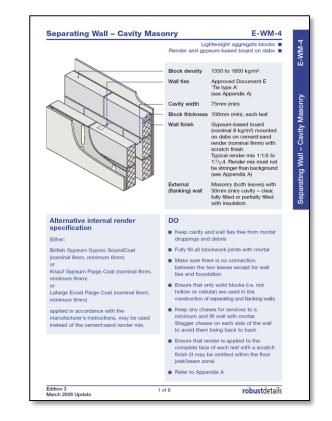
robustdetails[®]

RDL Technical Managers: Simon Bloodworth Chris Miles Colin Potter Robust Details Limited

What is a Robust Detail?

- Separating wall or floor design assessed and approved by Robust Details Limited
- Capable of consistently exceeding Building Regulation performance standards
- Practical to construct on site
- Reasonably tolerant to workmanship
- Can be used as an alternative to PCT to comply with the relevant Building Regulations



Its all about context...



A bit like car production:

- a prototype is developed
- testing is undertaken

If successful, the same design can be repeated based on the tested prototype.

Its all about context...

Details are available for:

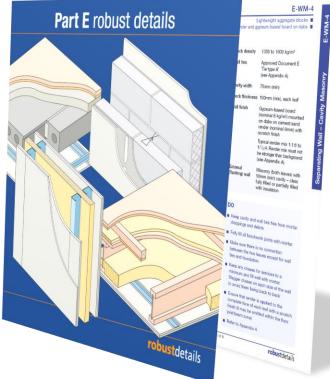
- Loadbearing masonry
- Timber frame
- Reinforced concrete frame
- Lightweight steel frame
- Heavy duty steel frame



To use the **robust**details[®] option, the 'Person carrying out the work' **must**:

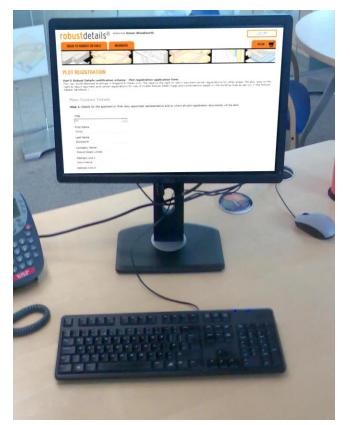
- Select appropriate Robust Details from the Handbook, and
- Design in accordance with the relevant Robust Detail specification(s)

If necessary seek advice – technical@robustdetails.com



To use the **robust**details[®] option, the 'Person carrying out the work' **must**:

- Register each plot with Robust Details Limited (now on-line)
- Give registration document to the BCB [before work starts]



robustdetails®

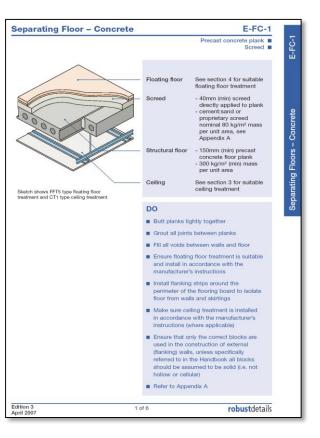
To use the **robust**details[®] option, the 'Person carrying out the work' **must**:

- Build in accordance with the relevant Robust Detail specification
- Satisfy the BCB that the relevant requirements have been met
- Agree to be subject to robustdetails[®] scheme surveillance (if selected)



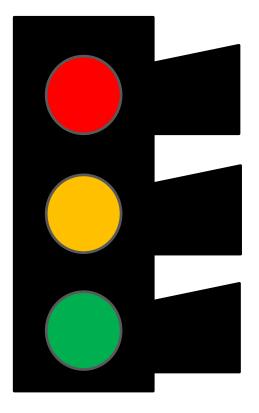
A Complementary Service

- robustdetails[®] provisions add an extra layer to existing Building Control procedures
- Robust Details Limited's activities supplement (rather than replace) BCB compliance monitoring





Surveillance monitoring:



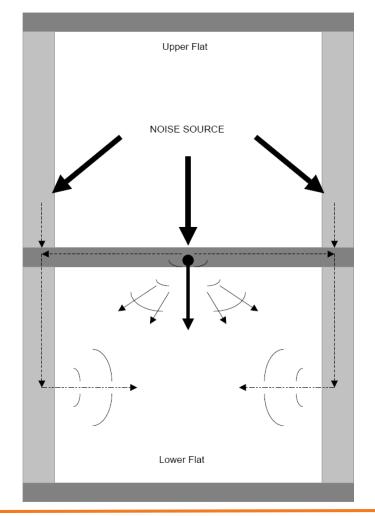
- spot check visual inspections and sound tests
- No enforcement powers
- If any serious problems notify BCB
- Withdraw any Robust Detail that consistently fails to meet required standards

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Acoustic principles

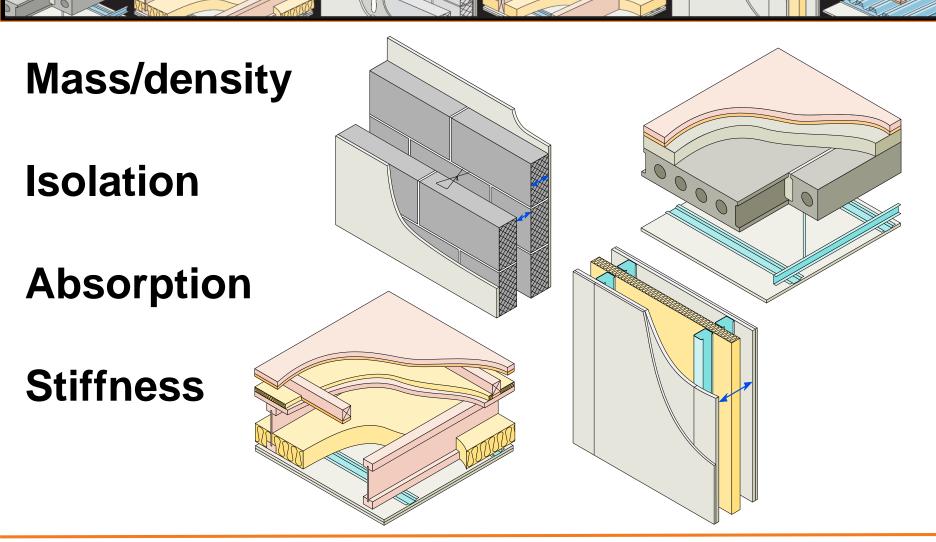
Sound Transmission:

- Airborne
- Impact
- Flanking





Sound insulation principles





Surveillance findings

Over 12,000 tests have been undertaken.

Of these:

- 98.3% met the Building Regulations standard (99% for tests from the last 12mths)
- Investigations showed the remainder were NOT compliant with a Robust Details specification.

	Airborne D _{nT,w} +C _{tr} (MIN)	Impact L' _{nT,w} (MAX)
Building Regulations	45	62
Robust Detail	47	60

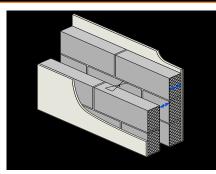
Surveillance findings

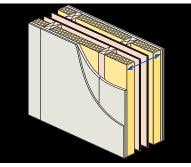


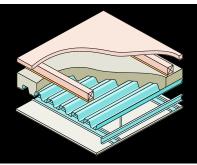
Furthermore:

- 3.1% did not achieve the performance typical of a Robust Detail
- again, investigations suggested these were NOT compliant with a Robust Details specification.

	Airborne D _{nT,w} +C _{tr} (MIN)	Impact <i>L</i> ' _{n<i>T</i>,w} (MAX)
Building Regulations	45	62
Robust Detail	47	60







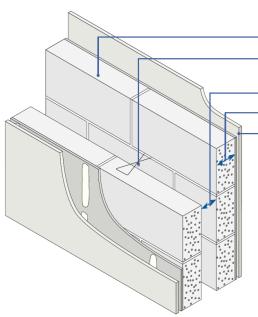
A surveillance visit to test separating walls identified an issue with airborne performance, particularly at first floor level:

	Airborne D _{n7,w} +C _{tr}
Test 1 – ground floor	46
Test 2 – first floor	43
Test 3 - first floor – repeat test	44

The sound transmission was noted to be directly through the separating wall.

The specification was fairly typical, cavity masonry construction. Built prior to 2010, there was no cavity insulation.

Aircrete blocks



-	Block density	600 to 800 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 Render mix must not be stronger than 1:1:6 and not stronger than background (see Appendix A)	
	External (flanking) wall	Masonry (both leaves) with 50mm (min) cavity – clear, fully filled or partially filled with insulation	

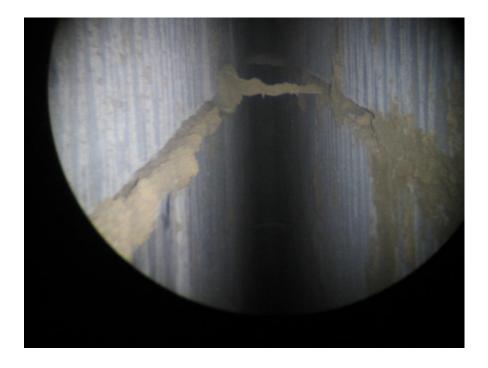
Render and gypsum-based board on dabs

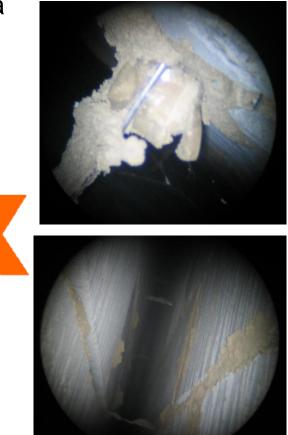
DO

- Keep cavity and wall ties (and insulation) free from mortar droppings and debris
- Fully fill all blockwork joints with mortar
- Make sure there is no connection between the two leaves except for wall ties and foundations (and insulation)
- Ensure that only solid blocks (i.e. not hollow or cellular) are used in the construction of separating and flanking walls
- Keep any chases for services to a minimum and fill well with mortar. Stagger chases on each side of the wall to avoid them being back to back

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Mortar bridging or incorrect wall ties were suspected so, with the assistance of the builder a borescope was used to view the cavity...

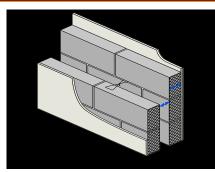


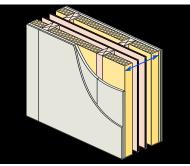


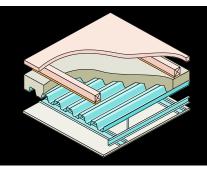
Having cleaned the cavity (accessing from the end of the wall), re-tests revealed a considerable improvement.



	Airborne D _{nT,w} +C _{tr}
Test 1 – ground floor	46
Test 2 – first floor	43
Test 3 - first floor – repeat test	44
Test 4 - ground floor – test following remedial work (PCT)	50
Test 5 - first floor – test following remedial work (PCT)	48



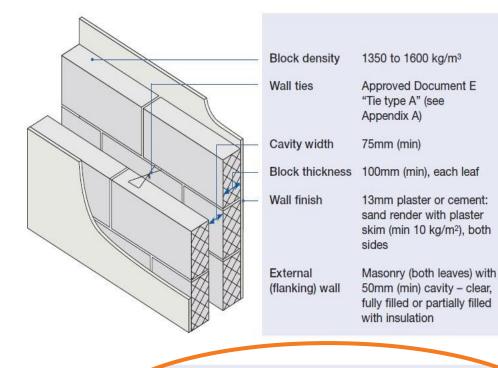




A surveillance visit to test separating walls identified an issue with airborne performance at ground floor level:

	Airborne <i>D</i> n <i>T</i> ,w+ <i>C</i> tr
Test 1 – first floor - bedroom	53
Test 2 – ground floor - lounge	44
Test 3 - ground floor – lounge - opposite	46





Separating wall cavity insulation (optional)

The cavity may be insulated with mineral wool with a maximum density of 40 kg/m³.

The specification was fairly typical, with cavity insulation adopted to address thermal bypass.

DO

- Keep cavity and wall ties (and insulation) free from mortar droppings and debris
- Fully fill all blockwork joints with mortar
- Make sure there is no connection between the two leaves except for wall ties and foundation (and insulation)
- Ensure that only solid blocks (i.e. not hollow or cellular) are used in the construction of separating and flanking walls

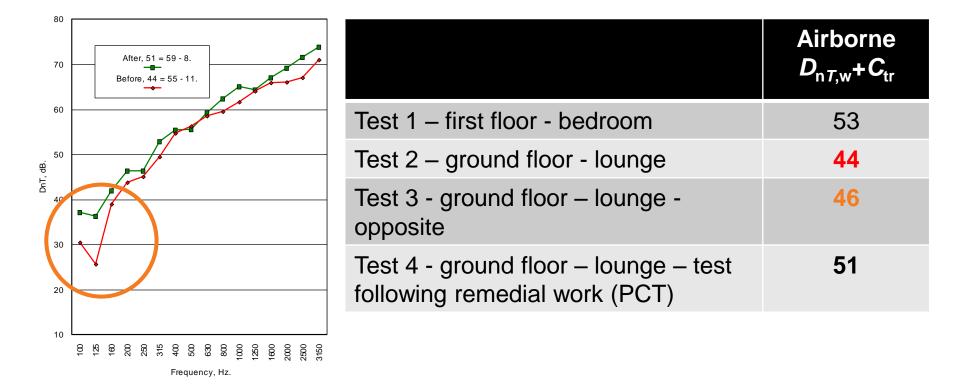
Mortar bridging was suspected but the cavity insulation meant that use of a borescope to view the cavity was not viable.

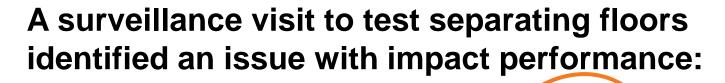
The builder chose to remove the plaster and sections of blockwork, discovering that mortar/debris had collected on the insulation and ties.

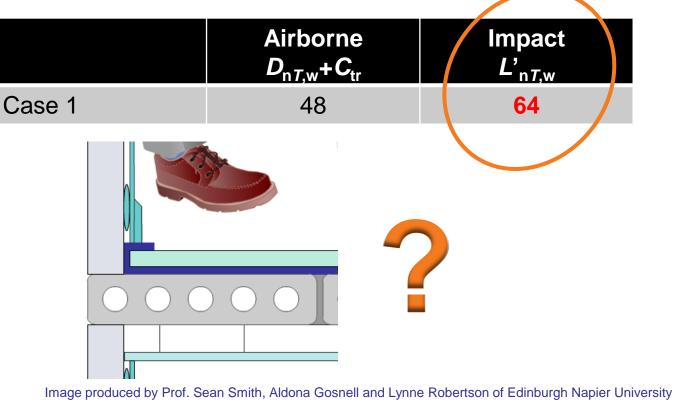




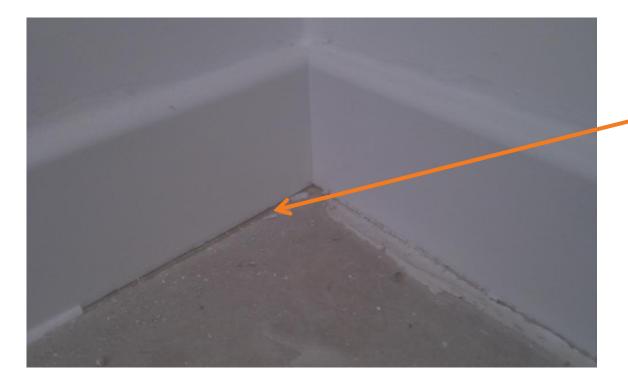
Having cleaned the cavity and re-built the wall, re-tests revealed a considerable improvement (particularly in terms of low frequency).



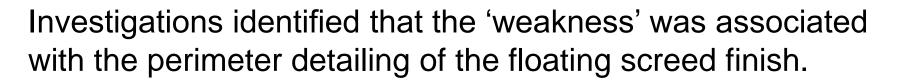




Investigations identified that the 'weakness' was associated with the perimeter detailing of the floating screed finish.



Removing the mastic seal at the base of the skirtings revealed that the skirting was in contact with the screed finish.



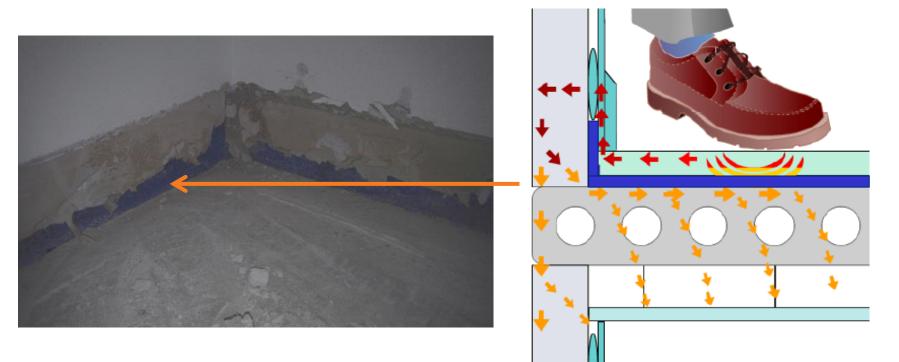


Image produced by Prof. Sean Smith, Aldona Gosnell and Lynne Robertson of Edinburgh Napier University



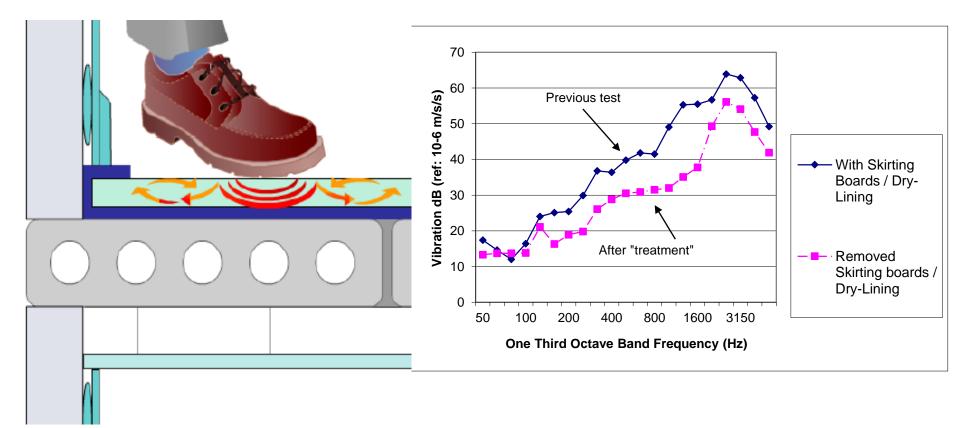


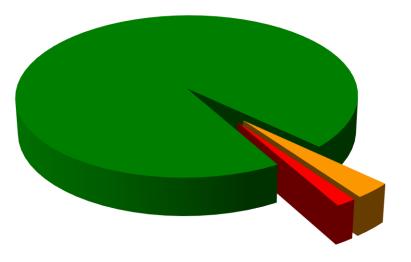
Image produced by Prof. Sean Smith, Aldona Gosnell and Lynne Robertson of Edinburgh Napier University

Surveillance findings

For loadbearing masonry construction, these two workmanship issues are quite significant factors

37% of the cavity masonry walls that failed to meet Building Regulations performance had mortar bridging

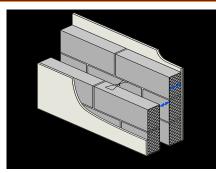
65% of the screed floors that failed to meet Building Regulations performance involved lack of isolation of the floating screed

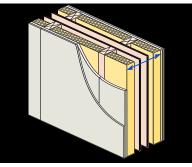


Getting these aspects correctly addressed would help considerably!

Now for something different!

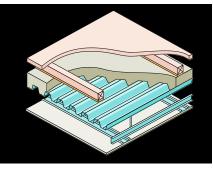
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A surveillance visit to test separating walls identified an issue with airborne performance at first floor level:

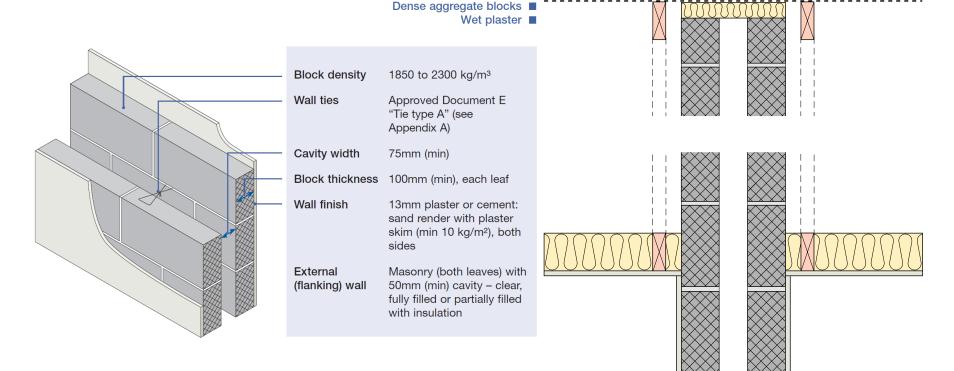




The sound transmission seemed to be passing over the separating wall, via the roof void.

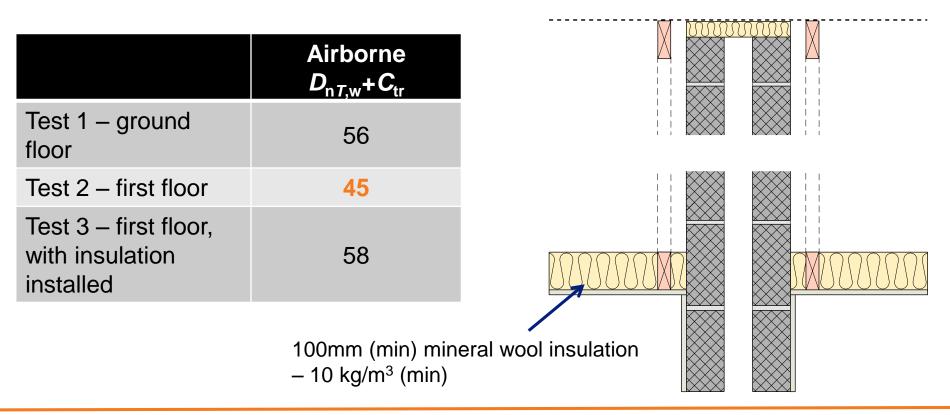


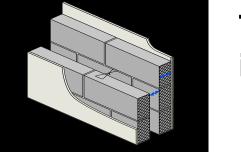
The specification was fairly typical, aggregate cavity masonry construction, no room-in-roof. Built prior to 2010, there was no cavity insulation.

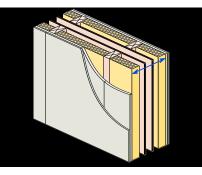


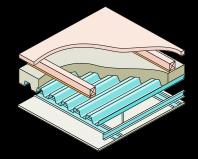
A check in the roof void revealed that...

... the loft insulation had not been installed







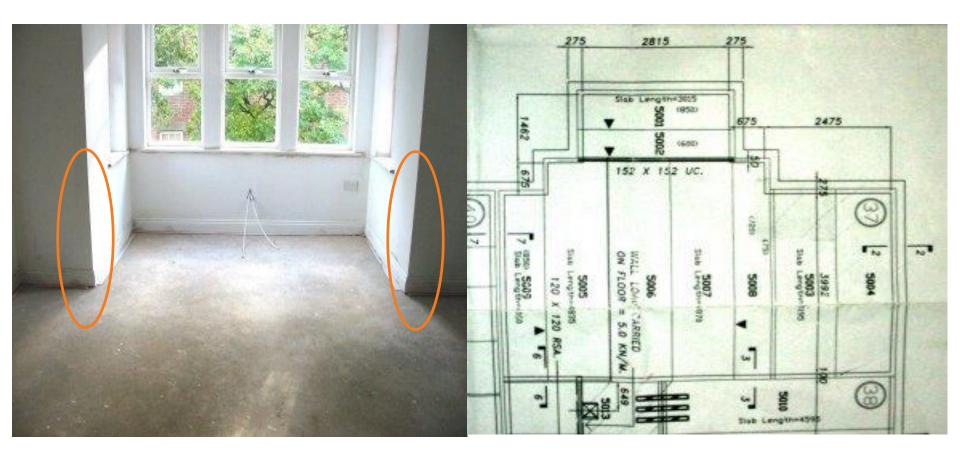


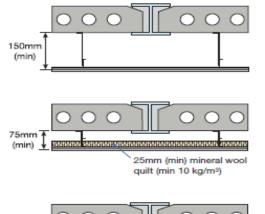
Two surveillance visits on separating floors identified performance below expectations:

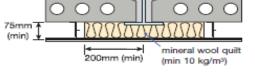
	Airborne D _{nT,w} +C _{tr}	Impact <i>L</i> ' _{n<i>T</i>,w}
Case 1	45	60
Case 2	46	56

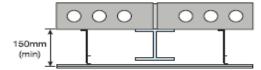
In both cases the airborne performance was a marginal Building Regulations pass.







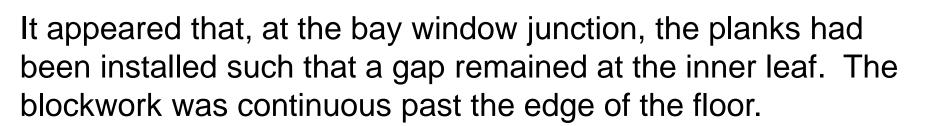


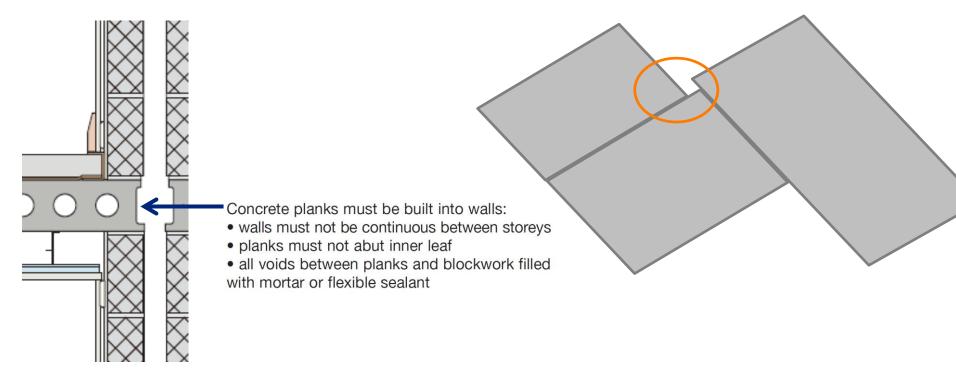


Guidance is provided in Appendix A1 of the Robust Details Handbook regarding the use of steel beams to support concrete floors.



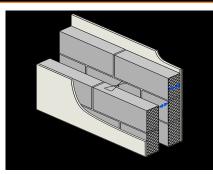


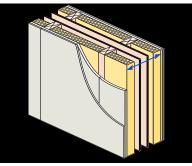


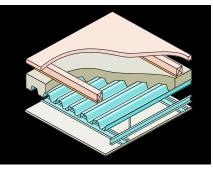




Case Study – Timber floors







A surveillance visits on separating floors identified performance significantly below expectations:

	Airborne D _{nT,w} +C _{tr}	Impact L'
Test 1	42	58
Test 2	(44)	61
Test 3 – retest of airborne only	43	N/A.

Both the airborne and impact performance were affected

Case Study – Timber floors



Tapping the ceiling from beneath revealed areas that sounded hollow and other areas that sounded solid.

The builder assisted in the investigations by opening the ceiling, which revealed...

Non-resilient bars used to support the ceiling boards, causing a rigid connection.

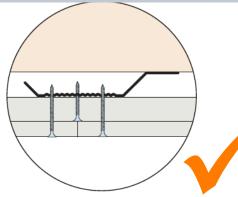




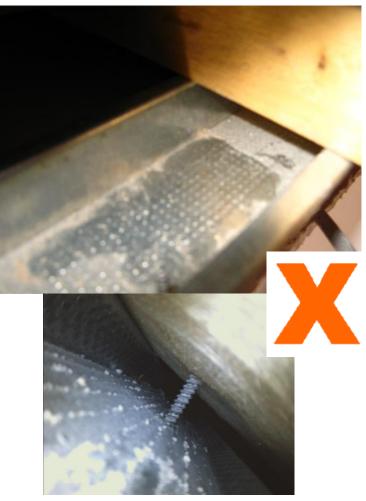
Case Study – Timber floors

Timber floors - resilient bars

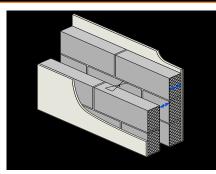


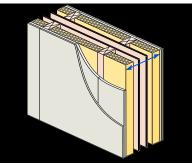


Ensure ceiling treatment is correct and take care not to compromise the resilient bars.



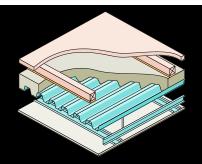
Case Study - Cavity masonry wall





A surveillance visit to test separating walls identified an issue with airborne performance at second floor level:

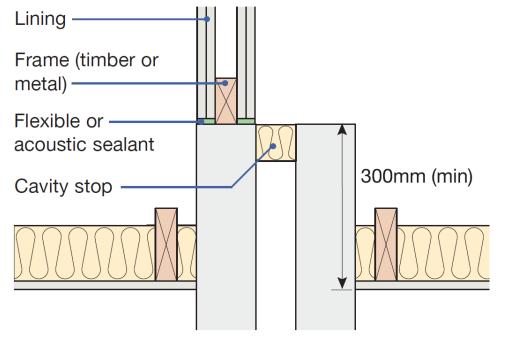




Unusually, with the sound source running on the second floor, it was noticeably audible on the ground floor in the adjacent plot!

Case Study - Cavity masonry wall

A review of the drawings revealed that a spandrel panel had been used in the roof void, immediately above the second floor rooms.

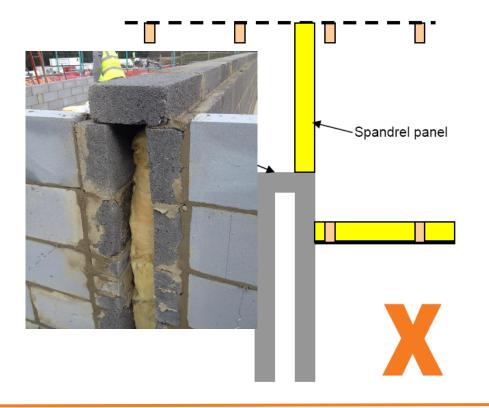


The drawings indicated that the correct detail, as shown in Appendix A1 of the Robust Details Handbook, was intended.



Case Study - Cavity masonry wall

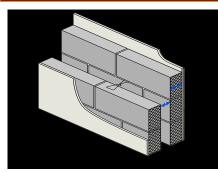
A check in the roof void revealed that a spandrel panel had been used but...

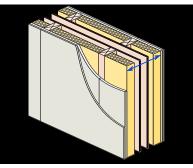


...the cavity wall had been closed at the top with blocks laid flat!

Also, it is perhaps more common than you might think!

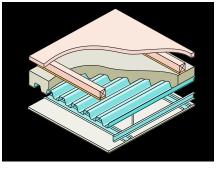
Amber result but don't be complacent.





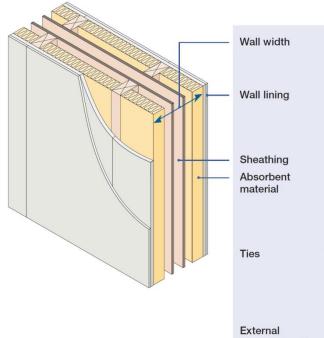


	Airborne D _{n T,w} +C _{tr}
Test 1 – ground floor (flats A and B)	42
Test 2 – first floor (flats C and D)	50
Test 3 - ground floor – repeat test	41



The sound transmission was noted to be through the separating wall but mainly at each vertical edge and along the ceiling line.

The registrations were for the use of the E-WT-2 timber separating wall, in a timber frame block of flats.



With sheathing board Twin timber frames

240mm (min) between inner faces of wall linings. 50mm (min) gap between wall panels

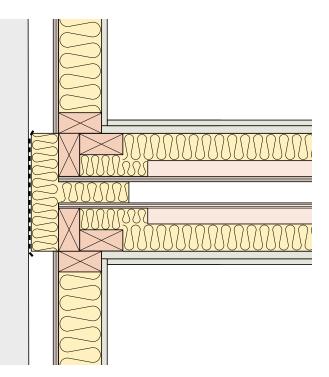
- 2 or more layers of gypsum-based board (total nominal mass per unit area 22 kg/m²), both sides - all joints staggered

9mm (min) thick board

60mm (min) mineral wool batts or quilt (density 10 – 60 kg/m³) both sides. Material may be unfaced, paper faced or wirereinforced

Ties between frames not more than 40mm x 3mm, at 1200mm (min) centres horizontally, one row of ties per storey height vertically

External
(flanking) wallOuter leaf masonry with
minimum 50mm cavity



The internal and external appearance gave nothing to suggest otherwise...





...but discussions with the Site Manager revealed...



...the ground floor had been constructed in steel frame, with cavity masonry separating walls between columns.



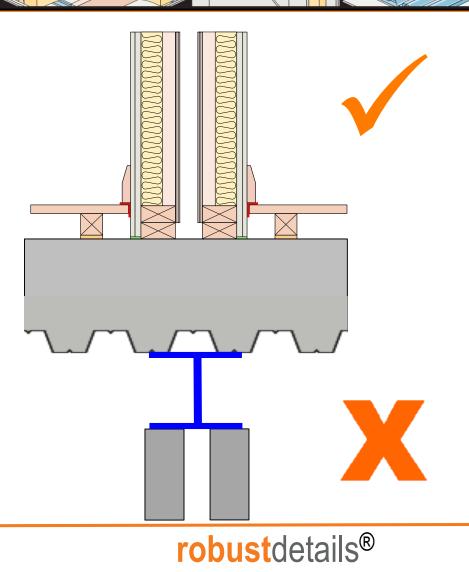






The steel frame supported an insitu concrete first floor structure, on top of which was timber frame construction...

...which explained the good performance of the wall at first floor level.

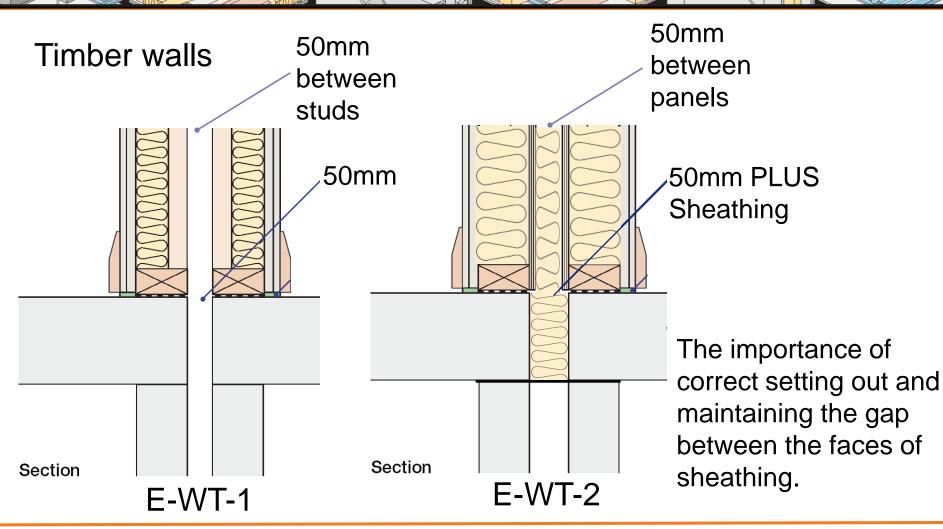


The surveillance also includes inspections of work in progress, the findings tend to be similar to those discovered through investigations.



'Well there was a terrace of houses there this morning...'





Timber walls





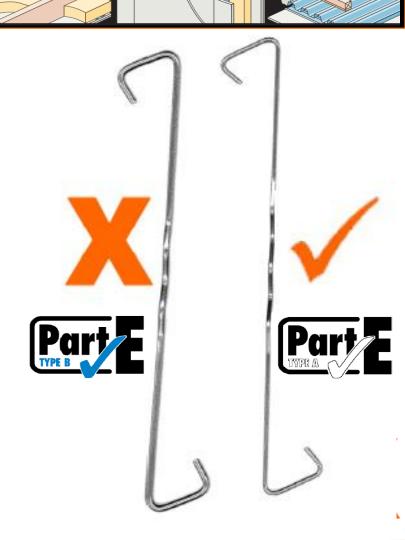
The importance of correct setting out and maintaining the gap between the faces of sheathing.

Correct masonry wall ties

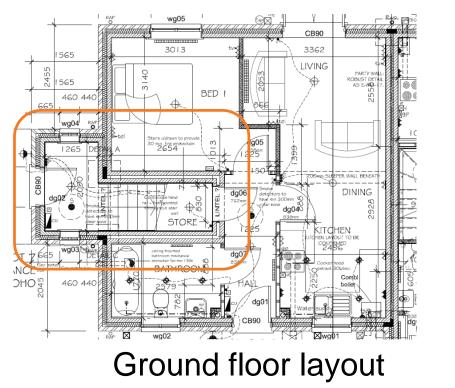
Separating walls – Type A Flanking walls – Type A or B

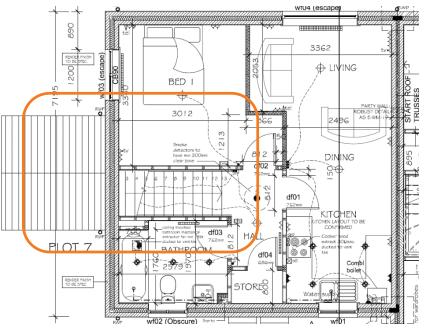
Caution

- note cavity width
- tie spacing

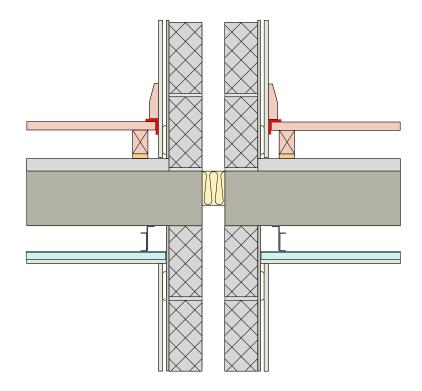


Private staircases are a relatively typical arrangement for small blocks/pairs of flats





First floor layout



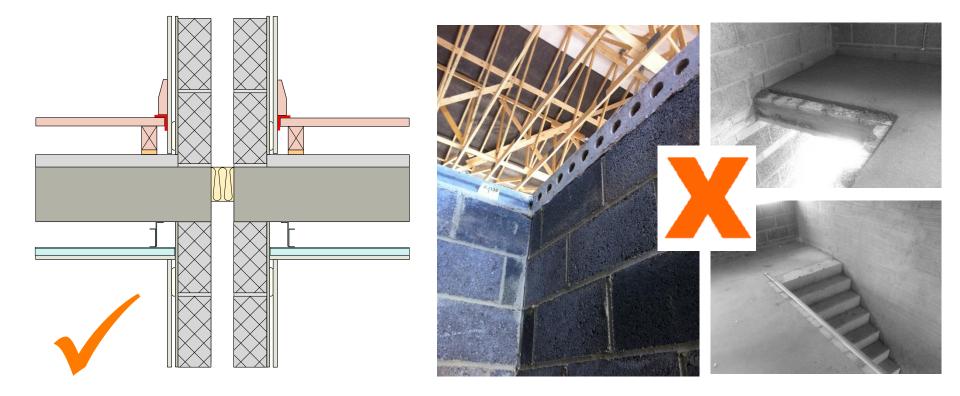
The Robust Detail specifications for loadbearing masonry and timber/lightweight steel frame require:

- Flats to be stacked
- Separate stairwell, isolated from all flats
- Cavity walls, in continuous vertical alignment.

Assessments having been done in relation to blocks of flats with communal staircases.





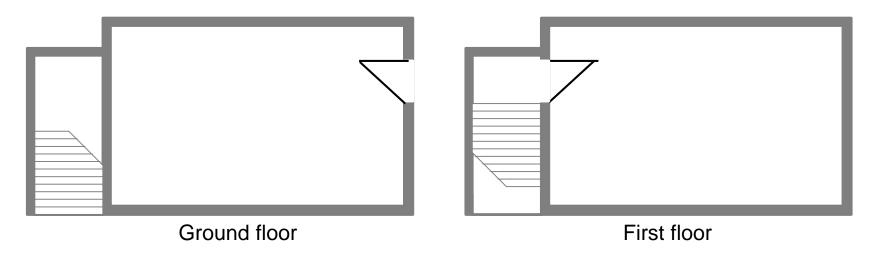








So is there a solution...?



... it has been done before!



Innovation

Since 2010 the main developments have been focused on addressing the thermal by-pass issue through filled cavities – 24 masonry walls and one timber wall.



F-WM-1 - Dense aggregate blocks - (Wet plaster)



E-WM-13 - Untied thinjoint aircrete blockwork - (render and gypsumbased board)



E-WM-25 - Porotherm perforated clay blockwork - 100mm (min) insulated cavity (Ecoparge and gypsum based board)



E-WM-16 - Dense aggregate blockwork -100mm (min) cavity -(render and gypsumbased board)



E-WM-26 - Besblock Star Performer blockwork - 100mm (min) insulated cavity (gypsum-based board)



aggregate blocks

based board)

(Render and gypsum-

Party Wall Roll or Round the House Roll (avpsumbased board)



E-WM-27 - Lightweight aggregate blockwork -Superglass Party Wall Roll - 75mm (min) cavity - (gypsum-based board)



E-WM-4 - Lightweight aggregate blockwork -(render and gypsumbased board)



(render and gypsum-

based board)

E-WM-18 - Dense E-WM-19 - Dense or aggregate blockwork lightweight aggregate 100mm (min) cavity blockwork - 100mm (wet plaster) (min) cavity with MONARFLOOR® BRIDGESTOP® system



E-WM-28 - Lightweight aggregate blockwork -Knauf Supafil Party Wall Wool - 100mm (min) cavity - (gypsum-based board)



E-WM-5 - Besblock 'Star Performer' cellular blockwork (render and gypsum-based board)

E-WM-6 - Aircrete blockwork - (render and gypsum-based board)

E-WM-20 - Lightweight

aggregate blockwork -

Saint-Gobain Isover RD

Party Wall Roll or Round

the House Roll - 100mm

(min) cavity (gypsum-

based board)

E-WT-2 - Timber frame

cavity wall with

sheathing board



(wet plaster)

E-WM-21 - Lightweight E-WM-22 - Lightweight aggregate blockwork aggregate blockwork -100mm (min) cavity -Knauf Earthwool Masonry Party Wall Slab or Superglass Party Wall Roll - 100mm (min) cavity (gypsum-based board)



E-WM-23 - Aircrete blockwork - Superglass Party Wall Roll - 100mm (min) cavity - (gypsumbased board)



gypsum-based board)

E-WM-24 - Aircrete blockwork - Saint Gobain-Isover RD Party Wall Roll - 100mm (min) cavity - (gypsum-based board)

But don't forget the edge sealing.



based board)



E-WM-10 - Thin-ioint aircrete blockwork -(render and gypsum-







E-WM-12 - Plasmor "Aglite Ultima" lightweight aggregate blockwork - (render and



Innovation

Efforts have also been made to provide new floors aimed at achieving higher sound insulation performance, for example...

