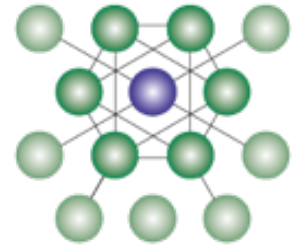


GBE Defects: Loft Insulation

GBE



Green Building Encyclopaedia

GBE Defects: Subject: Loft insulation

- Loft Insulation is simple so why and how does it contribute to the 'Performance Gap'?

Definition of Performance Gap

- See GBE Issue Paper: Performance Gap

What needs insulating?

- Government insulation programmes seem to only know about a few things:
- Lofts
- Cavity walls
- Hard to treat Solid Walls

What is missing?

- Suspended Ground floor
- Party Cavity Walls
- Not-flat ceiling
- Roof triangles

Definition of Loft

- Government insulation programme's Insulation installers are only geared up for
 - The flat ceiling under pitched roof at the top of bungalows
 - The flat ceiling under pitched roof at the top of two storey houses
 - The flat ceiling under pitched roof at the top of multiple storey flats or apartments

What are the missed opportunities

- Chalet Bungalows
 - Chalet Bungalows were popular pre and up to 1960's
- Mansard roofs
 - Mansard roof are often dictated by developed hungry for more floor area and T&C Planning control requiring extra floors above parapets to be stepped back and less visible from the street
- Room in Roof
 - Have become popular with speculative developed to maximize the habitable room density on sites

What is different about these?

- The eaves and ridge triangles
- The sloping wall lining and ceilings that follow the slope of the roof

How are these different?

- They often do not have access hatches to all areas
- They are often inaccessible or difficult to work in due to small dimensions
- They are technical difficult or fiddly to retrofit
- They need more care than skill, the industry is equipped with skill and not permitted time to care

- Self-builders may not have skill but will care and often do a better job than constructors
- They are time consuming and not profitable for 'flat ceiling under pitched roof' contractors
- They are best carried out by removing the roof covering, insulating and replacing the roof covering
 - Metal roof coverings need specialist skilled and expensive tradesmen to do this
 - Tiled and slated roofs need some skills and lots of labour
 - They have a large overhead cost to address

Does age come into it?

- Pre-1960's insulation was not required by by-laws or regulations
- Grant supported projects in the 1970's had their existing 0 mm or 50 mm of insulation increased to 100 mm or by 100 mm or more current requirement at the time
- Pre-1980's insulation was not required by London by-laws
- More recent funding or regulation requires insulation to be topped up to current standards
- Today buildings are insulated to 300-400 mm overall thickness (based on mineral wool k value)

Definition of Insulation

- Government insulation programmes are only geared up for
 - Cheap insulation (materials with the biggest market shares)
 - Approved insulation (Approval that big market share manufacturers can afford)
 - Fast and Simple insulation (that is still easy to get wrong)
 - Contractor led specification driven by time and cost (not by all the performance requirements)
 - Contractor that do not understand building performance and building failures (or do not have time to care)
- Government insulation programmes Insulation installers are only geared up for
 - Glass mineral wool conductivity thermal insulation
 - Rock mineral wool conductivity thermal insulation
 - Glass or Stone wool or foamed plastic insulation for external insulated render
 - Glass or Stone wool or foamed plastic insulation for internal insulated plasterboard
 - Stone wool blown fibre or injected foamed plastic insulation into cavity walls

What is wrong with these insulation types?

- These insulation materials have been middle of the road (MOR) performance
- By today's standards with Aerogels and VIPs they are now amongst the worst performers
- But this assumes the k value (conduction) is the only performance criteria
- Conventional insulation material marketing reinforces the idea that k value is the only criteria
- For Building Regulations and Technical Standards k value is the only criteria

What other criteria should be considered with any thermal insulation?

- Convection
 - Wind washing
 - Thermal bypass
 - Thermal flanking
 - Air and wind tightness
- Radiation
 - Thermal mass
 - Density
 - Specific heat capacity
 - Decrement delay
- Surface Properties
 - Low emissivity
 - High reflection
- Conduction (already mentioned in previous item)
 - Thermal bridging
- Moisture management
 - Vapour open v vapour closed
 - Hygro-thermal moisture movement
 - Hygro-scopicity
 - Moisture management
 - Moisture Transport
- Water tolerance
 - Wicking
 - Capillary Action
 - Hydro-phobic
 - Frost resistance

- Fire performance
 - Toxic Fumes
- Acoustic Performance
 - Acoustic Barrier
 - Acoustic Absorption
- Biodiversity Action
 - Nesting
 - Roosting
- Climate Change
 - Embodied Energy
 - Embodied Carbon
 - Sequestered Carbon
 - Global Warming Potential
 - Green House Potential
- Alternative ways of insulating a roof
- Ageing
- Surface condition
 - Closed pores/cells surface
 - Open pores/fibres/cells surface
 - Faced surface
 - Low emissivity surface
- Installation methods
 - Formless materials
 - Methods of application
 - Poured in
 - Blown In
 - Injected In
 - Sprayed In
 - Formed materials
 - Oversized
 - Accuracy of fit
 - Gappy Insulation
 - Jigsaw puzzle
 - Flexible materials
 - Squeezable
 - Compressions
 - Squashed Insulation
 - Resilience
 - Loft retention
 - Compliance
- Congestion
 - Competing for space with services
 - Separation of insulation from services

How does Loft insulation fail?

Problem: Wrong materials

- Good k value thermal insulation reduces heat loss by conduction in winter
- Good k value thermal insulation does nothing to stop solar radiation heat gains in summer
- Good k value thermal insulation reduces heat loss by conduction in summer
- Solar heat gains in summer gets in with ease but cannot get out, leading to overheating
- These include: stone, glass and slag mineral wools at normal densities,
- These include: Plastics: injected, sprayed, foamed, expanded or extruded and recycled
- These include: Structural Insulated Panel Systems (SIPS), Metal faced insulated core cladding panels
- These include: Vacuum Insulated Panel (VIP)

Solution: Right materials

- All roofs that can see the sun (most of them)
- Need to be insulated to protect from solar radiation heat gains
- This needs materials with high density, high specific heat capacity, low thermal conductivity
- These include: plant and tree based materials: e.g. Cork, Hemp, Wood fibre,
- These include: Expanded mineral: e.g. Cellular glass
- This includes: e.g. recycled newspaper cellulose fibre flake

Problem: Installation

- Undersized insulation placed between framing leaves gaps between insulation and framing
- Insulation spaced apart leaves gaps between rolls of insulation
- Over-sized spacing of framing creates gaps that standard sized insulation cannot fill without leaving gaps
- Lack of care in closing gaps in between insulation
- Gaps created permit heat loss by thermal by-pass or thermal flanking

Solution: Installation

- This can be solved by rolling out the insulation at right angles to framing allowing unrestricted placing of the insulation, close connection between rolls and between rolls and frames
- But: This may be more labour intensive and prone to inaccuracy in sizing of cuts leaving more gaps

Problem: Retrofitting

Problem: Existing insulation

- Old insulation may be non-existent
- Old insulation may be in sufficient thickness to fill the framing zone it occupies
- Old insulation may be wrongly sized or badly fitted
- Old insulation may have degraded by moisture, dust, age
- Old insulation may have lost its performance characteristics
- Old insulation may have been inhabited by nature and may be full of tunnels from the eaves inwards

Solution: Existing insulation

- The insulation layer nearest the ceiling needs to perform at its best
- It may make sense to remove, bag-up and dispose of degraded, dust filled, holey or damp insulation
- Reinsulate the framing zone with pristine new appropriate-sized, well-fitted insulation of the correct thickness

Problem: Water tank platform Insulation

- Insulation missing under water tank platforms is normal practice, to warm the water in the tank to prevent freezing.
- But insulation missing at the perimeter of tank platform just lets the heat dissipate uncontrollably into the cross-ventilated cold-roof

Solution: Water tank platform Insulation

- Insulation squeezed between the ceiling and the bottom of the water tank platform at the perimeter of the platform will close the air gap and trap the heat below the tank and not leaked out to the cross-ventilated loft
- Top up insulation may close the gap around the perimeter of the water tank platform
- An insulated enclosure to the water tanks and platform that goes down to the ceiling joists will close the gap

Problem: Adding top-up insulation

- Adding a second layer in any construction offers opportunities for loss of performance if joints in each layer correspond and potentially let the loss of performance affect the total thickness
- A gap between insulation in any layer will permit heat loss
- The thicker the total insulation thickness the greater the % of heat loss through the gaps

Solution: Adding Top-up insulation

- Second layers should be staggered in 1 or 2 directions compared to the first layer or better still turned through 90 degrees to the first layer and staggered in 1 or two directions
- Insulate by using poured-in/blown-in insulation that fills every gap, at such a density that they have good airtightness and have decrement delay as well as k value and hygroscopicity.

Problem: In-use:

- Problem: Wind washing at eaves
 - All cold roofs require cross ventilation to ensure the risks of condensation is minimized
 - The eaves and ridge needs ventilation slots to permit the cross-ventilation
 - In windy conditions the cross-ventilation washes across the thermal insulation at the eaves
 - Open pored, open celled or open fibred low density insulation materials will have the heat drawn out of their open surface and blown away
 - Closed surface insulation can lose heat by emissivity and wind-wash will cool the air at the surface to encourage more heat to the surface by conduction
- Solution: Wind washing at eaves
 - Wind baffles placed to maintain the 50 mm air-gap made of dense board like hardboard or breathing sheathing board offer resistance to wind-wash

- Paper-faced, Foil-faced insulation, closed cell insulation offer some resistance to wind-wash
- Dense insulation materials offer some resistance to wind-wash (but dense insulation usually means a poor k-value but improved decrement delay)
- Bagged insulation: are being promoted for insulation at the eaves to overcome wind-wash
 - But: if the bag is a vapour barrier on both sides of the insulation that is not ideal
 - But: if the bag is a breather membrane on both sides that is not ideal if the insulation is not hygroscopic
 - However if the bag is vapour barrier on one side and breather membrane on the other, this must be installed vapour barrier down and breather membrane up or that could be a disaster
- Problem: Cross ventilation
 - Heat emitted from the loft insulation surface, convected up and cross-ventilated to blow it away
- Solution: Cross ventilation
 - Low emissivity foil-faced insulation can offer some resistance to emissivity losses
- Problem: Squashed Insulation
 - Storage space is needed by house occupiers for their many essential but infrequently used camping gear and Christmas decorations or now redundant possessions and belongings kept just in case.
 - 300-400 mm of insulation between and above 100 mm ceiling joists means insulation will be compressed by their possessions and belongings
 - Compression down to 33% to 25% of their thickness at least doubles the U value and doubles the heat lost in winter
 - Hot lofts caused by solar radiation on to the roof coverings, conducting through the roof coverings warming the loft air to >40 degrees C
 - Heat conducts down through the unsquashed and more easily through the squashed insulation and heats up the top floor landing and bedrooms in summer
- Solution: Squashed Insulation
 - Raised storage/access platforms enable the possessions and belongings to be stored in the loft without impairing the loft insulation's ability to do its job

GBE Defects

- [Attic cistern thermal insulation enclosure](#) (Defect) G#1041 N#1058
- [Loft Insulation](#) (Defect) G#14166 (This Page)

GBE Issue Papers

- Performance Gap
- [Overheating](#) G#145
- [Squashed Loft Insulation](#) G#13919

GBE Manufacturers

- [Eco Answers Ltd t/a LoftZone](#) G#13890

GBE Suppliers

- [Eco Answers Ltd t/a LoftZone](#) G#13890

GBE installers

- Installer network via [Eco Answers Ltd t/a LoftZone](#) G#13890

GBE Products

- [StoreFloor](#) G#13287

GBE Accessories

GBE Systems

- [StoreFloor](#) G#13287

GBE Jargon Buster

Thermal Barrier

[Thermal Break](#) (Jargon Buster) G#9357

[Thermal Bridge](#) (Jargon Buster) G#9351

[Wind Wash](#) (Jargon Buster) G#14021

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GBE Slogan

Knowledge-Gap, Skills-Gap, Performance-Gap

[Build-Light, Insulate-Right, Solar-Tight](#)

[Stuffed-Loft, Squashed-Insulation, Lift-Your-Loft-Stuff](#)

Build-Tight, Ventilate-Right

[Don't Cook Your Client](#)

GBE #Hashtag

#Knowledge>Skills>PerformanceGap

[#BuildLightInsulateRightSolarTight](#)

[#LiftYourLoftStuff](#)

#BuildTightVentilateRight

[#DontCookYourClient](#)

GBE Jargon Buster

All of the following will be pages in their own right and in this page there will be lists of terms with links to those pages
More to add yet

Thermal Barrier

- Term used to describe when flow of heat is restricted or slowed.
- Accomplished through insulation and thermal breaks.
- (Energy Star '07 & NGS BRM '09)

Thermal Block

- Collection of one or more HVAC zones grouped together for simulation purposes
- Spaces need not be contiguous to be combined within a single thermal block.
- (Building Energy Glossary '06)

Thermal Break

- An element of low thermal conductivity placed in an assembly to reduce or prevent the flow of thermal energy between conductive materials.
- A typical example would be that found in a metal window frame to reduce the conduction of heat from the outside to the inside.
- (GreenSpec AEP '09)
- Unwanted heat loss or gain occurs due to conduction through a thermal bridge through thermal insulation and through thermally conductive materials.
- To reduce or prevent this heat loss or gain a thermal break is included in the construction in place of the thermal bridge.
- Thermal breaks need to have greater thermal resistance or lower thermal conductivity than the thermal bridge and ideally by a considerable margin.
- Thermal breaks are used in window sections, external doors, curtain walling, at floor edges and between floors and cantilevered balconies.
- An extensive set of components are needed for external solid wall insulation with rendered finish to address the thermal bridges created around windows, doors, externally mounted services, gutters, pipes and many other abutments.
- See: Extrusion
- (NGS BRM '09 – GBE BRM '16)
- Element of low thermal conductivity, space or vacuum placed in an assembly to reduce or prevent the flow of thermal energy between conductive materials.
- (EESC '11)

Thermal Bridge

- Unwanted heat loss or gain occurs due to conduction through a material.
- This can lead to significant energy losses and may also result in the build up of condensation.
- An example of thermal bridging is heat loss that occurs due to metal wall ties or steel framing that is insufficiently insulated between areas of temperature differences
- e.g. the internal and external environment.

- (based on Ecos Renews 17)
- A thermally conductive material which penetrates or bypasses an insulation system; such as a wall tie, metal fastener, concrete beam, slab or column.
- Thermal bridging lowers the overall thermal insulation of the structure by creating areas where heat loss is greater in one area than it is for another.
- The effect is to reduce the overall U value of the construction element.
- The heat loss per unit length of thermal bridge is known as the Ψ -(psi)-value and is measure in W/mK. (GreenSpec AEP '09)
- See: Passipedia: [Thermal bridge](#)
- (NGS BRM '11)
- Heat loss through a localized area where the primary insulation layer is significantly interrupted or reduced.
- Difficult but not impossible to treat in solid wall insulation (SWI).
- Become more significant where the building fabric has been upgraded.
- Effects of a cold bridge:
 - Rise in heat energy demand
 - Indoor surfaces at lower winter temperatures
 - Increased risk of surface condensation
 - Risk of damages to building units, leading to vacancies & rehousing costs
 - Danger of mildew, causing serious health threats, potential litigation
 - Complaints, withheld payments, reputation damage
- (ESLtd. LB '12)
- Heat loss through a localized area where the primary insulation layer is significantly interrupted or reduced in thickness or reduced in resistance to conductivity.
- Previously known as a cold bridge, but from the outside an 'anomaly' in an IRT survey will be a 'hot spot' and from inside it will be a 'cold spot', hence thermal bridge.
- Can be a continuous support angle or multiple ties, fixings or fastenings at close centres providing a conductivity route through an insulation layer.
- Their impact becomes more significant when the buildings U value is improved generally but the thermal bridge remains unresolved.
- Effects of a thermal bridge:
 - Rise in heating energy demand during heating season
 - Internal surfaces of external wall, roof or floor at localised lower temperatures in heating season
 - Increased risk of localised surface or Interstitial condensation
 - Danger of mildew and mould growing in condensate causing serious health risks
 - Risk of damage to building fabric due to rot in timbers and frost damage in masonry
 - Complaints, withheld payments, rehousing costs, vacancies, potential litigation, reputation damage.
- (GBE BRM '16)

Thermal Bridge Free Design

- See: Passipedia: [Thermal bridge free design](#)
- (NGS BRM '11)

Thermal Bridging

- Accelerated thermal flow that occurs when materials that are poor insulators displace insulation.
- (Energy Star '07)
- There are many ways to improve the thermal performance of traditional walls towards Zero Carbon standards, but consideration should be given to the consequences of doing so.
- Widening a cavity and adding more thickness to thermal insulation, will succeed in achieving an improved U value however, the better insulated the wall is – the worse the loss through thermal bridges at wall junctions with floors, roof and foundations, to such an extent that junction thermal transmittance fails to meet the default values laid down in the BRE Information Paper IP1/06 'Assessing the effects of thermal bridges at junctions and around openings'.
- Detailing and jointing of the insulation layer is a critical factor in energy efficient design.
- It has been estimated that up to 30% of the heat loss in a well-insulated house is through these 'Non Repeating Thermal Bridges' at wall/floor junctions, corners, reveals, ceiling junctions heads and sills.
- Thermal bridging is particularly evident through the wall ties in a cavity construction; wider cavities need more and bigger wall ties, each in turn increasing the thermal heat losses through the wall (see diagram below).
- Building Regulation Approved Document 'Part' L 2010 places great emphasis on how thermal bridging is accounted for.
- To minimise thermal bridging, accredited construction details can be used.
- Industry based accreditation schemes are to be set up, and will include site inspection to ensure construction quality.
- Alternatively, if the construction details are not accredited, their linear thermal transmittances (PSI values)

may be calculated by persons with suitable expertise and experience, but the calculated values must be increased by 0.02 W/m.K or 25% (whichever is the greater).

- If non-accredited details are used and PSI values are not calculated, a default overall thermal bridging transmittance (ψ value) of 0.15 W/m²K must be included in the DER calculation.
- Manufacturers are beginning to provide PSI values in tables in product literature.
- Thermal bridges can result in cold areas in a warm wall and warm moist air may be cooled on these surfaces leading to condensation and triggering ever-present spores into mould growth.
- Consideration can be given to the use of low conductivity materials:
- Stainless steel wall ties, are lower conductivity compared with galvanized steel, basalt fibre ties are better still.
- GRP pultruded lintels is lower conductivity compared with galvanized steel.
- Bringing the cavity wall thermal insulation right to the edge of a window avoiding blockwork reveal closers, makes the insulation more vulnerable but lining the opening jambs, head and sill with plywood box lining protects it again.
- Placing the window and doors in line with external, cavity or internal wall thermal insulation is critical to avoid diagonal thermal bridging.
- (Other? & NGS BRM '11)

Thermal Bypass

- There are many forms of thermal bypass and these are discussed in considerable detail in Green Building Magazine Building for a future Summer 2009 Vol 9 No.1, Pages 16 – 23.
- Where heat may bypass insulation by escaping into cavities and moving through air spaces
- One significant example: Cavity walls in separating walls (party walls) between housing in terraces or between flats in blocks are known to be poorly insulated heat escapes into the cavity and rises to the top floor or attic and escapes through roof tiling or into attic spaces.
- Until recently No Building Regulation Approved Document L requirements existed
- (NGS BRM '09)
- The movement of heat around or through insulation.
- This typically occurs when gaps exist between the air barrier and insulation or where air barriers are missing.
- (Energy Star '07)

Thermal Bypass Checklist

- Comprehensive list of building details for ENERGY STAR Qualified Homes addressing construction details where air barriers and insulation are commonly missing.
- (Energy Star '07)

Thermal Flanking

- Where heat may take a longer route around insulating construction via a thermal bridge or void.
- (NGS BRM '09)

Thermal Insulation

- Material, method or design used to reduce the rate of heat transfer from one space to another.
- (EESC '11)
- See also: Conduction Thermal Insulation, Convection Thermal Insulation, Radiation Thermal Insulation,
- (GBE BRM '14)

Thermal Lag

- See: Decrement Delay
- (NGS BRM '11)

Thermal Laminates

- Plasterboard with insulation layer on the back with or without vapour control layer of polyethylene or aluminium foil.
- May be part of an IWI or ISWI.
- (GBE BRM '16)

Thermal Looping

Thermal Mass

- Materials with mass heat capacity and surface area capable of affecting building loads by storing and releasing heat as the interior and/or exterior temperature and radiant conditions fluctuate.
- See: wall heat capacity.
- (Building Energy Glossary '06)

- The mass of a building that can retain heat from the sun or other radiant heat sources, e.g. the walls and floors of a building.
- Buildings constructed of dense materials, such as bricks or concrete, have a better thermal mass than lightweight buildings, such as timber.
- (Hastoe HA GreenStreet.org & NGS BRM '09)
- Thermal mass can be added to timber frame by use of dense materials or PCM phase change material as wall and ceiling linings.
- Materials with high thermal mass include masonry, rock and water.
- These materials are capable of absorbing and retaining heat e.g. from the sun or other radiant heat sources, and slowly releasing the heat back into the building when internal space air temperature falls.
- (Ecos Renews 17 & NGS BRM '09)
- The thermal mass in the building elements must be exposed to enable its abilities to be put to use.
- Thermal mass often but not always relates to material density, concrete is useful thermal mass, permanent steel formwork is not.
- Carpets on underlay on a concrete acts like thermal insulation preventing solar gains being absorbed and later released.
- Linoleum flooring is thin and dense enough not to interfere with heat transferring into the concrete slab or being released later.
- (NGS BRM '09)
- Materials characterised by the expression 'Thermal mass' (aka 'Thermal storage capacity') are those that absorb heat, store it, and at a later time, release it.
- Large surface areas of relatively thin, dense internal clay plasters or cement renders can provide thermal mass at the surface to help store passive heat gains.
- (GreenSpec AEP '10)
- The ability of construction materials to absorb, store and release heat.
- Thermal mass can be used effectively to absorb daytime heat gains (reducing cooling load) and release the heat during the night (reducing heat load), thereby maintaining a constant level of comfort through stable temperature.
- Materials of high thermal mass include water, stone, earth, brick and concrete.
- More recent innovations include 'phase change' materials that store energy whilst maintaining constant temperatures.
- The quality of thermal mass is usually described in terms of 'admittance'.
- Admittance is the ability of a material or construction such as a wall to exchange heat with the environment when subjected to a simple cyclic variation in temperature.
- For buildings, this is 24 hours.
- Admittance is measured in W/m^2K , where temperature (K) is the difference between the mean daily value and actual value within the space at a specific point in time.
- Key variables that determine admittance are thermal capacity, conductivity, density and surface resistance.
- (note that 'K' is used in a slightly different way from 'k' that is involved in the calculation of U value)
- (GreenSpec AEP '09)
- Capacity of a material to store heat.
- (EESC '11)

Thermal Resistance (R-Value)

- Reciprocal of the time rate of heat flow through a unit area induced by a unit temperature difference between two defined surfaces of material or construction under steady-state conditions, in $m^2.K/W$
- (Building Energy Glossary '06)
- Thermal resistance is the measure of a component's ability to restrict the passage of heat across its thickness.
- The R value is calculated by combining the lamda value (thermal conductivity, or 'k value') and the thickness of the material.
- Hence $R=t/\lambda$, where 't' is the thickness, λ is the lamda value
- Units are measured in $m^2.K/W$.
- Used in connection with insulation, the higher the R value, the more effective the insulation.
- The R value is also used to calculate the U value (see below)
- (GreenSpec AEP '09)
- Measure of a component's ability to restrict the passage of heat across its thickness.
- (EESC '11)

Thermal Transmittance

- Overall coefficient of heat transfer from air to air.
- It is the time rate of heat flow per unit area under steady conditions from the fluid on the warm side of the barrier to the fluid on the cold side, per unit temperature difference between the two fluids
- (Building Energy Glossary '06)

- heat transmission in unit time through unit area of a material or construction and the boundary air films, induced by unit temperature difference between the environments on each side, in $\text{W/m}^2\cdot\text{K}$
- (Building Energy Glossary '06)

Thermal Transmittance, Overall (U_o)

- Gross overall (area weighted average) coefficient of heat transfer from air to air for a gross area of the building envelope
- The U_o value applies to the combined effect of the time rate of heat flows through the various parallel paths such as windows, doors, opaque construction areas comprising the gross area of one or more building envelope components such as walls, floors, and roof or ceiling.
- (Building Energy Glossary '06)

Thermal Transmittance (U Value)

- Thermal transmittance is a measure of the overall rate of heat transfer, by all mechanisms under standard conditions, through a particular section of construction.
- This measure takes into account the thickness of each material involved and is calculated from R values of each material as well as constants accounting for surface transmittance (R_{si} and R_{so} , inner and outer surfaces respectively) and also for a small standard air gap (R_{so}).
- Thermal transmittance is measured in $\text{W/m}^2\text{K}$
- (GreenSpec AEP '09)

Thin Insulation

- With speculative developer's preoccupation with profit, floor area, net:gross ratios, designers have become preoccupied with thin walls demanding thin insulation.
- Together with progressively improving requirements in Building Regulations for better thermal insulation U values in buildings, manufacturers started to experiment with thin high performance insulation.
- See: PIR, PUR, XPS, Multifoil Insulation, Aerogel Insulation, Vacuum Insulated Panels, etc.
- (NGS BRM '10)

Wind Baffle

- An object or board that serves as an air barrier for the purpose of blocking wind washing at eaves within an attic/loft.
- (Energy Star '07 & NGS BRM '10 & GBE BRM '16)

Wind Tightness Layer

- A wind tight layer which allows transmission of water vapour, but which provides resistance to air-flow. Used in roof construction roof tile underlay or in wall construction as a damp proof membrane in Rainscreen cladding or behind timber weatherboarding.
- It is used to ensure that the thermal insulation in the construction can perform to the optimum level. Ventilation air in voids ensures the moisture levels to not build to levels where moisture sets off moulds and rot, but air movement across open fibre materials will draw heat out of the insulation's surface and cool the building.
- (NGS BRM '09 – '12)
- A wind tight layer is generally located on the external side of the thermal insulation layer.
- (Ecological Building Systems '09)

Wind Washing

- When insulating properties of insulation are reduced or eliminated due to air-current penetration removing heat.
- Boards above eaves insulation channelling ventilation air and preventing heat removal from insulation.
- (Energy Star '07 & NGS BRM '10)
- Air movement in cavities wall or in lofts, blowing over the air permeable surface of thermal insulation, drawing heat out as it passes.
- Masonry cavity walls suffer especially with partial fill insulation batts made of mineral wool.
- In Austria a membrane would be used in partial fill cavity wall insulation to reduce this method of heat loss.
- Low emissivity foil faced board insulation, Breather Membranes, Wind tightness layers and breathing sheathing boards can control heat loss from insulation subject to wind washing.
- (NGS BRM '10 – GBE BRM '16) G#14021