OVERVIEW · NOTE 6 ·

PVC IN ACCIDENTAL FIRES

the *cool facts* on PVC in fires

Science Supporting PVC in the Environment

There are many reasons why PVC has helped revolutionise the building industry. But the one which surprises most people is that it is far less likely to burn than traditional building materials such as wood. And in spite of rumours to the contrary, PVC has other distinct advantages in the event of a fire. This Overview Note aims to give the facts and the science concerning PVC in fires.

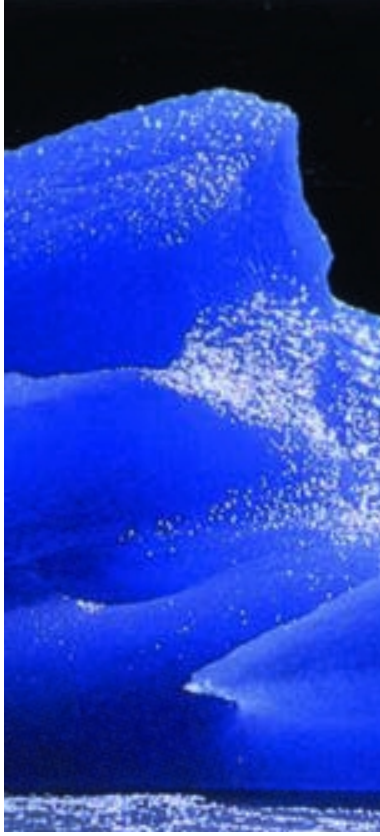
> Most PVC formulations are not just difficult to ignite, they will self-extinguish when the flame source is removed. This makes PVC particularly suitable for rigid applications, eg: windows, doors and cladding.

> 'Used properly, PVC presents no greater fire risk than other natural or synthetic organic materials.'
>
> Dr Jürgen Troitzsch, PVC Fire Behaviour, Association of Plastics Manufacturers in Europe.

Fire Retardancy

The development of a fire occurs in three distinct phases: ignition; flame spread; general blaze. The avoidance of ignition is the primary requirement in fire prevention, followed by the inhibition of flame spread. Halogenated flame retardants can improve the fire resistance of materials. Since 57% of PVC is chlorine, it is an intrinsically self-extinguishing polymer. This is one of the reasons why it has been widely used in conveyor belts for mining – where the risk of ignition must be avoided.

PVC
Good for Life...
Good for the Environment



> GOOD INSULATOR: PVC does not conduct electricity and is therefore an excellent material to use for electrical applications such as insulating sheathing for cables.

Because rigid PVC cannot continue to burn without continuously applied heat from an external source, it cannot contribute to the spread of a fire.

Combustion Emissions

All combustible building products emit toxic gases of some kind during combustion. Carbon monoxide is by far the most hazardous element in a fire. It arises from the burning of any combustible materials – natural or synthetic.

Once PVC is made to burn, it gives off hydrogen chloride gas (HC). But such emissions are at concentrations far below anything which could be considered as a lethal dose, partly because this substance is not persistent and condenses on the nearest cold surface, and partly because of the neutralising effect of the fillers widely used in PVC formulations for such applications as cable insulation and flooring.

Unlike odourless toxic gases, the presence of HC is very rapidly detected at totally harmless trace levels (1 to 5 parts per million) due to its highly distinctive smell and irritant properties. This can be considered as an important warning signal to people to leave the area immediately.

One key point is underlined by professional firefighters. What kills the vast majority of people in fires is carbon monoxide (CO), a gas which is always formed, whatever the nature or origin of the fire. Unlike HC , the presence of CO is not detectable until it reaches a dangerous level of toxicity.

> While burning, the rate of heat released from PVC products is generally similar to that of common hardwoods.

Düsseldorf Airport Fire

On 11 April 1996 a fire broke out at the Rhine-Ruhr Airport in Düsseldorf. It caused the tragic deaths of 17 people. Initial reports blamed burning PVC cables for the deaths. However, the official report, completed after a thorough, year-long investigation, found that the deaths were caused unequivocally by carbon monoxide poisoning and that the fire was started by ‘unprofessionally performed welding’ which ignited non-PVC flammable insulation material, creating thick smoke which overcame the victims.

The official technical report into the fire confirmed, beyond doubt, that PVC applications were not responsible for the 17 deaths in the tragedy.

The report was compiled for the government of North Rhine Westphalia by a Commission of leading fire experts.

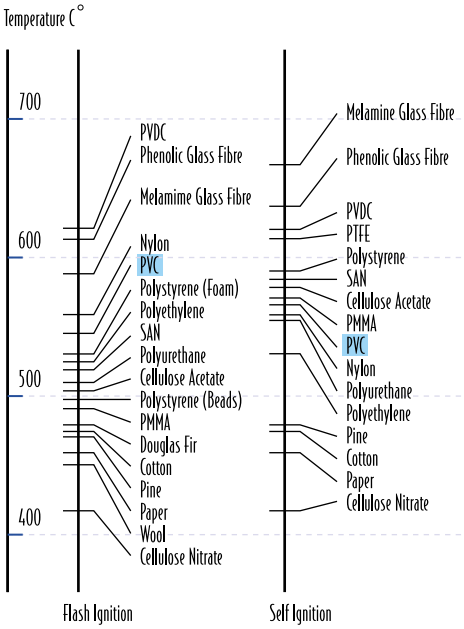
In summary, the report found that:

- All affected materials burned in the fire. PVC was no exception
- Non-halogenated, fire-resistant cables would have made no difference to the cause or extent of the blaze
- Other non-PVC materials used in the airport terminal generated the large amounts of smoke and carbon monoxide found to be the direct cause of all the deaths
- Allegations that hydrogen chloride from burning PVC played a part in the deaths were proven groundless by the official medical examinations.

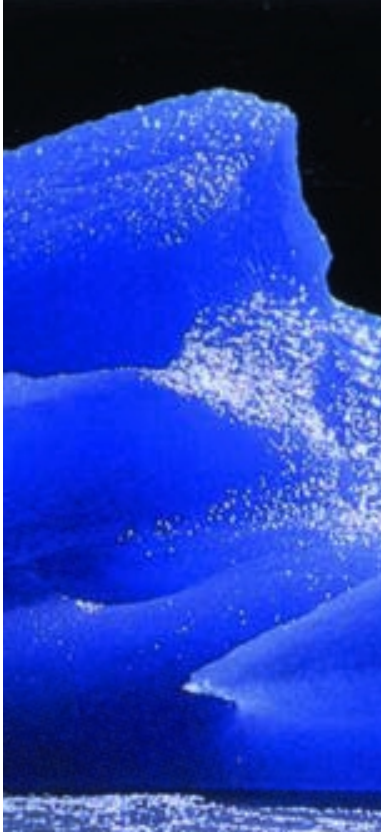
> 'The contamination of Düsseldorf Airport, following the fire which killed 17 people in April 1996, cannot be attributed to burning PVC wiring.'
>
> (Dr Heinz Chiffers – a member of the German Investigating Committee)

References: Report of independent Expert Commission under the Minister President for North Rhine-Westphalia for investigation of the consequences of the fire at the Rhine-Ruhr Airport in Dusseldorf, April 1997.

Ignition Temperatures



Source: The Vinyl Institute (USA) – Technical Information (1988)



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