

## Blower Door Measurement – Airtightness Testing in Building Room 房间气密性测试方法-鼓风机法

**1. Measuring airtightness according to the European standard EN 13829-2001: Thermal performance of buildings — Determination of air permeability of buildings — Fan pressurization method;**

测试方法参考标准为欧盟标准：**EN 13829-2001**

**2. In Table1, the tightness level is defined from ranges of air change rate at 50 Pa pressure difference between the internal and the external environments: according to the European standard EN 13790-2004**

房间气密性等级根据 **EN 13790-2004** 标准，如下表

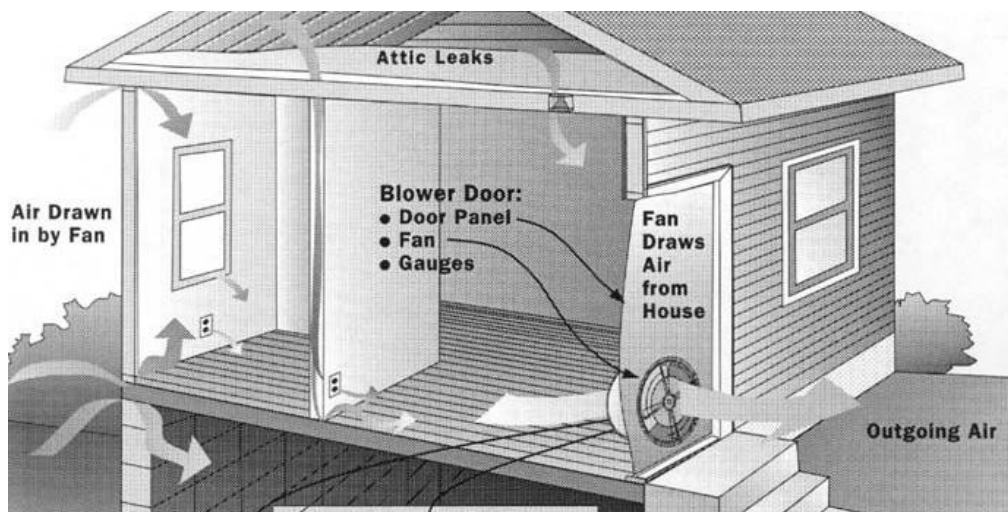
**Table1 Airtightness levels as used within this annex**

在 50Pa 下房间的换气次数 Air change rate at 50 Pa h <sup>-1</sup>		Envelope tightness level 气密性等级
Multi-family buildings 多用户建筑	Single family buildings 单用户	
Less than 2 ≤2	Less than 4 ≤4	High 高
2 to 5	4 to 10	Medium 中
More than 5 ≥5	More than 10 ≥10	Low 低

**3. Introduction 测试仪器介绍**

**3.1 The Blower Door is a diagnostic tool designed to measure the airtightness of buildings and to help locate air leakage sites. Building airtightness measurements are used for a variety of purposes including:** 鼓风机是测量房间气密性的工具，主要用于：

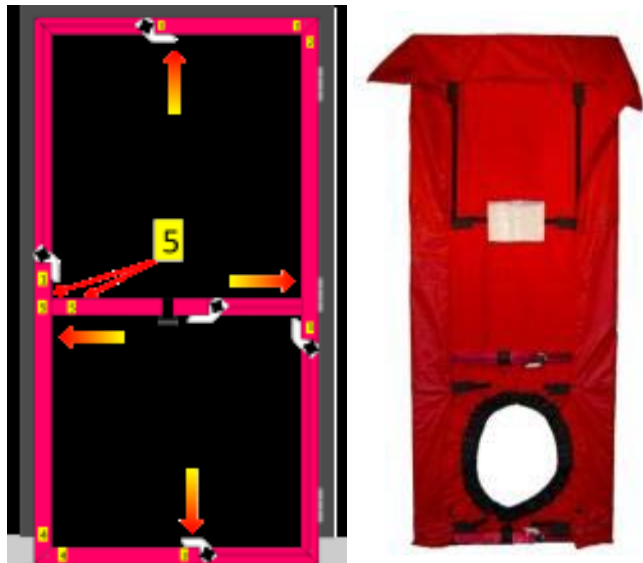
- Documenting the construction airtightness of buildings.  
建筑结构的气密性
- Estimating natural infiltration rates in houses  
评估自然渗透到房间的空气量.
- Measuring and documenting the effectiveness of air sealing activities.  
评价房间密封的效果
- Measuring duct leakage in forced air distribution systems.  
测试管道的泄漏风量



**3.2 Blower Door systems are comprised of three separate components:**

鼓风机系统主要有三部份组成

- 1). Blower Door Fan; 风机
- 2). Accessory Case with Test Instrumentation (building pressure and fan flow gauges), Fan Speed Controller and Nylon Door Panel;  
控制风机系统和风量测试系统
- 3). The Adjustable Aluminum Door Frame;  
可调整的密封门



**3.3 Digital Pressure Gauge**

数字压力表



**4. Testing Procedure** 测试步骤

**4.1 Installing the Aluminum Frame:** 在门框上安装密封框架

The first step is to fit the adjustable frame loosely in the door opening. Adjust the width of the frame by

loosening the three knobs on the top, middle and bottom frame pieces and sliding the sides apart. The side frame weather stripping should be touching the sides of the door jamb opening, but should be easily removed. Retighten the knobs. Now loosen the knobs on the 2 vertical frame pieces and slide the frame up to the top of the door opening. Retighten the vertical frame piece knobs

整个密封框架有横向 3 根和纵向 2 根铝合金支架构成，每一边都有一个锁紧按钮，可以上下，左右

把密封框架牢牢的安装在已有门框上。



#### 4.2 Installing the Outside Building Pressure Tubing 安装向外的压力测试管



**4.3 Installing the Blower Door Fan: 安装测试风机**





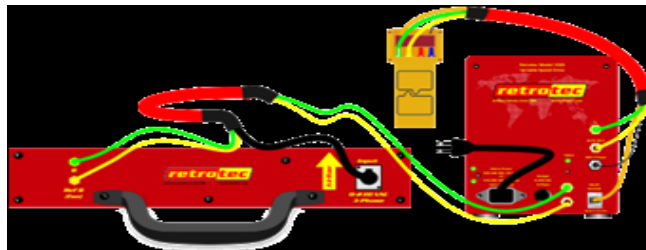
4.4 Attaching the Gauge Mounting Board 安装风机和压力控制器



4.5 Gauge Tubing Connections for Depressurization Testing 压力表用来控制压差

The Minneapolis Blower Door system comes with 2 pieces of color coded tubing - a 15 foot length of **Green** tubing for measuring building pressure, and a 10 foot length of **Red** tubing to measure fan pressure and flow. Connect the remaining end of the **Green** tubing (the other end should be running outside through the nylon panel) and one end of the **Red** tubing to the gauge(s) as shown below:

注意压力取样管的连接，绿色胶管测试建筑的压力，红色胶管连接测试风量的压力孔。

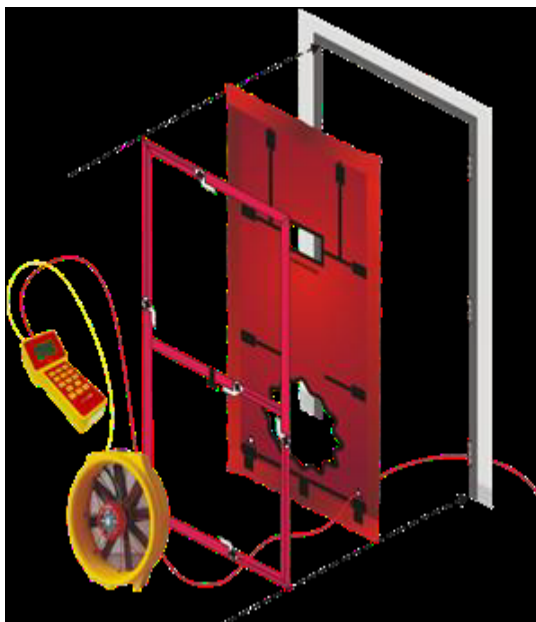


#### 4.6 Electrical and Tubing Connections to the Fan 风机接通电源



#### 4.7 Setting Up the Building for Testing 准备开始测试

- 1) The Blower Door has a special ventilator which is built into an opened outside door;  
鼓风机测试系统安装在被测建筑物门外。



- 2) Shut all the windows and open all the inner doors to measure the whole building as one zone.  
关闭所有的建筑里面的门和窗户以及其他与外界相连通的孔洞
- 3) To calculate the air change rate (ACH) at 50 Pa:  $n_{50} = \text{air leakage rate at 50 Pa} / \text{internal volume V}$ ;  
当房间内外压差到 50Pa 时，记录此时鼓风门的流量数据。

- 4) At  $-50$  Pascal we make air infiltration visible with fog from outside (here: at the entrance door).  
门和窗户渗透的是否渗透空气，可以用烟雾进行察看。



- 5) To guarantee good airtightness of a building envelope, a comprehensive sealed layer that encompasses the building's interior, should be designed and implemented within the building's interior.

当建筑的边界、门窗等密封措施到位，房间的气密性会符合设计要求。

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