point of flash-over, smoke production, toxic gasses and the determination of leaking drops.

- The Maars ML and IS.S partition have been examined by TNO with the request to classify them to *Reaction to Fire* in respect to the EN 13501-1:2002. Both are classified to be likely **A2** products.

Gent

Test criteria

- A partition tested to the EN 1364-1 must withstand 3 basic criteria to fulfil the demands as described in the standards during the fire test. These criteria are;

- Insulation, max temperature rise of 140/180 °C
- Integrity, on the picture above failure has occurred in this respect
- Stability, specimen may not collapse

Below are the terms how we specify the classifications and thus the quality of the construction in period of time e.g. 15, 20,30 or 60 etc. minutes un till failure of specimen.

- E = Stability and Integrity (E = Étanchéité)
- I = Thermal insulation in respect to surface temperature
- W = Thermal insulation in respect to heat radiation. (W= Watt)
- C = Self-Closing for doors.
- S = Smoke leakage at 200°C
- M = Mechanical impact on certain construction (e.g. specified in cycles at doors)

E glass

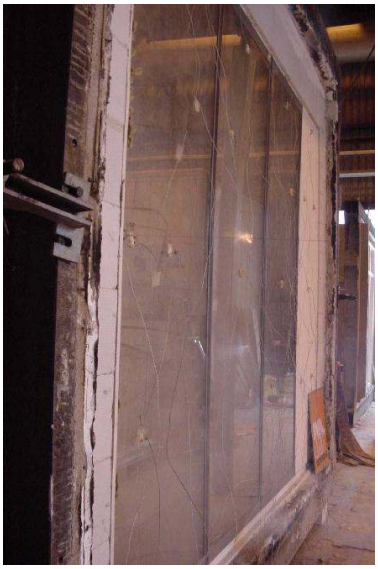
- These glasses are like, Pyran, Pyroswiss or Pyrocet.

They stay clear all the way during a case of fire.

EI glass

- This type of glass are like, Pyrostop, Contraflam and Pyrobel.

They block heat radiation and stay relatively cool at their surface.



EW glass

- This type of glass are like, Pyroguard 7mm, 6mm Pyroswiss 6mm or Pyrodur 7-10mm.

They block heat radiation in a way that the measured value stays below the 15 kW/m2 measured at 1 meter distance of the specimen.

Building regulations and fire

Different to the harmonized European Standards the national building regulations of European State members stay independent. Each State member still can and will use their own traditional laws and regulations when it comes to fire protection. This means that a fire report of a specific construction obtained in an EU country must be excepted by other Union members. It can happen that it will not be approved to be used caused by national or local regulations forbidding this, e.g. E or EW glass expectable in the Netherlands but not to the Belgium building law.

2. Fire and behavior of material

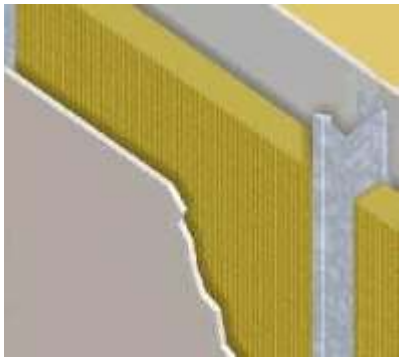
- Maars partitions build in an ordinary way do not meet the complete demand of firerating. Minor adoptions must be made at solid modules to achieve a certain level of fire ration. Glass and door constructions on the other hand must undergo sever modification. In almost all cases the perimeter profiles must be filled with plasterboard strips for the cooling effect of it.

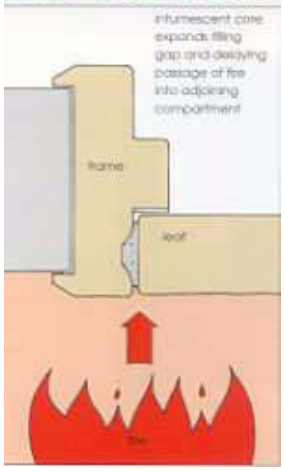
Gypsum board

-Plasterboards are almost always of a non-fire rated quality. Almost means that some old fire report show the use of firerated boards. When building a construction according to these reports one must make use of fire line boards. So please consult the report in question to verify the appropriate materials used.

Mineral wool

- Fire means rock wool. Glass wool is not fit for fire, it starts to melt at ~815°C while rock wool does beyond the 1000 °C. In almost all firerated construction Maars uses Rockwool with a 35kg/m3 density for both 30 and 60 minutes. Again almost means, check the report for confirmation because sometimes it can be different.





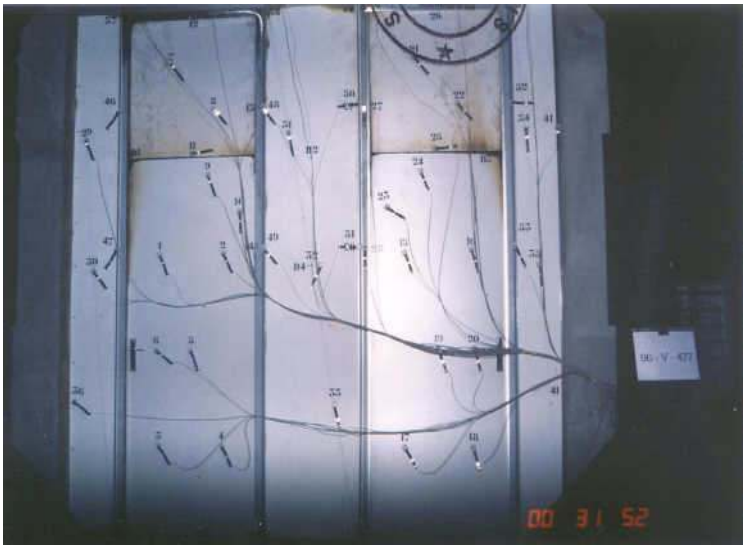
Intumescent strips

An other product are intumescent strips. They are used to seal off gaps and joints that appear in constructions during a case a fire. Doors are a well known constructions where we make use of them. These intumescent strips can be split in 3 qualities, those that build-up pressure, those that don't and those anywhere in between. What quality where to use depends upon the goal that must be achieved and the kind of construction where it has to go in to.

ULG – Liége Belgium

3 ‘Doing a fire test’

In the early days of 2004 almost all European furnaces were calibrated. Together with the new Euro Standards there are no obstructions left to get a report accepted by any of the other EU members. It does not mean that the tested construction it self is content with the building regulations of a particular EU member. EU Member states are still responsible for their own National Building regulations and they can differ.



CTICM - Mezière- lès-Metz - France

-The actual fire test is tied to the standard that is involved. Normally the test specimen must be installed into a restrained frame. This frame has an inside clear opening of at least 3x3m. When put in front of the furnace thermocouples are applied to the specimen. A fixed number of thermocouples as indicated in the standard must be put at specified positions while others may be put in a random order. These thermocouples measure the temperature development on the cold side while internal thermocouples watching over the temperature rise within the furnace.

- The cross average temperature rise over the thermocouples put to the Standard may not reach over the 140°C while at no point the temperature rise may pass the 180 °C.

IBMB – Braunschweig Germany

InterSign 99.S - EI30

IS.99.S underneath a mineral wool barrier. The barrier is installed into a omega ceiling grid profile. Next to the static thermocouples the fire laboratory can make use of so called cotton pads to determine the flow of hot gases trough the specimen. When the cotton pad glows or ignites the specimen does not fulfill the requirement of integrity any longer.

IBM - Linz Austria

IS 99 S - Aluminium window frames with 6mm Pyroswiss

Steel

-The base product for all of our systems and a good material to build constructions for fire protection. The benefit of steel in this respect is its extreme high melting point but the disadvantage of steel is that it looses it stability at ~ 450°C. Failure ore collapse of the construction can occur. To overcome this steel must be protected from the inside out.

Aluminum

-Not so suitable for fire protection but not impossible. The melting point of aluminum lays at about the 600°C. The heat transmission through aluminum however is a matter of concern. It goes 4 times as fast compare to steel. Partitions that must apply to the E demand can be build with aluminum frames. Some glass construction have been tested as well as door constructions.

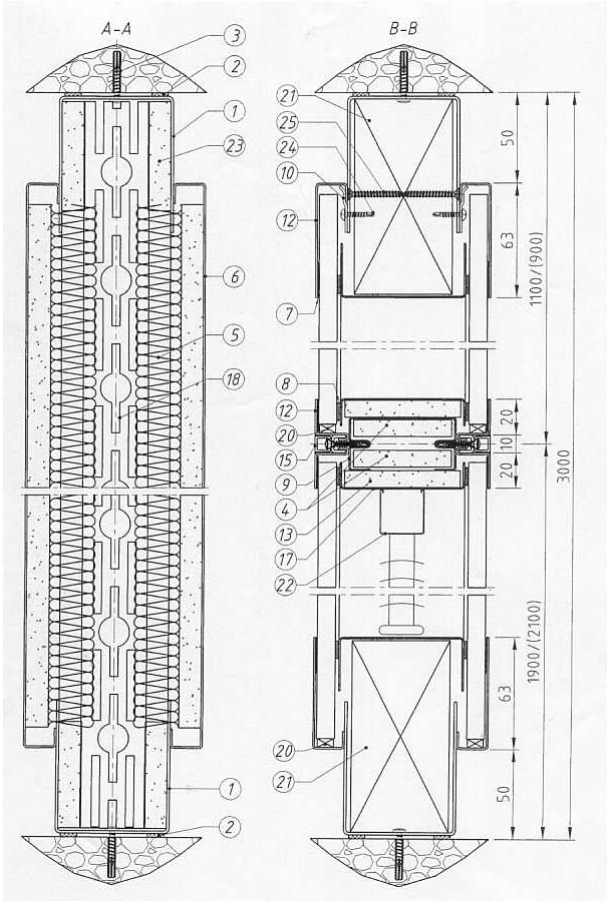
Pyrostop, Pyrobel, Pyrodur, Pyrobel Lite, Contraflam, Contraflam Lite, Swissflam, Vetroflam, Pyroguard, Delodur, Swissflam Lite, Pyrocet, Pyran-S, Pyroswiss, Pyranova, Georgian Wired glass, Paraflam, Five star, Pyroschield, Fire Lite, Promaglas, Securiflam, Vetroflam plus, Rapid Flameschield, Interflam, Multisafe,
etcetera.

Glass and fire safety

- Glass is a booming business. In the past there were about 3 convenient types of firerated glass. Georgian wired Polished Plate, Insulated (Pyrostop) and borosilicate glass (Pyran) and that was it!

Looking at the architectural desire of today to create a transparent atmosphere, the glass industry has designed a variety of fire rated glazing to make that desire to come through.

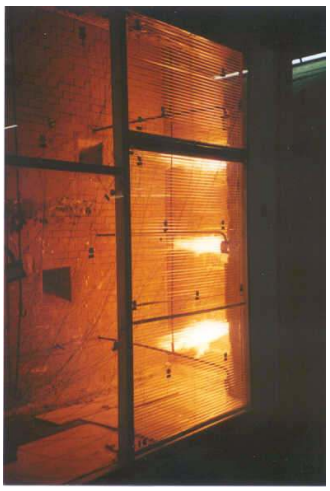
- Looking at the above listed types of glass the only way to determine the quality of performance is to look for the type indication E, EW or EI. In general the producers of firerated glass have tested there own products around the 2.5 s.q.m.



IBMB – Braunschweig Germany

-Firerated glass is expansive and in general designed to be used in single glass constructions. To meet the Architectural desire for flush glazing Maars has developed a tailor-made firerated construction. The section shown above is an InterSign partition double glazed with 10mm Pyrodur-S 201 on each side. Although non EI qualified glass was used the construction proved to be EI-30.



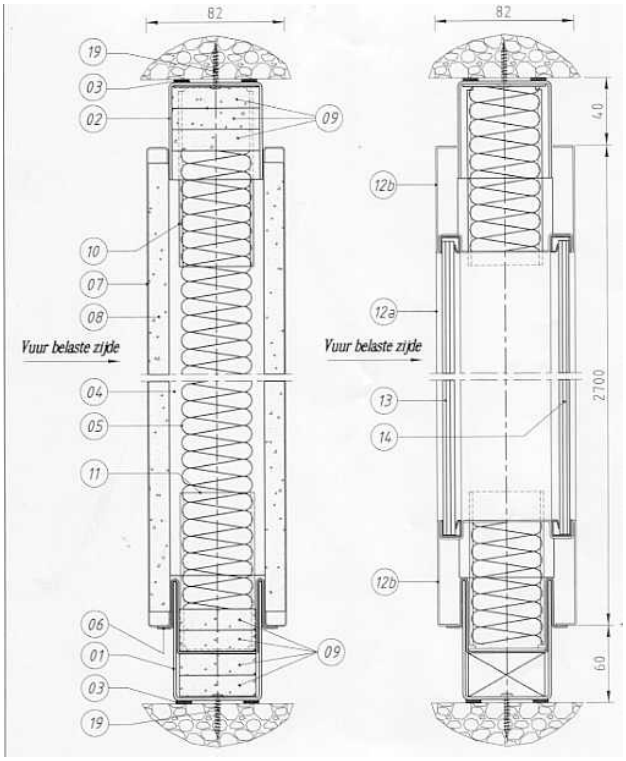



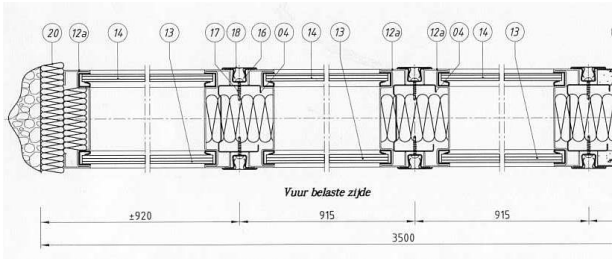
IBMB – Braunschweig Germany

IS WFR *EI-30/* 2x Pyrodur-S 201, 10mm

-The construction in action

6- New fire reports





TNO – Delft Netherlands

ML WFR *EW-30/* 7mm Pyroguard EW, 6mm tempered

MetaLine glazed with 7mm Pyroguard and 6mm tempered glass with standard PVC glass beading. Windows are put together with omegas sections and covered steel cover strip. The Dutch law does not demand thermal insulation on temperature for hatches, doors and window constructions. This is why we are allowed to use EW types of glass as long it is proved that the heat flux stays below the 15KW/m2.

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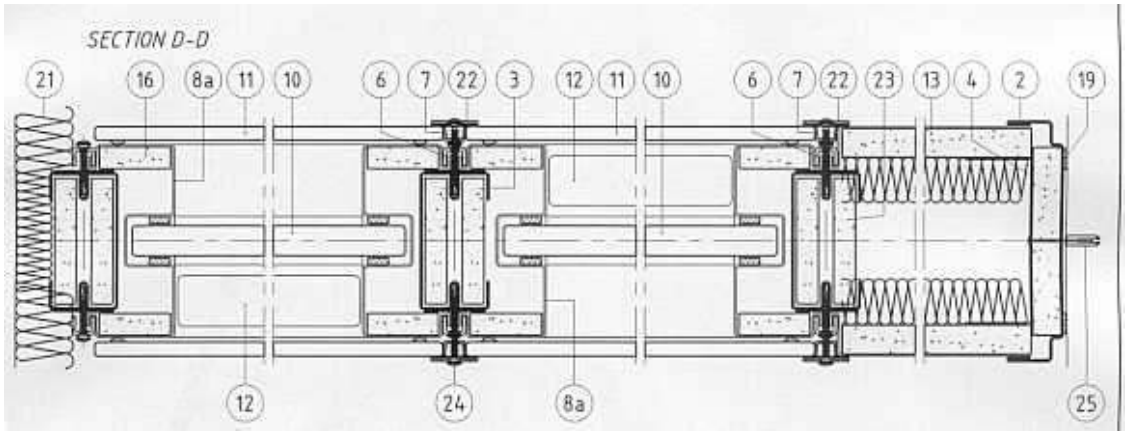
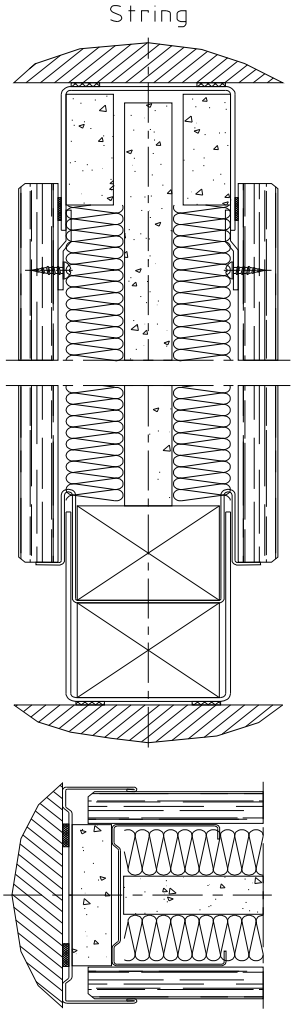
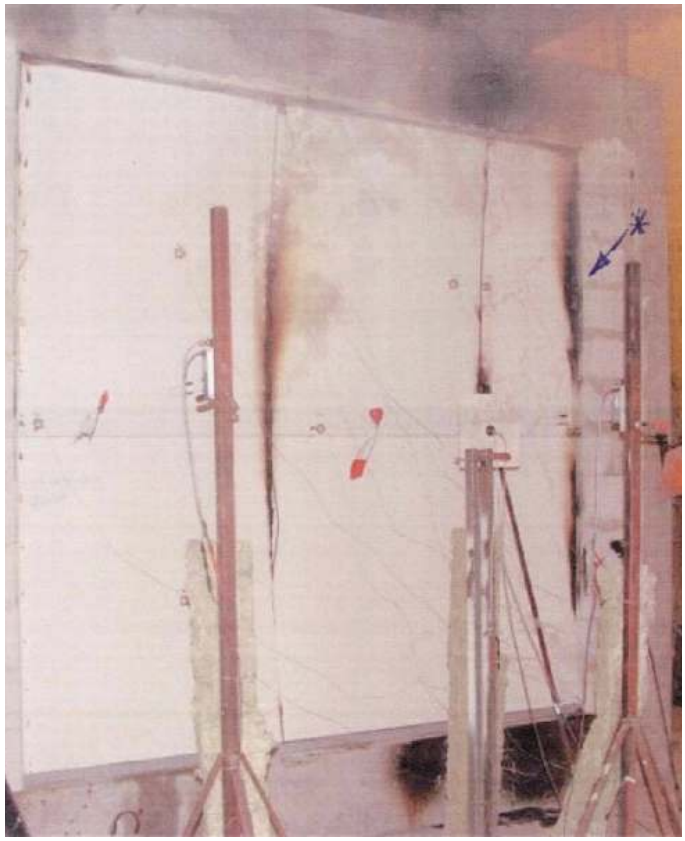


InterSign glass construction EI30

Contraflam light 13mm + 2x6mm tempered glass build as a ‘flush’ glazing. One of the rare cases that is tested to sound insulation as well.



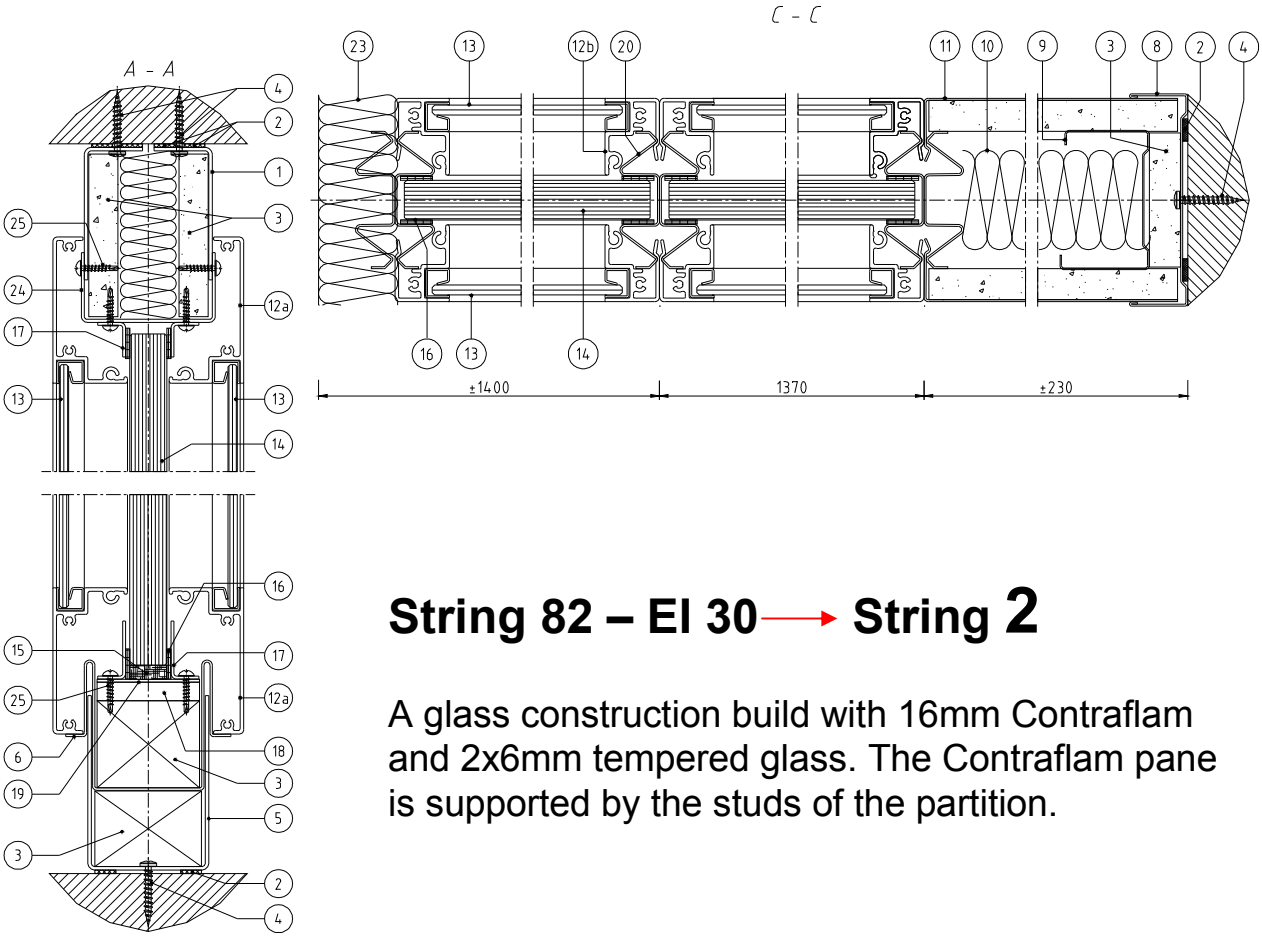


TNO – Delft Netherlands

String 82mm - 37 minutes

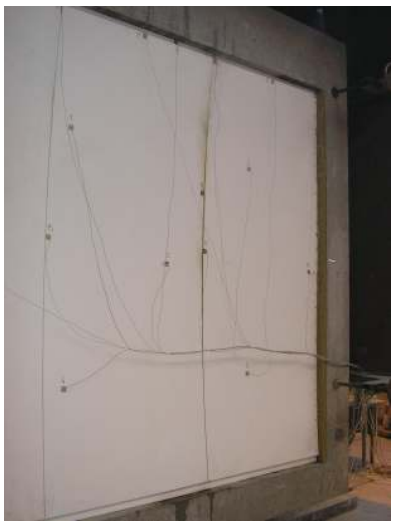
15mm Thick fire line plasterboard in the core of the partition with 20mm Rockwool on both sides. Chipboard panels are non fire rated.

CTICM - Mezière- lès-Metz - France



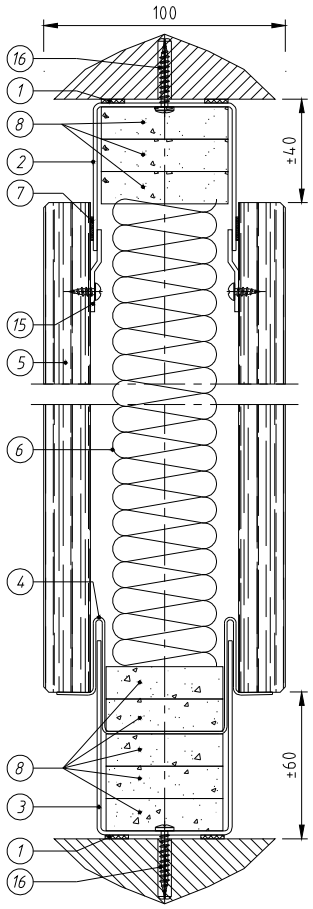
String 82 – EI 30 → String 2

A glass construction build with 16mm Contraflam and 2x6mm tempered glass. The Contraflam pane is supported by the studs of the partition.



3 minutes

30 minutes



CTICM - Mezière- lès-Metz - France

41 minutes

String 2 solid

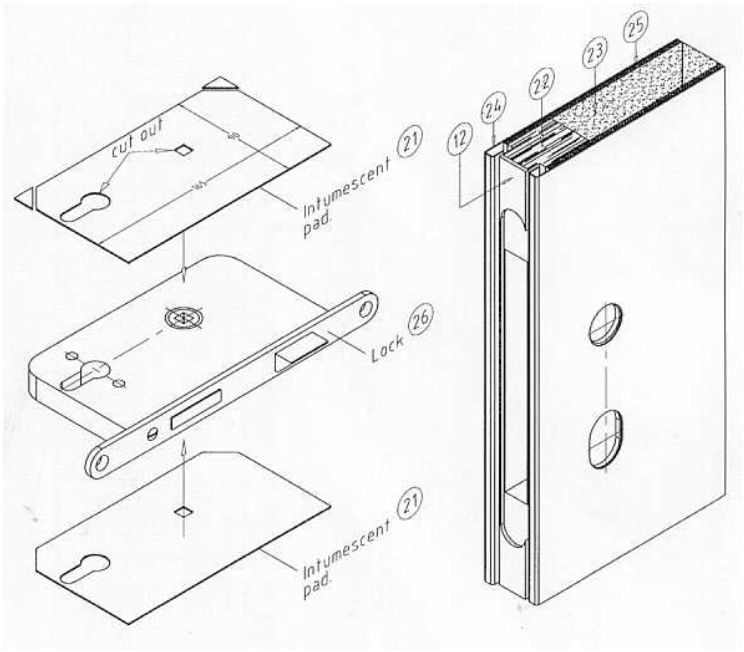
Result to EN-1364-1 and EN 1363-1
Standard chipboard and 40mm Rock wool density ~35kg/m3

CTICM - Mezière- lès-Metz - France

Doors

The EN 1634-1 says that when the specimen is intended to be used in a form of construction not covered by the Standard supporting construction, it shall be tested within the supporting construction in which it is intended to be used.

The reason why is that the interaction differs between door leaves and door frames of differing materials and the influence of differing associated and supporting constructions, hinges and pivoted doors.



Fittings

- The lock is packed with intumescent material in this case Interdens pads of 1mm tick to prevent that fire cut trough the door leaf around the lock.

The Standard does not demand the use of certified fittings.

CTICM - Mezière- lès-Metz Report nr. 04-V-079

MetaLine and timber doors - EI30

CE marking on Maars products ?

NO! Why not?

The Construction Product Directive (Council Directive 89/106/EEC of 21 December 1988):..relating to construction products.

If your product complies with the following definition:
"a product which is produced for incorporation in a permanent manner in
construction works, including both buildings and civil engineering works, and
which is placed on the European internal market."
then the answer is YES.

Maars products, as to be non-load bearing partitions, are not and can not become a permanent part of a building.

So that's why the answer is **NO!**

Second reason; there is no standard for office partitioning systems.