



BÜFA

**The
BÜFA®-Complete Range
of Fire Retardant Products**

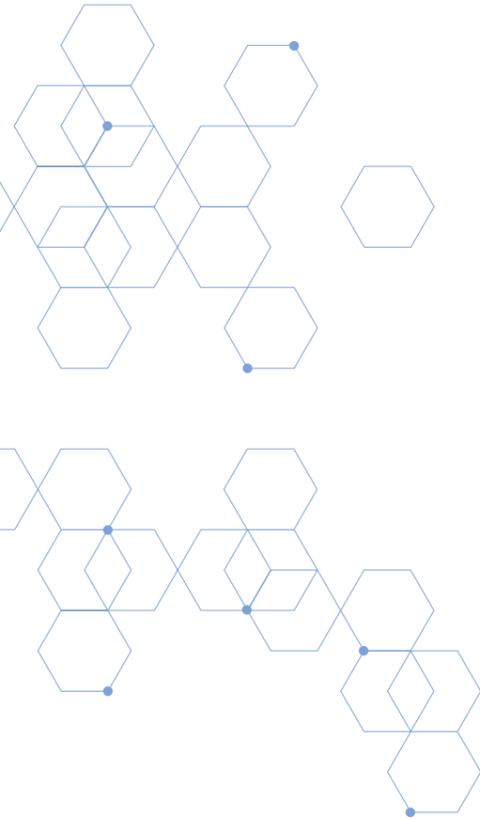
Tried, tested and reliable

Composites

Why Fire Retardancy?



Synthetic resins and other plastics are flammable. As well as the heat, smoke gases pose a safety hazard by obstructing the view of escape routes and making rescue work more difficult. Plastic's fire retardant rating is determined by how it behaves in the event of a fire. Effective fire retardant systems are vital in areas with high levels of personal injury or property damage and must comply with current technical standards, especially for transport and construction. BÜFA Composite Systems is the leading supplier of highly innovative, tailor-made materials for composite manufacturing with over two decades of experience. Of course, we support our customers in the processing of economical and technically flawless fire retardant solutions – at every stage of component development! Be it in automotive and rail vehicle production, in the wind energy, tank and pipe, construction and boat building sectors – BÜFA has tried, tested and has reliable Fire Retardant Systems in its range for every application.



We are Passionate about Fire Retardancy!

The BÜFA portfolio of Fire Retardant Systems has been specially designed to meet the needs of the user based on decades of experience. There are various ways of making plastics flame-retardant, such as adding halogen-containing additives or aluminium hydroxide. Each method has its justifications and areas of application, but also specific limitations that need to be recognised. BÜFA offers extensive solutions for polyester resin processing in various processes – both for closed processes, such as vacuum infusion and RTM, as well as for hand laminates. Effective application is achieved by combining several flame retardant components.

When developing fire retardant solutions, BÜFA takes into account the various technical and legal requirements in Germany, the EU and worldwide. As a system provider, BÜFA Composite Systems believes it is important to optimise the coordination of all components.



BÜFA Fire Retardant Experts Paul Palm and Peter Kornas:

"At BÜFA, we are particularly proud to not only supply our customers with effective, economical fire retardant systems, but also to work with them to adapt them to their current needs.

This is, of course, more successful the earlier we are involved in the development work. The sooner we can bring our expertise to the table, the less the customer has to pay, for instance, for failed fire tests in which the component does not behave as hoped. This is particularly the case for highly sophisticated solutions, such as cladding used in rail transport. We are also renowned for always keeping a close eye on profitability."

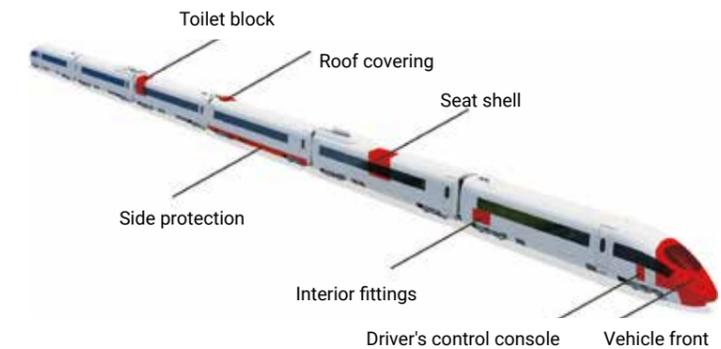
P. Kornas





Fire Retardancy in Rail Transport: BÜFA sets Standards

Using composite products in rail transport is particularly challenging, as emergency situations such as tunnel fires are complex. Components must be particularly fire-resistant in order to keep escape routes open. In Europe, the EN 45545-2 standard regulates the requirements for synthetic resin products. BÜFA has over 20 years of experience in the development of such fire retardant systems and offers high-performance flame retardants with sophisticated technology.

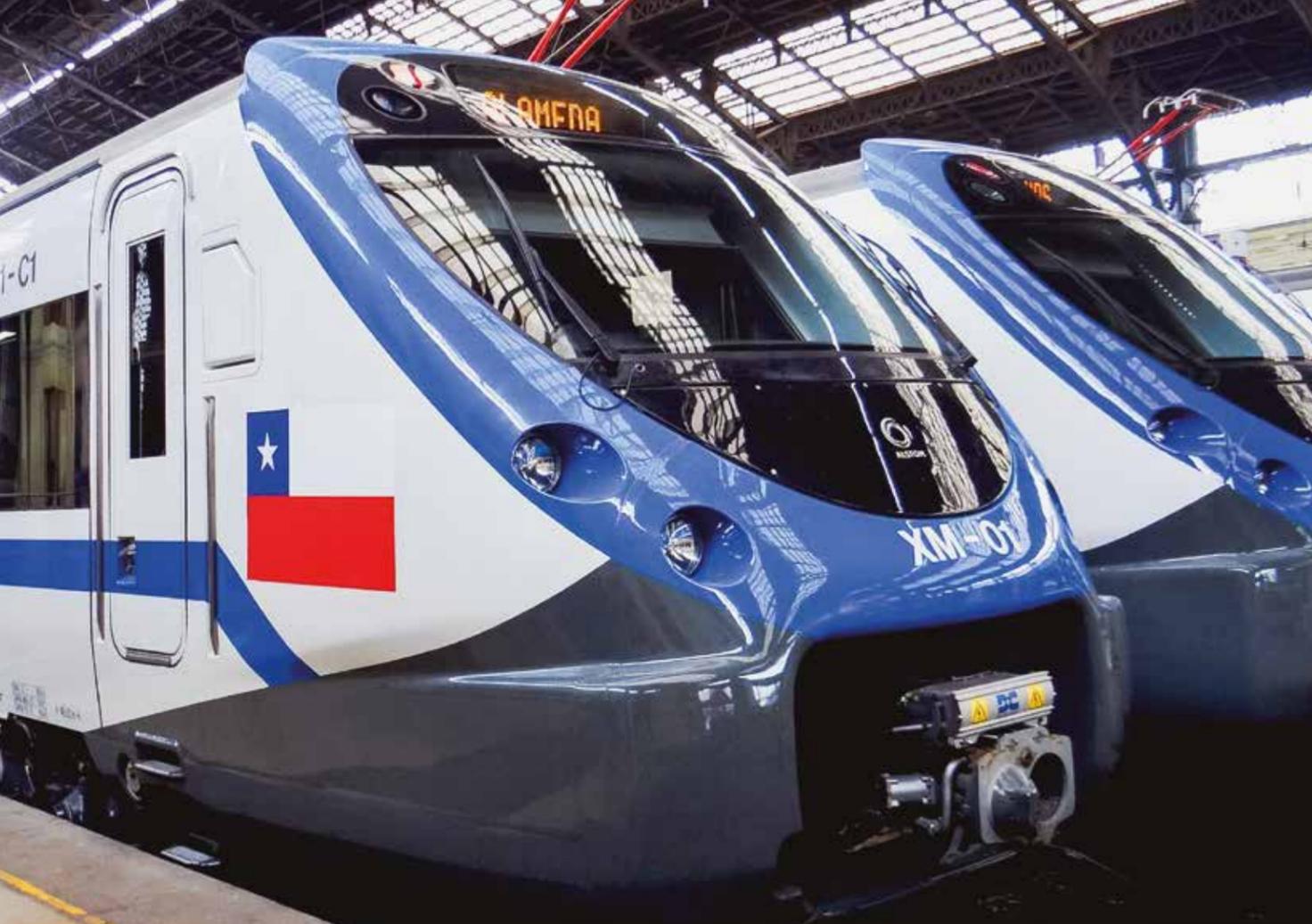


With over 20 years of experience, BÜFA Composite Systems is a leader in fire retardancy for railway. The company supplies standard-compliant, economical and environmentally friendly flame retardant systems.

In its product range, BÜFA®-Firestop offers gelcoats that break down into a carbon layer in the event of fire (carbonisation) for maximum fire safety. This layer blocks oxygen and heat, which preserves the mechanical structure of the component for longer. Another development is systems that combine carbonisation and the formation of a foamed protective layer (intumescence). This technology offers better protection against heat radiation and flue gas penetration. Neither technology uses halogens or antimony compounds, and both have been optimised in BÜFA's own fire laboratory. They are suitable for both closed processes and hand lamination.

Saving lives with High-Tech

Fire retardancy requirements for components are dependent on various factors, such as layer thicknesses, laminate construction and paint. Fire assessment is complex and requires fire tests and experience. BÜFA has a cone calorimeter for measuring standards such as ISO 5660 and machines for standards such as DIN 5510, UIC 564-2, ISO 4589-2 and IMO 1006. BÜFA offers guidance test kits to ensure product standards, which saves development costs. Our in-house production of BÜFA®-Gelcoats and resins integrates fire safety experience. This is how we help to protect lives with high-tech.



© REFISA: manufacturer of rail vehicle parts

Case Study

BÜFA®-Firestop Gelcoat S 285: Maximum Fire Retardancy for Rail Vehicles!

Before the European standard EN 45545-2 on protection against fire and smoke finally became binding for rail traffic, Recubimientos y Fibras, S.L. carried out a product search to find an alternative to phenol resins, which are used in the manufacture of glass fibre parts.

We all agreed that we should have an obligation to use systems with resin and gelcoats that not only eliminate toxicity, but also meet the new regulations," says REFISA. "Having tested several different options on the market without much success, we finally came upon

the BÜFA®-Firestop Gelcoat Series S 270 with intumescence technology, which we were able to combine with various resins in hand lamination and infusion processes.

Today we use the latest generation of intumescent filled gelcoats, the BÜFA®-Firestop S 285, a pre-accelerated, fire-retardant gelcoat that was developed for the most important fire retardant applications in rail transport.

This is a halogen-free, intumescent, fire-retardant gelcoat based on an unsaturated polyester resin that was developed for spray application and which has enabled us to use the flame retardant gelcoats across the board in our company, both for manual production and for infusion and RTM Light.

BÜFA®-Firestop Gelcoat S 285 is a very versatile gelcoat that is easy to apply and cures even at low temperatures.

With this gelcoat in combination with various BÜFA®-Firestop resins, we make a range of parts throughout Europe, such as roofs, channels and fronts for underground trains and trams and undercarriages for high-speed trains, where the requirements regarding fire and smoke and their behaviour in load tests are very restrictive."

Recubimientos y Fibras, S.L. (REFISA) is located in Lleida, 150 km from Barcelona, and serves the main national and international railway manufacturers. REFISA is a reference company in the rail vehicle industry which specialises in the manufacture of polyester parts, mainly in the rail vehicle sector, and has over 30 years of experience in doing so.

The company currently works for leading national and European railway construction firms. REFISA has made over 2,500 complete fronts for underground railway trains and trams with an annual production volume currently of 150-200 units. The company has four modern production sites covering an area of 14,000 m², three of which are in the area of Lleida, and one is in Serbia, from where customers in central Europe are served.

A joint project with



BÜFA®-Firestop Gelcoats

The Benefits:

- Ready to use immediately („Ready for use“)
- Higher flexibility (reduced brittleness)
- Low shrinkage tendency
- Reduced emissions
- Adequate fire retardancy from a layer thickness of 800 µm
- EN 45545-2 (R1, R7, R17) HL 2 / HL 3 – with and without paint

Processing Methods + Products

Hand Lamination Process:

BÜFA®-Firestop GC S 285
+ BÜFA®-Firestop 8175-W-1

VI (Vacuum Infusion):

BÜFA®-Firestop GC S 285
+ BÜFA®-Firestop S 425

Light RTM / RTM:

BÜFA®-Firestop GC S 285
+ BÜFA®-Firestop S 910 Foaming Resin



BÜFA®-Firestop: References

A small selection of the rail vehicle projects that were manufactured with components from our customers:



© Siemens Mobility GmbH



© Siemens Mobility GmbH



© Voith-Turbo GmbH & Co. KG



© PESA Bydgoszcz S.A



© PESA Bydgoszcz S.A



© PESA Bydgoszcz S.A



BÜFA®-FireFox System

The Best Choice of Fire Retardant System

BÜFA®-FireFox is the premium system for manufacturing fire safety fibre-reinforced composite components in closed-system processes. Individual components allow a multitude of possible combinations for very specific customer requirements.

Lightest Weight

offers weight savings of up to 40 % without any loss of performance.

Outstanding Mechanics

for maximum stability and much higher tensile strength and resistance to heat deformation.

Maximum Fire Retardancy

for fibre-reinforced applications.

Innovative Fire Retardancy for the Branches:



BÜFA®-FireFox System High Performance at all Levels

Many Years of Expertise & Customised Solutions

Years of fire retardancy expertise on the part of BÜFA Composite Systems goes into the BÜFA®-FireFox System. BÜFA is the developer of all the chemical components. The BÜFA®-FireFox System offers customised solutions for closed-system processes with the technical support of our experts.

High-performance System with Applications Across Industries

The BÜFA®-FireFox System brings together fire retardancy and mechanical performance. Customers in a wide range of branches already use this system: e.g. wind energy, boat building and shipbuilding, rail vehicle construction and the building sector.

Lightest Weight

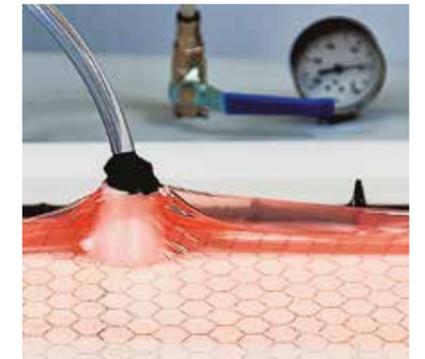
One system component of BÜFA®-FireFox is BÜFA®-Foaming Resin with integrated fire retardant for RTM applications. The advantages of unfilled lightweight systems are material savings and short cycle times. Hardly any reworking is required, and low-emission, machine-controlled processing is possible. Product benefits such as noise reduction and heat insulation also contribute to sustainability.

Outstanding Mechanical Properties & Maximum Fire Retardancy

The BÜFA®-FireFox System is a guarantee of fire retardant composite components with outstanding mechanical properties with maximum stability and much higher tensile strength and resistance to heat deformation and, of course, it meets the highest European and international fire safety standards.



BÜFA laboratory



Infusion set-up



Cone calorimeter for investigating fire behaviour

BÜFA®-FireFox System

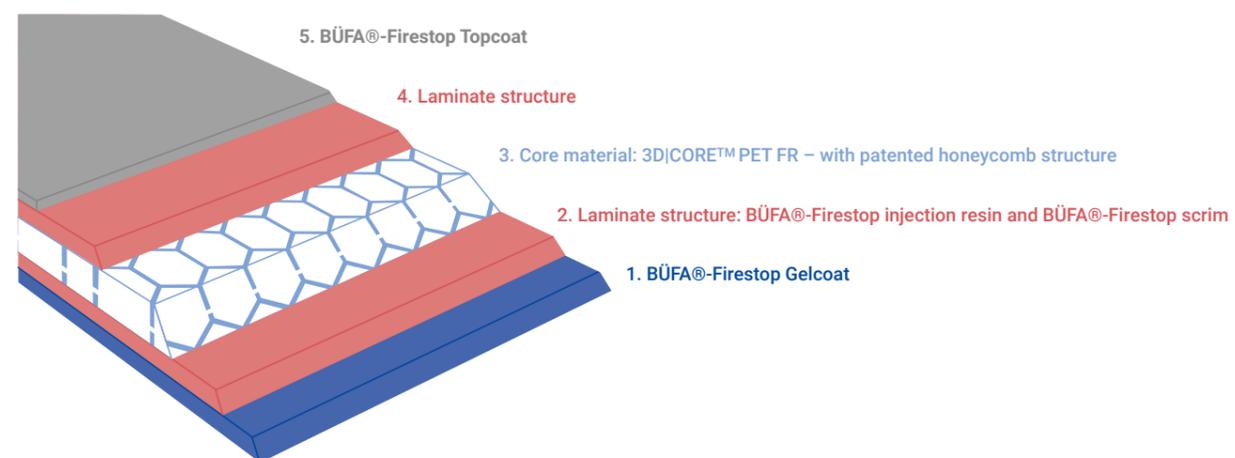
The Best Choice of Fire Retardant System

Optimal Solutions from a System Provider

The whole is more than the sum of its parts – GRP specialist BÜFA Composite Systems brings this aphorism to life. Especially in high-tech multi-component systems such as the construction of fire retardant composite components, all components must be optimally matched with each other so that the product delivers the required performance. Especially where the highest performance is expected, such as the field of rail transport. The fire retardant system is often a key component here.

This is why the premium product modules from the BÜFA®-FireFox fire retardant systems are perfectly co-ordinated. Of course, the individual components also provide top performance in other combinations. But when used in combination with our FireFox Premium products and optimised for the specific application, the user achieves a higher level of performance. The system modules from the BÜFA®-FireFox system fit together perfectly. So you can build higher.

Modular System: the Right Components for Every Project



The BÜFA®-FireFox System World in Closed Processes



BÜFA®-FireFox System

The Best Choice of Fire Retardant System

BÜFA®-Firestop Best Choice Combination Examples for Closed Processes

BÜFA®-Firestop Gelcoat + Resin System	Gelcoat mode of operation	EN 45545-2	Process	Paint	Glass content	Total laminate thickness
BÜFA®-Firestop GC S 285 + BÜFA®-Firestop S 425	Intumes-cence	HL 3 (R1) HL 2 (R7, R17)	VI (Vacuum Infusion)	No	65 to 70 % by weight	3.4 mm
BÜFA®-Firestop GC S 270 + BÜFA®-Firestop S 425	Intumes-cence	HL 2 (R1)	VI (Vacuum Infusion)	No	65 to 70 % by weight	3.0 mm
BÜFA®-Firestop GC S 285 + BÜFA®-Firestop S 440	Intumes-cence	HL 2 (R1, R7, R17)	VI (Vacuum Infusion)	Yes	65 to 70 % by weight	4.0 mm
BÜFA®-Firestop GC S 285 + BÜFA®-Firestop S 910 Foaming Resin	Intumes-cence	HL 2 (R1, R7, R17)	RTM (Resin Transfer Moulding)	No	40 % by weight	6.0 mm

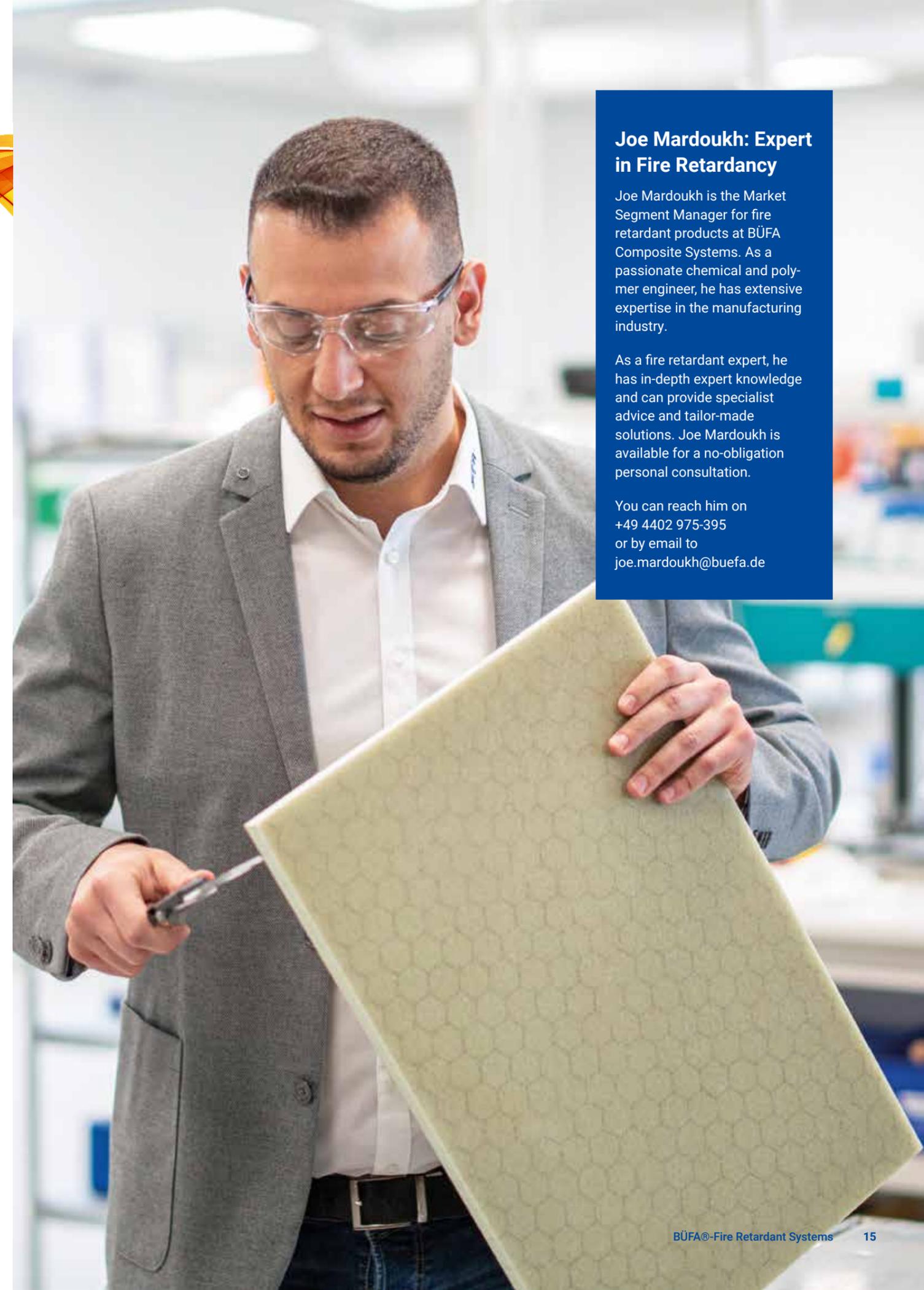
The BÜFA®-FireFox System combines flame-retardant gelcoats and the highly stable, glass fibre-reinforced laminate structures of a fire retardant injection resin. Maximum strength and rigidity are combined with extremely low weight. This makes BÜFA®-FireFox the ideal material for the construction of lightweight, resource-saving transport systems such as rail transport, including load-bearing components.

Optimum Fire Retardancy for Rail Vehicles:

BÜFA®-Firestop GC S 285 at the highest technical level! This innovative gelcoat features increased flexibility and low emission and shrinkage tendencies. BÜFA's flame-retardant gelcoats can achieve the strictest fire safety requirements of EN 45545-2 in accordance with HL3 from layer thicknesses of 800 µm (in combination with one of the tried-and-tested BÜFA®-Firestop resins). Painting usually results in the less stringent HL2 classification.

Lightweight components are particularly well-suited when this gelcoat is combined with new, flame-retardant foaming resins from BÜFA (e.g. BÜFA®-Firestop S 910 Foaming Resin for RTM and RTM light technology). Compared to "classic" laminate structures, these offer considerable weight savings and benefits in terms of noise reduction and thermal insulation.

The data listed are approximate and without guarantee. The latest, detailed information and data can be found in the valid technical data sheet and/or the corresponding EU safety data sheet, which must also be observed.



Joe Mardoukh: Expert in Fire Retardancy

Joe Mardoukh is the Market Segment Manager for fire retardant products at BÜFA Composite Systems. As a passionate chemical and polymer engineer, he has extensive expertise in the manufacturing industry.

As a fire retardant expert, he has in-depth expert knowledge and can provide specialist advice and tailor-made solutions. Joe Mardoukh is available for a no-obligation personal consultation.

You can reach him on +49 4402 975-395 or by email to joe.mardoukh@buefa.de

Tried and Tested Combination Options

from the Complete BÜFA®-Fire Retardant Range
for Various Processing Methods and Standards

Our Complete Range of Products offers you further tailor-made System Solutions
– please contact us!

Overview of BÜFA®-Fire Retardant Products		Branches				Processing Methods								Standards																										
		Building / Construction	Wind Energy	Public Transport	Industry	Marine	Manual application	Spray application	Panel production	RTM / Infusion	Pultrusion	Wet pressing	Winding process																											
														EN 13501-1	EN 13501-5	EN** 45545-2	UN ECE Reg. 118	UIC 564	DIN 5510	DIN 4102	NFF 16-101	BS 6853	BS 476 Part 3	BS 476 Part 6	BS 476 Part 7	UNI CEI 11170	UNE 23721	PN-K-02511	ASTM E 162	ASTM E 662	ASTM E 84	UL 94								
Halogenated Systems	Translucent Resins	BÜFA®-Firestop 6806-N-5	x					x	x	x		x		passed								SAB																		
	Specialities	BÜFA®-Firestop 2754-P-2	x	x	x		x	x		x															class 2															
Halogen-free Systems	System Components	BÜFA®-Firestop GC S 250 + BÜFA®-Firestop 5001-W-2	x	x	x	x	x	x			x	x																					passed	passed						
		BÜFA®-Firestop GC S 250 + BÜFA®-Firestop 8175-W-1	x	x	x	x		x	x		x	x	x	x						S4/SR2/ST2		M2 / F1																		
		BÜFA®-Firestop GC S 250 + BÜFA®-Firestop S 420	x		x	x		x	x																class 2															
		BÜFA®-Firestop GC S 250 + BÜFA®-Firestop S 425	x	x	x	x					x		x												class 2															
		BÜFA®-Firestop GC S 250 + BÜFA®-Firestop S 520			x	x					x	x	x								S4/SR2/ST2																			
		BÜFA®-Firestop GC S 260 + BÜFA®-Firestop 8175-W-1	x	x	x			x	x		x		x								S4/SR2/ST2									Is=30		Ds 1.5=14 Ds 4=135								
		BÜFA®-Firestop GC S 260 + BÜFA®-Firestop S 440		x	x						x	x								Class A																				
		BÜFA®-Firestop GC S 270 + BÜFA®-Firestop 8175-W-1	x	x	x			x	x		x		x									HL 2	passed							Is=20		Ds 1.5=4 Ds 4=37								
		BÜFA®-Firestop GC S 270 + BÜFA®-Firestop S 425				x	x				x											HL 2	passed																	
		BÜFA®-Firestop GC S 270 + BÜFA®-Firestop S 520				x	x				x	x										HL 2	passed																	
		BÜFA®-Firestop GC S 270 + BÜFA®-Firestop S 570	x		x	x		x	x							b, s2, d0		HL2	passed	Class A		B1	M1 / F1			class 1		M2		P1/ R1/A/ D1/T2				V0		passed			***	
		BÜFA®-Firestop GC S 285 + BÜFA®-Firestop 8175-W-1	x	x	x			x	x		x		x					HL 3	passed				M1							Is=5		Ds 1.5=8 Ds 4=79								
		BÜFA®-Firestop GC S 285 + BÜFA®-Firestop S 425				x	x			x	x					b, s2, d0		HL 2	passed						class 1		M2													
		BÜFA®-Firestop GC S 285 + BÜFA®-Firestop S 585			x	x					x							HL 2	passed																					
		BÜFA®-Firestop GC S 285 + BÜFA®-Firestop S 570	x	x	x			x	x		x		x					HL 3	passed																					
BÜFA®-Firestop GC S 285+ BÜFA®-Firestop S 910 Foaming Resin			x	x					x							HL 2	passed																							
Fire Retardant Resins	BÜFA®-Firestop 5001-T-1 (300 phr ATH)	x		x	x	x	x									HL 3	passed			B1		cat 1a		class 0	class 1															
	BÜFA®-Firestop 5001-W-2	x		x	x	x	x			x	x					HL 2	passed									cat 1a							passed	passed						
	BÜFA®-Firestop 8175-W-1			x	x		x	x		x		x							S4/SR2/ST2		M2															passed				
	BÜFA®-Firestop S 520			x	x					x	x	x										M2																		

The thickness of the laminate as well as the overall structure of this, including any cover layers, paint, applied materials, sandwich layers, etc., also have a decisive influence on fire behaviour. Here, it must be taken into account that individual component tests are prescribed for most applications.

*The data listed are approximate and without guarantee.
The latest, detailed information and data can be found in the valid technical data sheet and/or the corresponding EU safety data sheet, which must also be observed.*

The laminates were produced under ideal, controlled laboratory conditions. This information does not replace component testing by the manufacturer.
** Requirement set R1 *** Low flammability, flame retardant, D2 (OK for railway vehicles and metro), I < 20, T2 (OK for rail vehicles and metro)

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Overview of Fire Retardant Products

Abbreviations: THP: Tetrahydrophthalic acid
 VE-LP: Vinyl ester low profile
 HLU: Hand lamination process
 MEKP: Methyl ethyl ketone peroxide
 DCPD: Dicyclopentadiene
 OP: Orthophthalic acid
 IP: Isophthalic acid
 VE: Vinyl ester
 NPG: Neopentyl glycol
 nd: not determined



BÜFA®-FireFox system
 The Best Choice Fire Retardant System

Gelcoats and Topcoats

Gelcoat / Topcoat Name	BÜFA®-Firestop GC S 230	BÜFA®-Firestop GC S 235	BÜFA®-Firestop GC S 250	BÜFA®-Firestop GC S 260	BÜFA®-Firestop GC S 270	BÜFA®-Firestop GC S 285
Item no.	on request	on request	on request	on request	on request	on request
Resin base	IP	THP	IP	OP / NPG	VE / DCPD	IP
Non-volatile fractions [%]	82	78	708 colour = 77 728 colour = 84	76	84	80
Viscosity [mPas]	30000	26000	708 colour = 7500 728 colour = 30000	11500	28000	14000
Elongation at break [%]	5	10	8.2	3.4	3	4.5
Tensile strength [MPa]	50	8	52	56	45	48
HDT [°C]	59	<23°C	57	64	90	58
Comments	Spray quality gelcoat with increased fire retardant properties	Roll-on topcoat with very high fire retardant properties	Hand-applied and spray quality gelcoat with good fire retardant properties	Spray quality gelcoat with increased fire retardant properties	Spray quality gelcoat with the highest fire retardant properties	Spray quality gelcoat with the highest fire retardant properties

Topcoat versions of all gelcoats are also available in principle.

Halogen-free Resins

Resin Name	BÜFA®-Firestop S 420	BÜFA®-Firestop S 425	BÜFA®-Firestop S 440	BÜFA®-Firestop S 520	BÜFA®-Firestop S 570	BÜFA®-Firestop S 585
Item no.	716-0420	716-0425	716-0440	716-0520	716-0570	716-0585
Resin base	DCPD	DCPD	VE	DCPD	OP	VE
Non-volatile fractions [%]	56	56	66	74	84	74
Viscosity [mPas]	500	230 (20s/1)	350	800	1150	450
Elongation at break [%]	2.6	2.8	3.3	2.8	2	1.1
Tensile strength [MPa]	54	55	56	82	82	39
HDT [°C]	90	91	85	100	88	93
Comments	Filled, halogen-free, pre-accelerated, for structural components in the hand lamination process	Unfilled, halogen-free, pre-accelerated, for structural components in the vacuum infusion process	Pre-accelerated VE infusion resin for structural components using the vacuum injection process	ATH filled resin for structural components, pre-accelerated in the RTM process	ATH-filled, thixotropic resin for structural components in the hand lamination process, pre-accelerated	Filled, pre-accelerated VE-LP resin with good fire retardant properties for components using the RTM process

The data listed are approximate and without guarantee.

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Halogen-free Resins

Resin Name	BÜFA®-Firestop S 910 Foaming Resin	BÜFA®-Firestop 5001-W-2	BÜFA®-Firestop 5001-T-1	BÜFA®-Firestop 8175-W-1
Item no.	796-0910	716-5002	716-5003	716-8175
Resin base	OP	DCPD	DCPD	DCPD
Non-volatile fractions [%]	60	80	nd	76
Viscosity [mPas]	700	1100 (20s/1)	100	750 (20s/1)
Elongation at break [%]	nd	2.2	0.45 (filled)	3
Tensile strength [MPa]	nd	87	51 (filled)	80
HDT [°C]	nd	90	nd	>100
Comments	Unfilled foaming resin system with good fire retardant properties using the RTM process	High ATH-filled resin, for higher standards in the hand lamination process, pre-accelerated	Specially modified resin that enables high fill levels of up to 300 parts ATH, low smoke development, not pre-accelerated, for hand lamination processes	Filled thixotropic resin for structural components for hand lamination processes, pre-accelerated, can also be used for RTM processes

Halogenated Resins (offered in UK)

Resin Name	BÜFA®-Firestop S 840	BÜFA®-Firestop 2754-P-2	BÜFA®-Firestop 6806-N-5
Item no.	788-0840	716-2754	788-0806
Resin base	OP	OP	OP
Non-volatile fractions [%]	60	65	60
Viscosity [mPas]	nd	230 (20s/1)	200
Elongation at break [%]	> 100	1.8	0.6
Tensile strength [MPa]	5	49	96
HDT [°C]	35	65	63
Comments	Halogenated resin for highly flexible applications (e.g. roof coatings), not pre-accelerated	Halogenated unfilled resin system, for HLU and RTM applications, pre-accelerated, also available as a filled version (716-2755)	Halogenated resin for translucent applications, not pre-accelerated

Bonding Paste

Product Name	BÜFA®-Firestop Liquid Mat
Item no.	715-0245
Resin base	OP
Non-volatile fractions [%]	87
Viscosity [mPas]	300,000
Elongation at break [%]	2.5
Tensile shear strength [N/mm²]	6.5
HDT [°C]	70
Comments	Liquid fire retardant mat: levelling of sharp edges and corners, can also be used as a fire retardant adhesive with good fire retardant properties

Glass

Product Name	Firestop scrims for infusion components with very high mechanical properties							
Item no.	024-0201	024-0202	024-0204	024-0205	024-0206	024-0207	024-0200	024-0203
Properties	BÜFA®-Firestop Fabric Biaxial (+45°/-45°), 1200 gr. 127 cm	BÜFA®-Firestop Fabric Biaxial (+45°/-45°) 800 gr. 127 cm	BÜFA®-Firestop Fabric Bidiagonal (0°/90°), 410 gr. 127 cm	BÜFA®-Firestop Fabric Bidiagonal (0°/90°), 830 gr. 127 cm	BÜFA®-Firestop Fabric Bidiagonal (0°/90°), 970 gr. 127 cm	BÜFA®-Firestop Fabric Quadraxial, 1230 gr. 127 cm	BÜFA®-Firestop Fabric Quadraxial, 810 gr. 127 cm	BÜFA®-Firestop Fabric UD (0°), 850 gr. 127 cm

Please contact your contact person in the respective country. The delivery programme may vary depending on the country.

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Core Material

Product Name	3DJCORE™ PET FRE in closed-cell, thermoplastic and recyclable rigid foam with outstanding FST properties (Flame, Smoke, Toxicity) 3DJCORE™ features an integrated honeycomb structure that is applied to the entire surface of the foam using a patented process.		
Properties and Benefits	Very good fire retardant properties (EN 45545-2; NF F16-101; FAR 25,853; EN 13823; IMO Res. A 653 (16) FTP Code MSC 61 (67) Annex 1 - part 5) Significant weight savings compared to other sandwich materials Integrated resin distribution system for maximum process control without additional flow medium High draping capability for convex and concave component geometries Permanent heat resistance up to 100°C and working temperature up to 180°C The honeycomb-shaped hardened matrix forms double T-beams with the cover layers and maximises the compression, bending and shear properties. Processes: Vacuum infusion, RTM, hand lamination, wet pressing, etc. Density: 95 kg/m³		
Products	3DJCORE™ SHEETS 3DJCORE™ ROLLS Fix-in-place™ ASSEMBLY KITS	Thickness 3 - 29 mm Thickness 3 - 10 mm Optimised foam and textile construction kits (incl. engineering)	L: 1015 mm W: 405 mm ideal for larger components

More details can be found in the technical data sheet – please request if required.

Peroxides

Product Name	Curox M 102	Curox M 303
Item no.	021-0033	021-0053
Comment	MEKP with lower hydrogen peroxide content	Standard MEKP

Please contact us for information on choosing a suitable peroxide. We can provide you with country-specific product solutions.

Release Agent

Product Name	Chemrelease® 2196 W
Item no.	023-2196
Comment	Water-based, semi-permanent release agent

FR Additives and Anchillaries

Product Name	BÜFA®-Accelerator Complex 9004	BÜFA®-Additive Viscoreducer	BÜFA®-Accelerator Foaming Agent	BÜFA®-Additive Repair Solution	BÜFA®-Accelerator Complex 0399
Item no.	715-9004	742-0018	742-2000	742-0030	742-1399
Comments	Accelerator complex for curing highly filled fire retardant systems based on polymeric cobalt	Viscosity reducer for filled HLU and injection systems	Blowing agent for fire retardant foam resin	Additive mixture for repairing gelcoat surfaces by spraying	Accelerator complex for Gelcoat S 270 and S 300

Vacuum consumables such as vacuum films, sealing tape, flow aids, peel ply and infusion nozzles feature in our product range. Please contact us directly.

Paint

Product Name	
Item no.	Please contact us for information on choosing a suitable paint system. We are constantly in contact with all well-known manufacturers and can provide a large number of test results and certificates for guidance.
Chemical Composition	

BÜFA®-Tec Machine Recommendations

Product Name	BÜFA®-Tec GSU ES1 EM	BÜFA®-Tec Delta Evo-Line	BÜFA®-Tec Sigma 6 Evo-Line	BÜFA®-Tec Delta 3.3 RTM-Foaming Resin	BÜFA®-Tec RTM Delta EVO-LINE	BÜFA®-Tec GSU Omega EM
Applications	Gelcoat Spraying System	Fibre Spray, Gelcoat, Impregnation System	Fibre Spray and Gelcoat System	RTM Applications	RTM Applications	Gelcoat Spraying System
For processing	small quantities	medium quantities	large quantities	Foam resin	Injection resin	medium quantities

More details are available on request, ask for the brochures. We are happy to advise you on which machine technology is suitable for your application. You are also welcome to test our demonstration machines on site

The data listed are approximate and without guarantee.

The latest, detailed information and data can be found in the valid technical data sheet and/or the corresponding EU safety data sheet, which must also be observed.

Glossary

ATH

Aluminium hydroxide (or aluminium trihydrate Al(OH)₃): A compound that breaks down into water at temperatures above 200° C and cools the source of a fire through evaporation and simultaneously prevents oxygen from reaching the flame. The solid residue from the release of water, aluminium oxide, also provides additional shielding for the seat of the fire.

Antimony

A chemical element from the nitrogen group of the periodic table (symbol: Sb). Antimony compounds strengthen the flame-retardant effect of halogens. But many of them are toxic.

Carbonisation

Deliberate "charring" of a surface using an appropriately effective fire retardant finish. The thin carbon layer prevents the laminate components underneath it from coming into contact with oxygen.

EN 45545-2

The standard that regulates the requirements of the fire behaviour of materials and components in rail transport. As trains are difficult to evacuate (in a tunnel, for example) in the event of a fire, EN 45545-2 is extremely strict. Fire retardant systems that meet its requirements must be very carefully designed and are regarded as the "gold standard" in many other areas of application.

Flame

A flame is much more than just a light phenomenon that accompanies fire, it is the essence of the fire itself. It is the area in which fierce, heat-generating chemical reactions take place between the oxygen in the air and the volatile components of a flammable material. If it is possible to prevent these reactions, the flame goes out, and so does the fire.

Halogens

Chemical elements in the 7th main group of the periodic system, such as chlorine (Cl) and bromine (Br). They can prevent the spread of flames in the air by disrupting the chemical reactions that contribute to the generation of heat in a flame.

Halogenated

Containing halogens. For flame retardants that contain chlorine or bromine.

HL

Hazard Level. A classification system that helps to order the areas of application of (not only) plastic components according to the minimum performance required of them in a fire. The strict rail transport standard DIN EN 45545 has three hazard levels; the requirements of the strictest – HL3 – apply, for example, to sleeping cars in trains, for which evacuation is not possible via side access points within four minutes in the event of a fire.

Intumescence

Formation of a foamed, oxygen-impermeable layer as a result of the effect of heat on a plastic. The protective foam prevents oxygen from penetrating and shields the laminate beneath it from the heat for a certain time. An enhanced form of carbonisation.

LOI

Limiting Oxygen Index – an important indicator for describing the fire behaviour of plastics. The number indicates how much oxygen the material needs to ignite. Above an LOI of 21, a material is difficult to ignite in air. Higher values are even better.

Phosphorus

Chemical element that is widely used as a flame retardant. In the event of a fire, it draws water from the subsurface and forms phosphoric acids (which are not very caustic). This creates a protective layer which gases can only pass through with difficulty (see carbonisation).

Smoke

Mixture of finely distributed droplets of liquid and dust particles created in a fire. Thick smoke can prevent visibility on escape routes, toxic smoke can harm people. Ideally, burning plastics only produce thin, non-toxic smoke thanks to carefully selected flame-retardant additives

Oxygen

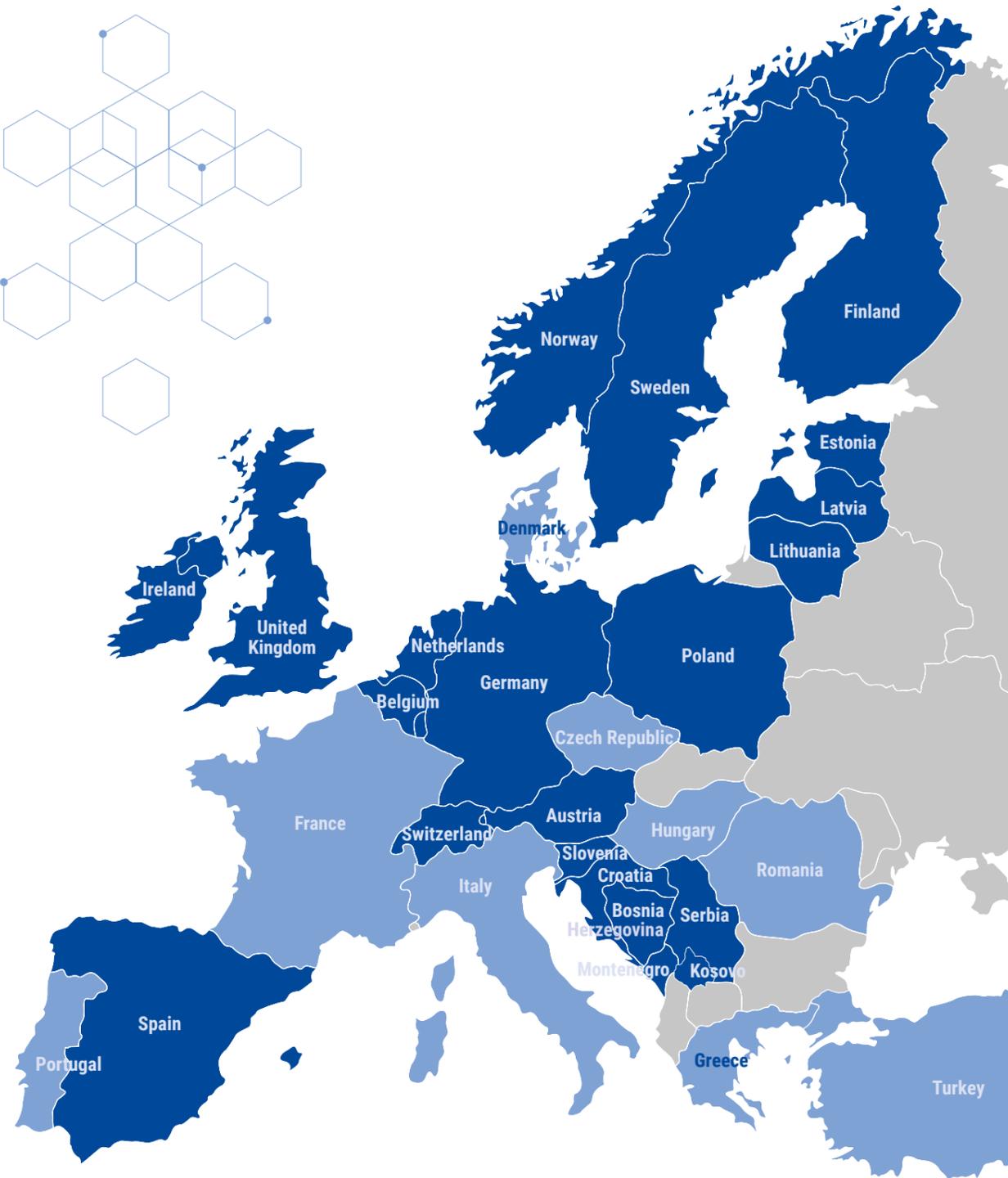
The gas that drives the combustion processes. The air we breathe contains around 21 % oxygen. Without this gas, a flame will go out.

Water

The classic extinguishing agent. Water puts out flames because it cools down the seat of the fire and reduces the development of flammable gases from the burning material. It also prevents oxygen from reaching the seat of the fire and thus stops the heat-generating reactions in the flame. There are some flame retardants, such as ATH, that break down into water under the effect of heat.

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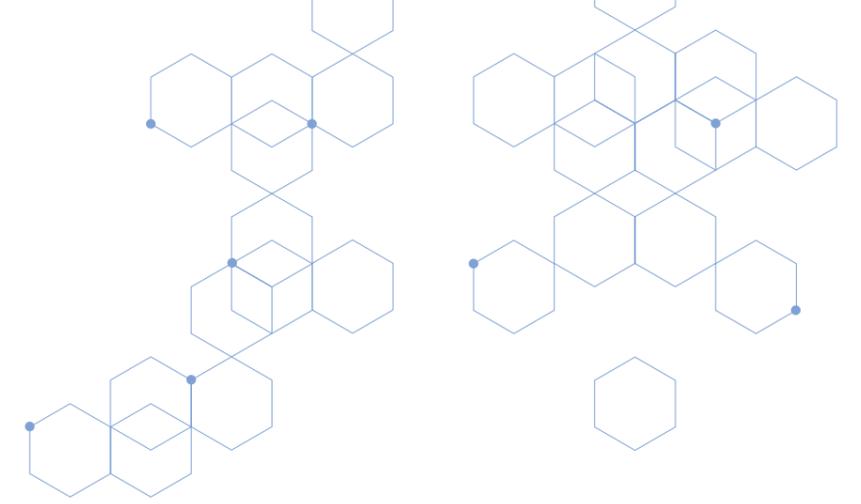
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