



Flame Retardants: Integral to Fire Safety

TC 108 and flame retardants – the FR manufacturers' perspective

The European Flame Retardants Association



TC 108 and flame retardants

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- Overview of flame retardants
- Issues and concerns, facts and figures
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Background

- Alarms raised by NGO`s against flame retardants
- The case against candle resistance in consumer electronics
- Failed votes on CDV (IEC 62368) and FDIS (IEC 60065) in April and June 08
- Pending vote on CDV (IEC 60950), deadline 3rd Oct 08

Our objective

- Present our case to TC 108 National Committees to allay concerns and to facilitate well informed decision making on this issue



European Flame Retardants Association (EFRA)

Represents approx. 90% of the European flame retardant industry

Represents all the major manufacturers of flame retardants in Europe

Covers all flame retardant chemistries

Is a sector group of Cefic, the European Chemical Industry Council



EFRA members

Members

 ALBEMARLE®

 Budenheim

Ciba 



 Clariant





 Joseph Storey
& COMPANY LIMITED

 LANXESS
Energizing Chemistry

MelaminebyDSM™



 PCC
ROKITA



Associate members







Observers









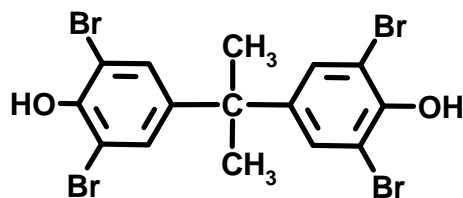
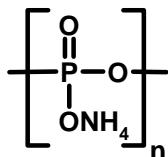


Classes of flame retardants

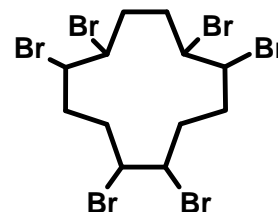
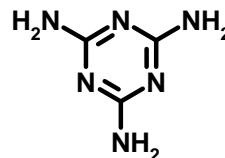
A very wide variety of chemical substances are used as flame retardants

- **differing fire mechanisms**
- adapted to **different materials**
(different plastics, fibres, wood)
- adapted to **different applications**
(material properties, fire performance)

^{80}Br

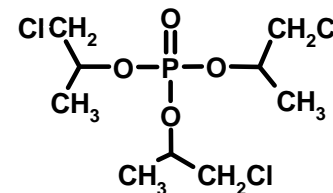


^{24}Mg



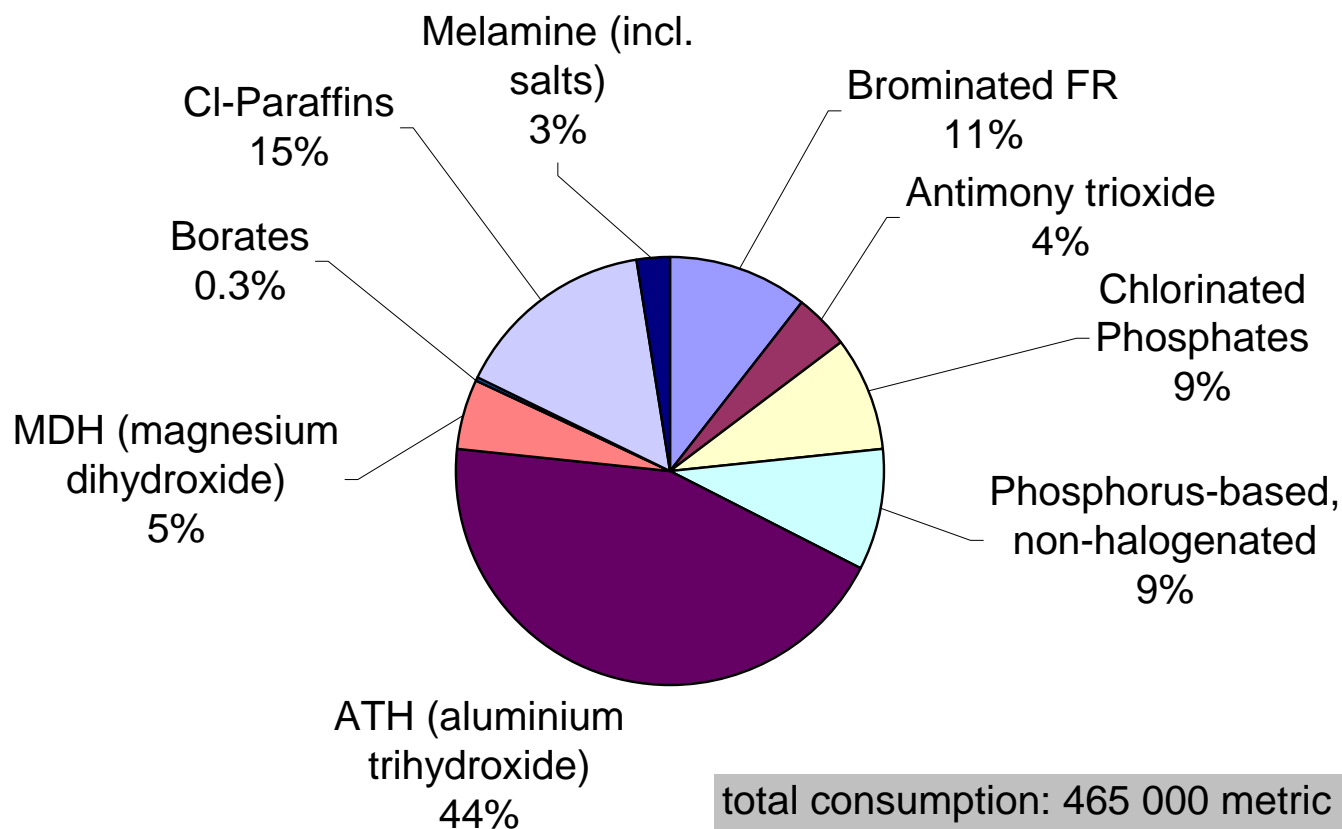
^{31}P ^{14}N

^{27}Al



^{35}Cl

European FR Consumption (2004)



Source: A. Beard estimate

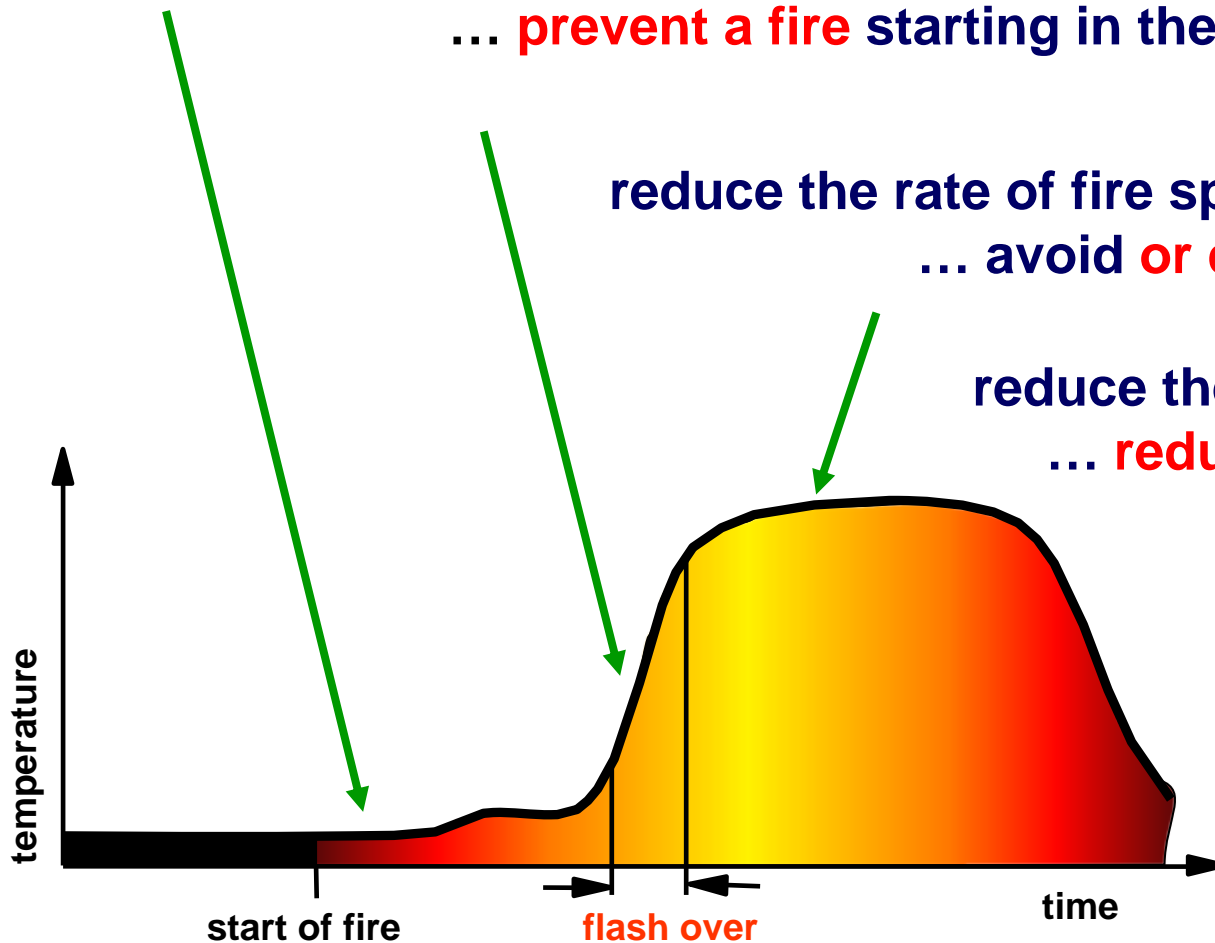


How flame retardants act:

increase the threshold required to ignite a product:
... **prevent a fire** starting in the first place

reduce the rate of fire spread:
... **avoid or delay flashover**

reduce the rate of burning:
... **reduce fire intensity**



Concerns: consumer exposure

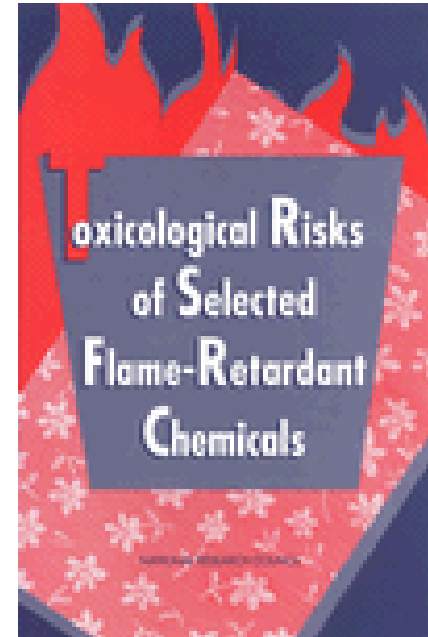


- Some FRs are “reactive”, that is chemically bound into the treated plastic, textile, etc, so cannot be released. Others are physically enclosed in the matrix of the material.
- No report exists of human illness related to FR release from consumer products
- All EU Risk Assessments of FRs completed to date conclude no risk to human health from consumer product usage
- Other independent studies also confirm that FRs can be used in consumer products without concerns for health

Independent studies of FR's

- **US National Academy of Sciences**
“Toxicological risks of selected Flame-retardant chemicals”
- **Assessment of FRs most commonly used in furniture:**
 - worst cases
 - risks through contact, respiration, babies “sucking”
- **Conclusions: 8 chemicals can be used with minimal risk to human health¹**
Further investigation needed for the 8 others examined

1 = HBCD Deca-BDE, ATH, magnesium hydroxide, zinc borate, ammonium polyphosphates, phosphonic acid, tetrakis hydroxymethyl phosphonium chloride



Eight flame retardant chemicals pass a very tough test.
Now, let's get back to saving lives.



Concerns: environment

- Some brominated FRs have been found at extremely low concentrations in human blood, breast milk, wildlife
- Typical levels are several orders of magnitude below risk levels
- Strict regulation of chemicals - including flame retardants – is in place in Europe and other TC 108 jurisdictions
- The REACH Regulation, considered to be the toughest in the world, is now in place in the EU
- REACH will phase out chemical Substances of Very High Concern (SVHCs)
- Only one or two flame retardants are deemed SVHCs
- A choice of FR technologies is available for most EEE applications



Environmental regulations

Some of the regulations on chemicals...

Classification & Labeling

Restrictions on marketing & use

Dangerous Preparations Directive

MSDS Directive

Existing Substances Regulation

Water Framework Directive

Waste Electrical and Electronic Equipment (WEEE)

Restriction on Hazardous Substances (RoHS) Regulations for E & E equipment : in the EU, China, Korea, Japan, USA

And now REACH in Europe...

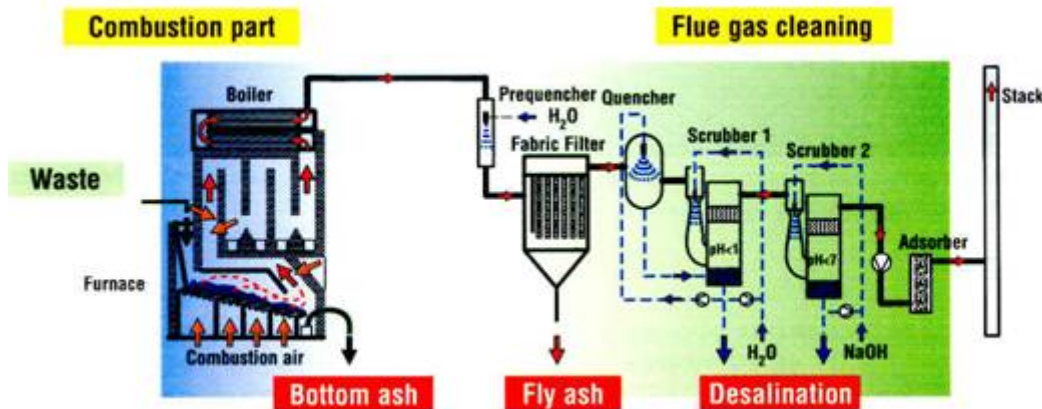
These laws are designed to protect human health and the environment, yet NGO's do not refer to or respect such official processes



Concerns: waste incineration

- Flame retardants will not prevent a material burning at the operating temperature of domestic waste incinerators
- Flame retardants will not prevent the recovery of energy when burning in such conditions
- Studies show that production of dioxins/furans in incinerators is not increased by burning of FR plastics

Incineration of bromine-FR containing waste: “Tamara” test facility, Karlsruhe Research Centre, Germany 2002 http://hikwww2.fzk.de/itc/itc-tab/themen/tamara_haupt.html



Flame retardants and release of smoke and gas



FR's, Smoke and Gas

- The US National Bureau of Standards (NIST) tested a range of flame retardant (FR) containing and non FR containing products :

- Total quantities of **toxic gases** released by FR products one third lower than for non FR

- **Smoke** production not significantly different

- Total **carbon monoxide** (CO) emissions around half as low for the FR products

**FR's → reduced fire
→ less toxic gases,
reduced toxic emissions**



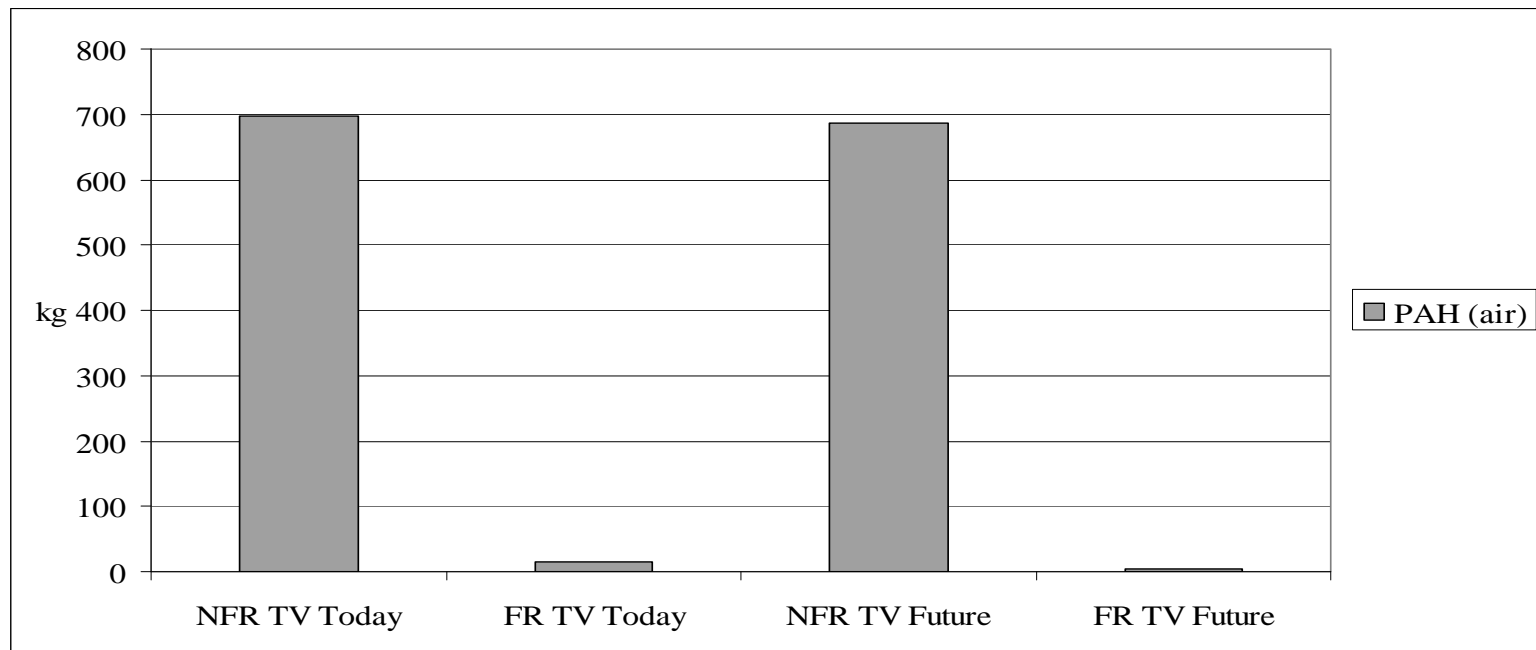
NIST 1988, "Fire-hazard comparison of fire retarded and non fire retarded products" (TV, PC, upholstered chair, cable, circuit board) <http://fire.nist.gov/bfrlpubs/fire88/art003.html>



FR's and toxic emissions

Total toxic emissions are considerably reduced, because of statistically lower probability of fires, and reduced fire gravity, when FRs are used

Fire Life Cycle Analysis (LCA) – TV Case study - Swedish National Testing and Research Institute (SP) and Swedish Environmental Research Institute (IVL) 2000 www.sp.se/fire



Total PAH emission over TV life cycle of PAH (poly aromatic hydrocarbons)

Facts and Figures



- Televisions sold in Europe are one of the major fire hazards in our homes
- The existing standard (EN 60065) has not proved effective at preventing fires in Member States of the EU.
- Research estimates there are 160 deaths and over 2,000 injuries each year in the EU due to TV fires. **
- Independent research in two Member States estimates that more than 40% of TV fires in the EU are caused by external ignition sources, particularly candles and tea lights.***

** LCA study of flame retardants in TV enclosures, SP Swedish Testing and Research Institute, Swedish Environmental Research Institute.

***DTI Consumer Affairs Directorate. Cause of fires involving television sets in Dwellings. P 83.



Facts and Figures



**325 fires
per million TV sets
each year**



**5 fires*
per million TV sets
each year**

WHY?

Because TV sets in the US are manufactured to UL94 VO which is a higher level of ignition resistance than in Europe

* IEC TC108, Special Fire Research Group 108/176/2006





Facts and Figures

Netherlands: 165 TV fires per million TV's per year (still much higher than the US at 5 per million)

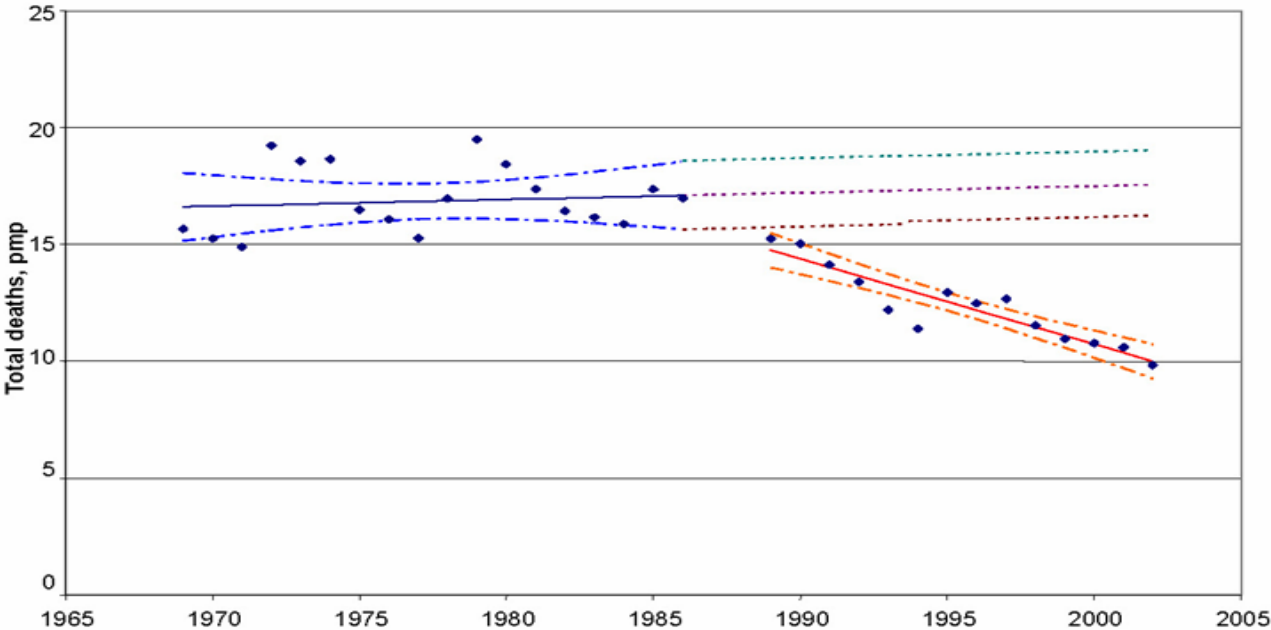
- 20% of these fires have an external source as the cause of the fire
- After cooking, deep-frying and the tumble dryer, TV-sets are the largest source of domestic fires.
- 8% of fire casualties (death and injured) originate from TV fires (research from the Netherlands)
- Research from the UK shows that the risk of a fatal casualty through fires involving a TV set is almost double the risk compared with fires involving other electronic appliances such as vacuum cleaners etc.

Proof that FRs work : The UK Furniture Regulations 1988

450 lives per year estimated to be saved in the UK from 1988 to 2000

Estimated that 160 people will be saved each year by fire safe TVs :

Such a declining trend should be the objective of TC 108



Total deaths pmp 1969 – 1986 and 1988 - 2002

Source: University of Surrey 2005



Accidental external ignition

- Candles are a widespread domestic **hazard** and should be at the heart of a Hazard Based Standard
- For consumers and the emergency services in the EU: the hazard of exterior flammability of television sets or other IT equipment and the consequences for domestic fire safety is a real and serious issue which needs to be addressed
- “Candle accessible area” ignitability needs to be **re-introduced** at EU and at global level
- Imports of low cost television sets continue to grow. We need to ensure the same safety standards as brand leaders
- *UL 94 V0/V1 standards are not “unnecessary”, they save lives !*
Rene Hagen, Professor of Fire Safety, NIBRA, Netherlands



Duty on TC108 to maintain the requirement for candle flame ignition

Our messages

- *Fire safety standards for consumer electronics is in the hands of TC 108. We believe that many more human lives will be saved and injuries reduced due to the introduction of an external ignition standard*
- *The regulation of chemicals such as flame retardants is in the hands of official regulatory agencies. They have rigorous processes to assess and manage risks*
- *It is not a choice between fire safety on one hand and consumer health and environmental protection on the other. The consumer is entitled to both !*

We appeal to TC 108 NC members to take a balanced view on this issue whilst voting on future standards involving external ignition

