



SUZUHIRO CHEMICAL

PRODUCT INFORMATION

Ver. 4.0

ANTIMONY TRIOXIDE
HALOGENATED FLAME RETARDANTS
NON-HALOGENATED FLAME RETARDANTS
ETC.

SUZUHIRO CHEMICAL CO.,LTD.

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PRODUCT

Antimony Trioxide [Powder]

3-1

Antimony Trioxide is widely used as flame retardant synergist for various plastics.

Flammability standard for industrial and consumer products such as plastics, rubber, textile, etc. becomes stringent yearly. Along with the tightening, flame retarding of new material and expansion of the application needs for flame retardants are sophisticated and diversified. We line up four grades of antimony trioxides depend on the production and finishing sites.



Hsikwangshang Twinkling Star



Antimony ore

1. AT3 is finished at Moriya plant and its quality management is highly reputed.
2. AT-3^{CN} is co-developed product with Hsikwangshang Twinkling Star in Hunan, China, worldwide antimony marketer. They produce AT-3^{CN} based on our processing technology and quality management system. We guarantee the stable quality as well as AT3.
3. AT-3TL is product finished in Thailand. Raw material antimony ore is mined in Myanmar. We market it as non-China product. We control less than 500ppm each of lead (Pb) and arsenic (As) as impurity and it has higher whiteness.
4. AT-3LT has bigger particle size and gives high transparency. AT-3LT is mainly used for high gloss ABS and PVC pigment.



AT-3^{CN}



PRODUCT

Antimony Trioxide [Powder]

3-2

SPECIFICATION

Chemical Name	Antimony Trioxide
Chemical Formula	Sb ₂ O ₃
Molecular Weight	291.5
Specific Gravity	5.2

CHEMICAL REGISTRATION No.

METI No.	1-543
CAS No.	1309-64-4
EINECS	215-175-0

PACKAGE

25kg net paper bag
500kg, 1,000kg net big bag

General Grade AT3 AT-3^{CN} Quality Specification

Item	Unit	Specification	Typical
Sb ₂ O ₃	%	≥99.5	99.7
Pb	%	≤0.1	0.07
As	%	≤0.1	0.03
Whiteness	%	≥95.0	98.5
Average Particle Size	μm	1.0 ~ 2.0	1.4
325 mesh on	%	≤0.02	0.002

AT-3TL (Made in Thailand) Quality Specification

Item	Unit	Specification	Typical
Sb ₂ O ₃	%	≥ 99.5	99.7
Pb	%	≤ 0.05	0.03
As	%	≤ 0.05	0.03
Whiteness	%	≥ 97.0	99.5
Average Particle Size	μm	0.7 ~ 1.7	1.4
325 mesh on	%	≤ 0.02	0.002



PRODUCT

Antimony Trioxide [Powder]

3-3

Large particle grade AT-3LT Quality Specification

Item	Unit	Specification	Typical
Sb ₂ O ₃	%	≥ 99.0	99.8
Pb	%	≤ 0.04	0.02
As	%	≤ 0.1	0.05
Whiteness	%	≥ 93.0	96.5
Average Particle Size	μm	≤ 4.0	3.6
325 mesh on	%	≤ 0.02	0.002



PRODUCT

Antimony Trioxide [Wet]

1-1

Wet type product of Antimony Trioxide [Fire Cut AT-3^{CN}]

1. Less inhalation and skin contact of antimony particles dust,
Contribute to improvement of working environment.
2. Shorten production and cleaning time. Improve output.



Fire Cut TOP-5

Product Name	Sb2O3	DINP	Liquid Paraffin
Fire Cut TOP-5	95%	5%	
Fire Cut WP-2	98%		2%
Fire Cut WP-3	97%		3%

*Optimization of the above formulation and wetting agent is available
by customer requirement.



PRODUCT

Antimony Trioxide [Pellet]

1-1

Pelletized product of Antimony Trioxide [Fire Cut AT-3^{CN}]



Hiromaster C-380

Product Name	Carrier Resin	Concentration of Sb ₂ O ₃
Hiromaster C-380	LDPE	80%
Hiromaster A-390	PP	90%
Hiromaster M-380	PBT	80%
Hiromaster N-380	PA6	80%
Hiromaster S-380	PA66	80%
Hiromaster K-380	AS	80%
Hiromaster L-200	PVC/DINP	75%

*Optimization of the above formulation is available by customer requirement.

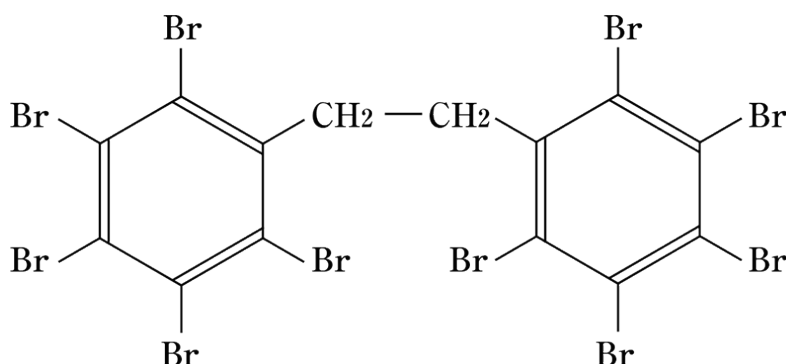


PRODUCT

Fire Cut P-801 (FCP-801)

1-1

CHEMICAL STRUCTURE



CHEMICAL NAME

Ethylene bis (pentabromobenzene)
CAS No. 84852-53-9

PROPERTIES

Appearance	Off-white Powder
Bromine Content	ca.82%
Melting Point	ca.350°C
Volatiles	≤ 0.3%

APPLICATION

Polyethylene, Polypropylene, Polystyrene, ABS
Polyamide, Polycarbonate, Polyester, epoxy, etc.

PACKAGE

25kg net paper bag

*Mixture of antimony trioxide(powder) and its masterbatch(pelletized product) are also available

FCP-1590	Mixture of FCP-801 and antimony trioxide (powder)
Hiromaster C-510	Masterbatch of FCP-1590 (pellet)



PRODUCT

Fire Cut P-680 (FCP-680) , Fire Cut P-680G (FCP-680G)

2-1

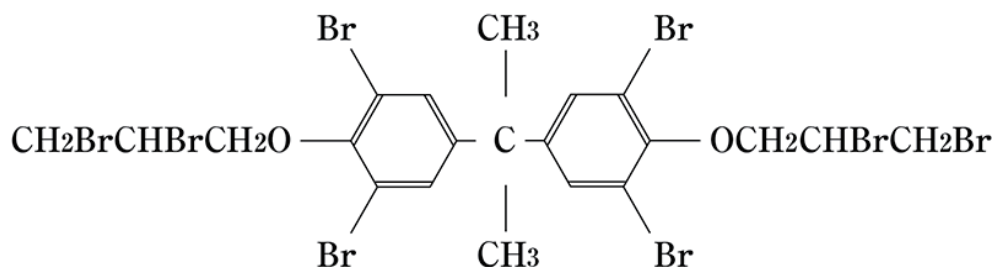


FCP-680 (White Powder)



FCP-680G (White Granule)

CHEMICAL STRUCTURE



CHEMICAL NAME

TBA-bis (2,3-dibromopropylether)
CAS No. : 21850-44-2

PROPERTIES

Appearance	FCP-680	White Powder
	FCP-680G	White Granule
Bromine Content	ca.68%	
Melting Point	ca.105°C	
Volatiles	≤0.3 %	



PRODUCT

Fire Cut P-680 (FCP-680) , Fire Cut P-680G (FCP-680G)

2-2

APPLICATION

Polyethylene, Polypropylene, Polystyrene

PACKAGE

25kg net paper bag

FORMULATION

PP	100	100	100		
HIPS				100	100
FCP-680		3	12		
FCP-AT-3 ^{CN} (Sb ₂ O ₃)		1.5	6		1
Oxygen Index	19.0	25.0	28.0	18.0	25.0
UL94 3.0mm	HB	V2	V0	HB	V2
1.5mm	HB	V2	V0	HB	V2



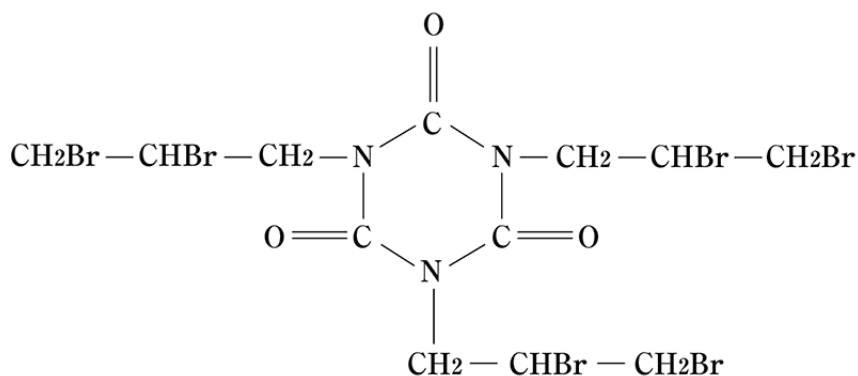
PRODUCT

Fire Cut P-660CN (FCP-660CN)

2-1



CHEMICAL STRUCTURE



CHEMICAL NAME

Tris(2,3-dibromopropyl)isocyanurate
CAS No. 52434-90-9

PROPERTIES

Appearance	White Powder
Bromine Content	ca. 66%
Melting Point	ca. 105°C
Volatiles	≤ 0.3%



PRODUCT

Fire Cut P-660CN (FCP-660CN)

2-2

APPLICATION

Polyethylene, Polypropylene, Foamed polystyrene

PACKAGE

25kg net paper bag

FORMULATION

PP		100	100	100		
HIPS					100	100
FCP-660CN			3	15		4
FCP-AT-3 ^{CN} (Sb ₂ O ₃)			1	5		1
Oxygen Index		19.0	25.0	29.0	18.0	25.0
UL94	3.0mm	HB	V2	V0	HB	V2
	1.5mm	HB	V2	V0	HB	V2

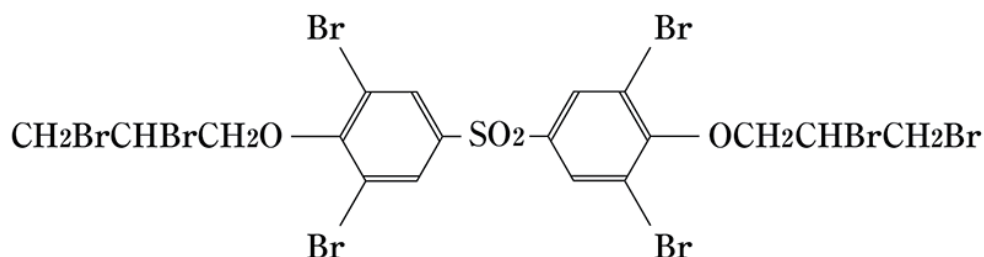


PRODUCT

Fire Cut P-65CN (FCP-65CN)

1-1

CHEMICAL STRUCTURE



CHEMICAL NAME

Bis [3,5-dibromo-4- (2,3-dibromopropoxy) phenyl] sulfone
CAS No. 42757-55-1

PROPERTIES

Appearance	White Powder
Bromine Content	ca. 65%
Melting Point	ca. 105°C
Volatiles	≤ 0.3%

APPLICATION

Polyethylene, Polypropylene, Polystyrene

PACKAGE

25kg net paper bag

FORMULATION

PP	96.0	88.0
FCP-65CN	3.0	9.0
FCP-AT-3 ^{CN} (Sb ₂ O ₃)	1.0	3.0
UL94 3.0mm	V2	V0
1.5mm	V2	V0



PRODUCT

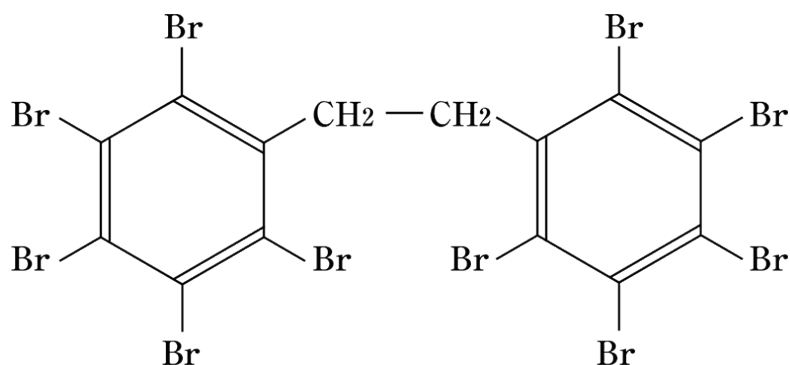
Fire Cut P-1590 (FCP-1590)

2-1

FCP-1590 is mixture of Ethylene bis(pentabromobenzene)(FCP-801) and antimony trioxide with optimized ratio. It can be widely used for various thermoplastic, thermoset resins, engineering plastics, synthetic rubbers.



CHEMICAL STRUCTURE OF FCP-801



COMPONENT

Mixture of ethylene bis(pentabromobenzene) and antimony trioxide

PROPERTIES

Appearance	Off-white Powder
Melting Point	ca.350°C
Volatiles	≤ 0.3%



PRODUCT

Fire Cut P-1590 (FCP-1590)

2-2

APPLICATION

Polyethylene, Polypropylene, Polystyrene, ABS
Polyamide, Polycarbonate, Polyester, Epoxy, etc.

PACKAGE

25kg net paper bag

FORMULATION

LDPE	100	100	100
FCP-1590	-	10	20
Oxygen Index	19.0	23,5	27.0



PRODUCT

Hiromaster C-510 (HM C-510)

2-1

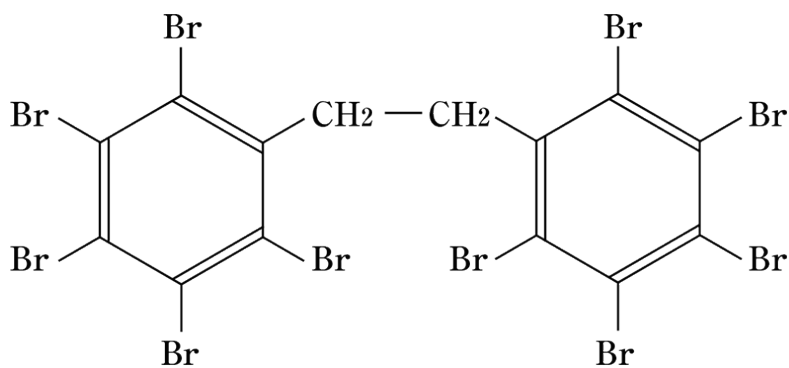
Hiromaster C-510 is flame retardant masterbatch formulated with high bromine content flame retardant (FCP-801) and Sb_2O_3 effectively. Available to enhance flame retarding effect.



COMPOSITION

Ethylene bis(pentabromobenzene)/ Sb_2O_3 80%
LDPE 20%

CHEMICAL STRUCTURE (FCP-801)



PROPERTIES

Appearance	White Pellet
Specific Gravity	2.0 ~ 2.3 g/ml
Volatiles	≤ 0.3%



PRODUCT

Hiromaster C-510 (HM C-510)

2-2

APPLICATION

Polyethylene, Polypropylene, polystyrene, ABS
Polyamide, Polycarbonate, Polyester, epoxy, etc.

PACKAGE

25kg net paper bag

FORMULATION

LDPE	100	100	100	100
C-510	0	10	20	30
Oxygen Index	19.0	26,5	29.5	30.0
UL94 1.5mm	HB	V2	V2	V2



PRODUCT

Hiromaster 99 (HM 99)

2-1

Hiromaster 99 is pelletized high flame retardant concentration masterbatch for PP. It contains low melting point brominated flame retardant, antimony trioxide and additives.

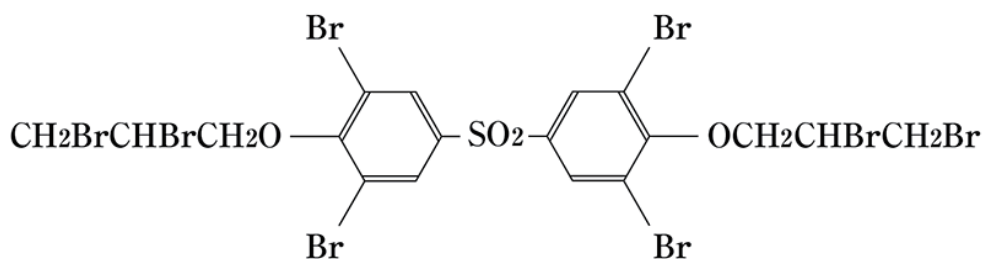
Use of low melting point brominated flame retardant with powder form may cause blocking at storage and poor dispersion at compounding but this product ease the handling because of the pelletized form.



COMPOSITION

TBS derivative / Sb ₂ O ₃	93%
EEA Resin / Additive	7%

CHEMICAL STRUCTURE OF BROMINATED FLAME RETARDANT



PROPERTIES

Appearance	White Pellet
Specific Gravity	ca.2.3g/ml
Volatiles	≤ 0.5%



PRODUCT

Hiromaster 99 (HM 99)

2-2

APPLICATION

Polypropylene

PACKAGE

25kg net paper bag

FORMULATION

PP	95	85
Hiromaster 99	5	15
Oxygen Index	25.0	29.0
UL94 3.0mm	V2	V0
1.5mm	V2	V0



PRODUCT

Hiromaster A-500-7 (HM A-500-7)

2-1

Hiromaster A-500-7 and A-500-7(B) is masterbatch product for polypropylene resin.
It is effective for highbrow type block copolymer and enable to pass several flammability standard depend on the loading level.
As product is pelletized form, it ease the handling because of no blocking and dust emission. It is well dispersed even from dry blend to direct molding and obtain good flame retardancy.



Hiromaster A-500-7

COMPOSITION

TBS derivative/Aromatic brominated flame retardant / Sb_2O_3 72%
Block PP / Additive 28%

PROPERTIES

Appearance	Hiromaster A-500-7	White Pellet
	Hiromaster A-500-7 (B)	Black Pellet
Specific Gravity	1.7 ~ 2.0g/ml	
Volatiles	≤ 0.5%	

APPLICATION

Polypropylene

PACKAGE

25kg net paper bag



PRODUCT

Hiromaster A-500-7 (HM A-500-7)

2-2

FORMULATION

PP	95	70
Hiromaster A-500-7	5	30
Oxygen Index	24.0	28.0
UL94 3.0mm	V2	V0
1.5mm	V2	V0



PRODUCT

Hiromaster F-101 (HM F-101)

2-1

Hiromaster F-101 is high flame retardant concentration masterbatch effective for ABS, ABS/PC, HIPS and various engineering plastics.

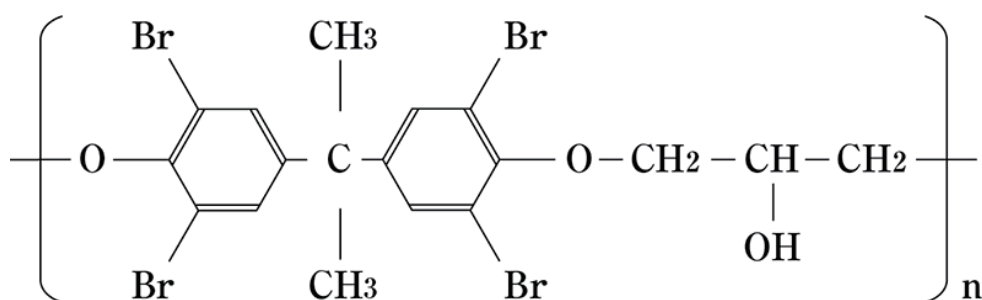
It is pelletized product by special processing and contains thermally stable polymeric brominated flame retardant as main component and Sb_2O_3 . It gives higher flame retardancy while retaining physical properties.



COMPOSITION

Polymeric brominated epoxy (Brominated phenoxy) / Sb_2O_3 100%

CHEMICAL STRUCTURE OF BROMINATED FLAME RETARDANT



PROPERTIES

Appearance	White Pellet
Specific Gravity	ca.2.2g/ml
Volatiles	≤ 0.5%



PRODUCT

Hiromaster F-101 (HM F-101)

2-2

APPLICATION

HIPS, ABS, PC, PC/ABS, Polyamide, PBT, PET

PACKAGE

25kg net paper bag

FORMULATION

Resin	Hiromaster F-101	Flammability
HIPS	20 ~ 25%	UL94 1.5mm V0
ABS	20 ~ 25%	UL94 1.5mm V0
PBT	20 ~ 25%	UL94 1.5mm V0
PA66	20 ~ 25%	UL94 1.5mm V0
PC	20 ~ 25%	UL94 1.5mm V0



PRODUCT

Hiromaster MA-80 (HM MA-80)

2-1

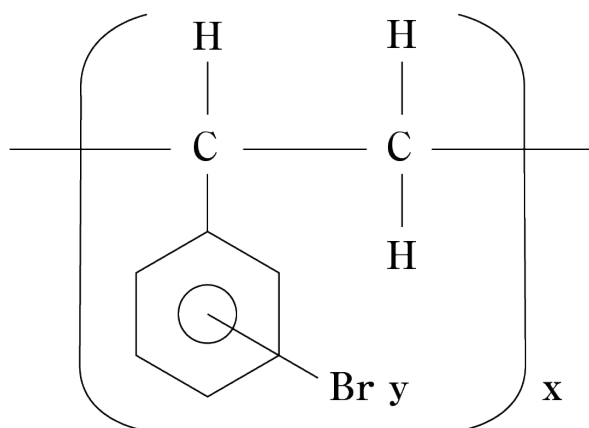
Hiromaster MA-80 is high flame retardant concentration masterbatch effective for various engineering plastics.



COMPOSITION

Brominated Polystyrene / Sb₂O₃ 95%
Additive 5%

CHEMICAL STRUCTURE





PRODUCT

Hiromaster MA-80 (HM MA-80)

2-2

PROPERTIES

Appearance	Slight Yellow Pellet
Specific Gravity	ca. 2.3g/ml
Volatiles	≤ 0.5%

APPLICATION

HIPS, ABS, PC, PC/ABS, Polyamide, PBT, PET

PACKAGE

25kg net paper bag

FORMULATION

Resin	Hiromaster MA-80	Flammability
PA6	25 ~ 30%	UL94 0.8mm V0
PA6 / 30%GF	20 ~ 25%	UL94 0.8mm V0
PBT	20 ~ 25%	UL94 1.5mm V0
PET	20 ~ 25%	UL94 1.5mm V0



PRODUCT

Expandable Graphite GREP-EG

3-1

COMPOSITION

Special treated expandable graphite controlled expansion until 230°C

ADVANTAGES

- High efficiency non-halogen flame retardant for several resins.
- High flame retardancy is achieved with lower loading level.
- Minimize deterioration of physical properties.
- Minimize smoke emission during burning.

PROPERTIES

Appearance	Black Powder
Moisture	≤ 0.3%
Expansion ratio	180 ~ 230cc/g (1,000°C)
pH	6.0 ~ 9.0
Particle Size	300 ~ 400 μm

Particle size distribution

+24 mesh	0.5%
+32 mesh	3.0%
+48 mesh	63.5%
+60 mesh	13.0%
+80 mesh	10.0%
-80 mesh	10.0%



PRODUCT

Expandable Graphite GREP-EG

3-2

STATE OF EXPANSION



Not-Expand and Expanded



Expanding of GREP-EG

APPLICATION

Thermoplastics

PACKAGE

20kg net paper bag

FORMULATION

- Knead at milder condition to prevent collapse of particle.
Once collapsed, deteriorate flame retardancy.
- Perform powerful ventilation at vent of extruder.
- Do not use mesh at head of extruder.



PRODUCT

Expandable Graphite GREP-EG

3-3

THERMOPLASTICS FORMULATION COMBINED WITH RED PHOSPHOROUS

	PP				HIPS		LDPE		ABS	
Resin	100	100	100	100	100	100	100	100	100	100
GREP-EG		8	10	10		8		10		10
Red-P (Powder)		4	5	5		4		5		5
Mg(OH) ₂				25	1					
Oxygen Index	19.0	26.0	27.0	31.5	18.5	29.5	18.5	28.0	18.5	30.5
UL94 3.0mm	HB	V0	V0	V0	HB	V0	HB	V0	HB	V0
UL94 1.5mm	HB	V2	V0	V0	HB	V0	HB	V0	HB	V0

THERMOPLASTICS FORMULATION COMBINED WITH AMMONIUMPOLYPHOSPHATE

(FCP-770 → complex of surface treated ammonium polyphosphate and nitrogen flame retardant)

	PP		HIPS		LDPE		ABS	
Resin	100	100	100	100	100	100	100	100
GREP-EG	15	15	20	25	15	25	20	25
FCP-770	20	25	15	20	10	25	15	20
Oxygen Index	28.0	30.0	27.0	28.0	28.0	28.5	27.0	31.0
UL94 3.0mm	V0	V0	V0	V0	V0	V0	V2	V0
UL94 1.5mm	V2	V0	V2	V0	HB	V0	V2	V0

EPDM FORMULATION

EPDM	342	342	342	342
Curing Agent	4.3	4.3	4.3	4.3
GREP-EG	25	33.3	16.7	40
Red-P (Powder)	25	16.7	33.3	10
UL94 1.0mm	V0	V0	V0	V2

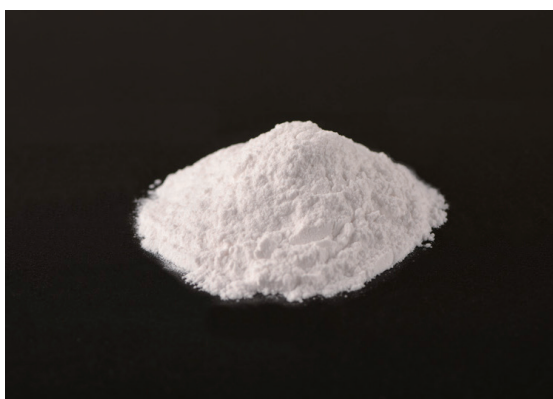


PRODUCT

Fire Cut P-770 (FCP-770) , Fire Cut P-790 (FCP-790)

2-1

FCP-770 and FCP-790 are non-halogen flame retardants contain Ammonium Polyphosphate(APP) as main component.
FCP-770 is formulated with THEIC (Trihydroxyisocyanurate) and other synergist.
FCP-790 is formulated with Zinc hydrogen phosphate as synergist.



FCP-770

COMPOSITION

FCP-770 : Surface treated APP / THEIC / synergist

FCP-790 : Surface treated APP / Zinc hydrogen phosphate / synergist

PROPERTIES

Appearance	White Powder
Average Particle Size of APP	8 ~ 12 μ m
Phosphorous Content	FCP-770 24% / FCP-790 23%
Volatiles	$\leq$ 0.5%

CARBONIZATION PROMOTION



Added 30% of FCP-770 to PP.
Acceleration of char formation
at flame-contact.



PRODUCT

Fire Cut P-770 (FCP-770) , Fire Cut P-790 (FCP-790)

2-2

APPLICATION

Polyethylene, Polypropylene

PACKAGE

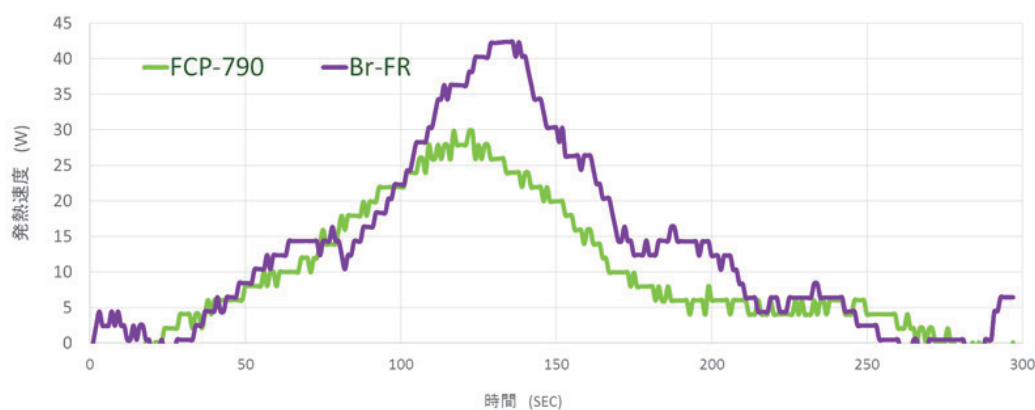
20kg net paper bag

FORMULATION

PP		100	75	70	70
FCP-770 (FCP-790)			25	30	30
Anti-dripping agent (PTFE)					0.2
Oxygen Index		18.0	35.5	41.0	39.0
UL94	3.0mm	-	V0	V0	V0
	1.5mm	-	V0	V0	V0
	0.8mm	-	V0	V2	V0

PP		80	75	70			
HDPE					80	75	70
FCP-770 (FCP-790)		20	25	30	20	25	30
Oxygen Index		26.5	32.5	36.0	26.5	32.0	36.5
UL94	3.0mm	V2	V0	V0	V2	V0	V0
	1.5mm	-	-	V0	-	-	V0

MULTI CALORIE METER (MCM)



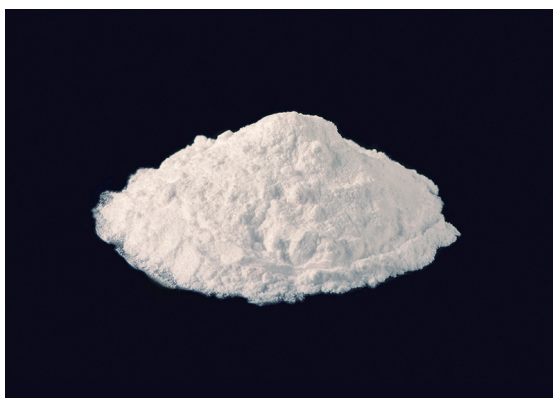


PRODUCT

Fire Cut P-796 (FCP-796)

3-1

FCP-796 is non-halogen flame retardant composite formulated with phosphonate type flame retardant and synergist.



FCP-796

ADVANTAGES

- Effects at gas phase with high flame retardancy
- High phosphorous content
- Gives high transparency to olefin film and sheet
- Less bleed out
- Low smoke emission



6% loading to PP Retain transparency



PRODUCT

Fire Cut P-796 (FCP-796)

3-2

COMPONENTS

Phosphonate type flame retardant/ nitrogen type radical initiator composite

PROPERTIES

Appearance	White Powder
Phosphorous Content	ca. 21%
Volatiles	0.8% Max.

BURNING TEST



6% loading to PP (100 μ m VTM-0)



9% loading to PP (0.8mm V-0)



PRODUCT

Fire Cut P-796 (FCP-796)

3-3

APPLICATION

Polypropylene, Polyethylene, EVA, EEA Polyurethane, Polylactic acid(PLA), Cellulose, etc.

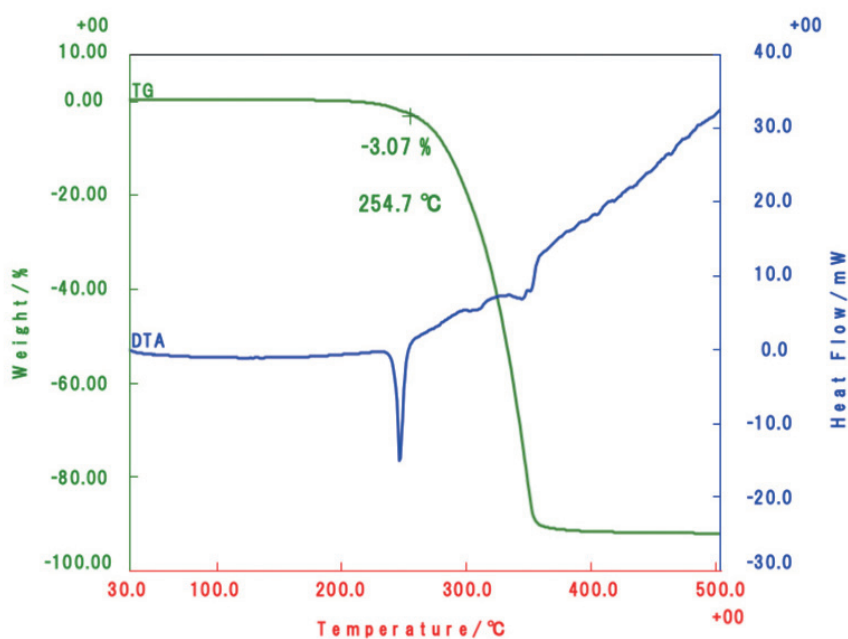
PACKAGE

20kg net paper bag

FORMULATION

PP	97	94	85
FCP-796	3	6	15
Oxygen Index	24.0	25.5	26.0
UL94 100μm	VTM-2	VTM-0	VTM-0
0.8mm	-	V-2	V-0
1.5mm	-	V-2	V-0
3.0mm	-	V-2	V-0

TGA ANALYSIS





PRODUCT

Hiromaster R-103 (HM R-103)

2-1

Hiromaster R-103 is flame retardant for polycarbonate and can achieve UL 94 V-0 rating with quite lower loading level while retaining transparency.



COMPOSITION

Lactone modified compound of potassium perfluorobutane sulfonate (PFBSK)

ADVANTAGE

Conventional PFBSK is needed use of PC resin with processing at higher temperature due to the poor dispersion to produce masterbatch.

Hiromaster R-103 is PFBSK modified with compatible lactone compound and enhance dispersion.

PROPERTIES

Appearance	White Powder or Flake
Softening Point	ca. 65°C
Specific Gravity	ca. 1.47g/ml
Volatiles	≤ 0.5%

APPLICATION

Polycarbonate

PACKAGE

10kg net cardboard box



PRODUCT

Hiromaster R-103 (HM R-103)

2-2

FORMULATION

PC Resin		99.95	99.90	99.85	99.80
Hiromaster R-103		0.05	0.10	0.15	0.20
UL94	3.0mm	V2	V0	V0	V0
	1.5mm	V2	V2	V2	V0



Hiromaster R-103 Formulation

Brominated FR/Sb₂O₃ Formulation



PRODUCT

Hiromaster BC-7A (HM BC-7A)

2-1

Main component of Hiromaster BC-7A is ester polymer compound.
Especially, it is effective to prevent blooming of flame retardant added to polypropylene.



COMPOSITION

Ester polymer compound / Additive 100%

PROPERTIES

Appearance	White Pellet
Specific Gravity	ca. 1.1g/ml
Volatiles	≤ 0.5%
Molecular Weight	ca.70,000
Melting Point	ca.60°C

APPLICATION

Thermoplastic Resins

PACKAGE

20kg net paper bag



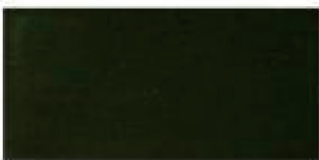
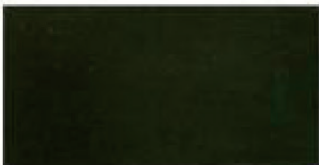
PRODUCT

Hiromaster BC-7A (HM BC-7A)

2-2

FORMULATION

PP	100 Phr
Brominated FR (FCP-680G)	14 Phr
Sb ₂ O ₃ (AT-3 ^{CN})	7 Phr

	Ref	BC-7A 5%
Blank		
80 °C × 24h		
80 °C × 72h		
80 °C × 120h		