Flame - retardant ABS

| Product Introduction |

Kumho's flame-retardant ABS resin is approved by UL and CSA. The flame-retardant ABS resin, which has outstanding, impact strength, weather resistance and chemical resistance, is suitable for home electronics and office automation equipment that require flame- retardant quality, such as computer monitors and TV housings.

| Characteristics & Applications |

Grade		Characteristics	Applications
General Purpose	HFA 703	High Rigidity	Computer monitors, Copy machine, etc.
	HFA 707	General Purpose	
	HFA 451	High Flammability	
	HFA 452	Low Flammability	
	HFA 462	Extrusion	Profile, Sheet requiring flammability
Weather Resistane	HFA 705	General Purpose	Computer monitors, Copy machine, etc.
Special Purpose	HFA 700HT	Super Heat Resistance	Temperature controller, Electric concent
	HFA 456	Non-Halogen	Non-toxic V-2 application as Home eletronics Housing

| Flame - retardant ABS |

Flame – retardant ABS

Test Item / Unit	Test Method (ASTM)	Test Condition	General Purpose					Weather Resistance	Special Purpose	
			HFA-703 High Rigidity	HFA-707 General Purpose	HFA-451 High Flammability	HFA-452 Low Flammability	HFA-462 Extrusion	HFA-705 Weather Resistance	HFA-700HT Super Heat Resistance	HFA-456 Non-halogen
Tensile Strength [kg/cm²(psi)]	D638	23℃	510 (7,250)	420 (5,970)	420 (5,970)	460 (6,540)	520 (7,367)	460 (6,540)	440 (6,260)	520 (7,367)
Elongation [%]	D638	23℃	30	20	20	20	25	20	15	20
Flexural Strength [kg/cm²(psi)]	D790	23℃	670 (9,530)	600 (8,530)	600 (8,530)	700 (9,960)	630 (8,960)	650 (9,250)	700 (9,950)	700 (9,950)
Flexural Modulus [kg/cm²(psi)]	D790	23℃	24,000 (341,400)	23,000 (327,000)	23,000 (327,000)	26,000 (370,000)	25,000 (355,000)	24,000 (341,400)	27,000 (384,000)	27,000 (384,000)
IZOD Impact strength [Kg·cm/cm (ft·lb/in)]	D256	3.2mm, Notched, 23℃(73℉)	16 (2.9)	22 (4.1)	21 (4.0)	15 (2.8)	22 (4.1)	15 (2.8)	15 (2.8)	15 (2.8)
		6.4mm, Notched, 23℃(73℉)	14 (2.6)	19 (3.5)	18 (3.3)	14 (2.6)	20 (3.7)	14 (2.6)	14 (2.6)	14 (2.6)
Rockwell Hardness	D785	R scale	105	100	100	102	105	102	100	100
Heat Distortion Temp.[℃(℉)]	D648	18.6kg/cm²(264psi) Unannealed	76(169)	76(169)	76(169)	80(176)	80(176)	78(172)	87(189)	76(169)
Vicat Softening Temp.[℃(℉)]	D1525		91(196)	91(196)	91(196)	96(205)	96(205)	96(205)	101(214)	91(196)
Melt Flow Index [g/10min]	D1238	200℃, 5kg	3	6	6	5.5	1.6	5	2	5
		220℃, 10kg	30	60	60	55	16	50	1.5	50
		200℃, 21.6kg	60	120	120	110	32	90	18	100
Molding Shrinkage [%]	D955		0.4~0.7	0.4~0.7	0.4~0.7	0.4~0.7	0.4~0.7	0.4~0.7	0.4~0.7	0.4~0.7
Specific Gravity	D792		1.18	1.18	1.18	1.07	1.18	1.18	1.18	1.06
Water Absorption [%]	D570		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Flammability	UL94*	1.5mm	V-0		V-0	V-2	V-0		V-0	V-2
		2.1mm		V-0	V-0, 5VB			V-0		
		3.0mm	V-0	V-0, 5VB	V-0, 5VB		V-0	V-0	V-0	V-2

(*)UL File No. E65424 (CSA File No. LS66457)

Note 1) These are typical property values, not specifications.
Note 2) In case of colored products, the values could vary slightly by color.
Note 3) Values are measured at 23℃ and in RH of 50% on injection molded specimens.

Revision 5

2012. 10

SAMYANG® CHEMICAL

beyond the best
KUMHO PETROCHEMICAL

Overseas Sales Team
TEL 82-2-6961-1881~2, 1781~3 FAX 82-2-6961-1899, 1799

R&BD CENTER Synthetic Resin T/S Team
TEL 82-2-6961-1903 FAX 82-2-6961-1919

http://www.kkpc.com

http://www.kkpc.com

beyond the best

KUMHO ABS

Acrylonitrile Butadiene Styrene

KUMHO PETROCHEMICAL

ABS

| Product Introduction |

Whether you require general purpose, plating, low-gloss, flame-retardant, or a heat-resistant grade, Kumho produces the ABS resin for your specific application.
Kumho ABS resins are widely used for injection molding, extrusion molding, vacuum forming, thermoforming and blow molding with dimensional stability and high gloss surface.
Furthermore, they will grant excellent secondary processing characteristics, such as adhesion, plating, paint and sputtering.

| Characteristics & Applications |

Grade		Characteristics	Applications
plating	ABS 710	General plating	Automobile parts, Cosmetics cases, Refrigerator knobs, Various knobs
	ABS 710G	Plating, Adhesion strength reinforced	
High rigidity	ABS 720	High rigidity	Cassettes, Radios, Video tape cases
	ABS 720R	High rigidity	Automobile batteries
	ABS 722P	High rigidity, extrusion molding use	Trays for semi-conductor
	ABS 722W	Scratch resistance	Cassettes, Radios, Video tape cases
High gloss	ABS 728	General high gloss	Products demanding for gloss : Sweeper, Washing machine cover etc
	ABS 728W	High gloss, weather stable	
High impact strength	ABS 740	High impact resistance	Automobile parts(radiator grill etc), Helmets, Toys
	ABS 745	Super impact resistance	Helmets, Suitcase
	ABS 749	Compounding use	Compounding use
Easy flow, medium impact strength	ABS 750	General easy flow	Household appliances, Office equipments, Miscellaneous goods
	ABS 750SH	Easy flow, white	
	ABS 750SW	Super white	
High flow	ABS 780	High flow	Household appliances, Office equipments, Miscellaneous goods
	ABS 780M	High flow, Painting use	Computer monitors
	ABS 780F	Super flow	Large size injection molded products, TV housings,
Painting	ABS 765	General painting use	Injection molded products for painting : Automobile parts, Household appliances
Refrigerator sheet	ABS 775	High impact resistance	Refrigerator inner case, door liner(cyclopentane foaming agent use)
	ABS 775T	Thin layer use	
	ABS 775EG	General extrusion molding use	Edge bands

Grade		Characteristics	Applications
Extrusion molding	ABS 795	High impact strength, easy flow	Pipe, Briefcases
ESCR	ER872M	Extrusion molding use	Refrigerator inner case, door liner(HCFC-141b foaming agent use)
	ER875	Injection molding use	Injection molded products :Refrigerator door cap etc(HCFC-141b foaming agent use)
Blow molding	BM510	Heat resistance, general use	Automobile rear spoiler
	BM530	High heat resistance	
Low gloss	ABS 770ZH	General extrusion molding use	Extruded products demanding for low gloss
	H2938Z	Heat resistance	Injected products demanding for heat resistance and low gloss"
	HU650ZW	High heat resistance, weather stable	
Heat resistance	ABS 730	Semi heat resistance	Rear garnish, Automobile parts, Light electronical appliances
	H2938	Heat resistance	Automobile parts, Mirror housing, Radiator grills, Rear lamp housings
	H2938L	Heat resistance, painting use	
	HU600	High heat resistance	
	HU600SKG	High heat resistance, low shrinkage	
	HU621	Heat resistance, high impact strength	
	HU650	Super heat resistance	
	HGX 4500	Ultra high heat resistance	
Aluminum Sputtering	H2938DS	Heat resistance, AL sputtering	Automobile parts : Rear lamp housings
	HU600DS	High heat resistance, AL sputtering	
Odorless heat resistance	HU601	Heat resistance, odorless	Automobile parts demanding for heat resistance and odorless
	HU651	High heat resistance, odorless	

| Typical Properties |

Typical Properties

Test Item / Unit	Method (ASTM)	Test condition	Electro-plating		High rigidity				High gloss		High impact strength						Painting	High flow			Sheet extrusion for refrigerator			Extrusion molding	ESCR		Blow molding		Low gloss			Heat resistance									Aluminum sputtering		Odorless heat resistance	
			ABS 710 General plating	ABS 710G Plating, adhesion reinforced	ABS 720 High rigidity	ABS 720R High rigidity	ABS 722P High resigidity, extrusion molding use	ABS 722W Scratch resistance	ABS 728 High gloss	ABS 728W High gloss, weather stable	ABS 740 High impact	ABS 745 Super high impact	ABS 749 Compounding use	ABS 750 General purpose	ABS 750SH Easy flow, white	ABS 750SW Super white	ABS 765 Painting use	ABS 780 High flow	ABS 780M High flow, painting	ABS 780F Super flow	ABS 775 High impact	ABS 775T Thin layer use	ABS 775EG Edge band	ABS 795 High impact, easy flow	ER872M Extrusion molding	ER875 Injection molding	BM510 General	BM530 High heat	ABS 770ZH Extrusion molding	H2938Z Heat resistance	HU650ZW Heat resistant, weather stable	ABS 730 Semi heat resistance	H2938 Heat resistance	H2938L Heat resistance, painting use	HU600 High heat resistance	HU600SKG High heat, low shrinkage	HU621 Heat resistance, high impact strength	HU650 Super heat resistance	HGX4500 Ultra high heat resistance	H2938DS Heat resist	HU600DS High heat resistance	HU 601 Heat resistance	HU 651 High heat resistance
Tensile Strength [kg/cm²(psi)]	D638	23℃, 50mm	410 5,740	440 6,160	500 7,000	530 7,420	550 7,700	650 9,100	470 6,580	470 6,580	420 5,880	420 5,880	320 4,480	465 6,510	470 6,580	485 6,790	460 6,440	465 6,510	460 6,440	440 6,160	450 6,300	480 6,720	430 6,020	400 5,600	430 6,020	450 6,300	430 6,020	430 6,020	450 6,300	450 6,300	480 6,720	470 6,580	475 6,650	500 7,000	475 6,650	500 7,000	480 6,720	485 6,790	430 6,020	480 6,720	500 7,000	500 7,000	485 6,790
Elongation [%]	D638	23℃ 50mm	25	20	20	15	10	10	20	20	25	25	30	20	15	15	20	20	20	20	25	20	25	25	25	20	25	25	25	20	15	20	20	15	20	15	20	15	20	20	15	20	20
Flexural Strength [kg/cm²(psi)]	D790	23℃, 3mm	600 8,400	640 8,960	720 10,080	750 10,500	800 11,200	890 12,460	650 9,100	650 9,100	580 8,120	580 8,120	500 7,000	620 8,680	660 9,240	700 9,800	640 8,960	620 8,680	620 8,680	580 8,120	630 8,820	670 9,380	630 8,820	520 7,280	580 8,120	600 8,400	620 8,680	630 8,820	550 7,700	700 9,800	650 9,100	620 8,680	640 8,960	670 9,380	640 8,680	670 9,380	620 8,680	670 9,380	620 8,680	650 9,100	670 9,380	650 9,100	640 8,960
Flexural Modulus [kg/cm²(psi)]	D790	23℃, 3mm	20,000 284,000	21,000 298,200	25,000 355,000	25,500 362,100	28,500 404,700	30,000 426,000	22,000 312,400	22,000 312,400	20,000 284,000	17,500 248,500	17,000 241,400	21,000 298,200	22,500 319,500	23,500 333,700	21,000 298,200	21,500 305,300	22,000 312,400	20,000 284,000	22,000 312,400	24,000 340,800	22,500 319,500	16,500 234,300	19,500 276,900	20,500 291,100	22,000 312,400	20,000 284,000	17,000 241,400	20,000 284,000	22,500 319,500	21,000 298,200	21,500 305,300	23,000 326,600	21,500 305,300	23,000 326,600	18,500 262,700	22,000 312,400	22,000 312,400	22,500 319,500	22,000 312,400	21,000 298,200	20,500 291,100
Rockwell Hardness	D785	R scale	102	102	112	113	118	120	108	108	98	98	94	108	108	109	106	108	108	105	105	107	105	93	98	100	100	102	109	107	105	108	110	111	110	112	101	109	108	110	110	106	105
IZOD Impact strength [Kg·cm/cm (ft·lb/in)]	D256	3.2mm, Notched, 23℃	36 6.6	35 6.4	25 4.6	20 3.7	10 1.8	12 2.2	27 5.0	27 5.0	36 6.6	45 8.3	40 7.3	30 5.5	28 5.1	24 4.4	36 6.6	27 5.0	32 5.9	22 4.0	45 8.3	38 7.0	38 7.0	48 8.8	60 11.0	30 5.5	35 6.4	32 5.9	24 4.4	18 3.3	21 3.9	30 5.5	25 4.6	25 4.6	24 4.4	18 3.3	32 5.9	20 3.7	16 2.9	25 4.6	21 3.9	24 4.4	20 3.7
		6.4mm, Notched, 23℃	32 5.9	30 5.5	20 3.7	15 2.8	8 1.5	10 1.8	22 4.0	22 4.0	30 5.5	35 6.4	30 5.5	24 4.4	22 4.0	20 3.7	32 5.9	22 4.0	27 5.0	18 3.3	36 6.6	30 5.5	30 5.5	40 7.3	40 7.3	24 4.4	28 5.1	25 4.6	18 3.3	15 2.8	18 3.3	24 4.4	21 3.9	20 3.7	18 3.3	14 2.6	25 4.6	18 3.3	14 2.6	20 3.7	18 3.3	18 3.3	15 2.8
Heat Distortion Temp.,[℃(℉)]	D648	18.6kg/cm², Unannealed	83 181	84 183	87 189	89 192	88 190	90 194	86 187	86 187	84 183	84 183	82 180	85 185	85 185	85 185	85 185	85 185	86 187	82 180	87 189	88 190	87 189	83 181	84 183	84 183	92 198	94 201	90 194	95 203	105 221	91 196	95 203	92 198	100 212	99 210	94 201	105 221	110 230	94 201	96 205	96 205	101 214
Vicat Softening Temp.,[℃(℉)]	D1525		93 199	94 201	97 207	99 210	98 208	100 212	96 205	96 205	94 201	94 201	92 198	95 203	95 203	95 203	95 203	95 203	86 187	92 198	97 207	98 208	97 207	93 199	94 201	94 201	102 216	104 219	100 212	105 221	115 239	101 214	105 221	102 216	110 230	110 230	104 219	115 239	120 248	104 219	106 223	106 223	111 232
Melt Flow Index [g/10min]	D1238	220℃, 10.0kg 200℃, 21.6kg	30.0 45.0	20.0 30.0	20.0 30.0	20.0 30.0	35.0 50.0	28.0 40.0	40.0 60.0	40.0 60.0	25.0 35.0	10.0 18.0	19.0 28.0	30.0 45.0	35.0 48.0	38.0 52.0	20.0 30.0	55.0 75.0	35.0 50.0	80.0 110.0	5.0 7.0	4.5 6.0	5.0 7.0	4.0 7.5	4.5 8.0	32.0 50.0	5.0 7.0	6.0 8.0	4.0 6.0	5.0 8.0	3.5 5.0	12.0 20.0	12.0 18.0	15.0 22.0	8.0 12.0	10.0 15.0	12.0 18.0	4.0 6.0	3.0 4.5	12.0 18.0	9.0 15.0	6.0 9.0	5.5 7.5
Shrinkage [%]	D955		0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.3~0.6	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8	0.5~0.8
Density	D792	23℃	1.04	1.04	1.04	1.04	1.05	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.08	1.08	1.05	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.05	1.04	1.04	1.05	1.05
Water absorption [%]	D570	24hr, Immersion wate	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
UV resistance [△ E]	D4459	300hr, Ivory	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Withstanding voltage [V/mil]	D149		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Sheet resistance	D257		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Flammability [Rating]	UL94*	1/16"(1.6mm) 1/12"(2.2mm) 1/8"(3.2mm)	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB	HB HB HB

(*)UL File No. E65424 (CSA File No. LS66457)

Note 1) These are typical property values, not specifications.
Note 2) In case of colored products, the values could vary slightly by color.
Note 3) Values are measured at 23℃ and in RH of 50% on injection molded specimens.