Annex

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) IN LIGHTING PRODUCTS – *Factsheet*

v250417

GLOBAL LIGHTING ASSOCIATION

MANDATORY (INTERNATIONAL) ELECTRICAL SAFETY STANDARDS GOVERNING PFAS USE IN LIGHTING PRODUCTS

PFAS are integral to many electronic components and production processes, making them essential to the functionality and durability of lighting products.

Preliminary research has identified a broad spectrum of over 50 PFAS compounds commonly used in generic electrical and electronic components for a wide range of electronic applications, many of which are also integrated into lighting products.

An internal survey with our GLA member organisations based on supplier data and available literature, indicated that PFAS are used in components for unique characteristics, listed in the table below.

Flame retardancy	**Water and dust repellence**
Dielectric strength	**UV resistance**
Chemical inertness and non-reactivity	**Bonding properties**
Low and high temperature and thermal resistance	**Shatterproof/fragment retention protection**
Flexibility	**Minimisation of wear and tear for machinery and products**

These unique characteristics are essential to provide safety, reliability and durability of lighting solutions, which are mandated by electrical and fire-safety standards issued by international standardisation bodies (e.g. ISO/IEC/EN/UL/CSA).

The list below contains electrical and fire-safety standards issued by international standardisation bodies. It is subject to change and will be updated in the event that new applications of PFAS in lighting products and their related safety standards are identified in future.

PFAS Type(s)	End-use Component	Reason for use	International & regional Standards
• Polytetrafluoroethylene (PTFE)	Connectors	***Fire Safety*** (Flame retardancy)	UL 94 UL 1694 IEC 60598-1 IEC 60947-7-4 IEC 60838-2-2 IEC 60998 IEC 62560 IEC 62776 IEC 62031
		Fire Safety (Anti-dripping)	IEC/EN 60695-2-10 IEC/EN 60695-2-11 IEC/EN 60695-2-12 IEC/EN 60695-2-13 IEC/EN 60695-11-20 IEC/EN 60695-11-5
• Potassium nonafluorobutane sulphonate (often used with PTFE or other PFAS)	Power supply unit plastic housing	***Fire Safety*** (Flame retardancy)	UL 94 UL 1694 IEC 61347
		Fire Safety (Anti-dripping)	IEC 60598-1 IEC 60947-7-4 IEC 60838-2-2 IEC 60998 IEC/EN 61558-1 IEC/EN 60695-2-10 IEC/EN 60695-2-11 IEC/EN 60695-2-12

			IEC/EN 60695-2-13 IEC/EN 60695-11-5 IEC/EN 60695-11-20 IEC/EN 60950-1
• Perfluorobutanesulphonate PFBS (often used with PTFE or other PFAS)	Luminaire housing	***Fire Safety*** (Flame retardancy) ***Fire Safety*** (Anti-dripping)	UL 8750 UL 94 UL 1694 IEC 60598-1 IEC 60838-2-2 IEC 60998 IEC/EN 60695-2-10 IEC/EN 60695-2-11 IEC/EN 60695-2-12 IEC/EN 60695-2-13 IEC/EN 60695-11-5 IEC/EN 60695-11-20 UL 1993 UL 1598 UL 746C
• Polytetrafluoroethylene (PTFE)	Lamp base housing / module	***Fire Safety*** (Flame retardancy) ***Electrical Safety*** (Dielectric strength) ***Durability*** (Low and high temperature resistance)	IEC 62560 IEC 62031 IEC 62776 UL 1993 UL 746C
• Polytetrafluoroethylene (PTFE)	Inductor and transformer	***Electrical Safety*** (Dielectric strength)	UL 1446 IEC 60085
• 1-Propene, 1,1,2,3,3,3-hexafluoro-, oxidized, polymerized	Film capacitor	***Reliability*** (Dielectric strength)	IEC 60384-1 IEC 60384-2 IEC 60384-14

			IEC 60384-17
• PTFE • Fluoroethylenepropylene (FEP) • 1-Hexene, 3,3,4,4,5,5,6,6,6-nonafluoro-, polymer with ethene and 1,1,2,2-tetrafluoroethene (ETFE) • Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl) oxy]-polymer with 1,1,2,2-tetrafluoroethene	Cable insulation	***Fire Safety*** (Flame retardancy) ***Electrical Safety*** (Dielectric strength) ***Flexibility and crack avoidance*** (Temperature and UV-resistance)	UL 94 UL 1694 UL 1581 UL 2556 IEC 61347 IEC 60598-1 IEC 60947-7-4 IEC 60838-2-2 IEC 60998 IEC 60695-11-5 IEC 60950-1 IEC/EN 60695-2-10 IEC/EN 60695-2-11 IEC/EN 60695-2-12 IEC/EN 60695-2-13 IEC 60085 UL 1446
• Polytetrafluoroethylene (PTFE) • Fluoroethylenepropylene (FEP) • 1-Hexene, 3,3,4,4,5,5,6,6,6-nonafluoro-, polymer with ethene • 1,1,2,2-tetrafluoroethene (ETFE) • Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]-, polymer with 1,1,2,2-tetrafluoroethene	Insulation sleeves	***Fire Safety*** (Flame retardancy) ***Electrical Safety*** (Dielectric strength) ***Flexibility and crack avoidance*** (Low & high temperature and UV-resistance)	UL 94 UL 1694 IEC 61347 IEC 60598-1 IEC 60947-7-4 IEC 60838-2-2 IEC 60998 IEC 60695-11-5 IEC 60950-1 IEC/EN 60695-2-10 IEC/EN 60695-2-11 IEC/EN 60695-2-12 IEC/EN 60695-2-13 IEC 60085 UL 1446
• Polytetrafluoroethylene (PTFE) • Fluoroethylenepropylene (FEP)	Shrinking sleeves	***Fire Safety*** (Flame retardancy)	UL 94 UL 1694 IEC 61347 IEC 60598-1 IEC 60947-7-4

• 1-Hexene, 3,3,4,4,5,5,6,6,6-nonafluoro-, polymer with ethene • 1,1,2,2-tetrafluoroethene (ETFE) • Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]-, polymer with 1,1,2,2-tetrafluoroethene		***Electrical Safety*** (Dielectric strength) ***Flexibility and crack avoidance*** (Low & high temperature and UV-resistance)	IEC 60838-2-2 IEC 60998 IEC 60695-11-5 IEC 60950-1 IEC/EN 60695-2-10 IEC/EN 60695-2-11 IEC/EN 60695-2-12 IEC/EN 60695-2-13
• Fluoroethylenepropylene (FEP)	Lamp protection sleeve	***Customer safety*** (glass shattering protection)	IEC 61549 61549-IEC-810
• PFAS	Ink	***Durability*** (Water repellence, high temperature resistance, chemical inertness, and non-reactivity)	IEC 62035 IEC 61195 IEC 61199
• 1-Hexene, 3,3,4,4,5,5,6,6,6-nonafluoro-, polymer with ethene • 1,1,2,2-tetrafluoroethene (ETFE)	Solar / PV Panel	***Efficiency and durability*** (Water and dust repellence)	
• Hexane1,1,1,2,2,3,3,4,4,55,666-tetradecafluorohexane	Glue / adhesive	***Durability*** (Bonding properties, UV-resistance, chemical inertness and non-reactivity)	

• Fluoroethylene vinyl ether (FEVE) • Polyvinylidene fluoride (PVDF) • Polytetrafluoroethylene (PTFE)	Paint	***Durability*** (Water and dust repellence, UV-resistance, chemical inertness and non-reactivity)	
• Homo-polymer of vinylidene fluoride (VDF) • Hexafluoropropylene (HFP)	Gasket / O-ring	***Durability*** (UV-resistance, chemical inertness, and non-reactivity)	
• Perfluorocarboxylic acids containing 9 to 14 carbon atoms. • Perfluorooctanoic acid (PFOA) and its salts • Perfluorohexane-1-sulphonic acid • Perfluorooctane sulfonate (PFOS) • Perfluoroheptanoic acid and its salts • And many more	Switch, socket, plug and safety breaker	***Fire safety*** (Flame retardancy)	IEC 60669 IEC 60884
• Polyvinylidene fluoride (PVDF) • Perfluoroalkoxyalkane (PFA) • 1,1,2,2- Tetrafluoroethyl 2,2,3,3-tetrafluoropropyl ether • Polytetrafluoroethylene (PTFE)	Battery	***Durability and efficiency*** (Binder properties)	
• Perfluoropolyether (PFPEs)	Thermal shock testing	***Electrical insulation*** (Thermal stability and	IEC 60068-14 NC, or MIL-STD-202G (107)

		chemical inertness)	
• PFAS	Packaging paper	***Under investigation: Might be used for glossy effects*** (Water repellence)	
		Under investigation: Residue in recycled materials	

ABOUT THE GLA

The Global Lighting Association (GLA) is the leading voice for the lighting industry worldwide, representing over 5,000 lighting manufacturers and generating $75 billion in annual sales. Through its network of 27 national and regional lighting associations, the GLA advocates for policies and practices that promote sustainable lighting solutions, energy efficiency, and human well-being. The GLA is committed to fostering a collaborative environment that supports innovation, fair competition, and the growth of the lighting industry on a global scale.

This document is designed to provide advice and guidance for relevant stakeholders. It is subject to change or update without prior notice. The content is compiled based on the best available knowledge of participating GLA members, who cannot be held liable for any inaccuracies, omissions, or misinterpretations.

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