Webinar – Ductwork airtightness: Standardisation’s on-going work and an overview of status and trends in Sweden, Japan, Spain and Portugal

25 January 2018
Hot news

Register now for the TightVent webinar on Ductwork Airtightness. Thursday 25 January 2018, 09:00-10:30 (CET)...
more

Register now for the AIVC International workshop on ventilation and airtightness. 19-20 March 2018, Wellington, New Zealand...
more

AIVC Workshop on Ventilation for Indoor Air Quality and Cooling. Friday 23 March 2018, Sydney, Australia...
more

39th AIVC - 7th TightVent - 5th venticool joint Conference in Juan-les-Pins, France. The 7th TightVent conference will be held on 18 and 19 September 2018 in Juan-les-Pins, France together with the 39th AIVC conference...
more

Energy Efficiency and Indoor Climate in Buildings is out. This monthly online newspaper contains relevant information on TightVent Europe, AIVC, venticool & IEA EBC annex 62 and EU relevant information (from the BUILD UP platform). Subscribe to get informed on a regular basis on the platforms/activities...
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Recent News

• TightVent welcomes SIGA as new partner
• 23 March 2018, Workshop, Sydney (AU) - Ventilation for Indoor Air Quality and Cooling
• 25 January 2018, Webinar - "Ductwork airtightness: Standardisation's on-going work and an overview of status and trends in Sweden, Japan, Spain and Portugal"
• TightVent newsletter issue #13 – November 2017 now available
• Feedback from the 38th AIVC & 6th TightVent conference: Summary of the airtightness track
AIVC Workshop: 19–20 March, 2018

The AIVC Workshop 19–20 March 2018 will be held at the University of Auckland, New Zealand. The Workshop will address current issues in the design and operation of air conditioning systems, with a focus on energy efficiency and environmental sustainability. The workshop will also provide a platform for networking and exchange of ideas among professionals in the field.


The workshop will focus on the latest research and developments in the field of air conditioning and ventilation, with sessions on topics such as energy efficiency, indoor environmental quality, and the impact of climate change on building performance. Participants will have the opportunity to discuss and exchange ideas with experts from around the world.

For more information, please visit the AIVC website at www.aivc.org.

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Agenda for this webinar

• **Ductwork Airtightness: Why Should We Care?**
  • Valérie Leprince, PLEIAQ, France

• **Status of Ductwork Airtightness in Japan and on-Going Work at ISO on Ductwork Airtightness**
  • Masaki Tajima, KUT, Japan

• **European Ductwork Airtightness Classes, on-Going Standardization Work and Status in Sweden**
  • Lars-Åke Mattsson, CEN/TC 156/WG3, Sweden

• **Market Trends in Spain and Portugal. An Industry Point of View**
  • Rodrigo Sanz, Gonal Driving Air, Spain
Why should we care about ductwork airtightness?

Webinar on ductwork airtightness
January 25th, 2018
Valérie Leprince, PLEIAQ

Outline

- Impact of ductwork leakages
- Ductwork airtightness level
- Evolution in regulatory and programme requirements in EU countries
- Presentation of speakers
IMPACT OF DUCTWORK LEAKAGES

Supply ductwork

- Losses of pre-conditioned air
- Outside conditioned space

The fan compensates leakages

- Increase of fan energy use

The fan does not compensate

- Decrease of hygienic flowrate
- Decrease of IAQ

Extract ductwork

- Air temperature decrease
- Outside conditioned space

May induce over-ventilation

- Inside conditioned space

May induce over-ventilation
Fan energy use, test on laboratory replication of real ductwork system

- Area 18.7 m²
- Extract fan constant pressure
- 8 self-adjusting air terminal devices
- Airflow rate:
  - Max: 525 m³/h
  - Min: 260 m³/h
- Measurement and calculation method

Results for maximum airflow rate

- Decrease leakages from 1.5 class A to Class C can almost divide Fan energy use by 2

Source: Leprince, Carrié, AIVC 2017
Energy use impacts

• Impact on overall building energy use:
  • According to (Soenens, 2011) the total energy consumption related to ventilation can **be reduced by over 30%** by achieving an airtight ventilation system.
  • According to (Dyer, 2011) in a pharmaceutical plant over a 30 years life of the building the energy **penalty** associated with excessive duct leakage is **more than 1.3 million dollars**

=> More studies on the impact on heating and cooling are needed

IAQ impacts

• Duct leakage:
  • Reduces flowrates at air terminal devices, unless fan compensates
    • A decrease of 10% of flowrate has been observed by (Berthault, 2014) if the fan is not re-adjusted
  • Suspicions:
    • Increases dust accumulation in filters, heat exchangers, ducts, ...
    • Weakens contamination protection of sensitive areas (operating theatres, clean rooms, etc.)

=> More studies on this field are needed
DUCTWORK LEAKAGE LEVELS

Ductwork leakage levels

- SAVE-DUCT project has shown striking difference between Sweden, Belgium and France (Carrié, 1999)
  - In Sweden, since 1966, the AMA tightness requirements have been raised to reach Class C for every ductwork since 2007 (Andersson, 2012)
- In US: duct leakage in 11 large buildings shown to represent on average 28% of the fan flow (Modera, 2013)
EVOLUTION IN REGULATORY OR PROGRAMME REQUIREMENTS

Evolution in regulatory or programme requirements

- **In Sweden** ductwork airtightness is required
  - Since 1966
  - Since 2007: **Class C** required
- **In Portugal** for large building
  - Since 2006 ductwork leakage below 1.5 l/s.m² under 400 Pa
- **In Belgium**
  - Taken into account in calculation method, but no minimum requirement
- **In UK**
  - **Test mandatory** for system with design flows > 1 m³/s
  - For low pressure ducting no test required but taken into account in calculation
  - Test typically performed by ducting contractor
- **In France**
  - Since 2013
  - Effinergie + label requires **Class A**
  - Test has to be performed by a **qualified** independent **technician**
How ductwork airtightness is taken into account in regulations?

- Result of a Tightvent Airtightness Association Committee (TAAC) survey
  - Only France (RT2012) and Belgium (EPB) consider ductwork airtightness as an input in EP-regulation
    - But there is no minimum requirement
    - In France if a value better than default value is used then it has to be justified (testing or certified quality approach)
  - Awareness is low

Source: Leprince, Carrié, Kapsalaki, AIVC 2017

What is in your view the progress needed to promote ductwork airtightness in your country?

- As for building airtightness the main driver for change will probably be energy use therefore progress are needed in this topic

![Bar chart showing priorities](chart.png)

Legend:
- Highest priority
- 2nd highest priority
- 3rd highest priority

Number of respondents:
- Quantified impacts in terms of energy use (cooling, heating and fan consumption)
- Quantified impacts in terms of Indoor Environmental Quality
- Long-term performance
- Other (please specify)
- Don’t know
PRESENTATION OF SPEAKERS

Ductwork airtightness: standardisation's ongoing work and an overview of status and trends in Sweden, Japan, Spain and Portugal

Lars-Ake Mattsson
- CEN TC 156/WG3, Sweden
- European ductwork airtightness class, on-going standardization work and status in Sweden

Masaki Tajima
- KUT, Japan
- Status of ductwork airtightness in Japan and on-going work at ISO on ductwork airtightness

Rodrigo Sanz
- Gonal Driving Air, Spain
- Market trends in Spain and Portugal, an industry point of view
EUROPEAN DUCTWORK AIRTIGHTNESS CLASSES.
ON-GOING STANDARDIZATION WORK AND STATUS IN SWEDEN

Lars-Åke Mattsson:
Convener TC156 WG3 “Ducts”
R&D manager Lindab
Tightvent Europe webinar, 25 January 2018

The big perspective
Goals

2020 climate & energy package

- The draft package is in line of further legislation to meet the EU's engagement to climate and energy targets by 2020.
- The targets set by the ECO stability pact were reached in 2006, so are "easy"
- "headline" targets of the business-as-usual scenario for smart sustainable and inclusive growth.

The EU is taking action in several areas to meet these targets.

Research findings

Building and ducts, etc. will implicitly become a mandatory norm.

Before 2020: EU countries will need to generalize related energy-saving alterations in new constructions and major renovations.

Build Tight

Verify Right

- Energy efficient ventilation systems will have to be used.

EU countries will have to generalize related energy-saving alterations in new constructions and major renovations.

Before 2020
Mechanical supply and exhausted ventilation with heat recovery

Airtightness in ventilation ducts what is it?
Airtightness diagram

EN 14239 Surface area

Table 1: Example of calculation of duct surface area for connector ducts

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Per unit length</th>
<th>Length</th>
<th>Total duct surface area</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>0.54</td>
<td>6.0</td>
<td>3.24</td>
</tr>
<tr>
<td>630</td>
<td>1.00</td>
<td>5.0</td>
<td>5.00</td>
</tr>
<tr>
<td>400</td>
<td>1.20</td>
<td>4.2</td>
<td>5.08</td>
</tr>
</tbody>
</table>

Total for installation shown in Figure 3: 44.8
System test

History
History

1960


SIS 827209

1972
1975
2.2 For normal ventilating and air conditioning installations, three classes of air tightness, A, B, and C have been chosen for which the upper limits of $\Gamma_{P_{am}}^{-0.65}$ are represented by:

\[
\begin{align*}
K_A &= 0.027 \cdot 10^{-3} \text{ms}^{-1} \cdot \text{Pa}^{-0.65} \\
K_B &= 0.009 \cdot 10^{-3} \text{ms}^{-1} \cdot \text{Pa}^{-0.65} \\
K_C &= 0.003 \cdot 10^{-3} \text{ms}^{-1} \cdot \text{Pa}^{-0.65}
\end{align*}
\]
EN standards

Tightness class diagram

Third party certification

Swedish Type approval

Eurovent Certification
Requirements from other standards

EN 13779 Performance requirements (Old EPBD)

A.8.2 Selection of airtightness class

The minimum airtightness class is selected according to the following principles. However, a more strict class is applied in cases where the total area of the casing is exceptionally large in relation to the total airflow, where the pressure difference across the casing is exceptionally high, or when exceptional problems result from leakage because of the demands on air quality, risk of condensation or any other reason. EN 15242 gives methods to estimate the energy impact of air leakages and further advise on selection of airtightness classes for ductwork and air handling units.

The air leakage of enclosed air-handling units, and equipment rooms and chambers for fans and other assemblies should not exceed the leakage according to class A (corresponds class L3 for air handling units, EN 15686) in Figure A.3.

Class B is the general minimum requirement for air ducts, and also the minimum for all exhaust air ducts subject to overpressure inside the building, excluding plant rooms.

Class C is the recommended minimum class in many cases, especially if the pressure difference across the duct casing is high, or if any leakage can result in a hazard to the indoor air quality, control of pressure conditions or functioning of the system.

Class D is applied in special situations, and also applicable for cases described above for Class C, especially in installations with high hygiene requirements or with special attention to energy performance.
EN 16798-3 Performance requirements (New EPBD)

6.9.4 Leakages at air ducts

The classification and testing of airtightness of round ducts are defined in EN 12237, of rectangular ducts in EN 1507.

To reduce energy losses and to guarantee the planned air distribution, this value shall be minimum class B. Class C is recommended.

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EN 15780 Cleanliness

F.3 Application of cleanliness levels - airtightness

The airtightness of the ductwork is also important for cleanliness. Leakages in unclean hollow spaces or suspended ceilings can have a big influence to the indoor air quality, especially for the advanced level. The minimum recommended tightness class related to these cleanliness levels can be expressed as follows, corresponding with the technical recommendations of EN 13779:2007, A.6.2.

<table>
<thead>
<tr>
<th>Level</th>
<th>Recommended minimum tightness class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>B</td>
</tr>
<tr>
<td>Intermediate</td>
<td>C</td>
</tr>
<tr>
<td>Advanced</td>
<td>D</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality Class</th>
<th>Typical examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>rooms with only intermittent occupancy e.g. storage rooms, technical rooms</td>
</tr>
<tr>
<td>Medium</td>
<td>offices, hotels, restaurants, schools, theatres, residential homes, shopping areas, exhibition buildings, sport buildings, general areas in hospitals and general working areas in industries</td>
</tr>
<tr>
<td>High</td>
<td>Laboratories, treatment areas in hospitals high quality offices</td>
</tr>
</tbody>
</table>
EN 12599 Handing over

<table>
<thead>
<tr>
<th>Table 1 — Summary of tests, measurements and report to verify the quality of the systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Steps</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Basic</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

— air tightness of ducts according to EN 13779.

EN 12599 Handing over

<table>
<thead>
<tr>
<th>Table 2 — Functional measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Ventilation System</td>
</tr>
<tr>
<td>MS (L)</td>
</tr>
<tr>
<td>MS (H)</td>
</tr>
<tr>
<td>MS (B)</td>
</tr>
<tr>
<td>MS (MD)</td>
</tr>
<tr>
<td>Air conditioning system</td>
</tr>
<tr>
<td>MS (L)</td>
</tr>
<tr>
<td>MS (H)</td>
</tr>
<tr>
<td>MS (B)</td>
</tr>
<tr>
<td>MS (MD)</td>
</tr>
</tbody>
</table>

Explanations:
0: measurement not necessary
1: to carry out in all cases
2: to carry out only in the case of contracted agreement
Different standards

Airtightness Standards to the environment
## Airtightness Standards Systems

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Strength and leakage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 1506</td>
<td>EN 12237</td>
</tr>
<tr>
<td>EN 1505</td>
<td>EN 1507</td>
</tr>
<tr>
<td>prEN 17192</td>
<td>prEN 17192</td>
</tr>
</tbody>
</table>

## Differences

### L/A ratio

For rigid ductwork, L/As shall be:

\[ 1m^{-1} < \frac{L}{A_s} < 1.5m^{-1} \]

For semi-rigid ductwork, L/A shall be:

\[ 0.4m^{-1} < \frac{L}{A_s} < 0.6m^{-1} \]
Airtightness Standards Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dampers</td>
<td>EN 1751</td>
</tr>
<tr>
<td>Technical Components</td>
<td>EN 15727</td>
</tr>
<tr>
<td>Flexible ducts</td>
<td>EN 13180</td>
</tr>
</tbody>
</table>

Differences

Area calculation

7.2 Calculation of the total joint length (L2)

The total joint length, in metres, for a product of circular cross-section is the sum of the joint perimeter of each connection (1 to N):

\[ L = (\pi \times d_1) + (\pi \times d_2) + \ldots + (\pi \times d_N) \]  

(1)

The total joint length, in metres, for a product of rectangular cross-section is the sum of each joint perimeter:

\[ L = 2 \times (h_1 + h_2 + h_3 + \ldots + h_N) \]  

(2)

7.3 Calculation of the virtual product surface area (Av)

The virtual product surface area, \( A_v \), in square metres, is:

\[ A_v = 0.5 \times (d_1 + d_2) \]  

(3)

\[ A_v = \max(A_1, A_2) \]  

(4)

where \( A_1 \) and \( A_2 \) are the product surface areas

whichever is the larger.

C.3 Casing leakage

The range of case leakage performance has been related to the general ductwork leakage classes as follows:

The reference casing area is taken as the perimeter of the outer pipe multiplied by an equivalent length of 1 m:

\[ A_{ref} = \pi \times d \times L \]  

(5)

Figure C.2 gives for classes A, B and C the permitted maximum case leakage \( q_{cas} \) in \( \text{m}^3\text{s}^{-1} \) as a function of duct static pressure \( p_{stat} \), in Pa.

The leakage factor shall be determined by the air leakage rate divided by the surface area \( A_{ref} \times d \), where \( L \) is the length of the reference test element and \( d \) is its nominal diameter.
Differences
Area calculation “1 meter duct”
Same theory in both EN 1751 and EN 15727

Figure 1: virtual duct lengths B applied to circular slip-in joint and T-piece.

Airtightness Standards Air Handling Units

| Air Handling Units | EN 1886 |

Table 4 — Casing air leakage classes of air handling units, 400 Pa negative test pressure

<table>
<thead>
<tr>
<th>Leakage class of casing</th>
<th>Maximum leakage rate ($f_{400}$) $1 \times s^{-1} \times m^{-2}$</th>
<th>Filter class (EN 779)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L3</td>
<td>1.32</td>
<td>G1 to F7</td>
</tr>
<tr>
<td>L2</td>
<td>0.44</td>
<td>F8 to F9</td>
</tr>
<tr>
<td>L1</td>
<td>0.15</td>
<td>superior to F9</td>
</tr>
</tbody>
</table>
Airtightness Standards in field at the handing over process

Handing over  EN 12599

Airtightness through damper blade Standards
Airtightness Standards
Through damper blade

| Damper blades | EN 1751 |

Tightness past the closed damper blade and pressure classes

Pressure classification
# Circular metallic duct classification

## Table 2 – Ductwork Classification

<table>
<thead>
<tr>
<th>Air tightness class</th>
<th>Static pressure limit ($p_s$) Pa</th>
<th>Air leakage limit ($f_{max}$) m$^3$·s$^{-1}$·m$^{-2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>A</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>B</td>
<td>1 000</td>
<td>750</td>
</tr>
<tr>
<td>C</td>
<td>2 000</td>
<td>750</td>
</tr>
<tr>
<td>D $^a$</td>
<td>2 000</td>
<td>750</td>
</tr>
</tbody>
</table>

$^a$ Ductwork for special applications.

---

# Rectangular metallic duct classification

## Table 1 — Ductwork classification

<table>
<thead>
<tr>
<th>Air tightness class</th>
<th>Air leakage limit ($f_{max}$) m$^3$·s$^{-1}$·m$^{-2}$</th>
<th>Static gauge pressure limits (ps) Pa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negative at all pressure classes</td>
<td>Positive at pressure class 1 2 3</td>
</tr>
<tr>
<td>A</td>
<td>$0.027 \times P_{new}^{\frac{1}{3}} \times 10^3$</td>
<td>200 400</td>
</tr>
<tr>
<td>B</td>
<td>$0.009 \times P_{new}^{\frac{1}{3}} \times 10^3$</td>
<td>500 400 1 000 2 000</td>
</tr>
<tr>
<td>C</td>
<td>$0.003 \times P_{new}^{\frac{1}{3}} \times 10^3$</td>
<td>750 400 1 000 2 000</td>
</tr>
<tr>
<td>D $^a$</td>
<td>$0.001 \times P_{new}^{\frac{1}{3}} \times 10^3$</td>
<td>750 400 1 000 2 000</td>
</tr>
</tbody>
</table>

$^a$ Ductwork for special application.
In field classification

D.8 Air leakage

D.8.1 Measuring method

The leakage measurements can be performed while the duct system is being installed.

As soon as a sufficiently large section of the air duct system has been installed, all openings are sealed off. A fan which is connected to the sealed duct system through an equipment for measuring is used to generate a test pressure difference above or below atmospheric pressure. The test pressure should be adjusted to one of the following values which should be chosen to be as near as possible to mean operating pressure of the system, preferably:

- 200 Pa, 400 Pa, or 1 000 Pa above atmospheric in case of supply air ducts
- 200 Pa, 400 Pa or 750 Pa below atmospheric in case of exhaust air ducts.

If measurement equipment is used to verify tightness class A or B, it is possible that the above named pressure values could not be achieved at a greater ductwork surface area.

In this cases, the tightness class could be determine by a lower pressure, using the following formula to calculate the leakage airflow approximately:

New standards
New non metallic ducts

To small system
New shapes on ducts
New shapes on manifolds
Other criteria for pressure
L/A 1-1,5

solutions
To small system at least 10 m2 or whole system
New shapes on ducts measure the exact area
New shapes on manifolds ad the whole surface of the cube or outline
Other criteria for pressure Same idea as EN12599
L/A 0,4-0,6 Recommendation for supplier
US standards

Comparison European US classes

Generally, the air tightness classes are applied by European Union (EU) member countries as listed in Table 12-4. For the United States, ASHRAE originally developed “Air Leakage Class \( C_{L} \)" to predict air leakage from round, rectangular, flexible, and fibrous glass duct using data from research conducted in 1985 (RP-308). Today, ASHRAE is using air leakage classes in the same manner as European countries. Figure 12-5 shows the relationship of European air tightness classes and leakage classes. The equivalency between EU and ASHRAE leakage classes is noted on these figures; namely, A \( (C_{L}=19) \), B \( (C_{L}=6.4) \), C \( (C_{L}=2.1) \), and D \( (C_{L}=0.7) \).
Source comparison

International Energy Agency

Deep Energy Retrofit

A Guide to Achieving Significant Energy Use Reduction with Major Renovation Projects
Annex 61, Subtask A

Sweden news
Tätning av ventilationskanaler

Förstudie inför teknikupphandling

Upprättad av
Katarina Högdal, WSP Environmental
2014-12-12


Class E

Diagram for the classification of tightness classes A to G.
Class E

My view:

1. No demand from energy perspective.
2. Wet cleaning demand.
3. Problem with grease drips from factory processing.
4. Smell from garbage ventilation with over pressure.

2-3 should be solved by airtight or downpipe principle
4 should be solved by airtight or negative pressure.

Lindab duct leaking calcylator

https://www.lindqst.com/ads/calcleak/default.aspx
At Lindab, good thinking is a philosophy that guides us in everything we do. We have made it our mission to create a healthy indoor climate – and to simplify the construction of sustainable buildings. We do this by designing innovative products and solutions that are easy to use, as well as offering efficient availability and logistics. We are also working on ways to reduce our impact on our environment and climate. We do this by developing methods to produce our solutions using a minimum of energy and natural resources, and by reducing negative effects on the environment. We use steel in our products. It’s one of few materials that can be recycled an infinite number of times without losing any of its properties. This means less carbon emissions in nature and less energy wasted.

We simplify construction.
Status of Ductwork Airtightness in Japan and On-going Work at ISO on Ductwork Airtightness

Kochi University of Technology
Assoc. Prof. Masaki TAJIMA, PhD
tajima.masaki@kochi-tech.ac.jp

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   1. Building Standard Law
   2. Building Energy Efficiency Act
   3. Discussion

II. On-going Works
   1. Works at ISO/TC163/SC1/WG10
   2. Ductwork Airtightness
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Status of Ductwork Airtightness in Japan
Building Standard Law

- The Building Standard Law
  - is the mandatory and primary law concerning building codes
  - requires minimum standards concerning the site, construction, equipment and use of buildings

Reference: Introduction to the Building Standard Law, www.bcj.or.jp

- About airtightness related in ductworks
  - In an Order for Enforcement of the Standard, airtightness of Fire dampers is required

No requirement on airtightness of ductworks
Status of Ductwork Airtightness in Japan
Building Energy Efficiency Act

• Standards of the Act
  – Calculation of envelope performance and primary energy consumption amount targeting for newly built buildings is required
  – The calculation is executed in design term
  – It becomes full obligation in 2020


• About airtightness related in ductworks

Reference: house.app.lowenergy.jp
**Status of Ductwork Airtightness in Japan**

**Building Energy Efficiency Act**

- Standards of the Act
  - Calculation of envelope performance and primary energy consumption amount targeting for newly built buildings is required
  - The calculation is executed in design term
  - It becomes full obligation in 2020


- About airtightness related in ductworks

---

**Status of Ductwork Airtightness in Japan**

**Discussion : What makes the present situation**

**Design term**

- Building Standard Law & Building Energy Efficiency Act
  - by MLIT (Ministry of Land Infrastructure, Transport and Tourism)

**Operation term**

- Act on Maintenance of Sanitation in Buildings
  - by MHLW (Ministry of Health Labour and Welfare)
  - Measurement of indoor air environment has to be executed every 2 months or more
  - Floor area of target building is greater or equal to 3,000m²

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No requirement even on airtightness of building

No requirement on airtightness of ductworks
Status of Ductwork Airtightness in Japan
Discussion : Summary

- How to achieve energy conservation & good IEA
  
  Method 1: Inspect design performance
  Method 2: Inspect IAE
  Method 3: Inspect the performance of facilities

Indoor Environment

Contents

I. Status of Ductwork Airtightness in Japan
   1. Building Standard Law
   2. Building Energy Efficiency Act
   3. Discussion

II. On-going Works
   1. Works at ISO/TC163/SC1/WG10
   2. Ductwork Airtightness
On-going Works
Works at ISO/TC163/SC1/WG10

1. Measurement of airtightness of building
   1) High-rise building > under discussion
   2) Large building > the proposal from USA

2. Air tightness of building elements and assemblies
   1) Ducts > under discussion
   2) Barrier assemblies > ISO14857-2014
   3) Partition, etc.

3. Evaluation of the measurement of airtightness
   1) Uncertainties > under discussion

4. Measurement of ventilation rate
   1) Multizone ventilation

Ductworks

1) Status
   a) ASTM, CEN and northern European countries have related regulations with the brief description on measurement procedures

2) Importance
   a) To indicate the leak position of the ventilation system
   b) To improve the airtightness of the building

3) Tasks to be settled
   a) Overviewing the status in terms of the codes and the regulations
   b) Practical measuring system, procedures, etc. should be shown
Accumulating Knowledge

**Products**
- Duct, components and so on
- Measurement instruments

**Standards**
- ASTM E1554
- EN 1509
- EN 12237
- EN14239
- EN 15727
- and so on

**Lectures**
MARKET TRENDS IN SPAIN & PORTUGAL
AN INDUSTRY POINT OF VIEW

Webinar of Ductwork airtightness, 25/01/2018
Rodrigo Sanz

Introduction

- Since 1986 in Barcelona
- Our group
  - Plastic Ductwork
  - Ventilation Systems
  - Metallic Ductwork
- Members of
- Integration in Technical Comittee in
Need to align the concepts!

Legislation for the Energy Performance

Indoor Air Quality (IAQ)

MEV & MVHR Ventilation Strategies

Systems & Products technologies

Legislation for the Energy Performance

Healthiness

Energy efficiency
Indoor Air Quality (IAQ)

Healthy homes in air tight buildings

Ventilation Strategies

MEV & MVHR Ventilation Strategies

Windows
Ventilation Strategies

MEV & MVHR Ventilation Strategies

A
B
C
D
E
F

Grilles

Extract Fan
Ventilation Strategies

Self-Balanced Ventilation System

Humidity–Sensitive Ventilation System
Ventilation Strategies

MEV & MVHR Ventilation Strategies

• Poorly designed air distribution systems

Systems & Products Technologies

• Poorly designed air distribution systems
• Poorly installed air distribution system or bad product choice

• Leakage consequences

- Healthiness
  - Entry of Pollutants
  - Filtration to unconditional spaces

- Energy Efficiency
  - System’s sizing
  - Thermal loss

- Confort
  - Air distribution
  - Noise
Best practises are needed

- BEST PRACTISE design principles to minimise pressure loss
- BEST PRACTISE installing principles to avoid leakage in connections

We offer solutions in plastic ductwork systems
Tubpla® Pure StancoFix

- Integrated air-tight seals
- Mechanical connections
- Extremely easy and quick to install
- Cost saving
- Extremely Airtight Class D according to EN 12237
Benefits for better practice of Tubpla® Pure StancoFix

- The widest range of plastic air-tight mechanical connections ductwork.
- Antibacterial and Antistatic duct!
- Preventing diseases
- Avoiding dust embedded into the duct and preserving stocked ducts

### AIR FLOW:

<table>
<thead>
<tr>
<th>SIZES (mm)</th>
<th>SYSTEM 100</th>
<th>SYSTEM 125</th>
<th>SYSTEM 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 110</td>
<td>Ø 125</td>
<td>Ø 100</td>
<td>Ø 100</td>
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</table>

**FLOWS (m³/h)**

<table>
<thead>
<tr>
<th>maximum*</th>
<th>minimum**</th>
</tr>
</thead>
<tbody>
<tr>
<td>240</td>
<td>180</td>
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<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>90</td>
<td>50</td>
</tr>
</tbody>
</table>

* Air speed ~ 0.3 m/s
** Air speed ~ 2.5 m/s

Tubpla® Airtight Pure, integrating value in the concepts!

- Legislation for the Energy Performance
- Indoor Air Quality (IAQ)
- MEV & MVHR Ventilation Strategies
- Tubpla® ductwork technology
..., bitting for a better practise

Thank you!