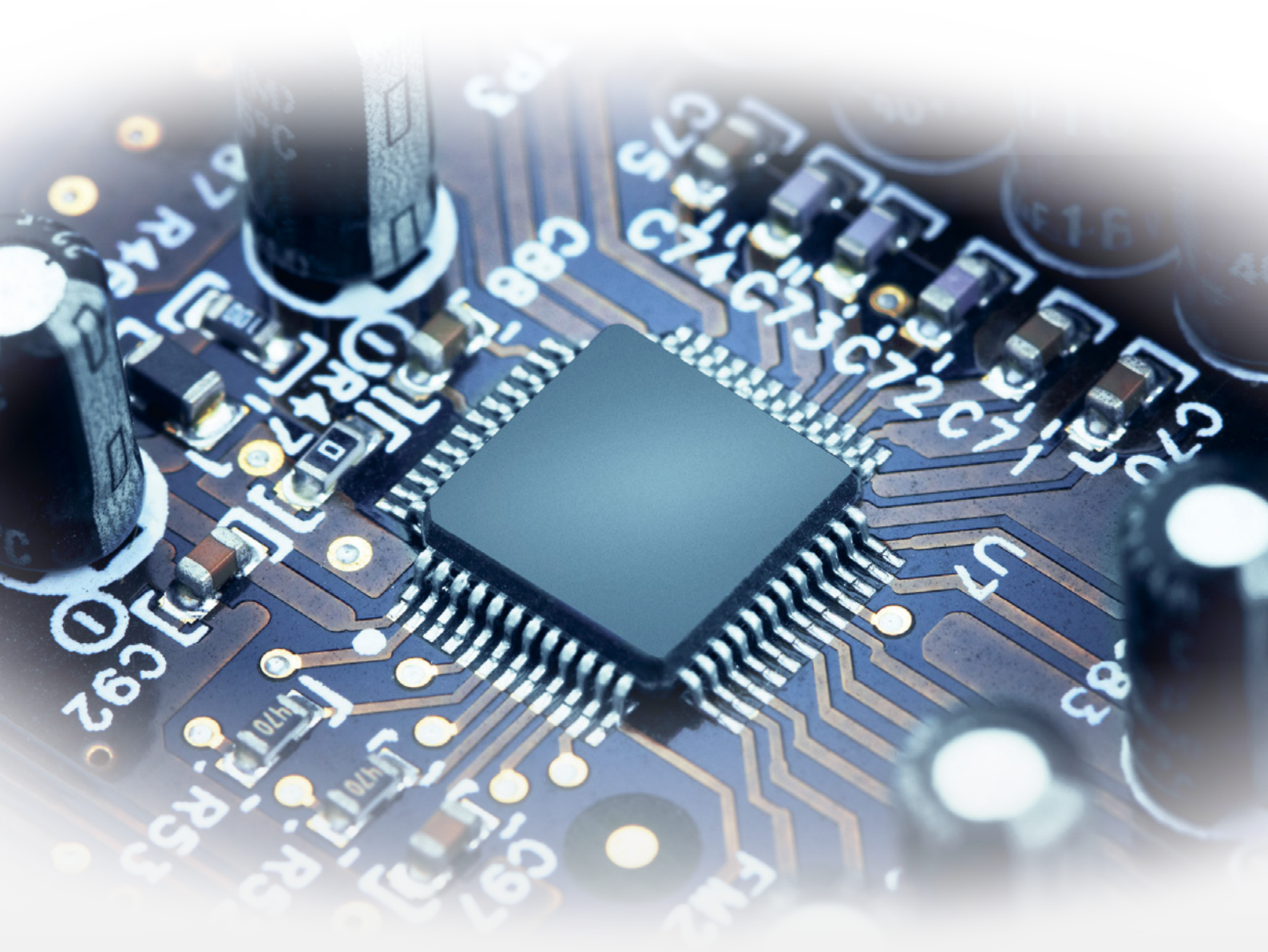


QUALITY PERFORMS.



LANXESS Bromine Solutions

Flame retardants product guide

QUALITY WORKS.

LANXESS
Energizing Chemistry

A GLOBAL LEADER IN FLAME RETARDANTS

INNOVATIVE. RELIABLE. SUSTAINABLE.

Resulting from decades of hard work, innovation and lessons learned, the LANXESS Bromine Solutions of today is positioned to be an excellent partner to our customers for bromine and phosphorus-based flame retardant needs both now and far into the future.

For almost a century, we have helped our customers to meet their flame retardant needs with a broad portfolio of products and solutions. In late 2010, the Great Lakes Solutions business was introduced with a mission to build on its well-established heritage, by introducing differentiated, innovative products and greener, sustainable solutions while maintaining performance and quality.

We are proud of our history and look forward to helping our customers meet future performance, safety and compliance requirements by constantly improving our portfolio with new and improved products for maximum sustainability.



FLAME RETARDANTS – SAVING LIVES

Fire kills thousands of people each year throughout the world, but many are spared because fires are slowed or never start due to the use of flame retardants. LANXESS is a global leader in flame retardant products and solutions for use in applications such as furniture foam, electronic components, electrical enclosures, building products and more.

We believe the public should not be forced to choose between environmental and fire safety and that we must have both. Our business demands the highest standards of both fire retardancy performance and environmental sustainability. To meet these increasingly complex challenges, LANXESS offers a wide range of flame retardant solutions that allow OEM's the versatility to meet their individual needs.

Brominated flame retardants are used in a variety of applications from electronic housings to printed circuit boards and electrical connectors to flexible and rigid polyurethane foam. Brominated flame retardants provide optimal processing while maintaining outstanding physical properties in a cost effective manner.



FLAME RETARDANTS

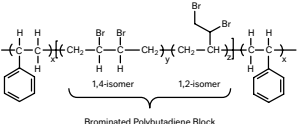
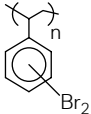
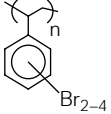
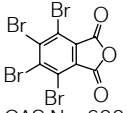
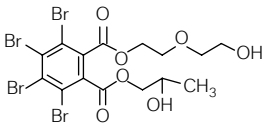
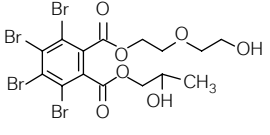
SELECTION GUIDE

	Polyolefins	Polypropylene	Polyethylene	TPO (thermoplastic polyolefin)	EPDM	PVC	Styrenics	HIPS (high impact polystyrene)	ABS	PC/ABS (polycarbonate / ABS blends)
Bromine-based flame retardants										
Emerald Innovation [®] 3000 ¹⁾										
PDBS-80 [™]										
Firemaster [®] CP-44HF										
Firemaster [®] PBS-64HW										
PHT-4 ^{™ †}										
PHT4-Diol ^{™ †}										
PHT4-Diol LV ^{™ †}										
Firemaster [®] 504										
Firemaster [®] 508										
Uniplex FRP-45					■	■				
BA-59P ^{™ †}									■	
Firemaster [®] BZ-54 [*]						■				
Firemaster [®] 600 [*]										
Firemaster [®] 602 [*]										
BC-52 [™]										■
BC-58 [™]										■
Firemaster [®] 2100R	■	■	■	■			■	■		■
PH-73FF ^{™ †}										

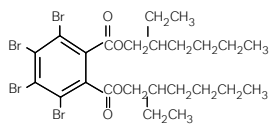
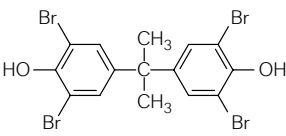
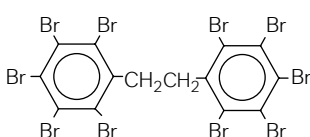
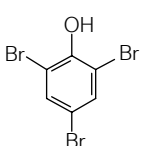
■ Recommended ■ Suitable † Reactive flame retardant used during polymerization. * Products not registered for sale in Europe.
¹⁾ Emerald Innovation[®] 3000 is based on technology licensed from The Dow Chemical Corporation.

	PPE/HIPS blends	XPS	EPS	Polyurethane	Rigid (polyurethane (PUR/ PIR)	Flexible polyurethane	TPU	Thermosets	UPE (unsaturated polyester)	Epoxy	Phenolics	Engineering thermoplastics	PA 6	PA 66	HTPA	PBT	PET	PC	
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BROMINE-BASED FLAME RETARDANTS

		Viscosity/ melting range °C	Volatility TGA, Wt. loss @ temp	Typical specific gravity	Bulk density g/ml	Solubility (g/100 g solvent @ 25°C)	
Emerald Innovation® 3000 ¹⁾ Brominated polymeric Bromine content: 64%	 <p style="text-align: center;">Brominated Polybutadiene Block</p>	Softening 120	5% @ 255°C 10% @ 260°C 50% @ 280°C	1.9	0.5 (L) 0.7 (P)	Water Methylene chloride Methanol Styrene	<0.1 >20 <0.1 >20
CAS No. 1195978-93-8							
PDBS-80™ Poly (dibromostyrene) Formula weight: 50,000 Bromine content: 59.0%		Tg: 144	5% @ 368°C 10% @ 378°C 50% @ 404°C 95% @ 544°C	1.9	1.11 (P)	Water Dichloromethane Toluene Methanol MEK	<0.1 C C <0.1 2
CAS No. 88497-56-7							
Firemaster® CP44-HF Copolymer of dibromostyrene Formula weight: ~16,000 Bromine content: 64–65%	Proprietary	Tg: 147	1% @ 316°C 5% @ 347°C	2.0		Water Toluene Methylene chloride MEK Methanol Acetone	Insoluble C P P Insoluble Insoluble
CAS No. 88497-56-7							
Firemaster® PBS-64HW Poly (dibromostyrene) Formula weight: 40,000 Bromine content: 64.0%		Tg: 156	5% @ 356°C 10% @ 371°C 50% @ 401°C	2.0	1.25 (P)	Water Dichloromethane Toluene Methanol MEK	<0.1 C C <0.1 P
CAS No. 88497-56-7							
PHT4™ Tetrabromophthalic anhydride Formula weight: 463.7 Bromine content: 68.2%		274–277	5% @ 229°C 10% @ 242°C 50% @ 277°C	2.9	1.37 (L) 2.09 (P)	Water Dichloromethane Toluene Methanol MEK	<0.1 1 6 1.6 2.6
CAS No. 632-79-1							
PHT4-Diol™ Tetrabromophthalate diol Formula weight: 627.9 Bromine content: 46.0%		90,000 cps @ 25°C	5% @ 128°C 10% @ 166°C 50% @ 319°C 95% @ 380°C	1.9		Water Dichloromethane Toluene Methanol MEK	<0.5 C C 9 C
US CAS No. 77098-07-8 EU CAS No. 20566-35-2							
PHT4-Diol™ LV Tetrabromophthalate diol Formula weight: 627.9 Bromine content: 43%		22,500 cps @ 25°C	5% @ 127°C 10% @ 151°C 50% @ 325°C 95% @ 382°C	1.7		Water Dichloromethane Toluene Methanol MEK	<0.5 C C 9 C
CAS No. 77098-07-8 EU CAS No. 20566-35-2							
Firemaster® 504 Tetrabromophthalate diol blend Bromine content: 18% (This product is not registered for sale in Europe)	Proprietary	350–500 cps @ 25°C	5% @ 147°C 10% @ 167°C 50% @ 211°C	1.45		Water Dichloromethane Toluene MEK Methanol MEK	<0.1 C C C C C
CAS No. 77098-07-8 EU CAS No. 20566-35-2							
Firemaster® 508 Tetrabromophthalate diol blend Bromine Content: 37% This product is not registered for sale in Europe)	Proprietary	8800 cps @ 25°C	5% @ 136°C 10% @ 157°C 50% @ 285°C	1.67		Water Dichloromethane Toluene MEK Methanol MEK	<0.1 C C C C C

¹⁾ Emerald Innovation® 3000 is based on technology licensed from The Dow Chemical Corporation.

		Viscosity/ melting range °C	Volatility TGA, Wt. loss @ temp	Typical specific gravity	Bulk density g/ml	Solubility (g/100 g solvent @ 25 °C)
Uniplex FRP-45 Tetrabromophthalate ester Formula weight: 706.1 Bromine content: 45 %		1800 cps @ 25°C	5% @ 211°C 10% @ 226°C 50% @ 268°C 95% @ 291°C	1.6		Water <0.1 Dichloromethane C Toluene C Methanol 5.7 MEK C
CAS No. 26040-51-7						
BA-59P™ Tetrabromobisphenol A Formula weight: 543.7 Bromine content: 59 %		179–182	5% @ 244°C 10% @ 261°C 50% @ 301°C	2.2	0.96 (L) 1.36 (P)	Water <0.1 Acetone 225 Dichloromethane 27 Toluene 6 Methanol 80 MEK 168
CAS No. 79-94-7						
Firemaster® BZ-54 Tetrabromophthalic anhydride derivative Bromine content: 54% (This product is not registered for sale in Europe)	Proprietary	800 cps @ 25°C	5% @ 211°C 10% @ 226°C 50% @ 268°C 95% @ 291°C	1.7		Water <0.1 Dichloromethane C Toluene C Methanol 5.7 MEK C
Firemaster® 600 Tetrabromobenzoate ester composition Bromine content: 27% Phosphorus content: 4% (This product is not registered for sale in Europe)	Proprietary Blend	200 cps @ 25°C	5% @ 210°C 10% @ 226°C 25% @ 249°C 50% @ 269°C	1.4		Water <0.1 Dichloromethane C Toluene 9.47 Methanol C MEK C
Firemaster® 602 Tetrabromobenzoate ester composition Bromine content: 27% Phosphorus content: 4% (This product is not registered or sale in Europe)	Proprietary Blend	200 cps @ 25°C	5% @ 217°C 10% @ 234°C 25% @ 257°C 50% @ 279°C	1.4		Water <0.1 Dichloromethane C Toluene 9.40 Methanol C MEK C
BC-52™ Phenoxy-terminated carbonate oligomer of Tetrabromobisphenol A Formula Weight: ~2,500 Bromine Content: 52%	Proprietary CAS No. 94334-64-2	180–210	5% @ 408°C 10% @ 438°C 50% @ 480°C	2.2	0.61 (L) 1.00 (P)	Water <0.1 Dichloromethane C Toluene 14 Methanol <0.1 MEK C
BC-58™ Phenoxy-terminated carbonate oligomer of tetrabromobisphenol A Formula weight: ~3,500 Bromine content: 58%	Proprietary CAS No. 71342-77-3	200–230	5% @ 380°C 10% @ 423°C 50% @ 475°C	2.2	0.66 (L) 1.02 (P)	Water <0.1 Dichloromethane C Toluene 14 Methanol <0.1 MEK C
Firemaster® 2100R Decabromodiphenyl ethane Formula weight: 971.2 Bromine content: 81-82%		348–353	1% @ 314°C 5% @ 344°C 50% @ 402°C 90% @ 423°C	3.2	1.19 (L) 1.39 (P)	Water <0.01 Dichloromethane <0.01 Toluene <0.01 Methanol <0.01 MEK <0.01
CAS No. 84852-53-9						
PH-73FF™ 2,4,6 Tribromophenol Formula weight: 330.8 Bromine content: 72.5%		91–95	5% @ 122°C 10% @ 134°C 50% @ 167°C 95% @ 183°C	2.2	1.4 (L) 1.41 (P)	Water <0.1 Dichloromethane 36 Toluene 50 Methanol 84 MEK 225
CAS No. 118-79-6						

Notes:

TGA:
10 mg @ 10°C/min., N₂

Bulk Density:
L denotes loose
P denotes packed

Solubility:
C denotes complete solubility (100 g/100 ml)
P denotes partial solubility



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Unless specified to the contrary, the values given have been established on standardized test specimens. The figures should be regarded as guide values only and not as binding minimum values. Kindly note that the results refer exclusively to the specimens tested. Under certain conditions, the test results established can be affected to a considerable extent by the processing conditions and manufacturing process.

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