Performance Gap

Dr. Fanoula Ziouzia
Head of Corporate Development & Client Services

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Agenda

• A few words about the BBA
• Some of our experiences so far with the performance gap
• Focus on the performance gap from a thermal performance perspective
• Final thoughts
What about the BBA?

966 Agrément Certificates

- 1810 certified products
- 30 countries
- 295 Product types
- 800 manufacturers

PLUS

669 other Certificates

Testing Centre
40 different product areas and over 400 test methods

Over 40,000 inspections a year
UKAS ISO: 17020 accredited to undertake inspections
Thermal performance assessment and testing

Key elements
- Condensation
- Damp-proofing and waterproofing
- Weather tightness
- Air tightness

Use of THERM, BISCO, and TRISCO inclusion in BBA certificates

As built performance – roof constructions tested in a hot-box apparatus
Testing and Installer Activities

• Study of full fill cavity walls at severe exposure conditions – NHBC and other industry members
• Measurements on hard to treat cavities
• Test rig designed for testing partial filled cavities that are subsequently fully filled
• Green Deal Installer schemes – learning from being site
Performance Gap

- Well documented difference between the as designed and as built performance, currently focused on new homes
- The BBA has worked closely with the Zero Carbon Hub to provide evidence and technical input on various aspects of the entire construction process
- Today we will focus on thermal performance related examples
1. Evidence – U value calculation competency

Problems: Each person calculating a given construction will have differing:

- competence level
- software package
- assumptions
- requirements for input values e.g. thermal conductivity, thermal resistance, emissivity, water vapour resistance

This leads to:

- differing results
- industry mis-trust
1. Evidence – U value calculation competency

The scheme minimises these problems by:

• assessing competency levels, software checks, quality control
• setting requirements for assumptions and data acceptance

A rigorous assessment process

• Screening
• Office Inspection & Technical Interview
• Annual Surveillance

Lessons learned

• Design brief is critical
• Product substitution on site and on the final design
• Software inconsistencies and presentation of results make a difference
2. Evidence – Impact of wind in roof constructions

Problems

• What about real world phenomena, such as wind?

Three types of construction

• Mineral wool
• PUR
• Double - layer Multifoil

Test Parameters

• 3 different air speeds - 1.5, 4.5 and 7.5 m/s
2. Evidence – Impact of wind in roof constructions

Improving quality output

- Real effects can have a big impact on calculated performance
- Air tightness is critical in thermal performance and must be considered both in design and onsite application
3. Evidence – Thermal bridging at junctions

U values – repeated thermal bridges such as timber studs

Non – repeating: Linear thermal transmittance, called $\psi$-value

Calculated using numerical modelling with computer software
3. Evidence – Thermal bridging at junctions

What’s the problem with thermal detailing?

- Thermal modelling of junctions is very specific. $\Psi$-value depends on exact construction of junction and adjacent elements.
- If any material in the junction, or elements is changed then this invalidates the $\Psi$-value and it should be re-calculated.
- Technically complicated, lack of industry knowledge and inconsistency of approach
- No effective site monitoring
3. Evidence – Thermal bridging at junctions

Example: Pitched roof. Ventilated loft

$\Psi = 0.07$ W/m$^\circ$K

U_{roof} = 0.20 W/m$^2$K
U_{wall} = 0.25 W/m$^2$K

$\Psi = 0.24$ W/m$^\circ$K if using Accredited Construction Details (ACD's), with no description of materials

Constructive Details Methodology

- Clear guidance on material specifications
- Allowance for product substitution – critical parameters
- Buildability analysis
- Inspection Checklist and relevant Notes
- In line with sound requirements and NHBC standards
3. Evidence – Constructive Details

Improving quality output

- On site execution is critical
- Appropriate models and standards, including a standard methodology are essential
- Education and training required for a technically complicated issue

Current status clients

- Aircrete Products Association
- Pittsburgh Corning
- Instagroup
- Icopal
- Wienerberger

1,000 subscribers for free details – positive feedback and ongoing development
Final thoughts

A house complying with 2013 regulations

Poor detailing and quality of construction associated with thermal bridging (y=0.15) have a significant effect as the U-values are reduced.
Thank you!

fziouzia@bba.star.co.uk
Twitter @ZiouziaFanoula