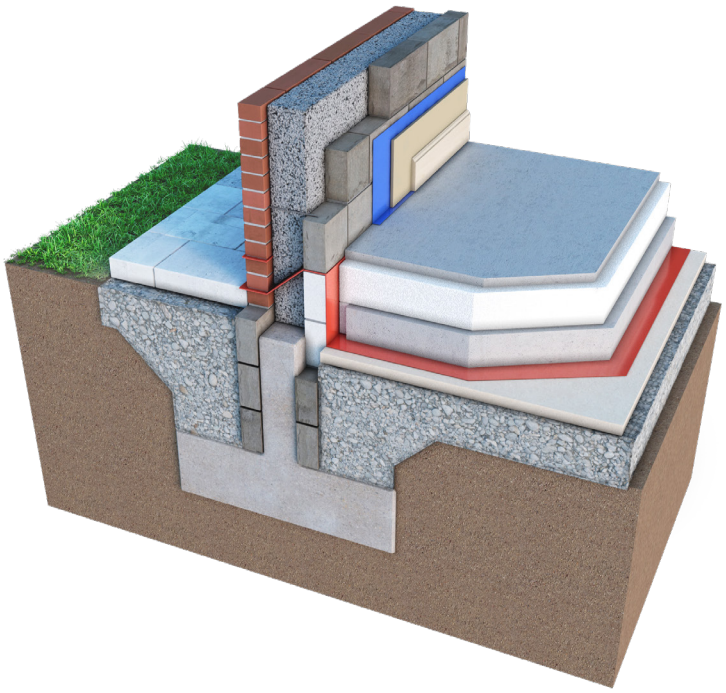
KORE

KORE Fill Cavity Wall Insulation

New Build Wall Insulation Design Guide

KORE Fill Bonded Bead



Key Features

· Meets and exceeds building regulations
· Suitable for passive house construction
· Installed by insulation experts
· Completely fills the wall cavity
· Eliminates thermal looping - a major cause of heat loss in cavity construction
· Suitable for very wide cavity constructions
· Thermal mass benefits from concrete construction

Application & Description

Application

KORE Fill is a bonded bead, complete cavity wall fill insulation system for application in new and existing buildings up to 12 meters in height. KORE Fill is approved for use in masonry cavity walls for both full fill and partial fill situations, when a residual cavity wall width of 40mm or greater exists. The KORE Fill Diamond Bonded Beads have not been assessed or approved for use in residual fill applications when the remaining cavity width to be filled is less than 50mm.

Product Name Guide

Product Name	Application	New Build
KORE Fill Original	Cavity Wall	Yes
KORE Fill Diamond	Cavity Wall	Yes

Description

KORE Fill is expanded polystyrene injected in bead form into a cavity to form an insulating mass. The bead solidifies in the cavity as it's injected with a special bonding agent. This insulating mass significantly reduces thermal transmittance across the cavity. Filling the cavity completely with KORE Fill will not diminish the original function of the cavity. The cavity will still be able to breath; the bead will not absorb water and will not allow the transfer of water across the cavity to the inner leaf. The product when installed facilitates the control of surface and interstitial condensation in walls.

Typical Construction & U-Value Calculations

Calculation Assumptions

All U-value calculations are in accordance with BS EN ISO 6946:2007. Unless stated otherwise inner blocks have a thermal conductivity of 1.13W/mK. Internal finish unless otherwise stated taken as 12.5mm standard plasterboard with 3mm plaster skim on dabs. Conventional surface resistance; direction of heat flow taken as horizontal. Where applicable air layer is taken as unventilated. Unventilated air layer emissivity surfaces were given due consideration. Calculations that include KORE EPS in a Thermal Board; the vapour control layer must be provided by the plasterboard e.g. Gyproc Duplex Board 12.5mm. KORE EPS in a Thermal Board must be applied using plaster dabs and treated as a inhomogeneous layer. Corrections for air layers and mechanical fasteners penetrating the insulation layer were considered. Best practice in terms of workmanship was assumed and therefore the correction factor for air gaps were ignored in calculations for new buildings. A correction factor was applied to calculations for existing buildings. Mechanical fasteners were taken as double triangle stainless steel, number 2.5 per m/sq for cavities up to 150mm. For cavity widths over 150mm, specialist advice should be sought for wall tie spacings and selection from an engineer or trained specialist. These calculations should act as a guide only. Please contract our technical team for a detailed U-Value calculation and condensation risk analysis.

Definitions

fRSI-Values Definition

The fRSI-value is a ratio of the difference in internal temperature and minimum surface temperature to the difference in internal and external temperatures. Internal and external temperatures are applied to the relevant surfaces of the model, and the software calculates the heat flow through the materials and bridging elements, to determine the heat energy loss from inside to outside, and the surface temperatures on the inner surfaces of the building. It is then determined if the fRSI-value is above or below the limits set out in IP 106 and Technical Guidance Document Part L 2019. fRSI-value must be above 0.75 at the coldest point (must be above 15 degrees Celsius) on any internal face of the junction modelled for residential areas.

Psi Values Definition

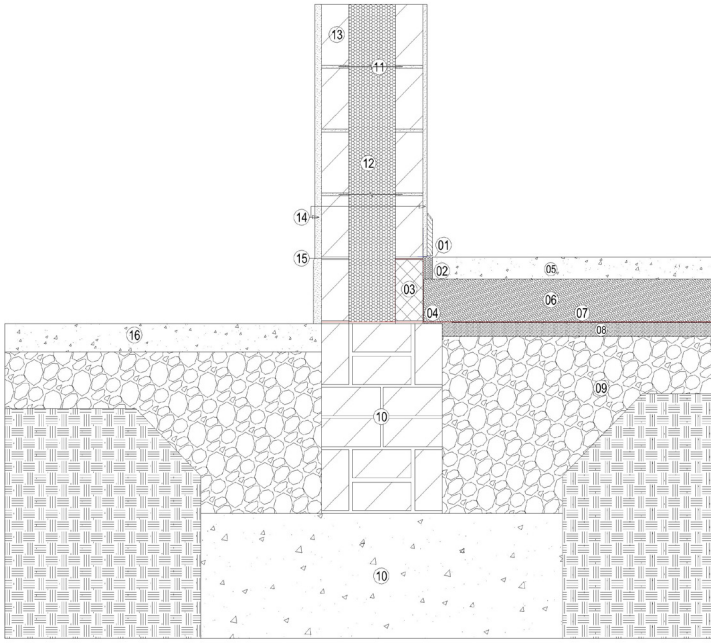
The Psi-value represents the extra heat flow through the linear thermal bridge over and above that through the adjoining plane elements. If a Psi-value does not meet the default value outlined in TGDL tables it is still possible to calculate a Thermal Bridging Factor (y value) that is better than default, by means of manual (y value) calculation. The Thermal Bridging Factor (y value) is a parameter that is inputted in the BER calculation and takes into account the Psi-values of all heat loss junctions, the lengths over which the Psi-values apply and the total thermal envelope area of the building.

Thermal Modelling

All thermal modelling has been carried out by Evolusion Innovation on behalf of KORE Insulation. Evolusion Innovation are NSAI certified to thermally model junction details and calculate their linear thermal transmittance. Evolusions thermal modellers are also included on the NSAI registrar of approved thermal modellers. All modelling is carried out in accordance with EN ISO 6946 as well as EN ISO 10211-1 and BR 497.

Typical Construction & U-Value Calculations

CWI_04: Cavity Wall Construction - Block Inner and Outer Leaf, Plasterboard and Skim Internal Finish

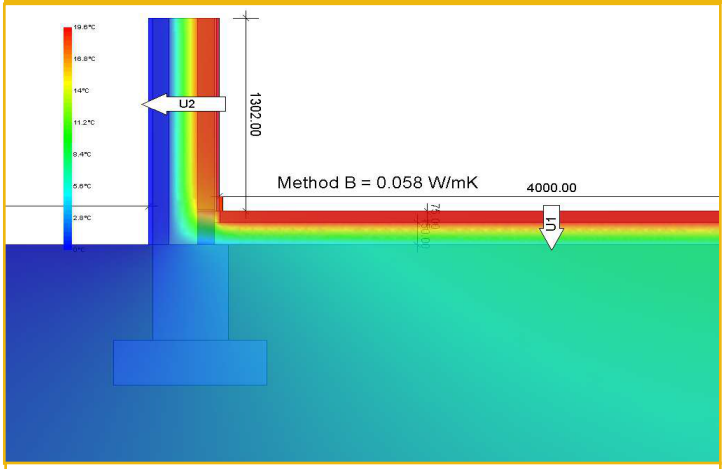


Plasterboard, Block, Insulation, Block, Render		
Cavity Width	KORE Fill Original 0.035W/mK	KORE Fill Diamond 0.033W/mK
	U-Value W/m²K	
150mm	0.21	0.20
170mm	0.19	0.18
180mm	0.18	0.17
200mm	0.16	0.15
250mm	0.13	0.13
300mm	0.11	0.11

U-Value Legend	
Orange	nZEB Ready

1. Junctions to be taped with airtightness tape to ensure air tightness levels are achieve
2. 35mm KORE EPS70 Silver Floor Perimeter Insulation with min R-value of 1.0 m2k/W.
3. Autoclaved aerated concrete (AAC) block to be used to ensure thermal break is maintained. (maximum thermal conductivity of 0.20 W/mk) AAC block suitable for use in foundations in all conditions. Block to be installed so to avoid any effect of moisture on thermal conductivity.
4. Radon membrane to be lapped over AAC block and sealed to radon barrier below with radon resisting sealing tape to avoid rising moisture
5. Concrete floor to engineers specifications and details
6. 150mm KORE Floor Insulation
7. Radon barrier of 50mm sand blinding and installed to TGD-C
8. 50mm sand blinding
9. Compacted hardcore
10. Foundations and rising walls to Structural Engineers specifications and details
11. Wall ties to manufacturers specifications and details
12. 170mm KORE Fill Diamond bonded bead insulation to be installed 225mm minimum below top of floor level
13. 370mm cavity wall: -100mm concrete block outer leaf, 170mm cavity and 100mm concrete block inner leaf
14. 24mm external and 15mm Internal sand cement remder (internal includes airtight parge coat)
15. DPC level minimum of 150mm from ground level
16. Foothpath.

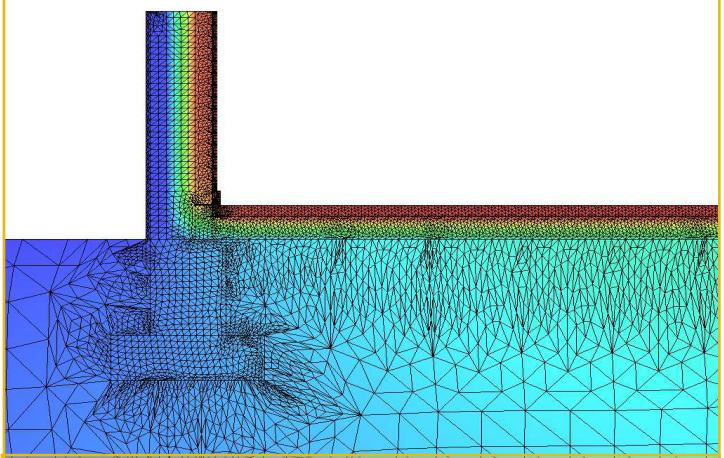
CWI_04: PSI Calculation



Thermal bridges calculation

Ψ = +0.058 W/(mK)

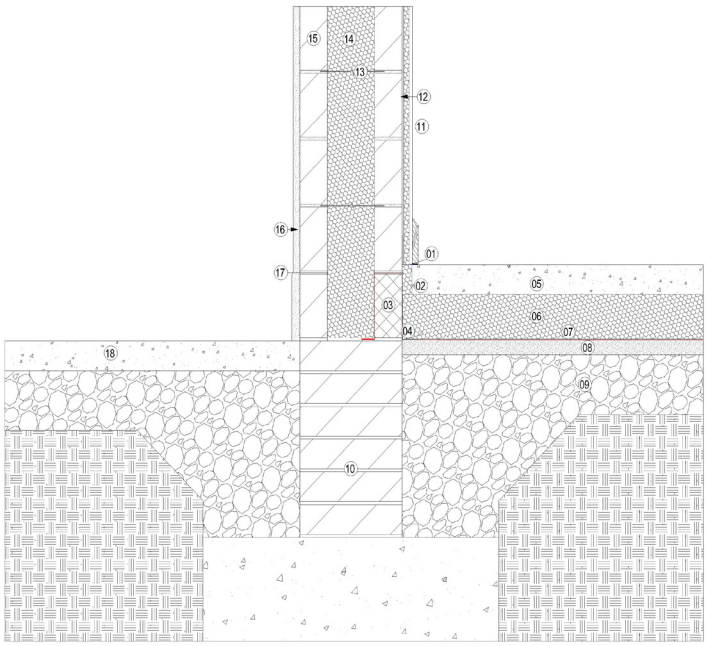
CWI_04: fRSI Calculation



$f_{RSI} = 0.92 > 0.75$

Typical Construction & U-Value Calculations

CWI_06: Cavity Wall Construction - Block Inner and Outer Leaf, Thermal Plasterboard Internal

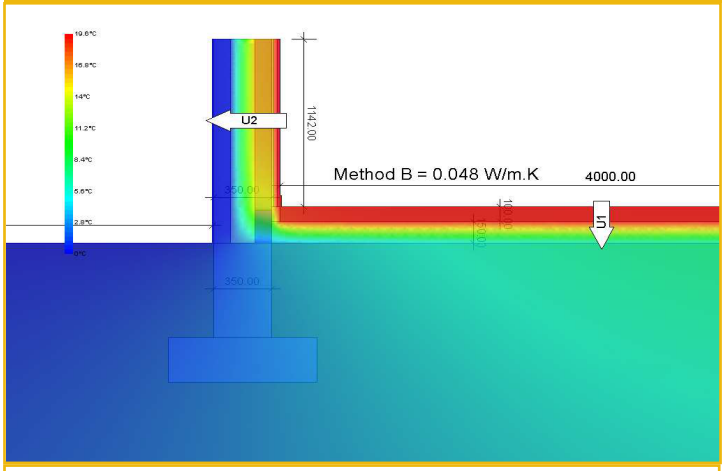


Thermal board __mm EPS Silver Bonded to 12.5mm Vapour Control Plasterboard, Block, Insulation, Block, Render		
Cavity Width	KORE Fill Std 0.035W/mK & 30mm Thermal Board (EPS70 Silver)	KORE Fill Diamond 0.033W/mK & 20mm Thermal Board (EPS70 Silver)
	U-Value W/m²K	
150mm	0.18	0.18
200mm	0.14	0.14
250mm	0.12	0.12
300mm	0.10	0.10

U-Value Legend	
Orange	nZEB Ready

1. Junctions to be taped with airtightness tape to ensure air air-tightness levels are achieved.
2. 35mm KORE EPS70 Silver Floor Perimeter Insulation with min R-value of 1.0 m2k/W.
3. Autoclaved aerated concrete (AAC) block to be used to ensure thermal break is maintained. (maximum thermal conductivity of 0.20 W/mk) AAC Block to be suitable for use in foundations in all conditions. Block o be installed so to avoid any effect of moisture on thermal conductivity.
4. Radon membrane to be lapped over AAC block and sealed to radon barrier below with radon resisting sealing tape to avoid rising moisture.
5. Concrete floor to engineers specifications and details.
6. 150mm KORE Floor Insulation.
7. Radon barrier on 50mm sand blinding and installed to TGD-C.
8. 50mm sand blinding.
9. Compacted hardcore.
10. Foundations and rising walls to Structural Engineers specifications and details.
11. 12.5mm plaster slab with vapour control layer below rafter.
12. Continuous bonding adhesive seal along perimeter of KORE thermal plasterboard, to prevent air infiltration at back of plasterboard slab.
13. Wall ties to manufacturers specifications and details.
14. 170mm KORE Fill Diamond bonded bead insulation to be installed 225mm minimum below top of floor level.
15. 370mm cavity wall: - 100mm concrete block outer leaf, 170mm cavity and 100mm concrete block inner leaf.
16. 24mm external sand cement render.
17. DPC level minimum of 150mm from ground level.
18. Footpath.

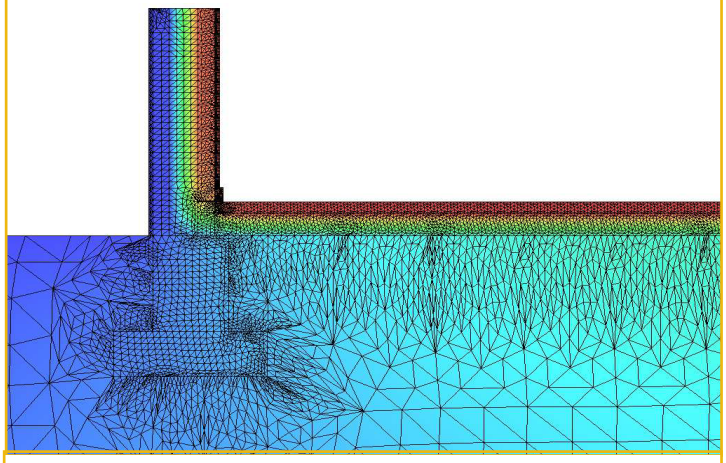
CWI_06: PSI Calculation



Thermal bridges calculation

Ψ = +0.048 W/(mK)

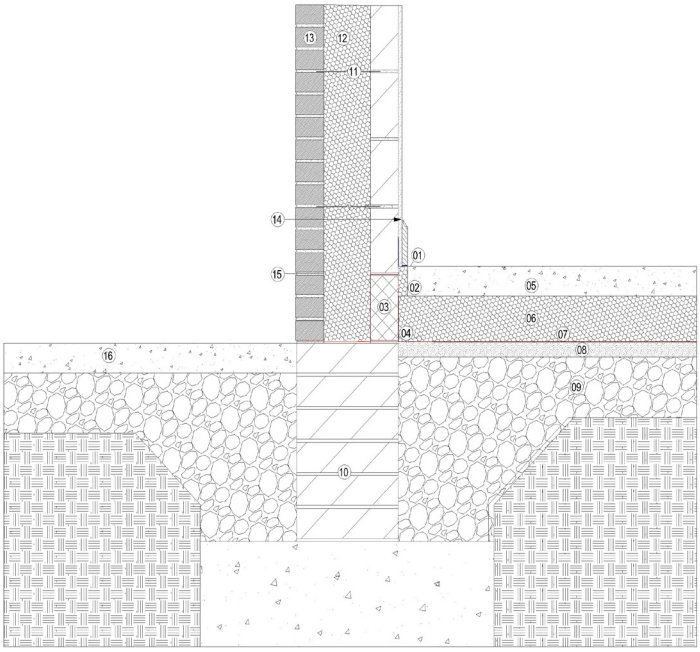
CWI_06: fRSI Calculation



$f_{RSI} = 0.93 > 0.75$

Typical Construction & U-Value Calculations

CWI_08: Cavity Wall Construction - Brick Outer, Block Inner, Plasterboard/Skim Internal Finish

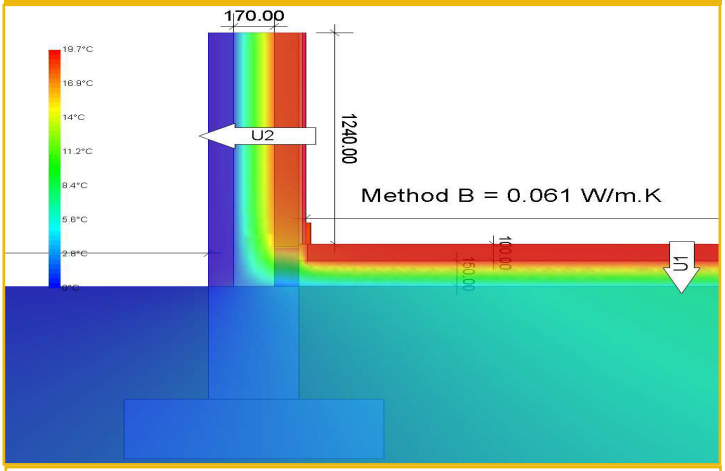


Plasterboard, Block, Insulation, Brick		
Cavity Width	KORE Fill Std 0.035W/mK	KORE Fill Diamond 0.033W/mK
	U-Value W/m²K	
150mm	0.21	0.20
170mm	0.19	0.18
180mm	0.18	0.16
200mm	0.16	0.15
250mm	0.13	0.12
300mm	0.11	0.10

U-Value Legend	
Orange	nZEB Ready

1. Junctions to be taped with airtightness tape to ensure air tightness levels are achieved.
2. 35mm KORE EPS70 Silver Floor Perimeter Insulation with min R-value of 1.0 m2k/W.
3. Autoclaved aerated concrete (AAC) block to be used to ensure thermal break is maintained. (maximum thermal conductivity of 0.20 W/mk). AAC Block to be suitable for use in foundations in all conditions. Block to be installed so to avoid any effect of moisture on thermal conductivity.
4. Radon membrane to be lapped over AAC block and sealed to radon barrier below with radon resisting sealing tape to avoid rising moisture
5. Concrete floor to engineers specifications and details
6. 150mm of KORE Floor Insulation
7. Radon barrier on 50mm sand blinding and installed to TGD-C.
8. 50mm sand blinding.
9. Compacted hardcore.
10. Foundations and rising walls to Structural Engineers specifications and details.
11. Wall ties to manufacturers specifications and details.
12. 170mm KORE Fill Diamond bonded bead insulation to be installed 225mm minimum below top of floor level.
13. 372.5mm cavity wall: - 102.5mm brick outer leaf, 170mm cavity and 100mm fair faced block inner leaf
14. 15mm internal sand cement render (internal includes airtight parge coat).
15. DPC level minimum of 150mm from ground level.
16. Footpath.

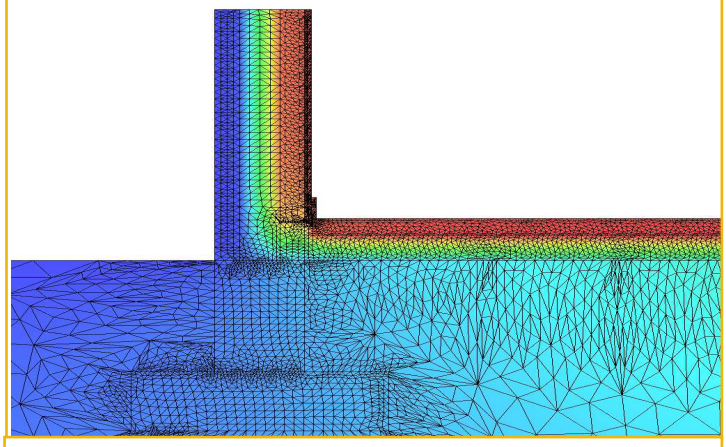
CWI_08: PSI Calculation



Thermal bridges calculation

Ψ = +0.061 W/(mK)

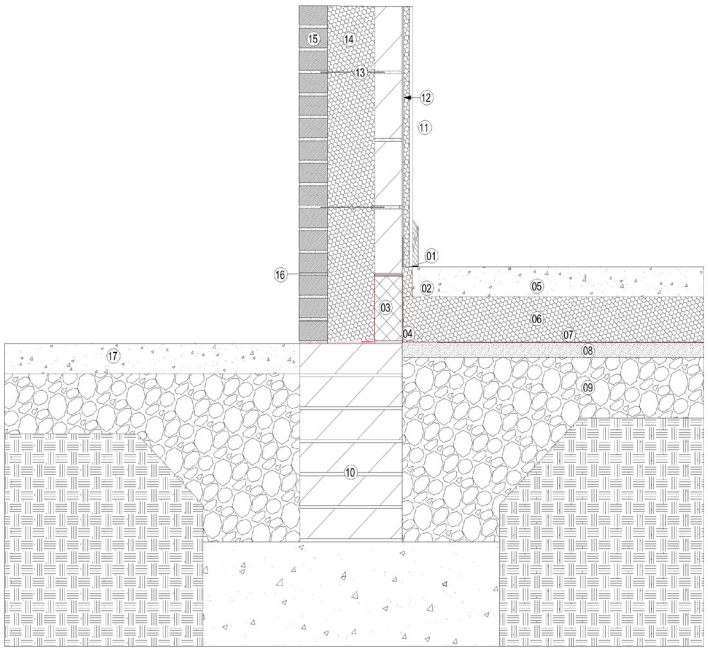
CWI_08: fRSI Calculation



$f_{RSI} = 0.92 > 0.75$

Typical Construction & U-Value Calculations

CWI_09: Cavity Wall Construction - Brick Outer, Block Inner, Thermal Plasterboard Internal

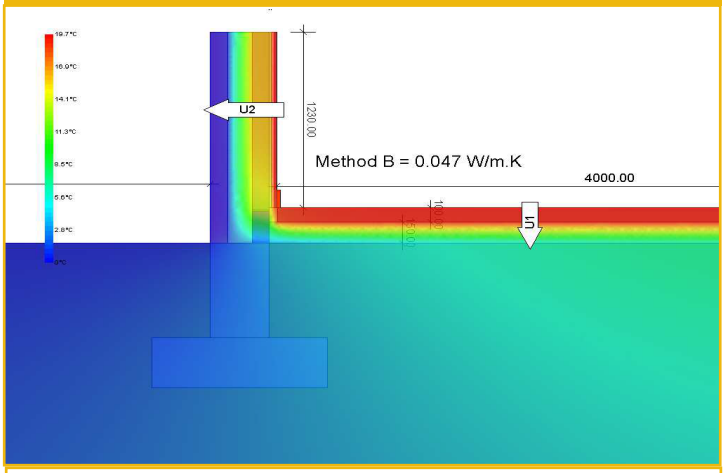


Thermal board __mm EPS Silver Bonded to 12.5mm Vapour Control Plasterboard, Block, Insulation, Brick, Render		
Cavity Width	KORE Fill Std 0.035W/mK & 30mm Thermal Board (EPS70 Silver)	KORE Fill Dia-mond 0.033W/mK & 20mm Thermal Board (EPS70 Silver)
	U-Value W/m²K	
150mm	0.18	0.18
200mm	0.14	0.14
250mm	0.12	0.12
300mm	0.10	0.10

U-Value Legend	
Orange	nZEB Ready

1. Junctions to be taped with airtightness tape to ensure air tightness levels are achieved.
2. 35mm KORE EPS70 Silver Floor Perimeter Insulation with min R-value of 1.0 m2k/W.
3. Autoclaved aerated concrete (AAC) block to be used to ensure thermal break is maintained. (maximum thermal conductivity of 0.20 W/mk). AAC block to be suitable for use in foundations in all conditions. Block to be installed so to avoid any effect of moisture on thermal conductivity.
4. Radon membrane to be lapped over AAC block and sealed to radon barrier below with radon resisting sealing tape to avoid rising moisture.
5. Concrete floor to engineers specifications and details.
6. 150mm KORE Floor Insulation
7. Radon barrier on 50mm sand blinding and installed to TGD-C.
8. 50mm sand blinding.
9. Compacted hardcore.
10. Foundations and rising walls to Structural Engineers specifications and details.
11. KORE thermal plasterboard with internal vapour control.
12. Continuous seals of bonding adhesive along perimeter of KORE thermal plasterboard to prevent air infiltration at back of plasterboard slab
13. Wall ties to manufacturers specifications and details.
14. 170mm KORE Fill Diamond Bonded Bead insulation to be installed 225mm minimum below top of floor level
15. 372.5mm cavity wall: -102.5mm brick outer leaf, 170mm cavity and 100mm fair faced block inner leaf.
16. DPC level minimum of 150mm from ground level
17. Footpath.

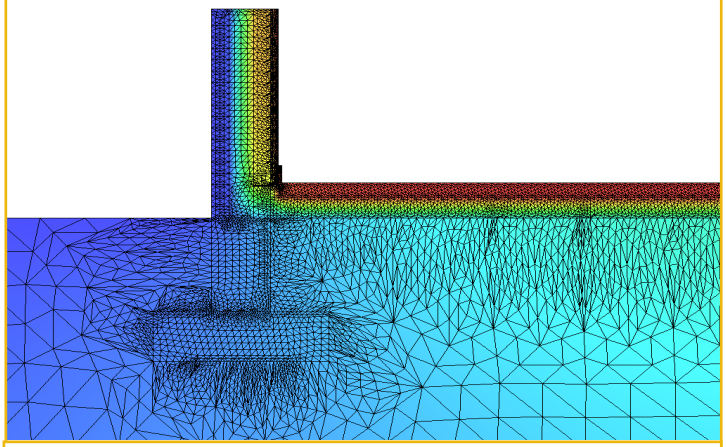
CWI_09: PSI Calculation



Thermal bridges calculation

Ψ = +0.047 W/(mK)

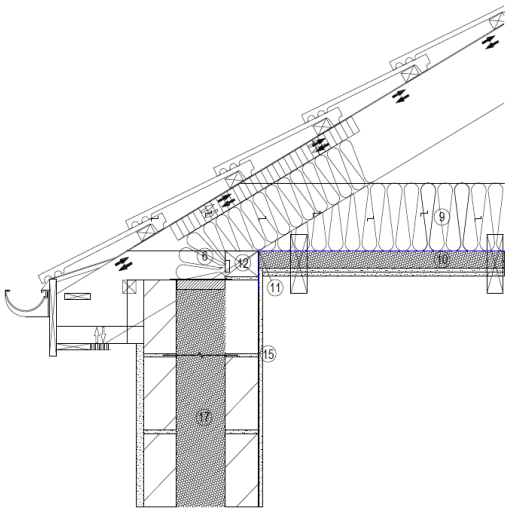
CWI_09: fRSI Calculation



$f_{RSI} = 0.93 > 0.75$

Typical Construction

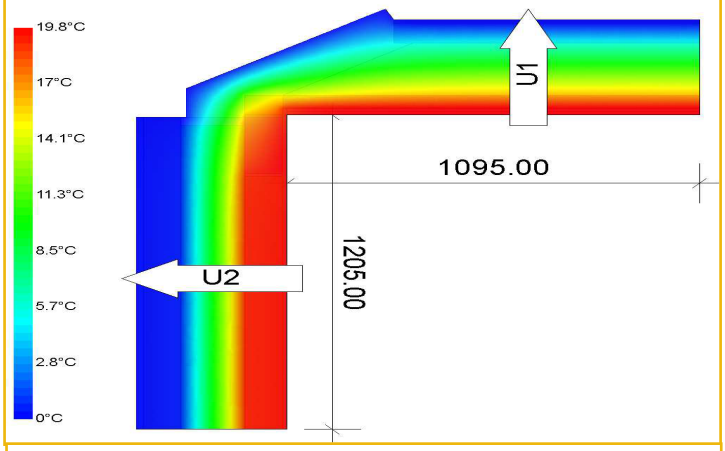
CWI_28: KORE Fill Bonded Bead Typical Ventilated Eaves



1 CWI_28 KORE Fill Bonded Bead Typical Ventilated Eaves Detail

1. Gutter.
2. Tilting fillet/felt support to prevent ponding of felt at eaves level.
3. Ventilated soffit.
4. Tiled/slated roof.
5. Roof Felt.
6. Ensure gap between wall plate and proprietary eaves vent is completely filled with insulation having a min. R-value across the insulation thickness of 1.2 m 2 K/W.
7. Eaves ventilator to provide 25mm (min) unobstructed air passage over insulation.
8. 47mm x 35mm slate/tiling battens.
9. Mineral Fibre Wool or similar insulation layered between ceiling joists in compliance with TGD - Part L.
10. KORE EPS in an insulated plaster board with gypsum render and vapour control layer behind
11. Airtight tape applied to wall ceiling junction
12. 100mm x 75mm wallplate on continuos mortar bed, wall plate to be secured down to wall by restraint straps nailed to wall. Strap at least 750mm long, 450mm of which should be over blockwork.
13. Insulated cavity closer to manufacturers specifications and details.
14. Autoclaved aerated concrete (AAC) block to be used to ensure thermal break is maintained. (maximum thermal conductivity of 0.20 W/mk). AAC block to be installed so to avoid any effect of moisture on thermal conductivity.
15. 15mm internal sand cement render (internal includes airtight parge coat)
16. Wall ties to manufacturers specifications and details
17. 170mm KORE FILL Diamond bonded bead insulation

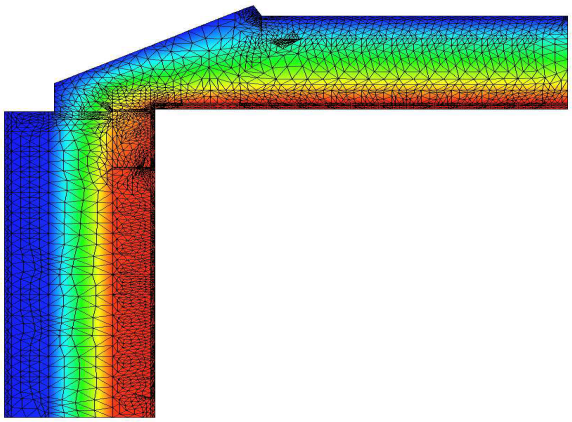
CWI_28: PSI Calculation



Thermal bridges calculation

Ψ = +0.054 W/(mK)

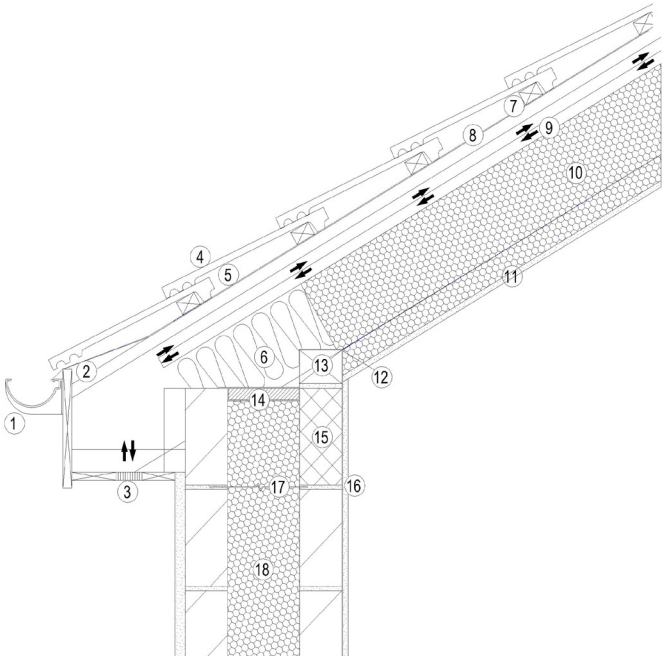
CWI_28: fRSI Calculation



f_{RSI} = 0.91 > 0.75

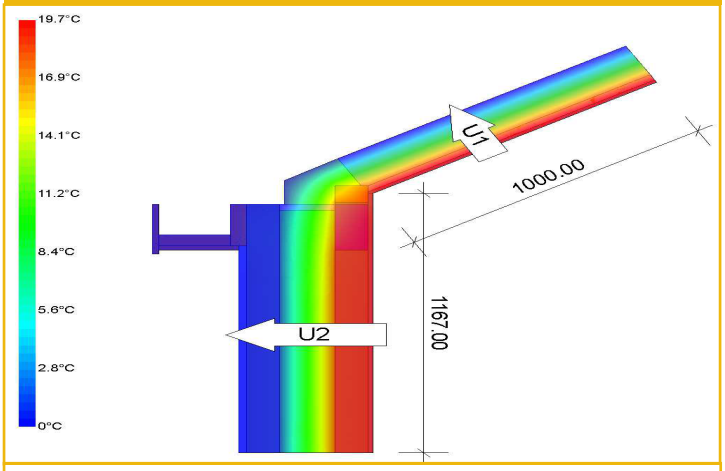
Typical Construction

CWI_62: KORE Fill Bonded Bead Typical Ventilated Eaves



1. Gutter.
2. Tilting fillet/felt support to prevent ponding of felt at eaves level.
3. Soffit.
4. Tiled/slated roof.
5. Airtight breather membrane.
6. Ensure gap between wall plate and proprietary eaves vent is completely filled with insulation having a min. R-value across the insulation thickness of 1.2 m 2 K/W.
7. 47mm x 35mm slate/tiling battens.
8. 18mm sarking board above rafters.
9. 25mm timber batten fixed to rafter to allow ventilation above
10. 175mm KORE Lock panels, between each rafter, keeping panels flush with the under side of the rafter and closely butted at the ends.
11. KORE Linear drylining panel with vapour control layer behind.
12. Airtight tape applied to wall ceiling junction.
13. 100mm x 75mm wallplate on continuos mortar bed, wall plate to be secured down to wall by restraint straps nailed to wall. Strap at least 750mm long, 450mm of which should be over blockwork.
14. Insulated cavity closer to manufacturers specifications and details.
15. Autoclaved aerated concrete (AAC) block to be used to ensure thermal break is maintained. (maximum thermal conductivity of 0.20 W/mk). AAC block to be installed so to avoid any effect of moisture on thermal conductivity.
16. 15mm internal sand cement render (internal includes airtight parge coat).
17. Wall ties to manufacturers specifications and details.
18. 170mm KORE FILL Diamond bonded bead insulation.

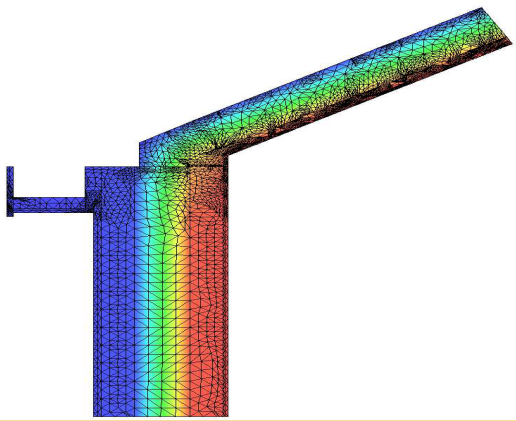
CWI_62: PSI Calculation



Thermal bridges calculation

Ψ = +0.075 W/(mK)

CWI_62: fRSI Calculation



f_{RSI} = 0.91 > 0.75

Specification Guidelines

New Building

For specification purposes the exposure zone of the building must be assessed. Further details can be found in our NSAI Agrement Certificate Number 07/0293. Buildings must be assessed in accordance with BS 8104:1992 Code of practice for assessing exposure of walls to wind driven rain together with information provided by the Irish Meteorological Office. Please contact our technical team for further information. The buildings must be surveyed in full by a trained, competent KORE Fill installer prior to verify the suitability of the buildings KORE Fill bonded bead.

General Design Considerations

- The construction of walls with cavities in excess of 110mm requires adjustments to lintels, wall ties, cavity barriers etc. Therefore cavity walls must be adequately designed in respect of structural stability; fire safety and thermal bridging in accordance with Irish Building Regulations Part A, B and L.
- Where extra wall ties are used in a new building this must be accounted for in the U-value calculation as this may affect the result.
- Electric cables in the cavity shall be run through ducting or be sleeved in accordance with ETCI publication ET 207:2003 Guide to the National Rules for Electrical Installations as Applicable to Domestic Installations.
- Where a flue pipe from a heating system passes horizontally through a wall, the flue pipe shall be separated from the cavity insulation by non-combustible material in accordance with TGD Part J to the Irish Building Regulations
- KORE Fill Bonded Bead should be separated from the flue in a brick or block work chimney and from any heating appliance by solid non-combustible material not less than 200mm thick. Alternatively, KORE Fill Bonded Bead should be separated by 40mm from the outer surface of a masonry chimney.

Building a Cavity Wall Suitable for KORE Fill Bonded Bead

The best practice points outlined below apply to cavity wall constructions with respect to all insulating materials including KORE Fill Bonded Bead. Each of these is inspected by the KORE Fill installer at the survey stage to ensure the wall is suitable for installing bonded bead. The BRE Good Building Guide GBG 33 was used as a reference.

- Leakage can occur through the outer leaf through joints between bricks and mortar. Rain resistant pointing includes: bucket handle, weathered and struck.
- Mortar extrusions on the cavity face should be cleaned off to avoid large mortar obstructions in the cavity
- Wall ties must point downwards from inner to outer leaf, drips must be positioned in the centre of the cavity and ties must be kept free from mortar snots. Ideally wall ties should be approved and conform to BS IE EN 845 - 1: 2003. Consideration should be given to the exposure zone when specifying wall ties as outlined in BS 5628-3:2001.
- DPC and cavity tray must be installed to best practice.

Detailed Specification Guide

Full specification guide is available on www.kore-system.com

Thermal Bridging

TGD Part L of the Irish Building Regulations states that care must be taken to ensure the continuity of insulation and to limit local thermal bridging and that any thermal bridge should not pose a risk of surface or interstitial condensation. KORE have undertaken a complete thermal bridging analysis of KORE Fill bonded bead at typical junctions. Please contact our team today to request a copy of these results.

On Site

Installation Guidelines

KORE Fill bead and bonding agent are injected into the cavity, through drill holes, using specifically designed equipment. The KORE Fill certified drilling pattern insures that the entire cavity is completely filled. Installation of the KORE Fill bonded bead product must only be carried out by KORE or one of our NSAI trained and approved installers. For details of your local installer or our installation manual please contact our team today.

Consult our KORE Fill Installers Register for approved and certified KORE Fill Bonded Bead installers across Ireland and the UK.

Product Technical Details

KORE Fill Bead

Properties	Units
Thermal Conductivity	
KORE Fill Diamond	0.033W/mK
KORE Fill Original	0.035W/mK
Density	11.5kg (dry weight), 12kg (pumped weight)
Bead Size	3-8mm

KORE Fill Glue

Properties	Units
Total Solids	56 - 58
Quality	Free from impurities or lumps. Residue on 177 micron sieve max 20ppm
Form	Liquid Suspension
Colour	White
Odour	Mild Sweet
Viscosity	1000 - 4000 mPA s @ 20°C
Freezing Point	0°C
Boiling Point	100°C
Min Operating Temperature	5°C
pH	7.0 - 9.0

Thermal Resistance

Thermal resistance, known as the R-Value, varies with the thickness of insulation. To calculate the thermal resistance ($m^2.K/W$) divide the thickness of the insulation by its thermal conductivity and round down the result to the nearest 0.05.

Product Technical Details

	KORE Fill Original 0.035W/mK	KORE Fill Diamond 0.033W/mK
Thickness Insulation (mm)	**Thermal Resistance (m².K/W)**	
150mm	4.286	4.545
200mm	5.714	6.060
250mm	7.142	7.576
300mm	8.571	9.090

Durability

The KORE Fill Cavity Wall Insulation System is rot-proof, water repellent and durable. When installed in accordance with NSAI certification, it is sufficiently stable to prevent settlement and will remain effective as an insulant for the life of the building.

Behaviour in Fire

When used in accordance with KORE's NSAI certification KORE Fill Cavity Wall Insulation System will meet the relevant requirements of TGD Part B3 of the Irish Building Regulations. Further design details are outlined in NSAI Certificate Number 07/0293.

Certification

NSAI Irish Agrement Certification Number 07/0293 in accordance with Building Regulations 1997 to 2012.

Standards

KORE Fill Bonded Bead is manufactured to:
1) ISO 14001:2015 - Environmental Management systems
2) ISO 9001:2015 - Quality Management Systems
3) ISO 45001:2018 – Occupational Health & Safety Management System

Building Standards

KORE Fill can satisfy the requirements of the Irish Building Regulations as outlined in:

- Part L - Conservation of Fuel and Energy - Dwellings (2019)
- Part L - Conservation of Fuel and Energy - Buildings other than Dwellings (2019)

Design Standards

The following standards should be consulted regarding the construction of insulated cavity wall:

- BS 5628 - 1: 2005
- BS 5628 - 2 : 2005
- IS EN 1996 - 1 - 1 : 2006 Eurocode 6

Environmental

Expanded polystyrene is BRE Green Guide A+ Rated.

Technical Services

Contact our team today for:

- U-value calculations
- Condensation risk analysis
- Determination of exposure zone
- Accredited drawings and details
- Thermal bridging analysis results
- Temperature factor analysis
- Any other project specific requirements
- BIM Files

Other Products to Consider

KORE Fill Bonded Bead Cavity Wall Insulation can be used in conjunction with a wide range of KORE products and services. When installing KORE Fill Bonded Bead in a new building, consider the following products:

- KORE Insulated Foundation System
- KORE's Floor Insulation System
- KORE Lock for Cold and Warm Pitched Roofs
- KORE Loft Insulated Attic Flooring System
- KORE's Range of Draught Proofing Products
- KORE's Wall and Roof Ventilation Products
- KORE's Hot and Cold Water Lagging Jackets
- KORE's Pipe Insulation

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