



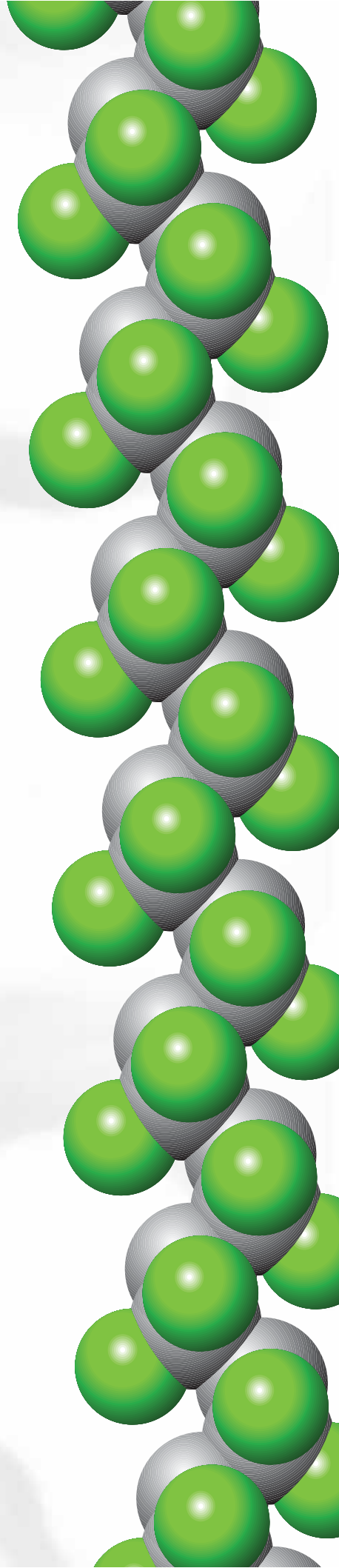
ZOTEK[®]

HIGH PERFORMANCE PVDF FOAMS

Taking
foam
technology
to a
new level



ZOTEFOAMS



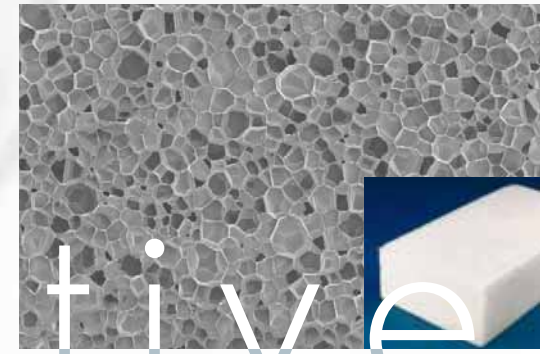
ZOTEK® F, ZOTEK® F HT and ZOTEK® F HT LS are a new range of lightweight, closed cell, PVDF (polyvinylidene fluoride) foams based on Kynar® fluoropolymer, a remarkable material that offers a unique balance of properties.

innovative

NEW LIGHT WEIGHT, FIRE RETARDANT & CHEMICAL RESISTANT FOAMS - INSPIRATION

Kynar PVDF exhibits exceptionally wide temperature tolerance (up to 160°C), excellent UV, nuclear radiation and ageing resistance, high dielectric strength and outstanding resistance to a wide range of solvents and aggressive chemicals. It is biologically inert, thermally stable across a wide temperature range and is of a very low order of toxicity.

In ZOTEK F, ZOTEK F HT and ZOTEK F HT LS, these properties are combined with light weight, flexural response, buoyancy and thermal and acoustic insulation properties derived from the foaming process. Like their parent resins, ZOTEK F, ZOTEK F HT and ZOTEK F HT LS foams exhibit outstanding durability and longevity.



ZOTEK F 40 HT LS (Low Smoke) is recommended for use in a variety of sealing and insulation applications in the semiconductor, pharmaceutical and chemical processing industries, where exceptionally low smoke release is required in the event of fire. This material is listed to **UL 723/ ASTM E-84** (Standard Method of Test of Surface Burning Characteristics of Building Materials).

ZOTEK F 40 HT LS also exhibits exceptionally low heat release values, which in combination with leather, adhesive and decorative laminates helps with compliance to the aviation flammability standard OSU 65/65.

ZOTEK F 42 HT LS (Low Smoke) is used for conversion into **T-Tubes®** a revolutionary, advanced insulation system specifically developed for stainless steel process lines in clean environments. This is the first foam insulation that has successfully achieved the approval criteria of the **FM Approvals FM 4910 Standard 'Clean-room Materials Flammability Test Protocol'**. Contact t-tubes@zotefoams.com for more information. Contact newproducts@zotefoams.com for applications where the FM 4910 approval would be beneficial.

Development grades

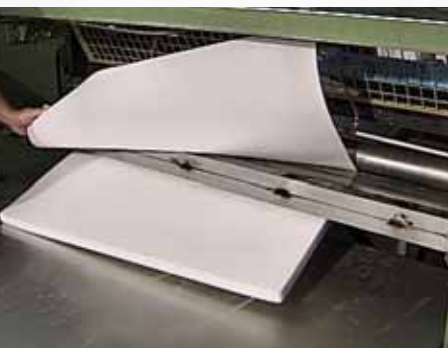
- ZOTEK F grey
- ZOTEK F conductive and static dissipative
- ZOTEK F 30 coarse cell (higher level of light transmittance)

LIGHTWEIGHT

Many so called 'fire retardant' foams are open cell in nature and have to be sealed with a suitable barrier material to avoid moisture absorption during use. Others not requiring barrier films tend to be higher density materials. ZOTEK F foams have been developed in a range of densities from 30 kg/m³ (1.9 pcf) and higher.

EXCELLENT FIRE RESISTANCE

ZOTEK F, Kynar PVDF foams have a high auto ignition temperature, minimal fire propagation and smoke generation, low fuel load and self-extinguish when a direct flame is removed. These foams have been tested to a variety of other relevant fire standards including stringent aviation, aerospace, building material standards and clean room materials test protocols.



THE RANGE

Currently comprises seven grades:

ZOTEK F 40 HT and **ZOTEK F 75 HT** are both recommended for general use in industrial applications such as chemical engineering, pharmaceutical and medical where high temperature and chemical resistant (eg. Sulphuric acid and nitric acid) insulation or sealing materials are needed.

ZOTEK F 30, ZOTEK F 38 HT, ZOTEK F 40 HT, ZOTEK F 40 HT LS and **ZOTEK F 74 HT** are intended for use in the commercial and military aircraft and aerospace industries. For more information please refer to our ZOTEK F - Aviation flyer.



FOAM FOR DESIGN INNOVATION

CHEMICAL AND SOLVENT RESISTANT

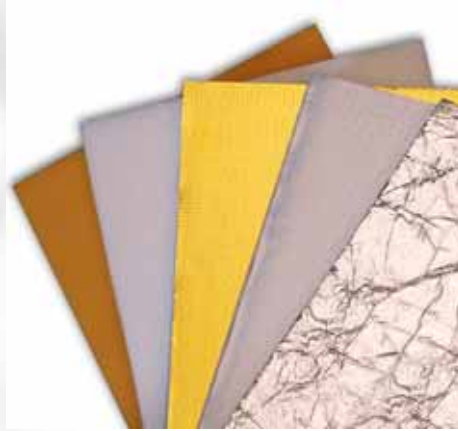
ZOTEK F foams are resistant to most chemicals and typical sterilisation methods. ZOTEK F is highly resistant to acids, halogens, alcohols, hydrocarbons and ozone. It has good resistance to ketones, amines, bases and oxidising agents. The ZOTEK F HT grades offer enhanced chemical and solvent resistance, combined with higher levels of structural rigidity and temperature resistance. Testing also indicates noticeable improvements in terms of tensile strength, elongation, tear strength and compression set.

TEMPERATURE RESISTANT

ZOTEK F 30 has a top operational temperature of 110°C (230°F) while both ZOTEK F HT and ZOTEK F HT LS offer an operational temperature limit of 155°C (311°F).

UV STABLE

ZOTEK F foams have excellent weathering properties being exceptionally resistant to UV and ozone degradation. Although not translucent, they permit and maintain relatively high light transmission.



CONTROLLED FLEXURAL RESPONSE

Kynar PVDF fluoropolymers exhibit varying degrees of flexibility or stiffness. This is exaggerated by the degree of expansion achieved in the foaming process. Flexible polymers become even more flexible when foamed to lower densities, adopting elastomeric properties that make them ideal for cushioning and sealing applications. More rigid polymer foams, when expanded to higher densities, maintain a higher stiffness to weight ratio, ideal for structural applications. ZOTEK F HT grades offer higher levels of structural rigidity.

resistant

HIGH PURITY, LOW TOXICITY

Kynar® PVDF is a high purity fluoropolymer used in many 'clean' applications. ZOTEK F and ZOTEK F HT foams maintain this purity. They are physically expanded using Zotefoams' unique nitrogen process and contain no pigments, fillers, light stabilisers or other additives that could leach or contaminate during use.

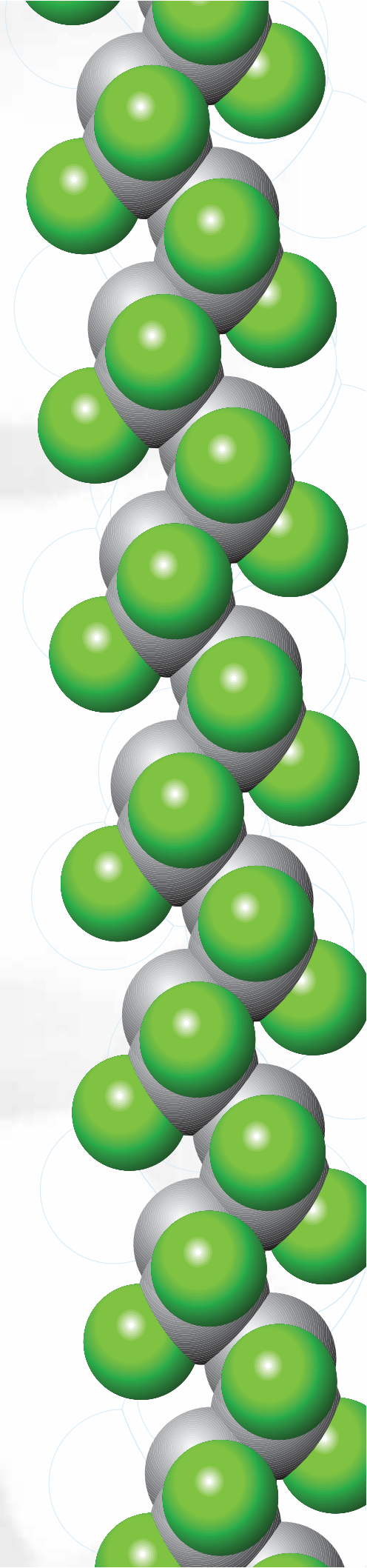
The base unpigmented PVDF resins, which are used for ZOTEK F and ZOTEK F HT foams are approved to FDA 21 CFR 177.2600 for repeated food contact. Kynar PVDF resin meets USP Class 6 specifications, making it the material of choice for food, biological, pharmaceutical and semiconductor manufacturing processes. ZOTEK F foams have very small and uniform closed cells and are hydrophobic and resistant to mould and fungal growth.

PROCESSABILITY

ZOTEK F foams can be easily converted by using traditional foam fabrication techniques such as sawing, routing, laminating, welding, glueing and die-cutting. They can be thermoformed into complex single component structures providing many benefits over multi-layer foam systems, such as weight and cost reduction.

FINISHING

ZOTEK F foams present a fine closed cell surface suitable for direct use in many applications. To enhance aesthetic appeal and functionality they can be laminated with fabrics and foils or coated by dipping or spraying. Finishes are available to improve the already high surface durability and impart a high degree of scratch resistance.



Performance Indications:

FIRE RETARDANT PROPERTIES

Market	Property	Test Method
Aviation	Heat release	FAR/CS 25.853(d) Appendix F Pt IV
	Smoke density	FAR/CS 25.853(d) Appendix F Pt V
	Smoke density	ABD0031 para. 7.3.2
	Toxic gas emissions	ABD0031 para. 7.4
	Vertical Bunsen burner	FAR/CS 25.853(a) App F Pt I (a), (1), (ii)
	Radiant heat panel test	FAR 25.856(a) App F Pt VI
Building & Construction	Surface burning characteristics of building materials	ASTM E-84/UL 723
	Single flame source test	EN ISO 1195-2
	Single burning item test	EN 13823
Devices and appliances	Vertical burn test	UL 94 V0 (indicative)
Transportation	Surface flammability using radiant heat	ASTM E162-02a
Clean room materials	Clean room materials flammability test protocol	FM 4910

Full performance details are available on the relevant application documents. Contact newproducts@zotefoams.com for further details

THERMAL CONDUCTIVITY

The thermal conductivity of ZOTEK F grades has been tested in accordance with ISO 8301 and ASTM C 518 test methods at a range of temperatures.

Grade	Testing Temperature (°C)	k-value metric (W/m.K)	k-value imperial (Btu.in/ft ² .h.°F)	R-value metric (m ² .K/W)	R-value imperial (ft ² .h.°F/Btu)
ZOTEK F 30	-40	0.027	0.187	0.94	5.35
	-27	0.028	0.194	0.91	5.15
	0	0.033	0.226	0.77	4.42
	25	0.035	0.247	0.73	4.05
	40	0.038	0.266	0.67	3.76
	80	0.046	0.316	0.55	3.16
ZOTEK F 40 HT	-40	0.027	0.187	0.94	5.35
	-27	0.028	0.194	0.91	5.15
	10	0.032	0.224	0.79	4.46
	25	0.036	0.249	0.71	4.01
	50	0.037	0.256	0.69	3.90
	83	0.042	0.288	0.60	3.47
ZOTEK F 75 HT	-40	0.028	0.194	0.91	5.15
	-27	0.029	0.201	0.87	4.97
	10	0.034	0.238	0.75	4.20
	50	0.039	0.270	0.65	3.70
	83	0.044	0.306	0.58	3.27
ZOTEK F 40 HT LS	10	0.032	0.222	0.79	4.51
	50	0.037	0.256	0.69	3.90
	83	0.041	0.284	0.62	3.52
	130	0.053	0.367	0.48	2.72

RESISTANCE TO FUNGAL GROWTH: Selected ZOTEK F and ZOTEK F HT grades have been subjected to microbiological testing in accordance with RTCA DO1600, Category F, Section 13 and the results evaluated and laid out as per MIL-STD-81E method 508.4. Both products showed no fungal growth. Contact newproducts@zotefoams.com for a copy of the independent test results.

BIOCOMPATIBILITY: Selected ZOTEK F and ZOTEK F HT grades have been tested to the relevant sections of ISO 10993. The foams were shown to be suitable for use in medical surface devices in contact with the skin or surface devices in contact with mucosal membranes or breached or compromised surfaces for limited or prolonged exposure. Contact newproducts@zotefoams.com for further details.

CHEMICAL RESISTANCE: General guidelines for chemical resistance of PVDF resins are that they exhibit excellent resistance to a wide range of chemicals. They are resistant to attack from most inorganic acids and alkalis, aliphatic and aromatic hydrocarbons, organic acids, alcohols and halogenated solvents. However, they are susceptible to attack from strong alkalis (i.e. pH>12) and strongly polar solvents (e.g. acetone, methyl ethyl ketone, ethyl acetate, dimethylformamide and dimethylacetamide).

SOLVENT RESISTANCE: Selected ZOTEK F and ZOTEK F HT grades have been independently tested for resistance to a wide range of solvents including fuels, lubricating oils, de-watering fluids, hydraulic fluids and alcohol solvents. No cracking, deterioration, punctures or other detrimental effects were observed. Contact newproducts@zotefoams.com for an copy of the independent test results.

UV RESISTANCE: Selected ZOTEK F and ZOTEK F HT grades have been tested and found to have exceptional UV resistance. The foams were exposed to intense UV light in Xenon Arc Lamp test equipment, a widely used accelerated weathering test based on ISO 105-B02 with no loss of strength discernable after 1000 and 2000 hours exposure.

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