

Product Information

Firepel® Polyester Resin for Filled Fire Retardant Applications

TYPICAL CAST MECHANICAL PROPERTIES* (1) see back page

Test	Unit of Measure	Nominal	Test Method
Tensile Strength	psi/MPa	9,900/68	ASTM D 638
Tensile Modulus	psi/GPa	490,000/3.4	ASTM D 638
Tensile Elongation	%	2.4	
Flexural Strength	psi/MPa	15,400/106	ASTM D 790
Flexural Modulus	psi /GPa	550,000/3.8	ASTM D 790
Heat Distortion Temperature °F/°C at 264 psi		185/85	ASTM D 648
Barcol Hardness		45	ASTM D 2583

TYPICAL LIQUID RESIN PROPERTIES of Firepel® K133 Series* (2) see back page

Versions	Viscosity, cps	Thix Index	Gel Time, Minutes	Gel To Peak Exotherm, Minutes	Peak Exotherm, °F°C	Specific Gravity	HAP Content, %
K133-AAA-00	18 ¹	NA	8 ²	5	375/191	1.05	55
K133-ATT-00	100 ⁴	3 ⁵	8 ²	5	375/191	1.05	55

NA- Not applicable

- 1) 77°F/25°C Brookfield RV viscosity spindle 1 at 50 rpm
- 2) 180°F/82°F SPI Gel with 1.0% BPO
- 3) 77°F/25°C Gel time with 2.0% MEKP
- 4) 77°F/25°C Brookfield RV viscosity spindle 2 at 20 rpm
- 5) 77°F/25°C Thix Index 2/20

*Typical properties are not to be construed as specifications.

OPTIONAL PROMOTER/CATALYST SYSTEMS AT 77°F/25°C for K133-AAA-00 and K133-ATT-00

Resin	100	100*
Cobalt 6%,phr	0.6	-
N,N-Dimethyl aniline,phr	0.2	0.2
ATH, phr	150	150
MEKP, phr	2	-
Dibenzoyl peroxide (BPO 98% active) , phr **	-	2
Gel time, minutes		30 38

* Preferred system

** Adjust to concentration of BPO to be used.

Flame Retardant & Smoke Development Data (See note below) **

N F P A 158 Smoke Development (ASTM E 662-97 NBC Smoke Density Chamber)			Flame Spread Rating (ASTM E 162-98)
	Flam ing	No n-Flam ing	20
D _m	61	40	
D _s 1.5	1	0.2	
D _s 4.0	16	2	



DESCRIPTION

Firepel® K133 series resins are specifically designed to be blended with alumina trihydrate (ATH) to provide fire retardant properties. Firepel K133-ATT-00 is thixotropic to keep the ATH in suspension longer. ATH is needed to provide fire retardant properties.

Flammability of composite parts is dependent on the geometry of the part, degree of cure, reinforcement content, types of reinforcement, etc. It is the end user's responsibility to ensure that finished parts meet the required specifications. Published flammability properties should be used for comparison purposes only.

BENEFITS

Fire Resistance

Laminates made with Firepel K133 series have passed the UL 94-HB, UL 94-5V and UL 94-V-0 test requirements. Laminates were made with a blend of 40/60 resin/ATH and 2 plies of 1.5 oz/450 grams/m² chopped strand mat. (The glass content was 22.5%)

Toxicity

Composites made with Firepel K133 series resins have low toxicity values due to the absence of halogens.

Low Cost

Economical Fire Retardant composites can be made with Firepel K133 series resins.

Firepel® K133 Series Polyester Resin

FLAMMABILITY PROPERTIES (ASTM E-84 TUNNEL TEST)		
ASTM E 84 RESULTS **		
Flame Spread	Smoke Developed	Class
25	65	1

ASTM E 1354 RESULTS **	
OXYGEN CONSUMPTION CALORIMETER with 50kW/m ²	
TEST	RESULTS
Time to sustained ignition, seconds	63
Average peak heat release rate, kw /m ²	340
Average heat release rate after 60 seconds, kw /m ²	235
Average heat release rate after 180 seconds, kw /m ²	138
Average heat release rate after 300 seconds, kw /m ²	104
Total heat release, mj/m ²	27
Average effective heat of combustion, mj/kg	17
Smoke obscuration, average specific extinction area, m ² /kg	430
Mass loss, %	51

Toxic Gas Generation Based on Boeing Specification Support Standard BSS 7239 Sampling 4 minutes after initiation of the test**		
Gas	Flaming Mode	Non-Flaming Mode
Hydrogen Cyanide (HCN), ppm	<2	<2
Carbon Monoxide (CO), ppm	67	<10
Nitrous Oxides (NOx) ppm	<2	<2
Sulfur Dioxide (SO ₂), ppm	<1	<1
Hydrogen Fluoride (HF), ppm	<1.5	<1.5
Hydrogen Chloride (HCL), ppm	4	2

**Laminates contained 16% fiberglass and were post cured at 212°F/100°C for 3 hours.

British Standard Testing.				
	BS: 6853		BS:476 Part-6	BS:476 Part-7
	Smoke Density, Annexure D clause D.8.4 Panel Test	Toxic fume, Annex- B, Clause-B.2	Fire Propagation Index	Surface spread of flame
Test Results.	Ao(On) / Ao(Off)	R	1	Class
Formulations	1.96 / 2.65	0.4	Class "O" (i= 6.8)	Class-1
Firepel K133-AAA-00	PHR	PHR	PHR	PHR
DMA	100	100	100	100
Cobalt Octoate 6%metal	0.5	0.5	0.5	0.5
BYK - W 996 **	1.5	1.5	1.5	1.5
Aluminium hydroxide (Martinal ON-921) *	9	9	9	9
MEKP	300	300	300	300
Glass Reinforcement	8	8	8	8
Resin glass ratio.	3 Plies of 300g/m ² chopped strand mat	2 Plies of 600g/m ² woven roving		
Post Cure	3.5	3.5	3.5	3.5
	100°C for 5 hrs.	100°C for 5 hrs.	100°C for 5 hrs.	100°C for 5 hrs.

Firepel® K133 Series Polyester Resin

PERFORMANCE GUIDELINES

A. Keep full strength catalyst levels between 1.0% - 2.0% of the total resin weight.

B. Maintain shop temperatures between 65°F/18°C and 90°F/32°C and humidity between 40% and 90%. Consistent shop conditions contribute to consistent gel times and will help the fabricator make a high quality part.

APPLICATION GUIDELINES

A. Due to the curing characteristics of the Firepel K133 series resin, it is desirable to complete all secondary bonding as soon as possible. Exposure of the laminate to sunlight will result in severe secondary bonding problems. After 24 hours of cure, it may become necessary to abrade the laminate to ensure good secondary bonding, especially if the surface of the laminate has been allowed to become resin rich. Low fiberglass content and resin puddling should be avoided with this product.

To assure adequate bonding to gel coats, fabricators should pre-wet the gel coat surface with a thin pass of catalyzed resin prior to lamination.

STORAGE STABILITY

This product is stable for three months from the date of manufacture when stored in the original containers, away from direct sunlight or other UV light sources and at or below 25°C (77°F). Storage stability of two months or less should be anticipated if the storage temperature exceeds 30°C (86°F).

After extended storage, some drift may occur in the product viscosity and gel time.

SAFETY

A. See appropriate Material Safety Data Sheet for guidelines.

B. Chemical resistance studies have indicated the dicyclopentadiene resins such as the Firepel K133 Series resins have inferior resistance to certain hydrophobic liquids, such as hydrocarbons. Fuel storage tanks should not be produced with the Firepel K133 Series resins. If your manufacturing needs require a more corrosion resistant resin, please contact your AOC representative for information or technical assistance on AOC's line of isophthalic or vinyl ester resins.

ISO 9001:2000 CERTIFIED

The Quality Management Systems at every AOC manufacturing facility have been certified as meeting ISO 9001:2000 standards. This certification recognizes that each AOC facility has an internationally accepted model in place for managing and assuring quality. We follow the practices set forth in this model to add value to the resins we make for our customers.

FOOTNOTES

(1)

Based on tests of Firepel® K133-AAA-00 resin at 77°F/25°C and 50% relative humidity. Thixotropic components, if applicable, are excluded. Resins were prepared using 1.25% MEKP, 0.3% Cobalt 12% post cured for 5 hours at 212°F/100°C.

(2)

The gel times shown are typical but may be affected by catalyst, promoter, inhibitor concentration, resin, mold, and shop temperature. Variations in gelling characteristics can be expected between different lots of catalysts and at extremely high humidities. Pigment and fillers can retard or accelerate gelation. It is recommended that the fabricator check the gelling characteristics of a small quantity of resin under actual operating conditions prior to use.

Note:

*BYK is a register trademark of BYK-Chemie GmbH.

**Martinal is a register trade mark of Albemarle corporation Germany

Firepel® is a registered trademark of AOC, LLC

The information contained in this data sheet is based on laboratory data and field experience. We believe this information to be reliable, but do not guarantee its applicability to the user's process or assume any liability for occurrences arising out of its use. The user, by accepting the products described herein, agrees to be responsible for thoroughly testing each such product before committing to production.

Our recommendations should not be taken as inducements to infringe any patent or violate any law, safety code or insurance regulation.



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