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PIN flame retardants are today at the centre of materials fire safety innovation. Leading flame retardant and chemicals companies, polymer and textile specialists, compounders and formulators are concentrating on PIN FR solutions in order to be future-proofed against regulation and to respect sustainability objectives. PIN FRs are thus key to combining the high levels of fire safety expected by society and demanded by regulation with innovative technologies such as 3D-printing and e-mobility. PIN FRs also enable to achieve low smoke emission – low smoke toxicity requirements in demanding applications such as railways, aircraft or plenum cables. This pinfa Newsletter presents a small range of such innovative new PIN FR fire safety solutions. We welcome information about innovative PIN flame retardant products and applications, which we can cover in future pinfa Newsletters: pinfa@cefic.be

POLICY AND CHEMICALS

EU textiles BREF open for comment

The [EU BAT BREF](#) document (best available techniques reference document) for the Textiles Industry is open for comment (see below). The “BAT Conclusions” of BREF documents become mandatory for all concerned installations across Europe. The draft BAT Conclusions specify (BAT 49) that inherently flame retardant textiles should be preferred but that if this is not applicable, flame retardants should be selected taking into account their risks, in particular persistence and toxicity. This should be ensured (BAT13) within a chemicals management system as part of EMAS (Eco-Management and Audit Scheme). Outside the BAT Conclusions, the general text (4.7.4) discusses the need to substitute certain brominated flame retardants, including in proposed criteria to select halogen-free FRs. Different families of FRs are discussed in this chapter to which pinfa is submitting comments. Your input is welcome.

Best Available Techniques (BAT) Reference Document for the Textiles Industry, draft December 2019: <https://eippcb.jrc.ec.europa.eu/reference/textiles-industry>

Comments can be submitted via pinfa@cefic.be by **March 26th** deadline, please.

OECD revamps eChemPortal

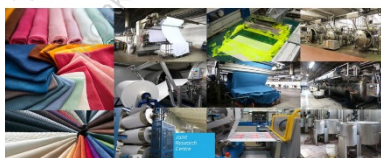
A new version of the OECD eChemPortal has been launched, providing free public access to more than 600 000 records on chemical substances. Data is provided by 19 chemical databases, including ECHA (Reach, Chem and C&L Inventory data), the US AEPa and the Japanese Government. The database covers existing and new chemicals, pesticides and biocides. Links allow access to GHS (Globally Harmonized System) Classification & Labelling information.

eChemPortal <http://www.echemportal.org/>



JRC SCIENCE FOR POLICY REPORT
Best Available Techniques (BAT)
Reference Document for
the Textiles Industry

Industrial Emissions Directive
2010/75/EU
(Integrated Pollution
Prevention and Control)
JOINT RESEARCH CENTRE
Directorate B – Growth and Innovation
Circular Economy and Industrial Leadership
Unit
European IPPC Bureau
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Brussels,
ENV DG-REPL. Area (2019)

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European Union withdrawal of the registration for certain specific exemptions for recycling of articles that contain or may contain tetra-, penta-, hexa- and/or heptabromodiphenyl ether pursuant to Annex A to the Stockholm Convention

EU clarifies ban on recycling of plastics with PBDEs

The European Commission has notified UNEP that it “withdraws” its exemption from the Stockholm Convention POP ban (Persistent Organic Pollutant) for recycled materials containing tetra-, penta-, hexa- or hepta-BDE. This follows adoption in June 2019 of Regulation EU 2019/2021 on POPs, which bans (art. 3) placing articles containing POPs on the market. However, there are tolerances (art. 4) where the POP is “present as an unintentional trace contaminant” (e.g., as in recycled plastics). POPs thus banned include the PBDEs cited above but also decaBDE, HBCD and short chain chlorinated paraffins (SCCPs). Tolerance limits are fixed at 500 mg/kg in articles for the sum of all of the PBDEs cited above (including decaBDE), with some exemptions for spare parts, 100 mg/kg for HBCD and no tolerance for SCCPs in articles (except for some articles already in use). This Regulation also requires the Commission to review and adopt if appropriate, by 2021, a lowering of the limit for decaBDE in waste from 1000 to 500 mg/kg (limit above which the waste must be separated and treated).

European Commission letter of 28/11/2019 to UNEP “European Union withdrawal of the registration for certain specific exemptions for recycling of articles that contain or may contain tetra-, penta-, hexa- and/or heptabromodiphenyl ether pursuant to Annex A to the Stockholm Convention” http://chm.pops.int/Portals/0/download.aspx?d=UNEP-POPS-EXEM-NOTIF-WDRAW-Octa_PentaBDE-SE-EU.En.pdf EU Regulation 2019/2021 “on persistent organic pollutants (recast)” <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32019R1021>

CONSULTATIONS



Ireland consultation on furniture fire regulations

The Government of Ireland has opened a public consultation to **31st March 2020** on the national Furniture Fire Regulations Ireland, which currently require effectively the same foam and textile cigarette and flame fire safety performance as the UK Furniture Fire Safety Regulation. The consultation addresses scope (e.g. whether outdoor furniture should be covered by the regulation, testing, labelling and information and specifically flame retardants. It is stated that certain brominated, chlorinated and organophosphorus FRs can pose health risks. Questions ask to propose groups of FRs which may not pose health risks, how to protect against health risk from FRs and other solutions to ensure fire safety.

Ireland national government Furniture Fire Regulations Consultation
<https://dbei.gov.ie/en/Consultations/Furniture-Fire-Regulations-Consultation.html> **deadline for replies 31st March 2020.**

Chemical Footprint 2020 survey open

The “Chemical Footprint Project” was launched in 2015 by [Clean Production Action](#), [Lowell Center for Sustainable Production](#) at the University of Massachusetts Lowell, and [Pure Strategies](#) with the objective of transforming global chemical use by measuring and disclosing data on business progress towards safer chemicals use. It provides a tool for benchmarking companies as they select safer alternatives and reduce their use of chemicals of high concern. Thirty-one companies responded to the 2019 call for data, ranging from Walmart, Xerox and Philips to SMEs. The survey for the fifth (2020) Chemical Footprint Report is now open.

Chemical Footprint 2020 survey open to 30th April 2020
<https://www.chemicalfootprint.org/assess/apply-to-participate>



IFSS

Consultation on International Fire Safety Standard

The International Fire Safety Standards (IFSS) Coalition has [published](#) a “Draft International Standard: International Fire Safety Standards (IFSS) - Common Principles – Safe Buildings Save Lives” . **The consultation is open to 23rd March 2020.** The proposal aims to define a common framework for fire safety engineering design, construction, occupation and ongoing management. It also addresses safety gaps in processes and in practices, and the implementation of fire safety standards across the world. The IFSS coalition includes housing associations, architects’ organisations, fire protection associations, the World Bank, Underwriters Laboratories and the United Nations. The proposed Common Principles document covers fire prevention (fire outbreak, ignition, fuel sources), communication, containment (limiting fire and its consequences, including smoke), escape, extinguishment. Under prevention the document cites “Installation of materials and contents (fire/ignition resistance)” and under containment, it specifies: “selection of materials and contents (fire resistance and growth) and linings (surface spread of flame and reaction to fire characteristics)”

IFSS (International Standards for Fire Safety in Buildings” home page <https://ifss-coalition.org/>

IFSS consultation to 23rd March 2020 on “Draft International Standard: International Fire Safety Standards (IFSS) - Common Principles” (49 pages)

<https://consultations.intstandards.org/consult.ti/IFSS/consultationHome>

FIRE SAFETY AND COMMUNICATIONS



NFPA points to e-vehicle fire safety challenges

The US National Fire Protection Association (NFPA) emphasises in its [latest publication](#), the fire challenges posed by electric vehicles. pinfa is actively developing cooperation with the automotive industry, materials suppliers and experts with workshops on e-mobility held over the last year in China, Japan and Europe (see pinfa Newsletter n°109). NFPA cite the case of a Tesla electric car which crashed at high speed in Mountain View California (3/3/2018) was in flame within a few minutes. Fire fighters extinguished the fire a couple of minutes on arrival, but the batteries continued to hiss and pop, and firefighters feared the whole car frame could be energised: fully charged, the batteries contain 75 kW of energy. With no other solution, the fire service called Tesla, whose headquarters is nearby. The Tesla engineers dismantled damaged parts of the battery, cell by cell, dropping cells into buckets of water, and isolated exposed wiring. The highway was closed for 6 hours before the car was towed away by the fire services (standard tow companies having refused to take it). The car then reignited twice over 24 hours at the salvage yard, and then again six days later. Overall, the incident occupied fire service teams for seven hours, compared to <45 minutes for a conventional vehicle. Tesla has blamed a missing freeway battier for the crash.

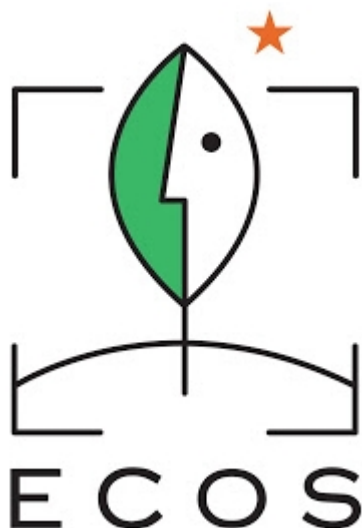
“The number of electric vehicles on the road is growing rapidly. Even so, critical questions remain about stranded energy and how to respond effectively to the most severe EV crashes”, NFPA Magazine Jan-Feb 2020 <https://www.nfpa.org/News-and-Research/Publications-and-media/NFPA-Journal/2020/January-February-2020/Features/EV-Stranded-Energy>



Stranded energy

This is the term coined for the dangerous situation where an incident results in damaged batteries containing energy with no means to empty this out as electricity. This is a major challenge in e-vehicles but also in energy storage facilities. In an incident in Sunrise, Arizona, at an electricity utility lithium-ion energy storage site, eight firefighters were injured when a battery container exploded without warning, during monitoring, hours after heat and smoke first appeared. Lithium ion batteries are estimated to have a failure rate of one in ten million to one in forty million (i.e. risk of failure during the battery lifetime). Because energy storage containers have maybe 100 000 battery cells inside, this means a risk of maybe one in a hundred for each container. High contained energy means damaged batteries need spraying with water for hours, or even days (see above) posing questions of water supply and runoff pollution risks. The only identified solution to stranded energy to date is to submerge in salt water. Netherlands firefighters tow shipping containers to EV accident sites, fill the box with water, then lift the compromised battery or vehicle into the bath.

NFPA Journal Jan-Feb 2020 “[Beyond EVs](#)” and “[Research powered](#)”



ECOS calls for blanket exclusion of FRs

The European consumer standards organisation ECOS has published a position on the EU’s Circular Economy Action Plan, calling to “exclude the use of substances of concern systematically, starting with endocrine disruptors, flame retardants, fluorinated compounds and toxic pesticides”. The organisation wants Europe to ban these substances through a “zero pollution and toxic-free strategy” and through “product design requirements”. ECOS proposes to “build on the Ecodesign Directive ban on halogenated flame retardants (pinfa note: this only concerns, to date, TV enclosures) to ban chemicals in products “by class and groups of chemicals” in coordination with REACH. pinfa regrets such calls for blanket bans of all flame retardants, which cannot be justified given that many PIN FRs have no significant health or environmental risk, and note that the blanket ban call is contradicted by the proposal to consider groups of chemicals.

“The next circular economy action plan: Priority measures for the European Commission”, ECOS, 10th December 2019 <https://ecostandard.org/publications/the-next-circular-economy-action-plan-priority-measures-for-the-european-commission/>

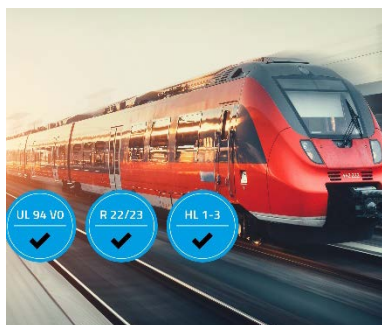
INNOVATION



PIN FRs for laser transmission plastic welding

pinfa member Lanxess has developed compounds with innovative non-halogenated flame-retardant packages, based on PBT (polybutylene terephthalates) and on polyamides, compatible with laser transmission welding. Laser welding is used to fuse small plastic parts, enabling complex geometries to be miniaturised, but requires laser transparency and specific processing characteristics. The new Lanxess materials also offer demanding performance characteristics: hydrolysis resistance (30% glass fibre reinforced PBT), UL94-V0 at 0.75 mm and comparative tracking index (CTI) of 600V (PA6) or very high laser transparency for thick-walled items (another 30% glass fibre PBT compound).

“New compounds from LANXESS for laser transmission welding”, 11th October 2019 <https://lanxess.com/en/corporate/media/press-releases/2019-00096e/>



PIN FR TPEs for performance applications

Kraiburg TPE GmbH & Co. KG, a leading manufacturer of tailor-made soft thermoplastic elastomers (TPE) for specialist and industrial applications, continues to expand its range of performance HFFR (Halogen Free Flame Retardant) TPEs. The company has launched the first TPE on the market to meet the European railway standard EN 45545-2, with products achieving R22 and R23 at HL1-3 wall thickness up to 3 mm or UL94-V0 @ 1.5 mm. These products can be used for sealing applications in both interior and exteriors of trains. All of Kraiburg TPE's flame-retardant compounds comply with the IEC 61249-2-21 standard for halogen-free. Kraiburg TPE has also launched new 'Thermolast K' HFFR TPE compounds for E&E applications, offering high Glow Wire Ignition Temperatures (up to 920°C @ 2 mm), as well as being low smoke, no dripping and self-extinguishing. These compounds offer excellent adhesion to polyolefins (polypropylene, polyethylene).

"KRAIBURG TPE meets railway standards. Flame-retardant Thermoplastic Elastomers for railway applications" 28 May 2019 <https://www.kraiburg-tpe.com/fr/node/207>

"THERMOLAST® K flame retardant TPE series for electrical, electronics and other applications" 14 January 2020 <https://www.kraiburg-tpe.com/en/flame-retardant-tpe-electrical-sector>



Silicate synergists for heat & smoke performance

pinfa member company, TOLSA, has extended its range of technical silicate (PIN) additives as synergists for flame retardants in a range of polymer and fire safety packages. The specialist additives are based on natural silicate clay and reduce smoke production and heat release by supporting char creation and enhancing char properties, especially in synergy with PIN flame retardants, and also have an anti-dripping effect. A new grade for polypropylene uses the mineral titanium dioxide to improve performance of PIN intumescent FR systems (at doses of 1-2 %). A second new grade is designed for silicones and PVC, reducing heat release and smoke emission, and substituting antimony trioxide (ATO) which is GHS Classified H351 potential carcinogen class 2 - H373 STOT RE lung and is subject to [consultation](#) on possible RoHS restrictions

"Tolsa expands its ADINS flame-retardant synergist line", 29 July 2018

<https://www.adsalecprj.com/Publicity/MarketNews/lang-eng/article-67032995/Printing.aspx>

Photo: why flame retardants are needed in electrical installations



PIN FR polyamide for 3D-printing

CRP Technology, an Italy-based leader in SLS (selective laser sintering) 3D printing since 1996, has launched the world's first UL94-V0 (2 and 3 mm), carbon fibre reinforced 3D printing material. Windform FR1, part of the company's TOP-LINE composite family, has also passed FAR 25.853 12 second vertical and 15 second horizontal burn tests, the 45° Bunsen burner test and smoke density test. It can thus be used for 3D printing parts for aircraft applications (cockpit, cabin, air conditioning piping, air ducts and outlet valves) as well as for automotive, electronics and consumer goods. Use of PIN flame retardants ensures that it passes smoke density tests. The flame retardant and carbon fibre reinforced composite material after printing offers high strength and stiffness, as well as light weight, and enables printing of components with high surface resolution.

"CRP Technology launches flame-retardant Windform FR1", 3 September 2019

<http://www.windform.com/news/crp-technology-launches-flame-retardant-windform-fr1.html>
and <http://www.windform.com/windform-fr1.html>



First HDPE cable compound without ADCA

Borealis has launched the world's first chemically-foamed HDPE cable compound without use of ADCA (azodicarbonamide), a substance which is classified as SVHC (Substance of Very High Concern) and has recently been recommended for inclusion in the REACH Annex XIV 'Authorisation' list. Borealis' HE1355 is intended in particular for telecommunications cables, including foam or foam skin insulation telephone cables, as well as dry core or jelly-filled cables, and is offered in low smoke zero halogen (LSZH) formulation, based on PIN flame retardants, to meet industry and building safety requirements. The compound offers good processability, stabilisation and toughness.

"Borealis launches innovative, ADCA-free compound HE1355 for telecommunications cables", 22 January 2020 <https://www.borealisgroup.com/news/borealis-launches-innovative-adca-free-compound-he1355-for-telecommunications-cables>

PIN FR cable for e-vehicle powertrains



Padanaplast, a leader in cross-linked polyolefins (XLPO) since 1971, and part of the Finproject Group in Italy, has launched a new ultra-flexible halogen-free flame retardant T4 cable, specifically adapted for electric vehicle powertrains. The Cogegum® GFR 1709-27. The silane-grafted compounds are non-corrosive, not releasing acids, so facilitating recycling. This new compound extends the Cogegum® XLPO-HFFR range, which includes grades for T3 e-vehicle cables and for charging cables, compliant with ISO 6722 Class C and SAE J 1128.

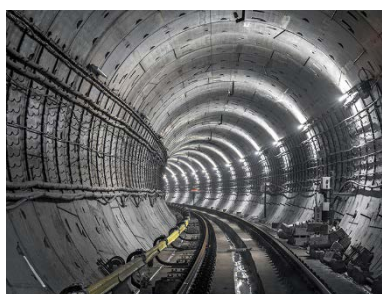
"Padanaplast to showcase advanced HFFR compounds for electric powertrain cabling at WIRE 2020", 15 January 2020 <http://www.padanaplast.com/pp/images/media.pdf>



PIN FR for natural fibre reinforced plastics

pinfa member, [Budenheim](#), has launched a PIN flame retardant specifically developed for natural fibre reinforced plastics, such as WPC (wood plastic compounds). The ammonium polyphosphate based product is coated to improve polymer compatibility, processing and durability, resulting in high stability and water resistance in outdoor applications, such as deckings, building facades or fencing. The innovative PIN FR has a very good eco-toxicological profile and is compatible with a range of polymers (PP, PE and PVC). Depending on the fibre and polymer, UL94-V0 can be achieved (4 mm) at an FR loading of 20%. Because it is coated and is used in plastics, the product is not concerned by the REACH restriction on ammonium salts in cellulose insulation materials.

https://www.budenheim.com/fileadmin/user_upload/Downloads/press/2019-08-08_PR_Budenheim_at_K_Fair_2019.pdf and <https://www.budenheim.com/en/solutions/flame-protection/> Credit photo: imaginima/iStock



First 2-hour fire resistant phenolic cable conduit

Radix, a leading producer of high-performance cables, has launched Champion Flame Shield XW, a phenolic fire alarm cable (FPLR Fire Power Limited Riser) conduit which offers 2-hour fire resistance, as required by UL2196, for its DuraLife circuit integrity cable systems. Phenolic conduits offer advantages over metal for transit and infrastructure applications, because they do not corrode and do not conduct electricity, as well as being flexible for easy installation. The PIN flame retardant conduits are low-smoke, zero-halogen (LSZH), adapted for use with the Radix LSZH DuraLife FPLR cables, including plenum rated FPLR cable.

Radix [press release](#) 29 January 2020:

SCIENCE

Weather resistance of PIN FR cables

Prolonged artificial weathering of EVA (ethylene-vinyl acetate copolymer) cables was tested with three different PIN flame retardants (ATH aluminium hydroxide @60% from Nabeltec, AIPi aluminium diethyl phosphinate @20% and APP ammonium polyphosphate @20%, both from Clariant). Neat polymer was not tested. The cables, prepared specifically by Leoni Kabel with simplified formulation (PIN FR only, no other additives) had 2 mm copper core and 1.5 mm EVA jacket. The cables were subjected to three different conditions, each for 2000 hours: artificial weathering (cycling -10 to +70°C, an accelerated equivalent to 14 months outside in Berlin), humidity and salt spray. Visual modification of the polymer surface, changes in the polymer (ATR-FTIR) and changes in fire performance were tested after 400, 800, 1200, 1600 and 2000 hours. The authors note significant chemical modification in the polymer with weathering, which would probably occur in neat polymer without FR, including generation of aldehydes, ketones and other complex hydrocarbons. Flame retardance was significantly impacted by weathering: e.g. MARE increased in some cases (up to c.+10%) and decreased in others (down to c.-20%). The authors conclude that all the PIN FR cables did not lose their effective flame retardancy, but that changes are non-linear, so that longer duration tests would be needed to understand how the cables would perform after ten or more years.

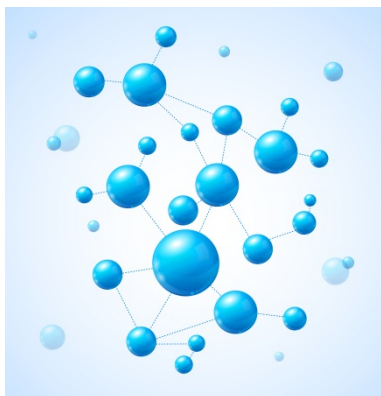


“Durability of the flame retardance of ethylene-vinyl acetate copolymer cables: Comparing different flame retardants exposed to different weathering conditions”, Y. Tan et al., J. Applied Polymer Science 2020, DOI: 10.1002/APP.47548

Comparing FRs in polyamides

Two different polyamides with 30% glass fibres, based on terephthalic acid (PTA) or isophthalic acid (ITA), were tested for fire performance and other properties with a halogenated and a PIN FR solution. The ITA-based polyamide has a lower melting point, facilitating processing, but poorer mechanical and fire characteristics. The PIN FR Alpi (aluminium diethyl phosphinate) was loaded at 18% w/w. In the halogenated compound, brominated polystyrene and zinc borate were loaded at 21% + 7%. Both FR solutions enable to achieve UL94-V0 @ 0.75 mm, and reduce toxic gas (carbon monoxide, hydrogen cyanate) and smoke emissions. Peak heat release rate was lower with the halogenated FR but time to ignition was marginally shorter. The authors conclude that the PIN FR solution, at these loadings, offers higher flame retardancy efficiency.

“Halogen and halogen-free flame retarded biologically-based polyamide with markedly suppressed smoke and toxic gases releases”, T. Cai et al., Composites Part B 184 (2020) 107737, <https://doi.org/10.1016/j.compositesb.2019.107737>

**PUBLISHER INFORMATION:**

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