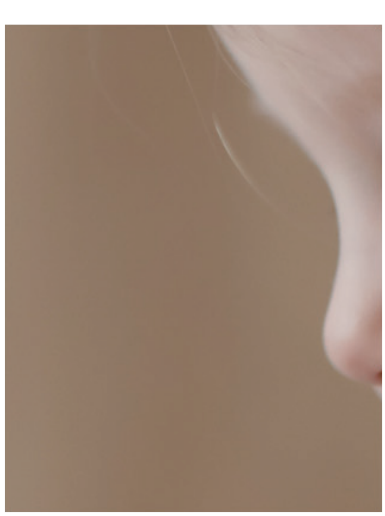
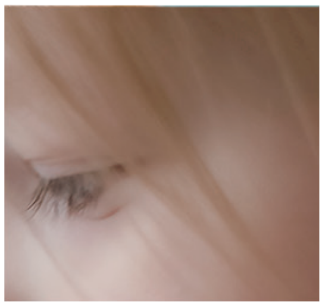
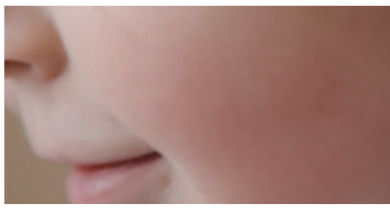
SHAPE A BETTER LIFE

KINGFA

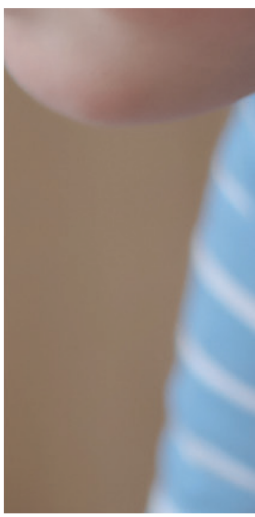
KINGFA TOY
BORN FOR INFINITE JOY







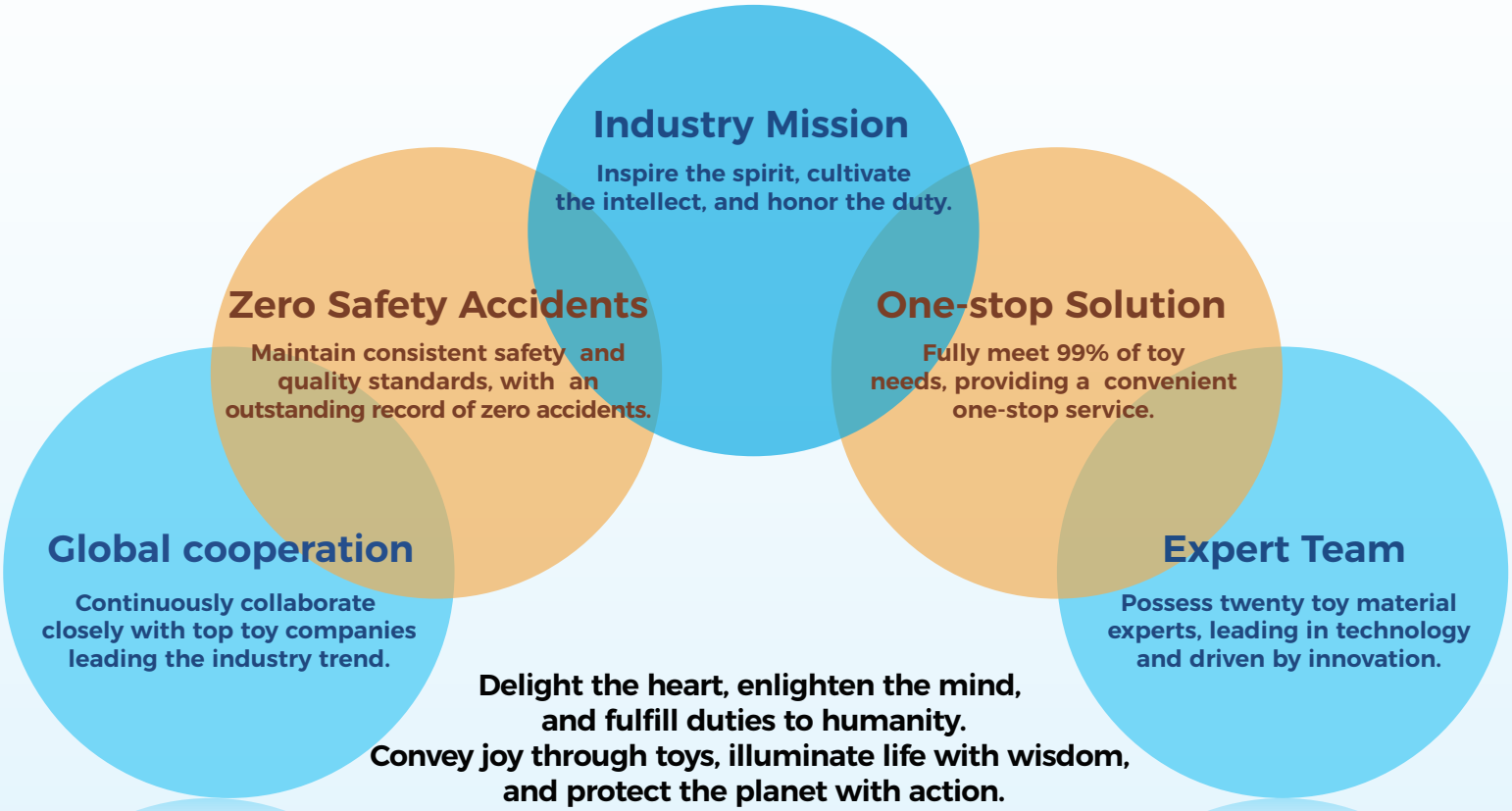






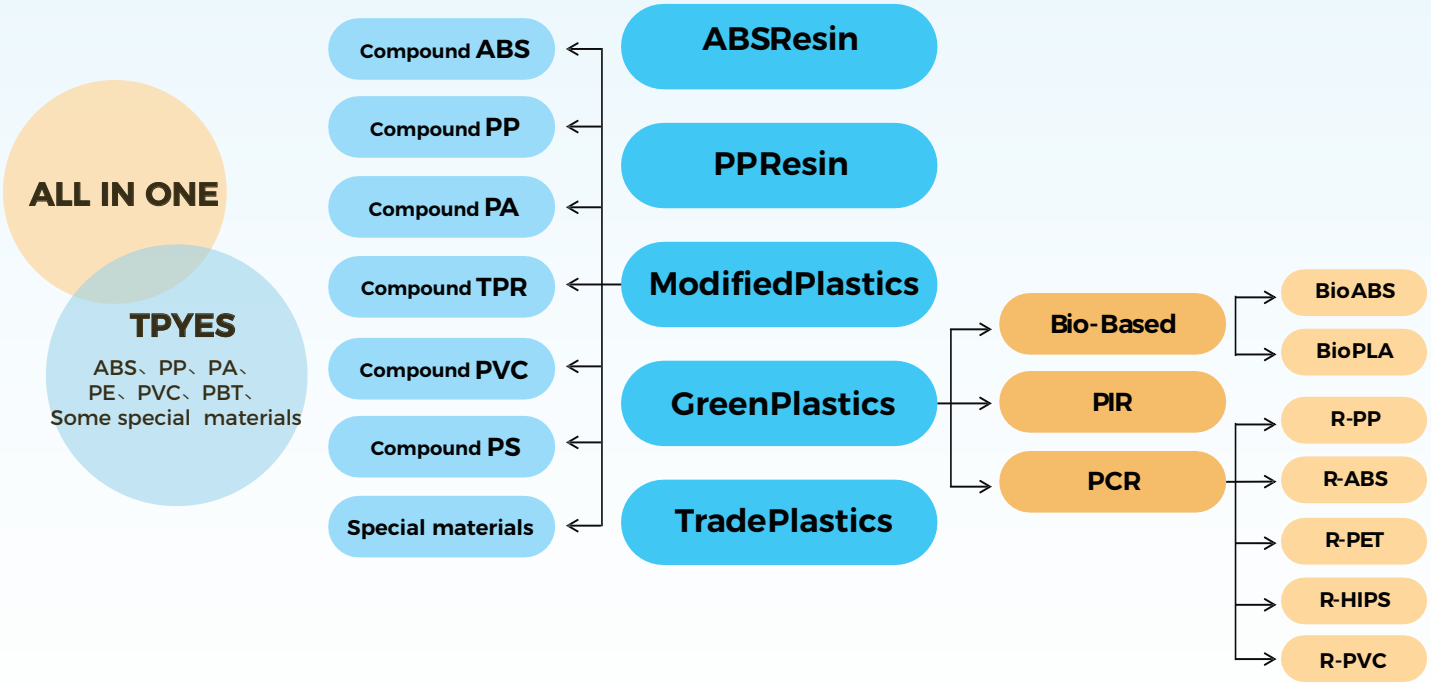


KINGFA TOY



**Delight the heart, enlighten the mind,
and fulfill duties to humanity.
Convey joy through toys, illuminate life with wisdom,
and protect the planet with action.**

SOLUTION



KINGFA TESTING CAPABILITY FOR HAZARDOUS CHEMICAL SUBSTANCES IN TOY INDUSTRY

Regulatory Requirements and Testing Items

Countries, Regions, or Organizations	Heavy Metals	Phthalates	Azo-dye	Polycyclic aromatic hydrocarbon
ISO	ISO 8124-3	ISO 8124-6	N/A	N/A
Europe	EN 71-3	REACH Annex 17, Articles 51 and 52	REACHAnnex 17 Articles 43	REACH Annex 17, Articles 50
Germany	DIN EN 71-3			GS MARK
UK	BS EN 71-3			
France	NF EN 71-3			REACH Annex 17, Articles 50
USA	ASTM F963-16/16CFR 1303 CPSIA Section 101	CPSIA Section 108	N/A	N/A
Canada	SOR/2016-195 of CCPSA	SOR/2016-188 Phthalates Regulation	N/A	N/A
Brazil	NM 300-3	Regulations 369/2007	N/A	N/A
Australia/ New Zealand	AS/NZS 8124-1	Consumer Protection Notice No.11 of 2011	N/A	N/A
Japan	ST 2016-3Food Hygiene Law (Toys)		N/A	N/A
China	GB 6675.4-2014 GB 24613		N/A	N/A
Equipment	ICP-OES & IC-UV & GCMS	GC-MS	GC-MS	GC-MS
IDLs	Can Meet Regulatory Requirements			

Test Objects



Test Equipments



ICP-OES
(17 Heavy Metals)



IC-UV
(Cr(VI))



GC-MS
(PAE, AZO)



GC-MS
(Organic Tin, PAHs)

COMMODITY PLASTICS

- Material Name: Toy-specific material PP
- Grade： HPP-DN61 NC333
- Characteristic： Low melt index, high impact
- Additional functions： High heat & weather resistance
- Main applications: Toys, strollers, tools and battery casings
- Product line： HPP line

Properties	Test Methods	Units	HPP-DN61 NC333
Melt index	ASTM D1238	g/10min	6
Density	ASTM D792	g/cm3	0.90
Tensile Strength	ASTM D638	MPa	26
Impact Strength	ASTM D256	J/m	400
Flexural Modulus	ASTM D790	MPa	1250
Mold Shrinkage	KINGFA	%	1.3-1.6
Forming method	/	/	Injection molding

- Material Name: Toy-specific material ABS
- Grade： HITOY-200
- Characteristic ： MFR-impact balance
- Main applications: Toys
- Product line： ABS line

Properties	Test Methods	Units	HITOY-200
Tensile Strength	ISO 527	MPa	47
Tensile Strain at Break	ISO 527	50mm/min	10
Flexural Strength	ISO 178	2mm/min	76
Flexural Modulus	ISO 178	MPa	2500
Izod Notched Impact Strength	ISO 180	kJ/m2	21
Temperature of Deflection Under Load	ISO 75	1.8MPa	77
Vicat Softening Temperature	ISO 306	5kg 50℃/h	95
Melt Mass-flow Rate(MFR)	ISO 1133	220℃ 10kg	20
Density	ISO 1183	23℃	1.05

ABS SPECIFIC RESIN

Custom-made materials:

- Besides special grades which widely used in toys, we also provide specific grades which are fully customized according to their requirements;
- Optimize properties, reduce comprehensive costs;

GAR-322 HCNC001

☐ product: toy car

☐ Description: High impact

G360 HFNC001

☐ product: Large-sized, thin-walled toys

☐ Description: High flowability

GAR-322 NC106

☐ product: Toy gun

☐ Description: High impact, high flowability



产品资料

KINGFA®金发

GAR-322 HCNC001

High impact ABS

version 6.8

主要特征 FEATURES	主要应用 APPLICATIONS
• 高冲击 High impact resistance • 综合性能优异 Excellent comprehensive performance	• 注塑成型 Injection molding • 家用电器 Household appliances • 电子电器 Electronic appliances

性 能[1] Properties	测试标准 Test Standard	测试条件 Test Condition	国际单位 S.I. Unit	典型值 S.I.[1,2] Typical Value
力学性能 Mechanical				
拉伸强度 Tensile Strength	ISO 527-2	50mm/min	MPa	40
断裂拉伸应变 Tensile Strain at Break	ISO 527-2	50mm/min	%	30
弯曲强度 Flexural Strength	ISO 178	2mm/min	MPa	60
弯曲模量 Flexural Modulus	ISO 178	2mm/min	MPa	1900
悬臂梁缺口冲击强度 Izod Notched Impact Strength	ISO 180	23℃	kJ/m²	36
洛氏硬度 Rockwell Hardness	ISO 2039/2	R-Scale	-	95
热性能 Thermal				
负荷变形温度 Temperature of Deflection Under Load	ISO 75	1.8MPa Unannealed	℃	74
维卡软化温度 Vicat Softening Temperature	ISO 306	50N, 120℃/h	℃	93
电性能 Electrical				
体积电阻率 Volume Resistivity	IEC 60093	-	Ω·cm	10^{14}
介电强度 Dielectric Strength	IEC 60243-1	2mm, in oil	kV/mm	22
其他 Others				
密度 Density	ISO 1183-1	23℃	g/cm³	1.03
熔体质量流动速率 Melt Mass-flow Rate(MFR)	ISO 1133-1	220℃, 10Kg	g/10min	10
模塑收缩率 Molding Shrinkage	ISO 2577	23℃	%	0.4-0.7
阻燃等级 Flammability	UL 94	1.6mm-3.2mm	/	HB

[1] 数据为典型值，只作为客户使用的参考，不作为品质指标最低值或最高值的保证及其他任何用途的保证。

[2] 不同的颜色性能可能会不同。

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KINGFA®金发

G360 HFNC001

ABS

主要特征 FEATURES	主要应用 APPLICATIONS
• 高流动、良冲击 • 优异着色性、尺寸稳定性	• 家用电器、玩具薄壁大尺寸产品； • 办公设备、电子电器大尺寸产品

性 能[1] Properties	测试标准 Test Standard	测试条件 Test Condition	国际单位 S.I. Unit	典型值 S.I.[1,2] Typical Value
力学性能 Mechanical				
拉伸强度 Tensile Strength	ISO 527-2	50mm/min	MPa	46
断裂拉伸应变 Tensile Strain at Break	ISO 527-2	50mm/min	%	25
弯曲强度 Flexural Strength	ISO 178	2mm/min	MPa	73
弯曲模量 Flexural Modulus	ISO 178	2mm/min	MPa	2550
悬臂梁缺口冲击强度 Izod Notched Impact Strength	ISO 180	23℃	kJ/m²	20
洛氏硬度 Rockwell Hardness	ISO 2039-2	R-Scale	-	108
热性能 Thermal				
负荷变形温度 Temperature of Deflection Under Load	ISO 75-2	0.45MPa	℃	91
		1.8MPa		80
维卡软化点 Vicat Softening Temperature	ISO 306	1kg, 120℃/h	℃	102
		5kg, 50℃/h		97
电性能 Electrical				
体积电阻率 Volume Resistivity	IEC 60093	-	Ω·cm	10^{14}
介电强度 Dielectric Strength	IEC 60243-1	-	kV/mm	22
其他 Others				
密度 Density	ISO 1183-1	23℃	g/cm³	1.04
熔体质量流动速率 Melt Mass-flow Rate(MFR)	ISO 1133-1	220℃, 10kg	g/10min	35
模塑收缩率 Molding Shrinkage	ISO 2577	23℃	%	0.4-0.7
阻燃等级 Flammability	UL 94	1.2mm	/	HB
		3.0mm		HB

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产品中试资料

KINGFA®金发

GAR-322 NC106

ABS

主要特征 FEATURES	主要应用 APPLICATIONS
• 高抗冲击 • 综合性能优异	• 注塑成型 • 家用电器、电子电器、汽车等

性 能[1] Properties	测试标准 Test Standard	测试条件 Test Condition	国际单位 S.I. Unit	典型值 S.I.[1,2] Typical Value
力学性能 Mechanical				
拉伸强度 Tensile Strength	ISO 527-2	50mm/min	MPa	42
断裂拉伸应变 Tensile Strain at Break	ISO 527-2	50mm/min	%	25
弯曲强度 Flexural Strength	ISO 178	2mm/min	MPa	67
弯曲模量 Flexural Modulus	ISO 178	2mm/min	MPa	2250
悬臂梁缺口冲击强度 Izod Notched Impact Strength	ISO 180	23℃	kJ/m²	28
洛氏硬度 Rockwell Hardness	ISO 2039-2	R-Scale	-	103
热性能 Thermal				
负荷变形温度 Temperature of Deflection Under Load	ISO 75-2	0.45MPa	℃	84
维卡软化点 Vicat Softening Temperature	ISO 306	5kg, 50℃/h	℃	94
电性能 Electrical				
体积电阻率 Volume Resistivity	IEC 60093	-	Ω·cm	10^{14}
介电强度 Dielectric Strength	IEC 60243-1	-	kV/mm	22
其他 Others				
密度 Density	ISO 1183-1	23℃	g/cm³	1.04
熔体质量流动速率 Melt Mass-flow Rate(MFR)	ISO 1133-1	220℃, 10kg	g/10min	23
模塑收缩率 Molding Shrinkage	ISO 2577	23℃	%	0.4-0.7
阻燃等级 Flammability	UL 94	1.6mm	/	HB
		3.2mm		HB

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TRANSPARENCY PP

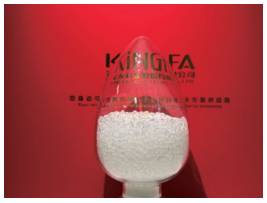
Properties:

The Klarity series is engineered for exceptional clarity. Through innovative design at the raw material stage, its transparency significantly outperforms existing transparent polypropylene materials on the market.

Grade	1008U	1030U	1008P	1030P	1008C	1030C	1530P	2030P
Melt Flow Rate g/10min	8	28	8	28	8	28	30	30
Tensile strength MPa	28	26	28	26	28	26	32	41
Flexural strength MPa	31	30	31	30	31	29	45	56
Flexural modulus MPa	1020	1030	1000	1000	950	1020	1500	2000
Izod impact strength, Notched kJ/m2	7.5	6	7.5	6	7.5	6	3	2
HDT	87	73	85	72	83	70	97	110
HAZE (230℃, 1 mm, %)	2.0	2.0	5.0	5.0	7.0	7.0	5.0	2.5

Transparency Comparison:

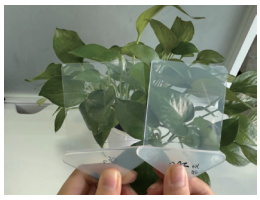
Ultra-low haze, excellent gloss, and comprehensively outperforms current 3rd and 4th-generation commercial products. At 1mm thickness, its haze approaches that of PS and MABS plastics.



Klarity-1030U



Left: 3rd Generation Transparent PP
Right: 1030U



Left: 1030U
Right: 4th Generation Transparent PP



Left: PS
Right: 1030U



Left: 1030U
Right: MABS TR557

TRANSPARENCY PP WITH EXCELLENT TOUGHNESS

Properties:

Krisfex Series: Engineered for outstanding transparency and superior toughness with excellent impact resistance. Proprietary synthesis and precision process control ensure unmatched performance right out of the gate.

Grade	R3005P	R3005C	R1008P	R2008P	R1020P	R1020C
Melt Flow Rate g/10min	5	5	8	8	25	20
Tensile strength MPa	20	20	27	24	24	25
Flexural modulus MPa	750	800	950	800	850	900
Izod impact strength, Notched kJ/m2	30	30	10	20	10	10
HDT	60	65	78	72	75	77
HAZE (230℃, 1 mm, %)	4.0	8.0	4.0	4.0	4.0	8.0

HIGH PERFORMANCE SOFT MATERIAL

TPR-MB:

Good strength and high toughness

Toy eraser

· Halogen free
· High erasure rate



Trade name	TPR-MB65
Hardness	65A
Density	1.26g/cm3
Tensile strength	4MPa
elongation	500%

KFLEX/FLEXBOND(TPS) :

Overlapping injection molding, excellent hand feel

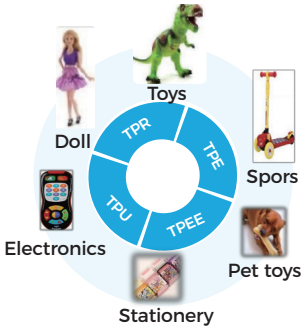
Handle

· VDI2019D level adhesion
· UV resistant, smooth to the touch



Trade name	TPR-MB65
Hardness	65A
Density	0.9g/cm3
Tensile strength	7MPa
elongation	600%

KINGFA's thermoplastic elastomer materials have four main brand series, namely MICROPRENE series (TPV) , KFLEX/FLEXBOND series (TPS), TPR-MB series (TPR), ET series (TPU), suitable for stationery products with different hardness and color requirements.





Dolls Solution :

Soft Doll Replaceable Clothing

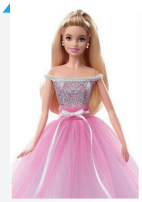
· Paintable
· Soft, transparent color



Trade name	TPR-MB34
Hardness	34 A
Density	0.9 g/cm3
Tensile strength	3 MPa
Elongation at break	600%

Doll body and torso

· Skin friendly touch
· Can be bonded with PP
· High temperature resistance without deformation



Trade name	KFLEX-245
Hardness	45A
Density	1.1g/cm3
Tensile strength	3 MPa
Elongation at break	500%

Kingfa thermoplastic elastomer materials have four main brand series, namely MICROPRENE series (TPV) , KFLEX/FLEXBOND series (TPS), TPR-MB series (TPR), ET series (TPU), suitable for toy products with different hardness and color requirements.

BUILDING BLOCKS SOLUTIONS

Parts	Material	Characteristics
Classic building blocks	ABS	Excellent tactile feel
Transparent magnetic building blocks	MABS	Ultrasonic welding, high transparency
Flexible building blocks	HDPE	Safe and antibacterial



- **Kingfa ABS material for building blocks has a good hand feel and appearance, making it the largest material supplier in the domestic building block industry.**
- **The Application Evaluation Center has evaluation platforms for ultrasonic welding, friction welding, and laser welding, providing evaluation platforms for advanced connection processes.**

- The materials for blonde toy building blocks include ABS building block special material, MABS ultrasonic welding transparent material, and antibacterial HDPE material.
- We have evaluation platforms such as building block precision evaluation molds and insertion and extraction force testers, providing sufficient evaluation data support for the application of materials in products.

MAGNESIUM ALLOY TOY CAR

Magnesium Alloy Toy Car Solution—KingToy PPS

- **Metallic tactility derives from the elevated modulus**
- **Metallic feel arises from the high density**
- **Metallic appearance originates from the surface coating**
- **Excellent flowability enables the miniaturization trend**

	Testing standards	Units	Typical values
Flexural modulus	ISO178	MPa	6000
Density	ISO1183	g/cm³	3.0
Meltindex	ISO1133	g/10min	50



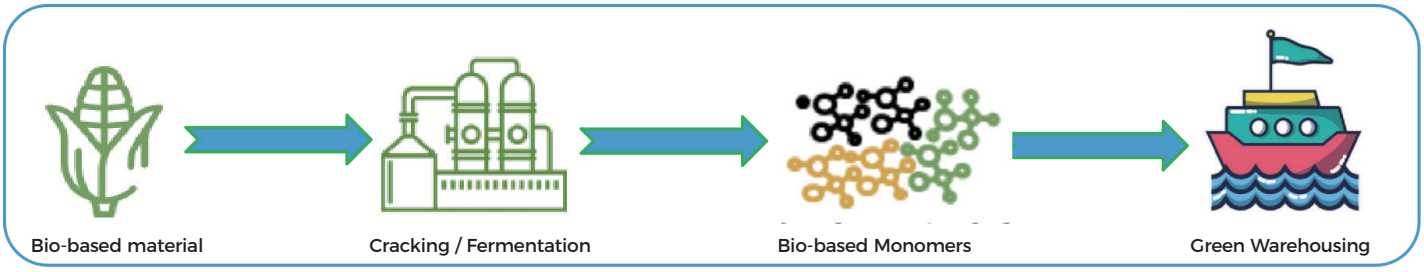


- **The high-density materials promoted by KINGFA are subversive to the production process of traditional toy alloy cars.**
- **From traditional metal die casting to the current plastic injection molding, the toy factory has simplified management and more selectivity in product design, which is acceptable to the toy factory.**

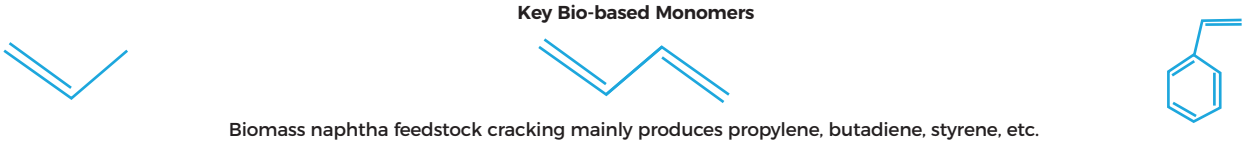
Category	Zinc alloy	Advantage or not	High density PPS	Advantage or not
Density	6.7	☺	3.0	☹
Molding method	Metal diecasting	☹	Injection molding	☺
Processing cost	1.83USD/MT	☹	0.183USD/MT	☺
Product designability	N	☹	Y	☺
controllability	N	☹	Y	☺
Energy consumption	N	☹	Y	☺
Environmental protection	N	☹	Y	☺

BIO- BASED ABS

Synthesis Route of Bio-based Monomers

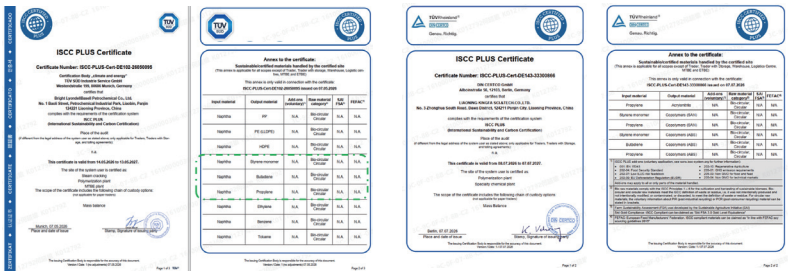


Key Bio-based Monomers



Biomass naphtha feedstock cracking mainly produces propylene, butadiene, styrene, etc.

Bio-based Category	Annual Demand (wt/yr)	Medium Flash Point (°C)	Medium Boiling Point (°C)	Storage Tank Type	Storage Temperature	Application	Remarks
Propylene	60	-108	-42	Pressure Spherical Tank	Low Temperature	Biobased AN	Flammable Gas
Acrylonitrile	14	-5	77	Atmospheric Storage Tank	Ambient Temperature	Biobased ABS	Flammable Liquid
Butadiene	10	-76	-4	Pressure Spherical Tank	Low Temperature	Biobased ABS	Flammable Gas
Styrene	50	31	145	Atmospheric Storage Tank	Ambient Temperature	Biobased ABS	Flammable Liquid



Bio-based ABS – ISCC PLUS Certified Bio-based Monomer Raw Materials - Bright Lyondell Basell (Propylene, Styrene, Butadiene)
- Kingfa Liaoning (Acrylonitrile, ABS)

PCR MATERIAL

PP



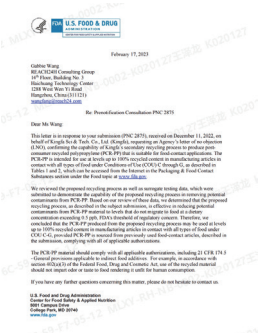
PET



ABS



PCR Material



February 17, 2023

Gabbie Wang
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Huichuang Technology Center
1288 Wuxi Wan Yi Road
Hangzhou, China (311121)
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Re: Premol-fication Consultation PNC 2075

Dear Ms Wang:

This letter is in response to your submission (PNC 2075), received on December 11, 2022, on behalf of Kingfa Sci & Tech. Co., Ltd. (Kingfa), requesting an Agency's letter of no objection (LNO), confirming the capability of Kingfa's secondary recycling process to produce post-consumer recycled polypropylene (PCR-PP) that is suitable for food-contact applications. The PCR-PP is intended for use at levels up to 100% recycled content in manufacturing articles in contact with all types of food under Conditions of Use (COU) C through G, as described in Table 2 of the 2021 Guidance for Industry: Use of Recycled Plastic in Food Packaging & Food Contact Substances outside under the Food type at www.fda.gov.

We reviewed the proposed recycling process as well as surrogate testing data, which were submitted to demonstrate the capability of the proposed recycling process in removing potential contaminants to ≤ 0.5 ppb. Based on the data and information in the submission, the proposed recycling process, as described in the subject submission, is effective in reducing potential contaminants from PCR-PP material to levels that do not migrate to food at a dietary concentration exceeding 0.5 ppb, FDA's threshold of regulatory concern. Therefore, we concluded that the PCR-PP produced from the proposed recycling process may be used at levels up to 100% recycled content in manufacturing articles in contact with all types of food under COU C-G, provided PCR-PP is sourced from pre-treated used food-contact articles, described in the submission, complying with all of applicable authorizations.

The PCR-PP material should comply with all applicable authorizations, including 21 CFR 174.5 -General provisions applicable to indirect food additives. For example, in accordance with section 402(a)(4) of the Federal Food, Drug and Cosmetic Act, use of the recycled material should not impart odor or taste to food rendering it unfit for human consumption.

If you have any further questions concerning this matter, please do not hesitate to contact us.

U.S. Food and Drug Administration
Center for Food Safety & Applied Nutrition
5001 Campus Drive
College Park, MD 20740
www.fda.gov



Scope Certificate

Scope Certificate Number: ITS-E10703-CAS-0000006

Intertek
certifies that

GUANGDONG KINGFA SCI AND TECH CO., LTD
License Number: E10703
No.29 Xinlong Road, Qingcheng Dist,
Qingyuan City, 511810
Guangdong Province, China

has been audited and found to be in conformity with the

GLOBAL RECYCLED STANDARD 4.0 (GRS 4.0)

Product categories mentioned below (and further) specified in the product appendix conform with the standard(s):
Processed post-consumer materials (PCM/PCR): Processed pre-consumer materials (PCM/C)
Process categories carried out under responsibility of the above mentioned organization for the certified products cover:
Mechanical recycling (PM/C/T) Warehousing (PM/D/E) Trading (PM/D/E)
*The processes marked with an asterisk may be carried out by subcontractors

Place and Date of Issue
Hong Kong, 2021-12-16
Last update: 2022-12-16

This certificate is valid until: 2023-12-15
Audit criteria:

Colin Hutchinson
President, Business Assurance

Certification body is owned by: Intertek International Limited, 2000
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Certification body is owned by: Intertek International Limited, Shanghai

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The liability of Intertek towards its Client is limited to the amount of the invoiced sum for the issuance of this certificate. No liability towards any third party is assumed.
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ESTS

ISCC PLUS Certificate

Certificate Number: ISCC-PLUS-Cert-CN150-20230194
Extensible Standard Technical Services Co., Ltd.
Unit 2214, 21/F, Nina Plaza Tower A, 133 Hathan Road
Tsim Sha Tsui, Kowloon, Hong Kong
certifies that

Kingfa Environmental SCI.&TECH.CO., LTD.
No. 29 Xinlong Road, Shijiao Town, Qingcheng, Guangdong, P.R. China

complies with the requirements of the certification system

ISCC PLUS
(International Sustainability and Carbon Certification)

This certificate is valid from 05.05.2023 to 04.05.2024

The site of the system user is certified as:
Converter

The scope of the certificate includes the following chain of custody options:
Mass balance

Place and date of issue | Certification Body | Standard | Scan this code to verify
Hong Kong, 05.05.2023

Xiaohui Wu
Managing Director of ESTS

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COMPANY PROFILE OF KINGFA SCI. & TECH. CO., LTD.

Founded in 1993, Kingfa Sci. & Tech. Co., Ltd. is an advanced material enterprise focusing on the R&D, production, sales and service of advanced high-performance chemical materials, and providing advanced material solutions for creating a safer, more comfortable and more convenient life. Kingfa is committed to solving the increasingly severe environmental problems, actively responding to the challenges brought about by the changes in the global environment, and promoting the continuous improvement of living environment by balancing economic, environmental and social relations to achieve sustainable development and create a better life.

Based in Guangzhou Science City, Kingfa has established 56 subsidiaries across the world, and founded R&D and production bases in overseas regions including South Asia, North America, and Europe. The products of Kingfa mainly rely on independent innovation and development, covering eight categories with independent intellectual property rights including modified plastics, eco-friendly high-performance recycled plastics, fully biodegradable plastics, specialty engineering plastics, carbon fiber and composite materials, light hydrocarbon and hydrogen energy, styrene resins, medical and healthcare polymer materials, which are widely used in various industries including automobiles, household appliances, electrical and electronic components, communications, new infrastructure, new energy, modern agriculture, modern logistics, rail transit, aerospace, high-end equipment, medical and healthcare industries, establishing strategic partnership with numerous well-known enterprises around the world.

At present, Kingfa is one of the companies with the most complete product categories in global advanced chemical material industry. Kingfa is the largest modified plastics production company in the Asia-Pacific region with the most complete product range. For complete biodegradable plastics, specialty engineering plastics, carbon fiber and composite materials, Kingfa's technology and product quality has reached the international advanced level. At present, the company has formed four major business segments of modified plastics, advanced materials, green petrochemicals, and medical and health polymer materials. Relying on the international marketing service network, excellent operation system and collaborative innovation across the industrial chain, Kingfa will continue to invest in technological innovation to ensure the high-quality development.

Products are the foundation of market competition. In order to ensure the continuous innovation of products, with the R&D concept of "independent innovation, leading technology, and product superiority", relying on the support of National Recognized Enterprise Technology Center, National Engineering Laboratory, State Key Laboratory, and National Industrial Innovation Center, Kingfa has established the strategic "13551" R&D system, gradually forming a R&D platform driven by technology research, industry research, and product research.Kingfa continued to invest about 4.0% of its revenue in research and development. In 2022, Kingfa R&D expenses reached 1.453 billion yuan. The company adheres to the concept of "common endeavor, common growth, and common prosperity", and continues to innovate and improve the talent incentive mechanism to adapt to different stages of enterprise development. The value sharing concept has attracted a large number of outstanding talents. At present, the R&D team consists of 133 engineers with Ph.D. degree and 905 engineers with master degree, and has independently trained 1 Foreign Academician of Russian Academy of Engineering, 2 candidates for academicians and 5 experts with special allowance from the State Council.

Kingfa has accumulatively applied for 5401 domestic and foreign patents in total, including 3951 invention patents, 688 utility models, 34 appearance designs, 459 PCT patents and 269 foreign patents. The company has won 3 national scientific and technological progress second prizes, 15 scientific and technological progress awards at provincial and ministerial level, and 19 China Patent Awards (Excellent Award).

In line with China's "Belt and Road" initiative and dual circulation in domestic and overseas markets, Kingfa adheres to the strategic thinking of " Strengthen the middle, Consolidate both ends, Innovation-oriented, Leap-forward development", and strives to build a world-class R&D, marketing, manufacturing, and information platform to become a global leader in advanced materials, providing support for national strategic materials.

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