Guidelines for designers and workers: the Etanch'air project

Webinar
“Building airtightness and initiatives to improve the quality of the works”

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BBRi
Airtightness: Quality of works

Diversity...
Airtightness: Quality of works

During the construction process…

And from the pre-project!

- Architects have to deal with a large bunch of items.

  Airtight zone?

  Which material?

  Piping and ducts?

  Construction details?
Airtightness: Quality of works
A path decomposed on 10 practical steps
Step 1: Define the ambition level

EP regulation

- Airtightness is taken into account in EP-calculation BUT there is no explicit requirement.

- Calculation is made with a default value of $v_{50} = 12\ m^3/(h.m^2)$

  → **Objective**: Motivate a pressurization test to get in better value for airtightness and valorised it in the calculation of the EP

The targeted value of airtightness should be fixed as soon as the pre-project by the customer
Step 2: Define the airtight zone within the building

Protected volume = Isolated zone = Airtight zone
Step 3: Choose equipment types and their position regarding the airtight zone

- Example for heating appliance

Openings can not be sealed during the pressurization test
Step 3: Choose equipment types and their position regarding the airtight zone

- Fire safety
- Ventilation requirements

- Airtightness

→ Summary tables are available as tools for designer

<table>
<thead>
<tr>
<th>Equipment / rooms</th>
<th>Recommended position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garages</td>
<td>Foresee specific ventilation system or place them outside the protected volume</td>
</tr>
</tbody>
</table>
| Technical shafts     | Depending on the fire regulations.  
                        | If not applied in the considered building: inside the protected volume  
                        | If applied in the considered building: outside the protected volume or provide a partitioning of the shafts |
| Elevator shafts      | Inside the protected volume and provide a ventilation system with motorized valves  
                        | Or Outside the protected volume                                                  |
Step 4: Place piping and ducts

- Passage of ducts could lead to huge air leakages

Solutions exist BUT need place!
Step 4: Place piping and ducts

→ Architects has to:
  - minimize the openings through the airtight envelope
  - provide a sufficient space

Solutions exist BUT need place!
Step 5: Choose the good material to achieve an airtight envelope

Example

⇒ We could consider a material as airtight if its air permeability is below $0.1 \, \text{m}^3/(\text{h}.\text{m}^2)$ for a pressure difference of 50 Pascal
Step 6: Correctly choose doors and windows

Class of air permeability
Step 6: Correctly choose doors and windows

Class of air permeability
Etanch’air project

- Estimation of local air leakages

→ Which constructive node has to be treated in priority ?
Step 7: Prioritize the constructive nodes

For cavity walls

<table>
<thead>
<tr>
<th>Constructive nodes</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground bearing floor</td>
<td>* → **</td>
</tr>
<tr>
<td>Junction between separating wall and façade</td>
<td>*</td>
</tr>
<tr>
<td>Junction between intermediate floor and façade</td>
<td>**</td>
</tr>
<tr>
<td>Pitched roof: Purlins</td>
<td>*** → ****</td>
</tr>
<tr>
<td>Pitched roof: Gable</td>
<td>****</td>
</tr>
<tr>
<td>Pitched roof: Eaves</td>
<td>*** → ****</td>
</tr>
<tr>
<td>Service penetration through roof</td>
<td>***</td>
</tr>
<tr>
<td>Junction between window and façade</td>
<td>** → ***</td>
</tr>
</tbody>
</table>
Step 8: Choose technical solutions for each constructive nodes… and implement it!

- Library of technical details
Step 9: Check the coordination and communication between all the builders
Step 10: Provide an intermediate pressurization test
Thank you for your attention