LowCarb4Real; Design collection:
Thermal bridging

What is a thermal bridge?
- A thermal bridge is created when materials that are poorer insulators than surrounding materials come in contact, allowing heat to flow through the path created.
- Insulation adjacent to a bridge is of limited help in preventing heat loss (or gain) due to thermal bridging; the bridge has to be eliminated, rebuilt with a reduced cross-section or with materials that have better insulating properties, or with an additional insulating component (a thermal break).

Types of thermal bridge
- Repeating: where bridges occur following a regular pattern, such as that made by wall ties penetrating a cavity wall or timber studs in a timber frame external wall.
- Non-repeating: where bridges occur that are detail specific, such as the bridging of a cavity wall by a combined lintel or at a door threshold.
- Geometric: at the junction of two or more planes, such as at the corner of an external wall or at the eaves.

Rules to assist in the avoidance of thermal bridging

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<th>Design Rule</th>
<th>Description</th>
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<tr>
<td>Prevention Rule</td>
<td>Where possible, do not interrupt the thermal envelope.</td>
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<tr>
<td>Penetration Rule</td>
<td>Where an interrupted insulating layer is unavoidable, thermal resistance in the insulation plane should be as high as possible.</td>
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<td>Junction Rule</td>
<td>At building element junctions, insulating layers should meet without any gaps. Insulating layers should join without interruption or misalignment.</td>
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<td>Geometry Rule</td>
<td>Design edges to have as obtuse angles as possible.</td>
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Adapted from CEPHEUS (Cost Efficient Passive Houses as European Standards) - Project Information No. 36 (Feist, Peper & Gorg, 2001).

SAP Table K1 value for

- Original separate lintel
  - Insulated panels (left)
  - Combined lintel:
    - Insulated head liner which was omitted in the construction phase for aesthetic reasons.
- Steel toe added to inner leaf
  - Compromise 42mm gap
  - W = 0.16 W/mK
- Insulated panels (right)
  - Worst case, 25mm gap
  - W = 0.18 W/mK

Thermal bridge at the Stamford Brook bay window head, the design included an insulated head liner which was omitted in the construction phase for aesthetic reasons.

UrbanBuzz Project—Developing Low Carbon Housing: Lessons from The Field—LowCarb4Real
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