



Module 5
Masonry and blockwork separating walls



Welcome to Module 5 – Masonry and blockwork separating walls

Additional notes:

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Slide 2

Module Contents

This module will cover the following topics:

- Block type options
- Junction options with inner leaf (abutted and tied)
- Cavity width
- Wall ties (Type A)
- Wall Finishes

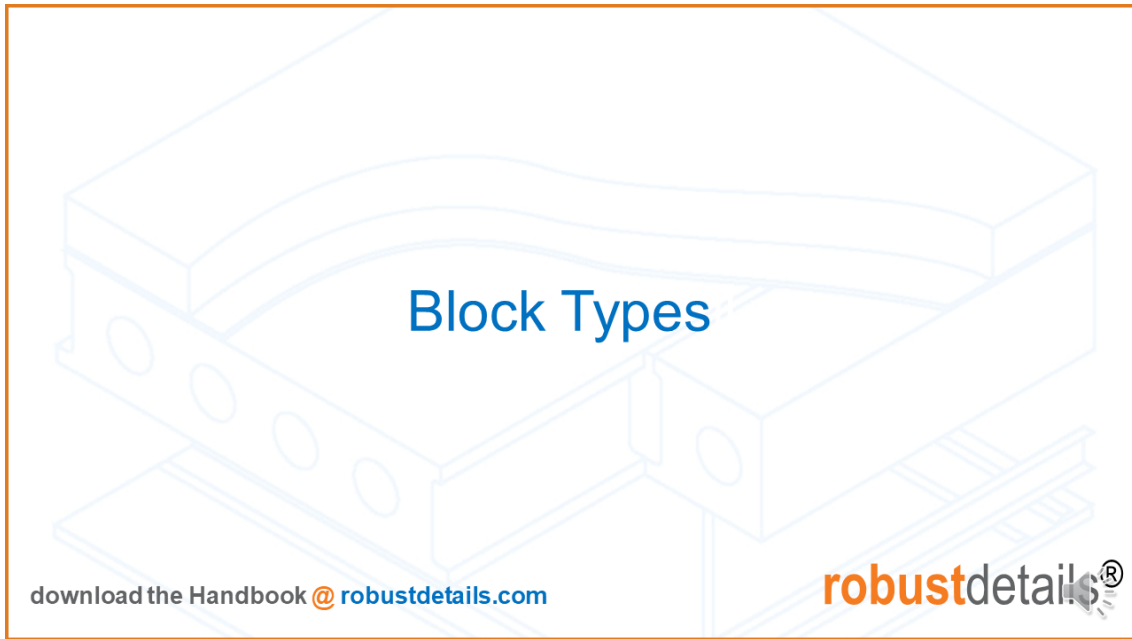
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This Module will cover the following topics

Additional notes:

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Slide 3



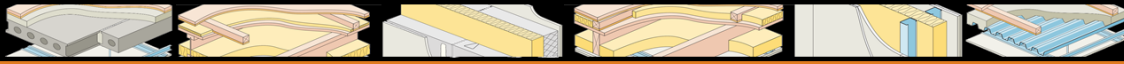
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Slide 4

Block Densities

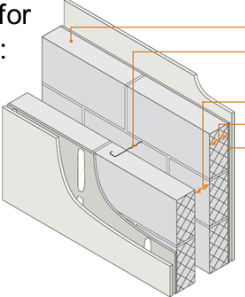


Generic Blocks:

Robust Details specify the following ranges for generic blocks used in the Separating Walls:

- Dense Aggregate - 1850-2300 kg/m³
- Lightweight Aggregate - 1350-1600 kg/m³
- Aircrete - 600-800 kg/m³

Separating Wall – Cavity Masonry **E-WM-4**



Block density	1350 to 1600 kg/m ³
Wall ties	Approved Document E 'Tie type A' (see Appendix A)
Cavity width	75mm (min)
Block thickness	100mm (min), each leaf
Wall finish	Gypsum-based board (nominal 8 kg/m ²) mounted on dabs on cement:sand render (nominal 8mm) with scratch finish Typical render mix 1:1:6 to 1:1/2:4. Render mix must not be stronger than background (see Appendix A)
External (flanking) wall	Masonry (both leaves) with 50mm (min) cavity – clear, fully filled or partially filled with insulation

Legend:
■ Lightweight aggregate blocks
■ Render and gypsum-based board on dabs

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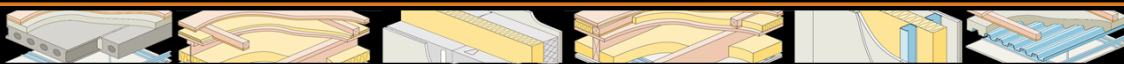
Reflecting guidance in Part E, Robust Details specify the following densities for generic blocks used in each of the Separating Walls:

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Blocks in these Generic walls can be sourced from anywhere, provided they meet the material description – so they must be “solid”; and be min 100mm thick... and of course, with the right density.

Additional notes:

Block Densities

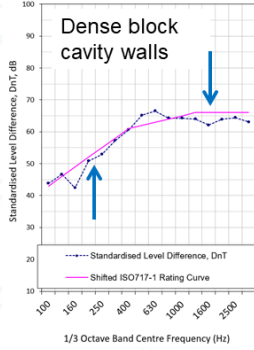


Block **density** will affect the acoustic performance

- Denser aggregate blocks are better performing at lower frequencies
- Lighter aircrete blocks are better at higher frequencies

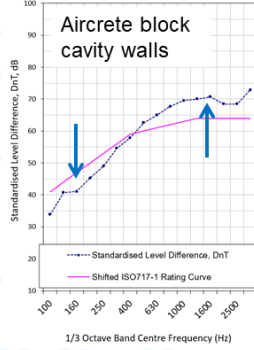
So blocks must be the same as specified

Dense block cavity walls




1/3 Octave Band Centre Frequency (Hz)	Standardised Level Difference, DnT, dB
100	45
125	55
160	60
200	65
250	68
315	65
400	65
500	65
630	65
800	65
1000	65
1250	65
1600	65
2000	65

Aircrete block cavity walls



1/3 Octave Band Centre Frequency (Hz)	Standardised Level Difference, DnT, dB
100	35
125	40
160	45
200	50
250	55
315	60
400	65
500	68
630	70
800	70
1000	70
1250	70
1600	70
2000	70

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The Density of a block used in a separating wall will play a major role in the acoustic properties of that wall

Different blocks have different characteristics -

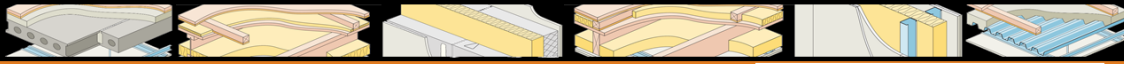
Dense aggregate blocks are good at resisting low-frequency; but sometimes being more porous, they can let high-frequency sound through

Conversely, the closed-cell structure of aircrete is better at stopping high-frequencies, but they don't have the mass to dampen the lower-frequencies

So if the expected performance is to be maintained, the specified density of block must be used in the Robust Details.

Additional notes:

Block Densities

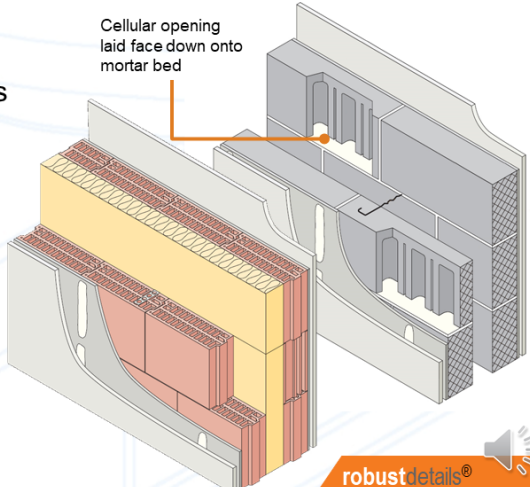


Proprietary Blocks:
Some Robust Details specify named blocks that have specific properties:

- Besblock Star Performer - Cellular block
- Plasmor Aglite Ultima - 1050 kg/m³
- Porotherm - Clay block

Blocks used on site must be the same as specified

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There are also proprietary Details.

These have block types that fall outside of the generic descriptors – so they could be cellular; an unusual density; or they could be a completely different material.

For example, we have... as slide..

As each of these will have very specific properties, it is critical that the specified block is used – and is not substituted.

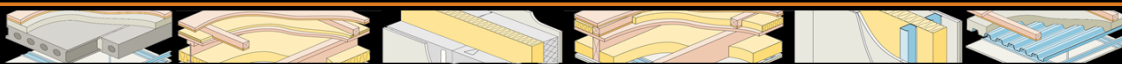
For CELLULAR blocks they must be laid “frog / opening” facing down onto the mortar bed.

Where a product is named in a Robust Detail, there is no “or similar approved”.

Additional notes:

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Flanking in Walls



External (flanking) wall junction: How to stagger

Separating wall leaf (refer to Robust Detail)

Inner leaf (refer to Robust Detail)

House B

House A

Outside

Plan

Steps and staggers in separating walls of 300mm or more can add 3-5dB to sound insulation performance

External wall cavity (min 50mm)


Masonry outer leaf

Robust Detail

Appendix A1

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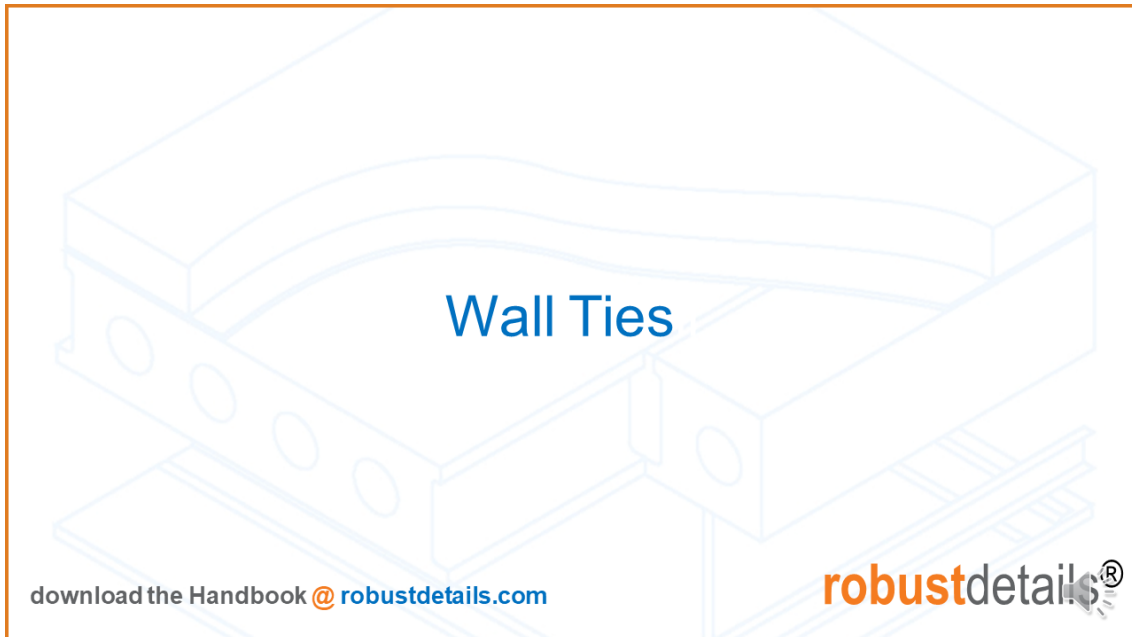
There's a couple of ways of forming a stagger:

Looking at what's in the Robust Detail first, and we can see one leaf continues.... However, a large stagger would be thermally inefficient, so we can refer to Appendix A1. But beware that this junction could suffer differential drying and cracking – so best to seek guidance from warranty provider.

Additional notes:

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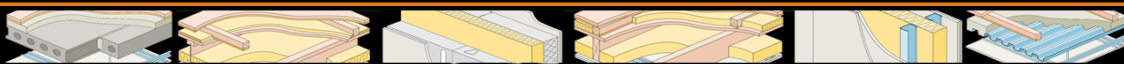
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Wall ties and stiffness



As the name suggests, these tie the wall leaves... structurally **and** acoustically.

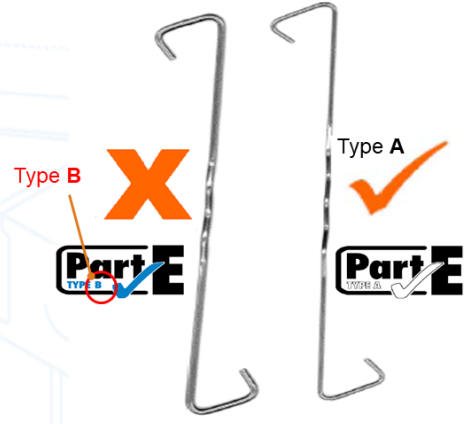
Factors:

- Inherent stiffness of the tie
- Cavity width
- Number of ties

Required Type of Wall Tie

- All wall ties used for masonry/blockwork cavity separating walls **MUST be Type A**

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As the name suggests, these tie the wall leaves both structurally and acoustically
How rigidly they tie them together is dependent on 3 factors...

Inherent stiffness – as we can see here, these two look identical, but put side-by-side, we can clearly see one is thicker and hence, stiffer than the other

Cavity Width

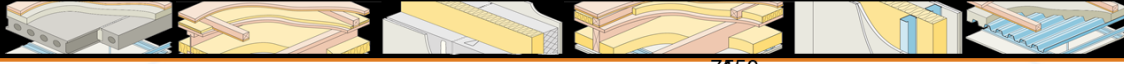
Number of Ties

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Wall Ties

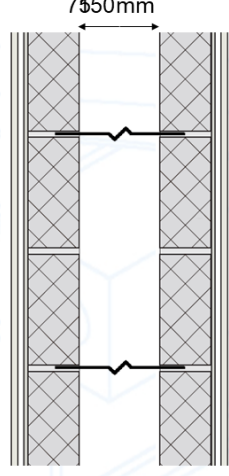


Dynamic Stiffness:

Factors:

- Inherent stiffness of the tie
- Cavity width

1.2 MN/m over 150mm



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So looking at the first two of these...

A term often used to describe the acoustic stiffness of a wall tie is the Dynamic Stiffness.

In simple terms, this is a laboratory measure of how much vibration is transferred from one end to the other.

It is dependent on...

Stiffness – imagine 2 tin cans and a piece of string – if tight, it works, if loose, no transmission

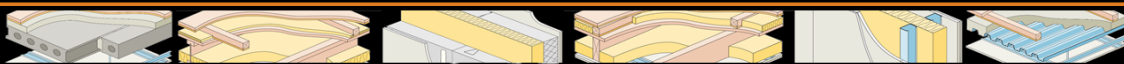
Span a 25mm batten over 6 feet – not too stiff... over 6 inches, really stiff.

So the dynamic stiffness value is always quoted with a specified cavity width.

Additional notes:

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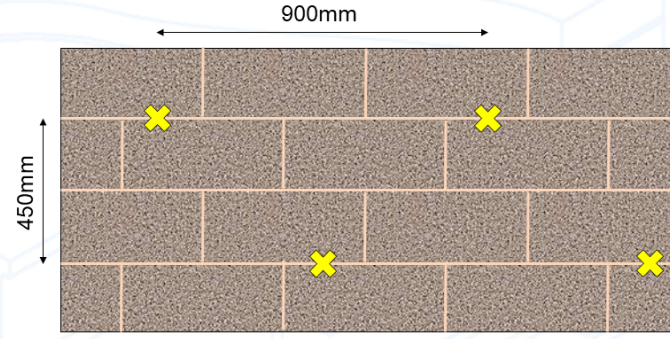
Wall Ties




Density of connections:

Factors:

- Number of ties

$$\frac{1}{0.9 \times 0.45} = 2.5/m^2$$


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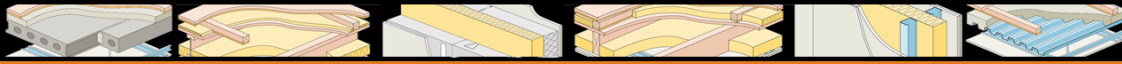
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The third part of the equation is the number of connections – or number of ties. As we all know, the standard spacing for the ties is 900mm horizontally, and 450 vertically. Doing the calculation, this results in a density of 2.5/m²

Additional notes:

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Wall Ties




Type A connection:

Factors:

- Dynamic stiffness measured across a stated cavity width – in **MN/m**
- Density of wall ties – in **m²**

Multiplying these together must result in a value **< 4.8 MN/m³**

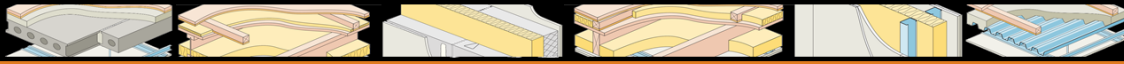
$1.2 \text{ MN/m} \times 2.5/\text{m}^2 = \mathbf{3.0 \text{ MN/m}^3}$

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So this brings us back to the question of how rigidly are the 2 leafs connected?
And more importantly, is it Type A ?
In ADE, it states that when we multiply the dynamic stiffness by the density, it must give a connection value less than 4.8 Meganewtons/ metre squared
Assuming a Dynamic stiffness of 1.2 MN/m – multiplied by 2.5 gives 3.0

Additional notes:

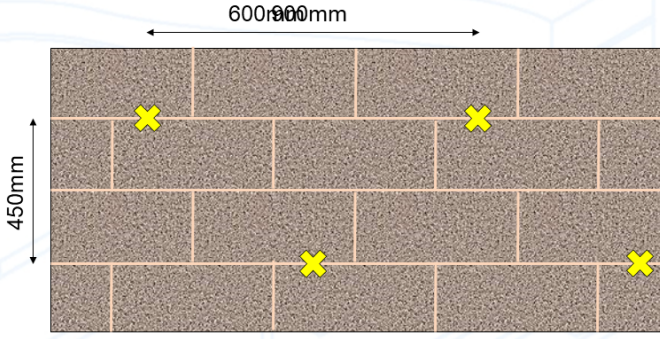
Wall Ties



Density of connections:

Factors:

- Number of ties

$$\frac{1}{0.6 \times 0.45} = 3.7/\text{m}^2$$


$1.2 \text{ MN/m} \times 3.7/\text{m}^2 = 4.4 \text{ MN/m}^3$

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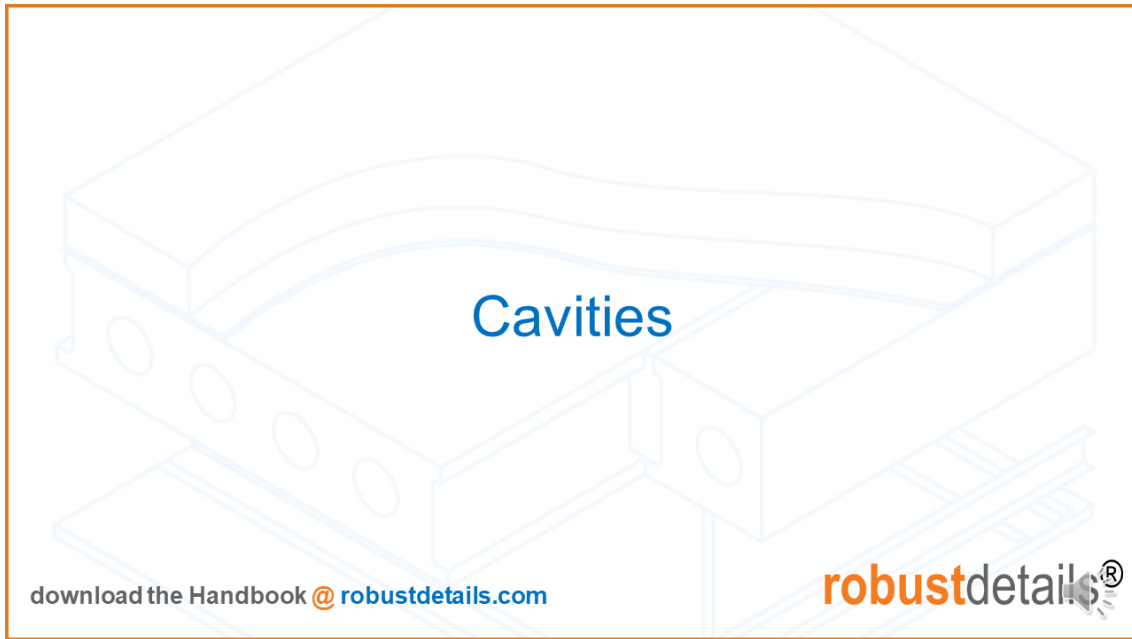
If wall ties are at 600x450 instead of 900x450, does this mean the wall is non-compliant?

Well if we do the calculation again, this gives 3.7 ties/m², so using the same 1.2MN ties gives us 4.4MN/m³, which is still a Type A connection.

Additional notes:

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Now for the third factor; cavities

Additional notes:

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Cavities



What can go wrong?

Workmanship:

- Incorrect Wall Tie and spacing
- Mortar on wall tie



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So what can actually go wrong with wall ties? Well a few things really.

It is really important NOT using ties that are so long they have to be put in diagonally;

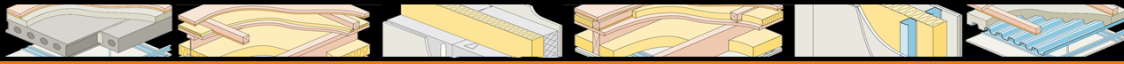
And that they go in at 900mm centers horizontally and 450mm vertically – NOT 450mm horizontally, as seen here.

But the ties also have to stay clean – allowing mortar to build up on a tie will significantly increase its dynamic stiffness and **THUS** increase sound transmission from one wall leaf to the other.

Additional notes:

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Cavities



What can go wrong?

Workmanship:

- Build up of Mortar at the base of the wall
- Unwanted debris dropped to the GF level



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As well as mortar collecting on wall ties, a much more significant issue is allowing it to accumulate at the base of the wall, as it creates an acoustic bridge for the whole length of the wall – which can lead to high levels of sound transmission across ALL frequencies.

This is a particular problem where membranes are continuous across the cavity, as the bridging effect is now apparent at superstructure level

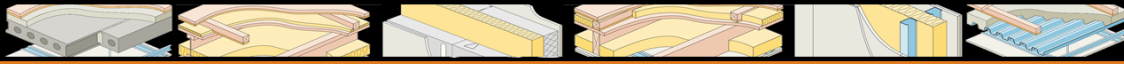
This can give the biggest reduction in performance, and aircrete is much less tolerant to this bridging than aggregate.

It's not just mortar... these are offcuts from over-sized joists

Additional notes:

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Cavities




What we should be doing:

Workmanship:

- Preventing Mortar and other debris from accumulating in the cavity



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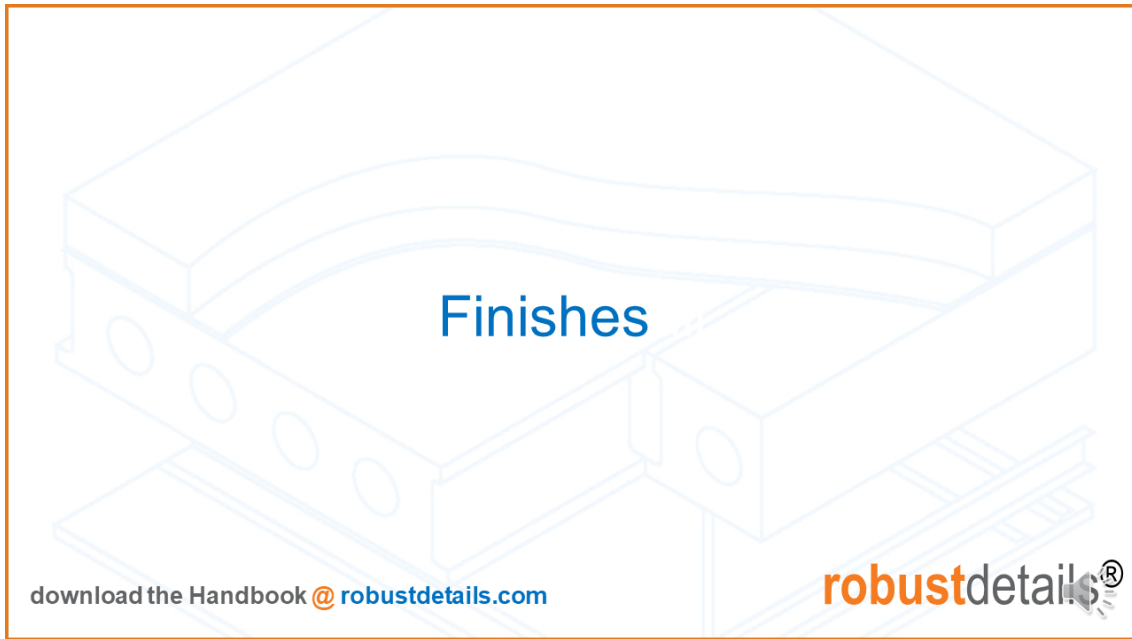
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We could look to clean the mortar off the ties; and clear the base of the cavity every couple of hours,
But it's much simpler to prevent it getting in there in the first place – and this can be done in a number of ways, as we can see here.

Additional notes:

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Slide 19

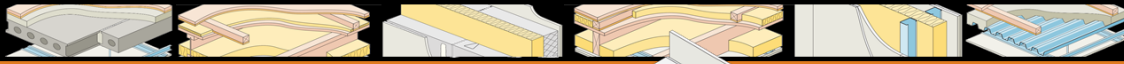


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Finishes

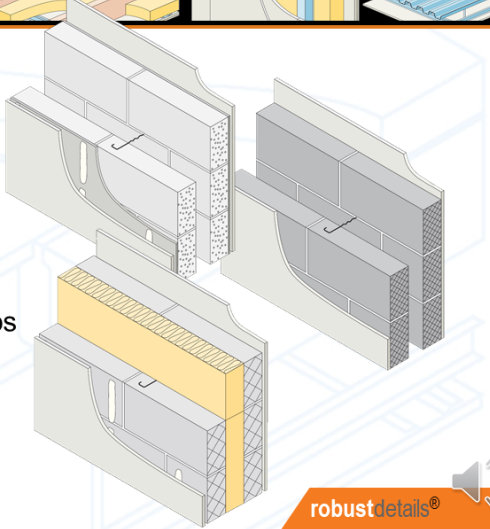


Wall Linings:


The Robust Details specify the type of finish that must be applied.

This will be either:

- Wet Plaster finish
- Render coat + Gypsum Board on dabs
- Gypsum Board on dabs



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We need to address a spectrum of sound frequencies, and as mentioned in the Block Types section, more density helps with the lower part of the spectrum; and lack of porosity helps with the upper frequencies.

Adding a wet plaster finish, or a render coat will help all frequencies, as it will “seal” the denser blocks, to help with upper frequencies
And will add mass to lightweight walls to help with lower frequencies.

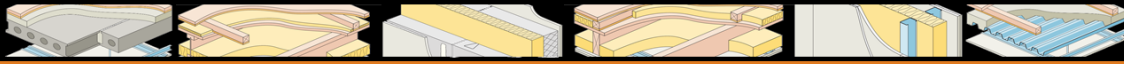
If there are no wet treatments to seal the blocks, mineral wool insulation will absorb high frequency sound getting through the blocks.

In all instances you need to ensure that the specified weight of gypsum board is applied – this can vary by wall type.

Additional notes:

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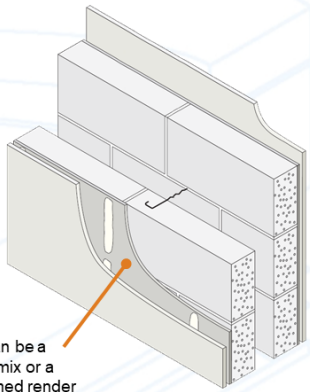
Renders



Render:


A **render** applied to the block (room side face) can add over **4dB improvement** to the airborne sound insulation performance. Some specific aspects of renders:

- Must be **8mm thick** where specified for for cavity separating walls
- **Scratch finished** to allow adhesive dab to bond
- Helps **seal all joints and perpend**s and improves air tightness.



Render coat can be a sand:cement mix or a proprietary named render coat (see RD Handbook)

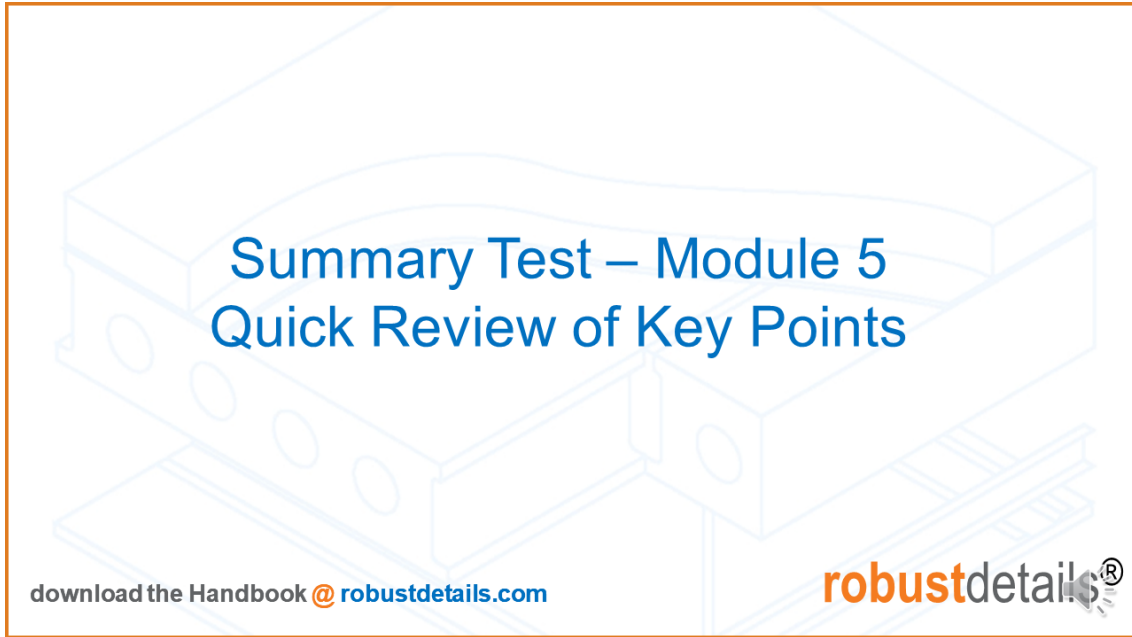
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Additional notes:

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Now for a quick TEST to recap on Module 5

Additional notes:

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Slide 23

Summary Test – Module 5

No.	Question
1	What are the main 3 generic block types?
2	What frequency range do aircrete block perform less at? and why?
3	If a Robust Detail only refers to a specific proprietary block, can this be substituted?
4	Cellular blocks must be laid in which orientation?
5	What classification do all wall ties need to meet in order for use in separating walls?
6	The Building Regulations state that when you multiply the dynamic stiffness by the density, wall ties must be less than (what) MN/m ³
7	If the density of wall ties differs from the standard 900x 450mm, does this automatically mean Type A compliance is not achieved?
8	If there is an increase of mortar at the base of the cavity, what impact does this have on the wall?
9	When installed at FF Level in the separating wall, what could increase the risk of mortar collection at superstructure level?
10	What is the other internal wall finish option for masonry walls, 1) Wet Plaster finish; 2) Gypsum Board on dabs; 3)?
11	What, when applied to a wall, can increase the sound performance by 4dB when a clear cavity is used?
12	What 2 configurations can you use to connect separating blockwork to the external (flanking) wall?

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Here are the questions – you may wish to PAUSE the recording and test yourself against these questions.

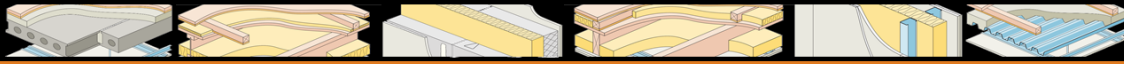
Once you have answered all of them – the next slide provides the answers. In 10 seconds the slide will change so press pause now if you want to test yourself first.

Thank you for following Module 5.

Additional notes:


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Summary Test – Answers



No.	Answer
1	Dense aggregate, Lightweight aggregate and Aircrete
2	Low frequencies - Low mass for damping sound transmission
3	No - only details that provide generic block types can be substituted
4	Cellular opening facing down onto the mortar bed
5	Type A approved
6	4.8 MN/m ³
7	No - multiply the stiffness by the Density to see if they are under the 4.8 MN/m ³ . Extra guidance - Speak to the tie manufacture for additional assistance
8	Mortar bridges the cavity giving a reduction in the flanking path, allowing sound to transfer more easily from one leaf to the other
9	DPM / Gas membrane
10	3) Render coat + Gypsum Board on dabs
11	Render coat
12	Either toothed or tied

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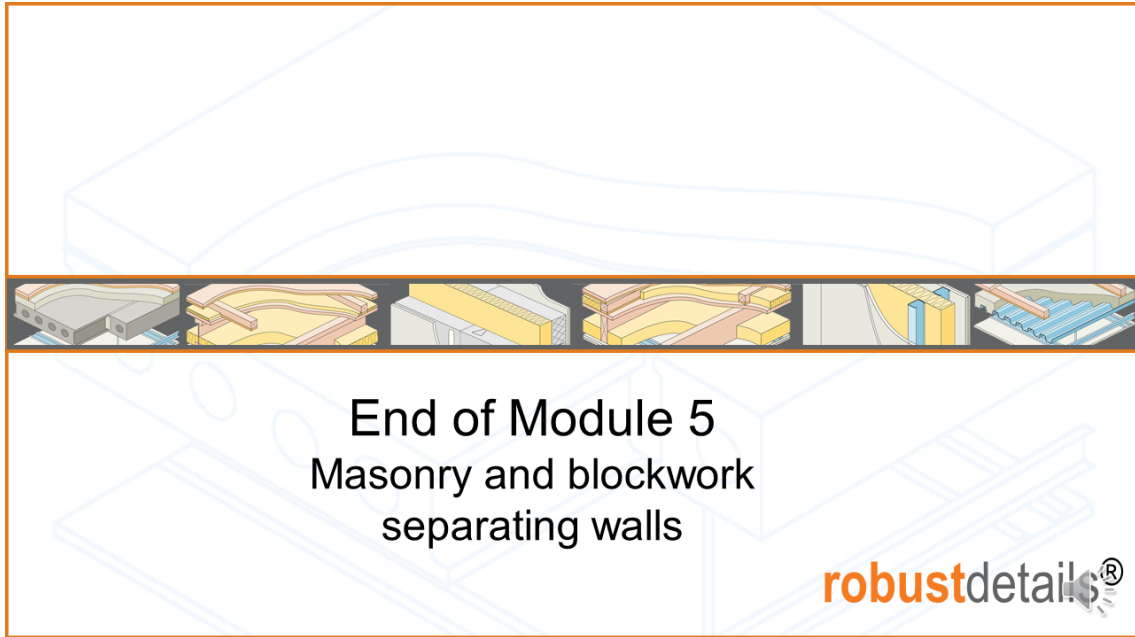
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Here are the answer to Module 5's quick test.
How did you do?

Thank you for following Module 5

Additional notes:

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End of Module 5
Masonry and blockwork
separating walls

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This is the end of Module 5 – Masonry blockwork separating walls

Additional notes:

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