

Tight Vent
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

Airtightness and ventilation in the Romanian regulation



Dr. Eng. Ioan Silviu DOBOȘI
Vice-president of ROMANIAN INSTALLATIONS ENGINEER ASSOCIATION
Vice-president of REHVA




1st TightVent national Webinar
21 June 2011
15:00-17:00(Bucharest) / 14.00-16.00 (Brussels)



Tight Vent
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM


European Legislation/Regulation

- EPBD 2002/91/EU
- Recast EPBD 2010/31/EU
- CEN – EPBD Standards




Tight Vent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

- **Romanian Legislation/ Regulation**
 - Building tightness**
 - **1985 – STAS 6472/7-85 Building physics/Termotechnics**
Calculus of air permeability of building materials and components
 - **1995 – Law 10 – Quality of constructions**
 - **1997 – C107/1.7 – Requirements for new buildings**
 - correction for thermal bridges
 - $R'_{min}(U_{max}) [m^2K/W]$ – comfort, energy
 - average global coefficient $G [W/m^3K] < G_N$



Tight Vent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM


- **2005 – Law 372/13.12.05 – EPBD transposition**
 - new methodology – 01.01.2007
- **2005 – C107 (revised) - Requirements extended to renovation and extensions of existing buildings**
- **2006 – 20.12.06 – MC001 New EPB methodology according with pr CEN-EPBD, including:**
 - building's envelope MC001/1
 - certification MC001/3
 - energy audit (EPB solutions) MC001/3
- **2010 – C107/2010 annex 3 (revised) – Improving the thermal resistance values**



▪ Romanian Legislation/Regulation

Tightness of ventilations systems

- **2006 – 20.12.06 – MC001 New EPB methodology according with pr CEN-EPBD, including:**
 - building's services MC001/2
 - certification MC001/3
 - energy audit (EPB solutions) MC001/3
- **2009- SR EN 12237 Ventilation for building. Ductwork. Strength and leakage of circular sheet metal ducts**
- **2010 - Code I 5 – Normative document - The design, manufacture, and operation of ventilation and climate control systems**



Building tightness

- **Art. 4 – 2005 – Law 372/13.12.05 – EPBD transposition**
- **2006 – 20.12.06 – MC001 New EPB methodology**


“a) thermotechnical characteristics of the elements that make up the building envelope, interior partitions, including air-tightness;”



Tight Vent
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

The envelope and airflow


- The exchange of air through the envelope can be a source of heat loss. Because warm air can contain large amounts of water vapor, air flow is also the main means through which moisture passes through the building envelope.
- In winter conditions, air is forced to pass through the building envelope. The air coming out carries heat and humidity, and incoming air which is dry and uncomfortable creates currents



Tight Vent
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

The envelope and airflow


- Because the air passing through the building envelope, there must be an empty space (hole-door, open a window opening, a slot) and a pressure difference between inside and outside envelope. The pressure difference can be caused by any combination of:
 - Wind
 - Temperature difference leading to vertical thermal stratification phenomenon known as chimney effect
 - Equipment with burners or ventilation fans



Tight Vent
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

The envelope and airflow


- **Control air flow between inside and outside provides many advantages such as:**
 - **Save money and energy**
 - **Building more comfortable without cold spots and drafts.**
 - **Protection of building materials against damage caused by moisture**
 - **An increase of comfort, health and safety, remove clogged exhaust air and excess air and ensure necessary air to achieve safe combustion process.**
 - **A building cleaner and calmer.**



Tight Vent
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

The envelope and airflow


- **Controlling airflow involves three basic activities that must be made at once:**
 - **Preventing uncontrolled leakage of air through the envelope,**
 - **Provide fresh air and exhaust polluted air,**
 - **Ensure the air circulation and the necessary air for combustion in the house equipments (chimney, stove, hot water boiler).**



Tight Vent
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

Building tightness

- **Tightness is important not only in terms of capitalization energy, and behaviors to ensure a good climate and building construction proper vapor barrier interior.**
- **The vapor barrier prevent the penetration of moisture inside in the building**
- **Humidity encourages mold growth, it generates over time, damage in the building on the one hand and the production of allergy in the building to the occupants on the other hand.**



Tight Vent
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

Building tightness

- **Do not forget that a completely tight building is unhealthy, even dangerous**

Tight Vent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

■ Tightness of ventilations systems
Normative document - Code I 5/ 2010
Air-tightness requirements for air pipes

Static pressure [Pa]		100	200	300	400	500	600	700	800	900	1000	1200	1500	1800	2000
Air loss [l/s . m ²] [m ³ /h . m ²]	Class A	0.54 1.94	0.84 3.04	1.10 3.96	1.32 4.78	1.53 5.52	1.73 6.22	1.91 6.87	2.08 7.49	2.25 8.09	2.41 8.66	2.56 9.75	3.13 11.3	3.53 12.7	3.77 13.6
	Class B	0.18 0.65	0.28 1.01	0.37 1.32	0.44 1.59	0.51 1.84	0.58 2.07	0.64 2.29	0.69 2.5	0.75 2.7	0.80 2.89	0.85 3.25	1.04 3.76	1.18 4.23	1.26 4.53
	Class C	0.06 0.22	0.09 0.34	0.12 0.44	0.15 0.53	0.17 0.61	0.19 0.69	0.21 0.76	0.23 0.83	0.25 0.9	0.27 0.96	0.30 1.08	0.35 1.25	0.39 1.41	0.42 1.51
	Class D	0.02 0.07	0.03 0.11	0.04 0.15	0.05 0.18	0.06 0.20	0.06 0.23	0.07 0.25	0.08 0.28	0.08 0.30	0.09 0.32	0.10 0.36	0.12 0.42	0.13 0.47	0.14 0.50

Maximum air losses admissible for the 4 classes of air-tightness

Tight Vent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

Air-tightness requirements for air pipes
Clasa de etanșeitate

Maximum air losses admissible for the 4 classes of air-tightness

Tight Vent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

■ **Carrying out works related to ventilation and climate control systems**

Air-tightness of ventilation/climate control systems

Class of air-tightness	Static pressure limit [Pa]		Maximum speed [m/s]	limit values for air losses [l/sm ²]
	Positive	Negative		
Class A Low pressure	500	500	10	0.027 p ^{0.65}
Class B Medium pressure	1 000	750	20	0.009 p ^{0.65}
Class C High pressure	2 000	750	40	0.003 p ^{0.65}
Class D (special) High pressure	2 000	750	40	0.001 p ^{0.65}


Air pipe classes and limit values for air losses in pipes

Tight Vent Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

Air-tightness of ventilation/climate control systems


The following steps shall be taken to test the degree of air-tightness of the air pipes:

- air pipes belonging to class A do not require testing;
- air pipes belonging to class B shall be tested within the limit of 10 % of the parts within a network, chosen at random. If these parts do not comply with the limit values given in Slide 13, the tests shall be repeated using another 10 % of the parts within the network;
- pipes belonging to classes C and D shall be 100 % tested.



Tight Vent[®]
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM


- **Setting into operation, acceptance, and commissioning**
- **Operation of ventilation and climate control systems**



Tight Vent[®]
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM


Buildings with very low energy consumption /nZEB

- **Passive buildings, is the next stage in Romania, in order to achieve the goal of nZED**
- **Buildings designed to ensure a high standard of energy efficiency and environmentally friendly buildings are called passive buildings.**
- **Designing passive buildings in general without traditional heating systems and installation of air conditioning active, the result is the energy savings of 70-90% compared with the current housing fund.**




Tight Vent[®]
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

- **The main elements contributing to this low power consumption, taking into account the severe demands on the health, comfort and cost are:**
 - **Very high energy efficiency building envelope**
 - **Very high thermal resistance**
 - **Avoid thermal bridges**
 - **Excellent tightness**
 - **Controlled ventilation and energy efficient**



Tight Vent[®]
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM


- **Examples of definitions and specifications for passive buildings in the European countries:**
 - **German Passive House Effinergie[®]**
 - **(France), Minergie[®]**
 - **MinergieP[®] (Suisse)**
 - **buildings with low energy class 1 (Denmark)**



Tight Vent[®]
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

■ **Definition**

A passive house is a building with thermal insulation quality which maintain a pleasant indoor climate, using as main source of heating energy "passive" free, capture solar energy and heat from appliances.



Tight Vent[®]
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

■ **Determining features of a passive house:**

- **Quality insulation**
- **Triple-glazed windows Low-e**
- **Without thermal bridges**
- **Controlled ventilation with efficient heat recovery**
- **Sealing - sealing**
- **Optimum building orientation for maximum solar energy capture and protection from prevailing winds**
- **Appliances with low power consumption**
- **Annual heat consumption up to 15 kWh per square meter. Total primary energy consumption is limited to 120 kWh/m² a year.**

 **Tight Vent**
Europe
BUILDING AND DUCTWORK AIRTIGHTNESS PLATFORM

Dr. Eng. Ioan Silviu DOBOȘI

Thank you for your attention
ioansilviu@dosetimpex.ro
id@rehva.eu

Vice-president of ROMANIAN INSTALLATIONS ENGINEER ASSOCIATION
Vice-president of REHVA
1st TightVent national Webinar
21 June 2011
15:00-17:00(Bucharest) / 14.00-16.00 (Brussels)