Fatal fires and building materials

How can we prevent that more occupants and fire fighters are killed?
Should building authorities allow more combustible materials in our buildings?

• In Denmark we fight fires from within

• Fire safe constructions are vital to our safety

• The Danish authorities now consider allowing plastic insulation in facades only covered by a thin render

• Brandfolkenes Organisation wants to stop that

• Via the EFFUA we want to spread the message that we risk materials that can add fuel to deadly fires
Some tragic examples
Why are we concerned? Combustible insulation has been involved in tragic fires

- Some of these fires have killed fire fighters
- For instance in the Netherlands and the UK
- Here fire fighters are being warned against fighting such fires from within
- Regulations don’t always stop the use of these materials
CCTV Tower, Beijing, China (9 February 2009) – 1 fire fighter died

- 1 fire fighter was killed when the China Central Television headquarters’ (CCTV Tower) in Beijing caught fire.
- The fire spread rapidly over that part of the façade that was insulated with extruded polystyrene (XPS) insulation.
- There was no ignition of façades insulated with mineral wool.
- Fire works were reported to have ignited the fire.
- The damages on the high-rise building are estimated at €110 million.
- 71 people have been convicted, or are awaiting verdicts. This includes Xu Wei, the head of the construction for the new CCTV headquarters, accused of "causing an accident with dangerous articles", and a building-materials supplier, arrested for allegedly providing substandard materials.

More information: http://online.wsj.com/article/SB10001424052748703455804575057283177122348.html

Video and photos
http://www.youtube.com/watch?v=6hSPFL2ZIpg

Photo: thebeijinger.com
Shanghai, China (15 November 2010) – 58 people died

- A fire in a 28-storey high-rise apartment building killed at least 58 people and injured more than 70 others
- The fire incident is still under investigation
- The building was under renovation and the facade being insulated. Welding was being made.
- The fire may have been caused by the accidental ignition of polyurethane foam insulation used on the building's outer walls.

Düsseldorf Airport, Germany (11 April 1996) – 17 people died

- 17 people died in the Düsseldorf Airport fire
- Welding was being made
- Polystyrene insulation caught fire
- Even today, this material is still being used in many buildings
- More information: National Fire Protection Association
  www.nfpa.org/assets/files/pdf/dusseldorf.pdf

After the fire, non-combustible insulation was used in the Düsseldorf Airport
Berlin, Germany, (25th April 2005) – 2 people died

- Two people tragically died and three more people were injured
- In Treskowstraße Pankow in Berlin a fire in a flat on the 2nd floor spread on the façade and up the building.
- The façade consisted of 80mm flame-retarded expanded polystyrene (EPS) with mesh and render and mounted on 25mm thick chipboard, which was the formwork left in place when the concrete walls had been built.
- Despite a 500 mm fire barrier being added in 2004 to the second and fourth floor levels the fire was so rapid and intense that its progress could not be stopped.

More information:
Berlin, Germany, (25th April 2005) – 2 people died
Miskolc in Hungary (15 August 2009) – 3 people died

- Three people lost their lives in a fire at a nine storey block of flats on Középszer Street in Miskolc, Hungary.

- The combustible façade insulation system allowed the fire to rapidly spread up the outside of the building.

- The façade of the block of flats was renovated in 2007 and covered by an insulation system, consisting of 70mm thick flame-retarded combustible polystyrene insulation with only a thin render on top.

- The death of the three residents was caused by s...Smoke emitted from the burning façade got in through windows.

- Smoke from the burning interior moved through the ventilation shafts within the building.

- The ventilation shafts had been wrongly designed, without fire breaks, and allowed the smoke to flow into the flats above. The fire occurred on a hot summer’s day so most apartment windows were open, providing another smoke inlet.

- This tragic fire illustrates how even small mistakes made when installing systems with combustible insulation can combine to cause a devastating fire. Several mistakes had been made during installation and technical guidance for fixing the insulation façade was not followed. These critical errors allowed the fire to spread much faster than expected up the building’s facade.

Dijon, France (14 November 2010) – 7 people died

- 7 immigrants died in 4 rue du Lac in the French city of Dijon. Furthermore 3 fire fighters suffered smoke inhalation.

- A fire was reported to spread from a burning waste container over the façade, insulated with EPS plastic foam.

- Neither the thin organic render applied, nor the Cellular Glass barriers were efficient in preventing flames from igniting the EPS insulation and spreading upwards along the façade, breaking the windows and getting inside the building with a high release of dark and toxic gases and sooths.

- The fire brigade arrived approximately 10 minutes after the beginning of the fire. The building was equipped with an automatic smoke alarm which seemed to have worked. But this was not enough to save the lives of 7 people.

More information: 
http://www.bbc.co.uk/news/world-europe-11752303#story_continues_1#story_continues_1

Fire Brigade Commander: Jean-Louis Marc
“Smoke rises into the air during a shipyard fire in De Punt in the northern Netherlands on May 9, 2008. Three firemen were killed during the fighting of the blaze.”

“Fire-fighters hold-up a screen to obscure views of a deceased colleague, who perished tackling the De Punt blaze.”
De Punt, Netherlands (May 9, 2008) – three fire fighters died

- Three fire fighters, Anne Kregel, Raymond Soyer and Egbert Ubels, died while fighting a blaze in a shipyard in De Punt.

- The shipyard was constructed of insulated sandwich panels with a core of combustible polyurethane insulation that, during the first minutes, was the main fuel for the fire.

- After this fire, the investigative committee made a strong recommendation to use a defensive attack from the outside in such fires.

- Only if sufficient extra units and security is available, can a decision be taken, in exceptional situations, to launch an attack from the inside.

- More information: Rapport_DePunt_ENG.pdf

http://www.onderzoeksraad.nl/en/

http://www.nvbr.nl/algemene_onderdelen/bovenbalk/zoeken/?mode=zoek&zoeken_term=de+punt&text-submit01=Submit

Click on the pdf title below to see the report:

Rapport_DePunt_ENG.pdf
De Punt – Netherlands
3 fire fighters died

Fig 3   Timeline
Sun Valley Poultry factory, Hereford, U.K. – 2 fire fighters died (1 September 1994)

- 2 fire fighters were killed in a fire at the Sun Valley Poultry factory in Hereford in England.

- The blaze swept through the building and trapped the fire fighters. The sandwich panels were insulated with expanded polystyrene and polyurethane insulation that made the fire spread so fast.

More information:
Fire Prevention magazine 285.

Ian Cox, of the Chief Fire Offices Association, has stated that British fire fighters “will not enter buildings where polyurethane insulation is present”.
Façades with combustible insulation – a growing problem? (1/2)

• 500 million m² of external facade insulation systems have been used to insulate buildings in Germany alone. The system consists of insulation (foamed plastic or mineral wool) with a thin rendering.

• More fuel: in future we will have more insulation in our buildings, because of demands to save energy and CO2. A lot of that (plastic) insulation will be able to fuel fire spread, because it is made of oil.

• **Expanded Polystyrene (EPS)** is the most used foamed plastic used in external façade insulation systems today. It has a reaction to fire class E or F (= worst, can cause flash-over). Nevertheless EPS usage grows.

• **Mineral wool** is the fire safe alternative. This insulation has a reaction to fire class A1 (= the best class, non-combustible, no flash-over). It used to be most popular in the Nordic countries.

• **Other insulation materials** are expected to grow, especially polyurethane (PUR)/polyisocyanurate (PIR), and phenolic foams.

More information: DVD about Reaction to Fire Classes A to F 
*A Fire Safe Europe*
Façades with combustible insulation – a growing problem? (2/2)

• Price before safety? The building industry wants to build as cheaply as possible. The contractor or building owner who saves a few euro when building with cheap and less safe materials is seldom the person risking his or her life if (or when) the building burns a few years later.

• Firefighter services are under increasing pressure to save money. Do we all have safety teams? Or a third firefighter as a back-up in each team – ready in just a split second to rescue a colleague trapped in a flash-over?

Expanded polystyrene insulation (EPS, the white material) and fire barriers of non-combustible stone wool insulation (the brown material). Allowed in some countries even for high buildings.
Flash-over or no flash-over
3 “naked” insulation materials in
the large-scale ISO 9705 Room/Corner test
(EU reference test for unprotected building materials in cases of doubt)

Polyurethane after 30 sec. Expanded Polystyrene after two min. Rockwool after 20 min no ignition

More information:
DVD with 11 fire tests
ISO 9705 Room/Corner Test
recorded 1994 at
SP Technical Research Institute of Sweden
**But if the plastic insulation is covered by non-flammable material – surely that must be safe…. or is it?**

- Producers and sometimes regulators argue that combustible insulation is covered by a non-flammable material (a render on a façade; a metal sheet in a sandwich panel; a gypsum/plaster board in a wall).

- This allows EPS-based facade systems to be almost exclusively fire-rated as B. Whereas systems with non-combustible insulation, are often rated A2 or with some types of render even B. In theory there should be little difference. But in practise:

- Is the fire always as weak as in some of the small-scale fire tests? Or will an intense fire expose the insulation?

- “The Devil is in the detail”:
  Did the installer at the building site complete the construction 100% perfectly? (as the producer had it done in the fire test laboratory)
  Example of poor workmanship: Miskolc fire in Hungary

- Is the protective layer always intact? Never any cracks? Never somebody cutting or drilling a hole? Never a bicycle or a football damaging the render? Never any vandalism?

- What happens during construction or building renovation *before* the insulation is covered by a protective layer? Do we evacuate the building? Do we have a fireguard with a hose?
How can we prevent low fire safety? An example about facades

- Danish fire fighters have a strong tradition to fight fires from within.
- Denmark also used to prefer non-combustible materials that prevent fast fire spread.
- The Danish building authorities now propose to allow facades with combustible insulation and just a thin render.
- They claim that it is OK to use an outdated, inadequate Swedish façade fire test, SP Fire 105, although it was NOT accepted in the EU.
- There are other fire tests. The Canadian CAN/ULC-S134-92 is larger and more realistic.
- See the DVD from National Research Council Canada Fire Test – Façade.
- We recommend realistic large-scale tests.

Cutting corners?
Does the outdated Swedish fire test SP Fire 105 (left photo) reflect fire risks in reality? As in Berlin, where 2 people died (middle). Or are there more realistic large scale tests such as the Canadian (right)?
What can we in the EFFUA do to improve fire safety?

• Prepare examples and good argumentation

• Meet with politicians

• Talk to the press

• Activate fire fighter organisations in other countries

• Exchange experience

• Inform our members about the dangers

• If we cannot convince the authorities to improve fire safety of our buildings:
  1. Can we still fight fires from within if the building is insulated with plastic insulation?
  2. Should we consider external fire extinguishing if we know that the building has combustible insulation?
  3. If we think that plastic insulation might have been used in a building on fire, should we wait to enter the building until a safety team (back-up) is ready?
  4. Should we demand visible hazard labels on the building if it contains a fire hazardous building material (as we do with gas bottles)?
Do you also feel that we have an issue?