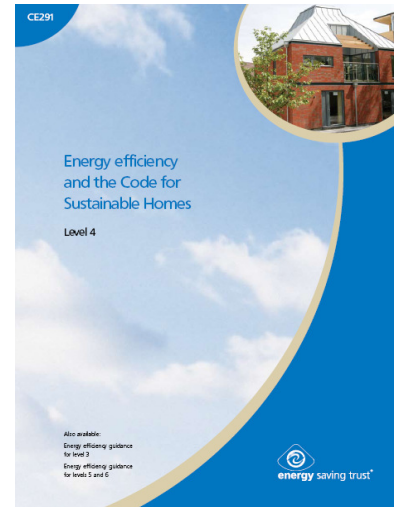


## HOW TO ACHIEVE U-VALUES FOR CODE FOR SUSTAINABLE HOMES LEVEL 4

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 CE291 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 44% 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 m<sup>3</sup>/h/m<sup>2</sup>.



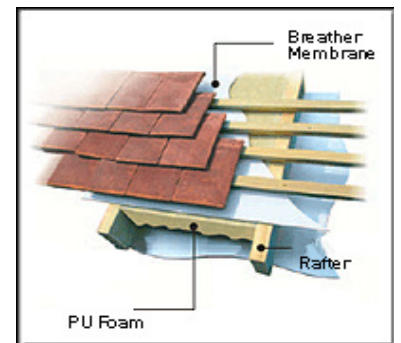
Aspect		National building regulations	Energy Saving Trust 44% solutions
Opaque elements W/m <sup>2</sup> .K (area weighted average)	roof	0.25	0.13
	walls	0.35	0.20
	exposed floors	0.25	0.20
Aspect		National building regulations	Energy Saving Trust 44% solutions
<b>Maximum permissible air permeability m<sup>3</sup>/(hr.m<sup>2</sup>)@50Pa</b> 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'. <sup>1</sup>  For further guidance see 'Improving airtightness in dwellings' (CE137/GPG224) and 'Achieving airtightness in new dwellings: case studies' (CE248)		10 <sup>2</sup>	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 <sup>2</sup> 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. resistance)	-	-	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/m<sup>2</sup>K

U-value, Combined Method : 0.13 W/m<sup>2</sup>K (upper/lower limit 8.107 / 6.784 m<sup>2</sup>K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc0.0000)

(Correction for mechanical fasteners, Delta Uf = 0.000W/m<sup>2</sup>K)

(Correction for air gaps, Delta Ug = 0.000W/m<sup>2</sup>K)

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



Isothane Limited, Newhouse Road  
 Huncoat Business Park, Accrington  
 Lancashire BB5 6NT UK  
 Telephone: + 44 (0) 1254 872555  
 Facsimile: + 44 (0) 1254 871522  
 Order Fax Line: +44 (0) 1254 398295  
 Email: info@isothane.com  
 Website: www.isothane.com  
 Registration No: 2975728



Certificate No. FM 21549



INVESTOR IN PEOPLE



Certificate No. EMS 68443

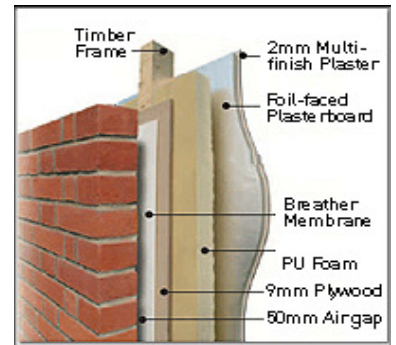
# HOW TO ACHIEVE U-VALUES FOR CODE FOR SUSTAINABLE HOMES LEVEL 4 ...

## Construction Type

Element : Wall - Level 4, U=0.2  
Internal surface emissivity : High External surface emissivity : High

## Construction

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (°) (m²K/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	140.0	0.024	5.800	8.0% Timber (140.0mm)
Vapourcheck Wallboard	12.5	0.180	0.069	
Plaster, lightweight (BS5250)	2.0	0.220	0.009	
Inside surface resistance	-	-	0.130	



In this scenario **140mm** of **Duratherm®** has achieved **0.20**. In block & brick, **0.20** is possible with a full fill of **Technitherm®** into a **100mm** cavity, using eg; Thermalite Turbo 100mm block.

## U-value - 0.20W/m²K

U-value, Combined Method : 0.20 W/m²K (upper/lower limit 5.238 / 4.904 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)

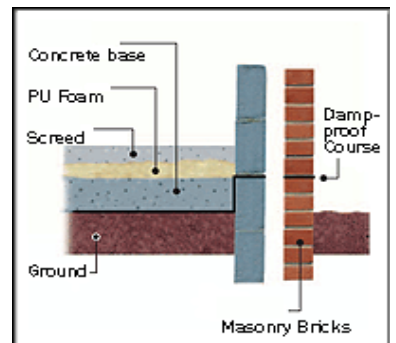
(Based on the combined method for determining U-values of structures containing repeating thermal bridges.)

## Construction Type

Element : Solid Ground floor - Level 4, U=0.2  
Internal surface emissivity : High External surface emissivity : High

## Construction

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (°) (m²K/W)	Pitch Bridge Details (°)
Inside surface	-	-	0.040	
Screed - aerated (BS5250)	75.0	0.400	0.187	
Duratherm 80-120mm	85.0	0.025	3.400	
Ground	-	-	0.170	



In this scenario, **85mm** of **Duratherm®** has achieved **0.20**. (Concrete base disregarded; neither edge insulation nor flooring included, 7m x 7m floor).

## Ground Floor Details

Calculation method : EN ISO 13370

P/A : 0.570m

Floor type : Solid floor

Edge insulation : None

## U-value - 0.20W/m²K

U-value, Combined Method : 0.20 W/m²K (upper/lower limit 3.798 / 3.798 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)

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 'Zero Carbon 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®**.



Isothane Limited, Newhouse Road  
Huncoat Business Park, Accrington  
Lancashire BB5 6NT UK  
Telephone: + 44 (0) 1254 872555  
Facsimile: + 44 (0) 1254 871522  
Order Fax Line: +44 (0) 1254 398295  
Email: info@isothane.com  
Website: www.isothane.com  
Registration No: 2975728



Certificate No. FM 21549



INVESTOR IN PEOPLE



Certificate No. EMS 68443