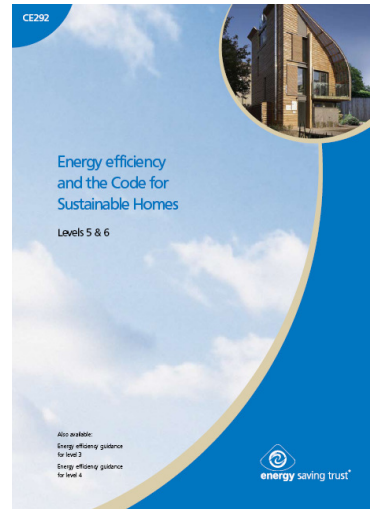


HOW TO ACHIEVE U-VALUES FOR CODE FOR SUSTAINABLE HOMES LEVEL 5/6

The Energy Saving Trust has developed a range of guidance to help housing professionals meet the energy performance requirements of the Code for Sustainable Homes. This is aimed at reducing the UK's carbon dioxide emissions. The document CE292 referenced here may be downloaded from the EST website.

Isothane Ltd has a range of products for insulating the building envelope based on modern rigid polyurethane foam technology, (being CFC and HCFC free and therefore having Zero Ozone Depletion Potential), of which two are illustrated here. Isothane has a well established approved contractor network serving the UK, and Ireland.

The target of 100% less CO₂ emissions than the current maximum allowed calls for stringent U-values and air tightness - that we believe are best met by using the most efficient insulation commonly available. On-site sprayed or injected polyurethane foam characteristically seeks and seals all gaps. Therefore no costly correction for air gaps is necessary in the calculations. Unwanted air leakage is restricted very efficiently and we have achieved Air Permeability test results of 3 m³/h/m².



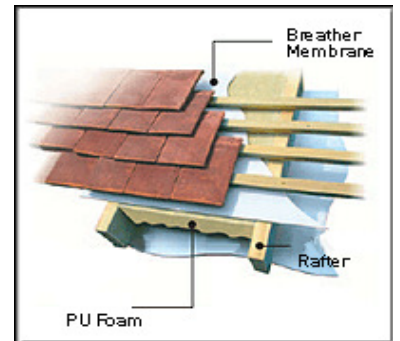
Aspect		National building regulations	Energy Saving Trust 100% and zero carbon solutions
Opaque elements W/m ² .K (area weighted average)	roof	0.25	0.13
	walls	0.35	0.15
	exposed floors	0.25	
Aspect		National building regulations	Energy Saving Trust 44% solutions
Maximum permissible air permeability m ³ /(hr.m ²)@50Pa Confirmed after construction (but prior to completion) by a pressure test carried out in accordance with the procedure set out in the ATTMA publication 'Measuring air permeability of building envelopes'. ¹ For further guidance see 'Improving airtightness in dwellings' (CE137/GPG224) and 'Achieving airtightness in new dwellings: case studies' (CE248)		10 ²	3

Construction Type

Element : Pitched roof - Zero Carbon, U=0.13
 Roof pitch : 30.0°
 Internal surface emissivity : High External surface emissivity : High

Construction

Construction	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m ² K/W)	Pitch (°)	Bridge Details
Outside surface resistance	-	-	0.040	30.0°	
Clay tiles (BS5250)	15.0	0.840	0.018	30.0°	
Airspace between tiles and roofing felt (inc. resistanc	-	-	0.120	30.0°	
Breather membrane (BS5250)	-	-	-	30.0°	
Duratherm >120mm	210.0	0.024	8.750	30.0°	6.3% Timber (210.0mm)
Cavity >=25mm, roof (CIBS)	-	-	0.340	30.0°	6.3% Timber (25.0mm)
Vapourcheck Wallboard	12.5	0.180	0.069	30.0°	
Loft space	-	-	0.180		
Plasterboard (BS5250)	12.5	0.170	0.074		
Plaster, lightweight (BS5250)	2.0	0.220	0.009		
Inside surface resistance	-	-	0.100		



In this scenario, 210mm of Duratherm® has achieved 0.13.

PTO

U-value - 0.13W/m²K

U-value, Combined Method : 0.13 W/m²K (upper/lower limit 8.107 / 6.784 m²K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc0.0000)

(Correction for mechanical fasteners, Delta Uf = 0.000W/m²K)

(Correction for air gaps, Delta Ug = 0.000W/m²K)

(Based on the combined method for determining U-values of structures containing repeating thermal bridges.)



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HOW TO ACHIEVE U-VALUES FOR CODE FOR SUSTAINABLE HOMES LEVEL 5 / 6 ...

Construction Type

Element : Wall - Zero Carbon, U=0.15
Internal surface emissivity : High External surface emissivity : High

Construction

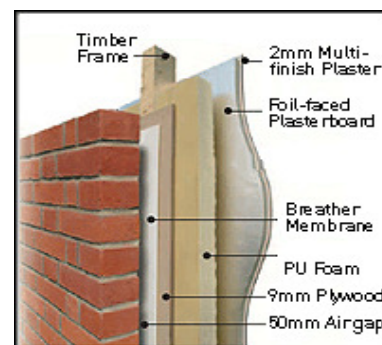
	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m ² K/W)	Pitch Bridge Details (°)
Outside surface resistance	-	-	0.040	
Brick - outer leaf (BRE)	103.0	0.770	0.134	17.3% Mortar (103.0mm)
Cavity >=25mm, wall (CIBS)	-	-	0.180	
Breather membrane (BS5250)	-	-	-	
Plywood	9.0	0.170	0.053	
Duratherm >120mm	185.0	0.024	7.700	8.0% Timber (185.0mm)
Vapourcheck Wallboard	12.5	0.180	0.069	
Plaster, lightweight (BS5250)	2.0	0.220	0.009	
Inside surface resistance	-	-	0.130	

U-value - 0.15W/m²K

U-value, Combined Method : 0.15 W/m²K (upper/lower limit 6.665 / 6.302 m²K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc0.0000)

(Correction for mechanical fasteners, Delta Uf = 0.000W/m²K)
(Correction for air gaps, Delta Ug = 0.000W/m²K)

(Based on the combined method for determining U-values of structures containing repeating thermal bridges.)



In this scenario, **185mm** of **Duratherm®** has achieved **0.15**. In block & brick, **0.15** is possible with a full fill of **Technitherm®** into a **100mm** cavity, using eg; Thermalite Turbo 100mm block, and 50mm of foam backed plasterboard.

Construction Type

Element : Solid Ground floor - Zero Carbon, U=0.15
Internal surface emissivity : High External surface emissivity : High

Construction

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m ² K/W)	Pitch Bridge Details (°)
Inside surface	-	-	0.040	
Screed - aerated (BS5250)	75.0	0.400	0.188	
Duratherm >120mm	125.0	0.024	5.200	
Ground	-	-	0.170	

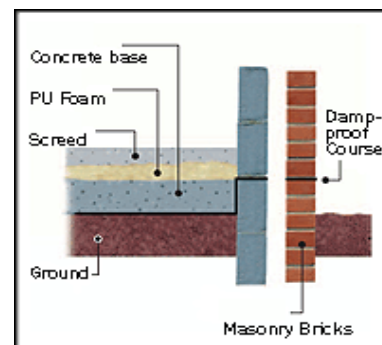
Ground Floor Details

Calculation method : EN ISO 13370
P/A : 0.570m
Floor type : Solid floor
Edge insulation : None

U-value - 0.15W/m²K

U-value, Combined Method : 0.15 W/m²K (upper/lower limit 5.598 / 5.598 m²K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc0.0000)

(Correction for mechanical fasteners, Delta Uf = 0.000W/m²K)
(Correction for air gaps, Delta Ug = 0.000W/m²K)



In this scenario **125mm** of **Duratherm®** has achieved **0.15**. (Concrete base disregarded; neither edge insulation nor flooring included, 7m x 7m floor).

Isothane provides a U-value and Condensation Risk analysis free of charge. Each project must be assessed individually and therefore all examples shown here can only be illustrative.

Please see the partner document 'Level 4 U-values'.

Please also see our 'SAP Pass Rescue' case study that gives more detail of an Air Permeability result of **3m³/h/m²** for Block & Brick and Timber Frame detached houses using **Duratherm®** and **Technitherm®**.



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