



**ANTIFLAME®**

Specialist In Halogen Free Flame Retardants

# Halogen Free Flame Retardants

PRODUCT DATA SHEET

Edition 2014



TOPCHEM TECHNOLOGY CO., LTD.



## TOPCHEM QUALITY PRODUCTS CATALOGUE

P2 Introduction

P3 Series of Antiflame™ halogen free flame retardant to satisfy your needs

### Flame Retardants Base on Melamine

P6 Antiflame MP Melamine Phosphates

P7 Antiflame MPP Melamine Pyrophosphate

P8 Antiflame MC Melamine Cyanurate

P9 Antiflame NP-100 Halogen-Free Flame Retardant

P10 Antiflame NP-120 Halogen-Free Flame Retardant

P11 Antiflame NP-400 Halogen-Free Flame Retardant (For PP、PE、EVA)

P13 Antiflame NP-430 Halogen-Free Flame Retardant (For PP、PE、EVA、TPE、SEBS、TPU)

P15 Antiflame NP-430C Halogen-Free Flame Retardant (For GF Reinforced PA66/PA6 )

P16 Antiflame NP-510 Halogen-Free Flame Retardant (For GF Reinforced PBT/PET/PA6 and TPU )

### Flame Retardants Base on APP

P18 Antiflame APP-1 Ammonium Polyphosphate

P19 Antiflame APP-2 Ammonium Polyphosphate

P20 Antiflame AP-310 Halogen-Free Flame Retardant (For PP、PE、EVA )

P21 Antiflame AP-3101 Halogen-Free Flame Retardant (For PP、PE、EVA )

P22 Antiflame AP-320 Halogen-Free Flame Retardant (For PP、PE、EVA )

P23 Antiflame AP-3201 Halogen-Free Flame Retardant (For PP、PE、EVA )

### Other Flame Retardants

P24 Antiflame KS-550 Flame Retardant for Clear Polycarbonate



## INTRODUCTION

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Topchem Technology Co., Ltd is a special corporation for exploring and manufacturing non-halogen flame-retardant agent. It has explored a series of products to meet flame resistant require of user in plastics. Antiflame flame retardants consist of non-halogenated MC (melamine cyanurate) for polyamide plastics, non-halogenated AP-310, 320, NP-400, NP-430 for polyolefin (PP, PE, EVA and so on). Especially, Ammonium polyphosphate (crystalline form II, n>1000) series flame retardants can be used in intumescent coating, rigid foam, thermoplastics and UP (unsaturated) resin etc.

Our company is devoted to promote adding technology of non-halogen, making “Environment protection, Security of fire-fighting, High efficiency of flame-retardant” as target, insists on the management concept of “best quality, perfect service”. Based on the enterprise spirit of “challenge ourselves, dare forgoing, win together, innovate limitlessly”, our company keeps in leading position of researching and producing in flame-retardant field.

We manage the enterprise according to ISO9001:2002 standard, it has a high-tech researching and development team, and establishes close cooperation with many research agencies, universities and enterprises in researching, development and application. It has built subject lab, application lab and modification lab. .

Our company insists on the service attitude of scheming for customers, has a professional marketing team. Our products have been sold to Europe, North American and South-east Asia countries. We also have established good business relation with many producers of different provinces in china. “Quality, Prestige and Service” is the foundation and guarantee of realizing the innovation and great-leap-forward development of our company. The more concern to us, the more repayment and value to you.



## Series of Antiflame™ halogen free flame retardant to satisfy your needs

	Product Type	Components	Product Description
Flame Retardants Base on Melamine	Antiflame MP	Melamine Phosphates	Salt of melamine and phosphoric acid intended to be used as halogen free flame retardant and smoke suppressant agent for thermoplastics, polyofins, elastomers, engineering resins, paints and intumescent fire retardant coatings.
	Antiflame MPP	Melamine Pyrophosphate	Salt of melamine and pyrophosphate acid intended to be used as halogen free flame retardant and smoke suppressant agent for rubber, fabrics, nylons, paint, paper and other plastics.
	Antiflame MC	Melamine Cyanurate	Salt of melamine and cyanuric acid intended to be used as halogen free flame retardant and smoke suppressant agent for nylons, polyesters, PU foams, epoxy resins, polyolefin and back side coatings
	Antiflame NP-100	Halogen-Free Flame Retardant	NP-100 is a non-halogenated flame retardant based on phosphorus nitrogen synergism particularly useful in epoxy resins, TPU, silicone rubber, ABS, SBR LATEX and polyurethane applications. NP-100 is compliant with the requirements of RoHS, WEEE, REACH and halogen-free specification IEC 61249-2-21.
	Antiflame NP-120	Halogen-Free Flame Retardant	NP-120 is a newly developed halogen free intumescent flame retardants for paint or coating. It is compliant with the requirements of RoHS, WEEE, REACH and halogen-free specification IEC 61249-2-21.
	Antiflame NP-400	Halogen-Free Flame Retardant	NP-400 is a non-halogenated flame retardant based on phosphorus nitrogen synergism. When incorporated into thermoplastics, it shows good processing stability and non-hydroscopic. It accord with the environmental Regulations RoHS, WEEE, REACH and halogen-free specification IEC 61249-2-21.
	Antiflame NP-430 Antiflame NP-430C	Halogen-Free Flame Retardant	NP-430 is a newly developed halogen free intumescent flame retardants for polyolefins and thermoplastic elastomer, it shows very high processing heat stability, on-hydroscopic and excellent flame retardancy. It accord with the environmental Regulations RoHS, WEEE, REACH and halogen-free specification IEC 61249-2-21. NP-430C have more Intumescent Char than NP-430
	Antiflame NP-510	Halogen-Free Flame Retardant	NP-510 is a newly developed halogen free environment friendly flame retardant based on phosphorus and nitrogen synergism. NP-510 was developed especially for the use in glass fiber reinforced PBT, PET, PA6 and TPU, it shows good processing stability and non-hydroscopic. NP-510 compliant with the requirements of RoHS, WEEE, REACH and halogen-free specification IEC 61249-2-21.

Flame Retardants Base on APP	Antiflame APP-1	Ammonium Polyphosphate	Ammonium polyphosphate, has high polymerization degree and belongs to crystal phase II, It is water insoluble straight-line polymer. The product has high content of phosphorus and nitrogen, strong heated stability and chemical stability, low water solubility and humidity, nearly neutral pH value.
	Antiflame APP-2	Ammonium Polyphosphate	A product of APP-1 surface-modified with organosiloxanes
	Antiflame AP-310	Halogen-Free Flame Retardant	AP-310 is a non-halogenated flame retardant based on APP-1 which develops its effectiveness through phosphorus/nitrogen synergism. When incorporated into thermoplastics, it shows high processing stability and very good flame retardant. It accord with the environmental Regulations RoHS, WEEE and REACH.
	Antiflame AP-3101	Halogen-Free Flame Retardant	A product of AP-310 surface-modified with organosiloxanes
	Antiflame AP-320	Halogen-Free Flame Retardant	AP-320 is a newly developed non-halogenated flame retardant based on APP-1 which develops its effectiveness through phosphorus nitrogen synergism. When incorporated into thermoplastics, it shows high processing stability and non-hydroscopic. It accord with the environmental Regulations RoHS,WEEE,REACH
	Antiflame AP-3201	Halogen-Free Flame Retardant	A product of AP-320 surface-modified with organosiloxanes
Other Flame Retardants	Antiflame KS-550	Flame Retardant For Clear Polycarbonate	KS-550 has been found to be an effective flame retardant in polycarbonate at use levels as low as 0.06% to 0.08% by weight. it can be formulated to produce optically-clear, haze-free grades of polycarbonate for extrusion and molding. KS-550 does not contain any bromine or chlorine

## Performance Comparison of Antiflame Flame Retardants

Product Type	Decomposition Temperature °C			Water resistance	Non-hygroscopic	Surface coated	Used in Field
	230-250	250-280	280-350				
Antiflame MP	●			●	●		Rubber, Paint
Antiflame MPP			●	●	●		Paint, Rubber, UP
Antiflame MC			●	●	●		PA6、PA66, Rubber
Antiflame APP-1		●					Rubber, Paint
Antiflame APP-2		●				●	Rubber, Paint
Antiflame NP-100			●	●	●	●	TPU、Epoxy, silicone rubber
Antiflame NP-120	●						Paint, copolymer/acrylate
Antiflame NP-400	●			●	●	●	PP、PE、EVA、PU
Antiflame NP-430			●	●	●	●	PP、PE、HDPE、LDPE、EVA、TPE、TPU, PPO, SEBS, EPDM
Antiflame NP-430C							
Antiflame NP-510			●	●	●	●	PBT、PET、PA6+GF, TPU
Antiflame AP-310		●					PP、PE、HDPE、LDPE、EVA、TPE、TPU
Antiflame AP3101		●				●	
Antiflame AP-320		●		●	●		
Antiflame NP-3201		●		●	●	●	
Antiflame KS-550			●		●		PC、PC/ABS

Note: ● = ready

All product can compliant with the requirements of RoHS, WEEE, REACH and halogen-free specification IEC 61249-2-21.

## Application Scope (● = recommend)

Type \ Material	MP	MPP	MC	APP	NP-100	NP-120	NP-400	NP-430	NP-510	KS-550	AP-310	AP-3101	NP-320
PP							●	●			●	●	●
PE、LDPE							●	●			●	●	●
EVA							●	●			●	●	●
Epoxy					●				●		●	●	●
TPE								●			●	●	●
TPU							●	●	●		●	●	●
PPO、EDPS								●					
PA6、PA66			●		●								
PET、PBT		●	●		●				●				
PC										●			
Silicone		●			●								
Paint	●	●	●	●		●					●	●	●
Adhesive		●	●			●					●	●	●
Rubber		●	●										

# Antiflame<sup>®</sup> MP

## Melamine Phosphate

### Product Description

Product name: Melamine Phosphate

Condensed Formula: C<sub>3</sub>H<sub>9</sub>N<sub>9</sub>O<sub>4</sub>P

CAS: 20208-95-1

EINECS: 243-601-5

General description and use: salt of melamine and phosphoric acid intended to be used as halogen free flame retardant/smoke suppressant agent for thermoplastics, polyofins, elastomers, engineering resins, paints and intumescent fire retardant coatings, it can partly replace Ammonium Polyphosphate (APP).

### Typical Properties Data

Appearance: Fine powder

Odor: odorless

Color off-white

Phosphorus content: min. 12.5%

Nitrogen content: min. 37.0%

Moisture content: max. 0.5%

Decomposition pt (°C): > 250

Specific gravity ( 23°C): 1,7 (g/cc)

Bulk density (Kg/m<sup>3</sup>): 400-500

Water solubility (g/100 ml): 0.35 (at 20°C)

PH (saturated sol.): 2.5±0.5

Particle size:

D<sub>50</sub>: < 10 μm

D<sub>98</sub>: < 30 μm

### Handling & Safety

The product is stable if maintained in the original bags and in a dry place at room temperature.

Handle the product in compliance with good industrial practice avoiding dust formation.

### Availability

Antiflame MP is supplied 25kg net weight in paper bag.

### Applications

Antiflame MP is a salt of Melamine and Phosphoric Acid, when it decomposes under high temperature, it undergoes endothermic decomposition thus acting as a heat sink and cooling the combustion source. The released phosphoric acid acts to coat and therefore shield the condensed combustible polymer or surface of the combustible materials. 25-30% Antiflame MP is the suggested dosage for Polymer or Intumescent Antiflame MP can be processed up to 250°C on typical polymer processing equipments (single or twin screw extruders, internal batch mixers (Banbury type) and roll mills). Molding operations such as injection molding and composites thermal forming are easily accomplished.

# Antiflame<sup>®</sup> MPP

## Melamine Pyrophosphate

### Product Description

Product name: Melamine Pyrophosphate

Condensed Formula:  $C_6H_{16}N_{12}P_2O_7$

CAS: 15541-60-3

EINECS: 239-590-1

Molecular weight: 430.23

General description and use: salt of melamine and pyrophosphate acid intended to be used as halogen free flame retardant/smoke suppressant agent for organic polymers.

### Typical Properties Data

Appearance: Fine powder

Odor: odorless

Color off-white

Specific gravity ( 23° C): 1,7 (g/cc)

Bulk density (Kg/m3): 300-450

Water solubility (g/100 ml): 0,06% (at 20° C)

Decomposition pt (° C): > 300

PH (saturated sol.):  $3.8 \pm 0.4$

Particle size:  $D_{50} < 10 \mu m$   $D_{99} < 30 \mu m$

Phosphorous Content approx. 14.4%

Nitrogen Content approx. 39.0%

### Handling & Safety

The product is stable if maintained in the original bags and in a dry place at room temperature. The product in compliance with good industrial practice avoiding dust formation.

### Availability

Antiflame MPP is supplied 25kg net weight in paper bag.

### Applications

Melamine pyrophosphate is an excellent non-halogen chemical useful in various rubber, fabrics, nylons, paint, paper and plastics as a flame retardant. It is compatible with melamine-urea formaldehyde systems. It has shown uses in the electronic industry when incorporated in the manufacturing of circuit boards and other equipment. In addition, melamine pyrophosphate can be used with epoxy and other adhesive compositions to achieve fire retardant barriers in gluelines in wood and plastic laminates. Melamine pyrophosphate is useable with di-pentaerythrytol as well as polyolefins. Also useable in SMC process (unsaturated polyester resins). Melamine pyrophosphate can be partially used instead of ammonium polyphosphate (as a spumescent and a catalyst) in some intumescent applications.



# Antiflame<sup>®</sup> MC

## Melamine Cyanurate

### Product Description

Product name: Melamine Cyanurate

Condensed Formula:  $C_6H_9N_9O_3$

CAS: 37640-57-6

EINECS: 2535757

Molecular weight: 255,2

General description and use: salt of melamine and cyanuric acid intended to be used as halogen free flame retardant/smoke suppressant agent for organic polymers.

### Typical Properties Data

Appearance: Fine powder

Odor: odorless

Color off-white

Specific gravity ( 23°C): 1,7 (g/cc)

Bulk density (Kg/m<sup>3</sup>): 300-450

Decomposition pt (°C): > 330

Water solubility (g/100 ml): 0,001 (at 20°C)

PH (saturated sol.): 5.0-6.5

Particle size: D<sub>50</sub> < 6µm D<sub>98</sub><16 µm

### Handling & Safety

The product is stable if maintained in the original bags and in a dry place at room temperature. Handle the product in compliance with good industrial practice avoiding dust formation.

### Availability

Antiflame MC is supplied 20kg net weight in paper bag.

### Applications

Antiflame MC is the elective product for flame proofing clear unfilled PA articles with halogen free additive. As sole additive at a concentration ranging from 8 to 12% w, it is in position to achieve high demanding applications (UL 94 V0) in nylons (PA66 and PA6) showing also good retention of tensile strength properties and significant increase of tensile modulus. It is also effective in polyesters, PU foams, epoxy resins, styrenics, polyolefins and back side coatings, in combination with suitable coagents. Other applications: lubricants and adhesion agents.

### Processing

Antiflame MC is endowed with high thermal stability; therefore it is in position to overcome both extrusion and injection moulding processing conditions typical of engineering plastics. In order to maximize the flame proofing effect of the product, the compounding processes are generally carried out on corotating twin screw extruders by feeding the product in the main hopper and using predried polymers, if necessary. Antiflame MC does not interact with the common processing additives like: stabilizers, crosslinking agents, processing aids, inorganic fillers, pigments, etc.

# Antiflame<sup>®</sup> NP-100

## Halogen free Flame Retardant

### Product Description

NP-100 is a non-halogenated flame retardant based on phosphorus/nitrogen synergism. When incorporated into thermoplastics, it shows good processing stability and non-hydroscopic. NP-100 differs in its mode of action from chlorine- or bromine-containing flame retardants by achieving its effect through intumescence. The thermoplastic material foams on exposure to flame, the carbon foam layer so formed protects the polymer through its heat-insulating effect, reduces further oxygen access and prevents dripping of the thermoplastic. NP-100 do not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), or polybrominated diphenyl ethers (PBDEs). It accords with the environmental Regulations "The Restriction of the Use of Hazardous Substances in electrical and electronic equipment, RoHS" in European Union.

### Performance Benefits

- High nitrogen content
- Limited water solubility.
- Good thermal stability.
- Small particle size.

### Typical Properties Data

Property	Value
Appearance	White free-flowing powder
Nitrogen content % $\geq$	30
Particle Size	$D_{50} < 5 \mu m$ , $D_{98} < 15 \mu m$
Water content % $\leq$	0.5
Density $g/cm^3$	1.7
Bulk density $g/cm^3$	0.63
pH (10% slurry)	6-7

### Availability

NP-100 is supplied in bags with 20kg net weight.

### Applications

NP-100 is a white, thermally-stable non-halogen flame retardant particularly useful in epoxy resins, TPU, silicone rubber, ABS, SBR LATEX and polyurethane applications. Low density flame retardant polyolefin with high elongation and impact resistance can be achieved with NP-100, NP-100 also can be used in Paint

Table 1 Typical dosage for UL94 V-0 rating at 1/16"

Type	Dosage (W%)
Epoxy Resins	15-20%
TPU	30%
Silicone Rubber	12-15%
PA6	10-12%

# Antiflame<sup>®</sup> NP-120

## Halogen free Intumescent Flame Retardant

### Product Description

NP-120 is a newly developed halogen free intumescent flame retardants for paint or coating. NP-120 possesses an excellent flame retardancy with low amount of flame retardants, when incorporated into water based coatings, it shows good processing stability and non-hydroscopic. NP-120 differs in its mode of action from chlorine- or bromine-containing flame retardants by achieving its effect through intumescences. The coatings on exposure to flame, the carbon foam layer so formed protects the polymer through its heat-insulating effect, reduces further oxygen access and prevents dripping of the thermoplastic. NP-120 do not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers. It accords with the environmental Regulations "The Restriction of the Use of Hazardous Substances in electrical and electronic equipment, RoHS" in European Union.

### Performance Benefits

- Excellent flame retardancy
- Very low water solubility; non-hydroscopic compared with APP flame retardant system.
- low smoke density, excellent aging stability
- Possesses excellent light stability and thermal stability.
- no migration, high quality during lifetime.

### Typical Properties Data

Property	Value
Appearance	White powder
Phosphorus content %	18 (min)
Particle Size, D <sub>50</sub> (μm)	15
Water content % ≤	0.5
Bulk Density g/cm <sup>3</sup>	0.6
Decomposition (5%, air)	> 200 °C

### Availability

NP-120 is supplied in bags with 25kg net weight.

### Handling & Safety

NP-120 requires no special safety measures, provided the usual precautions for handling chemicals are observed. Avoid dust formation and ignition sources. For more detailed information please refer to the material safety data sheet.

### Applications

NP-120 is a white, thermally-stable non-halogen flame retardant particularly useful in paint and water based coatings. Example formulation seen below. In acrylic paint, about 25-30% additive amount.

# Antiflame<sup>®</sup> NP-400

## Halogen Free Intumescent Flame Retardant

### Product Description

NP-400 is a non-halogenated flame retardant based on phosphorus/nitrogen synergism. When incorporated into thermoplastics, it shows good processing stability and non-hydroscopic. NP-400 differs in its mode of action from chlorine- or bromine-containing flame retardants by achieving its effect through intumescence. The thermoplastic material foams on exposure to flame, the carbon foam layer so formed protects the polymer through its heat-insulating effect, reduces further oxygen access and prevents dripping of the thermoplastic. NP-400 do not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), or polybrominated diphenyl ethers (PBDEs). It is compliant with the requirements of RoHS & WEEE Directive and halogen-free specification IEC 61249-2-21. .

### Performance Benefits

- High phosphorus content
- High efficiency - UL.94 VO at 1.6 mm in polypropylene at 30% loadings.
- Enables the compounding of Flame Retardant polyolefins with low density, high elongation and high impact strength.
- Limited water solubility.
- Good thermal stability.
- Small particle size.
- Neutral pH in aqueous solution.

### Typical Properties Data

Property	Value
Appearance	White free-flowing powder
Phosphorus content %	15-17
Particle Size	D <sub>50</sub> < 10 μ m, D <sub>98</sub> < 30 μ m
Water content % ≤	0.5
Density g/cm <sup>3</sup>	1.2
Bulk density g/cm <sup>3</sup>	0.63
pH (10% slurry)	7.2

### Thermal Stability

Thermo gravimetric analysis (TGA) at 20 °C/min weight loss 250 °C  
9% weight loss 300 °C  
53% weight loss 400 °C

### Availability

NP-400 is delivered in 20 kg paper bags with PE inliner.

### Handling & Safety

NP-400 requires no special safety measures, provided the usual precautions for handling chemicals are observed. Avoid dust formation and ignition sources. For more detailed information please refer to the material safety data sheet.

## Applications

NP-400 is a white, thermally-stable non-halogen flame retardant particularly useful in polyolefin and polyurethane applications. Low density flame retardant polyolefins with high elongation and impact resistance can be achieved with NP-400.

The following flame retardant performance was obtained on formulating a compound of NP-400 with polypropylene (PROPATHENE GYM621).

NP-400 (%)	18	21	24	27	30
LOI (ASTM D2863)	28.7	29.4	30.4	32.4	34.2
UL.94 3.2 mm	V-2	V-2	V-0	V-0	V-0
UL.94 1.6 mm	V-2	V-2	V-2	V-0	V-0

[ PROPATHENE is a registered trade mark of ICI ].

The following flame retardant performance was obtained on formulating a compound of NP-400 with polyethylene (BP LDPE Grade LM1620 AA).

NP-400 (%)	27	30	33
LOI (ASTM D2863)	27.6	29.2	30.20
UL.94 3.2 mm	V-1	V-0	V-0
UL.94 1.6 mm	NR	V-0	V-0

A few compounding tips for using Antiflame NP-400 :

- High tinting strength
- Compound materials at of below 200°C
- White parts are readily achieved by adding TiO<sub>2</sub>
- Standard color additives cause no difficulties
- Good dispersion is essential, noting that high shear increases heat input
- Use a silane coupling agent (0.25%) like OSi Specialties' A-174 to aid dispersion
- Proper devolatization during compounded is recommended
- Loss of flame retardant efficiency is observed with the addition of Zinc Borate

Further information on NP-400 applications, formulating and processing is provided in the NP-400 Application Data Sheet, available from TopChem Ltd:

# Antiflame<sup>®</sup> NP-430

## Halogen Free Intumescent Flame Retardant

### Product Description

NP-430 is a newly developed halogen free intumescent flame retardant based on phosphorus and nitrogen synergism (not APP series). The product differs in its mode of action from chlorine or bromine containing flame retardants by achieving its effect through intumescence. The thermoplastic material foams on exposure to flame, the carbon foam layer so formed protects the polymer through its heat-insulating effect, reduces further oxygen access and prevents dripping of the thermoplastic. NP-430 was developed especially for use in polyolefin and thermoplastic elastomer. It is suited for PP, PE, LDPE, HDPE, EVA, TPE, TPU, TPO, SEBS, and PPO for injection moulding and extrusion applications. NP-430 show an excellent flame retardancy with low amount of flame retardants, when incorporated into thermoplastics, it shows good processing stability and non-hygroscopic. NP-430 do not contain Pb, Hg, Cd, Cr<sup>6+</sup>, polybrominated biphenyls or polybrominated diphenyl ethers. It is compliant with the requirements of RoHS & WEEE, REACH Directive and halogen-free specification IEC 61249-2-21.

### Performance Benefits

- Excellent flame retardancy - UL.94 VO at 1.6 mm in polypropylene below 20% loadings with 0.2%PTFE.
- Enables the compounding of Flame Retardant polyolefins with low density, high Elongation and high impact strength.
- Very low water solubility, non-hygroscopic.
- Good thermal stability can be process at 220°C.
- Can be available with appropriate hindered amine light stabilizers (HALS), unlike bromine-type flame retardants.
- Possesses excellent light stability compared with other flame retardant system.

### Typical Properties Data

Property	Value
Appearance	White powder
Phosphorus content %	17-22
Particle Size	D <sub>50</sub> < 10 μ m, D <sub>98</sub> < 30 μ m
Water content % ≤	0.5
Density g/cm <sup>3</sup>	1.70
Bulk density g/cm <sup>3</sup>	0.5-0.6
Decomposition (5%, air)	> 280 °C

### Availability

NP-430 is delivered in 25 kg paper bags with PE inliner.

## Handling & Safety

NP-430 requires no special safety measures, provided the usual precautions for handling chemicals are observed. Avoid dust formation and ignition sources. For more detailed information please refer to the material safety data sheet.

## Applications

NP-430 is a white, thermally-stable non-halogen flame retardant particularly useful in PP, PE, LDPE, HDPE, EVA, TPE, TPU, TPO, PPO, SEBS, EPDM etc. applications. Low density flame retardant polyolefin with high elongation and impact resistance can be achieved with NP-430. Targeted applications are thick section extrusions as well as injection moulded and selected thin wall applications e.g. cable jacketing and films.

Table 1 Typical dosage for UL94 V-0 rating at 1/16"

	Without PTFE	With 0.2%PTFE
PP homo polymer	> 23%	> 19%
PP block copolymer	> 25%	> 21%
LDPE	> 28%	> 25%
EVA	> 28%	> 25%

Table 2 Mechanical properties of flame retarded PP block copolymer

	unit	control	NP-430	Mg(OH) <sub>2</sub>	DBDPO
Dosage of flame retardant	%	-	20 +0.2%PTFE	60	27 +14%Talc
Density	g/cm <sup>3</sup>	0.9	1.0	1.4	1.3
Tensile Strength	MPa	28.5	23.5	18.5	26.3
Elongation at brake	%	230	54	12	35
HDT(0.45Mpa)	°C	103	122	115	130

A few compounding tips for using Antiflame NP-430 :

- High tinting strength
- Compound materials at of below 230°C
- White parts are readily achieved by adding TiO<sub>2</sub>
- Standard color additives cause no difficulties
- Good dispersion is essential, noting that high shear increases heat input
- Use a silane coupling agent (0.25%) like OSi Specialties' A-174 to aid dispersion
- Proper devolatization during compounded is recommended
- Loss of flame retardant efficiency is observed with the addition of Zinc Borate

# Antiflame<sup>®</sup> NP-430C

## Halogen Free Intumescent Flame Retardant

### Product Description

NP-430C is a upgrade product of NP-430, it have more better Intumescent Char than NP-430. NP-430C was developed especially for use in polyolefin and thermoplastic elastomer. It is suited for PP, PE, LDPE, HDPE, EVA, TPE, TPU, TPO, SEBS, PPO, EPDM for injection moulding and extrusion applications. NP-430C show an excellent flame retardancy with low amount of flame retardants, when incorporated into thermoplastics, it shows good processing stability and non-hydroscopic. NP-430C does not contain heavy metal Pb, Hg, Cd, Cr6+, polybrominated biphenyls or polybrominated diphenyl ethers. It is compliant with the requirements of RoHS & WEEE, REACH Directive and halogen-free specification IEC 61249-2-21.

### Performance Benefits

- Excellent flame retardancy - UL.94 VO at 1.6 mm in polypropylene below 20% loadings with 0.2%PTFE.
- Enables the compounding of Flame Retardant polyolefins with low density, high Elongation and high impact strength.
- Very low water solubility, non-hydroscopic.
- Good thermal stability can be process at 220°C.
- Can be available with appropriate hindered amine light stabilizers (HALS), unlike bromine-type flame retardants.
- Possesses excellent light stability compared with other flame retardant system.

### Typical Properties Data

Property	Value
Appearance	White powder
Phosphorus content %	16-20
Particle Size	D <sub>50</sub> < 10 μ m, D <sub>98</sub> < 30 μ m
Water content % ≤	0.5
Density g/cm <sup>3</sup>	1.70
Bulk density g/cm <sup>3</sup>	0.5-0.6
Decomposition (5%, air)	> 280 °C

### Availability

NP-430C is delivered in 25 kg paper bags with PE inliner.

### Applications

NP-430C is a white, thermally-stable non-halogen flame retardant particularly useful in PP, PE, LDPE, HDPE, EVA, TPE, TPU, TPO, PPO, SEBS, EPDM etc. applications. Low density flame retardant polyolefin with high elongation and impact resistance can be achieved with NP-430C. Targeted applications are thick section extrusions as well as injection moulded and selected thin wall applications e.g. cable jacketing and films.



# Antiflame<sup>®</sup> NP-510

## Halogen Free Flame Retardants

(For Glass Fiber Reinforced PBT/PA6 and TPU)

### Product Description

Antiflame NP-510 is a newly developed halogen free environment friendly flame retardant based on phosphorus and nitrogen synergism. The product differs in its mode of action from chlorine or bromine containing flame retardants by achieving its effect through intumescences. The thermoplastic polymer with Antiflame NP-510 foams and crosslinks on exposure to flame and forms a stable char at the surface acting as a barrier. The protective layer provides a heat insulation effect, reduces oxygen access and prevents dripping of molten polymer. Antiflame NP-510 was developed especially for the use in glass-fiber-reinforced PBT and PET. Antiflame NP-510 show an excellent flame retardancy with low amount of flame retardants, when incorporated into polyester, it shows good processing stability and non-hydroscopic. NP-510 do not contain Pb, Hg, Cd, Cr<sup>6+</sup>, polybrominated biphenyls or polybrominated diphenyl ethers. It is compliant with the requirements of RoHS、WEEE、REACH and halogen-free specification IEC 61249-2-21.

### Performance Benefits

- Excellent processing: good thermal stability, it can be process up to 250°C.
- Good mechanical property: enables the compounding of flame retardant polyester with low density, high elongation and high impact strength.
- Good color stability.
- Efficient flame retardancy.
- Non- halogenated.
- Very low water solubility, non-hydroscopic; improved resistance against water extraction.
- Reasonable price.

### Typical Properties Data

Property	Value
Appearance	White powder
Particle Size	D <sub>50</sub> < 10 μ m , D <sub>98</sub> < 30 μ m
Water content % ≤	0.5
Density g/cm <sup>3</sup>	1.70
Bulk density g/cm <sup>3</sup>	0.5-0.6
Decomposition (5%, N <sub>2</sub> )	> 280 °C

### Packaging

Antiflame NP-510 is delivered in 25 kg paper bags with PE in liner.

### Handling & Safety

Antiflame NP-510 requires no special safety measures, provided the usual precautions for handling chemicals are observed. Avoid dust formation and ignition sources. For more detailed information please refer to the Material Safety Data Sheet.

## Applications

Antiflame NP-510 is a white, thermally-stable non-halogen flame retardant particularly useful in glass-fiber-reinforced PBT, PET and TPU. A dosage of 16-20% (by wt.) NP-510 is usually sufficient to obtain the UL94 V-0 classification for electrical components (at 1.6 as well as 0.8 mm thickness).

Table 1 Formulation and Flame Retardant Effectiveness of Antiflame NP-510

	Formulation 1 (%)	Formulation 2 (%)	Formulation 3 (%)
PBT	51.1	47.1	57.1
Antiflame NP-510	18	22	17
Glass Fibers	30	30	25
Irg 1010	0.3	0.3	0.3
Barium stearate	0.3	0.3	0.3
Wax E	0.3	0.3	0.3
UL94 (1.6mm)	V0	V0	V0
UL94 (0.8mm)	n.c	V0	V0
GWFI (960 °C)	Pass	Pass	Pass
CTI (V)	600	600	550

Table 2 Flame Retardant Effectiveness for Different Type FRs

	Without FRs	Br/Ato	Organic phosphinate	Antiflame NP-510
PBT	70	56	50	52
Glass Fibers	30	30	30	30
Antiflame NP-510				18
Organic phosphinate			20	
DBDPO		10		
Antimony Trioxide		4		
UL94 (1.6mm)	n.c	V0	V0	V0
CTI (V)	600	250	550	600

# Antiflame<sup>®</sup> APP-1

## Ammonium polyphosphate

### Product Description

Antiflame APP-1 is ammonium polyphosphate, its molecular formula is  $((\text{NH}_4)_{n+2}\text{P}_n\text{O}_{3n+1})$ , has high polymerization degree and belongs to crystal phase II, It is water insoluble straight-line polymer. The product has high content of phosphorus and nitrogen, strong heated stability and chemical stability, low water solubility and humidity, nearly neutral pH value.

### Typical Properties

White free-flowing powder (reflectance of color  $\geq 94$ )

### Data

Content of crystal phase II APP	% (w/w)	$\geq 99.0$
Content of phosphorus	% (w/w)	$\geq 31.0$
Content of nitrogen	% (w/w)	$\geq 14.0$
pH, 10% slurry, 25°C	-	$\geq 6.0$
Content of water	% (w/w)	$\leq 0.20$
Thermal decomposition onset	°C	$\geq 275$
average particle size	um	15
Density	g/cm <sup>3</sup>	1.9
Bulk density	g/cm <sup>3</sup>	0.7
Viscosity, 10% slurry, 25°C	mpa.s	$\leq 80$
reflectance of color	-	$\geq 94$
Degree of polymerization	n	$\geq 1000$
Solubility, 25°C	g/100mlH <sub>2</sub> O	$\leq 0.20$

### Handling & Safety

The product is stable if maintained in the original bags and in a dry place at room temperature. Handle the product in compliance with good industrial practice avoiding dust formation.

### Availability

Antiflame APP-1 is supplied 25kg net weight in paper bag.

### Applications

Expanding fire-refractory coating;  
-Fire-refractory building board, coiled material;  
-Thermal plasticity polyolefin and unsaturated arene plastic;  
-polyurethane foam; Epoxy resin and unsaturated resin;  
-Cable and rubber; Plastic material of electron device;  
-Fiber fabric.

# Antiflame<sup>®</sup> APP-2

## Silicone Resin-Coated Ammonium polyphosphate

### Product Description

Antiflame APP-2 is silicone resin-coated ammonium polyphosphate, its molecular formula is  $((\text{NH}_4)_{n+2}\text{P}_n\text{O}_{3n+1})$ , has high polymerization degree and belongs to crystal phase II, It is water insoluble straight-line polymer. The product has high content of phosphorus and nitrogen, strong heated stability and chemical stability, low water solubility and humidity, nearly neutral pH value.

### Typical Properties

White free-flowing powder (reflectance of color  $\geq 94$ )

### Data

Content of crystal phase II APP	% (w/w)	$\geq 99.0$
Content of phosphorus	% (w/w)	$\geq 31.0$
Content of nitrogen	% (w/w)	$\geq 14.0$
pH, 10% slurry, 25°C	-	$\geq 6.0$
Content of water	% (w/w)	$\leq 0.20$
Thermal decomposition onset	°C	$\geq 275$
average particle size	um	15
Density	g/cm <sup>3</sup>	1.9
Bulk density	g/cm <sup>3</sup>	0.7
Viscosity, 10% slurry, 25°C	mpa.s	$\leq 80$
reflectance of color	-	$\geq 94$
Degree of polymerization	n	$\geq 1000$
Solubility, 25°C	g/100mlH <sub>2</sub> O	$\leq 0.20$

### Handling & Safety

The product is stable if maintained in the original bags and in a dry place at room temperature. Handle the product in compliance with good industrial practice avoiding dust formation.

### Availability

Antiflame APP-2 is supplied 25kg net weight in paper bag.

### Applications

Expanding fire-refractory coating;  
-Fire-refractory building board, coiled material;  
-Thermal plasticity polyolefin and unsaturated arene plastic;  
-polyurethane foam; Epoxy resin and unsaturated resin;  
-Cable and rubber; Plastic material of electron device;  
-Fiber fabric.

# Antiflame<sup>®</sup> NP-310

## Halogen Free Intumescent Flame Retardant

### Product Description

AP-310 is non-halogenated flame retardant based on ammonium polyphosphate and nitrogen, which develops its effectiveness through phosphorus/nitrogen synergism. When incorporated into thermoplastics, it shows high processing stability and non-hydroscopic. AP-310 differs in its mode of action from chlorine- or bromine-containing flame retardants by achieving its effect through intumescence. The thermoplastic material foams on exposure to flame, the carbon foam layer so formed protects the polymer through its heat-insulating effect, reduces further oxygen access and prevents dripping of the thermoplastic. AP-310 do not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), or polybrominated diphenyl ethers (PBDEs). It accord with the environmental Regulations "The Restriction of the Use of Hazardous Substances in electrical and electronic equipment, RoHS" in European Union.

### Typical Properties Data

Property	Value
Appearance	White free-flowing powder
Phosphorus content %	21-23
Particle Size, D <sub>50</sub> (μm)	15
Water content % ≤	0.5
Density g/cm <sup>3</sup>	1.7
Bulk density g/cm <sup>3</sup>	0.55
Decomposition temperature °C	≥250

### Handling & Safety

AP-310 requires no special safety measures, provided the usual precautions for handling chemicals are observed. Avoid dust formation and ignition sources. For more detailed information please refer to the material safety data sheet.

### Availability

AP-310 is supplied in bags with 25kg net weight.

### Applications

AP-310 may be used in a range of thermoplastics, especially polypropylene, polyethylene, ethylene/vinyl acetate copolymers and polyolefin blends. It is suitable both for extrusion and injection moulding applications, In addition AP-310 are suitable for use in hot melt adhesives or coating compounds. They can also be blended with latex and then used a backing material or be impregnated polypropylene-based carpet and non-woven fabrics to enhance the flame resistance of these materials.

PP homopolymer UL94 V-0 at 25 - 28wt%

PP copolymer UL94 V-0 at 30 wt%

AP-310 should be processed at temperatures < 220°C

# Antiflame<sup>®</sup> NP-3101

## Halogen Free Intumescent Flame Retardant

### Product Description

AP-3101 is a coated AP-310 by silicone resin and non-halogenated flame retardant based on ammonium polyphosphate and nitrogen, which develops its effectiveness through phosphorus/nitrogen synergism. When incorporated into thermoplastics, it shows high processing stability and non-hydroscopic. AP-3101 differs in its mode of action from chlorine- or bromine-containing flame retardants by achieving its effect through intumescence. The thermoplastic material foams on exposure to flame, the carbon foam layer so formed protects the polymer through its heat-insulating effect, reduces further oxygen access and prevents dripping of the thermoplastic. AP-3101 do not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), or polybrominated diphenyl ethers (PBDEs). It accord with the environmental Regulations "The Restriction of the Use of Hazardous Substances in electrical and electronic equipment, RoHS" in European Union.

### Typical Properties Data

Property	Value
Appearance	White free-flowing powder
Phosphorus content %	21-23
Particle Size, D <sub>50</sub> (μm)	15
Water content % ≤	0.5
Density g/cm <sup>3</sup>	1.7
Bulk density g/cm <sup>3</sup>	0.55
Decomposition temperature °C	≥250

### Handling & Safety

AP-3101 requires no special safety measures, provided the usual precautions for handling chemicals are observed. Avoid dust formation and ignition sources. For more detailed information please refer to the material safety data sheet.

### Availability

AP-3101 is supplied in bags with 25kg net weight.

### Applications

AP-3101 may be used in a range of thermoplastics, especially polypropylene, polyethylene, ethylene/vinyl acetate copolymers and polyolefin blends. It is suitable both for extrusion and injection moulding applications, In addition AP-3101 is suitable for use in hot melt adhesives or coating compounds. They can also be blended with latex and then used a backing material or be impregnated polypropylene-based carpet and non-woven fabrics to enhance the flame resistance of these materials.

PP homopolymer UL94 V-0 at 25 - 28wt%

PP copolymer UL94 V-0 at 30 wt%

AP-3101 should be processed at temperatures < 220°C

# Antiflame<sup>®</sup> AP-320

## Halogen free Intumescent Flame Retardant

### Product Description

AP-320 is a non-halogenated flame retardant based on ammonium polyphosphate and nitrogen, which develops its effectiveness through phosphorus/nitrogen synergism. When incorporated into thermoplastics, it shows high processing stability and non-hygroscopic. AP-320 differs in its mode of action from chlorine- or bromine-containing flame retardants by achieving its effect through intumescence. The thermoplastic material foams on exposure to flame, the carbon foam layer so formed protects the polymer through its heat-insulating effect, reduces further oxygen access and prevents dripping of the thermoplastic. AP-320 do not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), or polybrominated diphenyl ethers (PBDEs). It accords with the environmental Regulations "The Restriction of the Use of Hazardous Substances in electrical and electronic equipment, RoHS" in European Union.

### Typical Properties Data

Property	Value
Appearance	White free-flowing powder
Phosphorus content %	23-25
Particle Size, D <sub>50</sub> (μm)	15
Water content % ≤	0.5
Density g/cm <sup>3</sup>	1.7
Bulk density g/cm <sup>3</sup>	0.55
Decomposition temperature °C	≥260

### Handling & Safety

AP-320 requires no special safety measures, provided the usual precautions for handling chemicals are observed. Avoid dust formation and ignition sources. For more detailed information please refer to the material safety data sheet.

### Availability

AP-320 is supplied in bags with 25kg net weight.

### Applications

AP-320 may be used in a range of thermoplastics, especially polypropylene, polyethylene, ethylene/vinyl acetate copolymers and polyolefin blends. It is suitable both for extrusion and injection moulding applications, In addition AP-320 are suitable for use in hot melt adhesives or coating compounds. They can also be blended with latex and then used as a backing material or be impregnated polypropylene-based carpet and non-woven fabrics to enhance the flame resistance of these materials.

PP homopolymer UL94 V-0 at 25 - 28wt%

PP copolymer UL94 V-0 at 30 wt%

AP-320 should be processed at temperatures < 220°C

# Antiflame<sup>®</sup> AP-3201

## Halogen free Intumescent Flame Retardant

### Product Description

AP-3201 is a coated AP-320 by silicone resin and non-halogenated flame retardant based on ammonium polyphosphate and nitrogen, which develops its effectiveness through phosphorus/nitrogen synergism. When incorporated into thermoplastics, it shows high processing stability and non-hydroscopic. AP-3201 differs in its mode of action from chlorine- or bromine-containing flame retardants by achieving its effect through intumescence. The thermoplastic material foams on exposure to flame, the carbon foam layer so formed protects the polymer through its heat-insulating effect, reduces further oxygen access and prevents dripping of the thermoplastic. AP-3201 do not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), or polybrominated diphenyl ethers (PBDEs). It accords with the environmental Regulations "The Restriction of the Use of Hazardous Substances in electrical and electronic equipment, RoHS" in European Union.

### Typical Properties Data

Property	Value
Appearance	White free-flowing powder
Phosphorus content %	23-25
Particle Size, D <sub>50</sub> (μm)	15
Water content % ≤	0.5
Density g/cm <sup>3</sup>	1.7
Bulk density g/cm <sup>3</sup>	0.55
Decomposition temperature °C	≥260

### Handling & Safety

AP-3201 requires no special safety measures, provided the usual precautions for handling chemicals are observed. Avoid dust formation and ignition sources. For more detailed information please refer to the material safety data sheet.

### Availability

AP-3201 is supplied in bags with 25kg net weight.

### Applications

AP-3201 may be used in a range of thermoplastics, especially polypropylene, polyethylene, ethylene/vinyl acetate copolymers and polyolefin blends. It is suitable both for extrusion and injection moulding applications, In addition AP-3201 are suitable for use in hot melt adhesives or coating compounds. They can also be blended with latex and then used a backing material or be impregnated polypropylene-based carpet and non-woven fabrics to enhance the flame resistance of these materials.

PP homopolymer UL94 V-0 at 25 - 28wt%

PP copolymer UL94 V-0 at 30 wt%

AP-3201 should be processed at temperatures < 220°C



# Antiflame<sup>®</sup> KS-550

High Temperature Stable Flame Retardant  
for Clear Polycarbonate

## Product Description

Flame Retardant Additive Antiflame KS-550 has been found to be an effective flame retardant in polycarbonate at use levels as low as 0.06% to 0.08% by weight. It is chemically and thermally stable to temperatures greater than 450°C—making it suitable for use in engineering resins that require high processing temperature and provides excellent performance without affecting the processability of the resin. One advantage of the low use levels necessary to provide effective flame retardance is that KS-550 flame retardant additive can be formulated to produce optically-clear, haze-free grades of polycarbonate for extrusion and molding. What's more, Antiflame KS-550 additive does not contain any bromine or chlorine and has been found effective as a flame retardant without the use of synergists.

## Typical Properties Data

Property	Value
Appearance	White powder
Melting Point (by DSC)	270-275°C
Decomposition Temp. (by TGA/N <sub>2</sub> purge)	485 °C
Solubility in Water (wt% at 25°C)	5%

## Handling & Safety

KS-550 requires no special safety measures, provided the usual precautions for handling chemicals are observed. Avoid dust formation and ignition sources. For more detailed information please refer to the material safety data sheet.

## Availability

KS-550 is supplied in bags with 5kg and 25kg net weight plastic pails.

## Applications

Antiflame KS-550 is extremely effective as a flame retardant additive with premium performance in polycarbonate at very low additive levels. For most effective incorporation it is recommended that the additive be initially dispersed into a 10% or more masterbatch and then compounded into the final plastic blend. Dispersion can be achieved effectively with typical polycarbonate processing equipment. There is limited data to suggest that KS-550 flame retardant additive may have utility at varying performance levels and higher addition levels in other engineering resins.

TOPCHEM believes that the information in this publication is an accurate description of the typical characteristics and/or uses of the product or products, but it is your responsibility to thoroughly test the product in your specific application to determine its performance, efficacy and safety. Suggestions of uses should not be taken as inducements to infringe any particular patent. Unless Topchem provides you with a specific written warranty of fitness for a particular use, Topchem's sole warranty is that the product or products, as supplied, will meet Topchem's then current sales specification



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