

**TOYS** SAFETY TESTING  
METROLOGICAL VERIFICATION **AND** CALIBRATION SERVICE  
**LIGHT** INDUSTRY TESTING

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## 前言

随全球经济一体化的日益深化和发展，各国的贸易壁垒逐渐地被削弱或打破。随之而来的是人们对环保、安全及健康的追求也越来越高，而各个国家不停地更新技术标准和相关的法规，提高产品的技术门槛，给制造商、进口商和零售商增加了负担。同时，保护人类的健康和环境，实现可持续发展，是各国必须追求的共同目标，也是必然的趋势。利奥计量检测服务有限公司(LEO-MTS)正是在这理想的定位上来帮助客户满足质量、安全和环境方面的标准要求。

利奥计量检测服务有限公司(LEO-MTS)的检测、检验、校准和咨询的一体化服务在消费品领域独树一帜，设立了全方位产品安全管理系统和测试实验室，为产品进行专业及严谨的测试，推动客户达致卓越，实现可持续发展，帮助您、您的供应商和客户，降低或消除违反技术性法规的风险。

我们愿意成为各界客户产品质量和安全的忠诚守护者，以世界先进设备和技术为保障，竭诚以我们的专业知识成就各界合作伙伴的卓越事业！

Trade barriers of each country are gradually weakened under global economic integration. Therefore, people have a higher standard for environmental protection, safety and health. Developed countries have set higher technical standards and more strict regulations for products, which has increased burdens for manufacturers, importers and retailers. Striving toward a sustainable world is undoubtedly a common goal for most countries. LEO-MTS is an excellent option to help customers satisfy standard requirements on quality, safety and environment.

LEO-MTS provides excellent, integrated testing, inspection, calibration and consulting services. Our comprehensive Products Safety Management System and testing laboratory were established to carry out professional and rigorous tests on products and to help reduce or eliminate risks that violate technical provisions.

Leo's advanced equipment and professional knowledge help guarantee our customers' products are of the highest quality and safe for the consumer.

### LEO-MTS 愿景

我们致力成为被全球认可的检验和校准高品质服务提供商！

### LEO-MTS 使命

秉承行业基准，捍御产品安全；  
校测科学严谨，降低客户风险；  
铸就专业品牌，践行诚信公正；  
服务臻于致善，超越顾客期望。

### LEO-MTS 品质方针

数据准确，服务及时，机制高效

### LEO-MTS 服务宗旨

MTS是具有完全独立合法的第三方公正地位的技术服务机构，专业从事符合国际/国家行业标准的校准、检测和技术咨询工作。我们致力于以良好的信誉、精湛的技术和卓越的工作品质，为广大客户提供优质、满意的服务，向社会提供公正、可靠的公证性数据。

### LEO-MTS Vision

To be a globally-recognized laboratory, offering high-quality service in testing and calibration.

### LEO-MTS Mission

Guarantee the product quality by sticking to the industry benchmark.  
Reduce the business risk for the client via rigor and technical expertise.  
Build the professional brand by adhering to honesty and impartiality.  
Beyond the customer's expectation by providing excellent service.

### LEO-MTS Quality Policy

Accurate data, Timely service, Efficient system

### LEO-MTS Service Objective

LEO-MTS is a legally established third-party organization, specializing in technical service in both national and international scope, including industry-specific calibration, products and materials testing, as well as technical consultation. LEO-MTS promises all our clients the credible data and excellent service based on our sound reputation, advanced technology and good workflow management.

## 公司简介

鹤山利奥计量检测服务有限公司(LEO-MTS)成立于2009年，位于中国广东省鹤山市古劳镇玄坛庙工业区，屹立于美丽的西江河畔，面积3,000平方米，是专业的工业校准，消费品安全和可靠性评估，轻工业原材料检测、货物检验和技术咨询服务的独立第三方公证机构，帮助众多行业和企业提供一站式的全面质量解决方案。

LEO-MTS在工业仪表校准、消费品检测、轻工业原材料可靠性及环境卫生四大领域，提供有害物质检测，玩具及相关产品安全性检测，环境安全检测，轻工产品可靠性与失效分析，材料可靠性与失效分析，材料成份分析，纺织品、鞋类、皮革检测及包装材料检测，验货与审核服务，计量校准及仪器维修，技术咨询等多项综合检测与验证业务。

LEO-MTS是中国合格评定国家认可委员会(CNAS)认可的实验室，完全具备出具第三方检测报告的资质。除了通过国内的认可以外，LEO-MTS还通过了美国消费品安全委员会(CPSC)授权，成为其认可的实验室，检测报告具有国际公信力。

作为综合性、专业性和国际性的检测验证机构，LEO-MTS凭藉先进的技术和卓越的服务理念，为广大企业解决了众多质量难题，赢得了客户和社会的信赖。

## Company Profile

Established in 2009 and located in Xuantan Temple Industrial Zone, Gulao town, Heshan, Guangdong, China, Heshan LEO-MTS stands along the riverside of Xi River, covering an area of 3,000m<sup>2</sup>.

LEO-MTS offers various comprehensive authentication services such as hazardous substance testing, safety testing on toys and related products, environmental safety testing, light industry product liability analysis, material liability analysis, material components analysis, fabrics, shoes, leather and packaging material tests, inspection and verification services, metrology and calibration and instrument maintenance and technical consultation.

LEO-MTS is a China National Accreditation Service for Conformity Assessment (CNAS) approved lab and is qualified to issue third-party testing reports. In addition, LEO-MTS has been authorized by the Consumer Product Safety Commission as an accredited lab which enables LEOMTS to offer global validated testing report.

As a comprehensive, professional and international testing and verification organization, LEO-MTS has gained the trust of its customers by its outstanding performance in solving quality problems with advanced technology and excellent service concept.

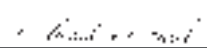


This recognizes that the company listed below is a Certified Testing Laboratory member of the International Safe Transit Association (ISTA).

Member ID: ST-9904 Valid through: November 01, 2017

Location: Heshan, Guangdong, China

## Heshan Leo Metrology and Testing Services Co., Ltd

  
 Edward A. Church  
 ISTA President

  
 Eric Hiser  
 ISTA Vice President - Technical

## LEO-MTS 优势

提供卓越专业服务，满足和配合顾客需求，并不断改进服务！

帮助企业在产前、产中和产後提供质量服务和技术改进方案！

不同类型产品，制订和实施质量方案，确保完成品质量要求！

紧密结合厂方需求，应特殊情况可灵活处理和配合订单货期！

熟识轻工行业原材料及辅料的特性，确保产质量安全和可靠！

集先进科研技术为一体，实现科学技术微创新、创新和变革！

参加国内外多项能力验证，保证数据结论公证准确、真实可靠！

技术和服是LEO-MTS立足于市场的基石，选择LEO-MTS，就意味您选择了一个具有丰富运作经验、真诚可靠的质量合作伙伴！

LEO-MTS独立公证的第三方专业技术服务机构，我们提供：

专业的检测、检验、校准技术支持；

公证独立的检验报告和数据；

便捷高效的服务保障；

以客户为中心的忠诚服务理念；

为客户提供一体化完全解决方案。

## Strengths of LEO-MTS

Integrate advanced scientific research and technology;  
Strive for innovation in science and technology;

Provide professional and excellent service to satisfy and meet the needs of customers' requirements continually.

Regularly participate in variety of international and domestic proficiency testing activities, ensure that testing and calibration results impartial and accurate, data true and reliable.

Familiar with the material properties of paper products, toys, textiles, packaging and food contact materials industries, have a good definition and accurate assessment on the safety and reliability of products.

Provide testing services and technical improvement proposals in pre-production period or product design stage.

Closely integrate with the factory, flexibly deal with special circumstances to urgent order delivery.

Technology and service are the foundation of LEO-MTS. Choosing LEO-MTS means choosing a reliable, sincere and quality partner with rich operating experience.

As an independent and impartial third-party professional technical service organization, LEO-MTS offers:

Professional technical support for testing, inspection and calibration;

independent and impartial inspection reports;

a convenient and effective service guarantee;

a loyal service concept with customer focus and an integrated total solution for the customer.



## LEO-MTS 核心业务 LEO-MTS Core Business

### 玩具及儿童产品安全检测

安全的玩具配合适当的监督能够使儿童玩耍时更添乐趣。正当主要的玩具入口国家通过出台不同的玩具安全标准及法规，以确保玩具安全之时，制造商及零售商亦同样需要面对产品制造时可能发生的缺陷及其所带来的健康危害。

LEO-MTS玩具安全检验范围基本涵盖了所有应用最广泛的国内外标准的要求，可以按美国、加拿大、澳大利亚、欧盟、中国等国家的标准和国际知名的大玩具公司的企业标准进行检验，对玩具类产品进行严格、准确的风险评估和测试。出具的报告符合各进口国的法规要求，可作为各国通关和结汇的有效文件，被全世界74个国家和地区认可和接受。

### Safety Testing of Toys and Children's Products

Child's play can be more fun with safe toys and proper supervision. While toy safety mandated by major importing countries through the toy standards and regulations, manufacturers and retailers alike are liable to possible manufacturing defects and related health hazards.

LEO-MTS toys safety testing covers almost all requirements of national and international standards. Tests can be conducted according to the standards of America, Canada, Australia, the European Union, China and famous toy manufactures' standards, which guarantees strict and accurate analysis of a product's risk. MTS reports are all in line with the regulations of each import country, and it can be used as the valid document for declaration and settlement. Test reports are accepted and certified by more than 74 countries around the world.

### 基本玩具安全标准

测试项目	美国	欧盟	加拿大	澳大利亚/ 新西兰	中国	国际
物理和机械性能	ASTM F963, 16 CFR 1500	EN71-1	Canada Consumer Product Safety Act Toys Regulations SOR/2011-17	AS/NZS ISO8124-1	GB6675.2	ISO8124-1
易燃性测试 (固体材料/玩具产品)	ASTM F963, 16 CFR 1500.44	EN71-2		AS/NZS ISO8124-2	GB6675.3	ISO8124-2
易燃性测试 (纺织品)	ASTM F963, 16 CFR 1610	EN71-2		AS/NZS ISO8124-2	GB6675.3	ISO8124-2
毒性元素(重金属)分析	ASTM F963, 16 CFR 1303, CPSIA	EN71-3		AS/NZS ISO8124-3	GB6675.4	ISO8124-3



## Basic Toy Safety Standards

Test Items	USA	Europe	Canada	Australia / New Zealand	China	International
Mechanical and physical properties	ASTM F963, 16 CFR 1500	EN71-1	Canada Consumer Product Safety Act Toys Regulations SOR/2011-17	AS/NZS ISO8124-1	GB6675.2	ISO8124-1
Flammability (Solid Material /Toys)	ASTM F963, 16 CFR 1500.44	EN71-2		AS/NZS ISO8124-2	GB6675.3	ISO8124-2
Flammability (Textile)	ASTM F963, 16 CFR 1610	EN71-2		AS/NZS ISO8124-2	GB6675.3	ISO8124-2
Toxic Element (Heavy metal)	ASTM F963, 16 CFR 1303, CPSIA	EN71-3		AS/NZS ISO8124-3	GB6675.4	ISO8124-3

## 玩具总重金属要求

	美国		欧盟			加拿大	
	CPSIA; ASTM F963-11		REACH			SOR/2011-17;SOR/2010-273	
材料	涂层	基材	塑料	珠宝	涂层	涂层	基材
总量要求	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
总铅(Pb)	90	100	500	500	500	90	90*
总汞(Hg)	—	—	—	—	—	10	—
总镉(Cd)	—	—	100	100	1000	—	—

\*适用于除厨具外在正常使用过程中与使用者口部直接接触的产品和供三岁以下儿童玩耍或学习的产品。

## Total Heavy metal requirement of Toy

	USA		Europe			Canada	
	CPSIA; ASTM F963-11		REACH			SOR/2011-17;SOR/2010-273	
Materials	Coatings	Substrates	Plastic	Jewelry	Coatings	Coatings	Substrates
Total limit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Lead (Pb)	90	100	500	500	500	90	90*
Mercury (Hg)	—	—	—	—	—	10	—
Cadmium (Cd)	—	—	100	100	1000	—	—

\*Applies to products, other than kitchen utensils, that are brought into contact with the user's mouth in the course of normal use and products intended for use in play or learning by children under three years of age.

## 玩具可迁移重金属要求

	美国		欧盟			加拿大	其他	
	ASTM F963-11		EN71-3:2013			SOR/2011-17	AS/NZS ISO8124-3; ISO8124-3; GB6675.4	
材料	涂层/基材	造型粘土	I类	II类	III类	涂层	除造型粘土 外材料	造型粘土
要求	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
砷 (As)	25	25	3.8	0.9	47	1000	25	25
钡 (Ba)	1000	250	1500	375	18750	1000	1000	250
镉 (Cd)	75	50	1.3	0.3	17	1000	75	50
三价铬 (Cr III)	60	25	37.5	9.4	460	—	60	25
六价铬 (Cr VI)			0.02	0.005	0.2	—		
汞 (Hg)	60	25	7.5	1.9	94	不允许含有*	60	25
铅 (Pb)	90	90	13.5	3.4	160	90 (T)	90	90
锑 (Sb)	60	60	45	11.3	560	1000	60	60
硒 (Se)	500	500	37.5	9.4	460	1000	500	500
铝 (Al)	—	—	5625	1406	70000	—	—	—
硼 (B)	—	—	1200	300	15000	—	—	—
钴 (Co)	—	—	10.5	2.6	130	—	—	—
铜 (Cu)	—	—	622.5	156	7700	—	—	—
锰 (Mn)	—	—	1200	300	15000	—	—	—
镍 (Ni)	—	—	75	18.8	930	—	—	—
锡 (Sn)	—	—	15000	3750	180000	—	—	—
有机锡 (Organic tin)	—	—	0.9	0.2	12	—	—	—
锶 (Sr)	—	—	4500	1125	56000	—	—	—
锌 (Zn)	—	—	3750	938	46000	—	—	—

注：

- (1) I类材料：干的，易碎的，粉末状或柔软的玩具材料(如：粉笔、蜡笔、造型粘土等)  
II类材料：液体或粘性的玩具材料(如：泡泡水、指画颜料等)  
III类材料：可刮取的玩具材料(如：表面涂层、纺织品、聚合物、皮革、纸张等)

(2) 加拿大的溶出测试方法与其他标准不同。

\*加拿大表面涂层中的总汞含量不能超过10mg/kg。

## Soluble Migrated Heavy Metal Requirement of Toy

	USA		Europe			Canada	Other	
	ASTM F963-11		EN71-3:2013			SOR/2011-17	AS/NZS ISO8124-3; ISO8124-3; GB6675.4	
Materials	Coatings/ Substrates	Modeling clay	Category I	Category II	Category III	Surface Coatings	Materials except modeling clay	Modeling clay
Requirements	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Arsenic (As)	25	25	3.8	0.9	47	1000	25	25
Barium (Ba)	1000	250	1500	375	18750	1000	1000	250
Cadmium (Cd)	75	50	1.3	0.3	17	1000	75	50
Chromium III (Cr III)	60	25	37.5	9.4	460	—	60	25
Chromium VI (Cr VI)			0.02	0.005	0.2	—		
Mercury (Hg)	60	25	7.5	1.9	94	Prohibited*	60	25
Lead (Pb)	90	90	13.5	3.4	160	90 (T)	90	90
Antimony (Sb)	60	60	45	11.3	560	1000	60	60
Selenium (Se)	500	500	37.5	9.4	460	1000	500	500
Aluminum (Al)	—	—	5625	1406	70000	—	—	—
Boron (B)	—	—	1200	300	15000	—	—	—
Cobalt (Co)	—	—	10.5	2.6	130	—	—	—
Copper (Cu)	—	—	622.5	156	7700	—	—	—
Manganese (Mn)	—	—	1200	300	15000	—	—	—
Nickel (Ni)	—	—	75	18.8	930	—	—	—
Tin (Sn)	—	—	15000	3750	180000	—	—	—
Organic tin	—	—	0.9	0.2	12	—	—	—
Strontium (Sr)	—	—	4500	1125	56000	—	—	—
Zinc (Zn)	—	—	3750	938	46000	—	—	—

**Note:**

( 1 )Category I: Dry, brittle, powder like or pliable toy material (such as: chalk, crayons, modeling clays, etc.)

Category II: Liquid or sticky toy material (such as: bubble solution, finger paints, etc.)

Category III: Scraped-off toy material (such as: surface coatings, textiles, polymers, leather, paper, etc.)

( 2 )Canada soluble test method is different from other standards.

\*Canada the concentration of total mercury present in a surface coating material must not be more than 10mg/kg.

## 儿童珠宝测试

儿童珠宝种类繁多，包括发饰、项链、耳环、手镯、手链、戒指等等，随著人们生活水准的提高，其需求量也日益增加。儿童年龄小还处在生长发育时期，抵抗能力弱于成年人，有些质量不好的首饰材料会对儿童的皮肤产生有害作用，出现过敏现象等。欧盟、美国、加拿大等多个国家或地区都已经制定专门的儿童珠宝首饰法规/标准，限制其中某些金属元素的含量

### (一) 美国

消费品安全改进法案CPSIA铅含量测试

ASTM F2923儿童珠宝首饰

加利福尼亚州珠宝法案 AB2901

### (二) 欧盟

欧盟REACH附录17条目23镉含量测试

欧盟REACH附录17条目63铅含量测试

欧盟REACH附录17条目27镍释放量测试

### (三) 加拿大

加拿大儿童首饰法规SOR/2011-19

## Children's Jewelry Test

There are various kinds of children's jewelry, including hair ornaments, necklaces, earrings, bracelets, rings, etc and demands are increasing. Poor quality jewelry materials have harmful effects on children's skin, triggering allergic reactions. As a result, EU, US, Canada and other countries have developed specific children's jewelry regulations and standards to limit the levels of certain heavy metals.

### (1) USA

Consumer Product Safety Improvement Act 2008 (CPSIA) Total Lead

ASTM F2923 Standard Specification for Consumer Product Safety for Children's Jewelry

California Bill AB2901 Jewelry

### (2) Europe

Total Cadmium test of Entry 23 of REACH Annex XVII

Total Lead test of Entry 63 of REACH Annex XVII

Nickel release test of Entry 27 of REACH Annex XVII

### (3) Canada

Canada SOR/2011-19 Children's Jewellery Regulations





## 邻苯二甲酸盐检测

邻苯二甲酸盐是一类使用广泛的增塑剂，也是工业常用的软化剂，用于增强可塑性，在塑胶和油漆中普遍存在。

欧盟早在2005/84/EC指令中已对用于玩具或儿童护理品的塑性材料及可放入口中的玩具及儿童护理品中的邻苯二甲酸盐作了明确限制，现已收编至REACH附录XVII限制列表中；美国在CPSIA2008中也明确提出了相关要求：供12岁以下儿童使用的玩具或3岁以下儿童使用的护理产品DEHP、DBP、BBP含量小于或等于0.1%；3岁以下儿童使用的护理产品或能放入口中供12岁以下儿童使用的玩具中DINP、DIDP、DNOP含量小于或等于0.1%；加拿大也在2010年提出邻苯二甲酸盐禁令：禁止6种邻苯二甲酸盐在乙烯基材料的儿童玩具和儿童护理用品中使用。

## 邻苯二甲酸盐法规汇总

### The Summary of Phthalates Regulations

邻苯二甲酸盐 Phthalates	REACH Annex XVII		CPSIA		Canada	
	限量 Limit	适用范围 Scope	限量 Limit	适用范围 Scope	限量 Limit	适用范围 Scope
邻苯二甲酸二丁酯 Dibutyl Phthalate(DBP)	0.1% SUM	玩具或儿童护理品的 塑性材料 Plasticized material in toys and childcare articles	0.1%	12岁以下儿童玩 具或儿童护理品 Any children's toy or child care article	0.1%	玩具或儿童护理品中 的乙烯基材料 The vinyl in a toy or child care article
邻苯二甲酸苯基丁酯 Benzylbuty Phthalate(BBP)			0.1%		0.1%	
邻苯二甲酸辛酯 Bis-(2-Ethylhexyl) Phthalate (DEHP)			0.1%		0.1%	
邻苯二甲酸二异壬酯 Diisononyl Phthalate (DINP)	0.1% SUM	可放入口中的玩具 或儿童护理品的塑 性材料 Plasticized material in toys and childcare articles which can be placed in the mouth by children	0.1%	可放入口中的玩 具或儿童护理品 Any children's toy that can be placed in a child's mouth or childcare article	0.1%	可放入4岁以下儿童口 中的玩具或儿童护理 品中的乙烯基材料 The vinyl in any part of a toy or child care article that can, in a reasonably foreseeable manner, be placed in the mouth of a child under four years
邻苯二甲酸二异癸酯 Diisodecyl Phthalate (DIDP)			0.1%		0.1%	
邻苯二甲酸二正辛酯 Di-n-octyl Phthalate (DNOP)			0.1%		0.1%	

## Phthalates Testing

Phthalates are a plasticizer which are widely used as a softener to enhance plasticity. They are applied in plastic and paint.

Europe has already made a clear restriction in directive 2005/84/EC on phthalates included in toys or childcare products which can be put into a child's mouth. The corresponding restriction requirements were replaced by the Annex XVII of REACH. The US also administered effective relevant requirements in CPSIA2008: DEHP, DBP, BBP contents in toys for children under 12 or childcare products for children under 3 include no more than 0.1% of phthalates. Canada put forward its own phthalate ban in 2010 including 6 kinds of phthalates often used in vinyl toys and childcare products.

被限制使用的邻苯二甲酸盐：  
Phthalates with limitations of application

序号 NO	CAS号 CAS No	缩写 Initials	物质名称 Substance
1	84-74-2	Dibutyl Phthalate (DBP)	邻苯二甲酸二丁酯
2	85-68-7	Benzylbutyl Phthalate (BBP)	邻苯二甲酸苯基丁酯
3	117-81-7	Bis-(2-Ethylhexyl) Phthalate (DEHP)	邻苯二甲酸辛酯
4	28553-12-0 & 68515-48-0	Diisononyl Phthalate (DINP)	邻苯二甲酸二异壬酯
5	117-84-0	Di-n-octyl Phthalate (DNOP)	邻苯二甲酸二正辛酯
6	68515-49-1 & 26761-40-0	Diisodecyl phthalate (DIDP)	邻苯二甲酸二异癸酯
7	84-69-5	Diisobutyl Phthalate (DIBP)	邻苯二甲酸异丁酯
8	84-75-3	Di-n-Hexyl Phthalate (DHP/DnHP)	邻苯二甲酸二己酯
9	84-66-2	Diethyl phthalate (DEP)	邻苯二甲酸二乙酯
10	131-18-0	Dipentyl phthalate (DPP)	邻苯二甲酸二戊酯
11	84-61-7	Dicyclohexyl phthalate (DCHP)	邻苯二甲酸二环己酯
12	84777-06-0	1,2-benzenedicarboxylic acid dipentylester, branched and linear (PiPP)	1,2-苯二甲酸-二(支链与直链)戊基酯
13	71888-89-6	1,2-benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)	邻苯二甲酸二C6-8支链烷基酯, 富C7
14	68515-42-4	1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	邻苯二甲酸二(C7-11支链与直链)烷基酯
15	117-82-8	Bis(2-methoxyethyl) phthalate (DMEP)	邻苯二甲酸二甲氧乙酯
16	776297-69-9	n-Pentyl-isopentyl phthalate (nPiPP)	邻苯二甲酸正戊基异戊基酯
17	605-50-5	Phthalic acid, bis-iso-pentyl-ester (DIPP)	邻苯二甲酸二异戊酯



## 欧美包装材料检测

包装及包装物料涉及各个行业，出口产品的所有包装必须符合相关重金属的含量要求，LEO-MTS能为广大客户提供相应的包装及包装材料的重金属含量检测。

### 欧盟包装废弃物指令(94/62/EC)

指令94/62/EC即《关于包装和包装废弃物的1994年12月20日欧洲议会和理事会指令》，2004年2月11日欧盟颁布了对94/62/EC的修正案2004/12/EC，其中规定整体回收率60%，再循环率55%，另外规定具体的再循环率：玻璃60%、纸和纸板60%、金属50%、塑胶25%、木材15%，重金属含量指标未改变。

### 包装物定义

是指由任何性质的任何材料制成的用于容纳、保护、搬运、交付和提供商品的所有产品。包括从原材料到加工成商品，从生产者到用户或消费者。

### 有害重金属限量要求

有害重金属物质铅、镉、汞及六价铬四种物质含量总和不得超过100mg/kg(0.01%重量百分比)。

## Packaging Materials Testing in USA & EU

Packaging and packaging materials are widely used in every industry. All packaging for export products should fulfill requirements related to heavy metal content. LEO-MTS provides customers with relevant heavy metal content testing on packaging and packaging materials.

### EU Directive on Packaging and Packaging Waste (94/62/EC)

Directive 94/62/EC refers to "European Parliament and Council Directive 94/62/EC of 20th December 1994 on Packaging and Packaging Waste." On February 11, 2004, the European Union issued 2004/12/EC as an amendment to 94/62/EC. The amendment specifies that the overall recovery rate of packaging should be 60% with the recycling rate of 55%, including specific recycling rates for glass at 60%, paper and paperboard at 60%, metal at 50%, plastic at 25% and wood at 15%. The standard of heavy metal concentrations remains unchanged.

### Definition of Packaging

Packaging refers to all products, regardless of their composition, that hold and protect commodities. These range from raw materials provided to manufacturers to finished goods for end users.

### Limit of Hazardous Heavy Metal Content

Total content of the four hazardous heavy metals lead, cadmium, mercury and hexavalent chromium should not exceed 100 mg/kg (0.01% weight percentage).

## 美国包装环保测试

CONEG即美国东北州首长联合会（8个州）于1989年成立，为减少包装及包装材料中的重金属含量而制定了地方性法规。随TPCH在1992年成立，CONEG也改名为TPCH，而TPCH测试方法和要求与CONEG是一样的，保持不变。

The Toxics in Packaging Clearinghouse (TPCH)在1992年设立，最初于1989年由CONEG资源节省委员会起草的包装毒性法规，旨在推进减少在美国各州出售或分销的产品包装和包装成分中四种重金属（汞、铅、镉和六价铬）的含量。因此，TPCH限制了整个包装的供应链，包括包装和包装零部件的生产商、供应商和使用包装的产品生产商或分销商。

该法规限制包装中铅、镉、汞及六价铬四种重金属的总和不得超过100mg/kg。

## CONEG and TPCH

In 1989 CONEG, the Conference of Northeastern Governors, recommended changes in local laws and regulations, aiming at reducing the heavy metal content in packaging materials. In 1992 the Toxics in Packaging Clearinghouse (TPCH) was formed to promote the Model Toxics in Packaging Legislation originally drafted by the Source Reduction Council of CONEG in 1989. The law specifically demands the reduction of the content of four heavy metals (Hg, Pb, Cd and Cr<sup>6+</sup>) contained in packaging materials of products sold or distributed in the United States. TPCH imposes restriction on the entire packaging supply chain, including manufacturers and suppliers of packaging components, and also product manufacturers and distributors who use packaging.

The regulation limits the total of the four heavy metals (Hg, Pb, Cd and Cr<sup>6+</sup>) contained in packaging to a total of no more than 100mg/kg.

测试标准 Testing standard	铅(Pb), 镉(Cd), 汞(Hg), 六价铬(Cr <sup>6+</sup> )的总浓度值(重量) Lead (Pb), Cadmium (Cd), Mercury (Hg), Hexavalent Chromium total concentration (weight)
欧盟94/62/EC EU Directive 94/62/EC	100mg/kg
美国TPCH USA CONEG or TPCH	100mg/kg





## 甲醛测试

甲醛（化学分子式HCHO，分子量：30.03）是一种无色的、有强烈刺激性气味的气体。甲醛已经被世界卫生组织确定为致癌和致畸性物质，是公认的变态反应源，也是潜在的强致突变物之一。

研究表明甲醛具有强烈的致癌和促癌作用，长期接触低剂量甲醛的危害有：引起慢性呼吸道疾病，鼻咽癌、结肠癌、脑瘤、月经紊乱和细胞核的基因突变，DNA单链内交连和DNA与蛋白质交连及抑制DNA损伤的修复、妊娠综合症、新生儿染色体异常、白血病，引起青少年记忆力和智力下降。各国对甲醛的限制要求如下：

## Formaldehyde Testing

Formaldehyde (Chemical formula: HCHO, formula weight: 30.03) is colorless gas proved to be of carcinogenicity and teratogenesis by the World Health Organization. Longtime contact with a small amount of formaldehyde may lead to: chronic respiratory diseases, nasopharyngeal carcinoma, colon cancer, brain tumors, menstrual disorders, nucleus genetic mutations, DNA damage, chromosome abnormality and leukemia. Restrictions for the use of formaldehyde in products are listed below:

标准要求	适用范围	限量要求	测试方法
EN 71-9有机化合物要求	3岁以下儿童玩具	可接触纺织品 30mg/kg 可接触纸张 30mg/kg 可接触树脂粘合木 80mg/kg	纺织品: ISO 14184-1/ GB/T 2912.1 纸张: EN 645+ EN 1541 树脂粘合木: EN 717-3
日本玩具安全标准第三部份, 2012	玩具中的纺织品	婴幼儿纺织品玩具(2岁以下) 16mg/kg 直接与人体接触的纺织品玩具 75mg/kg	
GB 18401-2010 国家纺织品基本安全技术规范	A类: 3岁以下婴幼儿用品 B类: 直接接触皮肤的产品 C类: 非直接接触皮肤的产品	A类: 20mg/kg B类: 75mg/kg C类: 300mg/kg	

Standards	Application Scope	Limitation	Test Method
EN 71-9:Organic chemical compounds Requirement	Toys for children under 3 years of age	30mg/kg Accessible textiles 30mg/kg Accessible paper 80mg/kg Accessible resin-bonded wood	Textiles: ISO 14184-1/ GB/T 2912.1 Paper: EN 645+ EN 1541 Resin-bonded Wood: EN 717-3
ST 2012 Toy Safety Standard part 3	Textiles used for toys	Textiles used for toys intended for infant (under 2 years old) 16mg/kg Textiles used for toys that come in contact with the human body 75mg/kg	
GB 18401-2010 National Textile Basic Safety Technical Specifications	Class A: Infant products for <3 year olds Class B: Products with direct contact to skin Class C: Products with indirect contact to skin	Class A: 20mg/kg Class B: 75mg/kg Class C: 300mg/kg	

## DMF检测

富马酸二甲酯(Dimethylfumarate, 简称DMF)具有很强的广谱杀菌效果, 能抑制30多种常见的细菌、酵母菌及霉菌, 被广泛用于皮革、鞋类、纺织品、竹木制品等的杀菌及防霉处理。如果超量使用富马酸二甲酯(DMF), 可能引起消费者皮肤过敏、皮疹或灼伤疼痛。

对DMF的禁令最初是在2009年3月17日欧盟发布的2009/251/EC中, 该决议是依据通用产品安全指令(2001/95/EC, GPSD)的第13条: 委员会在意识到特定产品造成严重危险, 在同成员国商议之后, 可批准紧急措施, 该措施一般不超过一年, 在相同程式下, 还可延长不超过一年的时间。

2009年3月20日《欧盟公报》发布: 于2009年5月1日起全面禁用富马酸二甲酯, 并要求成员国确保没有含富马酸二甲酯的产品在市场上投放或销售。此决议要求: 测定产品或产品部件中富马酸二甲酯的含量的最大限量为0.1mg/kg。

2012年5月16日, 欧盟已将富马酸二甲酯(DMF)纳入REACH法规附录17限制性物质列表条目61中进行管控。

## DMF Inspection

Dimethylfumarate (hereinafter referred to as DMF) is used to kill bacteria since it can restrain bacterium, saccharomycetes, and saccharomycetes of more than 30 kinds. It is commonly used for mildew prevention and the sterilization treatment of leather, footwear, textile, bamboo and wood items, etc. The overuse of DMF may cause consumers to experience skin irritation, rash or burning pain.

The first interdict for DMF was declared in resolution 2009/251/EC which was announced on March 17, 2009, and was conducted according to the thirteenth article of General Product Safety Directive: If there is any product which may lead to serious risk, the committee can approve emergency measures toward the product after coming to a consensus with other committee members. Generally, the emergency measure shall not be in force for more than one year, however, it may be prolonged for another year if necessary. On March 20, 2009 the Official Journal of the European Union declared the resolution take effect as of May 1, 2009. According to the Official Journal of the European Union, DMF use is prohibited in all products. All member countries are not permitted to sell DMF products in the marketplace. This prohibition requires that the DMF content in all tested products or product components should be under 0.1mg/kg. May 16, 2012, COMMISSION REGULATION (EU) has issued regulations to ban the using of DMF in consumer products and add DMF into the table of Annex XVII to Regulation (EC) No 1907/2006.

测试项目 Test Items	限制法规 Regulation	限量 Limit
富马酸二甲酯 (DMF)	Entry 61 of REACH Annex VXII	0.1mg/kg

## 多环芳烃

多环芳烃(PAHs)指分子中含有两个或两个以上苯环的碳氢化合物,包括萘、蒽、菲、芘等150余种化合物。英文全称polycyclic aromatic hydrocarbon,简称PAHs。有些还含有氮、硫和环戊烷,常见的多环芳烃具有致癌作用的为四到六种的稠环化合物。

多环芳烃对人体的主要危害部位是呼吸道和皮肤。人们长期处于多环芳烃污染的环境中,可引起急性或慢性伤害。多环芳烃PAHs落在植物叶片上,会堵塞叶片呼吸孔,使其变色,萎缩,卷曲,直至脱落,影响植物的正常生长和结果。

### 德国 18 PAHs

材料中PAHs污染的主要原因是在橡胶和柔性塑胶中使用了PAHs污染的软化油;在橡胶和塑胶中使用PAHs污染的煤烟作为黑色颜料;到目前为止,PAHs污染被证实不仅仅存在于橡胶中,也存在于其它各种塑胶当中,例如:ABS,PP,各种清漆或涂层和各种天然材料。

在2014年8月,德国技术设备及消费品委员会(ATAV)出台多环芳烃(PAHs)的新管控。对供应商提出了更为严苛的要求。此修订于2015年7月1日开始生效。适用范围:需要申请GS认证的电子电气产品,玩具及轻工产品。

## Polycyclic Aromatic Hydrocarbon (PAHs)

The hydrocarbon containing two, or more than two, benzene rings in their molecules is called a polycyclic aromatic hydrocarbon (PAHs). There is a total of 150 PAHs, including Naphthalene, Anthracene, Phenanthrene, Pyrene, and some PAHs containing Nitrogen, Sulphur and Cyclopentane. 4 to 6 kinds of fused ring compounds in PAHs have carcinogenic effects.

Prolonged exposure to PAHs, can cause acute or chronic damage to the human body, especially the respiratory tract and skin in addition to plant life.

### German 18 PAHs Certification

The reasons for PAHs contamination in materials are due to the application of PAHs contaminated softening oil in rubber and flexible plastics, and the use of PAHs-contaminated bitumite as black pigment in plastic and rubber. So far, PAHs contamination has been verified in not only rubber, but also in different kinds of plastics, such as ABS, PP, varnish or coatings and various natural materials.

In August 2014, ATAV issued a new PAHs Amendment with more demanding requirements for suppliers. The amendment has been in effect since July 1, 2015, and covers the electronics and electrical products, toys and light industrial products that has GS (Geprüfte Sicherheit) certification.



参数	第1类 (mg/kg)	第2类(mg/kg)		第3类 (mg/kg)	
	意图放入口中的材料或长期与皮肤接触的玩具材料 (大于30秒)	与皮肤接触超过30秒 (长时接触) 或短期重复接触且不属于第一类的材料		与皮肤接触小于30秒 (短时接触) 且不属于第一、二类的材料	
		玩具	其他产品	玩具	其他产品
苯并(a)芘	<0.2	<0.2	<0.5	<0.5	<1
苯并(e)芘	<0.2	<0.2	<0.5	<0.5	<1
苯并(a)蒽	<0.2	<0.2	<0.5	<0.5	<1
苯并(b)荧蒽	<0.2	<0.2	<0.5	<0.5	<1
苯并(j)荧蒽	<0.2	<0.2	<0.5	<0.5	<1
苯并(k)荧蒽	<0.2	<0.2	<0.5	<0.5	<1
蒽	<0.2	<0.2	<0.5	<0.5	<1
二苯并(a,h)蒽	<0.2	<0.2	<0.5	<0.5	<1
苯并(g,h,i)芘	<0.2	<0.2	<0.5	<0.5	<1
茚并(1,2,3-cd)芘	<0.2	<0.2	<0.5	<0.5	<1
萘烯, 萘, 芴, 菲, 芘, 蒽, 荧蒽	<1	<5	<10	<20	<50
	总和	总和	总和	总和	总和
萘	<1	<2		<10	
18种多环芳烃总和	<1	<5	<10	<20	<50

Parameter	Category 1 (mg/kg)	Category 2 (mg/kg)		Category 3 (mg/kg)	
	Materials indented to be put in the mouth, or materials of toy with intended and prolonged skin contact ( longer than 30 s ) Textiles used for toys	Materials not covered by category 1, with foreseeable skin contact for longer than 30s (long-term skin contact) or short-term repeated skin contact		Materials not covered by category 1 or 2, with foreseeable skin contact up to 30 s (short term skin contact)	
		Toy	Other product	Toy	Other product
Benzo[a]pyren	<0.2	<0.2	<0.5	<0.5	<1
Benzo[e]pyren	<0.2	<0.2	<0.5	<0.5	<1
Benzo[a]anthracen	<0.2	<0.2	<0.5	<0.5	<1
Benzo[b]fluoranthen	<0.2	<0.2	<0.5	<0.5	<1
Benzo[j]fluoranthen	<0.2	<0.2	<0.5	<0.5	<1
Benzo[k]fluoranthen	<0.2	<0.2	<0.5	<0.5	<1
Chrysen	<0.2	<0.2	<0.5	<0.5	<1
Dibenzo[a,h]anthracen	<0.2	<0.2	<0.5	<0.5	<1
Benzo[ghi]perylene	<0.2	<0.2	<0.5	<0.5	<1
Indeno[1,2,3-cd]pyren	<0.2	<0.2	<0.5	<0.5	<1
Acenaphthylen, Acenaphthen, Fluoren, Phenanthren, Pyrene, Anthracen, Fluoranthen	<1	<5	<10	<20	<50
	Sum	Sum	Sum	Sum	Sum
Naphthalin	<1	<2		<10	
Sum 18 PAH	<1	<5	<10	<20	<50





## 欧盟 8 PAHs

欧盟化学品管理法规REACH附录17要求，从2010年1月1日起，填充油如含有指定PAHs物质者，不可置于市场及用于生产轮胎或轮胎部件。2013年12月6日，欧盟委员会发布并修订REACH附录17关于多环芳烃(PAHs)的限制要求。此法规将于2015年12月27日正式执行。

在正常或合理的可预见的使用条件下，产品中如含有直接并且长期接触人体皮肤或口腔的橡胶或塑胶部件，则其中列表中任一多环芳烃的含量限值为1mg/kg(0.0001%)。限制的产品范围：运动器材如自行车、高尔夫球杆、球拍，日常用具、手推车、步行支架，家用工具，服装、鞋类、手套、运动服装，表带、腕带、面具、头巾。

玩具，包括活动玩具和儿童护理品，如果含有超出多环芳烃(PAHs)限量要求的橡胶或塑胶部件，不得投放市场。在正常或合理的可预见的使用条件下，产品中如含有长期直接接触或短期重复接触皮肤或口腔的橡胶或塑胶部件，则其中列表中任一多环芳烃的含量限值为0.5mg/kg(0.00005%)。

## EU REACH 8 Polycyclic Aromatic Hydrocarbons (PAHs)

Beginning January 1, 2010, Annex XVII of REACH stated that extender oils should not be placed in the market or used in the production of tires if they contain named PAHs substances. In addition, the limit of PAHs in Annex XVII to REACH was amended on Dec. 6th, 2013 and will be valid until Dec. 27th, 2015.

The entry 50 of Annex XVII states that articles shall not be placed in the market for supply to the general public if any of their rubber or plastic components that come into direct, as well as prolonged or short-term repetitive, contact with the human skin or oral cavity under normal or reasonably foreseeable conditions of use, contain more than 1mg/kg (0,0001 % by weight) of any of the listed PAHs.

Such articles include:

- sports equipment such as bicycles, golf clubs, racquets
- household utensils, trolleys, walking frames
- tools for domestic use
- clothing, footwear, gloves and sportswear
- watch-straps, wrist-bands, masks, head-bands

Toys, including activity toys, and childcare articles, shall not be placed in the market, if any of their rubber or plastic components that come into direct, as well as prolonged or short-term repetitive, contact with the human skin or the oral cavity under normal or reasonably foreseeable conditions of use, contain more than 0.5mg/kg (0,00005 % by weight) of any of the listed PAHs.

多环芳烃名称	CAS No.	轮胎或轮胎部件填充油 (mg/kg)	长期接触人体皮肤或口腔的橡胶或塑胶部件 (mg/kg)	玩具(活动), 儿童护理品, 其橡胶或塑胶配件长期与人体皮肤和口腔接触 (mg/kg)
苯并芘 (BaP)	50-32-8	1	1	0.5
苯并芘 (BeP)	192-97-2		1	0.5
苯并蒽 (BaA)	56-55-3		1	0.5
蒽 (CHR)	218-01-9		1	0.5
苯并荧蒽 (BbFA)	205-99-2		1	0.5
苯并芘 (BjFA)	205-82-3		1	0.5
苯并芘 (BkFA)	207-08-99		1	0.5
二苯并蒽 (DBAhA)	53-70-3		1	0.5
总含量		10		

PAHs	CAS No.	in extender oils and in tyres(mg/kg)	rubber or plastic components that come into direct as well as prolonged or short-term repetitive contact with the human skin or the oral cavity(mg/kg)	Toys, including activity toys, and childcare articles, shall not be placed on the market, if any of their rubber or plastic components that come into direct as well as prolonged or short-term repetitive contact with the human skin or the oral cavity(mg/kg)
Benzo[a]pyren (BaP)	50-32-8	1	1	0.5
Benzo[e]pyren (BeP)	192-97-2		1	0.5
Benzo[a]anthracen (BaA)	56-55-3		1	0.5
Chrysen (CHR)	218-01-9		1	0.5
Benzo[b]fluoranthene (BbFA)	205-99-2		1	0.5
Benzo[j]fluoranthene (BjFA)	205-82-3		1	0.5
Benzo[k]fluoranthene (BkFA)	207-08-99		1	0.5
Dibenzo[a,h]anthracene (DBAhA)	53-70-3		1	0.5
Sum		10		

## LEO-MTS 核心业务

### 材料检测分析及产品可靠性

随行业的发展，消费者的鉴别水准也在不断提升，对产品的可靠性要求也越来越高。为了帮助轻工行业或相关制造业尽可能地挖掘由设计、制造或机构部件所引发的潜在性问题，在产品投产前或后寻找解决问题点，为产品品质和可靠性做出必要的保证。

#### 纸张

纸张的品质直接影响整个纸制品的品质，纸张的用途不一样，其性能和品质要求也是不一样的。高档的产品，必须对纸张有很高的要求，适应性能必须要更加良好。LEO-MTS能全面分析纸张的本身特性，结合使用者的实际需要，开发了专业化的纸张检测实验室，满足印刷通讯行业印刷品的品质检测需求，从而知晓此纸张的适用性能和对相关标准的符合性。

## LEO-MTSCoreBusiness

### Materials Testing Analysis & Products Reliability

Product reliability requirements are increasing due to the growth of the printing industry and rising consumer concerns. It is necessary for industries to determine and alleviate potential risks prior to production in order to guarantee component's quality and reliability.

#### Paper

The quality of paper has a direct influence on the distinctive characteristics of finished products. The properties and requirements of paper vary according to usage. For example, paper used in high-end products is, appropriately, of a higher quality. With the development of a professional paper testing lab, Leo-MTS can comprehensively analyze the characteristics of paper. Our lab tests the applicability and conformity of a specified paper in order to ensure it will fulfill a customer's needs for their printed product.



测试类别 Test Type		中国标准 National Standard	美国标准 US Standard	国际标准 International Standard	
结构性能 Structural Performance	定量	Grammage	GB/T 451.2	TAPPI T410	ISO 536
	厚度	Thickness	GB/T 451.3	TAPPI T411	ISO 534
	水分含量	Moisture	GB/T 462	TAPPI T412	ISO 287
光学性能 Optical Performance	白度	Whiteness	GB/T 22879 GB/T 22880	TAPPI T562	ISO 11475 ISO 11476
	亮度	Brightness	GB/T 7974 QB/T 2804	TAPPI T452	ISO 2470
	颜色	Color	GB/T 7975 GB/T 21245		ISO 5631
	色度值	Tint		TAPPI T562	
	不透明度	Opacity	GB/T 1543	TAPPI T425	ISO 2471
	尘埃度	Defect Size	GB/T 1541	TAPPI T564	
	光泽度	Gloss	GB/T 8941	ASTM D523	ISO 8254-1 ISO 8254-3
表面性能 Surface Performance	粗糙度	Roughness	GB/T 22363	TAPPI T555	
	磨擦系数	Coefficients of Friction	GB/T 22895	TAPPI T549	ISO 15359
	表面强度	Wax Pick	GB/T 22837	TAPPI T459	
吸收性能 Sorption Performance	吸油性	Print Penetration	CY/T 104.3		IGT W24
	吸水量	Water Absorbency	GB/T 1540	TAPPI T441	
化学性能 Chemical Performance	pH	pH	GB/T 1545		ISO 6588-1
	碱度	Alkalinity		TAPPI T553	
	灰分	Ash	GB/T 742 GB/T 22877	TAPPI T413	ISO 1762 ISO 2144
力学性能 Mechanical Performance	耐折度	Folding Endurance	GB/T 457	TAPPI T511	ISO 5626
	Z方向强度	Z-Direction Tensile	GB/T 31110	TAPPI T541	ISO 15754
	粘合强度	Internal Bond Strength	GB/T 26203	TAPPI T569	
	短距压缩	Short Span Compressive Strength	GB/T 2679.10	TAPPI T826	ISO 9895
	挺度	Stiffness	GB/T 22837	TAPPI T489	ISO 2493
	撕裂度	Internal Tearing Resistance	GB/T 22364	TAPPI T414	ISO 1974
	耐破度	Bursting	GB/T 454 GB/T 1539	ISO 2759 ISO 2758	TAPPI T403 TAPPI T807 TAPPI T810
	边压强度	Edgewise Compressive	GB/T 6546 GB/T 2679.17	TAPPI T811	
	拉伸特性	Tensile Properties	GB/T 12914	TAPPI T494	ISO 1924-2
	伸缩性	Dimensional Instability	GB/T 459		
印刷性能 Printing Performance	拉毛阻力	Picking	GB/T 22365		ISO 3783 IGT W31
	胶印试验	Offset Printing			IGT W32
	墨斑	Mottle	CY/T 104.4		IGT W57
	掉毛	Linting			IGT W44



## 瓦楞纸和纸板

瓦楞纸板是一个多层的黏合体，它最少由一层波浪形芯纸夹层及一层纸板构成。它有很高的机械强度，能抵受搬运过程中的碰撞和跌落。

瓦楞纸板经过模切、压痕、钉箱或粘箱制成瓦楞纸箱。瓦楞纸箱是一种应用最广的包装制品，用量一直是各种包装制品之首。瓦楞纸箱以其特点和环保优势被广泛应用于商品的外包装，在商品的运输、保存和销售中起到了重要的保护作用。在使用过程中，要求纸箱必须达到一定的牢固度和耐用性。当前，激烈的市场竞争，使各纸箱生产企业在生产工艺和管理上不断的进行改进以获得最大利润，这就使得纸箱用户在使用纸箱的过程中遇到了或多或少的品质问题，如纸箱堆码后垮塌、破裂等造成了许多不必要的损失。为避免出现这样的情况，生产出合格的纸箱产品，必须对瓦楞纸箱进行检测，使瓦楞纸箱的生产过程得到有效的控制，确保使用瓦楞纸箱的合格。

## Corrugated paper and paper board

Corrugated paper board is a multi-layered bonding body. It consists of a minimum of one layer of wavy core paper and one layer of cardboard. It has high mechanical strength and is able to withstand impact and dropping during transpotations and removal.

Corrugated boxes are widely used packaging products with environmental advantages. They are used for packaging goods, and play an important protective role in the transportation and sales of goods. To be effective, corrugated boxes require a specified firmness and durability. Due to fierce market competition, carton manufacturers continue to modify their production process to reduce prices. Because of this, there are now cardboard boxes of questionable quality in the market. These substandard cartons can collapse when stacked and tear or burst under normal handling situations. In order to avoid these issues, testing of corrugated boxes is necessary to ensue their quality.

项目名称	Item Name	中国标准 National Standard	美国标准 US Standard	国际标准 International Standard
破裂强度	Bursting strength	GB/T 6545	TAPPI T810	ISO 2759
边压强度	Edgewise crush resistance	GB/T 6546	TAPPI T811	ISO 3037
平压强度	Flat crush	GB/T 22874	TAPPI T 825	ISO 3035
环压强度	Ring crush	GB/T 2679.8	TAPPI T 822	ISO 12192
粘合强度	Pin Adhesion	GB/T 6544	TAPPI T 821	
抗压强度	Compression Strength	GB/T 4857.4	ASTM D642	ISO 12048

## 油墨和涂料

油墨是印刷资讯传媒中的一种重要色体材料，它的性能直接影响到印刷中的转移过程和印刷后的图文资讯再现品质。印刷科学的发展和承印材料的开发与应用、新型印刷版材和新印刷工艺的出现，为油墨的更新与发展带来了挑战和机遇，控制油墨的各项参数，是印刷复制高品质图文资讯产品的重要保证。LEO-MTS能全面分析油墨的特性，从而知晓油墨的流变性能、干燥机理、粘附机理、成色机理和印刷适性能等，开发了专业化的油墨检测实验室，满足印刷通讯行业的印刷品的品质检测需求，从而知晓油墨的适应性能和对相关标准的符合性。

## Ink and Paint

Ink is an important coloring material in the printing communication industry. Its performance has a direct impact on the quality of graphic presentation during the process of transmission. With the development of printing science, development and application of printing materials, the presence of new printing plates and printing techniques, the renewal and development of ink faces a great challenge as well as opportunities. Control of ink's parameters guarantees high quality graphic products. LEO-MTS is able to analyze properties of ink thoroughly to check rheological properties, drying mechanism, adhesion mechanisms, coloring process and mechanism and printing applicability of the ink. A professional ink testing lab has been established in order to test the applicability and conformity of the inks.

项目名称	Item Name	中国标准 National Standard	美国标准 US Standard	国际标准 International Standard
颜色	Color	GB/T 14624.1 CY/T 31		ISO 12647-2
密度	Density	GB/T 14624.1		ISO 12647-2
光泽度	Gloss	GB/T 8941	ASTM D523	ISO 8254-1 ISO 8254-3
pH	pH	GB/T 1717	ASTM E70	ISO 787
细度	Grindage	GB/T 6753.1	ASTM D1316	
挥发物含量	Volatile Content	GB/T 1725	ASTM D2369 ASTM D5403	ISO 3251
粘度	Viscosity	GB 265	ASTM D4212	
乳化率	Emulsification		ASTM D4942	
耐磨度	Rub Resistance		ASTM D5264	
干燥时间	Drying Time	GB/T 14624.4	ASTM D5895	
耐化学试剂试验	Chemical Reagent Resistance	GB/T 18724	ASTM D6688	ISO 2836
固体含量	Nonvolatile Content	GB/T 1725	ASTM D2832	ISO 3251
附着力	Adhesion	GB/T 9286 GB/T 7707	ASTM F2252	ISO 2409
粘性	Tack	GB/T 18723		ISO 12634
耐光色牢度	Light Fastness	GB/T 22771	ASTM D3424	

## 粘 合 剂

胶粘剂能将两种或两种以上同质或异质的制件（或材料）连接在一起，固化后具有足够强度的有机或无机的、天然或合成的一类物质，统称为胶粘剂或粘接剂、粘合剂、习惯上简称为胶或胶水。粘合剂在轻工行业有广泛的应用，如覆膜、装订、粘合等加工工艺中，粘胶剂的稳定性直接影响到加工的效果，LEO-MTS拥有全套设备，对胶水的品质进行全面检测。

## Adhesive

Adhesive can connect two or more kinds of homogeneous or heterogeneous parts (or materials) together. It is an organic or inorganic, natural or synthetic substance with sufficient strengths after curing, which is collectively regarded as adhesive or bonding agents, adhesives, and commonly known as glue. Adhesive is widely used in light industry for such things as coating, binding, cohesives, etc. The stability of adhesive has a direct influence upon the effect of finishing. LEO-MTS has equipment for thoroughly testing the quality of adhesives.

项目名称	Item Name	中国标准 National Standard	美国标准 US Standard	国际标准 International Standard
单位用量	Weight Per Unit Area		ASTM D899	
颜色	Color	GB/T 9281.1	ASTM D1544	ISO 4630.1
气味	Odor		ASTM D4339	
比重	Density		ASTM D1475	
pH	pH	GB/T 14518	ASTM E70	
固体含量	Nonvolatile Content	GB/T 2793	ASTM D1489	
粘度	Viscosity	GB/T 2794	ASTM D2196 ASTM D4212	
耐化学试剂 试验	Chemical Reagent Resistance	GB/T 18724	ASTM D6688	ISO 2836



## 电化铝烫印箔

烫印箔实际由两个主要的薄层组成，即聚酯薄膜片和转印层。在烫印时，烫印层凭藉热量和压力的作用被压印承印件的全部或部分表面上。当烫印完毕后，聚酯薄膜连同没有被转印的部分一起被拉走。

## Aluminum Foil Stamping

Hot stamping foil is composed of two main thin layers, the polyester film substrate and the transfer layer. In the stamping process, heat and pressure are applied to imprint the foil on film transfer material which has not been used will be removed.

项目名称	Item Name	中国标准 National Standard	美国标准 US Standard
色差	Color Difference	GB/T 7921	ASTM D2244
剥离	Peel Adhesion	GB/T 2792	ASTM D3330
耐光色牢度	Light Fastness	GB/T 22771	ASTM D3424
耐磨度	Rub Resistance		ASTM D5264

## 塑胶类检测

用聚氯乙烯、聚乙烯、聚丙烯、聚苯乙烯以及其他树脂制成的薄膜,用于包装,以及用作覆膜层。塑胶包装及塑胶包装产品在市场上所占的份额越来越大,特别是复合塑胶软包装,已经广泛地应用于各个行业或领域,这些产品都给人们生活带来了极大的便利。对其各个特性的检测更有利于生产。

## Plastic

Plastic includes a variety of films made of polyvinyl chloride, polyethylene, polypropylene, polystyrene and other resins that are used for packaging and laminating material. There has been an increased demand for packaging and plastic packaging products in various industries or areas.

项目名称	Item Name	中国标准 National Standard	美国标准 US Standard	国际标准 International Standard
厚度	Thickness	GB/T 6672		ISO 4593
透光率	Luminous	GB/T 2410	ASTM D1003	
雾度	Haze	GB/T 2410	ASTM D1003	
湿润张力	Wetting Tension	GB/T 14216	ASTM D2578	
慢速刺破	Puncture		ASTM D5748	
拉伸特性	Tensile Properties	GB/T 1040	ASTM D882	ISO 2836
摩擦系数	Coefficients of Friction	GB/T 10006	ASTM D1894	
撕裂度	Tear	GB/T 16578.2	ASTM D1922	
热收缩率	Thermal Shrinkage		ASTM D2732	
热合强度	Welding Strength	QB/T 2358	ASTM F1921	



## 胶纸

透明胶纸是在BOPP原膜的基础上，经过高压电晕使一面表面粗糙，涂上胶水后经过分条分成小卷，就是我们日常使用的胶带。

## Gummed Paper

Transparent gummed paper, commonly called tape, is small rolls cut from the original BOPP film, which is coated with adhesive after corona by high-voltage.

项目名称	Item Name	中国标准 National Standard	美国标准 US Standard
剥离	Peel Adhesion	GB/T 2792	ASTM D3330
老化试验	Accelerated Aging	GB/T 17875	ASTM D3611
持粘性	Holding power	GB/T 4851	
初粘性	Tack	GB/T 4852	

## 木制品水分含量测试

水分会影响许多产品的加工工艺、使用寿命、可用性及产品质量。例如药品、塑胶和食品。因此监控水分含量资讯至关重要。大部份产品都具有最佳生产工艺所适合的水分含量，从而获得高品质产品。此外，水分含量对价格也有一定的影响。相关法规对于某些产品的最大允许水分含量有严格的规定（例如国家食品法规中有关规定）。

本实验室建立了干燥过程测试法，用传统烘箱法采用空气对流方式对样品进行加热，并需要较长时间干燥时间，测试样品中的水分含量。

## Test of Moisture Content in Woodware

Moisture content influences the processing technique, life, usage and quality of products, such as medication and food. It is critical to control the moisture content during production for achieving the highest quality product. Stringent regulations regarding the maximum moisture content in various products have been established, for example, National Food Regulations.

Considering its significance, our laboratory has developed an oven-drying method to detect moisture content in woodware based on air convection.

项目名称	Item Name	美国标准 US Standard
木材水份含量	Moisture Content	ASTM D4442 Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials

## 消费品耐气候环境试验

LEO-MTS环境可靠性实验室拥有一批专业的国际先进试验设备和环境室，性能稳定、功能齐全。包括下面的项目：

## Climate and Environment Experiments

LEO-MTS owns and operates advanced professional testing equipment and environment testing rooms with comprehensive functions and stable properties. Testing parameters are as follows:

项目名称	Item Name	测试范围 Test Scope
恒温恒湿房检验	Constant Temperature and Humidity	A.20°C±3 20%±5 B.20°C±3 35%±5 C.23°C±3 50%±5 D.26°C±3 75%±5
环境测试	Environmental Testing	温度：10~60°C 湿度：环境湿度0~95% Temperature: 10~60°C Humidity:Environment Humidity 0~95%
低温（冷冻与解冻）	Low Temperature(Freeze & Thaw)	0~25°C
高温	High Temperature	环境温度~200°C Environment Temperature~200°C
脱色（布料/绳）	Bleed Testing(Cloth/Cord)	
金属灰暗（项链类）	Metal Tarnish Testing(Necklace)	
翻粘	Blocking Tendency	





## 极端气候变化（温度和湿度）

温度范围Temp range: -18 至 25°C或室温至200°C  
湿度范围Humidity range: 15%-100%

## Extreme Climate Change (Temperature & Humidity Change)

LEO-MTS is capable of testing your products in a conditioning chamber based on your specified testing requirements and program.

## 光照老化－氙灯老化仪测试

氙灯老化测试是用氙灯来模拟全光谱太阳光的破坏效果，材料暴露在阳光下所产生的变化。通过材料试样的暴露在氙弧灯的光照及热辐射进行老化试验，从而评价材料的耐光、耐候性能。氙灯可产生与日光光谱曲线非常接近的稳定能量分布，能为包括红外线在内的整个光谱提供能量。对于照射有色物质，氙灯还能产生和日光一致的加热效应，从而大大提高了试验结果的准确性。

## Xenon Arc Lamp Artificial Aging – Accelerated Testing

The Xenon-arc lamp artificial aging-accelerated test simulates the natural destructive effect of sunlight on a full spectral region of a specimen. The Xenon-arc lamp controls irradiance in a simulated natural environment. This setup reveals the specimens colorfastness to light and its resistance to weather. Xenon-arc lamps can emit ideal light and stable energy distribution, which is very close to the solar spectrum, and encompasses all ranges of radiation including visible and infrared. Accurate and reliable test data analysis helps enterprises reduce product development time and production cost.

项目名称	Item Name	测试标准 Test Criteria
印刷品	Printing Product	ASTM D3424印刷品氙灯老化测试 ASTM D3424 Standard Practice for Evaluating the Relative Lightfastness and Weatherability of Printed Matter
涂料	Paints	ISO 11341色漆和清漆 人工风化及人工辐射照 滤子化的氙弧辐射照 ISO 11341 Paints and varnishes – Artificial weathering and exposure to artificial radiation – Exposure to filtered Xenon-arc radiation
		GB/T 1865 色漆和清漆 人工气候老化和人工辐射暴露 滤过的氙弧辐射 GB/T 1865 Paints and varnishes – Artificial weathering and exposure to artificial radiation – Exposure to filtered Xenon-arc radiation.

## 包装运输测试

为了尽可能降低运输流通过程对产品造成的损坏，保障产品的安全，方便储运装卸，加速交接点验，通常我们将以运输储运为主要目的的包装称之为运输包装。因此而进行的测试项目，称之为运输包装测试。

主要目的是克服物流过程中的各种危险因素：

防止物品从容器中脱出，集合产品；适应搬运和存储系统，充分利用空间；对标签（麦头）、条码等正确地标示以利于交接。

LEO-MTS拥有运输振动台、压力等设备，能对多个运输包装的要求项目进行核对总和测试：

## ISTA 国际运输安全测试

ISTA(International Safe Transit Association)，即国际安全运输协会，是一个国际性的非牟利组织，其前身是NSTA-美国国家安全运输协会，目前在全世界的会员已有数百家知名的货运公司和实验室。它一直致力于协助会员开发有效的包装、方法、后勤系统等，以提高产品的运输包装安全性能，从而防止或减少产品在运输和搬运过程中遇到的损失。该组织已经发布了一系列的标准以及测试程式和测试专案等档，作为对运输包装的安全性能进行评估的统一依据。LEO-MTS获得了ISTA的认证，可以提供重量低于150lb(80kg)的运输包装产品测试和品质评估服务，并可以签发ISTA认可的正式包装运输测试报告。

## Package Shipping Testing

To reduce product damage in logistics and for easy loading and unloading, special packaging methods are used for transportation. This type of packaging is referred to as “transportation packaging” and requires special testing in order to achieve the following:

Eliminate all risky factors in logistics;

Prevent products from coming off containers;

Ensure packages are suitable for logistics and storage;

Assure mark codes and labels are correct for efficient delivery.

LEO-MTS has shaking tests and pressure testing equipment available for different transportation packaging tests:

ISTA (International Safe Transit Association), a non-profit organization, whose Predecessor is NSTA-National Safe Transit Association’has hundreds of members over the world, including famous freight companies and laboratories. It has been committed to help our members develop more efficient packaging, methods, logistics system, etc, to improve the safe performance of products’ transport packaging and prevent or reduce the damages of products in handling and transportation. This organization has already published a series of documents, such as standards, testing Procedures and testing projects’as the uniform basis for evaluating the safe performance of products’ transport packaging. MTS, certified by ISTA, can provide transport packaging test of Packed-Products 150 lb (68 kg) or less and quality evaluation service, sign and issue formal and certified ISTA reports.

## ISTA 运输测试为您提供如下 **ISTA - International transit safe test** 的切实利益

- (1) 减少产品的损坏和流失，以保证产品价值；
- (2) 节省分销成本；
- (3) 减少和消除索赔争议；
- (4) 缩短包装开发的时间，增强市场投放信心；
- (5) 提高客户满意度和产品的市场占有率。

ISTA procedures will provide tangible benefits of:

- (1) Protection of products and profits with reduces damage and product loss
- (2) Economically balanced distribution costs.
- (3) Reduce and eliminate the controversial claims
- (4) Shortened packaged development time and confidence in product launch
- (5) Improve customer satisfaction and market share of products

测试项目	Test Category	方法 Method
定频振动，冲击（跌落）	Vibration-fixed displacement, shock(drop)	ISTA 1A
压力，振动（定频振动），冲击（跌落）	Compression, vibration (fixed displacement), shock(drop)	ISTA 1C
环境，压力，振动（定频振动），冲击（跌落），振动（定频振动）	Atmospheric Conditioning, Compression, vibration (fixed displacement), shock(drop), vibration (fixed displacement)	ISTA 2A
定频振动，旋转棱跌落，跌落，旋转面跌落，危险物冲击	vibration (fixed displacement), rotational edge drop, Drop, Full rotational drop, Hazard impact	ISTA 2D
定频振动，转动棱跌落，跌落，旋转面跌落，桥式冲击	Vibration (fixed displacement), rotational edge drop, Drop, Full rotational drop, bridge impact.	ISTA 2E



## 文具测试

书写工具中笔帽和端盖的危害,如果一个儿童吸入一个笔帽或一个端盖,可能遗留在喉咙处及堵塞在气管处。如果按照下面要求设计可以减少可能导致窒息的风险:

- 1) 笔帽有通气口或太大不能进入导气管。
- 2) 端盖是一个安全的附件,通风,平整或从书写工具的末端仅有个最小量的突起,或是太大不能进入导气管。

BS7272是已公认的及被广泛采用的英国国家安全标准规范要求之一,以减少由于笔帽导致窒息(BS7272-1)以及来自书写工具和标记工具的端盖(BS7272-2)的风险,因为在正常或可预见的情况下14岁及以内的儿童很有可能使用这些书写工具。

## Writing and marking instruments

If a child inhales a pen cap or an end closure, it may become lodged below the larynx and block the trachea. The risk of asphyxiation can be reduced if:

- 1) the pen cap is ventilated or is too large to enter the airway; or
- 2) the end closure is securely attached, ventilated, flush with or protrudes only a minimal amount from the end of the writing instrument or is too large to enter the airway.

BS 7272 is one of the well-recognized and widely adopted national safety standard specifying requirements to reduce the risk of asphyxiation from caps (BS 7272-1) and from end enclosures (BS 7272-2) of writing and marking instruments likely to be used by children up to the age of 14 years.

## 现行适用的有关书写和标记工具的国内/国际安全标准 Current Applicable National/International Safety Standards for Caps of Writing and Marking Instruments

项目名称	Item Name	方法 Method
书写和标记工具笔帽的测试	Writing and marking instruments – Part 1 Specification for caps to reduce the risk of asphyxiation	BS 7272-1:2008
书写和标记工具端盖的测试	Writing and marking instruments – Part 2 Specification for end closures to reduce the risk of asphyxiation	BS 7272-2:2008
14岁及以下儿童使用的书写和标记工具用笔帽的安全要求	Caps for writing and marking instruments intended for use by children up to 14 years of age	ISO 11540:2014
学生用品安全通用要求	Request in common use of security for student's articles	GB 21027-2007
进出口笔类产品笔帽和端盖安全要求及测试方法	Safety requirements and tests for caps and end closures of writing and marking instruments for import and export	GB 24110-2009

## LEO-MTS 核心业务 LEO-MTSCoreBusiness

### 计量检定 / 校准

为了确保测量设备数值的准确性，让企业所使用的每一台仪器都处于合格状态，LEO-MTS建立了综合校准室、电学校准室、压力校准室和理化校准室，目前通过中国合格评定国家认可委员会(CNAS)的计量校准项目共24项，项目包括了长度、力学、电磁和化学四个类别。

LEO-MTS有资质和能力承接体系的咨询和培训工  
作，并利用自身资源进行各种测试服务。

### 综合校准室

综合校准室配备了光栅式指示表检定仪、测温仪表检定仪、标准砝码、扭矩扳子检定仪、量块等标准设备，可开展指示表、温控仪、电子天平、电子秤、扭矩扳子、卡尺、千分尺等项目的校准。

### 电学校准室

电学校准室配备了多功能校准仪、耐压测试仪、标准电阻箱等标准设备，可开展电流、电压、电阻等项目的校准。

### Metrological Verification /Calibration

LEO-MTS offers calibration services for ensuring the accuracy of test data and to make sure every device and piece of equipment your company operates is qualified. We established comprehensive, electricity, pressure, physicochemical testing labs. Total 24 types include Length, Mechanic, Electromagnetic and Chemical services have been authorized by China National Accreditation Service for Conformity Assessment.

LEO-MTS lab is qualified to offer consulting and training and testing service with their resources in Metrology Division.

### Comprehensive Testing Lab:

The comprehensive testing lab equipment includes a raster-indicator instrument, thermometer, weight, electronic measuring wrench, a gauge block instrument and so on. We can offer calibration services for equipment such as indicators, temperature controllers, electronic balances, electronic scales, electronic measuring wrenches, calipers, micrometers, etc.

### Electricity Testing Lab:

The electricity testing lab equipment includes a multi-calibration meter, pressure instrument and resistance box so that we can offer current, voltage and resistance calibration services.

## 压力校准室

压力校准室配备了压力校准装置，可开展一般压力表、真空表和氧气表等项目的校准。

## Pressure Testing Lab:

The pressure testing lab equipment includes pressure related devices so that we can offer calibration services for pressure gages, vacuum gauges and oxygen forms

## 理化校准室

理化校准室配备了精密电子天平、恒温恒湿箱等装置，可开展对玻璃量器的校准。

## Physicochemical Testing Lab:

The physicochemical testing lab equipment includes an electronic scale and a constant temperature and humidity box so that we can offer calibration services for glass containers.





## （二）体系认证咨询业务

### 1. 专业课程培训

计量检定员、校准员考证、企业计量管理、ISO10012内审员、能源计量等培训、发证。我们与广东省计量协会、省计量院、赛宝计量检测中心强大的技术实力和人力资源，拥有大批行业内的专家讲师，并拥有国内一流的可供教学使用的计量标准和精密仪器；培训室配备可容20至200人不等的多个会议室、培训教室、实验室等，可开展各类培训，并且可提供多种现场教学。

可提供各类无线电、电磁、长度、热工仪器仪表的使用和校准培训，考核合格后颁发工业和资讯化部、国家质监、第三方认证机构等校准员、检定员、体系内审员、能源计量等培训证书。另外还提供计量与管理技术类培训，主要包括计量基础、测量不确定度评定、MSA测量系统分析、ISO/IEC 17025实验室管理运作、ISO10012测量管理体系内审员等培训。

## Management System Consultation Services

### 1. Professional Training

Technically supported by the professionals from Guangdong Province Institute of Metrology, Guangdong Metrology Association and Ceprei Calibration & Testing Center, and equipped with sophisticated and advanced metrological instruments, we offer professional courses including:

a. Training course of metrological supervisor (Curricular: the application and calibration on different appliances related to wireless, electromagnetism, length and etc.)

b. Acceleration course for calibration certification exam

c. Course on Enterprise Metrology Management

d. Course on Internal Auditor of ISO10012

e. Course on Energy Measurement

f. Training on Metrology and Management (Curricular: Measurement Basis; Estimate of Measurement Uncertainty; Measurement System Analysis; Management and Operation of Laboratory according to ISO/IEC17025; Internal Auditor of ISO10012 on Measurement Management System and etc.)

in the first-class training fields, including meeting rooms having a capacity from 20 to 200 people, training rooms and laboratories.

After the courses and examinations, you will receive training certificates issued by MTS and approved by the Ministry of Industry and Information Technology of the People's Republic of China, General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China and the third-party certification authorities.



# 校准与测量体系 METROLOGICAL VERIFICATION AND CALIBRATION SERVICE

## 2. ISO10012:2003 测量管理体系认证咨询

为加强企业计量管理工作，保证计量单位的统一和量值的准确可靠，推动我国企业计量工作的发展，在2005年6月，国家质量监督检验检疫总局和国家认证认可监督管理委员会联合发布了《测量管理体系认证管理办法》（即GB/T19022-2003 idt ISO10012:2003标准），并设立第三方认证机构—中启计量体系认证中心，统一管理、实施全国的测量管理体系认证工作。尽管国家对测量管理体系实行统一认证制度，对测量管理体系认证坚持“政府推动、企业自愿”的原则，但测量管理体系证书现已成为国家和广东省评价名牌产品、企业节能降耗的条件之一。

我司可为企业提供测量管理体系咨询服务，协助开展测量管理体系认证和内审员培训，提高企业的计量、测量管理水准。

## 2.Consultation Service on the Accreditation of ISO10012:2003 Measurement Management System Metrological Verification /Calibration

In June 2005, the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China and Certification and Accreditation Administration of the People's Republic of China together issued the guidebook GB/T19022-2003 idt ISO10012:2003 and established the Zhongqi Measurement System Center as a third party for accreditation. The center administers nation wide accreditation of the Measurement Management System, ensuring accuracy of units of measurement.

Leo MTS is qualified to provide professional advice and assistance regarding ISO 10012:2003 Measurement Management System accreditation.







校准认可能力范围 (见附表 认可的校准能力范围)

**SCOPE OF ACCREDITED CALIBRATION**

测量仪器名称 Instrument	校准参量 Parameter	领域代码 Code of Field	规范代号(含年号)名称 Title, Code of Calibration Method	测量范围 Range	扩展不确定度(校准和测量能力, $k=2$ ) Uncertainty (CMC, $k=2$ )	限制说明 Limitation
数显卡尺 Digital Display Caliper	长度 Length	130323	JJG30-2012通用卡尺检定规程 JJG30-2012 V. R. of Current Calipers	(0~200) mm, (200~300) mm	$U=0.01\text{mm}, U=0.02\text{mm}$	
带表卡尺 Dial Caliper	长度 Length	130323	JJG30-2012通用卡尺检定规程 JJG30-2012 V. R. of Current Calipers	(0~200) mm, (200~300) mm	$U=0.01\text{mm}, U=0.02\text{mm}$	
游标卡尺 Vernier Caliper	长度 Length	130323	JJG30-2012通用卡尺检定规程 JJG30-2012 V. R. of Current Calipers	(0~200) mm, (200~300) mm	$U=0.01\text{mm}, U=0.02\text{mm}$	
高度卡尺 Height Gauge	长度 Length	130320	JJG31-2011高度卡尺检定规程 JJG31-2011 V. R. of Height Gauge	(0~200) mm, (200~300) mm	$U=0.01\text{mm}, U=0.02\text{mm}$	
千分尺 Micrometer	长度 Length	130318	JJG21-2008千分尺检定规程 JJG21-2008 V. R. of Micrometer	数显外径千分尺:(0~25)mm, Digital display outside micrometer:(0~25) mm 外径千分尺:(0~25)mm Outside micrometer:(0~25) mm	$U=0.67\mu\text{m}, U=1.4\mu\text{m}$	
带表千分尺 Dial Micro- meters	长度 Length	130329	JJG 427-2004带表千分尺检定规程 JJG427-2004 V. R. of Micrometers with Gauge	(0~25) mm	$U=1.0\mu\text{m}$	
深度千分尺 Depth Micrometer	长度 Length	130329	JJG 24-2003深度千分尺检定规程 JJG24-2003 V. R. of Depth Micrometers	(0~25) mm	$U=1.2\mu\text{m}$	
百分表 Dial Test Indicator with Scale Division of 0.01mm	长度 Length	130329	JJG34-2008指示表(指针式、数显式) 检定规程 JJG34-2008 V. R. of Dial Gauges (dial and digital)	数显式:(0~10)mm, Digital:(0~10)mm 指针式:(0~3)mm, Dial:(0~3)mm 指针式:(0~5)mm, Dial:(0~5)mm 指针式:(0~10)mm, Dial:(0~10)mm	$U= 6.7\mu\text{m}, U= 4.5\mu\text{m},$ $U= 5.3\mu\text{m}, U= 6.7\mu\text{m}$	
千分表 Dial Test Indicator with Scale Division of 0.001mm	长度 Length	130329	JJG34-2008 指示表(指针式、数显式) 检定规程 JJG34-2008 V. R. of Dial Gauges (dial and digital)	指针式:(0~1)mm, Dial:(0~1)mm 数显式:(0~1)mm, Digital:(0~1)mm 数显式:(0~3)mm, Digital:(0~3)mm 数显式:(0~5)mm, Digital:(0~5)mm	$U= 1.5\mu\text{m}, U= 1\mu\text{m}$ $U= 1.5\mu\text{m}, U= 2.3\mu\text{m}$	
杠杆百分表 Dial Test Indicator with Scale Division of 0.01mm	长度 Length	130329	JJG35-2006杠杆表检定规程 JJG35-2006 V. R. of Dial Test Indicator	(0~1)mm	$U=4\mu\text{m}$	
杠杆千分表 Dial Test Indicator with Scale Division of 0.001mm	长度 Length	130329	JJG35-2006杠杆表检定规程 JJG35-2006 V. R. of Dial Test Indicator	(0~0.2)mm	$U= 1.5\mu\text{m}$	
深度百分表 Depth Dial Test Indicator with Scale Division of 0.01mm	长度 Length	130329	JJG 830-2007深度指示表检定规程 JJG 830-2007 Verification Regulation of Depth Dial Gauge	(0~5)mm	$U=6.7\mu\text{m}$	
电子称 Electronic Scale	质量 Mass	131103	JJG539-1997数字指示秤检定规程 JJG539-1997 V. R. of Digital Indicating Weighing Instruments	(1.5~100) kg	$U=0.76\text{g}~19\text{g}$	
弹簧称 Spring Dial Scale	质量 Mass	131103	JJG13-1997模拟指示秤检定规程 JJG13-1997 V. R. of Analogue Indication Weighing Instruments	200g~20 kg	$U=0.3\text{g}~10\text{g}$	
度盘称 Dial Scale	质量 Mass	131103	JJG13-1997模拟指示秤检定规程 JJG13-1997 V. R. of Analogue indication Weighing Instruments	200g~20 kg	$U=0.3\text{g}~40\text{g}$	
移动式杠杆称 Mobile Lever Scale	质量 Mass	131103	JJG14-1997非自行指示秤检定规程 JJG14-1997 V. R. of Non-self -indication Weighing Instruments	100g~100 kg	$U=0.25\text{g}~30\text{g}$	

# 校准与测量体系

## METROLOGICAL VERIFICATION AND CALIBRATION SERVICE

测量仪器名称 Instrument	校准参量 Parameter	领域代码 Code of Field	规范代号 (含年号) 名称 Title, Code of Calibration Method	测量范围 Range	扩展不确定度 (校准 和测量能力, $k=2$ ) Uncertainty (CMC, $k=2$ )	限制说明 Limitation
机械天平 Mechanical Balance	质量 Mass	131103	JJG98-2006机械天平检定规程 JJG98-2006 V. R. of Mechanical Balance	0.1mg~2 kg	$U=0.05\text{mg}\sim 0.16\text{g}$	只校 III级及以下 Accredited Only for: III level and below
电子天平 Electronic Balance	质量 Mass	131103	JJG1036-2008电子天平检定规程 JJG1036-2008 V. R. of Electronic Balance	0.1mg~2 kg	$U=0.05\text{mg}\sim 0.16\text{g}$	只校 III级及以下 Accredited Only for: III level and below
弹簧管式一般压力表及 真空表 Bourdon Tube Pressure Gauge, Pressure Vacuum and Vacuum Gauge for General Use	压力 Torque	132001 132002	JJG52-2013 弹性元件式一般压力表、 压力真空表和真空表检定规程 JJG52-1999 V. R. of Bourdon Tube Pressure Gauge, Pressure Vacuum Gauge and Vacuum Gauge for General Use	(-0.1~0) MPa, (1~+25) MPa	$U_{\text{rel}}=0.50\%$ , $U_{\text{rel}}=0.53\%$	只校 1.6级及以下 Accredited Only for: 1.6 level and below
扭矩扳子 Torque wrench	扭力 Torque	132501	JJG707-2014扭矩扳子检定规程 JJG707-2003 V. R. of Torque Wrenches	(20-100)N.m	$U_{\text{rel}}=0.50\%$ , $U_{\text{rel}}=0.21\%$	
电流表、电压表 Ampere- meter, Voltmeter	直流电流 DC Current	41001	JJG 124-2005电流表、电压表、功率 表及电阻表检定规程 JJG 124-2005 V.R.of Amperemeters, Voltmeters, Wattmeters and Ohmmeters	100uA~500uA, 500uA~2mA 2mA~5mA, 5mA~20mA 20mA~50mA, 50mA~200mA 200mA~500mA, 500mA~2A 2A~5A, 5A~20A	$U_{\text{rel}}=0.16\%$ , $U_{\text{rel}}=0.21\%$ $U_{\text{rel}}=0.25\%$ , $U_{\text{rel}}=0.21\%$ $U_{\text{rel}}=0.30\%$ , $U_{\text{rel}}=0.37\%$ $U_{\text{rel}}=0.25\%$ , $U_{\text{rel}}=0.35\%$ $U_{\text{rel}}=0.41\%$ , $U_{\text{rel}}=0.45\%$	
	直流电压 DC Voltage	41003		200mV~1V, 1V~2V, 2V~5V 5V~10V, 10V~20V, 20V~50V 50V~100V, 100V~200V 200V~500V, 500V~1000V	$U_{\text{rel}}=0.13\%$ , $U_{\text{rel}}=0.19\%$ $U_{\text{rel}}=0.22\%$ , $U_{\text{rel}}=0.20\%$ $U_{\text{rel}}=0.25\%$ , $U_{\text{rel}}=0.31\%$ $U_{\text{rel}}=0.22\%$ , $U_{\text{rel}}=0.34\%$ $U_{\text{rel}}=0.35\%$ , $U_{\text{rel}}=0.47\%$	
直流数字电压表 DC Digital Voltmeter	直流电压 Voltage	041001	JJG315-1983直流数字电压表电压表试 行检定规程 JJG315-1983 V.R.of DC Digital Voltmeter	200mV~1V, 1V~2V, 2V~5V, 5V~10V 10V~20V, 20V~50V, 50V~100V, 100V~200V	$U_{\text{rel}}=0.13\%$ , $U_{\text{rel}}=0.19\%$ $U_{\text{rel}}=0.22\%$ , $U_{\text{rel}}=0.20\%$ $U_{\text{rel}}=0.25\%$ , $U_{\text{rel}}=0.31\%$ $U_{\text{rel}}=0.22\%$ , $U_{\text{rel}}=0.34\%$ $U_{\text{rel}}=0.35\%$ , $U_{\text{rel}}=0.47\%$	
数字多用表 Digital Multimeter	直流电流 DC Voltage	41003	JJG598-1989直流数字电流表试行检 定规程 JJG598-1989 V.R.of DC Digital Amperemeter	100uA~500uA, 500uA~2mA 2mA~5mA, 5mA~20mA 20mA~50mA, 50mA~200mA 200mA~500mA, 500mA~2A 2A~5A, 5A~20A	$U_{\text{rel}}=0.16\%$ , $U_{\text{rel}}=0.21\%$ $U_{\text{rel}}=0.25\%$ , $U_{\text{rel}}=0.21\%$ $U_{\text{rel}}=0.30\%$ , $U_{\text{rel}}=0.37\%$ $U_{\text{rel}}=0.25\%$ , $U_{\text{rel}}=0.35\%$ $U_{\text{rel}}=0.41\%$ , $U_{\text{rel}}=0.45\%$	
温控仪 Thermo- meter Temperature Indication Controller	热工 Temperature	150103	JJG617-1996数字温度调节仪检定规程 JJG617-1996 Digital Temperature Indicators and Controllers	(0-1300)°C	$U=1.6^{\circ}\text{C}$	

## 主要检测设备

### 常用检测设备

鹤山利奥计量检测服务有限公司拥有先进检测设备：

气质联用仪

电感耦合等离子体发射光谱仪

气相色谱仪

原子吸收光谱仪

X射线荧光光谱仪

傅里叶转换红外光谱仪

IGT测试仪

分光密度计

纸箱整箱抗压机

边压强度测试仪

马弗炉

光源箱

油墨耐磨测试仪

洁白度测试仪

液相色谱电感耦合等离子体质谱仪

恒温、恒湿检测实验室

## The Main Testing Equipment

### Commonly Used testing equipments

Advanced Testing Equipment in LEO-MTS:

Gas Chromatography – Mass Spectrometer

Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES)

Gas Chromatography

Atomic Absorption Spectrometer

X-Ray Fluorescence Spectrometer

Fourier Transform Infrared Spectrometer

IGT Tester

Spectrodensitometer

Carton Compression Machine

Side Compression Strength Tester

Muffle Furnace

Viewing Light Box

Rub Tester

Brightimeter Micro S-5

Liquid Chromatography Inductively Coupled Plasma Mass Spectrometer (LC-ICP-MS)

Constant Temperature and Humidity Testing Laboratories

## 体系认证咨询业务

ISO 10012测量管理体系咨询  
代理ISO 10012测量管理体系内审员培训/发证  
ISO 17025实验室认可咨询

代理ISO 17025实验室认可内审员培训/发证  
欧美玩具安全标准  
新资讯咨询服务  
自订测试服务  
为客户的产品规格提供专业的技术顾问服务  
学员结业后能胜任工厂、企业的仪器管理和检测工作。计量培训类可满足ISO 9001等ISO标准，持证上岗的要求。

## 联系我们

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## Management System Consultation and Training Services

ISO 10012 Measurement Management System  
ISO 10012 Measurement Management System  
Internal Auditor Training And Certifying  
Consultation Approved By ISO 17025 Lab  
ISO 17025 Measurement Management System  
Internal Auditor Training And Certifying  
EU And US Toy Safety Standards  
Customized testing services  
Technical consultation on product specifications  
New Information Consulting Services  
After training, students are able to manage equipment and handle the testing work in factories and enterprises. Metrology training can well equip the trainees for handling jobs related to ISO operation including ISO9001.

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