BIM4Housing's Expert's Recommendations on Mitigating Risk to Drylining and Fire Walls, while Strengthening the Golden Thread

(In their own words with edits)

Second Edition

July 2023

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And the experts listed in Appendix 7

Below are recommendations that we, as BIM4Housing, are putting forward as the findings of our subject matter experts. We do not claim these findings to be definitive, but we would hope that they would provide 'accountable' and 'responsible' persons with some of the detail they would require to ensure that risks are mitigated.

Format

The structure of this set of information is designed to be consumed in various ways by different stakeholder groups doing different things. Therefore, information mentioned in one section may be repeated in another, so they can be applied to a particular activity.

Also, we have sought to organize the information to make it more machine-readable so, although the lists could be reduced by combining similar items, this would make them less easily used in applications.

Despite the need to edit and contextualise, we have tried to retain the authentic voice of our experts throughout. This is especially so in the Appendices, where no colloquialism is left unturned.

Terms of use

This document is not intended as an end-result, but as a snapshot of a dynamic, on-going piece of work being developed by Subject Matter Experts who represent the different interest groups.

We hope it is helpful, but it should not be used in isolation, since, as we have learned from our collaboration, no one knows everything- and experts often disagree. It should therefore be used to supplement other sources of information, all of which should be validated by a responsible person applying it to a project.

Comments and additional contributions are welcome, and a panel of volunteer experts will review suggestions to assess/validate them and augment our recommendations as required.

This document can be viewed, downloaded, and commented upon at https://bim4housing-blackbox.com/publications/

INTRODUCTION

BIM4Housing Structure

We have six Working Groups of experts who understand the individual Stakeholder needs of Development, Design, Construction, Manufacturing, Operations, and the specialist Advisors who support the whole process. Each Working Group determines the problems they are experiencing that could be alleviated by better information, often from a different Stakeholder group and they collectively establish Workstreams to collaborate and share knowledge to come up with practical solutions.

They have established Workstreams for MMC, Data Standardisation, Sustainability and Fire Safety and the latter has, in turn, established Round Table workshops that bring together SMEs who really understand specific asset types.

(See Appendix 1 for Structure Diagram)

Fire Safety Methodology

In 2021 it was determined to take individual fire-critical assets and examine impacts and influences through their lifecycle. A series of online discussions were held, along with one-on-one calls and an email gathering of views and inputs. In 2022 this consultation culminated in a series of Roundtable discussions, each with a clear focus and targeted output. BIM4Housing's expert team was enhanced by guests from the GTI, along with other fire safety specialists throughout the process.

Phase 1 defined the over-arching questions that need to be answered, for each asset type, to deliver the BIM-plus solution necessary to the effective functioning of the Golden Thread in terms of Fire Safety.

The questions defined are:

- What risks does the asset mitigate?
- To what risks is the asset, itself, susceptible?
- What information is needed about an asset, to ensure it performs as required?
- What tasks/method statements/procedures are required to ensure the asset is installed, commissioned, inspected, and maintained properly?
- What level of competency/training needs to be in place?
- How should product changes be recorded?

Phase 2 sought to answer those questions, offering a set of recommendations to mitigate risk and to help to deliver The Golden Thread, through the effective management of required information.

Phase 3 saw the Recommendations published on the BIM4Housing Blackbox web site enabling further comment and input to enhance the document.

Phase 4 saw a second tranche of roundtables, which sought to update the Recommendations in the light of the Fire and Building Safety Acts and other industry changes. This Second Edition is the result.

BIM HOUSING
Round Tables

Drylining and Fire Wall Methodology

The output from a Roundtable (1st November 2021) was collated and contextualized and combined with further subject matter expert input. Significant participant engagement was achieved prior to the event. The resulting report was then peer-reviewed.

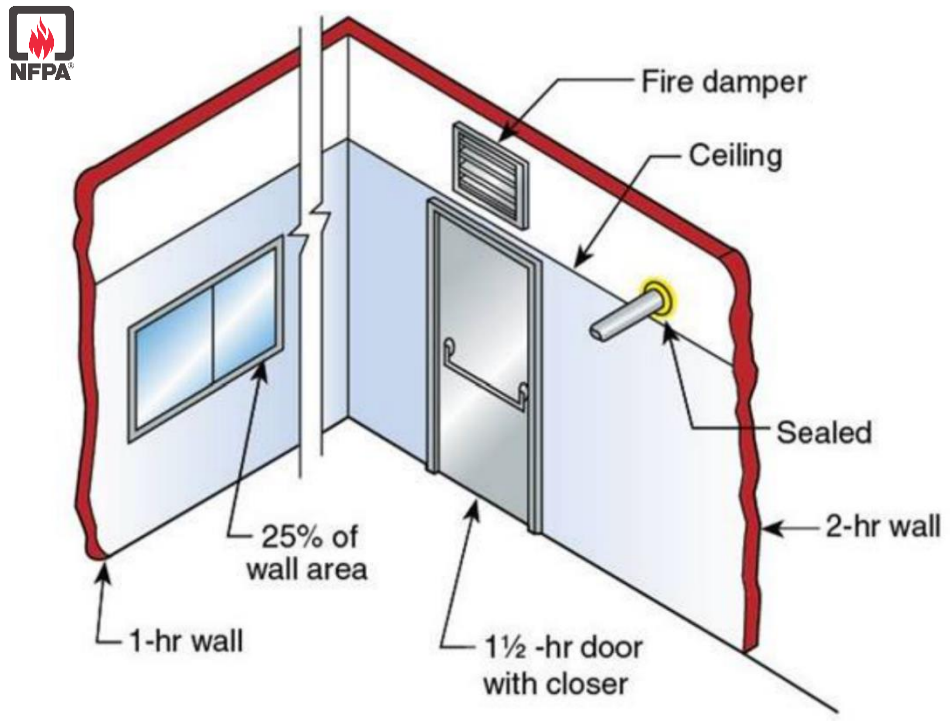
Now, eighteen months on, we are reviewing the Recommendations in light of recent legislation and any change in industry practice.

What is Drylining?

Single or multiple layers of plasterboard attached to one or both sides of framing, with the option to install insulation within the cavity of the wall using the mechanical fixings or adhesive, taped and sealed at joints, allowing for finishing. Covering external walls, Drylining is most commonly part of a system.

What is a Fire Wall?

A partition that when tested to BS476-22 or BSEN 1364-1 has evidence to meet the required time for fire resistance based on Insulation, and integrity. They are integral in maintaining vertical and horizontal compartmentation.



Fire and Smoke Damper Installation

FINDINGS

It was determined to look to 'codify' risks to enable teams to coalesce around tackling a problem, run scenarios to simulate what might happen and how collaboration can reduce the risk of them happening.

Clearly, it is not desirable for the 'Accountable Person' to be absolved of responsibility for not anticipating a risk, simply because it was not on this list of suggested risks- which should be considered a 'steer' not an absolute. However, without a list, it becomes impossible to define and deliver the information needed.

Q1a. What risks do Drylining and Fire Walls mitigate?

a) Fire walls, using drylining, are used to provide fire resistance measured in minutes along compartmentation lines in buildings
b) Risk of heat build-up
c) Risk to fire-fighter's access
d) The risk of the spread of fire and products of fire (fire, smoke, heat) via internal spaces, walls and building compartmentations
e) Risk of inhibiting safe exit from the building
f) Risk of fire brigade not having enough time to attend before fire spread
g) Risk of Injury/harm/loss of life to residents/occupants
h) Risk of smoke damage and subsequence
i) Risk of compromising security, both for the building and individual apartments, when doors don't close properly or are propped open or if structures are damaged
j) Risk of reduced thermal efficiency
k) Risk of damage to property, building or structure
l) Availability of evacuation egress
m) Robustness of acoustic performance
n) Financial risk

Q1b. To what risks are Drylining and Fire Walls, themselves, susceptible?

a) Risk of incorrect assembly
b) Risk of incorrect selection of systems
c) Risk of not following the relevant fire test standard methodology
d) Risk of incorrect installation to the structure e.g., Mastic, deflection heads, fixings
e) Risk of services penetrating or partially penetrating the wall and not being compliantly sealed
f) Risk of additional items having been placed into an escape route (such as a sofa), not having been considered at design stage, could provide fuel for a fire, and have the potential to counteract the AOV/smoke extraction system
g) Risk of incorrect replacement components having been installed
h) Risk of human intervention on ancillary assets, such as smoke detectors, impacting on asset performance
i) Risk of information on an individual asset being incomplete, inaccurate, or absent
j) Risk of information on an individual asset not being supplied in both digital and physical format
k) Risk of other trades and employees not appreciating the asset's function and so compromising its performance

l) Risk of non-appreciation of the differences between performance of assets in compartmentalised areas versus performance of assets in shared circulation areas
m) Risk of vandalism or simply misuse
n) Risk of being compromised (e.g., through introduction of windows, cavities, pipes etc)
o) Risk of gaps in joints between construction materials (e.g., plasterboard or brickwork)
p) Substitution of components for an alternative – generally, data is based is on a full system from one manufacturer
q) Assumed performance based on old data or previous schemes
r) Interfaces with other elements e.g., Passive fire protection, doors etc.
s) Lack of co-ordination leading to bespoke details and un-tested installations
t) Not being installed correctly
u) Not being documented
v) Not being inspected/signed off
w) Not being maintained
x) Accidental damage
y) Wear and tear
z) Modifications impacting their integrity
aa) Non-compliance with manufacturer's tested systems
bb) Poor standard of specification
cc) Inherent oversimplification ("It's just a bit of plasterboard… how hard can it be?" – statement from a senior design manager for one of the UK largest contractors)
dd) Substandard design information/unbuildable details
ee) Absence of design/construction information
ff) Untested systems, incorrectly applied testing of systems or insufficient understanding of tested systems
gg) Insufficient time availability for specialist design/involvement
hh) Poor standards of workmanship
ii) Altering methodology between system manufacturers
jj) Inadequate co-ordination with MEP Services
kk) Inadequate co-ordination with Door installations
ll) Movement of the structure in a fire state
mm) Interfacing with structure e.g., reactive coatings
nn) Mixing various manufacturers materials
oo) Non-compliant adaption and maintenance
pp) Environmental damage
qq) Excessive tolerances in the structure
rr) Applications include escape corridors and fire-fighting shafts
ss) Post-occupancy work, such as post-installation of services through a fire wall without planning and understanding the construction, place in the building, the service and compatible evidence
tt) Post-flooding damage
uu) Thermal bridging
vv) Assumptions that components installed into symmetrical/asymmetric systems will perform identically (incorrect application of test information)
ww) Moisture in dry lined external wall
xx) Mould growth, which can result from 'build-up' of condensation, where an external wall arrangement has been incorrectly specified, often without a dew point calculation being produced/acknowledged
yy) Failure of insulation which could lead to leakage into the cavity

(See Appendix 2 for Additional Participant Input)

BIM HOUSING
Round Tables

Q2. What information is needed about Drylining and Fire Walls to ensure they perform as required?

It is important to understand how the information will be used and how the context will vary what information is required. Initially, this was the subject of quite a lot of debate – largely driven by a worry about 'information overload'. However, with a truly cross disciplinary team of SMEs, it was possible to drill down to understand the detail of why a role would need certain information.

The aim was to collect all the information all stakeholders need against all products and leave it to each role to configure their software applications to see only the information they need for that individual task.

The designer should ensure that the Fire walls using drylining have up to date and relevant test evidence or third part certification, and detailed installation details relevant to that unique installation.

Requirements

a) Type and application of Drylining and Fire Walls along with size of walls
b) Manufacturer of products
c) Design life
d) 'As Built' drawings and documentation should be made a requirement of the contract
e) Classification reports
f) Manufacturers details
g) Legislation/standards it complies with
h) Warranty conditions/service life statement
i) Installed heights
j) Substrate composition
k) In accordance with Building Regulations Approved Doc. B, fire rating of external walls within 1m of the relevant boundary

Specification

a) Insulation type
b) Product composition
c) System installation and integrity performance
d) Evidence that the design has been carried out appropriately by competent persons
e) Evidence of the design is suitable
f) System fire resistance performance (insulation and integrity)
g) Acoustic requirements
h) Reaction to Fire
i) Robustness
j) Deflection
k) Movement joints

NB: https://www.thefis.org/membership-hub/publications/specifiers-guides/

Performance

a) Product insulation rating
b) Performance requirements of the construction and whether the specified construction has the correct associated test information to prove that it is able to achieve those requirements
c) Minutes/hours of fire resistance

d) Fire integrity and insulation ratings
e) Evidence the right product has been used (to include demonstration of suitability for intended use, product specification and limitations, use-specific test evidence)
f) Performance characteristics
g) The responsibility of the partition wall towards enabling the building element to perform its role as needed
h) Projected movements and tolerances of walls and floors
i) Projected wind/snow load
j) Security

Materials

a) Surrounding materials
b) Fitted vertically or horizontally
c) Record of batch numbers, purchase orders and delivery notes to ensure traceability
d) Duty rating
e) Internal pressure requirements

Construction

a) Position of wall ties
b) Party walls
c) Mobility of walls - can it be repositioned?
d) Wall type (brick, concrete, light wall etc.) and fire rating
e) Wind loadings

Installation

a) Locations including x/y coordinates
b) Evidence that the installation has been carried out appropriately by competent persons
c) Evidence that the installation methods are suitable
d) Evidence that the product is specified in design documents and site-specific methods of installation have been considered by designers
e) Dated site images of the installation alongside written records (taking note of elements that will be covered up in the final build)
f) Installer and their certification
g) Documentation confirming its having been installed in accordance with installation instructions
h) Installation date
i) A listing of all components and accessories of the partition walling and the part each one plays in ensuring that wall performs as required against both structural and fire integrity
j) Utilities within Immediate vicinity (electric, gas, ventilation, duct etc.)
k) Substrate
l) Critical stud locations
m) Size and position of Builders work openings
n) Use of shaft wall construction - specification of pressure performance. - Continuity of shaft wall through compartment floors

Inspection

a) If it is to be inspected
b) How should it be inspected?

c) Evidence that the inspection has been carried out appropriately by competent persons
d) BWIC information to be available while framing out
e) Inspections recorded and saved in a centralised / accessible digital format
f) Photographs of critical junctions(Especially for Part L)
g) Identification of the staged inspection points

Maintenance

a) Maintenance requirements
b) Contact for replacement materials
c) Evidence that the maintenance and servicing has been carried out appropriately by competent persons
d) Installation Date
e) Inspection Dates/Schedule
f) Design criteria (What services are they suitable/not suitable for)
g) Anti-tamper indicators?
h) Evidence that any remedial work is in accordance with the original system owners instructions using that manufacturer's products

NB. One of the big problems faced is that test houses are limited in the UK to 3m height (some only 2.6m) and some of the applications are above these levels for which no EN standard to allow this EN 15725 - no update for increase in height - note DIN allows an increase. However, A 3m test can cover for up to 4m provided the partition has not deflected 100mm.

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Q3. What tasks are required to ensure Drylining and Fire Walls are installed, commissioned, inspected, and maintained properly?

It should be a given that any work on fire safety critical assets should always be undertaken by competent people, probably 3rd party accredited. However, that person must be supported with any information that they might need to reduce the risk of an important step being missed and to provide an auditable record of what tasks were completed. This is common practice in M&E maintenance, where the industry has developed a significant library of standard procedures and tasks lists, along with roles/competency required.

An air-conditioning unit is maintained by a qualified air conditioning engineer, but the engineer is also issued with a check list for them to record what was done.

A similar industry-wide check list for installation, commissioning, handover, maintenance, and recycling could be agreed.

a) Stage inspections by a competent person at delivery, at first and second fix and at jointing
b) Each stage should be recorded, and images referenced to the location
c) The names of the installers and a record of their qualifications, training, CPDs and experience
d) A record of the specification and test evidence should be kept and made accessible.
e) Any maintenance requirements for the drylining and fire stopping should be kept on file and handed over to the FM team
f) All fire walls using drylining should be clearly marked on the drawings
g) All fire walls using drylining should be clearly labelled above the line of the ceiling to ensure that any future penetrations can be designed and constructed to ensure the performance of the fire wall can be maintained, https://www.thefis.org/wp-content/uploads/2016/09/Technical-note-Fire-Labelling-Scheme-with-ASFP.pdf
h) Review the design of the drylining to ensure it satisfies the project and legislative requirements
i) Ensure the installation company is familiar with the 'drylining' system being installed.
j) Engage with the system owner regarding any training available
k) Check the installer has a robust QA system in place
l) Deflection heads must be checked for fire resistance

Specification

a) Fire engineering assessments must be completed, which might be acceptable from a competent Fire Engineer. The client's consultants and contractors should appreciate the limitations in the direct field of application (DIAP) for product tests
b) A copy of the prescriptive specification should be included in any OM or information provided

Installation

a) Benchmark prior to installation
b) A benchmark / sample of junctions penetrations etc should be provided, used in tool box talks and compared during the installation to ensure compliance
c) Compile as built / O&M manuals to show the locations of the walls and, where possible, have RP's colour coded to show the levels of fire resistance
d) Define application of the barriers including compatible components (manufacturers guidance and test evidence that they can be installed within that guidance)

e) Ascertain product lifespan within the specific system it is being used within (if installed within an external facia having a 2-year product lifespan would not be suitable. This may be within the manufacturer's guidelines)
f) Preferably certified materials, products and systems should be installed by third party certified installers, under UKAS accreditation or products that have been tested against British Standard (476) Fire Tests or The European Standard (EN 13501) fire tests
g) Service penetration openings must be framed and lined and at the specified centres (See BG recent design specs for service penetration openings)
h) Take photos / evidence at all phases on the install
i) Complete responsibility matrix
j) Complete installation records
k) Consider using the FIS/ASFP tape is used on the face of the compartment walls to identify walls installed with a fire resistance
l) Employ hold points on the project
m) Complete commissioning records
n) Ensure fixers' packs contain the correct information (i.e., non- inclusion of the fire strategy information can lead to later built defects within the fire compartment interfaces)

Inspection

a) Confirm proof of competency of inspectors
b) Complete post work inspection
c) Complete regular inspections with all parties present e.g. installer, main contractor, manufacturer
d) Incorporate into hosting element's records, so as to be considered in any proposed modifications of the hosting element
e) Record unique identification (Barcode/RFID/Other)
f) Keep full inspection records
g) Identify access requirements

(See Appendix 3 for Additional Participant Input)

Q4. What level of competency/training needs to be in place?

Industry training courses are critical, but they must be complemented by additional knowledge-transfer from people with many years real experience.

Individual manufacturers have product-specific training which complements the more general training. Such training resources need to be provided in all cases where a product is used – both for new build but also as part of the long-term H&S/O&M information, ideally held as machine-readable data in the Asset information model to ensure maintenance teams have easy access to critical information.

Installation

a) Those involved in the design and installation should be able to demonstrate training /qualifications relevant to the systems they design/install and be members of a recognised organisation such as The Finishes and Interiors Sector (FIS)
b) Ongoing demonstrable CPD of installer (not simply the company they work for). For example, operatives installing products should have achieved L2 NVQ Diploma in Wood Occupations (Construction) - Site Carpentry (CSCS blue card) or L2 NVQ Diploma in Associated Industrial Services Occupations - Passive Fire Protection (Construction), both with the mandatory module for Installing Fire Resisting Timber Door sets in the Workplace
c) Supervisors should have achieved L3 NVQ Diploma in Wood Occupations (Construction) -Site Carpentry (CSCS gold card), or IFE Level 3 Certificate in Passive Fire Protection or be named as a competent supervisor in the company UKAS accreditation (see https://essentialsiteskills.co.uk/course-index)
d) Installer should have manufacturer-led product-specific installation guide provided.
e) Manufacturers should offer installation training, either in their own right, or sub-contracted out to a specialist to provide that service
f) Code of practice should include training materials
g) Competence of trainers needs to be determined
h) https://www.constructionproducts.org.uk/publications/technical-and-regulatory/built-environment-proposed-construction-product-competence-standard-white-paper/
i) Toolbox talks to brief site personnel on relevant products/systems and to address any queries

Maintenance

a) Manufacturer-specific installation, inspection, maintenance/repair, replacement, and recycling requirements should be retained to inform future maintainers of the manufacturers' recommendations

(See Appendix 4 for Additional Participant Input)

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Q5. How should changes to Drylining and Fire Walls be managed and recorded?

Robust Change Management requires an information baseline against which the different states – current, proposed, final and ongoing change – can be measured and reported.

The baseline information should contain the required performance in a machine-readable/actionable form and the Change Management process should enable that to be compared with:

a) the actual performance of the designed solution (probably generic)
b) the performance of the chosen product against the generic
c) the performance of an alternative (value engineered?) product.
d) the record of what was used/installed.

a) Any alterations to the Fire Wall constructed from drylining should be referred back to the system owner for advice before altering the installed fire wall

b) A schedule of safety critical elements for the building, to include products specified

c) Baseline against which to compare proposed alternative products (Some designers have expressed reluctance to propose (not specify) a specific manufactured product that will satisfy their design due to liability, procurement rules and fees)

d) This schedule would be "Locked" at a specific design stage, after which changes to products specified should not occur except for exceptional reasons

e) A formal change management system is required to ensure that any unavoidable changes are validated by a 'responsible' person e.g., original designer and/or fire engineer

f) There is a well-established change management process in construction called Technical Submissions in which requested changes from the specifications/recommendations, that were created by the designers (and selected manufacturers), need to be formally reviewed and approved. Design-and-Build procurement has affected that process and it should be re-established in a way that the performance of a proposed product, and its constituent components, is easily compared with the proposed alternative and, if agreed, it is recorded as a Technical Deviation

g) Validation of changes would include verifying that the new asset met all the requirements for the application with no detriment to the overall design, the details of which should be recorded (Changes in the asset may be made between design and procurement, procurement and installation, handover, and ongoing maintenance)

h) More onus needs to be on the client during the collation of Information Requirements and the updating of design models into 'as installed' content suitable for Asset/Facilities Management

i) Full Disclosure of the product is needed at handover so that after Work Stage 7, if a manufacturer goes out of business or products change the record is there in perpetuity

j) Asset database must be kept up to date with core data for new installs. Installation documents should be held in a centralised digital location. Once BIM/COBie level data is manageable within the asset management system then this will be used as the main source of data

k) BIM, CAFM, Asset and Housing management systems must inform the change management process

l) H&S files for each building (cradle to grave) must be supplied, recorded, and be updated with notification of changes and the implications

m) Warranty information of the existing and the proposed products should be provided to allow proper consideration to be made on the selection of an alternative or replacement. If a product has a shorter life than another, this information should be available to inform selection. Given some of the products will be in locations that are difficult to locate, the longevity of a product could have safety implications

n) Compliance systems should be informed with the information from the AIM

o) Asset tagging (barcode) systems and processes should be considered as forming part of the change management process

p) Procurement should be included in the process, recording what was purchased and feeding that into the BIM process to locate where they were installed, or which products they are replacing

q) Specification or design brief for the business (performance and or product) should be recorded in a machine-readable format to enable validation against the Golden Thread

r) Record the compatibility and compliance of any ancillaries and confirm they comply with the test data? (Ironmongery, door access control systems, vision panels, vents)

s) Any adjustment, repair, addition to / removal of product, ironmongery or fittings must be recorded and should only be undertaken by a licensed / accredited contractor (this includes and modification to an existing asset)

t) The asset information needs to enable comparison but the original performance spec of the AOV and the related information such as Fire Strategy and Cause and Effect should form part of that Technical Deviation process. The FMs must be able to update the Asset Information Model with machine-readable data of the newly installed product

u) Recording who has worked on/replaced the component and their entitlement/competence to do so

v) Evidence that the component's performance in relation to the part it plays in the system has been considered and is warranted

w) Manufacturers must provide a component list (e.g., ironmongery on a door) so if anything breaks, a direct replacement can be used

x) Removal of certain products/materials must be undertaken by people who are on an approved list, certified by an accreditation body and should require advance notice to all certification holders, with signoff to ensure traceability

y) Via a unique ID – (as per document control processes), Maybe there is a separation between the requirement and the solution whereby the requirement remains consistent however the solution could be changed/modified?

z) Re-Installation/re-commissioning records

aa) Installation management system, showing before and after records and compliance with relevant details

bb) Clear variation record, showing what has been instructed and ensuring that it is correctly designed before being installed. This is commonly pushed through last minute, with any design necessary falling into the “You tell us what’s required, and we’ll instruct you” category

cc) The use of benchmarks, to 'dry run' a proposed construction/interface, agree the proposed construction and identify any practical implications that might be missing from the design information

(See Appendix 5 for Additional Participant Input)

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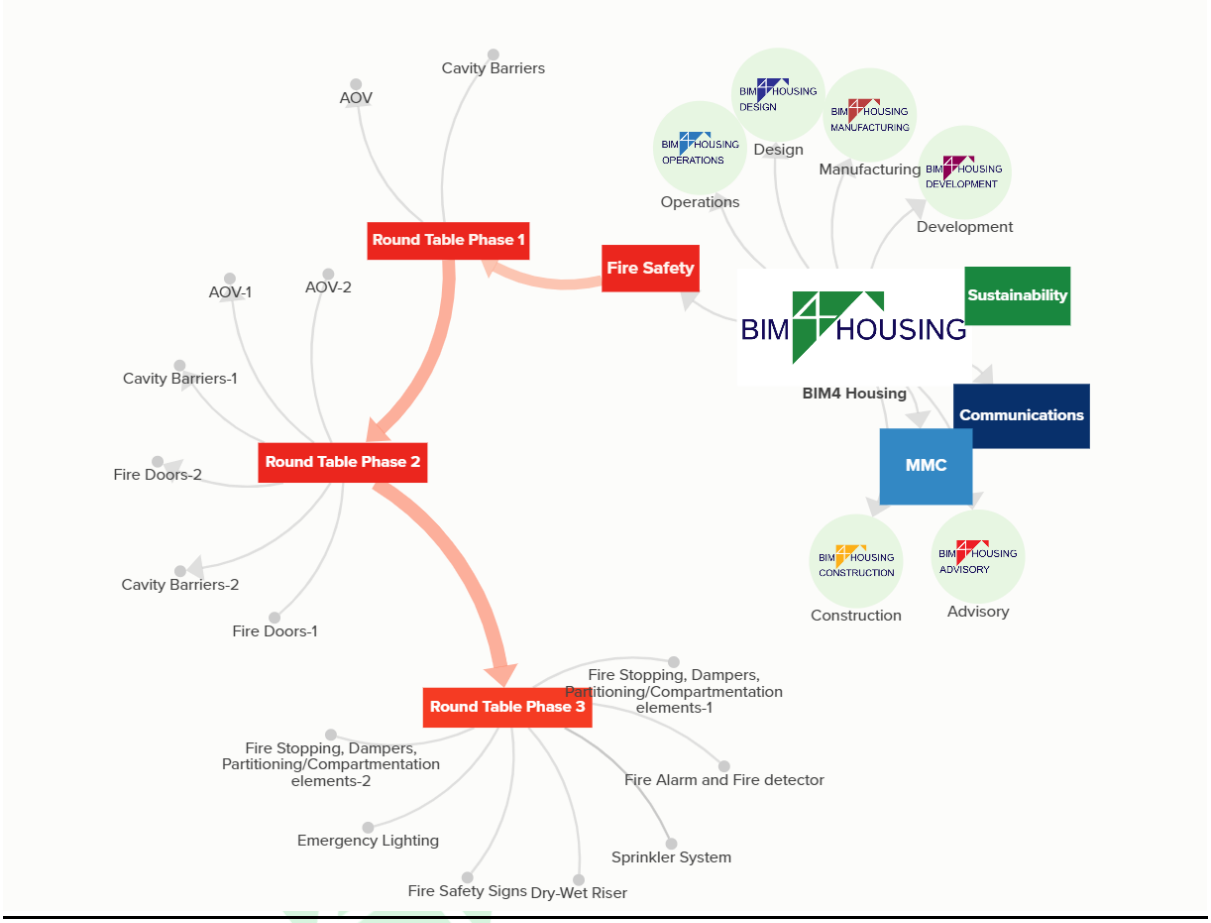
APPENDIX 1

BIM4Housing Structure



APPENDIX 2

Additional Participant Input Question 1

Like everything in construction, the main risk is poor design and in particular poor construction and finishing. Not only does this lead to poor performance in fire but it also has a knock-on effect for things like firestopping (poorly executed openings) and to the installation of fire doors (wall inability to provide the robust support required). Partitioning is also susceptible to water and mechanical damage that can render the expected performance null and void.

We need to categorize by types but at installation it is the specifics that matter.

Within BS:EN1366-3 Service Penetrations does not take account of structural movement during the test; cold state is taken care of with 3m x 3m tests to observe warping from steel studs thermally expanding.

One item that I would consider may benefit from specific mention, is the common misconception that a plasterboard alone will achieve a fire rating, i.e. "One board gives 30 minutes" etc. This is often doubled with the assumption that fire performance is stackable, increasing the potential for incorrectly specified systems.

If there is misspecification but also another of those accountable for not acting on the misspecification.

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APPENDIX 3

Additional Participant Input Question 3

https://www.thefis.org/membership-hub/publications/best-practice-guides/through-wall/

Smoke shaft fire resistance should match smoke control damper tested parameters, even where these are more than the structural fire resistance requirements within the regulations. For example, most dampers are tested within 120 minute fire resisting walls although many buildings will have a lower structural fire resistance requirement. Minimum width of wall is also a factor. In summary: interfacing elements must also be considered when specifying fire resistance.

Correct detailing/design information; and by this, I mean information that can actually be applied practically. There is currently a significant problem with 'idealistic' details that bear little resemblance to the necessary detailing which is required to allow current installation. This leaves the installer with a choice: make up the deficit (at their own risk… which is often not recognised until there is a problem) or send the detail back as inadequate. The whole management process on site is set up to discourage the latter and I have heard floor managers for MCs telling operatives "You're the dry liner/specialist/expert, what do you think it should look like" more times than I'd care to remember.

Competent supervision at the level required for the project. This is a problem on almost every project I have worked on, as the client doesn't want to pay for non-working supervisors, often leaving contractors having a single manager/supervisor managing a far larger group of operatives than they can accommodate.

The UK Military take a task-based performance model.

Any maintenance requirements for the drylining and fire stopping should be kept on file and handed over to the FM team. - and should be sent out as part of the job ticket whenever raised

There is 'BS EN 15254-3:2019 Extended application of results from fire resistant tests - Nonloadbearing walls' which is very useful for this application.

A record is NOT enough the installers competency profile needs to be updated with reference to evidence. Responsibility matrix key but 'duty' is a dimension of competency and competency profile of an actors must include duty statement.

Lifespan of internal partitions/firewalls is an interesting point - how long is a fire performance valid for and can it be extended?

Influence on COBie- COBie can be built upon with additional attributes however fire is not a default requirement.

With regards to repairs this ties into responsibility - if a wall is repaired who is now the responsible party?

Depending on the repair/retrofit could change performance or other criteria which then needs the questions asked 'does this change the competency demand profile'.... current world is roles needs to move to competency profiling.

Competence should be measured against the function rather than the job. EG to include the functions of Marketing, selling, buying, specifying, supervising, installing, maintaining, deconstructing, recycling. Competence should be assessed in Skills, Knowledge, Experience and Behaviour.

misconception that BIM models carry the correct wall specifications such as plasterboard materials. Unless there is a specific requirement to specify these designers just add generic information and leave to other specification. Asset Locations of each product need to be defined.

The three sided opening to which Joe refers is currently closed by use of a suitable 'firestopping' product. Whilst these products are used to close 4-sided BWIC openings, they have not been tested to accommodate the deflection of the substrate that they would need to, when used to close a 3-sided opening. Main contractors are now having to include inspection of these 3-sided openings within their maintenance strategy, inspecting them at regular intervals, to ensure no damage to the firestopping arrangement has occurred.

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APPENDIX 4

Additional Participant Input Question 4

This is a huge topic and first requires an appreciation of the current workforce issues. The more pressing question here might not be so much what training needs to be in place, but rather who should pay for it?

This is a relevant question for all parties within the process. Although I have focused more on the installation at present, the question also applies to the specification/design elements. We are often passed 'Competence Assessments' by clients, which often do not include the specific focus I consider required. All our design personnel are minimum Batchelor's degree level qualified in a suitable engineering discipline and have substantial project and system experience specifically associated with dry lining, however the fact that there is no specific relevant qualification for the role, leaves competence to the judgement of the appointing party.

Much of the dry lining industry still operates on an unskilled labour pool, with operatives being sub-contracted by the specialist contractor. These operatives are often part of gangs, headed by labour masters and move from job to job, with different specialist contractors, on the basis of securing the highest rate possible. At the same time, the specialist contractors are often required to increase/decrease workforce at a moment's notice, where jobs are required to accelerate to meet programme, or where work is not available, due to programme delays.

This results in a sub-contracted workforce, available to the highest bidder and poses a difficulty to the specialist contractor in investing in training a workforce who they may well lose the following day. As a recent example, a specialist contractor I have worked with previously, invested £250k in 16 applicants to the Governments apprentice scheme. Of those 16 applicants, only 2 made it through the course and then left shortly after being appointed onto jobs. The remaining 14 either failed to show up, or made excuses and left, despite having their tools bought for them (at approx. £1,000 per man) by the specialist contractor, along with their lunch and any other expenses. The underlying reasons and reluctance is based upon the nature of the work involved, rather than the pay with operatives often commanding up to £250 per day in Central London and £330 per day in Scotland.

Several of the larger dry lining contractors have invested in training centres, however this has been at their own cost and often the facilities involved only accommodate small scale work, which leaves operatives ill equipped for their first job on a 14m SFS wall or alternative complex detailing. Even the Government apprentice scheme, as I understand it, only consists of 3 wall sections with an opening and section of MF ceiling occasionally involved. The current NVQ scheme focuses mainly on health and safety and therefore level 2/3 NVQ pass operatives may still have little practical experience or knowledge. The CSCS card scheme has attempted to eliminate the possibility of unskilled workers, but there is still a considerable issue, that is compounded by a considerable absence of available labour.

O&M documents and Competency Questionnaires/Statements often tend to be too generic to ensure a compliant dry lining installation. Often the O&M manual does not include reference to the dry lining package details. Where focussing on dry lining, statements covering the necessity of specific remedial details to address repairs are important to consider as, when repairing a wall, it may not be possible to use the original detail provided.

There needs to be the principle of competency profiling - profiling the demand and individuals have current competency profiles across all dimensions.

experience is critical - who done what, when, where, with what, with whom etc.

Asset locations regarding where each product / system is located is crucial.

A broader issue is supply chain competency management and organisational competency management aligned to UKAS TPS 69 CMS

It is first critical that we are better able to define competency demand profile.

Lack of third-party accredited training for drylining!!

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APPENDIX 5

Additional Participant Input Question 5

Should we define a product versus system?

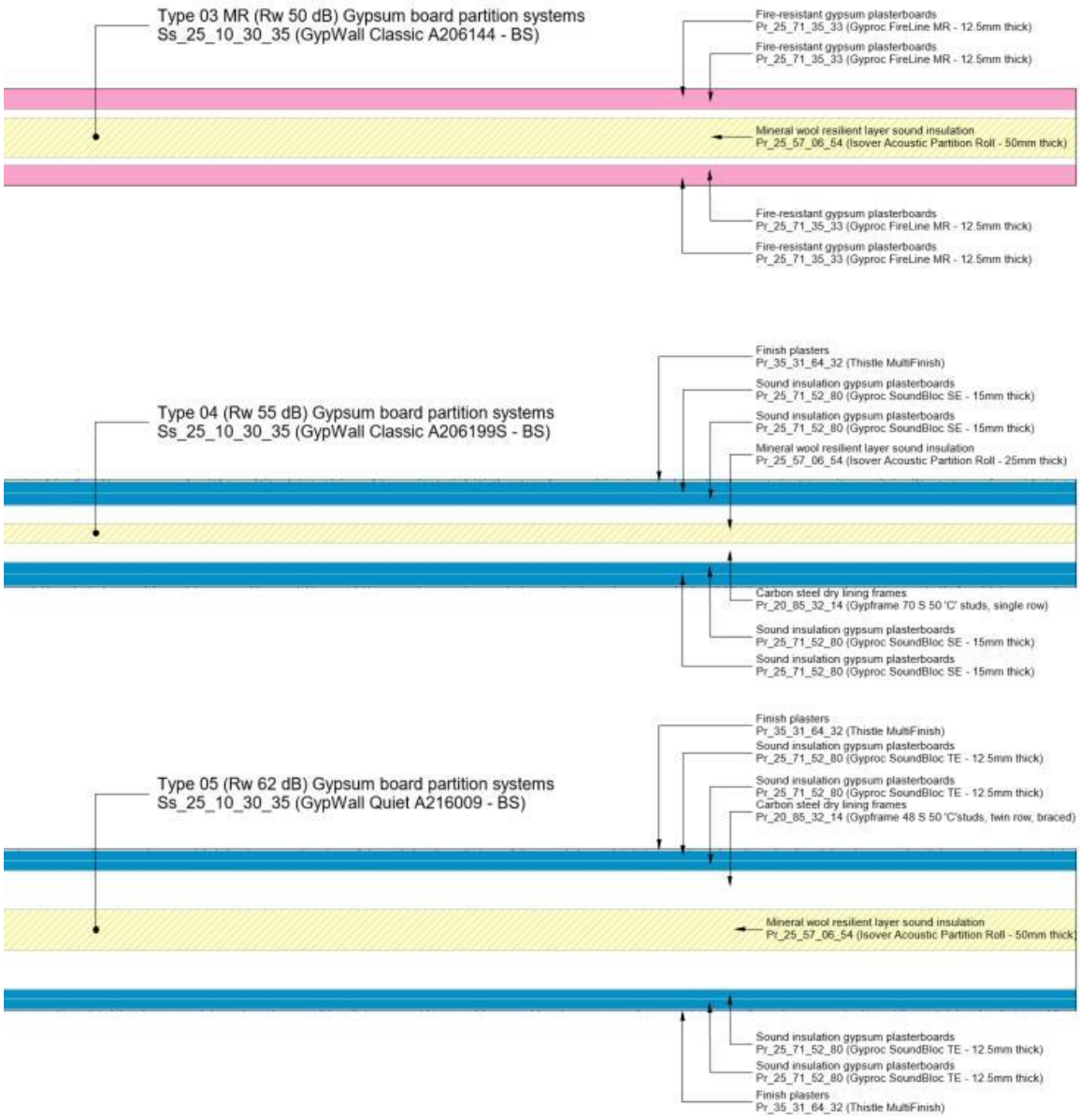
The golden thread includes competence.

When discussing competent/qualified installation, it is first important to understand the limitations relating to retention of personnel faced by the specialist contractor. If qualification/competence can be ensured further upward in the chain, this may allow the installer to utilise their own QA process to ensure that what is installed is in accordance with the design information. Currently we are still faced with a situation, across the industry, where the installer is required to make changes to the design at point of installation.

Is goes back to the RACI - responsibility matrix.....accountability should not be passed on.

Is the code of product information going to help reduce interpretation?

Example of LOD needed to perform Embedded Carbon to early Workstage models - each material connected to a detailed specification clause.



APPENDIX 6

Drylining fire wall

Misused/ misunderstood? term in the industry as common statutory regulator guidance will lead to **the wall assembly that creates** the fire resistance; dry lining itself provides the reaction to fire. If structural then testing to EN1365, non-structural EN1364 and certification to EN13501-2.

However, dry lining boards alone can provide encapsulation K class to EN 13501 – 2 classifications whereby the assembly can be treated independently subject to the fixings of the drylining.

Note drylining walls – *provide subdivision for acoustic or privacy not always Fire, and this is separate consideration. For external walls it is about thermal and moisture as well.*

Board types

Much confusion out there about plasterboard and other drylining types – some designers and builders just think it's a drylining board manufacture detail not an assembly.

The drylining gypsum manufacturers have EN520 Type A, D and F boards. Reinforced gypsum fibre products are specific make refence only. The Gypsum plasterboard manufactures guarantee their board to EN520 and that **does not include fire performance** unless it is used for non-load bearing stud partitions using the manufactures steel stud track and rail. For fire performance standards it is via testing or EN material codes. For timber stud partitions EN1995-1-2 provides guidance on drylining on timber adopting the common Type A and F classifications.

Non EN520 boards such as calcium silicate board and reinforced gypsum fibre products have test data for each assembly type and do typically have approved third party checked fire resistance for steel and timber.

Spread of flame / reaction to fire is typically provided as EN class A1 / A2 for boards.

For Gypsum based common plasterboard the use of different board manufactures products is commonplace in the same wall which has been acceptable practice. This is to be treated with caution and the timber industry (STA) has and is undertaking reviews on the interchangeability of type A boards.

Housing and dry lining

The housing design will determine if the internal fire walls are required to provide fire resistance for structure or may be for subdivision only.

Party walls/ compartment walls will need to be shown to extend for the full height of the building to roof level even if floors break the line of the wall. The party wall has a specific acoustic interface with the fire performance.

Imperfections in the dry lining assembly can cause weaknesses of fire performance if not tested with that weakness and shown not to create a reduction below acceptable level.

Note: Service penetrations to the statutory regulatory guidance allows in some cases un fire stopped penetrations

Construction risks on the site

Lack of understanding of importance of quality of assembly

Problems with lack of fit / gaps, lack of fixings and wrong board type.

Use of fire mastic for large gaps

Drylining is a commonly used term for non-loadbearing walls and defined in BS 8000;8 and BS 8212 for single or multiple plasterboards fixed to one or both sides of timber or metal studs.

Do we want to extend this scope to systems using other board types such as calcium Silicate, and also to include loadbearing systems?

Fire wall is not a term I have used for a drylining system. Where did this term come from?

When defining loadbearing or non-loadbearing systems, each of these will have a different test standard to the BS or EN standards.

Non- Loadbearing - BS EN 1364-1:2015 or BS 476:22 & Loadbearing - BS EN 1365-1:2012 or BS 476:21

Drylining systems can also be classified to EN13501-2, but this is rarely done by the three proprietary drylining system providers. Discuss.

We should start by defining Drylining (a common term) and Firewall (Not a term commonly used)

I have looked specifically at the questions in relation to fire, but it should be noted that the following other performance requirements should also be considered:

1. Acoustic
2. Thermal
3. Airtightness
4. Robustness
5. Wind loads

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APPENDIX 7

Participants

Alain Speed	PRP
Alan Oliver	Golden Thread Fire Delay Ltd
Alex Double	ADDC
Ana Matic	Scott Brownrigg
Bob Allen	Gypsum Products Development Association
Colin White	Smoke Control Dampers Limited
David Litherland	Halspan
Debbie Carlton	Dynamic Knowledge
Duncan Alabaster	Polyseam
George Stevenson	ActivePlan
Ian Doncaster	Fire And Smoke Solutions Ltd
Jimmy Collins	Knauf
Joe Cilia	Finishes and Interiors Sector
Joe Stott	AHR
Klaus Rieke	Multivista Systems LLC
Martin Adie	Balfour Beatty
Martin Milner	Milner Associates
Matt Taylor	Taylor Design Consultancy
Patrick Wilson	PW Architects
Paul Marsh	Metropolitan Thames Valley
Paul Oakley	ActivePlan
Pauline Tuitt	L&Q
Robert Cridford	Etex Group
Steve Osborne	BPHA