

深圳市计量质量检测研究院

SMQ

# RoHS指令六种有害物质的检测

主讲人：陈泽勇

# RoHS指令六种有害物质检测

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- **RoHS指令简介**
- **六种有害物质检测方法介绍**
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## RoHS指令简介

从2006年7月1日起，新投放市场的电子电气设备中不得含有以下六种物质：

- 铅 (Pb)
- 汞 (Hg)
- 镉 (Cd)
- 六价铬 ( $\text{Cr}^{6+}$ )
- 溴代阻燃剂
  - ✓ 多溴联苯 (PBB)
  - ✓ 多溴二苯醚 (PBDE)

## RoHS指令简介

➤根据欧盟委员会2004年4月发布的建议，六种有害物质最新限量标准如下：(参考值)

有害物质	限量标准 (mg/kg)
铅 (Pb)	1000
镉 (Cd)	100
汞 (Hg)	1000
六价铬 (Cr <sup>6+</sup> )	1000
多溴联苯 (PBB)	1000
多溴二苯醚 (PBDE)	1000

# 六种有害物质检测方法介绍

检测项目	分析仪器	检测方法（参考）
铅及其化合物 Lead (Pb) /Lead compounds	AAS/ICP	EPA 3050B
镉及其化合物 Cadmium (Cd) /Cadmium compounds	AAS/ICP	EN 1122: 2001
汞及其化合物 Mercury (Hg) /Mercury compounds	AAS/ICP	EPA 3052
六价铬化合物 Hexavalent Chromium (Cr <sup>6+</sup> ) compounds	UV-Vis	EPA 3060A & 7196A
多溴联苯 PBB	GC-MS	GC-MS EPA3540C&8082
多溴二苯醚 PBDE	GC-MS	GC-MS EPA3540C&8082

## 实验室检测条件

### ➤测试仪器设备:

- ✓ 电感耦合等离子体原子发射光谱仪 (ICP-AES)
- ✓ 原子吸收分光光度计 (AAS)
- ✓ 气相色谱-质谱联用仪 (GC-MS)
- ✓ 高效液相色谱仪 (HPLC)
- ✓ 微波消解系统 (Microwave Digestion System)
- ✓ 索氏抽提系统 (Soxhlet Extraction System)

➤化学测试人员配置: 拥有博士1名、硕士11名、高级工程师5名、工程师16名, 80%具有本科以上学历。

## 六种有害物质检测方法介绍——铅

### ➤ 铅及其化合物的主要用途：

- ✓ 塑料稳定剂、橡胶固化剂及配合剂
- ✓ 电气连接、焊接、涂蜡材料
- ✓ 电池原料
- ✓ 颜料、涂料、墨水、染料的原料
- ✓ 电镀液
- ✓ 润滑剂、硬化剂、油漆的干燥剂
- ✓ 陶瓷部件
- ✓ 光学玻璃



## 六种有害物质检测方法介绍——铅

### ➤可能含有铅的材料:

- ✓包装材料
- ✓印刷电路板
- ✓电池和电池组
- ✓部件的电极、引导端子
- ✓涂料、颜料、墨水、染料
- ✓各种合金
- ✓电子陶瓷部件
- ✓各种玻璃材料，包括电阻体、粘合剂、玻璃料、密封材等



# 六种有害物质检测方法介绍——铅

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## 预处理

微波消解（EPA3052）、混酸湿法消解（EPA3050B）



## 测定

AAS或ICP-AES

## 六种有害物质检测方法介绍——镉

### ➤ 镉及其化合物的主要用途：

- ✓ 塑料的稳定剂
- ✓ 化学合成材料
- ✓ 电池、相片
- ✓ 表面处理、连接材料
- ✓ 油漆、颜料、墨水、着色剂
- ✓ 低熔点焊接、保险丝
- ✓ 电镀液的稳定剂、电镀光泽剂

## 六种有害物质检测方法介绍——镉

### ➤可能含有镉的材料:

- ✓包装材料
- ✓塑胶
- ✓电池和电池组
- ✓部件的电极、引导端子
- ✓涂料、颜料、墨水、染料
- ✓各种合金
- ✓电子陶瓷部件

# 六种有害物质检测方法介绍——镉

## 预处理

微波消解（EPA3052）、混酸湿法消解（EPA3050B）、  
硫酸灰化（EN1122）

## 测定

AAS或ICP-AES

## 六种有害物质检测方法介绍——汞

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### ➤汞及其化合物的主要用途：

- ✓防腐剤、催化剤、防霉剤、杀菌剤
- ✓金属蚀刻
- ✓电池
- ✓颜料
- ✓电极、水银灯

## 六种有害物质检测方法介绍——汞

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### ➤可能含有汞的材料:

- ✓包装材料
- ✓印刷电路板
- ✓电池和电池组
- ✓涂料、颜料、墨水、染料
- ✓日光灯

# 六种有害物质检测方法介绍——汞

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预处理

微波消解 (EPA3052)



测定

AAS或ICP-AES



## 六种有害物质检测方法介绍——六价铬

### ➤六价铬化合物的主要用途：

- ✓ 催化剂、防腐剂
- ✓ 陶瓷用着色剂
- ✓ 电池
- ✓ 电镀液、防锈剂
- ✓ 涂料、颜料、墨水
- ✓ 鞣皮

## 六种有害物质检测方法介绍——六价铬

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### ➤可能含有六价铬的材料:

- ✓包装材料
- ✓印刷电路板
- ✓电池和电池组
- ✓电镀防锈处理的产品
- ✓涂料、颜料、墨水、染料
- ✓皮产品

# 六种有害物质检测方法介绍——六价铬



➤ 还可通过测量总铬进行筛选

## 六种有害物质检测方法介绍——溴代阻燃剂

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➤可能含有溴代阻燃剂的材料：

✓塑胶产品（PE、ABS、HIPS、LDPE、聚酯等）

✓印刷电路板

# 六种有害物质检测方法介绍——溴代阻燃剂

预处理

索氏抽提 (EPA3540C)



测定

GC—MS

➤快速检测筛选方法：燃烧法、XRF、红外光谱

## 检测费用及时间

检测项目	测试费用（¥）	测试时间 （工作日）
重金属四项	500.00	≤5
溴代阻燃剂两 项	1000.00	≤ 10
六项指标	1500.00	≤ 10

# 有害物质检测流程

客 户

送样，  
交费

收样，  
寄报告

SMQ业务部



## 证书及其有效性

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- 1988年，通过省计量认证，获CMA证；
- 1998年，通过中国实验室认可委员会(CNAL)认可；
- 2000年，经国家环保委审核认定为环保标志产品检验实验室；
- 2000年以来，通过美国FCC、UL、德国TUV、英国BABT、日本VCCI、加拿大IC、香港机电工程署等认证。

## 证书及其有效性

- 我院按ISO/IEC17025建立了完善的质量保证体系，严格依照国际准则和惯例运作，是深圳首家获CNAL认可的单位，所出具的校准证书和检测报告得到国际实验室认可合作组织多边互认协议（ILAC-MRA）成员（包括欧盟、美国、日本等国家和地区的相关机构）的承认和认可。

## 证书及其有效性

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- 出具CE、UL、FCC、TUV等国际证书，有力地帮助企业产品进入国际市场，实现“一个标准、一次检测、全球通行”

## 高附加值服务

- 拓展电子电气领域相关检测服务，随时跟进欧盟指令的最新动态，使您的产品全面符合欧盟的最新要求。
- 除了检测服务，SMQ还提供详尽的咨询服务（标准咨询、技术壁垒破解），为您提供专业的建议。
- 培训企业人员，提供技术支持，致力于成为您的产品顾问，并帮助您用最低的成本解决问题。

## 已进行的工作

- 已为多家知名企业及其原料供应商提供重金属及溴代阻燃剂的测试服务。
- 与某知名企业一起向市科技局申请六价铬电镀原料替代品的科研项目。
- 举办欧盟新指令宣贯会及培训班，主动拜访各企业，为企业出谋划策。
- 申请建立机电、信息产品环保指标公共技术平台，为“深圳制造”保驾护航。

## 机电、信息产品环保指标公共技术平台

- 重金属：铅、镉、汞、六价铬
- 有机氯化物：多氯联苯（PCB）、多氯化萘（PCN）、氯代烷烃（CP）等
- 有机溴化合物
- 有机锡化合物（三丁基锡化合物、三苯基锡化合物）
- 石棉
- 偶氮化合物
- 甲醛
- 聚氯乙烯（PVC）及聚氯乙烯混合物



深圳市计量质量检测研究院

SMQ

谢 谢 大 家





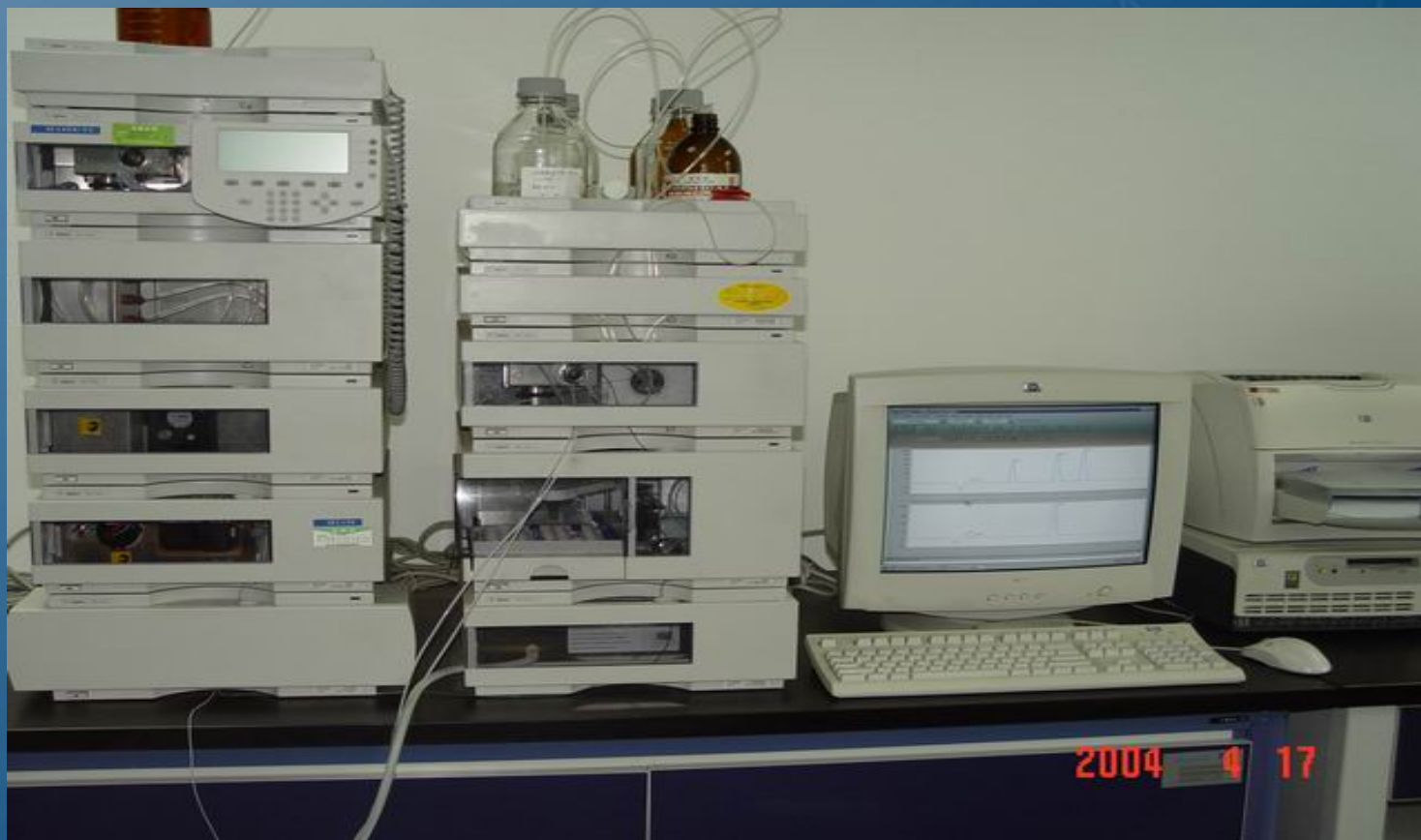
➤ 电感耦合等离子体原子发射光谱仪 (ICP-AES)



## ➤ 原子吸收分光光度计 (AAS)

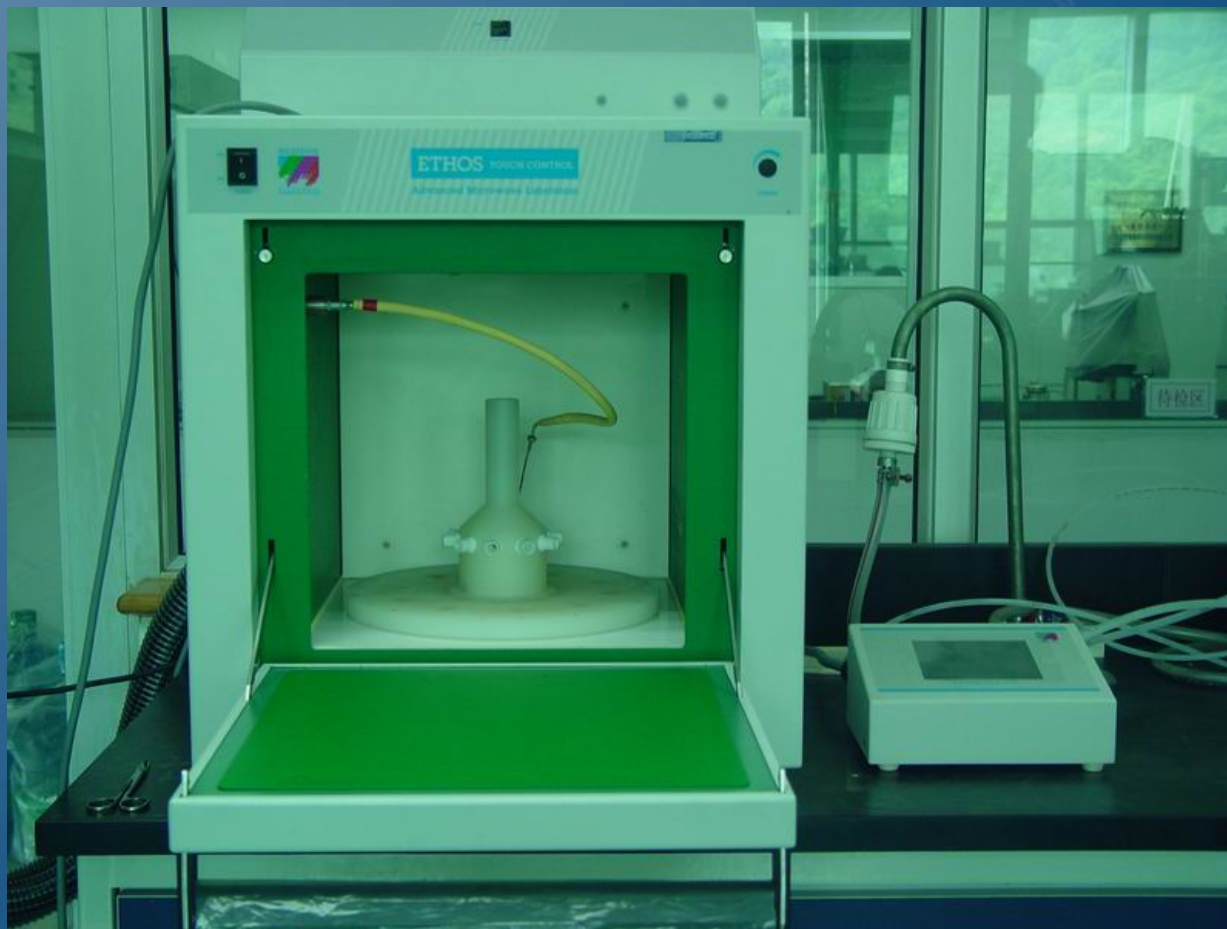


➤ 气相色谱-质谱联用仪 (GC-MS)



➤ Angilent高效液相色谱 (HPLC)





➤ 微波消解系统



➤ 索氏抽提系统



**ACCREDITATION CERTIFICATE  
OF CHINA NATIONAL ACCREDITATION BOARD  
FOR LABORATORIES  
(No.L0579 )**

This is to certify that

**Shenzhen Academy of Metrology & Quality Inspection**

Bldg. of Academy of Metrology & Quality Inspection, Longzhu Ave.

Nanshan District, Shenzhen, China

has been assessed and proved to be in compliance with CNAL/AC01:  
*2002 Accreditation Criteria for Testing and Calibration Laboratories*  
(identical to ISO/IEC17025: 1999 *General Requirements for the*  
*Competence of Testing and Calibration Laboratories*).

Accreditation scope of the laboratory is listed in the attachment.

Date of Issue: 2003.08.01

Date of Expiry: 2005.01.24

**魏昊**

**Wei Hao**

Secretary General of CNAL

国家实验室认可证书





Industry Canada Industrie Canada

<http://strategies.ic.gc.ca>

Certification and Engineering Bureau  
3701 Carling Ave., Building 94  
P.O. Box 11490, Station "H"  
Ottawa, Ontario  
K2H 8S2

Tel. No. (613) 990-5320  
Fax. No. (613) 990-4752

November 15, 2001

Our File: 46405-4174  
Submission: 40444

Mr. Peter Lin  
Shenzhen Academy of Metrology & Quality Inspection  
Longzhu Road, Nanshan, Shenzhen,  
Guangdong CHINA

Dear Mr. Lin,

The Bureau has received your test report for the Open Area Test Site located at dated August 29, 1997. I have reviewed the report and find it complies with RSS 212, Issue 1 (Provisional).

The site is acceptable to Industry Canada for the performance of radiated measurements.

**Please reference the file number "IC 4174" in the body of all test reports containing measurements made on this site.**

This reference number is the indication to the Industry Canada Certification Officers that the site meets the requirements of RSS 212, Issue 1 (Provisional). Your company has been added to our published list of filed sites on the Bureau's web page. Please keep the contact information current by notifying us if it changes or is in error.

Keep informed of the latest Industry Canada regulations by visiting the Bureau's site on the World Wide Web;

<http://spectrum.ic.gc.ca/deblab/english/debintre.html>

Whenever major construction or repairs to the site are completed, a re-submission of the site attenuation characteristics will be required, or every three years.

Yours sincerely,

Brian Kasper  
Head, EMC and Wireless Evaluation  
Certification and Engineering Bureau

Canada

加拿大认证证书

FEDERAL COMMUNICATIONS COMMISSION  
Laboratory Division  
7435 Oakland Mills Road  
Columbia, MD. 21046

April 17, 2000

Registration Number: 97379

Shenzhen Academy of Metrology & Quality Inspection  
Longzhu Road, Nanshan  
Shenzhen, Guangdong  
China  
Attention: Peter Lin

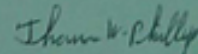
Re: Measurement facility located at Shenzhen  
3 & 10 meter site  
Date of Listing: April 17, 2000

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that this filing must be updated for any changes made to the facility, and at least every three years from the date of listing the data on file must be certified as current.

If requested, the above mentioned facility has been added to our list of those who perform these measurement services for the public on a fee basis. An up-to-date list of such public test facilities is available on the Internet on the FCC Website at [WWW.FCC.GOV](http://WWW.FCC.GOV), E-Filing, OET Equipment Authorization Electronic Filing.

Sincerely,



Thomas W Phillips  
Electronics Engineer

美国FCC认证证书

Technischer Überwachungsverein Rheinland



# Certificate of Appointment

The Testing Laboratory

**Rheinland Academy of Metrology and Quality Inspection**  
Bldg. of Academy of Metrology and Quality Inspection  
Langenlaar Road, Freudenstadt  
Freudenstadt, P.R. of China

has been authorized to carry out safety tests by order and under supervision of  
TÜV Rheinland. It has successfully demonstrated capability to conduct measurements and  
to perform test data for

ISO 9001:2000  
ISO 14001:2004

ISO 9001:2000, ISO 14001:2004 in accordance to actual capability  
ISO 9001:2000, ISO 14001:2004 in accordance to actual capability  
ISO 9001:2000, ISO 14001:2004 in accordance to actual capability

An inspection of the facility was conducted according to  
DIN EN ISO 9001:2000 and DIN EN ISO 14001:2004

Audit Report: 12/2004 (01)

The certificate is valid until next scheduled inspection or up to 12 months,  
at the discretion of TÜV Rheinland

Freudenstadt, P.R. of China, Aug. 04, 2005

Jia Youhua  
Authorized Body

Wang Wu  
Technical Officer

德国TUV认证证书



The Government of the Hong Kong Special Administrative Region  
Electrical and Mechanical Services Department  
Electrical Products (Safety) Regulation (Cap. 404 Sub. Leg.)

### Certificate of Recognized Certification Body

*I hereby certify that*

**SHENZHEN ACADEMY OF METROLOGY AND QUALITY INSPECTION**

is registered as a Recognized Certification Body and has been included in the register of recognized certification body maintained by the Department under the Electrical Products (Safety) Regulation (Cap. 404 Sub. Leg.).

Registration Number  
**AR00062**

A handwritten signature in black ink, appearing to read "George K. H. Ling".

George K. H. Ling  
Mr. Director of Electrical and Mechanical Services

Date 12 August, 2002

**0000043**

香港机电工程署认证证书



The Government of the Hong Kong Special Administrative Region  
Electrical and Mechanical Services Department  
Electrical Products (Safety) Regulation (Cap. 404 Sub. Leg.)

### Certificate of Recognized Certification Body

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Registration Number

**ACQ00043**

A handwritten signature in black ink, appearing to read "George K. H. Ling".

**George K. H. Ling**

*Mr. Director of Electrical and Mechanical Services*

Date 12 August, 2002

**0000043**

香港机电工程署认证证书