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Government of Ireland

IBCI Conference 2022

Technical Guidance Document C 2020 and TGD L, Acceptable Construction Details 2021

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31st March 2022

2020 Update

1 Technical Guidance Document C

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Key changes

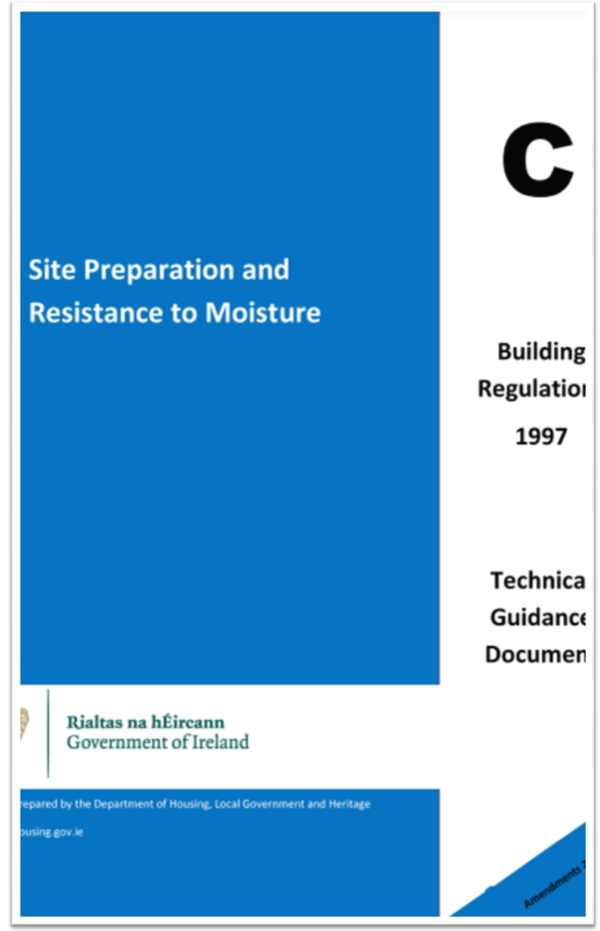
1. Takes account the latest version of S.R. 21:2014+A1:2016 *Guidance on the use of I.S. EN 13242:2002+A1:2007 – Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction*
2. Takes account of a revision to the national reference level for indoor radon concentrations in workplaces to an annual average activity concentration in air of 300 Bq/m^3, which was implemented by the '*Radiological Protection Act (Ionising Radiation) Regulations, 2019, S.I. No. 30 of 2019*'
3. Applies to works commencing on, or after, 1 November 2020

Ground Supported Floors – Hardcore Bed

Paragraph **3.1.4**

b) *The hardcore bed should be at least 200 mm thick and be gas permeable (T2 Perm as defined in par. 3.1.4(d)). Hardcore should conform with I.S. EN 13242:2002 + A1:2007 and meet the specification as outlined in Annex E of the accompanying guidance document to this standard, S.R. 21:2014 + A1:2016. The layer of hardcore should be well compacted, clean and free from matter liable to cause damage to the concrete. Specific guidance is given in section 3.3 and Annex E of S.R. 21:2014 + A1:2016 on limiting the presence of a reactive form of pyrite which may give rise to swelling or sulfate attack on concrete.*

Where a blinding layer is used (See Diagram 4a), it should be provided in accordance with the specification given in Annex E, of S.R. 21:2014 + A1:2016, for fines material. The blinding layer should be of adequate depth to fill surface voids thus creating an even surface and avoiding sharp projections, which may damage radon or damp-proof membranes.



“Gas Permeable Layer”

Paragraph **3.1.4**

d) *Hardcore should be placed as outlined in Diagram 4. Hardcore should be graded in accordance with S.R. 21:2014+A1:2016, as follows:*

T0 Struc *Suitably graded structural unbound granular fill (hardcore) material (0/125 mm), for use at depths greater than 900 mm below the radon barrier/Damp Proof Membrane (DPM).*

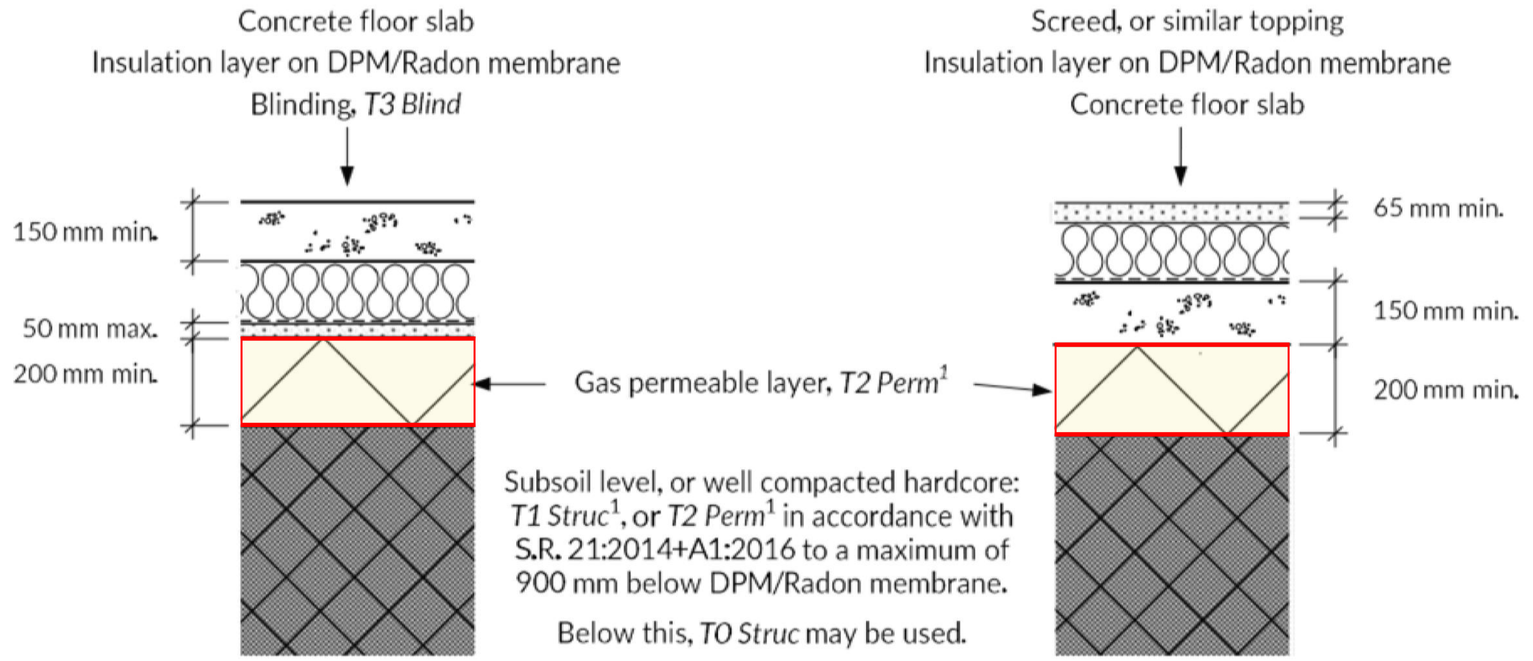
T1 Struc *Structural unbound granular fill (hardcore) material is an all in graded aggregate (0/32 mm) or gravel (0/40 mm) to facilitate placing and compactability.*

T2 Perm *Suitably graded unbound granular fill (hardcore) material (4/40 mm) to facilitate the free movement of gas within the hardcore layer.*

T3 Blind *Fine aggregate (0/4 mm, GF80), for blinding the top surface of the Annex E granular fill.*

Source: https://www.epa.ie/publications/research/environment--health/research-332.php

Diagram 4 **Ground Supported Floor** *Par 3.1.4*



(a) - Insulation below concrete slab **(b) - Insulation above concrete slab**

NOTES:

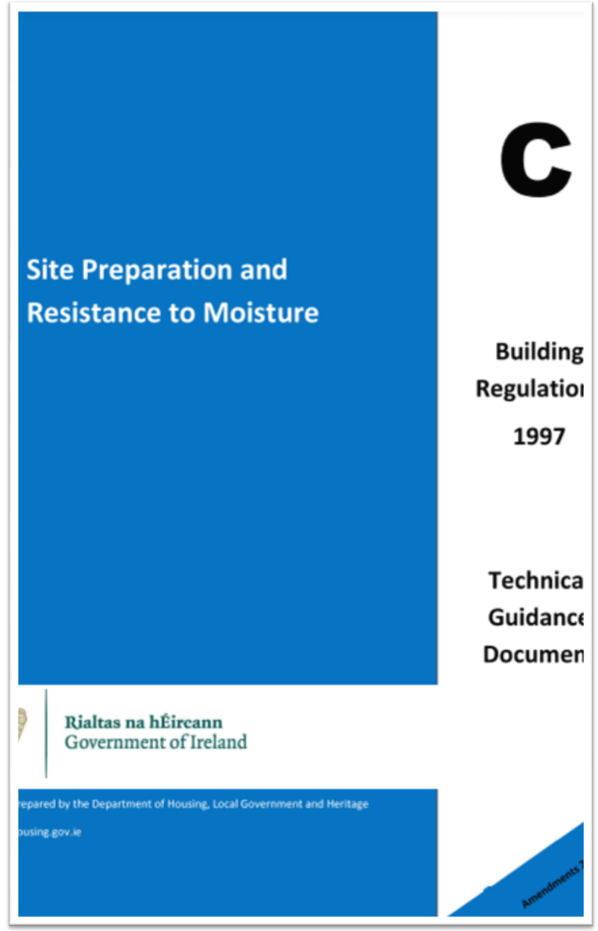
1 In well compacted layer(s) not exceeding 225mm.

Gas permeable layer 200mm thick (min.)

Updated National Reference level for Radon in Workplaces

Paragraph 2.7

- *The Radiological Protection Act 1991 (Ionising Radiation) Regulations 2019 (SI No. 30 of 2019) transposes the EURATOM Basic Safety Standards Directive – Council Directive 2013/59/EURATOM and sets a* ***National Reference Level for Radon Gas in Workplaces of 300Bq/m³*** *annual average concentration.*

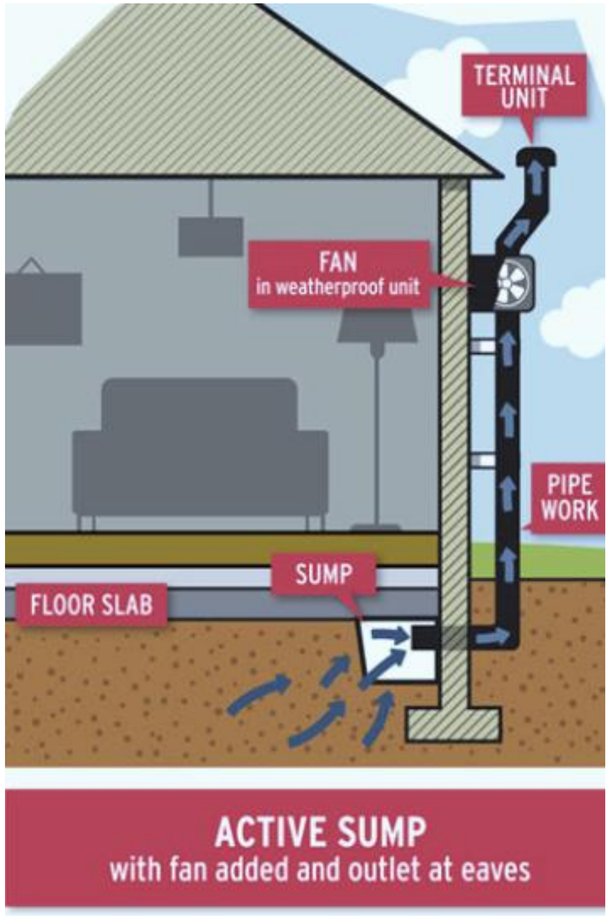


Insight – easier radon remediation

Gas permeable layer expected to have minimal impact on construction practice because S.R. 21:2014 + A1:2016 has already been in place for many years.

The gas permeable layer will significantly increase gas extraction rates when remediation is required (i.e. following a Radon test result above the reference level).

Periodic testing of workplaces for radon under Safety Health and Welfare at Work Act will increase the number of buildings that are found to require radon remediation.



Source: https://www.epa.ie/environment-and-you/radon/fixing-a-radon-problem/#d.en.83006

Future changes

A full revision of TGD C has commenced

- *Research awaited from EPA on provision of passive sumps in NZEB*
- *Cost-benefit study on making the radon barriers universal on the recommendation of the NRCS group, (which may remove the need for the inclusion of radon maps)*
- *Climate change research from Met Éireann on driving rain index will lead to an updated rain exposure map*
- *Updated wall types and limitations on their geographical use*
- *NSAI – any relevant updated standards*

Public consultation on the new text is expected early in 2023

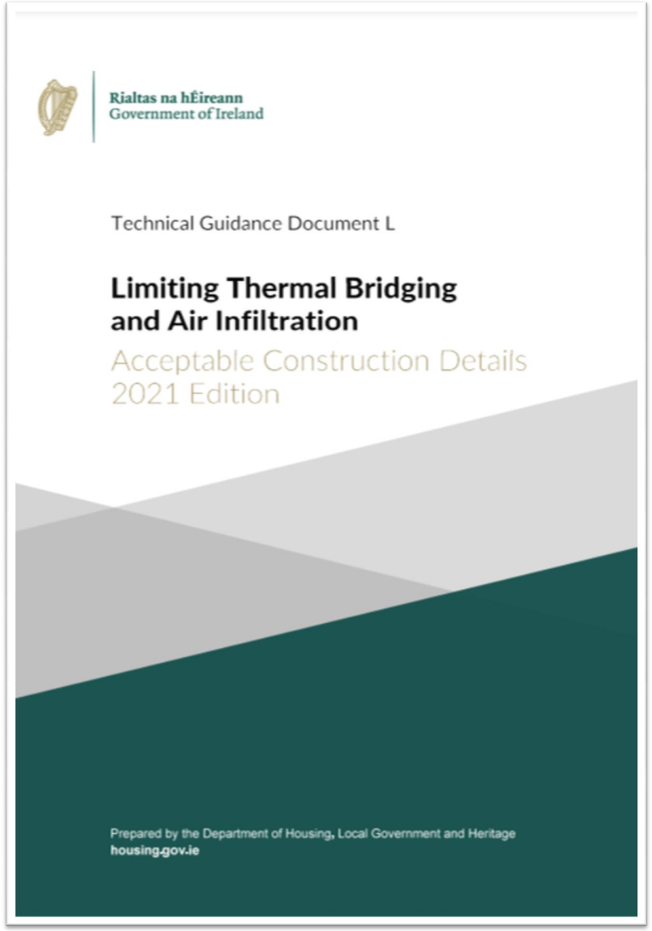
2 Acceptable Construction Details

Key changes

1. No change in the performance requirements so no application date. The 2011 ACDs can continue to be used.

2. Takes account of internal insulation, which was previously provided for in text of 2011 ACDs to support advanced u-values.

3. Takes account of current best practice for airtightness and thermal bridging.



Drivers for the ACD update

TGD L (2017 & 2019)

- *Better U-values*
- *Better airtightness*
- *Reduced thermal bridging*

Developments in construction practice and products

Greater focus on compliance due to S.I. 9 of 2014

Part 1: Limiting Thermal Bridging and Air Infiltration

Limiting Thermal Bridging and Air Infiltration

1

General theory of insulation continuity and air tightness

Part 1 of this guide discusses the general theory of insulation continuity and airtightness in construction. A common approach to the design, construction and testing methodology is considered and suggestions are made for the general improvement of the process. The use of the Acceptable Construction Details in the context of Technical Guidance Document L is also outlined.

Figure 6: Foil-faced insulation board sealed to joists providing an effective VCL, airtightness barrier and insulation continuity through the intermediate floor void

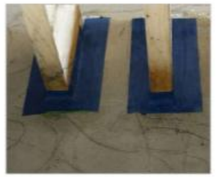


Figure 7: Wet plaster scratch coat forms a continuous air barrier through the intermediate floor zone, joists penetrations sealed with appropriate tape

If the insulation is on the inner face of the external wall, thermal continuity requires greater attention to detail. There is a potential cold bridge all along the zone of the suspended floor. Continue the wall insulation through the intermediate floor zone and seal any vapour control layer, where present, to the joist penetrations.

THERMAL CONTINUITY WITH CONCRETE INTERMEDIATE FLOORS

As with timber floors, if the thermal insulation is in the cavity or is the external type, thermal continuity at the junction of the intermediate floor and the outside wall is achieved readily.

If the insulation is on the inner face of the external wall, thermal continuity is not possible.

AIRTIGHTNESS WITH INTERMEDIATE FLOORS

Airtightness at intermediate floors is a matter of extending the wall air barriers above and below the floor through the intermediate floor zone and taping up any penetrations of the air barrier by joist, joist hangers, beams, services etc. Where the intermediate floor is mass concrete this may form part of the airtight layer.

In timber floors, where joists are built into the inner leaf, airtightness is achieved by plastering the wall around the joists and taping the face of the joist to the plaster finish, see Figure 8. Alternatively, proprietary airtight caps are available for building in. Where joist hangers are used, it is recommended that these be installed on a layer of airtight membrane which is plastered over.

With timber frame or with dry-lined masonry, carry the airtight membrane or plasterboards through the floor zone and tape around the joists.

For good thermal performance:-

- Use separate lintels and insulate between them.
- Fill all gaps around and between lintels with tightly packed insulation. Overlap the frame and this insulation by at least 15 mm.
- Secure any partial fill insulation firmly against the inner leaf.
- Cut cavity insulation to suit. Sheets should be tightly butted to each other and surrounding cavity closers and loose fill insulation.

Figure 8: Certified proprietary airtightness reveal tapes are available for use with wet plaster air barriers

AIRTIGHTNESS AT WINDOW AND EXTERNAL DOOR OPES

Air leakage often occurs between window or door frames and the surrounding construction. Appropriate airtightness sealants are required between plaster finishes, window boards and frames. Approved airtightness sealants and tapes are available to assist the formation of air barrier continuity at such interfaces.

For air barrier continuity:

- Apply a third party certified tape or sealant at all interfaces between the internal air barrier and the window or door frame
- If forming the air barrier to the walls with a plaster scratch coat on blockwork, install an appropriate airtightness tape. Where this tape is plastered over, the tape should provide a suitable key for the plaster.

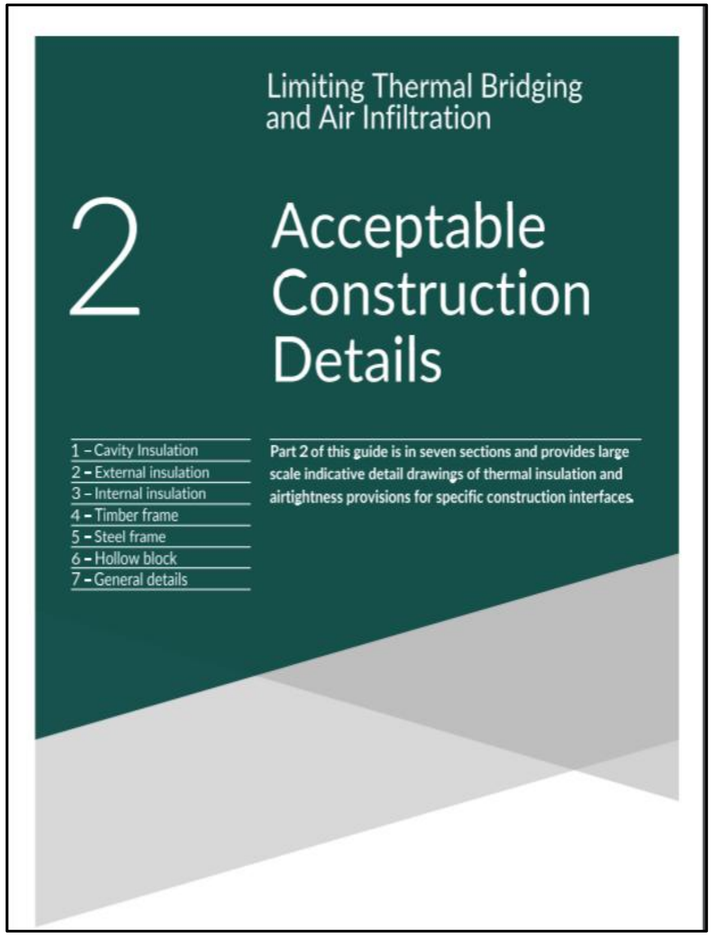
To qualify for the NSAI Window Energy Performance (WEP) Scheme, manufacturers must first demonstrate that their window and door arrangements achieve a Class 4 airtightness rating when tested at 600 Pa to I.S. EN 12207:1999 Windows and doors - Air permeability - Classification. As a result, well-made windows should have little or no air leakage. The lower the air leakage value of the window assembly, the greater will be the overall efficiency of the window assembly.

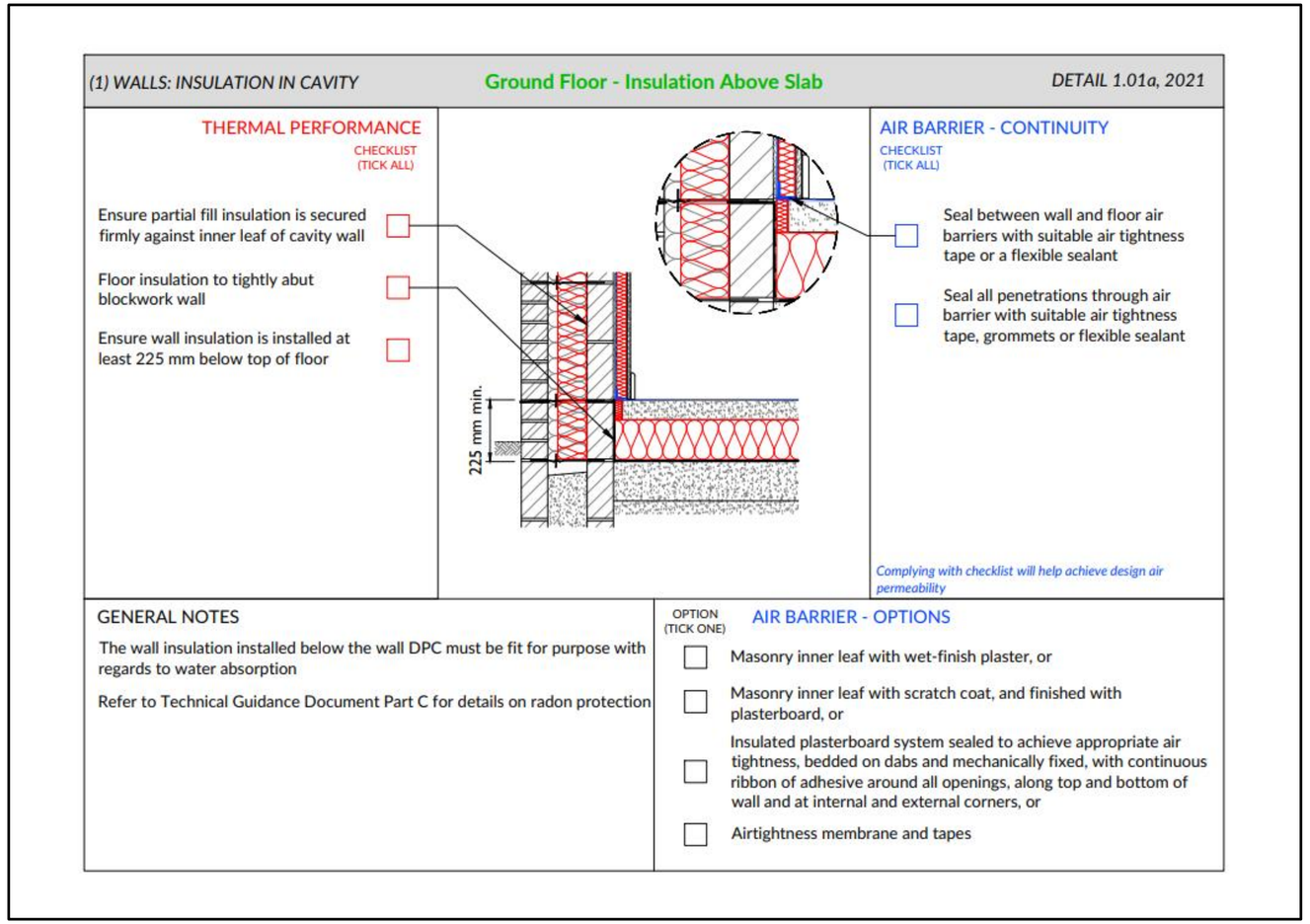
(8) External Door Thresholds

THERMAL CONTINUITY

Achieving sufficient thermal continuity to minimise the thermal bridge at door thresholds and to meet the critical surface temperature factor, fRsi, requires careful design.

Part 2: ACDs for six different external wall constructions and general walls





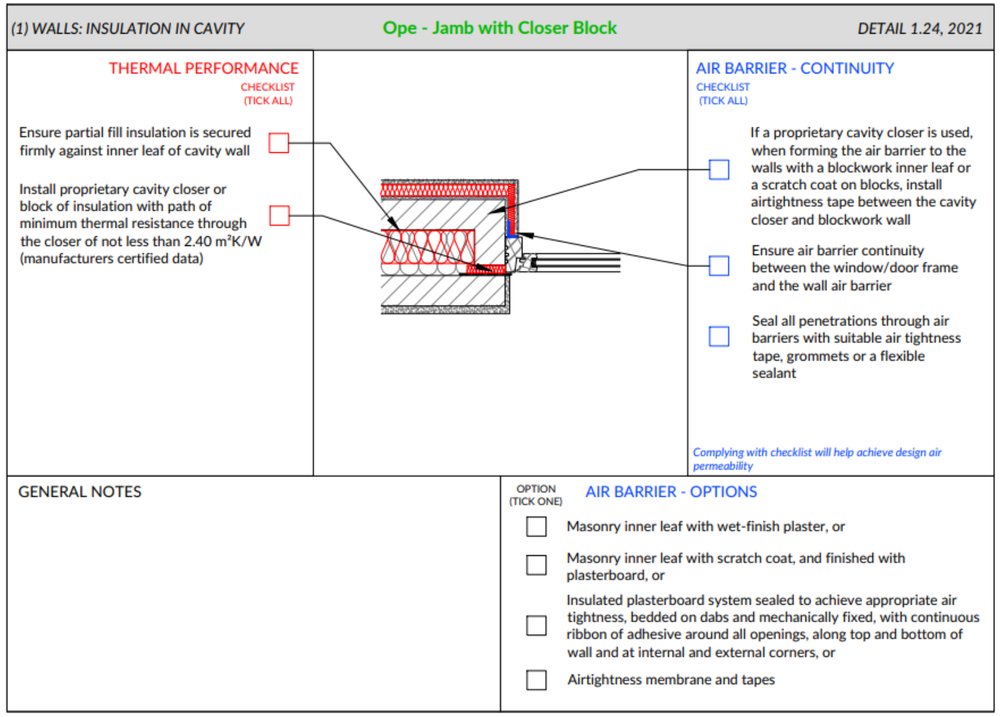
Purpose of the ACDs

These diagrams illustrate good practice for design and construction of interfaces only in respect to ensuring

- *thermal performance and*
- *air barrier continuity.*

The guidance must be implemented with due regard to all other requirements imposed by the Building Regulations.

Use of the ACDs during construction will enable the builder to demonstrate that provision has been made to eliminate all reasonably avoidable thermal bridges in the insulation layers.



Thermal bridging factor in DEAP

Where ACDs are

- *adopted for all key junction and*
- *are installed as per the ACD checklists,*

the dwelling fabric design as a whole will meet the guidance provided in Par 1.3.3.2 in Building Regulations 2011 TGD-L (Dwellings) and qualify for the reduced thermal bridging factor (y-factor) of 0.08 in DEAP calculations.

Insight: Calculated y-factor

Where ACDs are used to generate bespoke y-factor calculations, evidence shows that savings in the order of €3,000 can be made in the cost of construction by reducing the amount of renewables required or eliminating the need for triple glazing, for example.

Insight: Calculated y-factor

Where ACDs are used to generate bespoke y-factor calculations, evidence shows that savings in the order of €3,000 can be made in the cost of construction by reducing the amount of renewables required or eliminating the need for triple glazing, for example.

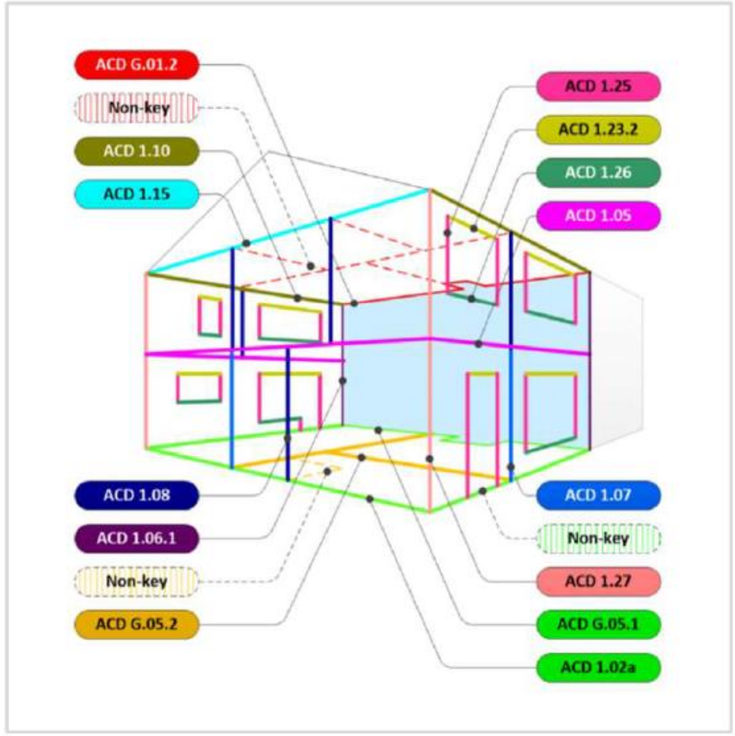


Figure 14: Wireframe of typical 3-bed semi-detached house showing typical thermal bridges normally present

Y-FACTOR CALCULATION

Key Junction Location/Description	ACD Reference	Target U-Value (W/m^2K)	Psi-Value Table D1-6 (W/mK)	Junction Length (m)	Calculated Value Psi x L (W/K)
Ground floor/external wall	1.02a	0.15	0.108	23	2.484
Ground floor/separating wall	G.05.1	0.15	0.240/2	9.8	2.352
Ground floor/masonry partition wall through slab	G.05.2	0.15	0.150	12.8	1.920
Intermediate floor/ext. wall	1.05	0.15	0.020	23	0.460
Roof/external wall	1.10	0.15	0.030	14	0.420
Roof/gable wall	1.15	0.15	0.152	9	1.368
Roof/separating wall	G.01.2	0.15	0.458/2	9.8	2.244
External wall/external wall	1.27.1	0.15	0.032	10.2	0.326
External wall/separating wall	1.06.1	0.15	0.066/2	10.2	0.337
External wall/masonry partition	1.07	0.15	0.000	4.9	0.000
Ext wall/stud partition	1.08	0.15	0.000	12.3	0.000
External wall/jamb	1.25	0.15	0.011	23.4	0.257
External wall/lintel	1.23.2	0.15	0.012	11.7	0.140
External wall/cill	1.26	0.15	0.015	9.9	0.146

Non-key junctions Location/Description	Reason for exclusion	
Ground floor/stud partition	Fully within thermal envelope	0.0
Roof/stud partition	Fully within thermal envelope	0.0
Thresholds	fRsi ≥ 0.75, heat loss included in ACD 1.02a	0.0
Total heat transmission through thermal bridging, $\Sigma(L \times \Psi)$, expressed in W/m^2K		12.4365
Total heat loss surface area of building, ΣA_{exp}, in m^2		
Y-factor = $\Sigma(L \times \Psi) / \Sigma A_{exp}$ =		**0.051**

0.05

Some key updates to the drawings

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Cavity Wall Construction

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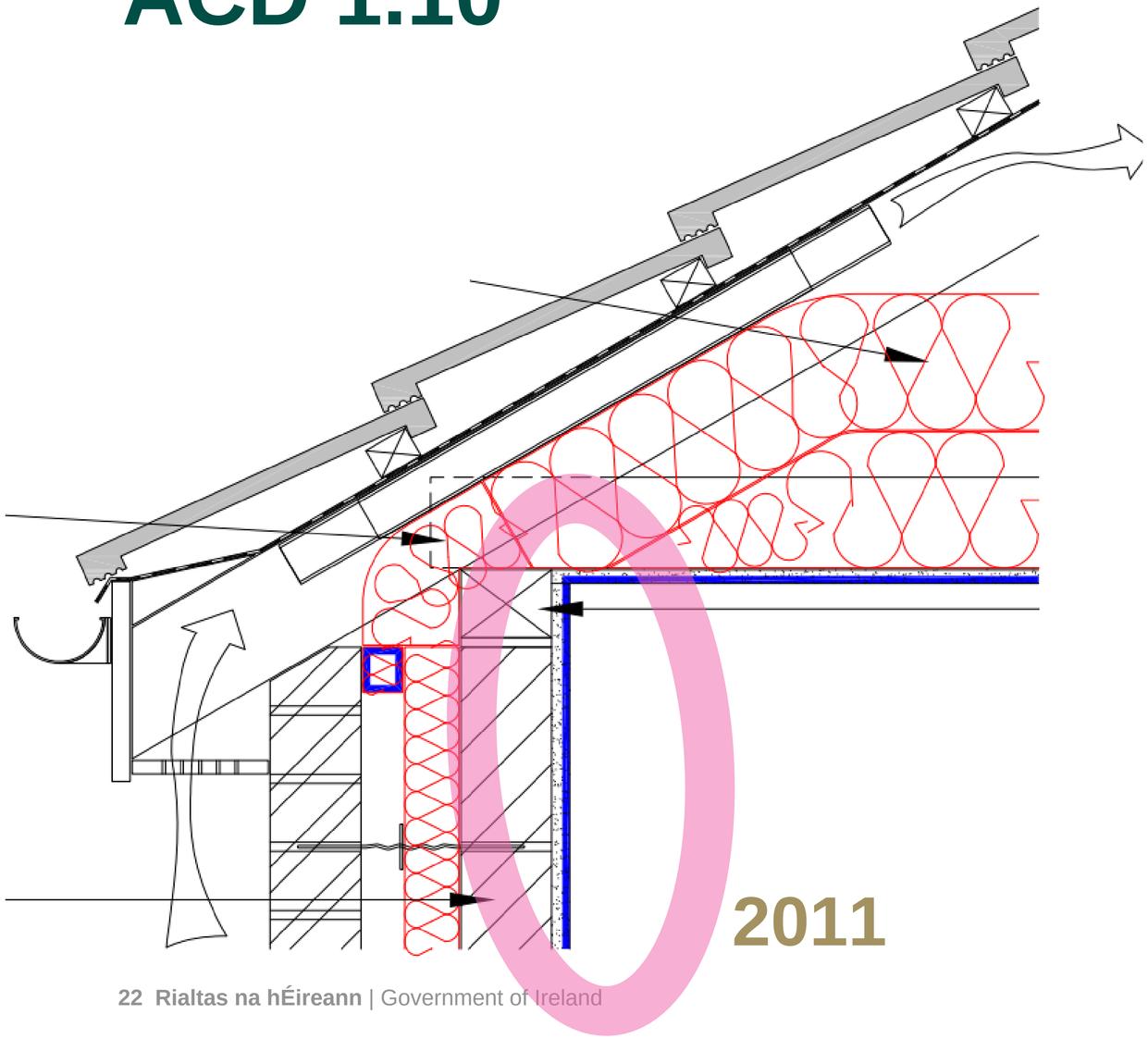
ACD 1.10



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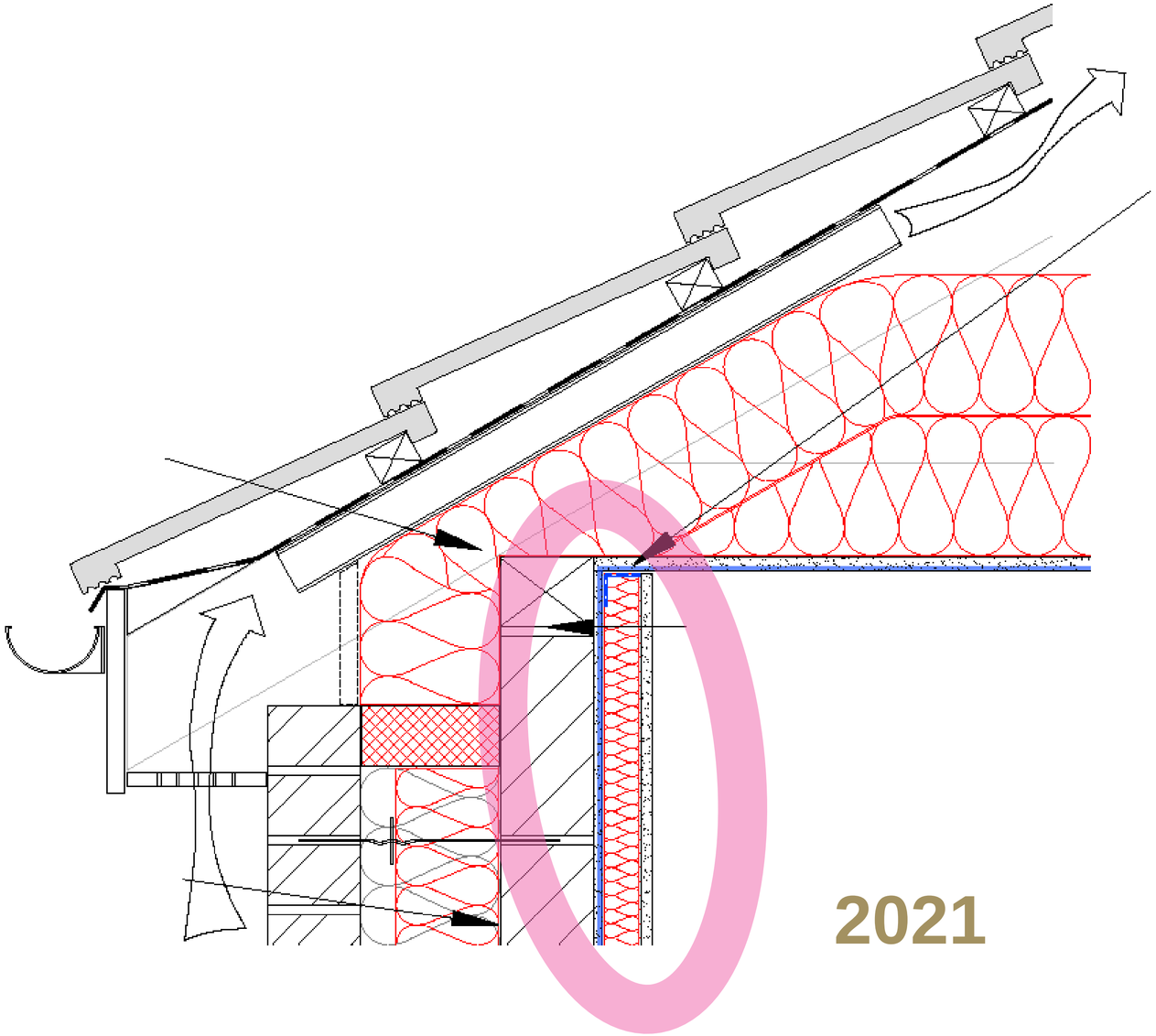

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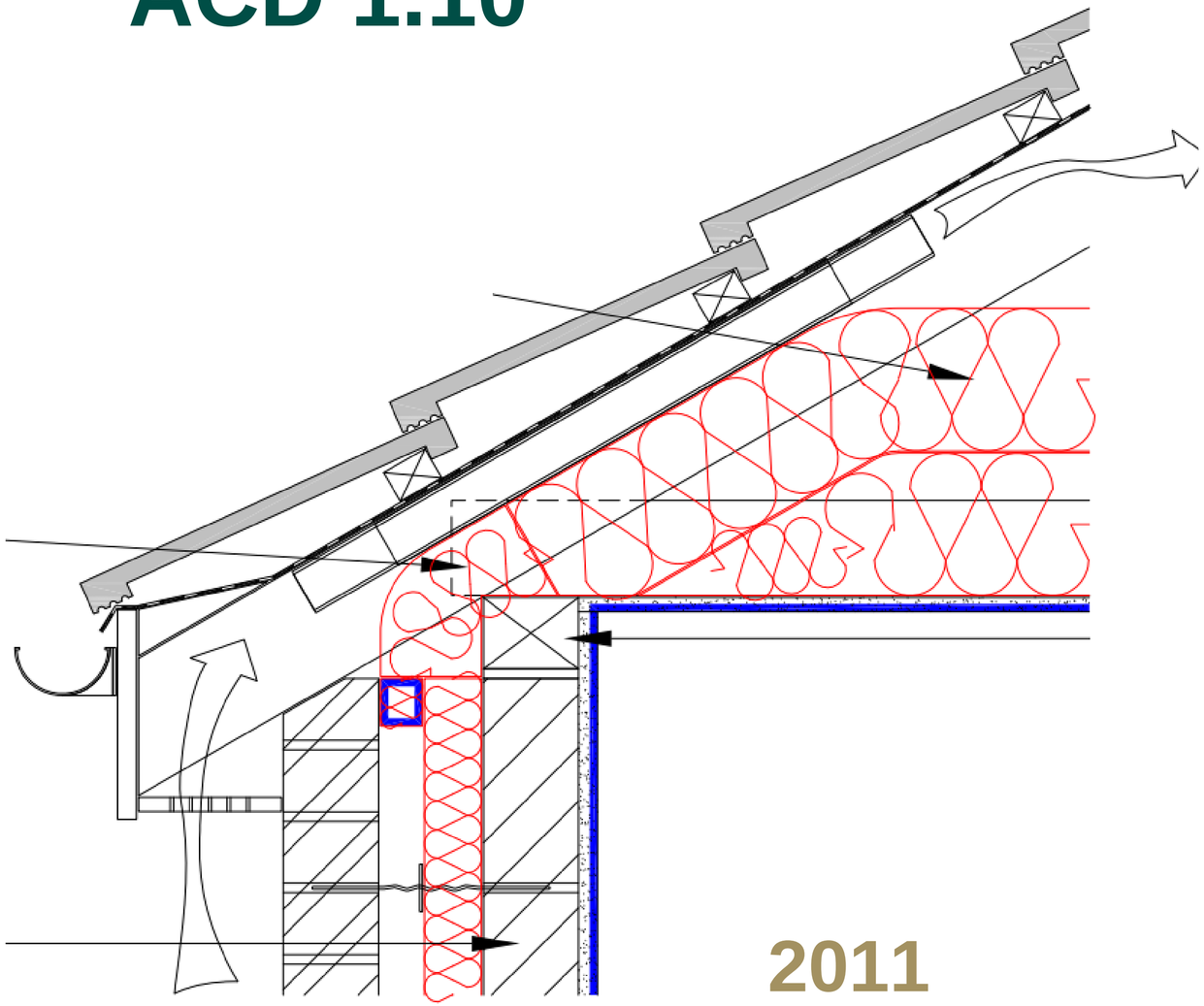

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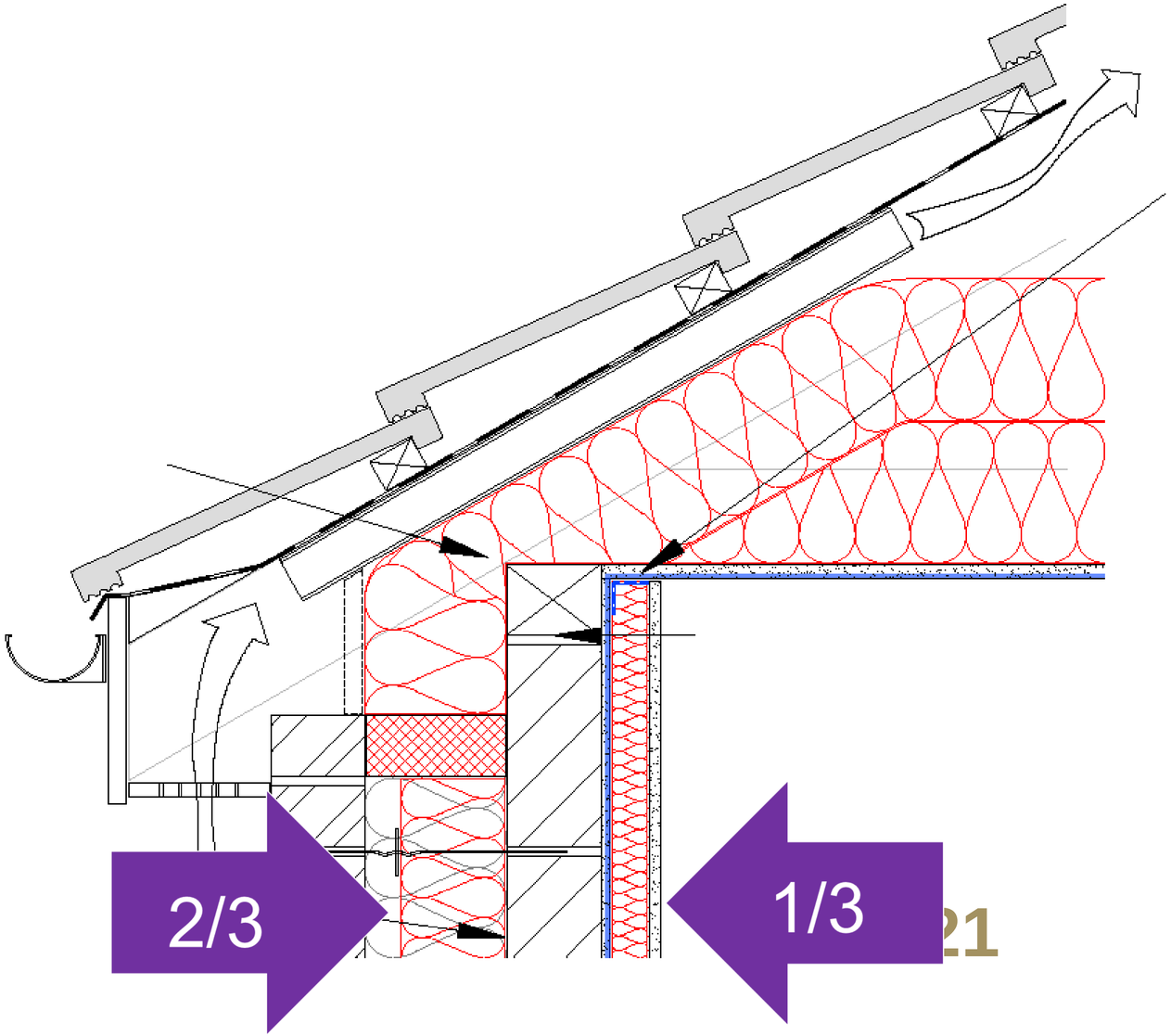

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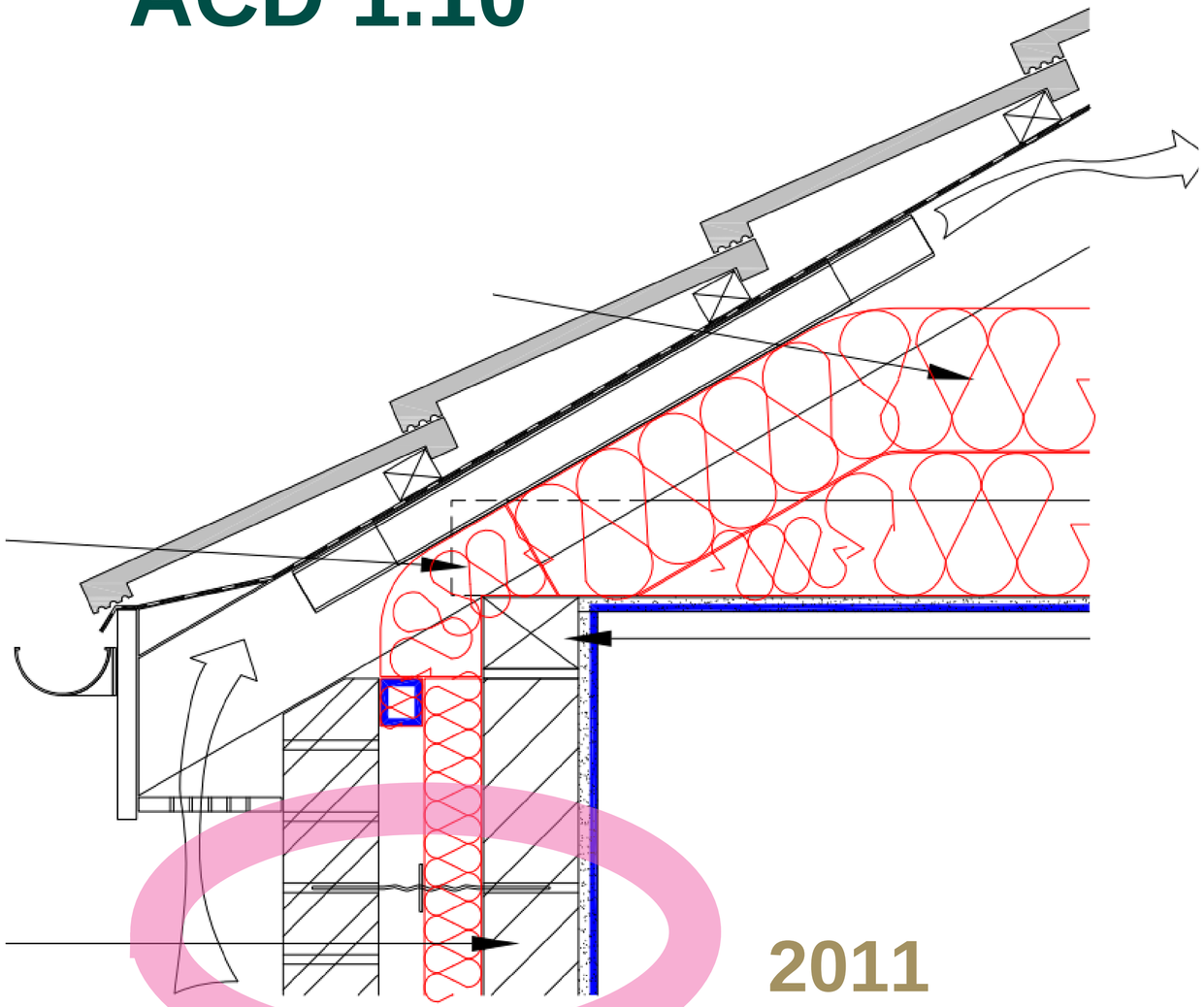

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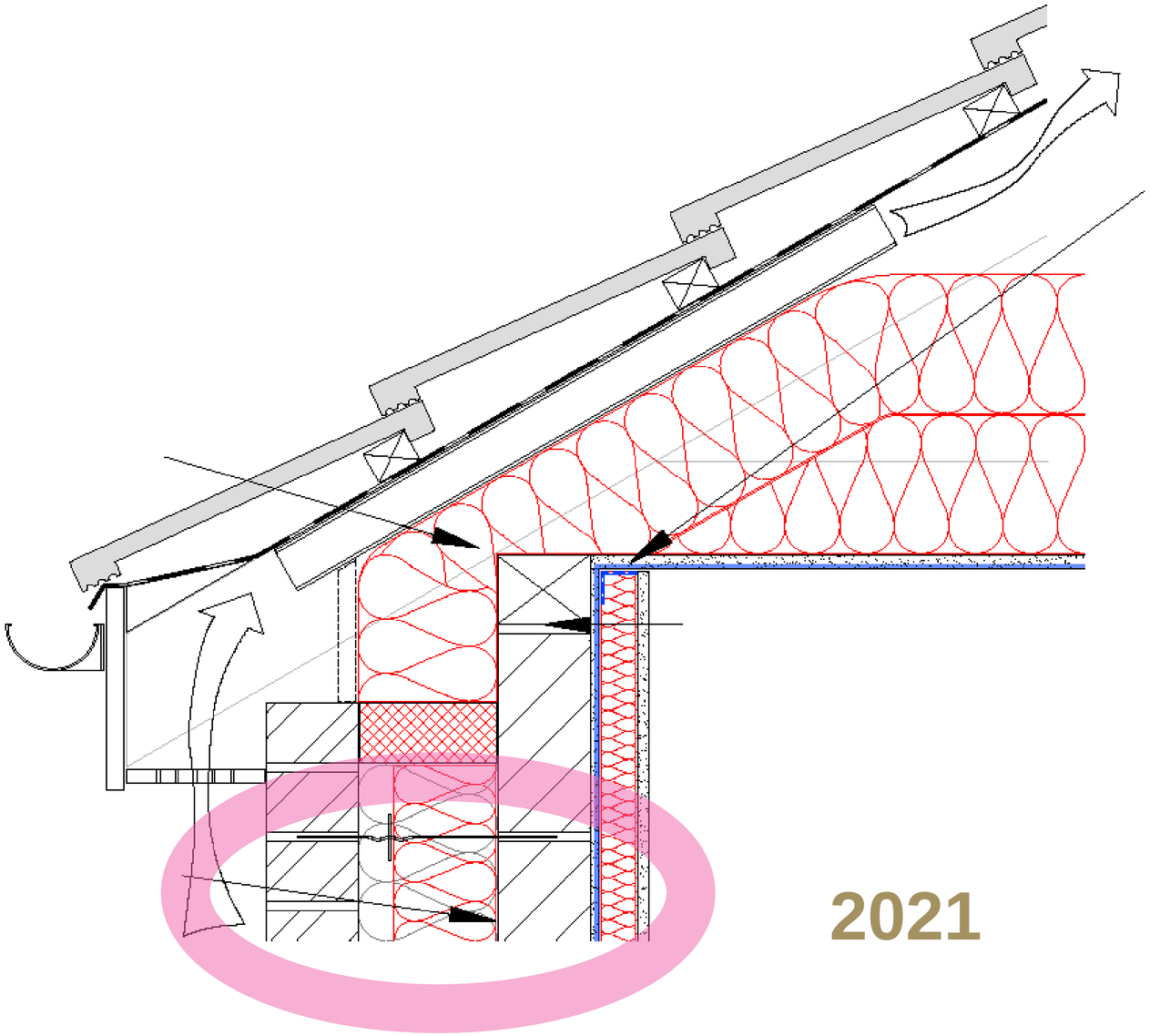

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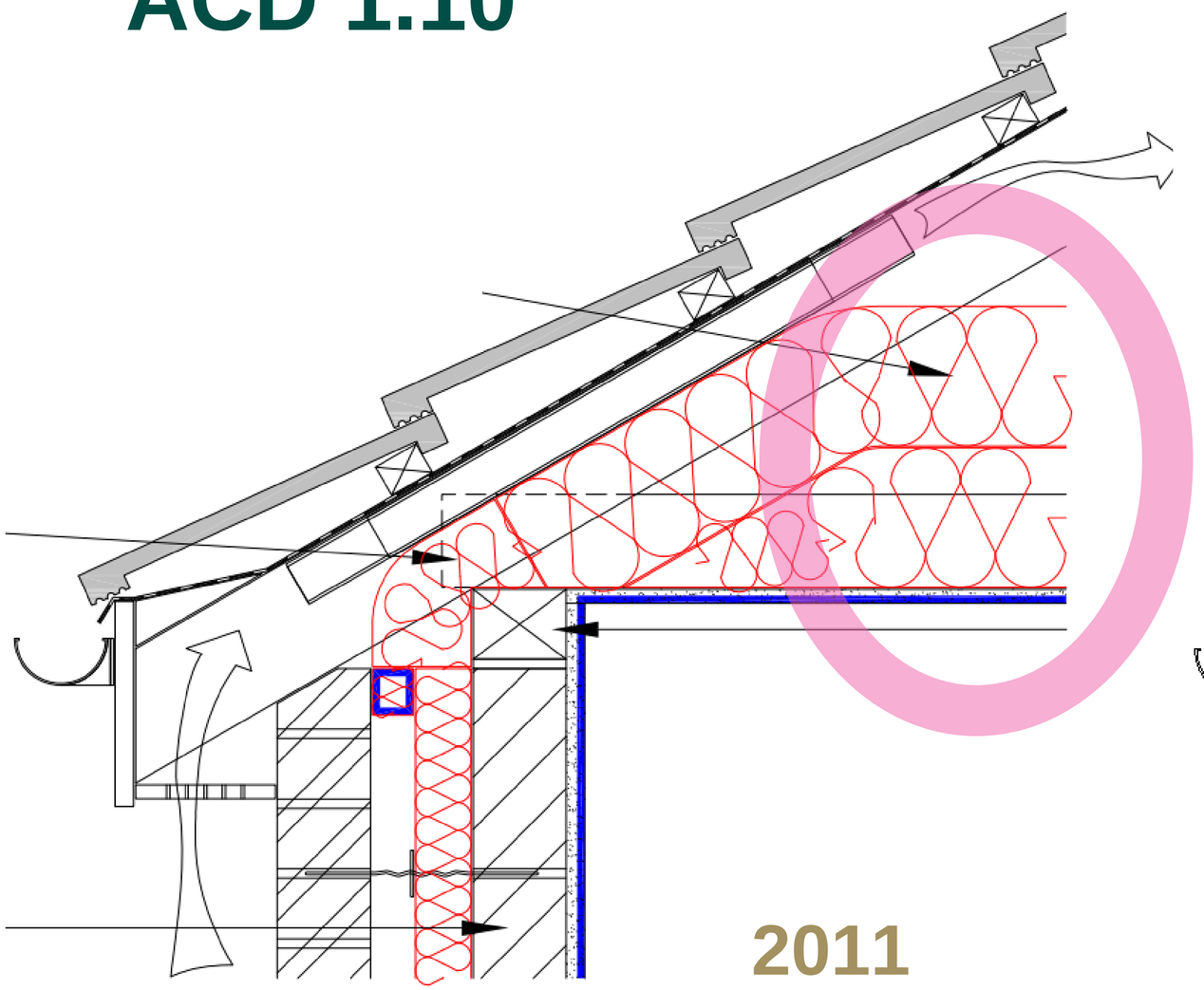

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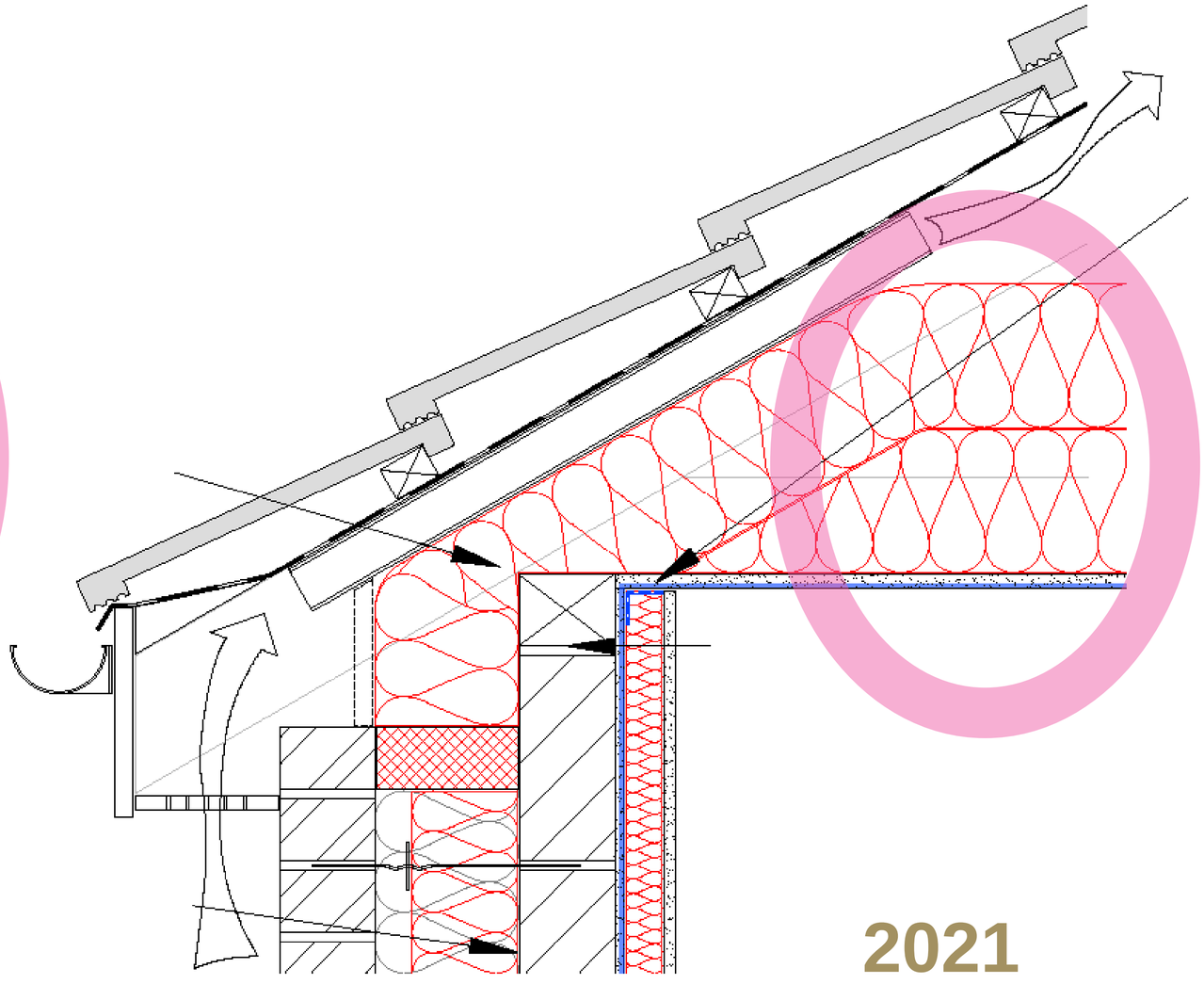

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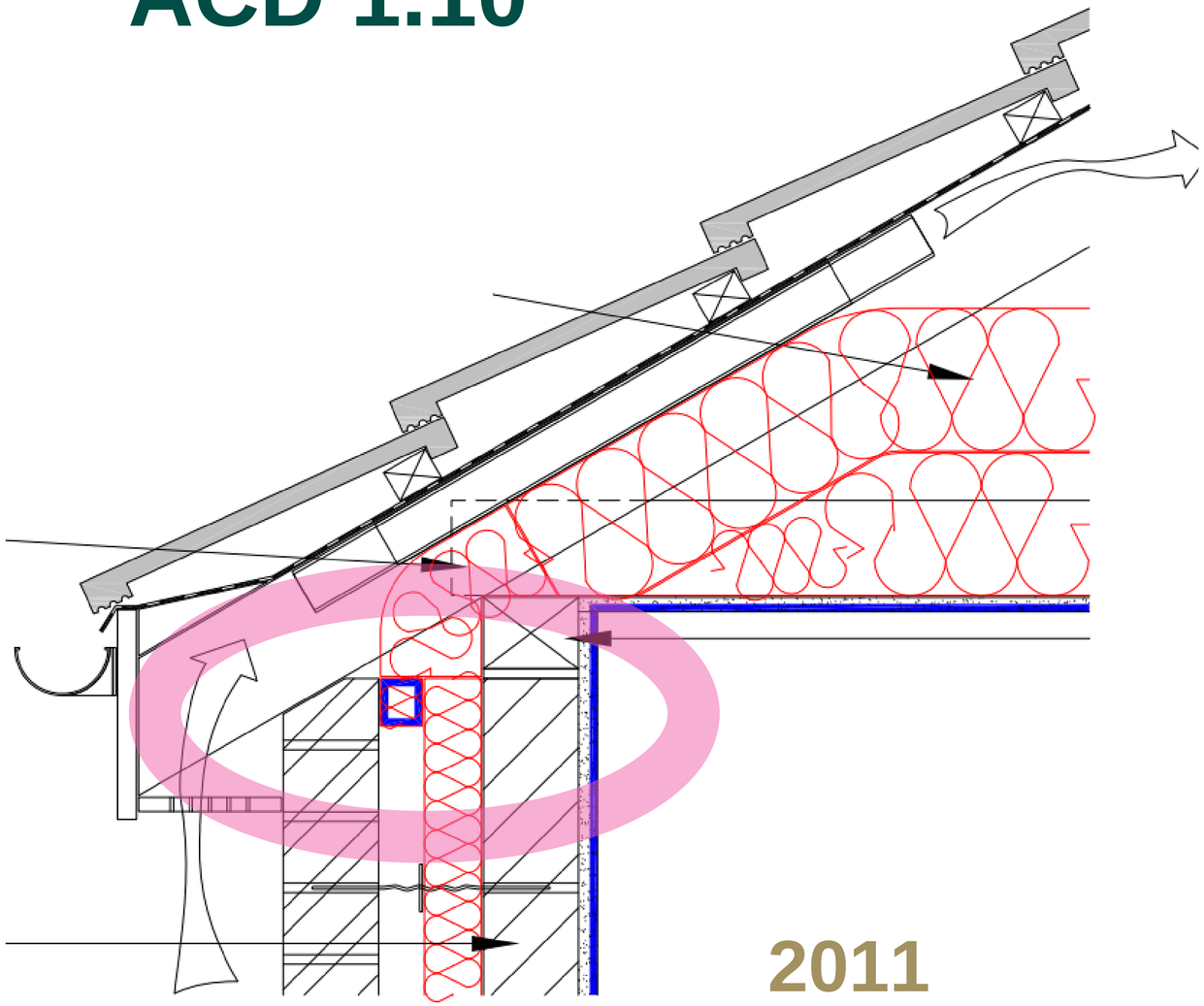

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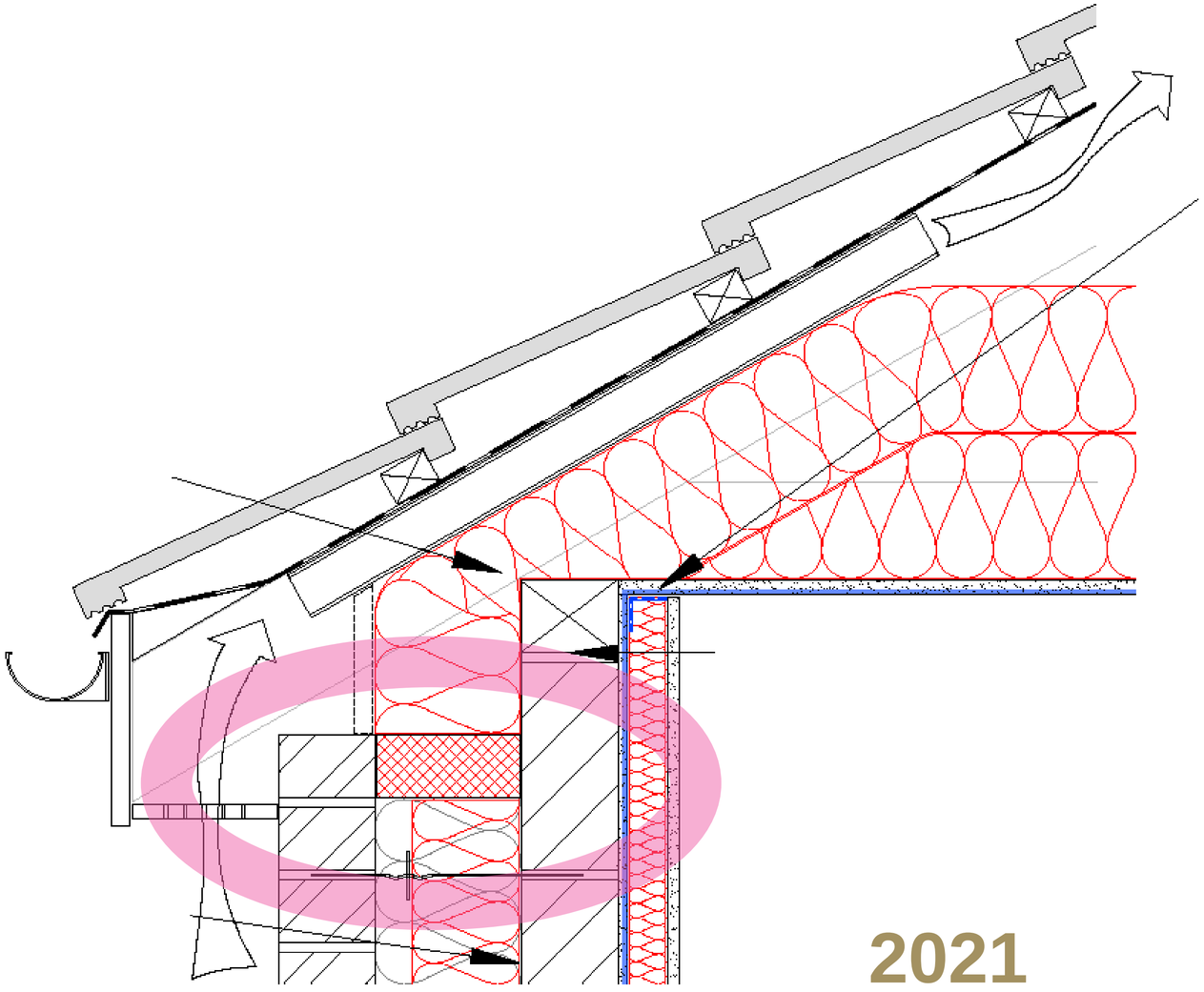

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Timber Frame Construction

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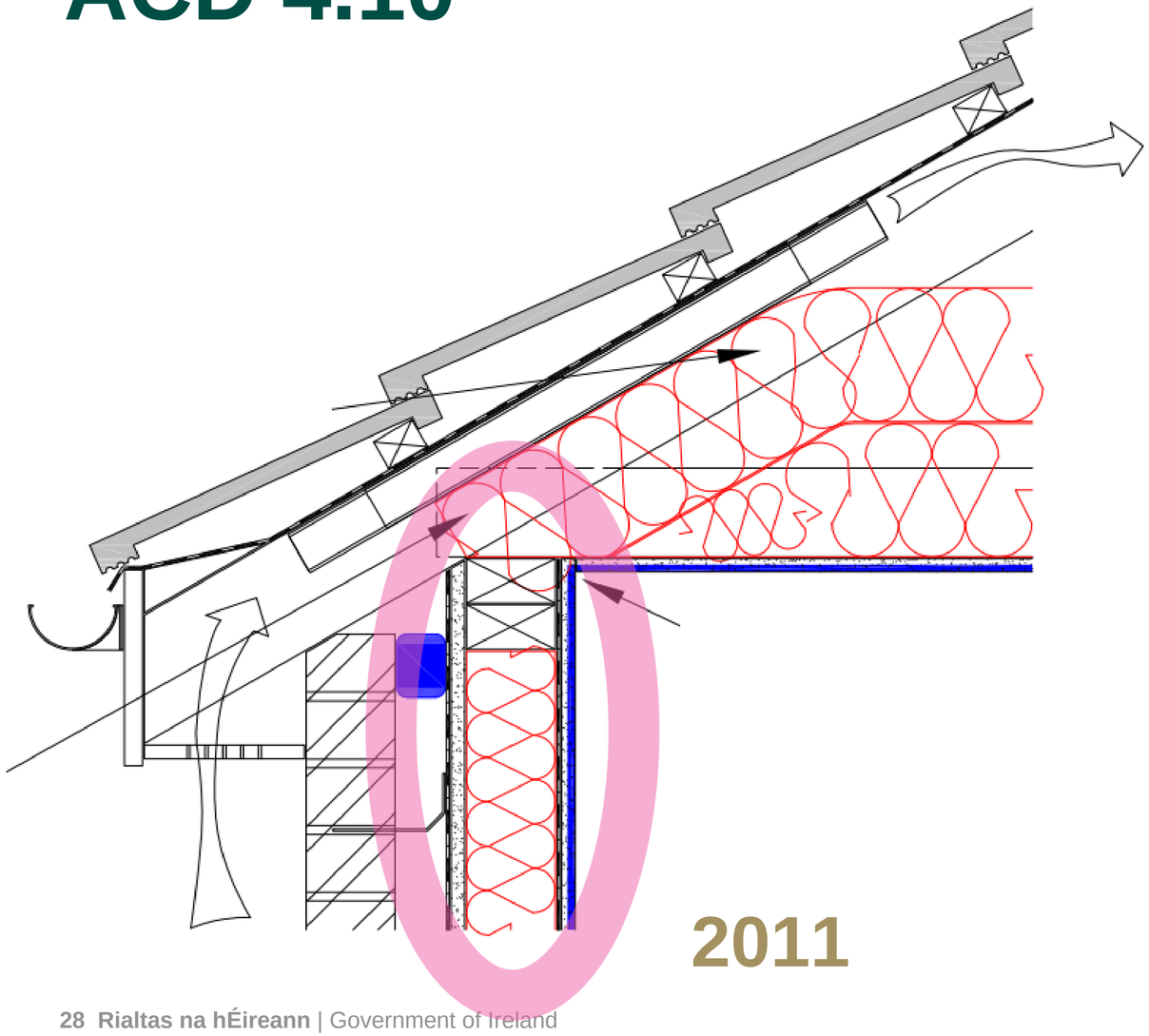

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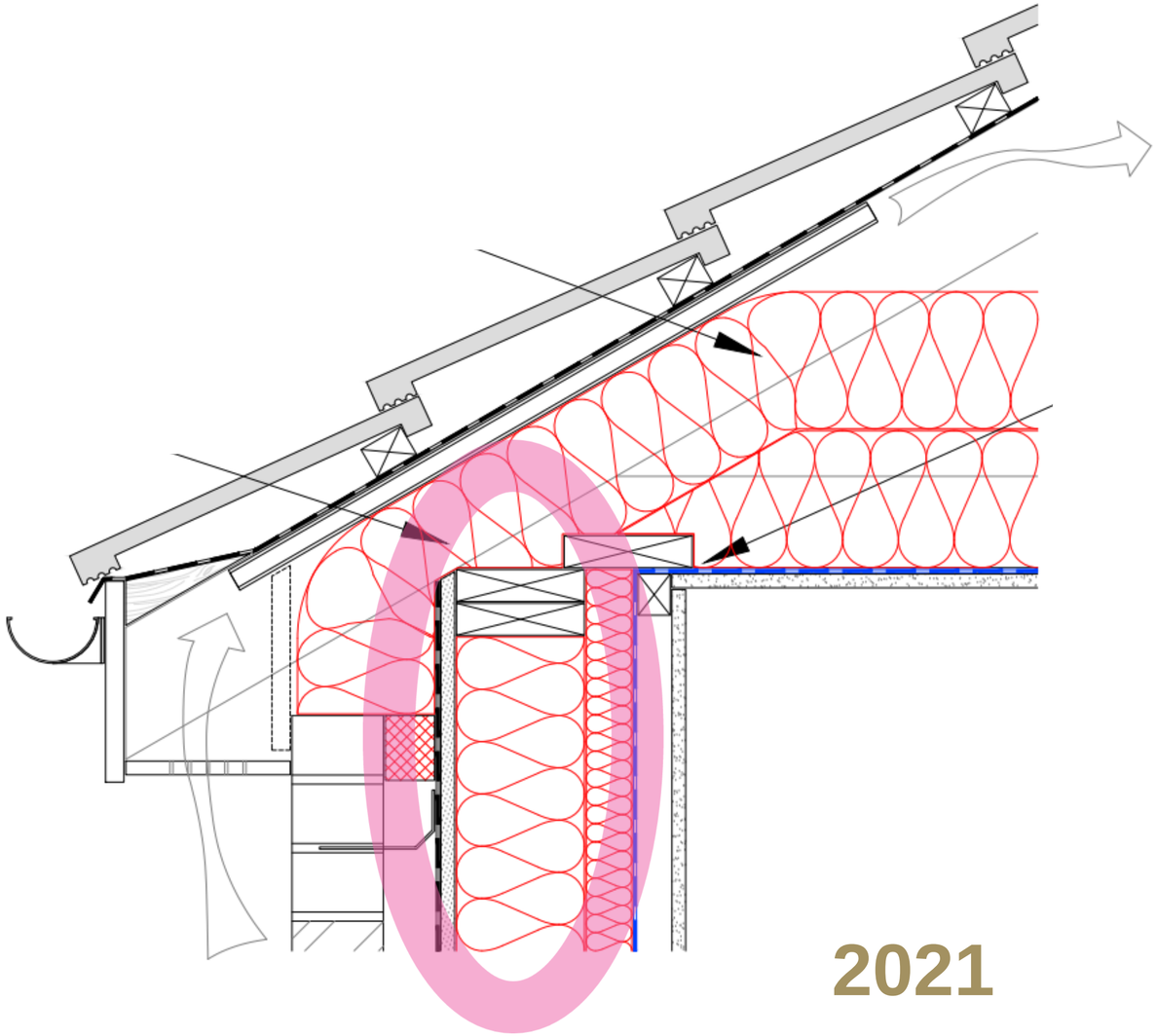

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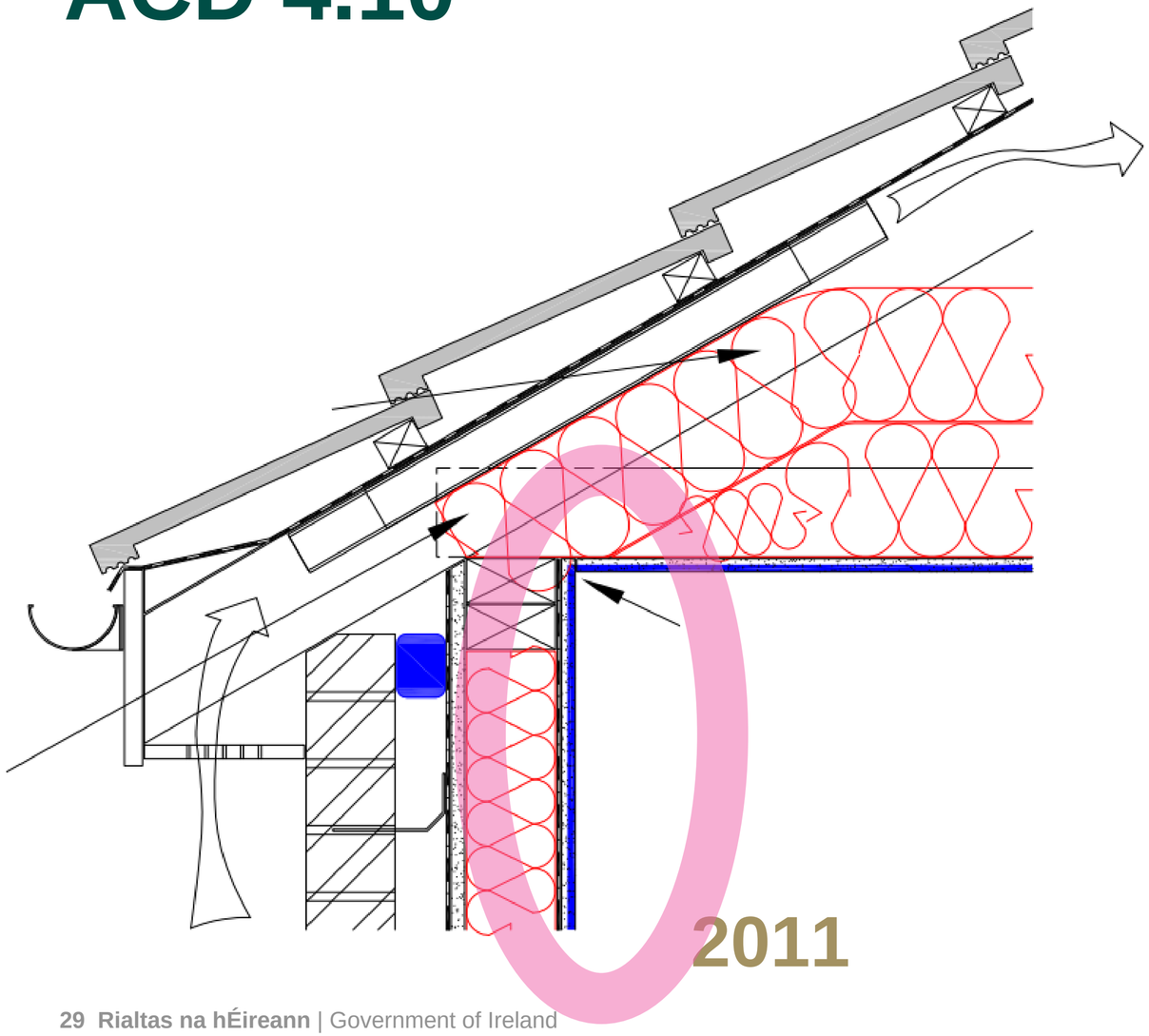

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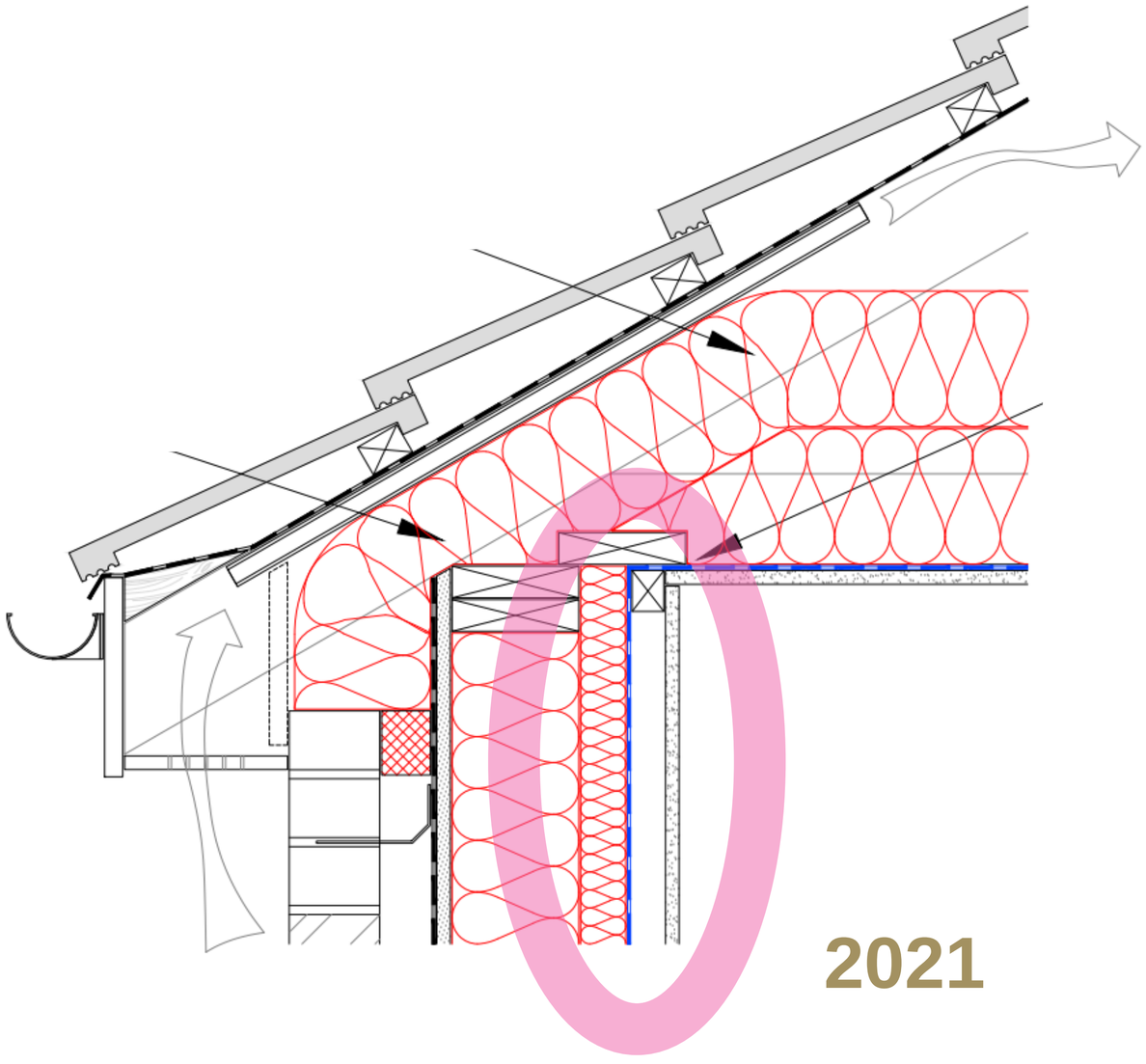

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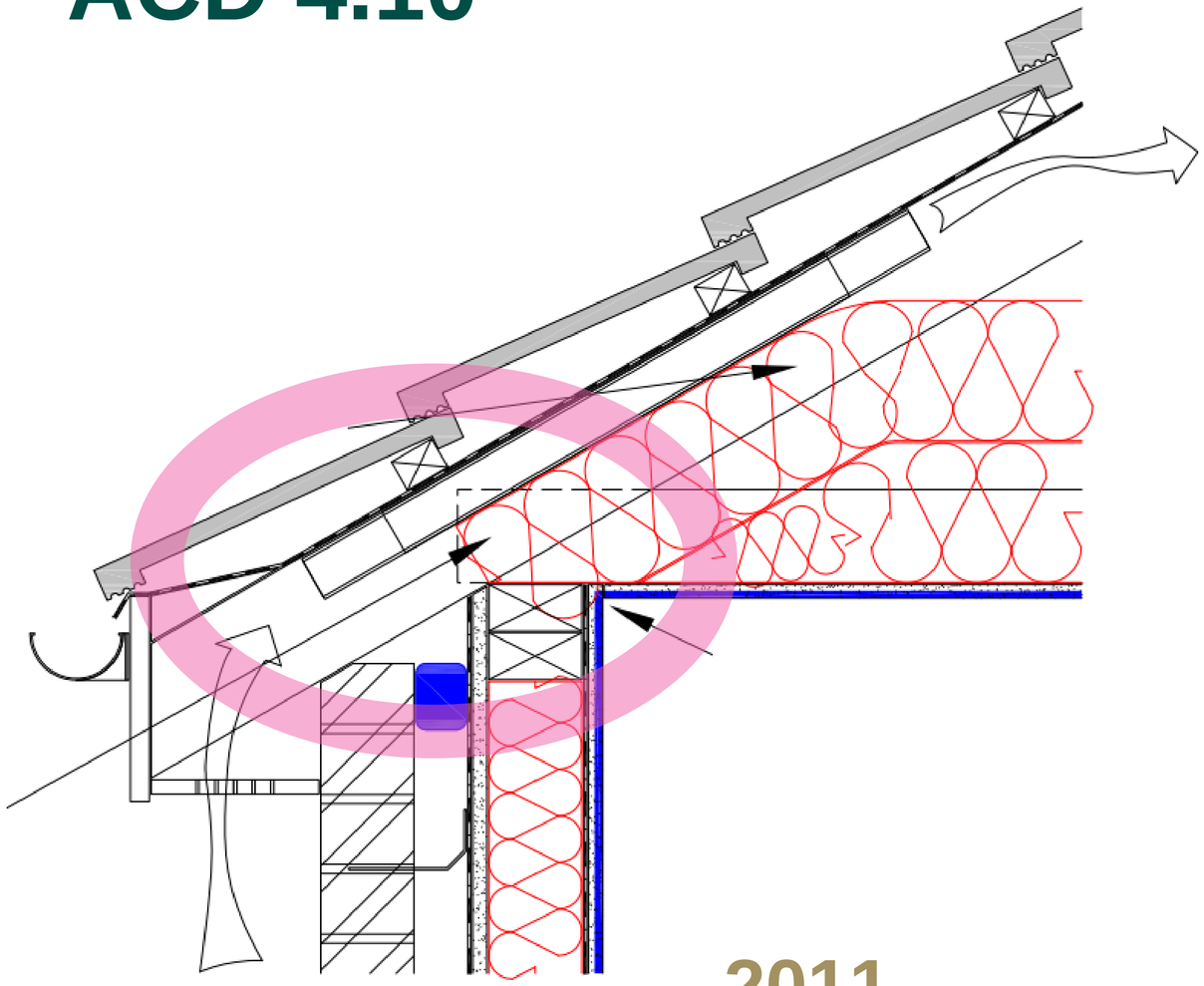

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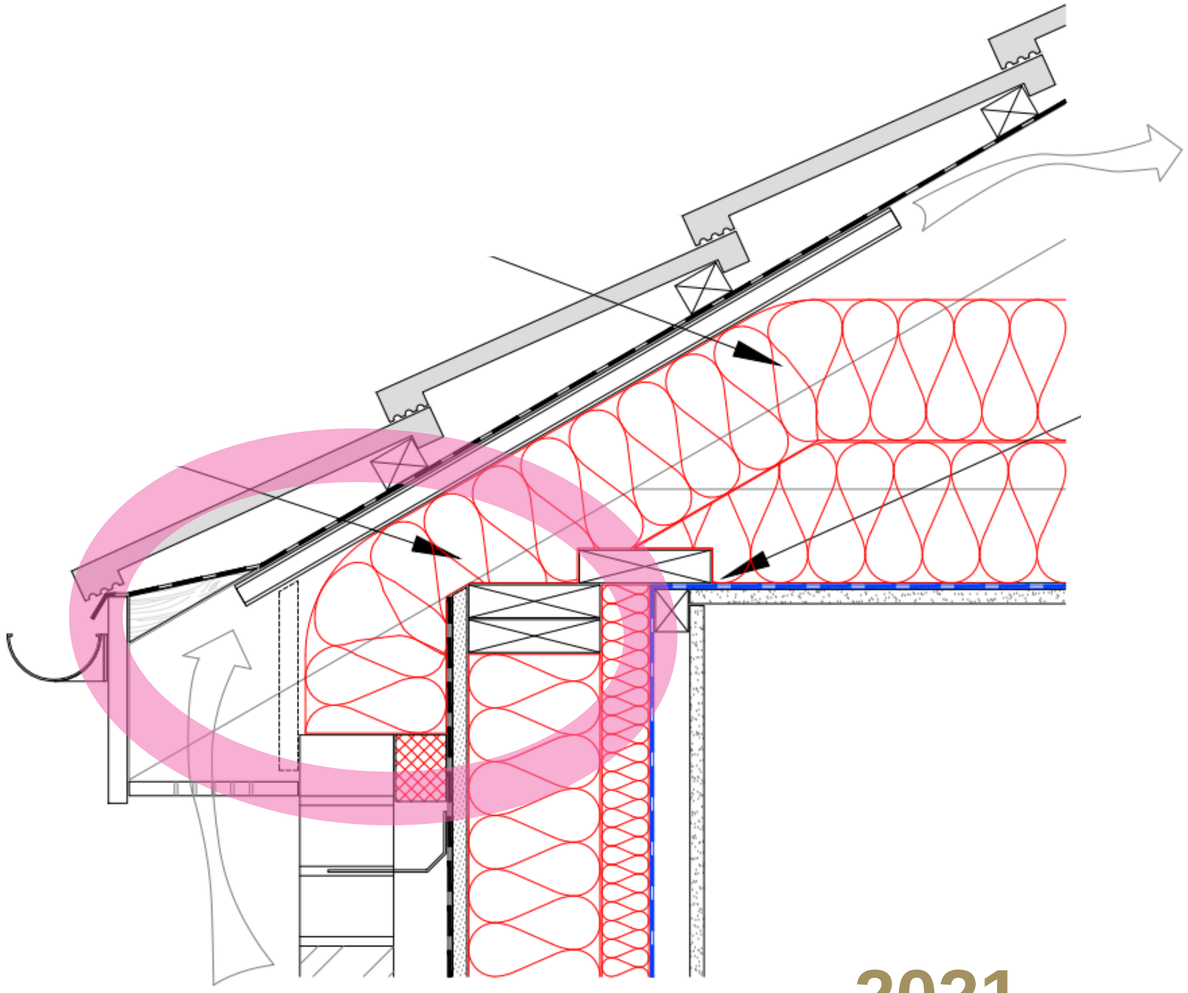

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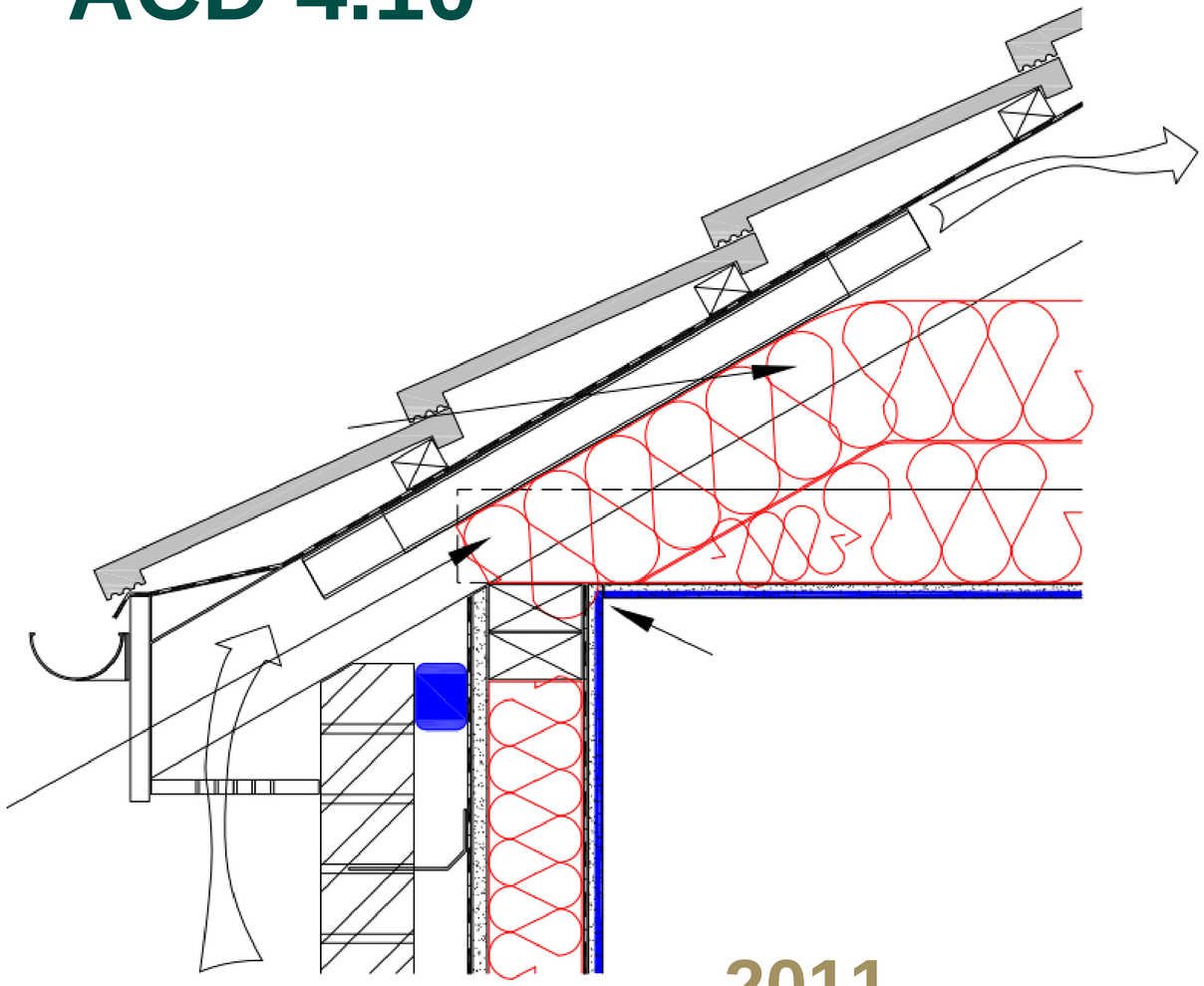

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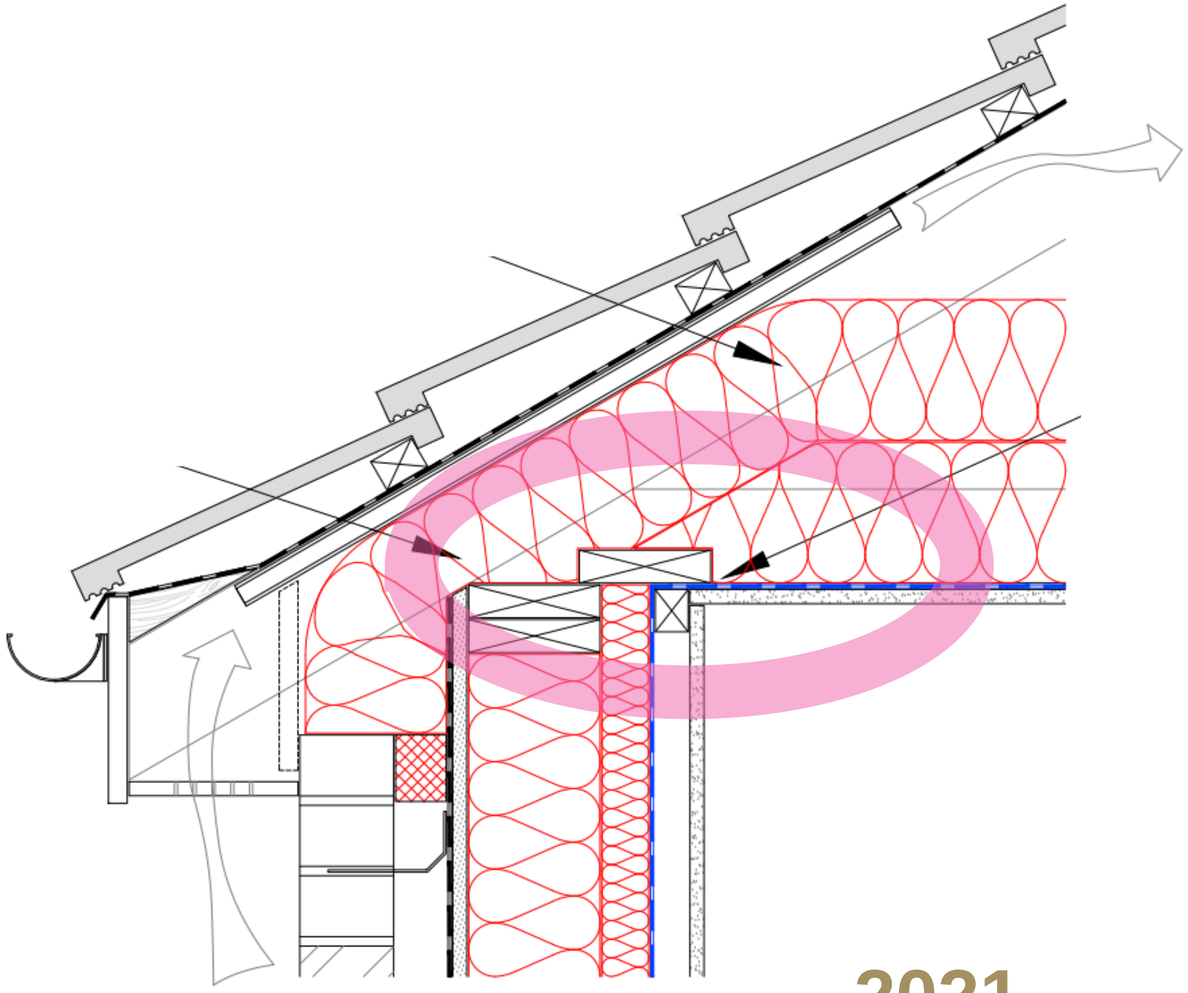

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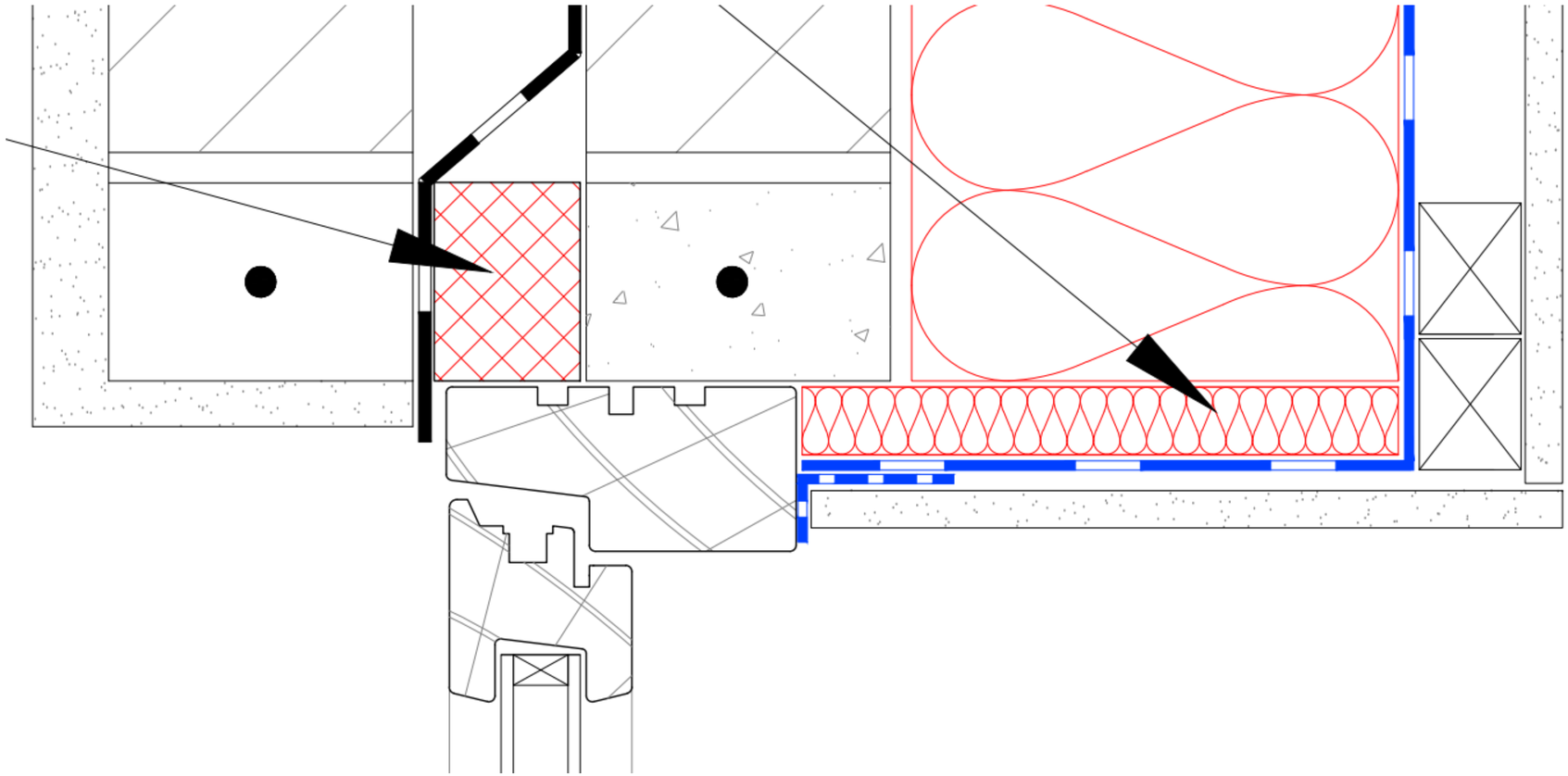
Enhanced Digital Detail

ACD 3.22



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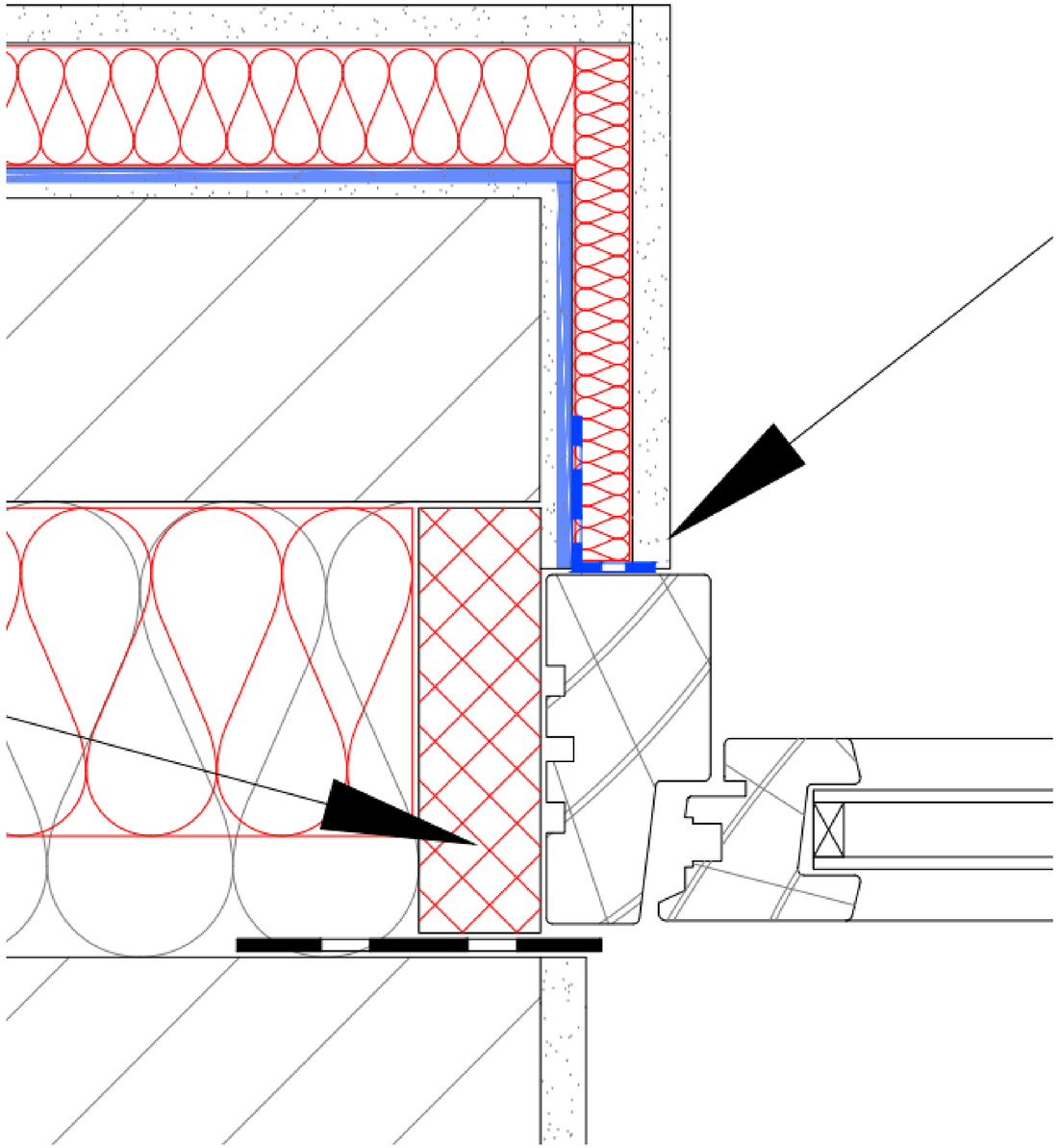

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Thank You

Simon McGuinness
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Department of Housing, Local Government and Heritage