



FIRE SAFETY OF ELECTRICAL AND ELECTRONIC EQUIPMENT ICL-IP SOLUTIONS



Brominated Flame Retardants



Phosphorus Flame Retardants



Magnesium Flame Retardants



Nitrogen Flame Retardants



ICL Industrial
P R O D U C T S

CARING FOR YOUR FUTURE TODAY

One major cause of the 4 to 5 million fires in Europe and the US that leave tens of thousands killed and hundreds of thousands injured is Electrical and Electronic (E&E) equipment. This is why fire safety is still an area of high concern in developed countries. The use of fire-retardant substances can prevent fatal electrical fire accidents and property or environmental damages caused by such fires.

ICL-IP develops flame retardants which not only reduce fire risk in high-performance E&E goods, but also meet or exceed the industry's most stringent environmental guidelines, including all risk assessment procedures according to Europe's strict REACH guidelines. As eco-friendly, effective and cost-effective products, they provide a comprehensive, sustainable solution to the market's real need for flame retardants.

ICL-IP is pleased to share its database with registered customers who are entitled to download a full and explicit set of Application Data Sheets by clicking on each product's name.

FLAME RETARDANT SOLUTIONS BY APPLICATIONS

Application	Polymer Type	FR Tradename
Printed circuit board	Epoxy	FR-1524
	Phenolics	FR-1410; F-2001; F-3014 Fyrol® FR-2 & PCF; Fyrolflex® RDP
Housing, casing & internal parts	HIPS V-0/V-1	FR-245; FR-1410; F-3014; Polyquel® 200 series
	HIPS V-2	FR-720; FR-245; FR-1410; FR-370
	ABS	FR-245; F-2016; F-2400; F-3020; F-3516; Polyquel® 200 series; Fyrolflex Sol-DP™ for V-2 ABS
	PC/ABS alloys	Fyrolflex® RDP & Sol-DP™; F-3100
	Modified PPO	Fyrolflex® RDP & Sol-DP™
Connectors & internal parts	Polyamide	FR-803P; F-2400; F-3100; FR-1025; FR-1410; FR-20 210 S7;
	PBT & PC/PBT alloys	FR-1025; F-2100L; F-2400; F-3100; FR-803P; FR-1410; F-370
Wire & cables	PP copolymers; EPR; SBR;	FR-20 100 & 120 S10 FR-1410; Polyquel® 100 series
	Plasticized PVC	Phosflex® 390 & 418



Connectors

(PP, PBT, Polyamides)

Refrigerator interior panel

(ABS, HIPS, PC/ABS)

Control panel

(ABS, PC/ABS, PC, Modified PPO)

Printed Circuit boards

(Epoxy, Phenolics)

Heater covers

(ABS, PC/ABS, PC, Modified PPO)

Control panel

(ABS, PC/ABS, PC, Modified PPO)

Trim components

(PP, ABS, PC/ABS, PC)

Fan

(PBT, ABS)

Housing

(ABS, HIPS, PC/ABS, Modified PPO)

Connectors

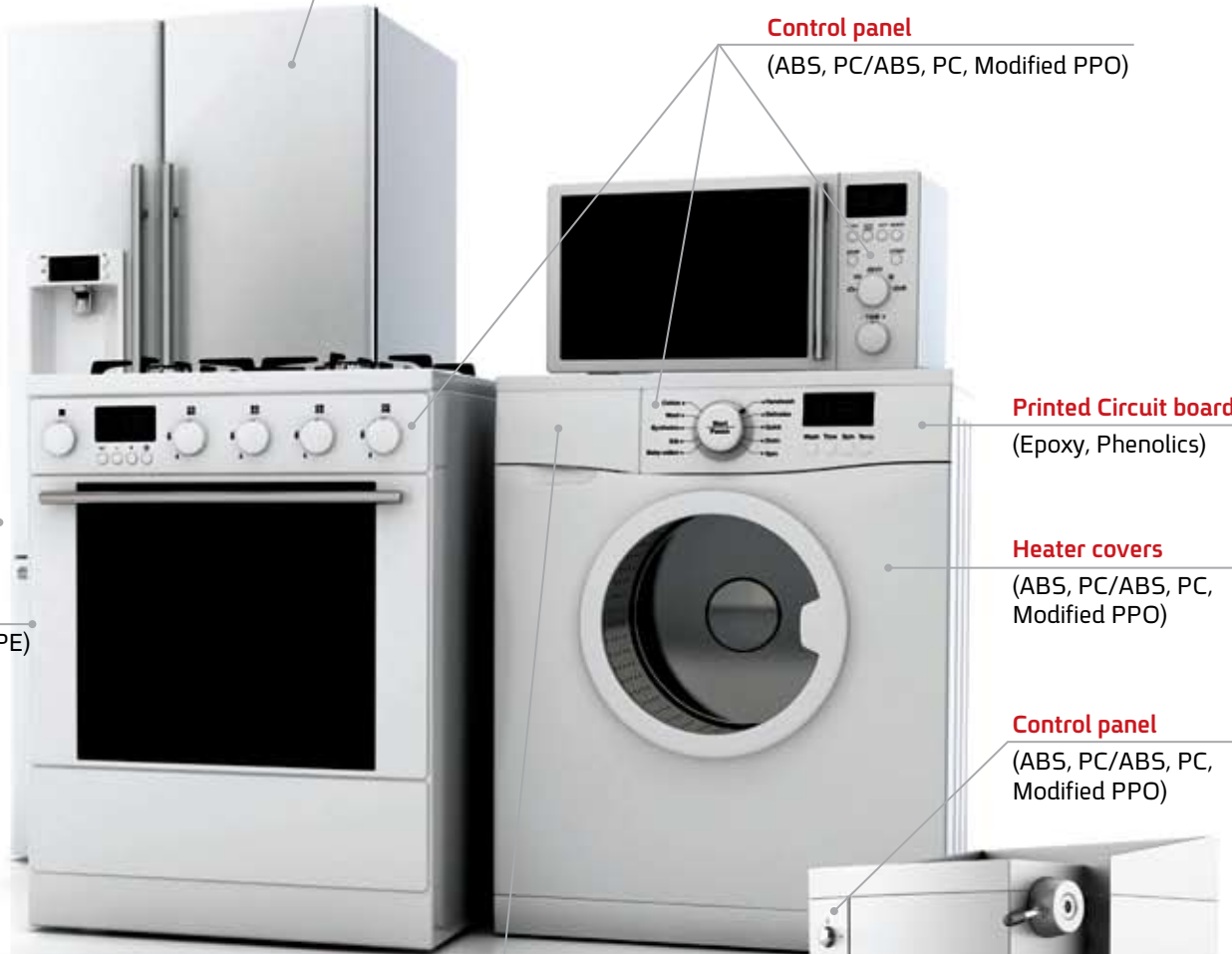
(PBT, Polyamides)

Printed Circuit boards

(Epoxy, Phenolics)

Wire & Cables

(PVC, PP, XLDPPE)



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 and good recycling properties

FR-720 High FR efficiency and thermal stability

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

FR-370 Synergism between phosphorus & bromine, outstanding UV stability, non-blooming, good melt-flow and impact.

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, non-blooming, and good recycling properties

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

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

Phosphorus based flame retardant additives

Fyrol® FR-2 & PCF Excellent thermal and hydrolytic stability and low viscosity

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® 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, high abrasion resistance, smoke suppressant, high thermal stability, good electrical properties and acid scavenger

MAIN FIRE SAFETY STANDARDS

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
Consumer equipment, TVs and household appliances	IEC 60335-1 (International); IEC 60065 (International); EN 60065 (Europe); UL 1410 (USA)
Wire & cables	IEC 60332-1 to 3 (International); ASTM D2863 (US ; LOI)
Fire Hazard Tests for Electrotechnical Equipment	IEC 60695-1-1 (General guidance); IEC 60695-2-10 to 13 (Glow Wire test); (International); IEC 60695-2-2 (Needle test) (International)
Evaluation of Materials for Electrical End Products	UL 746A, B & C (US); UL 1694 (US); CTI (Comparative Tracking Index) according to ASTM D 3638-85 (US) or IEC 112 (International)
Heat and Smoke release	UL 2043 (Cone calorimeter; US)
Corrosion Damages	IEC 60695-5 (International)
Toxicity of fire effluents	IEC 60695-7-2, 3 & 4 (International); ASTM E 1687-97 (US)
General for E&E equipment	UL 94; ASTM D2863 (LOI)

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.



Toner cartridge
(HIPS)



Printed circuit board
(Epoxy, Phenolics)



Connectors
(PBT, Polyamides)

ICL - INDUSTRIAL PRODUCTS

Head Office

ICL-IP
Makleff House, 12 Kroitzer St., P.O.B. 180
Beer Sheva 84101, Israel
Tel: +972 8 629 7608 Fax: +972 8 629 7846
E-mail: frinfo@icl-ip.com

Europe

ICL-IP Europe B.V.
Fosfaatweg 48, 1013 BM Amsterdam
The Netherlands, or P.O. Box 465
1000 AL Amsterdam, The Netherlands
Tel: +31 20 800 5800 Fax: +31 20 800 5805
E-mail: fr.europe@icl-ip.com

North America and Mexico

ICL-IP America Inc.
622 Emerson Road, Suite 500
St. Louis, Missouri 63141, USA
Tel: +1 877 661 4272 Fax: +1 314 983 7610
E-mail: fr.nam@icl-ip.com

South America

ICL Brasil Ltda.
Av. Major Sylvio de Magalhaes Padilha, 5200
Ed. Dallas Cj.22, 05693-000 Sao Paulo SP, Brazil
Tel: +55 11 2155 4539 Fax: +55 11 2155 4507
E-mail: fr.sam@icl-ip.com

Asia Pacific

• China

ICL CHINA
Room 908 Times Square Office Tower
No 93 Middle Huai Hai Road
Shanghai 200021, China
Tel: +86 21 5386 3322 Fax: +86 21 5386 3336
E-mail: fr.china@icl-ip.com

• Japan

ICL-IP Japan Ltd.
Sumitomo Fudosan Iidabashi Bldg., 5F
2-3-21, Koraku, Bunkyo-ku, Tokyo, 112-0004, JAPAN
Tel: +81 3 6801 8430 Fax: +81 3 6801 6970
E-mail: fr.japan@icl-ip.com

• Other Asia Pacific

ICL Asia Ltd.
Room 2301, 23/F, Allied Kajima Building,
138 Gloucester Road, Wanchai, Hong Kong
Tel: +852 2827 7761 Fax: +852 2824 1502
E-mail: fr.asia@icl-ip.com

Other parts of the World

ICL-IP Israel Sales Office
Makleff House, 12 Kroitzer St., P.O.B. 180
Beer Sheva 84101, Israel
Tel: +972 8 629 7633 Fax: +972 8 629 7819
E-mail: fr.row@icl-ip.com

Visit our Website: www.iclfr.com
Additional links: www.icl-ip.com • www.phoschek.com • www.bsef.com

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