



FIRE PROTECTION FOR AUTOMOTIVE AND TRANSPORTATION

35
Br
79.90

Brominated Flame Retardants

15
P
30.97

Phosphorus Flame Retardants

12
Mg
24.31

Magnesium Flame Retardants

7
N
14.01

Nitrogen Flame Retardants



ICL Industrial
P R O D U C T S

CARING FOR YOUR FUTURE TODAY

In 2012, the worldwide number of vehicles on the road is estimated at 1.2 billion and yearly car production is approximately 78 million.

The impressive progress made recently in the car and transportation industry has contributed to reduce fuel consumption, improve tremendously comfort and integrate audio/video, information and communication technology equipment facilitating traveling conditions. This has been achieved thanks to increased use of plastic materials

Unfortunately, these products are highly flammable and at the beginning of the 21st century, the number of road vehicle fires was estimated at 70,000 per year worldwide, causing the death of more than 3500 people. Consequently, increased attention is being paid by authorities, consumer associations and the car and transportation industry to increase fire safety.

Addressing the need for more fire safety, ICL-IP is offering to the market more than 50 flame retardant solutions for the various plastic applications in this industry.

The following picture illustrates the main fields of flame retardant applications in cars.

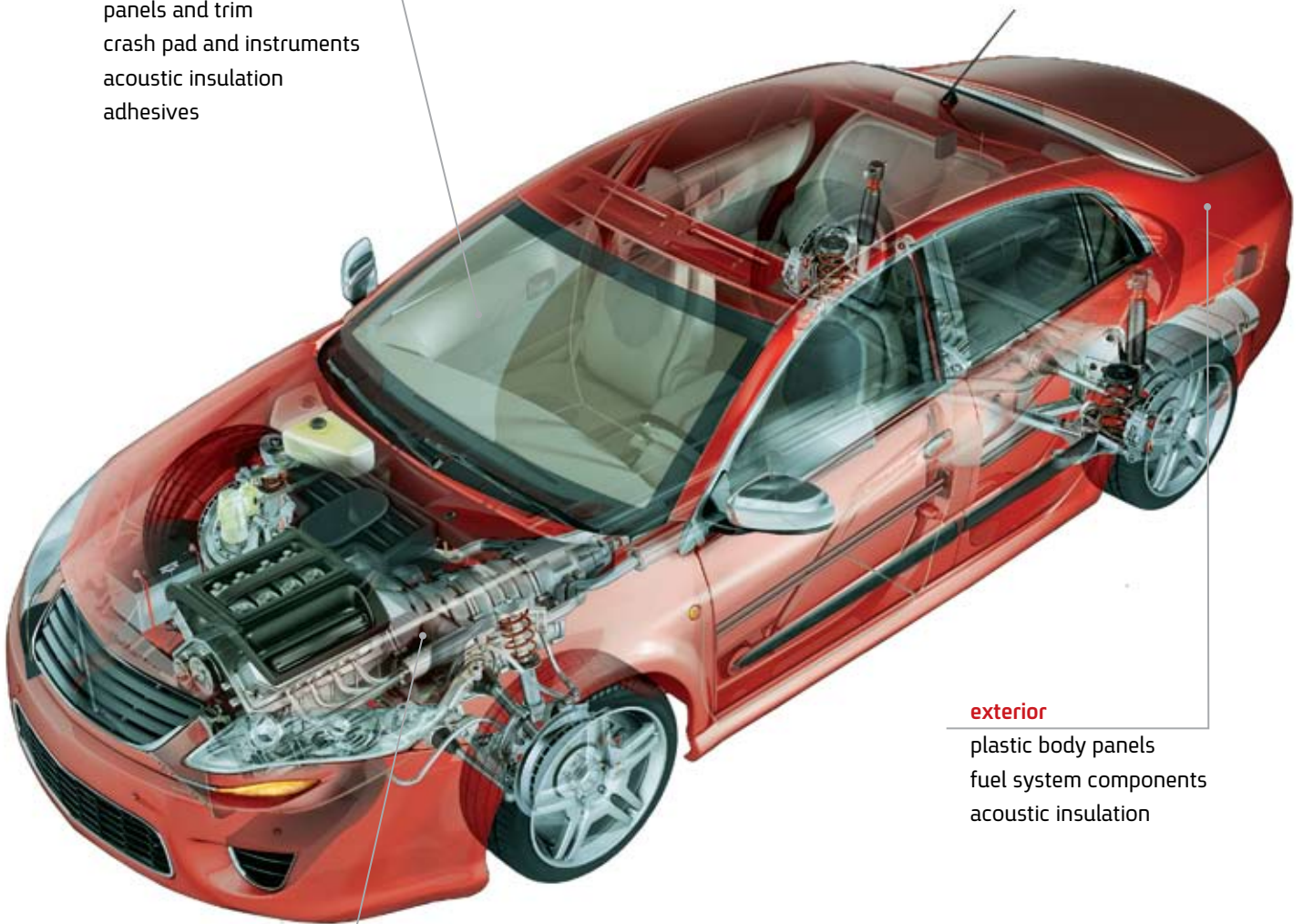
In mass transportation, truck, airplane and marine industries, flame retardants also play a very important role to provide good thermal insulation. The main products used for this purpose are foams made of rigid polyurethane, crosslinked polyolefins or crosslinked plasticized blends of PVC with nitrile rubber. Worthwhile to mention also is the use of plasticized PVC coated fabric for the production of truck and boat covers.

FLAME RETARDANT SOLUTIONS BY APPLICATIONS

| Application | Polymer type | FR tradename |
|------------------------------------|--|--|
| Printed circuit board | Epoxy | FR-1524 |
| | Phenolics | FR-1410; F-2001; Fyrol® FR-2 & PCF; Fyrolflex® RDP |
| Housing & dashboard | HIPS | FR-245; FR-1410; F-3014 Polyquel® 200 series |
| | ABS | FR-245; F-2016; F-2400 F-3020; Polyquel® 200 series |
| | PC/ABS alloys | Fyrolflex®RDP & Sol-DP™; F-3100 |
| | PP | FR-1410; FR-720; FR-370; FR-1025; FR-20 120 55 & 57; Polyquel® 100 series |
| Wire & cables | PP copolymers; EPR; SBR; | FR-20 100 & 120 510 FR-1410 |
| | Plasticized PVC | Phosflex® 390 & 418 |
| Battery casing | PP | FR-720; FR-1410 |
| | Modified PPO | Fyrolflex® RDP & Sol-DP™ |
| Textile for seats | Latex backcoating | FR-1210; TexRon® 9020/9025 |
| Seats | Flexible PUF | Fyrol®A300TB & PNX-(LE) |
| Connectors & under the hood parts | Polyamide | FR-803P; F-2400; F-3100 FR-1025; FR-1410; FR-20 210 57 |
| | PBT & PC/PBT alloys | FR-1025; F-2100L; F-2400; F-3100 |
| Acoustic insulation | XPE foam | FR-1210, FR-1410, FR-1025; FR-20 |
| Thermal insulation | Rigid PUF | Fyrol® PCF |
| | XPE foam | FR-1410 |
| | X Plasticized PVC nitrile rubber blend | FR-1410; FR-20 100 57; Phosflex® 71B & 390 |
| Truck & boat covers | Plasticized PVC coated fabric | Phosflex® 71B & 390 FR-20 100 57 |
| Door and partition internal panels | PP, WPC | FR-1210, FR-1410, FR-1025; FR-20 |

interior

seats
panels and trim
crash pad and instruments
acoustic insulation
adhesives



exterior

plastic body panels
fuel system components
acoustic insulation

under hood

ignition
wire and cabling system
electrical component
air filters and HVAC

(Courtesy EFRA)

FLAME RETARDANT MAIN ADVANTAGES

Brominated flame retardant reactive

FR-1524 High purity, high reactivity, low color, high clarity, good solubility and FR efficiency for epoxy printed circuit board application

Brominated flame retardant additives

FR-245 Thermal and UV stability, imparts good flow and impact strength, non-blooming FR, option for low antimony trioxide or antimony trioxide-free solutions

FR-720 High FR efficiency and thermal stability

FR-1410 High FR efficiency and thermal stability, multi-purpose

FR-1210 High FR efficiency and thermal stability and most popular for textile back-coating applications

TexRon® 9020 & 9025 Non deca BDE tailor made FR system with optimal melting range for textile back coating applications with excellent durability

Brominated polymeric flame retardant additives

FR-803P Very high thermal stability, non-blooming, good electrical properties

FR-1025 Excellent thermal aging stability, processing aid, high FR efficiency, high impact properties, non-blooming, compatibility with fiber reinforcement and good recycling

F-2000 series High thermal and UV stability, high FR efficiency, melt blendable and non-blooming

F-3000 series High thermal and good UV stability, low metal adhesion, non-blooming

Polyquel® series Non-dust, non-blooming, high thermal and UV stability, FR efficiency

Phosphorus based flame retardant additives

Fyrol® PCF Excellent thermal and hydrolytic stability and low viscosity

Fyrol® A300TB Easy processing, meeting fogging requirement

Fyrol® PNx-(LE) Halogen-free, low emission and fogging

Fyrolflex® RDP Halogen-free, high FR efficiency and thermal stability

Fyrolflex® Sol-DP™ Halogen-free, easy to handle free-flowing powder, good hydrolytic and thermal stability

Phosflex® 71B High thermal stability

Phosflex® 390 Good performance at low temperature, low smoke

Phosflex® 418 Excellent plasticizing efficiency at low temperature, low smoke & low volatility

Mineral flame retardant additive

FR-20 series High purity grades of magnesium hydroxide with option of surface treatment and high abrasion resistance, smoke suppressant and high thermal stability

MAIN FIRE SAFETY STANDARDS

The FMVSS 302 standards introduced more than 40 years ago are no longer relevant to car fire safety. According to experts, measures should be taken to improve survivability in automobile fires. In the following table, you will find a summary of the fire safety standards by categories of applications. More information about fire safety standards can be found in the Plastics Flammability Handbook of Jürgen Troitzsch, 3rd edition published by Hanser.

| CATEGORIES | FIRE SAFETY STANDARD |
|--|---|
| General Automotive interior applications | FMVSS 302 ; NFPA 556 (US); ISO 3795 (International); DIN 75200 (Germany); BS AU 169 (UK); JIS D1201 (Japan) |
| Wire & cables | ISO 6722 (International); ASTM D2863 (US) |
| Flexible PU foam (seats) | DIN 75201-G (Germany) |
| Textile back-coating (seats) | BS 5651 (UK) |
| General mass transportation | NFPA 130 (US); |
| Railways | EN 45545 (EU); NF F16-101, NF F16-201, NF X70-100 & NF X10-702 (France); DIN 5510 (Germany); BS 6853 (UK); TB/T3138 (US); ASTM D2863, ASTM D3675-95, ASTM E119-98, ASTM E162-98, ASTM E662, ASTM E1537-98 (US). |
| Ships | IMO A.653 (International); ISO 1182, ISO 5659 (International); BS 5852 (UK) |
| Aircraft | FAR parts 23, 25, 27, 29 & 33 (US); ASTM E648-97 (US) |
| General for E&E equipment | UL 94 |

ICL-IP invites you to make use of the “Flame Retardants brochure” and benefit from its long experience in order to optimize your choice of flame retardant solutions. Moreover our **Technical Support Network – TECNET** is a team of highly professional technical experts always available all over the globe to advise and help you.



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