Delivering Low Energy Homes

Part L 2013 & FEES Solutions

Paul Cave
National Housing Manager
Saint-Gobain
16,000+ Employees

400,000 Products

1000+ Distribution Sites

80 Manufacturing Plants

30+ Businesses

£3.2bn Sales
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% CO₂ reduction
- 2010: 25% CO₂ 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 it’s 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/m$^2$k</td>
</tr>
<tr>
<td>Party walls</td>
<td>0.00 W/m$^2$k</td>
</tr>
<tr>
<td>Floors</td>
<td>0.13 W/m$^2$k</td>
</tr>
<tr>
<td>Roofs</td>
<td>0.13 W/m$^2$k</td>
</tr>
<tr>
<td>Windows, roofed windows, glazed rooflights &amp; glazed doors</td>
<td>1.4 W/m$^2$k &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 Houses" /></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-teraced 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 $7\text{m}^3/\text{h.m}^2@50\text{Pa}$

- 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:

**Scenario A**
- This scenario is based on the premise that dwellings can be designed using mains grid gas services and therefore make use of a standard condensing boiler (SEDBUK rated).
- This scenario has an air-permeability target of 5.0 (m³/hr/m²), linear thermal transmittance Y-values of 0.05 (W/m²K) and elemental U-values designed according to 'Fabric First' principles (see below), including an improved window U-value of 1.2W/m²K.

**Scenario B**
- This scenario is based on the premise that dwellings are being constructed in rural areas where mains grid gas is not available. In this scenario, services are typically provided by LPG and/or electric and make use of renewable technologies (e.g. a flue gas heat recovery system for LPG).
- This scenario has an air-permeability target of 5.0 (m³/hr/m²), linear thermal transmittance Y-values of 0.05 (W/m²K) and elemental U-values designed according to 'Fabric First' principles (see below), including an improved window U-value of 1.2W/m²K.

**Scenario C**
- This scenario is based on the premise that dwellings are being constructed in rural areas where mains grid gas is not available. In this scenario, services are typically provided by LPG and/or electric and make use of renewable technologies (e.g. a flue gas heat recovery system for LPG).
- This scenario has an air-permeability target of 5.0 (m³/hr/m²), linear thermal transmittance Y-values of 0.05 (W/m²K) and elemental U-values designed according to 'Fabric First' principles (see below), including an improved window U-value of 1.2W/m²K.

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 trusses reduce mineral wool compression & improves thermal bridging
- Sequencing of installation
  - Eaves to be done before completion of breather membrane
Thank you
Any questions?