

# 美国雷科(LACO)气密性标准漏孔介绍

标准漏孔/泄漏件/漏口 气密检漏仪 Innomatec,Ateq,COSMO,CTS,USON

LACO 气密性标准漏孔采用业界先进的独特的微通道技术,对比传统的玻璃拉丝或金属压扁工艺具有抗摔、抗震、抗堵塞等优点,支持 400Bar 高压(业界支持普遍<20bar)、漏率稳定、可重复性好,远优于玻璃拉丝和金属压扁工艺。

适用任何品牌的空气检漏仪/测漏仪,包括:德国 Innomatec,法国 Ateq,日本 COSMO,美国 CTS,LACO, USON 等主流厂家...

每一个漏孔都提供高等级之美国计量局可溯源证书-NIST A2LA Certificate,并满足 ISO17205 标准,可作为标准源。

由于漏率是高定制产品,客户请务必提供定制需要的信息:

- I)压力值:空气检漏仪或气密性测漏仪工作两种方式:压力衰减法,真空衰减法。请告知相对压力或绝对压力。最高 40Mpa,最低 0(真空,绝对值)或-101.3Kpa(真空,表压)
- II)漏率:从 0.0003~500scc/m,或 5E-6mbar.L/sec~8mbar.L/sec
- IIi)接口:一般提供 1/8NPT 外螺纹或 10/32 外螺纹;可定制任何接口,或提供转接头。

## LACO 微通道气密性漏孔对比优势

有点	描述
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极宽量程	<p>同时指定漏率和压力，极宽量程</p> <p>压力：-100Kpa~40Mpa</p> <p>漏率：0.0006sccm~500sccm</p> <p>*业界：普通采用金属压扁或玻璃拉丝工艺，压力支持一般小于&lt;1Mpa ( 10 公斤 ) 超过就会形变或破碎，很容易失效</p>
精度高	<p>一般按要求漏率±5%定制</p> <p>低不确定度：&lt;4.0% ( &lt;4.8sccm ) ±1.1%(≥4.8sccm)</p> <p>对比其他技术：</p> <p>    厂家 1：uncertainty value =±20%</p> <p>    ( &lt;0.8sccm ) ±10%(0.8~2.0sccm) ±5%(&gt;2.0sccm)</p> <p>    厂家 2：uncertainty value =±6.5% ( &lt;0.5sccm ) =±MAX(0.1sccm,1.4%)</p> <p>    (&gt;0.5sccm)</p> <p>    同样一个标定值 0.5sccm 的漏孔，真实漏率区间厂家 1：【0.4，0.6】，厂家 2：【4.675，5.325】，LACO：【0.481,0.519】，精度高出很多</p>
寿命长	<p>高压不形变，不易堵塞，可重复性好，抗震抗摔</p> <p>传统技术：玻璃拉丝和金属压扁决定了容易形变不抗高压，也容易堵塞。在使用中不小心跌落，或机台震动可造成漏孔破碎损坏，寿命短；从使用情况来看体现为很快堵塞导致不可用。LACO 的很多甚至高压漏孔(40Mpa)在一年重新校准漏率几乎没有变化。</p>

### 技术特点

1. 材料：业界先进的专有微通道技术，抗震、抗摔、抗堵塞、重复性好

传统气密性漏孔采用玻璃拉丝制作，抗震抗摔性差，支持压力小，管壁易碎，导致容易堵塞而漏孔失效，重复性差，寿命短，一般几个月就得更换。也有采用金属压扁技术制作漏孔的，容易受外力或压力形变导致存在容易堵塞，可重复性差的缺点。

LACO 采用专有技术-微通道(MTC, Micro-Tube Capillary)技术，接近“理想小孔”的毛细管，可根据流导定律针对不同漏率，选用不同孔径、长度制作漏孔；具有极宽量程、支持高压、抗摔、抗震，可重复性好，寿命长的特点，远远优于传统漏孔的制作技术。

2. 定制漏孔，支持同时指定漏率和压力，极宽量程

压力：-100Kpa~40Mpa

漏率：0.0006sccm~500sccm（一般按要求漏率±5%定制）

3. 低不确定度：~±3.4% (<4.8sccm) ~±1.1%(≥4.8sccm)

4. 温度系数：-0.6%/°C

5. 支持各种接头和快速接头定制，支持 LACO, COSMO, ATEQ, USON, CTS...

支持任何品牌厂家测漏仪。

6. 标定证书：提供可溯源美国计量局证书-NIST A2LA Traceable Certificate，符合 ISO17025 具标准，备最高的计量等级，可直接作为第三方计量机构的标准源。

**实物照片**



图 1：气密性漏孔实物照片：3 个定制漏率：0.1，0.01，0.001scc/m

漏孔规格：1/8NPT+1/4pushin 接口，长度：8cm，入口压力：表压 2bar，出口压力：大气，  
按照客户要求的 3 个漏率定制

美国标准技术局 NIST 证书 1 (0.1scc/m 气密性漏孔)





CM521.0-210S8A0/3/0.2-M  
 SN: 15262  
 Cal #: 836598  
 Cal Date: 24 Apr 18  
 1.00 x 10<sup>-2</sup> scc/m  
 ±3.4% @ 0.20 MPa  
 Air into atm  
**LACO TECHNOLOGIES**



## Certificate of Calibration

Calibration Number 836598

Calibration Date: 24 Apr 2018

**Prepared for**  
 Real Meter Instruments (Shanghai) Co., Ltd.  
 Jianhao Rd 99-401, Zhoupu Town, Pudong New Distr  
 Shanghai, China 201316

**Item Identification**  
 Item/Type: Leak Standard  
 Model Number: CM521.0-210S8A0/3/0.2-M  
 Serial Number: 15262

**Calibration Data**

Calibration Gas: Air

Condition	Leak Rate (scc/m into atmosphere)	Uncertainty† (±% of Leak Rate)	Pressure (MPa)	Temperature (°C)
New	1.00 x 10 <sup>-2</sup>	3.4	0.20	24.1

†Expanded uncertainty, 95% confidence interval, coverage factor, k=2.

**Environmental Conditions/Effects**

The leak rate of this item increases/decreases at a factor of -0.6%/°C deviation from the calibration temperature(s) listed above. Relative humidity has negligible effect on the performance of this item. Barometric pressure during this calibration was 1.00 atm.; effect of barometric pressure on the performance of this item is detailed in the attached addendum.

**Traceability and Conformance**

All calibration procedures, equipment maintenance, and training of technicians are in accordance to LACO Quality Manual QM-100, which meets the requirements of ISO/IEC 17025:2005 and ANSI/NCSL Z540-1:1994. All reference standards used in this calibration (see table at right) are traceable to the SI through NIST. This calibration was performed according to procedure number LSP-106, a volume change method.

**Reference Standards**

Measurement Parameter	Serial Number	Expires
Pressure	016557653	Oct 13, 2018
Temperature	25551345	Jul 13, 2018
Volume	111600	Jul 11, 2021
Pressure	211H13020062	Aug 17, 2018

**Leak Standard Stability**

This and all leak standards are sensitive to moisture, oils, and particles; proper use and storage is important for preventing contamination and maintaining leak rate stability. This certificate does not guarantee this item to be in tolerance at the end of the calibration interval.

Calibration Technician

*Rod Empey*  
 Rod Empey

Quality Control:

*Fyler Webb*  
 Fyler Webb

The calibration data reported above applies only to the item referenced in this certificate.  
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美国标准技术局 NIST 证书 ( 0.01scc/m 气密性漏孔 )



LACO TECHNOLOGIES  
CM521.0-310S8A0/3.0 2-M  
M  
SN: 15263  
Cal # 837412  
Cal Date: 24 Apr 18  
1.01 x 10-3 scc/m  
±10% @ 0.20 MPa  
Air into atm

**Certificate of Calibration**  
Calibration Number 837412

Calibration Date: 24 Apr 2018

Prepared for  
Real Meter Instruments (Shanghai) Co., Ltd.  
Jianhe Rd 99-401, Zhoupu Town, Pudong New Distr  
Shanghai, China 201316

Item Identification  
Item/Type: Leak Standard  
Model Number: CM521.0-310S8A0/3.0 2-M  
Serial Number: 15263

**Calibration Data**

Calibration Gas: Air

Condition	Leak Rate (scc/m into atmosphere)	Uncertainty† (±% of Leak Rate)	Pressure (MPa)	Temperature (°C)
New	1.01 x 10-3	10	0.20	23.8

†Expanded uncertainty, 95% confidence interval, coverage factor, k=2.

**Environmental Conditions/Effects**

The leak rate of this item increases/decreases at a factor of -0.6%/°C deviation from the calibration temperature(s) listed above. Relative humidity has negligible effect on the performance of this item. Barometric pressure during this calibration was 1.00 atm.; effect of barometric pressure on the performance of this item is detailed in the attached addendum.

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Calibration Technician

*Rod Empey*  
Rod Empey

Quality Control:

*Tyler Webb*  
Tyler Webb

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图 2：气密性漏孔实物照片：2 个定制的 0.1sccm( $\pm 5\%$ ) 标准漏孔，用于模拟 IP67 防水测试  
 漏孔规格：10/32 外螺纹，长度：3.5cm，入口压力：大气，出口压力：- 20.4kpa，不确定度：  
 $\pm 4.0\%$





图 3：气密性漏孔实物照片：2 个定制的 0.2sccm( $\pm 5\%$ ) 标准漏孔

技术规格：1/8NPT 外螺纹，长约 4.8cm，入口压力：大气，出口：真空，不确定度： $\pm 3.8\%$



图 4：气密性漏孔实物照片：3sccm( $\pm 5\%$ ) 标准漏孔

技术规格：1/8NPT 外螺纹，长约 4.8cm，入口压力：0.5Mpa 表压，出口：大气，不确定度：  
 $\pm 3.4\%$

### 气密性标准漏孔演示视频

LACO 气密性标准漏孔以及气密性检漏仪演示视频（4 种漏率：0.1scc/m, 0.2scc/m, 0.3scc/m, 以及不漏工件；气密机采用压差法，压力 29.7PSI）

该视频演示 LACO Aura 气密检漏仪，我们用 3 种不同规格的漏率的标准漏孔模拟漏率，再加上一个不漏的工件，观测其曲线。3 个标准漏孔的漏率为： $\approx 0.1\text{scc/m}$ ,  $\approx 0.2\text{scc/m}$ ,  $\approx 0.3\text{scc/m}$ 。其中  $\approx 0.2\text{sccm}$  的漏孔为内置漏孔。可以清楚的观测 4 条检测曲线，从而对气密检漏仪工作原理有直观深入了解！

### 常用订货号示例

漏率	表压	接头	订货号
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0.1sccm	2bar	10-32male 螺纹	CM521.0-11009A0/3/2-G
0.5sccm	2bar	10-32male 螺纹	CM525.0-11009A0/3/2-G
1.0sccm	2bar	10-32male 螺纹	CM521.0-01009A0/3/2-G
10.0sccm	2bar	10-32male 螺纹	CM521.0+11009A0/3/2-G
0.1sccm	10Mpa	10-32male 螺纹	CM521.0-11009A0/3/10-M
0.5sccm	35Mpa	1/8" NPT 螺纹	CM525.0-110BNA0/3/35-M
0.1sccm	5Kpa	1/8" NPT 螺纹	CM521.0-110BNA0/3/5-A
0.5sccm	-10Kpa	1/8" NPT 螺纹	CM525.0-110BNA0/3/-10-A
0.1sccm	5bar	1/8" NPT 螺纹	CM521.0-110BNA0/3/5-G
0.01sccm	5bar	1/8" NPT 螺纹	CM521.0-210BNA0/3/5-G
0.1sccm	2bar	1/8"NPT 螺纹+1/4" Pushin	CM521.0-110S8A0/3/0.2-M
0.01sccm	2bar	1/8"NPT 螺纹+1/4" Pushin	CM521.0-210S8A0/3/0.2-M
0.01sccm	2bar	1/8"NPT 螺纹+1/4" Pushin	CM521.0-310S8A0/3/0.2-M