



TOY TESTING





There are almost 75% toys are from China as it is the largest production base for toys in the world. Recently, Chinese toys are frequently recalled, which require more attention on the latest requirements for safety of toys in various countries.

As the most intimate friends of children, toys are of vital importance to the intellectual development and health of children. They are indispensable consumer products during the children's growth. However, there are some hazards that may bring harm to children and even threaten their health. So countries and regions formulate strict standards on such products. C&K Testing is devoted to assisting businesses to comply with different regulations in countries to ensure the export of products.

About C&K



C&K Testing is a leading testing company to render you specialised solutions concerning green and sustainable development of products. Established in 2008, we' ve helped thousands of customers to minimise the risks of their products to human health and the environment through our testing services.

Our company is a member of CIRS which is a leading product safety management consulting firm. With our offices in Ireland and the United States as well as our laboratory in China, a global network of testing facilities enables you to meet all the relevant regulatory requirements across different markets more cost-efficiently.



I. Global Test Standards




International
International Standard for Safety of Toys (ISO 8124)



China
Chinese Standard for Safety of Toys (GB 6675)
Electrical Toys—Safety (GB 19865)



EU
Directive for Safety of Toys (2009/48/EC)
Standard for Safety of Toys (EN 71)
Electric Toys – Safety (EN 62115)
Electromagnetic Compatibility (EMC)




Germany
German Institute for Standardization (DIN EN 71)
(DIN EN 62115)
German Food, Commodity and Feed Law (LFGB)



US
Consumer Product Safety Improvement Act (CPSIA)
American Society for Testing and Materials (ASTM F963)
US Food and Drug Administration (FDA)



Canada
Toy Regulation (SOR/2011-17)



Australia
Standards Australia (AS/NZS ISO 8124)
Electromagnetic Compatibility (EMC)



New Zealand
New Zealand Standard (NZS 5822)
(AS/NZS ISO 8124)



Japan
Japanese Standard for Safety of Toys (ST 2002)

II. Test Standards and Items

Item	EU	US	China	Canada	International	Australia	New Zealand
Physical and Mechanical Test	EN 71-1	16 CFR 1500 ASTM F963	GB 6675	SOR/2011-17	ISO 8124-1	AS/NZS ISO 8124-1	NZS 5822 AS/NZS ISO 8124-1
Flammability Test (Textile Materials)	EN 71-2	16 CFR 1610 ASTM F963	GB 6675	SOR/2011-17	ISO 8124-2	AS/NZS ISO 8124-2	AS/NZS ISO 8124-2
Flammability Test (Other Materials)	EN 71-2	16 CFR 1500 ASTM F963	GB 6675	SOR/2011-17	ISO 8124-2	AS/NZS ISO 8124-2	AS/NZS ISO 8124-2
Analysis on Toxic Elements (Heavy Metal)	EN 71-3 REACH Annex XVII	16 CFR 1303 CPSIA ASTM F963	GB 6675	SOR/2011-17	ISO 8124-3	AS/NZS ISO 8124-3	AS/NZS ISO 8124-3
Stuffing Cleanliness Test (Visual)	EN 71-1	ASTM F963	GB 6675	SOR/2011-17	ISO 8124-1	AS/NZS ISO 8124-1	AS/NZS ISO 8124-1
Stuffing Cleanliness Test (Chemical)	-	AOAC Chapter 16, Pennsylvania Regulations	-	-	-	-	-
Phthalate Content	REACH Annex XVII (previous: 2005/84/EC)	CPSIA AB1108	GB 24613 GB 6675	SOR/2011-17	-	Consumer Protection Notice No. 11	-
Azo Dye	REACH Annex XVII (previous: 2002/61/EC)	-	GB 18401	-	-	-	-
Test of Battery Operated Toys	EN 62115	16 CFR 1505 ASTM F963	GB 19865	SOR/2011-17	IEC 62115	AS/NZS 62115	AS/NZ EN 62115
Electromagnetic Compatibility	2004/108/EC	FCC Part 15	GB 4343	Radio-communication Act	CISPR14-1&-2	Radio-communication Act	Radio-communication Act
Cosmetics	(EC) NO.1223/2009	21 CFR 700-740	Hygienic Standard for Cosmetics	Cosmetic Regulations CRC c.869	-	Trade Practices Act (Consumer Product Safety Standard)	-

III. Overview of Major Test Items

1. Chemical Safety

1) Phthalates

Phthalate is a kind of plasticisers employed to make plastics softer and more elastic. So it is generally applied in toys or childcare articles. However, excessive ingestion of phthalates can disturb endocrine of human bodies, which is harmful to the growth of children. Currently, there are six phthalates banned or restricted for application in toys and children's products.

Limits for Phthalates in Different Countries

Regulation	Substance	Condition and Limit		
EU REACH Annex XVII (previous: 2005/84/EC)	DEHP	For plasticised material in toys and childcare articles: $DEHP+DBP+BBP \leq 0.1\%$		
	DBP			
	BBP			
	DINP	For plasticised material in toys and childcare articles which can be placed in the mouth: $DINP+DIDP+DNOP \leq 0.1\%$		
	DIDP			
	DNOP			
US CPSIA/HR 4040 Consumer Product Safety Improvement Act		Toys (for children < 12 and cannot be placed in the mouth)	Toys (for children < 12 and can be placed in the mouth)	Childcare articles (for children < 3)
	DEHP	0.1%	0.1%	0.1%
	DBP	0.1%	0.1%	0.1%
	BBP	0.1%	0.1%	0.1%
	DINP		0.1%	0.1%
	DIDP		0.1%	0.1%
	DNOP		0.1%	0.1%
China GB 24613 Limit of Harmful Substances in Coatings for Toys	DEHP	Coatings for toys: $DEHP+DBP+BBP \leq 0.1\%$		
	DBP			
	BBP			
	DINP	Coatings for toys: $DINP+DIDP+DNOP \leq 0.1\%$		
	DIDP			
	DNOP			
China GB 6675 Toy Safety	DBP	For toys: $DBP+BBP+DEHP \leq 0.1\%$		
	BBP			
	DEHP			
	DNOP	For toys which can be placed in the mouth: $DNOP+DINP+DIDP \leq 0.1\%$		
	DINP			
	DIDP			

2) Migration of Heavy Metals

Heavy metals of toys are mainly found in paints and coatings of coloured toys. Heavy metals can accumulate in human bodies, to a certain degree that may cause decline in immunity and intelligence and even lead to hemopathy. Therefore countries formulate standards to regulate the heavy metals in toys to reduce its hazards to human bodies. It is noticeable that EU imposes higher requirements on such products as its limits for heavy metals are increased from 8 to 19 since 20 July 2013. You may refer to the following table for details.

Requirements on Migration of Heavy Metals under Different Standards (unit: mg/kg)

Standard	Antimony	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium
ISO 8124 (International)	60	25	1000	75	60	90	60	500
ASTM F963 (US)	60	25	1000	75	60	90	60	500
GB 6675/GB 24613 (China)	60	25	1000	75	60	90	60	500

EU EN 71-3 Migration of Heavy Metals

Element	Limit for Migration (mg/kg)		
	Category I Dry, brittle, powder like or pliable materials	Category II Liquid or sticky materials	Category III Scraped-off materials
Aluminum (Al)	5,625	1,406	70,000
Antimony (Sb)	45	11.3	560
Arsenic (As)	3.8	0.9	47
Barium (Ba)	1,500	375	18,750
Boron (B)	1,200	300	15,000
Cadmium (Cd)	1.3	0.3	17
Trivalent chromium (Cr(III))	37.5	9.4	460
Hexavalent chromium (Cr(VI))	0.02	0.005	0.2
Cobalt (Co)	10.5	2.6	130
Copper (Cu)	622.5	156	7,700
Lead (Pb)	13.5	3.4	160
Manganese (Mn)	1,200	300	15,000
Mercury (Hg)	7.5	1.9	94
Nickel (Ni)	75	18.8	930
Selenium (Se)	37.5	9.4	460
Strontium (Sr)	4,500	1,125	56,000
Tin (Sn)	15,000	3,750	180,000
Organic tin	0.9	0.2	12
Zinc (Zn)	3,750	938	46,000

3) Total Lead Content

Lead is widely employed in daily consumer products, such as toys, children's jewelry, packaging materials, food vessels, ceramic products, furniture, stationery, metal accessories, which are closely related with our life. It is categorised as a strong contaminant due to its persistence in the environment and potential toxicity to living tissues. To prevent human bodies and environment from excessive lead, now countries add requirements for total lead content based on limit for lead migration.

Requirements for Total Lead in Various Standards

Lead Content in Ink (Paint) and Coating					Lead Content in Materials Other Than Standard Coating	
Country	International	EU	US		China	US
Standard	ISO 8124	REACH Annex XVII Entry 63	CPSC 16 CFR 1303	ASTM F963	GB 24613	CPSIA
Total Lead	--	500ppm	90ppm	90ppm	600ppm	100ppm

4) Flame Retardants

Chemical flame retardants are widely used in plastics, textiles, thermal insulation materials for building, upholstered furniture and children's products to enhance their fire resistance. However, flame retardants may result in lower birth rate, congenital malformation of newborns, decline in children's intelligence and hormone disruption due to their toxicity.

EU and many states in US have issued bills to restrict the use of flame retardants in children's products along with the knowledge of the developmental toxicity, endocrine disruption and reproductive toxicity that may arise from such substances.

US

On 15 April 2013, the first case RG-13667688 to restrict flame retardants in children's products was settled under Proposition 65, which attracted widely concern of related producers. However, test results reveal that most children's products on the US market contain hazardous flame retardants. So many states introduce bills to deal with such phenomena.

State Requirements for Flame Retardants in US

Substance	CAS No.
TDCPP	13674-87-8
TCEP	115-96-8
TCPP	13674-84-5
TBB	183658-27-7
TBPH	26040-51-7
TPP	115-86-6
V 6	38051-10-4
MDPP	56803-37-3
DBPP	65652-41-7
TBPP	78-33-1
PentaBDE	32534-81-9
OctaBDE	32536-52-0
DecaBDE	1163-19-5



* The above information is not complete. Please refer to state bills for more details.

EU

Directive 2009/48/EC (Safety of Toys) introduces specific limits for flame retardants in toys that all toy companies to export their products to the EU market shall ensure the following flame retardants contained their products shall not exceed 5 mg/kg (effective since 21 December 2015).

Substance	CAS No.
TCEP	115-96-8
TCPP	13674-84-5
TDCP	13674-87-8

China

China doesn't have current laws and regulations to restrict flame retardants in children's products. But Chinese legislation will be gradually in line with international standards. It is advisable that businesses should make preparation for regulation compliance to avoid future losses.

Tip: C&K Testing boasts its capability to test 20 flame retardants. We are able to test flame retardants according to standards.

5) Organic Compounds

EU

This Part 9 of the document EN 71 for safety of toys targets on possible hazards caused by certain organic compounds, including cancer, organism mutation and reproductive damage. It specifies requirements for the migration or content of certain hazardous organic chemical compounds from/in certain toys and toy materials by the following exposure routes:

- mouthing ●ingestion ●skin contact ●eye contact ●inhalation

When used as intended or in a foreseeable way, bearing in mind the normal behaviour of children and the function and design of the toy.

EN 71-9: Requirements for organic compounds

Only the following toys and components are covered, such as

- * Toys intended to be mouthed by children under 3 years of age, such as teethingers;
- * Applicable to toys for children under 3 years of age and their accessible parts;
- * Mouthpiece components of mouth-actuated toys;
- * Solid toy materials intended to leave a trace.



China

Chinese standard GB 24613 Limit of harmful substances of coatings for toys specifies limits, test methods, test rules and packaging standards for coatings for toys. The requirements on organic compounds are as below:

Substance	Requirement
Volatile Organic Compound (VOC)	≤720(g/L)
Benzene	≤0.3%
Total of Toluene, Ethylbenzene and Xylene	≤30%

2. Safety of Physical and Mechanical Properties

Regulations: ISO 8124-1(International), 2009/48/EC (EU), EN 71-1 (EU), ASTM F963 (US), GB 6675 (China)

Small parts test	Compression test	Sharp edge test
Tensile force test	Bite force test	Sharp point test
Torque force test	Impact test	Seam tensile force test
Drop test	Flexure test

3. Flammability

Flammable toys may present burning hazards to children. There are lots categories of flammable toys, including textiles used for toy packaging, paper toys, plastic toys and rubber toys. The aforesaid products must comply with relevant requirements of toy safety standards.

Regulations: ISO 8124-2 (International), EN 71-2 (EU) , ASTM F963 (US), GB 6675 (China)

4. Electromagnetic Compatibility

1) EU: Directive 2004/108/EC

The Directive applies to any apparatus and fixed installation. Some provisions in the Directive stipulate that equipment should be designed and manufactured in such a way that: the electromagnetic disturbance generated does not exceed the level above which radio and telecommunications equipment or other equipment cannot operate as intended; it has a level of immunity to electromagnetic disturbance which allows it to operate without unacceptable degradation of its intended use.

2) US: FCC Part 15

As the technical regulation required to be met in the US market, FCC PART15 specifies requirements for all radio frequency devices, including scope, administrative requirements and other conditions to be fulfilled for the placing on the market of such devices.

FCC Part 15 mainly targets at four categories of radio frequency devices: unintentional radiators, intentional radiators, unlicensed personal communications service devices, unlicensed national information infrastructure devices. Almost all electrical and electronic devices may include the unintentional radiators.

5. Electric Toys

1) EU: EN 62115 Electric Toy—Safety

EN 62115 contains the following information:

- *Testing conditions
- *Criteria for reduced testing
- *Marking and instructions
- *Power input
- *Heating and abnormal operation
- *Electric strength at operating temperature

- *Moisture resistance
- *Electric strength at room temperature
- *Mechanical strength
- *Construction
- *Protection of cords and wires
- *Components

- *Screws and connection
- *Clearances and creepage distance
- *Resistance to heat and fire
- *Radiation, toxicity and similar hazards

2) US: ASTM F963, 16 CFR 1505

ASTM F963 requirements for electrical toys:

The regulation is to avoid potential hazards (such as overheat, leakage, explosion, ignition, suffocation or ingestion of battery) caused by use of battery for toys. Both non-rechargeable and rechargeable batteries must conform to these requirements.

16CFR 1505 requirements on electrically operated toys or other electrically operated articles intended for use by children:

The part applies to electrically operated toys driven by alternating current under nominal voltage above 30V. It also specifies requirements on labelling, production, electrical design and structure, performance and the highest acceptable temperature for surface/material.

3) China: GB 19865 Electric Toy—Safety

The content of GB 19865 is similar with that of EN 62115 (EU). China has a late start compared with the US and European countries. So it will formulate some standards by reference to those from other countries to regulate the safety of products.

6. Component Evaluation

According to 16 CFR 1500.14B8 of Consumer Product Safety Commission (CPSC), art materials must complete Labelling of Hazardous Art Materials Act (LHAMA) certification in accordance with ASTM D4236. Art materials include: pigment, crayon, painting brush, pencil, glue, ink and canvas.

The certification shall be performed by toxicologists accredited by National Toxicology Program of US and those toxicologists evaluate the chronic hazards of products to the human health. "Art materials or products" refer to any substance distributed or re-packed by producers or packers and applicable to any step for the procedure of painting art.

Materials must be supplied for LHAMA certification

- Product name;
- Formulation list, including their chemical names, mass fractions, CAS Registry Numbers (CASRN) and Material Safety Data Sheet (MSDS);
- Net weight (content) of materials in separate packaging.

IV. Other Toy-related Tests

1. Proposition 65

Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, was enacted as a ballot initiative in November 1986. The Proposition was intended by its authors to protect California citizens and the State's drinking water sources from chemicals known to cause cancer, birth defects or other reproductive harm, and to inform citizens about exposures to such chemicals. Proposition 65 requires the state to maintain and update a list of chemicals known to the state to cause cancer or reproductive toxicity at least once a year.

According to stipulations, for “toys” designed or used for children under 6 years of age under reasonable conditions and “childcare articles” intended to facilitate sleep, relaxation, decoration, hygiene, feed, or assist sucking and grinding teeth for children under 3 years of age, DEHP, BBP, DBP, DIDP and DnHP (each phthalate) shall not exceed 0,1%. All exported products within the regulation of Proposition 65 should follow relevant stipulations of phthalates in the act to test DINP since 20 December 2014.

2. Hazardous Substances in Packaging Materials

1) EU—Packaging and Packaging Waste 94/62/EC and its amendment Directive (EU) 2015/720

The directive aims to harmonise national measures concerning the management of packaging and packaging waste and to prevent or reduce its impact on the environment. It specifies the total limit for lead, cadmium, mercury and hexavalent chromium, requires member states to reach stipulated recycling rate within in term limit. Beside, packaging materials should bear legible and hard-to-erase identification. Such identifications shall follow the requirements in Decision 97/129/EC.



2) US—Toxics in Packaging Clearinghouse (TPCH)

Established in 1992, The Toxics in Packaging Clearinghouse (TPCH) aims to reduce the four heavy metals (lead, cadmium, mercury and hexavalent chromium) in packaging and packaging components intended to be sold or distributed in US states. Therefore it restricts the entire supply chain of packaging, including manufacturers and suppliers for packaging and packaging components, or manufacturers and distributors that intended to use such products. Packaging refers to vessels provided for sale, protection and handling of products, generally including packaging of separate product, intermediate packaging of several products and transportation packaging. Packaging components refer to parts of separate packaging.

Standards for Heavy Metals in Packaging Materials

Standard	Limit for Total Concentration (mass) of Pb, Cd, Hg, Cr(VI)
94/62/EC (EU)	100 ppm
TPCH (US)	100 ppm

V. Common Test Items for Toys and Children's Products

For toys or children's products for sale in the EU

- Physical and mechanical test: (EN 71-1)
- Flammability test: (EN 71-2)
- Phthalates: Common plasticisers (REACH Annex XVII (Previous: 2005/84/EC))
- 19 heavy metals: Coatings, pigments, plastic stabilisers (EN 71-3)
- Formaldehyde: Fabric (EN 71-9 , EN 71-1 , EN 71-2 , EN 71-3)
- DMF: Drying agent

For toys or children's products for sale in the US

- Physical and mechanical test: (ASTM F963)
- Flammability test: (ASTM F963)
- Phthalates: Common plasticisers (CPSIA)
- Total lead: Coatings, pigments, plastic stabilisers (CPSIA)
- Total cadmium: Plating, coating
- 8 heavy metals: (ASTM F963)

For toys or children's products for sale in China

- Physical and mechanical test: (GB 6675)
- Flammability test: (GB 6675)
- Phthalates: Common plasticisers (GB 24613)
- Total lead: Coatings, pigments, plastic stabilisers (GB 24613)
- 8 heavy metals: (GB 6675/24613)



An Authoritative Platform for 3rd-Party Testing

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