Delivering Low Energy Homes

Part L 2013 & FEES Solutions

Stacey Temprell
Residential Sector Director
Saint-Gobain
16,000+ Employees

30+ Businesses

80 Manufacturing Plants

£3.2bn Sales

400,000 Products

1000+ Distribution Sites
A unique capability to provide products and solutions for industry. An unparalleled breadth and depth of network.
Part L: History

- 2002: elemental approach
- 2006: whole house approach (SAP/SBEM) 20% CO$_2$ reduction
- 2010: 25% CO$_2$ reduction (over 2006)
- 2013: Dwellings
  - Consultation 8% or 26%
  - **Actual 6% on aggregate**
- 2013: Non-Dwellings
  - Consultation 11% or 20%
  - **Actual 9% on aggregate**
Part L 2013: More than just CO$_2$

- Second target to hit based on energy
- Called Target Fabric Energy Efficiency (TFEE)
- Same metric as used to define Zero Carbon
- Focus on the Fabric of the building
  - U-values of Walls, floors, Roofs, Doors & windows
  - Thermal Bridging
  - Air tightness
Part L 2013: New Notional Building

• Simple route to compliance
• Published for the first time within Part L documents in ‘Section 5 Model Designs’
• Promotes a Fabric First approach
• Flexibility allowed however a great place to start
## Notional recipe starting point

<table>
<thead>
<tr>
<th>Element</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>External walls</td>
<td>0.18 W/m²k</td>
</tr>
<tr>
<td>Party walls</td>
<td>0.00 W/m²k</td>
</tr>
<tr>
<td>Floors</td>
<td>0.13 W/m²k</td>
</tr>
<tr>
<td>Roofs</td>
<td>0.13 W/m²k</td>
</tr>
<tr>
<td>Windows, roofed windows, glazed rooflights &amp; glazed doors</td>
<td>1.4 W/m²k &amp; g-value 0.63</td>
</tr>
<tr>
<td>Air-tightness</td>
<td>5.0</td>
</tr>
<tr>
<td>Linear thermal transmittance</td>
<td>Better than standard ACD’s</td>
</tr>
<tr>
<td>Ventilation type</td>
<td>Natural (extract fans)</td>
</tr>
<tr>
<td>Heating systems</td>
<td>Mains gas, boiler (SEDBUK 2009 89.5% efficient)</td>
</tr>
<tr>
<td>Low energy lighting</td>
<td>100%</td>
</tr>
</tbody>
</table>
Part L 2013: Where *not* to start

Limiting Fabric U-values

• Part L1A 2013 states:

“...to satisfy the TER and the TFEE (Target Fabric Energy Efficiency), the building specification needs to be considerably better than the stated limiting values.....”

- The approaches detailed within this guide are representative of what could be used for compliance
- Examples based on the typical homes as used by the Zero Carbon Hub on the Fabric Energy Efficiency Standard (FEES) and the definition of zero carbon homes

<table>
<thead>
<tr>
<th>Home type 1: Detached</th>
<th>Home type 2: Semi-Detached</th>
<th>Home type 3: Mid Terraced</th>
<th>Home type 4: Apartment</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Detached House" /></td>
<td><img src="image" alt="Semi-Detached House" /></td>
<td><img src="image" alt="Mid Terraced House" /></td>
<td><img src="image" alt="Apartment Building" /></td>
</tr>
</tbody>
</table>

- The detached house is four bedrooms and two bathrooms over two storeys. The total glazed area amounts to approximately 20% of the internal floor area.
- The semi-detached house is three bedrooms and one bathroom over two storeys. The total glazed area amounts to approximately 20% of the internal floor area.
- The mid-terraced houses have two storeys comprising three bedrooms and two bathrooms. The total glazed area amounts to approximately 20% of the internal floor area.
- The apartment building has three storeys with a central access stair serving two apartments per floor. The total glazed area amounts to approximately 20% of the internal floor area.

• All of the examples in this guide are developed from a single base specification based on a typical specification from a UK based Housebuilder.

• The base specification reflects current good practice, that is, what can be achieved with readily available materials and common construction methods.

• The base specification assumes that homes will have natural ventilation (provided by a combination of trickle vents, opening windows and intermittent/continuous extractor fans) and to allow for the variation in air permeability results the target has been set at **7m³/h.m²@50Pa**
  – This figure can be readily achieved for both masonry and timber frame construction.

For each of the 4 house types, three frame options are given: medium dense blockwork, aircrete blockwork and timber frame.

Within each frame option, 3 scenarios are used as follows:

**Frame Type: (1) Medium Dense Blocks**

- **Scenario (A)**: Air tightness 5, V-value 0.05, Standard condensing boiler, amended U-values (windows @ 1.2).
- **Scenario (B)**: Air tightness 5, V-value 0.05, Flue Gas Heat Recovery system, amended U-values (windows @ 1.2).
- **Scenario (C)**: Air tightness 5, V-value 0.05, Flue Gas Heat Recovery system, amended U-values (windows @ 1.4).

**Frame Type: (2) Aircrete Blocks**

- **Scenario (A)**: Air tightness 5, V-value 0.05, Standard condensing boiler, amended U-values (windows @ 1.2).
- **Scenario (B)**: Air tightness 5, V-value 0.05, Flue Gas Heat Recovery system, amended U-values (windows @ 1.2).
- **Scenario (C)**: Air tightness 5, V-value 0.05, Flue Gas Heat Recovery system, amended U-values (windows @ 1.4).

**Frame Type: (3) Timber Frame**

- **Scenario (A)**: Air tightness 5, V-value 0.05, Standard condensing boiler, amended U-values (windows @ 1.2).
- **Scenario (B)**: Air tightness 5, V-value 0.05, Flue Gas Heat Recovery system, amended U-values (windows @ 1.2).
- **Scenario (C)**: Air tightness 5, V-value 0.05, Flue Gas Heat Recovery system, amended U-values (windows @ 1.4).

The guide takes each frame type in turn and looks at each of the above scenarios (A-C) to result in the indicative design values needed for the dwelling to achieve the new Approved Document L1A (2013).
Achieving These Solutions

• Each solution has to be constructed correctly to achieve the fabric performance:
  – On-site inspection regimes paramount
  – Champions required
    • E.g. Airtightness Champion

• Construction culture and behaviour require change
Achieving These Solutions: Factors Affecting Wall Performance

- Gaps between insulation and inner leaf can reduce performance
- Damaged insulation, not taken to meet roof insulation
- Wall tolerance
- Cavity boards to prevent mortar falling
Achieving These Solutions: 
**Follow Recommendations**

- Guidance is based on testing - e.g. Plaster dab positions
- **U-Values** - Triple up: the thermal bridge significantly increases by 50 times that of insulation (Timber noggins)
- Metal through walls
  - Don’t use steel lintels from one side to another
  - Try to separate or use thermal laminate
Achieving These Solutions: Ground Floor Technicalities

• Understand specified materials
  – Drying out times: more concrete = greater drying time
• 2 common issues with traditional (thick) screeds & floor installations: Shrinkage & Curling
• Solutions
  – Pour first / power float finishes / Thin screeds (e.g. Weber)
Achieving These Solutions: 

Roof Technicalities

- Pinch points on roof eaves
- Bobtail trussess reduce mineral wool compression & improves thermal bridging
- Sequencing of installation
  - Eaves to be done before completion of breather membrane
Thank you

Any questions?