Certificate No. FS 564908

WINTECH
FAÇADE ENGINEERING CONSULTANCY

20:20 Building, Skinner Lane, Leeds

Intrusive Survey of ACM Cladding Report

Prepared on behalf of:	Cardoe Martin Aizlewood Business Centre, Aizlewood's Mill, Nursery Street, Sheffield, S3 8GG
Date of visit:	3rd August 2020
Document reference:	05218/JY/XX/50316/WL/01

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The extent of this report is limited to the observations of the façade which may reasonably be made from the access provided by the Client or otherwise agreed to be provided by Wintech under the Client's instruction. No responsibility or liability whatsoever is accepted for defects in façade areas which could not be reasonably observed due to the limitations of access and/or the access equipment provided or agreed to be supplied.

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Issue No.	Report Issue Date	Contributors	Issue Notes
01	14/09/2020	JY/JS	First Issue

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Façade Engineer

Checked by: James Smith MSc FSFE
Technical Director

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1.0 Introduction

1.1 This report has been prepared by Jasmine Young of Wintech Limited, following instruction from Lee Rhodes on behalf of Cardoe Martin.

1.2 The report has been prepared following a visit to the property on 3rd August 2020. The weather conditions were sunny with intermittent cloudy periods.

1.3 The purpose of the visit was to witness an intrusive survey to the rainscreen cladding constructions which comprised of aluminium composite material (ACM) panels, to confirm previous survey findings by others and to determine the façades compliance in relation to fire with Approved Document B Part 2 2006 relevant at the time of construction.

1.4 It is our understanding that this document will support the claim for funding from the government's cladding remediation fund to replace the ACM panels on the building which are known to be combustible.

1.5 The property has an occupied storey above 18m in height and shall be considered accordingly in this report.

2.0 The Property

2.1 The 20:20 Building is situated on Skinner Lane, Leeds, LS7 1BB and is bordered by Regent Street, Millwright Street and Mabgate.

2.2 The building is seven storeys tall (ground floor plus six upper storeys) with two raised blocks forming the seventh floor. The building is largely rectangular in plan but follows the road resulting in an angle in the front elevation to the building.

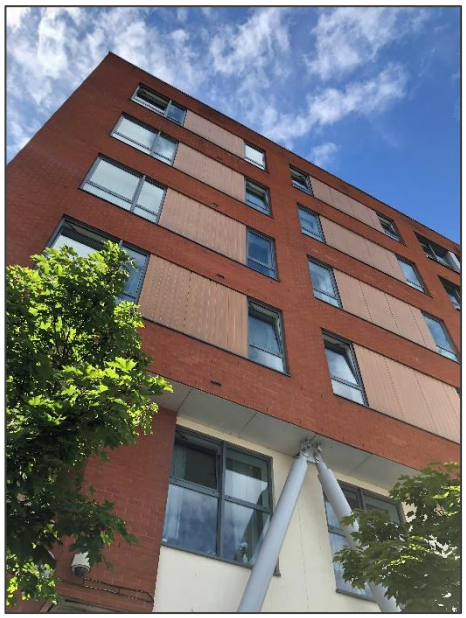
2.3 The building was completed circa 2008. We have been advised that the property was bought through an administration deal which has resulted in a loss of original building information.

2.4 The ground floor level of façade is comprised of aluminium curtain wall. The first floor level is a render system with aluminium windows. From the second floor to sixth floor, the façade is comprised of brickwork with aluminium windows and timber cladding. The seventh floor façade is comprised of a rainscreen system with ACM panels.

2.5 The façade elements are original with the exception of the North elevation to Skinner Lane and East elevation where the timber cladding has been replaced with Trespa. We have been advised that this took place approximately five years ago.

2.6 Refer to Photographs No. 1 to 5 for views of the property.

Photograph No. 1 - Front elevation to Skinner Lane



Photograph No. 2 - Section of elevation at the corner of Skinner Lane

Photograph No. 3 - Rear elevation (right) facing Millwright Street

Photograph No. 4 - Rear elevation (left) facing Millwright Street

Photograph No. 5 - Elevation facing Regent Street

3.0 Description of the External Façades

The following descriptions have been determined through visual and intrusive survey and are applicable to each elevation of the building.

3.1 ACM (Aluminium Composite Material) rainscreen

The ACM (aluminium composite material) rainscreen is located on all four elevations of the seventh floor blocks at the top of the building.

The ACM is comprised of 0.5mm aluminium internal and external facing with a 3mm thick black polyethylene core and formed into cassette panels to create the rainscreen. These have 20mm joints vertically across the façade and 8-10mm horizontally, depending on the panel position.

Behind this, there is a cavity fully filled with mineral wool insulation secured by fasteners adhered to the face of an externally fastened trapezoidal corrugated sheet which varies the depth of the cavity from 70mm to 90mm. The panels are secured to a secondary support structure of vertical aluminium top hat rails and horizontal galvanised steel 'z' rails. This is secured against the trapezoidal corrugated sheet to the primary structure of wet painted steel.

Behind the trapezoidal corrugated sheet, there is a further 150mm of mineral wool insulation within a 200mm cavity between the structural elements and then the internal wallboard has been observed.

Photograph No. 6 - One of two ACM clad blocks on the seventh floor

Photograph No. 7 - ACM panels of Area 1 on tenant's balcony

3.2 Brickwork

Brickwork is located on all four elevations of the second to sixth floors of the building as the predominant façade type.

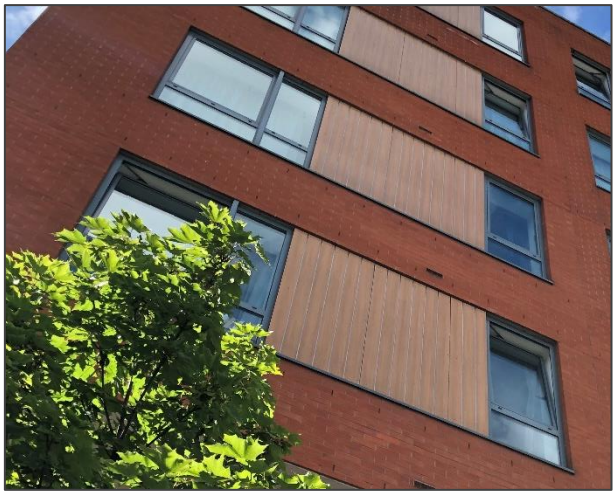
The main wall construction is understood to be masonry cavity wall construction with an internal leaf of concrete blockwork, mineral wool insulation in the cavity and an outer leaf of red brick.

3.3 Timber cladding

The punched openings for the windows within the brickwork are separated with timber cladding to various extents across the façade.

The façade comprises of an internal leaf of concrete blockwork (coated), vertical timber battens fixed to the face of the blockwork with horizontal timber battens on top. This is fully filled with mineral wool and then covered by a breather membrane. The timber slats are secured to the horizontal timber battens. On the Skinner Lane and Mabgate facing elevations, this timber cladding has been replaced with a high pressure laminate (HPL) cladding.

Photograph No. 8 - Surrounding brickwork, aluminium windows, and timber infill



Photograph No. 9 - Surrounding brickwork, aluminium windows and Trespa panel

3.4 Render wall system & soffit

A white render wall system with grey aluminium curtain walling and windows is located on the ground and first floors of all elevations. This interfaces with a soffit faced with a sheathing board that is supported by a secondary structure. Internally, the brick support can be observed with mineral wool insulation and a type of rigid insulation between the mineral wool and internal leaf of concrete blockwork. Above the rigid insulation appears to be a continuous tray.

4.0 Areas observed and Limitations of Survey

Two ACM areas were observed in two separate areas of the building. In one area, on the balcony of a tenant's demise was examined adjacent to a smoke vent to observe the interface detail at the opening. Examination of a replica detail in a second area was not possible at the second location due to access so this was used to verify the wall construction observed in the first area.

This survey is to verify the findings of a previous survey conducted by AOCA Engineers.

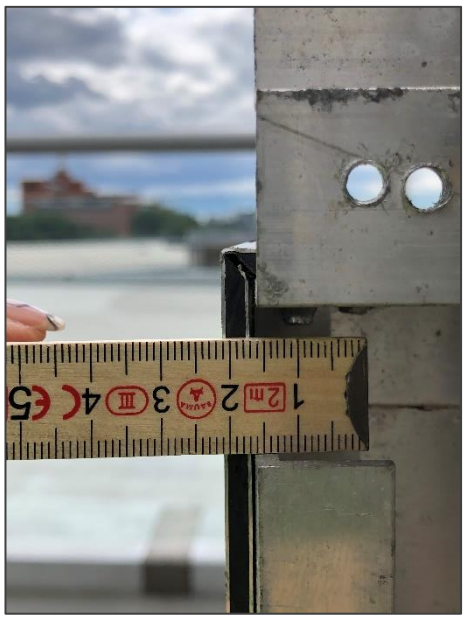
Figure 1- Elevation facing Millwright Street with surveyed areas

5.0 Observations

5.1 ACM cladding

5.1.1 The ACM cladding was observed to comprise of 0.5mm thick front and rear aluminium facing with a 3mm black polyethylene core and formed into a cassette panel 30mm deep. The vertical sides are supported by a 38mm 'U' channel. Horizontally, aluminium profiles are secured to the top and bottom of the cassette panel to allow it to hook onto the support structure and be secured in place.

Photograph No. 10 - ACM panels of Area 1

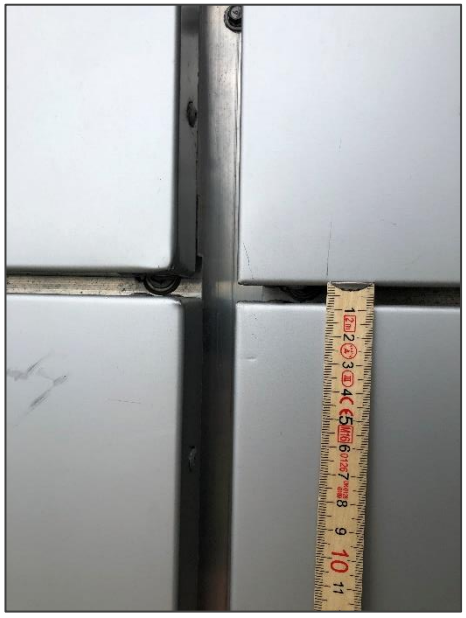


Photograph No. 11 - Edge of ACM panel

5.1.2 Based on the panels observed and markings to the rear face, these are understood to be Alucobond panels.

Photograph No. 12 - Soffit ACM panel showing markings and where cavity barriers were sat prior to removal

5.1.3 Vertically, there is a nominal 20mm joint between panels; horizontally, this is 8-10mm.

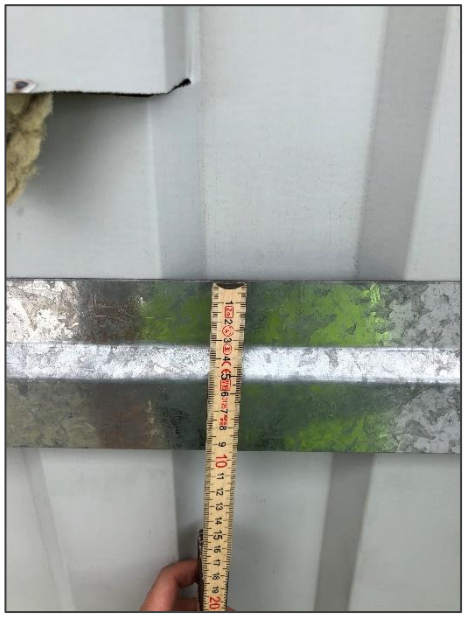


Photograph No. 13 - Horizontal joint - 8-10mm, depending on where measurement was taken

5.2 Supporting substructure

The supporting structure is comprised of vertical aluminium 'top hat' rails that are 90mm wide and 60mm deep (overall) and positioned to support each panel. These are secured to galvanised steel 'z' angles which are fixed, in turn, to the corrugated trapezoidal sheet beginning 110mm up from the base aluminium flashing and spaced 960mm-1000mm apart approximately.

Photograph No. 14 - Supporting structure, vertical top hat rail



Photograph No. 15 - Supporting structure – galvanised steel rail

5.3 Mineral wool insulation (external cavity)

Mineral wool insulation has been observed fully filling the cavity between the rear of the panel and the galvanised sheet. The cavity is 70mm-90mm depending on the plane of the sheet that is being measured from.

Photograph No. 16 - Insulation installation observed during removal of exterior ACM panels to Area 2

Photograph No. 17 - Mineral wool insulation removed from Area 1 in advance of façade review

Photograph No. 18 - Insulation fixing

5.4 Trapezoidal corrugated sheet

A trapezoidal corrugated sheet (thought to be galvanised steel) provides an element of rigid support for the insulation with fixings adhered to the face periodically. The width of each segment is circa 80mm.

Photograph No. 19 - Corrugated trapezoidal sheet

5.5 Mineral wool insulation (wall construction)

Behind the sheet, mineral wool insulation was observed. This appeared to be 150mm in depth within a 200mm cavity.

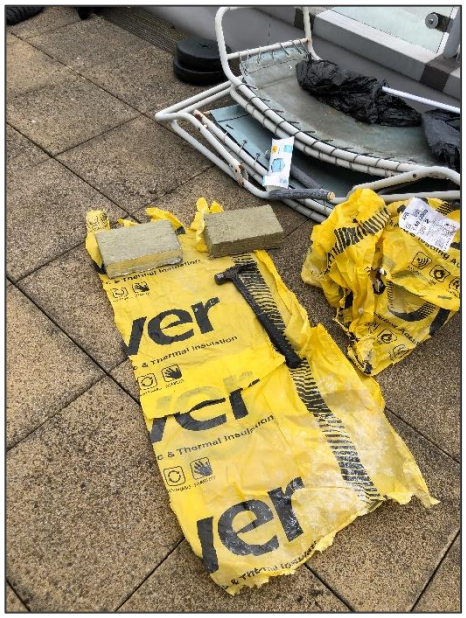
Photograph No. 20 - Mineral wool insulation observed to the interior cavity - Area 2

Photograph No. 21 - Overall internal cavity dimension – 200mm

Photograph No. 22 - 150mm of mineral wool insulation to the interior cavity

5.6 Cavity barriers

Cavity barriers were not observed at the edge of the cavity or at the jamb of the smoke vent opening/window. At the top of the smoke vent opening/window, the aluminium soffit panel was pulled away to reveal cavity barriers had been placed in the cavity above and were sat on the soffit panel, subsequently, these fell to the ground as they were not mechanically fixed as required by Approved Document B. These were observed to be a sleeved Isover product; however the sleeving was damaged and torn which may affect its performance and durability.



Photograph No. 23 - Fallen cavity barriers from soffit above smoke vent/window

Photograph No. 24 - Individual cavity barrier - 230mm wide

6.0 Building Regulations Approved Document B Guidance

6.1 The Building Regulations Approved Document B has been through a number of revisions in the last 25+ years. The earliest version Wintech have on record is ADB 1992. This was then followed with a revised version in 2000, 2002, 2006, 2010 and 2013. The document was split into two volumes from 2006 onwards, with volume 2 for buildings other than dwelling houses.

6.2 The main fire safety requirements for cladding in ADB2 2006 relate to:

- Surface spread of flame.
- External wall combustibility; this is designated as class A1, A2, B, C, D and E.
- Provision of cavity barriers and fire stops.

6.3 Minor changes to the wording of the guidance in terms of surface spread of flame were made between the 1992, 2000 and 2006 versions as shown in Figure 2 below.

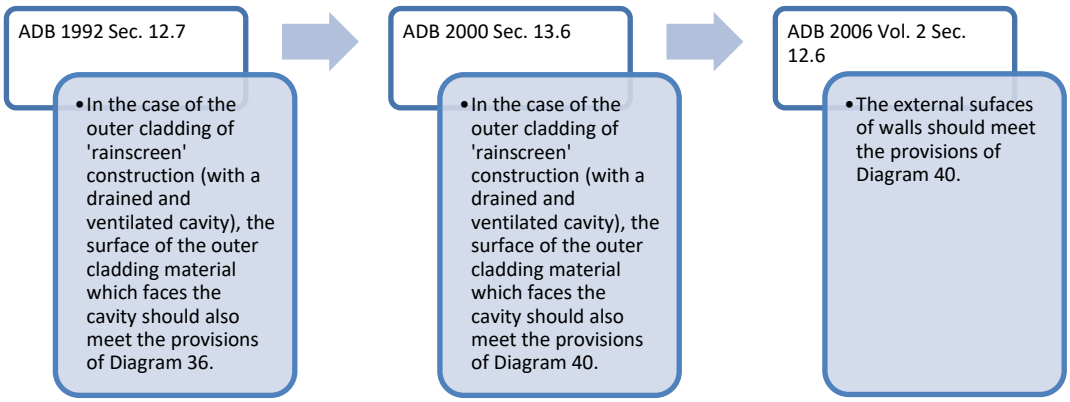


Figure 3 – Surface spread of flame requirements

6.4 Minor changes were also made in the guidance regarding the cladding combustibility requirements between the 1992, 2000 and 2006 versions as shown in Figure 4 below.

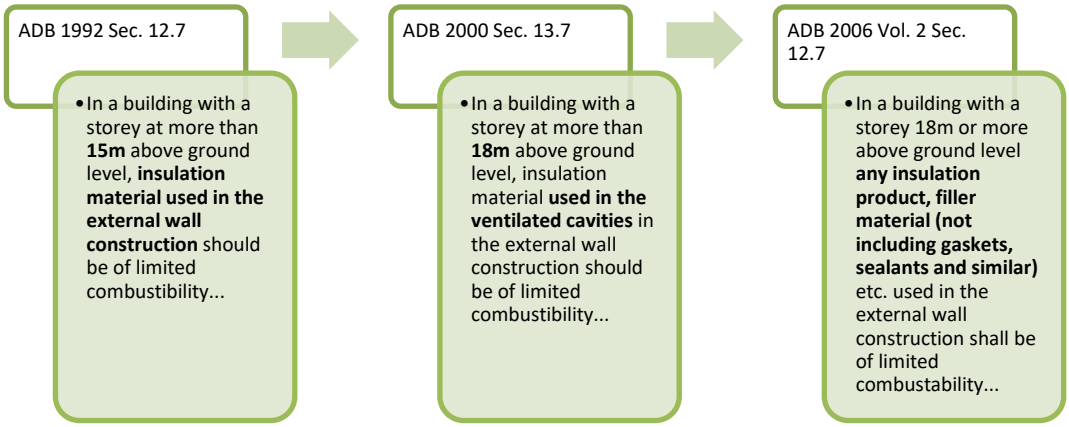


Figure 4 - Changes to cladding combustibility requirements in ADB

6.5 The version for which the building is to comply to, is the current version at the time of the planning application. As such, we believe that the building should be considered against the guidance contained in the 2006 version of the Approved Document B.

6.6 Surface Spread of Flame

6.6.1 The different classifications of surface spread of flame are class 0, 1, 2, 3 and 4. Note that class 0 is not referenced in a British Standard, but achieved by being of limited combustibility throughout, or a Class 1 material which has a fire propagation index of not more than 12 and sub-index of not more than 6 according to BS 476-6.

6.6.2 The guidance in ADB 2006 stipulates that the external surfaces of walls should meet the requirements of Diagram 40. The requirement depends upon the proximity to other buildings and the height and so a number of different scenarios are provided in Diagram 40 ADB 2006. The 20:20 Building is seven storeys tall with a storey above 18m and more than 1000mm from the site boundaries, therefore in accordance with Diagram 40 of ADB 2006, the materials used on the building up to 18m should have a surface spread of flame rating of Index (I) not more than 20 up to 18m and a Class 0 rating over 18m.

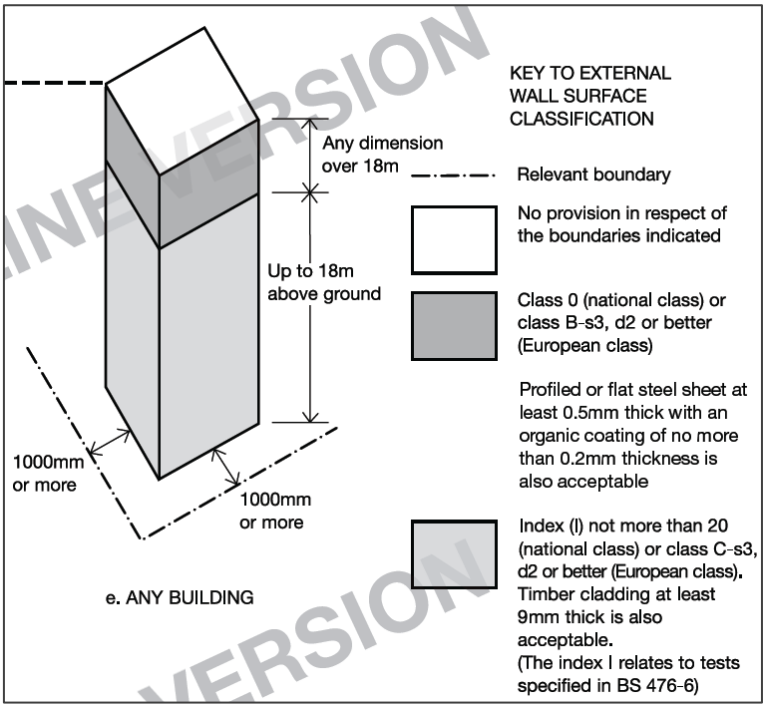


Figure 5 – Excerpt of Diagram 40 from ADB 2006 showing requirement for Class 0 above 18 m

6.7 Materials of Limited Combustibility

6.7.1 For tall buildings, ADB 2006 recognises the risk of the external cladding system contributing to fire propagation and making firefighting more difficult. It therefore includes an additional requirement for buildings over 18 m as provided in Figure 4 previously.

6.7.2 In terms of combustibility, from Wintech's understanding of ADB in effect at the time of construction, to demonstrate compliance where a building exceeds 18m above the ground level, Approved Document Part B provided two options:

Option 1 ADB, Vol 2, Clause 12.7: Year 2006 (post April 2007):

'In a building with a storey 18m or more above ground level any insulation product, filler material (not including gaskets, sealants and similar) etc. used in the external wall construction should be of limited combustibility (See Appendix A). This restriction does not apply to masonry cavity wall which complies with Diagram 34 in Section 9.'

Option 2 An acceptable alternative approach would be to submit evidence that the complete proposed external cladding system has been assessed according to the acceptance criteria in BR135 - Fire Performance of External Thermal Insulation for Walls of Multi-storey Buildings as referred to in clause 12.5 of ADB. The preferred method of demonstrating compliance is via a fire test carried out in accordance with BS 8414:1 Fire performance of external cladding systems – Part 1: Test method for non-loadbearing external cladding systems. The test should be carried out by a UKAS accredited testing body.

6.8 Provision of Cavity Barriers and Fire Stops

6.8.1 To prevent unseen fire spread through cavities in the external wall, ADB 2006 includes provisions in Section 9 for cavity barriers around window openings, junctions between the external cavity wall and every compartment floor and compartment wall and edge of cavity. The cavity barriers around openings may be formed by the window or door frame subject to certain material requirements in terms of integrity and insulation. Clause 9.13 states that every cavity barrier should be constructed to provide at least 30 minutes fire resistance.

7.0 Summary of Measurements & Ratings

Façade element	Measurement during survey (w x h x d)	Surface Spread of Flame rating	Compliance with ADB 2006, Clause 12.6	Combustibility rating in accordance with BS EN 13501-1	Compliance with ADB 2006, Clause 12.7
ACM cladding panel	1995mm x 990mm 0.5mm alu, 3mm core, 0.5mm alu	Class 0	Yes	Not better than Class B	No
Vertical support rails - aluminium	90mm, internal recess 44mm x 15mm	Class 0	Yes	A1	Yes
Horizontal support rails – galvanised steel	1mm thick*	Class 0	Yes	A1	Yes
Mineral wool insulation – external cavity	70mm-90mm, dependent on position	Class 0	Yes	A1	Yes
Corrugated trapezoidal sheet	0.5mm thick*	Unconfirmed	Unconfirmed	Unconfirmed	Unconfirmed
Mineral wool insulation – internal cavity	150mm	Class 0		A1	Yes

8.0 Commentary

8.1 Surface Spread of Flame

In accordance with Diagram 40 of ADB 2006 which would be in effect at the time of construction, the surface spread of flame rating of a building with a storey or more above 18m is required to be Class 0 or the material to be Class B-s2, d0. As such, we believe that the external surfaces of the external wall are compliant with ADB2 2006.

8.2 Materials of Limited Combustibility

The external façade of the 20:20 Building is comprised of ACM cladding. There are forms of ACM cladding which meet the combustibility criteria set out by ADB which have a mineral core. The ACM cladding with a combustible core is readily identified by its colour which is dark grey/black and this is the core material that has been observed on the building, in agreement with previous findings and surveys. This is not compliant with the requirements of ADB 2006.

The other materials observed within the façade construction have an A1 combustibility rating and therefore are compliant.

8.3 Provision of Cavity Barriers and Fire Stops

Survey areas were selected for the opportunity to observe the presence of cavity barriers at the edges of cavities (top, bottom and interfaces with components or openings).

Due to the cavity in the wall construction being fully filled with mineral wool insulation, no cavity barriers were present at the top, bottom or vertical edges of the cavity. When the cavity is fully filled with a non-combustible material, there is no requirement for there to be a cavity barrier as the passage for flame is already limited.

Where the soffit met the smoke vent/window that was observed during the survey, cavity barriers were observed and fell out of the cavity upon soffit removal. Based on the imprint on the back of the soffit panel, were thought to just be sat in the cavity rather than mechanically fixed which would have secured them in place and prevent their displacement over time. This is not installed in accordance with ADB requirements or manufacturer recommendations to be considered compliant.

The junction at the top where the horizontal and vertical trapezoidal corrugated sheets meet was not sealed, creating an open path. This junction will need addressing to allow secure fixing of cavity barriers in this location. Additionally, this area is problematic in relation to thermal performance and acoustic requirements and this will also need addressing.

8.4 Comparison to AOCA Findings

The findings observed during the survey with regards to materials and dimensions are in accordance with the findings of AOCA shown in their drawing package of information provided to us prior to the survey however we have been unable to verify the presence of a secondary weather membrane at the lower perimeter of the trapezoidal corrugated sheet, behind the flashing.

9.0 Other observations

While outside the scope of our appointment and this report, the following observations were made during the survey.

9.1 Overall construction & watertightness

In our experience, the wall build-up is relatively unique and as such, we have not undertaken sufficient investigations to opine on the likely weathertightness of the construction.

9.2 Secondary weather membranes

9.2.1 Within the AOCA documentation provided, there is a secondary weather membrane shown within the construction detail for the existing wall construction. While we are aware that they have completed a survey prior, we have not seen their report and cannot confirm whether this is has been informed through observation or documentation.

9.2.2 In the areas observed during the Wintech survey, there was no membrane at the top of the corrugated trapezoidal sheet at the junction where this interfaces with the roof. Another of the same type sheet runs horizontally across.

9.2.3 At the corner junction where the façade creates a reveal to the smoke vent/window in area 1, where two sheets meet can be observed. These are attached directly to the primary structure and no membrane was observed in this location at the bottom. Here the flashings extend up behind the galvanised sheet.

9.2.4 The absence of perimeter sealing membranes could allow water into the construction, along with uncontrolled air movements and should be investigated further.

9.3 Primary structure

9.3.1 The primary structure has not been fully investigated beyond the corrugated trapezoidal sheet however portions of it were exposed during the survey. The portions seen were observed to be painted steel and in all instances observed, the paint coating was observed to be degrading and the surface of the structural elements was corroding.

9.3.2 This is likely due to the lack of membranes or sealed interface detail at the top of the construction allowing moisture into areas which are usually face sealed and therefore dry.

9.3.3 The primary structure should be assessed and evaluated by an independent and suitably qualified structural engineer. This will likely result in the requirement for the corrugated trapezoidal sheet coming off and the inner façade construction being open to the elements.

Photograph No. 25 - Section of primary structure observed

Photograph No. 26 - Section of primary structure observed

Photograph No. 27 - Section of primary structure observed

9.4 Trapezoidal corrugated sheet

Usually, these sheets are designed to be fitted with a dry ,warm environment behind, so with consideration to the exposure of the façade elements to moisture, the front and rear faces of the corrugated trapezoidal sheet should be examined for a coating/coating thickness to allow assessment of the design life of the sheet.

10.0 Document Review

10.1 We have been advised that the building was acquired some years ago through an administration deal resulting in a loss of building information. As a result, an O&M manual was unavailable for review.

10.2 Previous work has been conducted by AOCA Engineering Consultants and documents in relation to this have been provided for review. These are:

- 20:20 House Leeds – Bill of Quantities
- AOCA Scope of Remedial Works Rev 1 – Ref 19-UK-1001
    - Appendix A – specification clauses
    - Appendix B – AOCA drawings
    - Appendix C – H92 Rainscreen Cladding (Genius Ltd)
    - Appendix D – Cavity Barrier – Siderise

10.3 Appendix B contains a number of elevations, a section showing the existing construction surveyed and a section showing the proposed remedial works from AOCA. This shows the replacement of the supporting substructure and ACM panels with a new supporting structure and Genius Prime aluminium cladding panels.

10.4 Points for consideration on the existing proposed detail include:

10.4.1 The drawing do not clearly define the primary and secondary wall construction; therefore, the elements which fasten to the sheet is not clear. This needs to be identified in order to determine the suitability of the existing construction.

10.4.2 It appears that the previous cladding system is completely supported onto the trapezoidal corrugated sheet. The newly proposed system will increase the weight of the façade system and should be verified by calculation.

10.4.3 The corrugated trapezoidal sheet stops short at the top of the detail where it interfaces with the roof and at the bottom which means this may not perform a number of functions relating to acoustic performance, thermal/condensation performance and fire performance. A strategy for sealing these areas to meet the necessary performance should be devised if the sheet is to remain part of the construction.

10.4.4 A cavity barrier is shown at the top of the proposed detail. Whilst a cavity barrier should be provided at edges of compartments, further cavity barriers may be required above and below the window and at the edge of the cavity. Vertically, full fill cavity barriers should be used; horizontally, open state cavity barriers with an intumescent face that will expand to the rear face of the aluminium panel when activated should be used or a sleeved, full fill cavity barrier whose durability has been proven to not be compromised by the presence of water. Given the shape of the trapezoidal corrugated sheet, assistance from the manufacturer in relation to the installation of the barriers with this form of sheet should be sought. Refer to Figure 1 below.

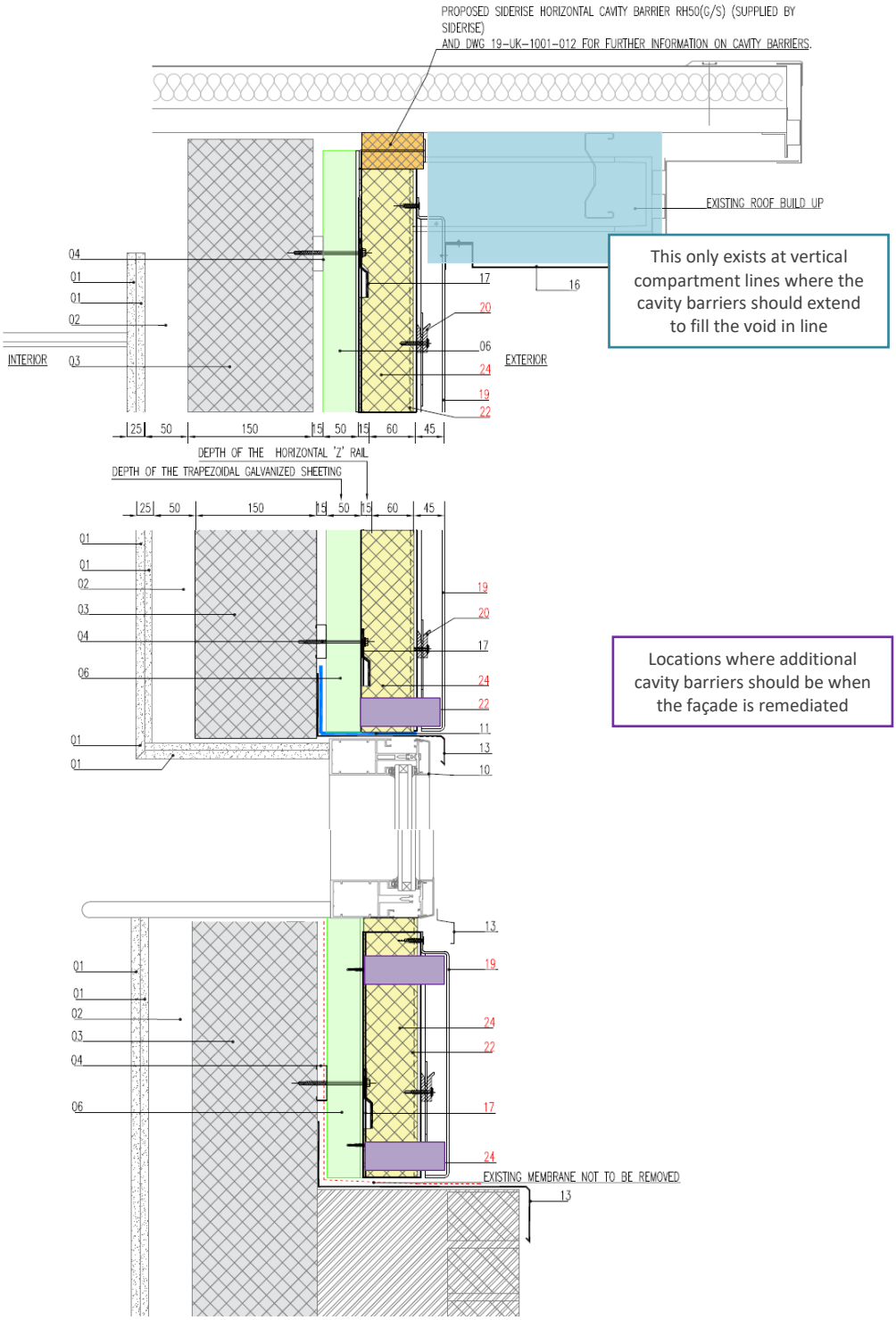


Figure 2- AOCA proposed detail

10.5 Points for consideration on the Genius Prime panels:

10.5.1 Based on available literature for the system, the panels are cassettes and dead fixed at the top. Although there are vertical slotted holes, it is unclear how the panels will accommodate lateral thermal expansion.

10.5.2 The panels are retained through the system specific clips secured to vertical rails. There are rectangular flanges to the vertical edges of the cassette which slot into the clips. It should be clarified what minimum edge cover is required for the panel to remain engaged after tolerance and movement is and how these accommodate tolerance and movement.

10.6 Specification differences

It has been requested that Wintech produce a performance specification alongside the existing specification. The specification currently provided by AOCA for the replacement façade on the seventh-floor blocks of the 20:20 Building consists of a number of NBS specification clauses.

The below points identify the key differences between the specification documents.

10.6.1 Air Permeability:

The performance of the Genius Prime façade system is tested in accordance with CWCT Sequence B for rainscreens which does not include the backing wall air permeability performance. As such, this will need to be assessed separately. Following the survey, there is some concern for the weathertightness of the backing wall and condition of the primary structure. It is likely additional remedial work extending to the backing wall may be required.

10.6.2 Aluminium flashings

- Applies to H72 Aluminium flashings
- The thickness specified in Appendix A/H72 specification is 2mm for aluminium flashings. The Wintech specification specifies 3mm unless thinner is agreed with the architect/client.

10.6.3 Fasteners and Fixing systems

- Applies to : H72 Aluminium flashings; H92/730X Mechanical Fixings – Material Requirements; Z20 Fixings and Adhesive
- Stainless steel fixings to be grade A2 unless they are visible, in which case they should be grade A4.

10.6.4 Rainscreen secondary support structure

- Applies to H92/110 Flat Aluminium Cladding System
- If the backing wall is determined to be unsuitable following a survey, including that of the primary structure; a new secondary support structure for the new rainscreen panels may be required.

10.6.5 Rainscreen backing wall

- Applies to H92/110 Flat Aluminium Cladding System
- Following the survey, it has been observed that the primary structure is wet painted steel showing signs of surface corrosion faced with a trapezoidal corrugated sheet that is potentially plastisol coated.

This type of sheet is designed to be dry from behind, however the top and bottom of the sheet are not weathertight.

- There is the concern that the back of the sheet may not be in good enough condition for this to continue in service and that its structural integrity has been affected. If this is determined to be unsuitable, a new backing wall will be required.

10.6.6 Site hose testing

- Applies to H92/685 Site Hose Test
- The current AOCA specification lists the joints to be tested as 'to be agreed' but an allowance for 2 full days. Wintech specify that 5% of all joints to the façade should be tested which could affect the time required, either requiring less or additional time.

10.6.7 Aluminium alloy components

- Applies to H92/710 Aluminium Alloy Framing Sections
- The Wintech specification allows other alloys such as AW-6060 and AW-6082 depending on the aluminium extrusion

10.6.8 Insulation

- Applies to H92/776X Thermal Insulation
- The existing façade has an external cavity fully filled with insulation. The remedial façade solution will be required to maintain the current level of thermal performance as a minimum. The current insulation was compressed to the trapezoidal corrugated sheet which is 90mm thick at points so it is likely that more than the 75mm thick specified in the current AOCA specification will be required

10.6.9 Pre-treatment of aluminium and application of powder coating

- Applies to Z31 Powder coating
- The Wintech specification requires that the aluminium is to be pre-anodised to 5-8 microns thick as its pre-treatment. The AOCA specification lists either chromate pre-treatment or chromate free pre-treatment.
- Following completion of the pre-anodising process, the aluminium must be powder coated within 16 hrs and in the same facility.

11.0 Recommendations

11.1 The following is required for the façade to be compliant with regards to fire requirements:

- Monolithic aluminium cladding panels in keeping with the building's original appearance
- Cavity barriers to the edges of cavities (top, bottom, interfaces with windows/doors/ openings/penetrations)

11.2 It is believed that the façade construction may not be weathertight, and it is not apparent whether moisture within the façade construction is the result of interstitial condensation or water ingress from the exterior. Any remedial works should also rectify the issue of moisture within the construction and at least match the existing thermal performance of the façade.

11.3 In relation to the other observations, the following is recommended:

- An independent and suitably qualified structural engineer should assess the primary structure to determine how the corrosion observed will affect the structure's service life and any remedial works to rectify the coating and corrosion.
- The corrugated trapezoidal sheet should be assessed for its condition (particularly to the rear face), load bearing capacity and service life.
- The junction where the roof meets the vertical is specifically addressed for watertightness, thermal performance and acoustic performance.

11.4 Options for remediation include:

- Replacement of the external panels and secondary support structure in front of the trapezoidal corrugated sheet. This would be following surveys of both the primary structure and the front and rear faces of the trapezoidal corrugated sheet. This would include the re-use of the existing external mineral wool insulation and installation of cavity barriers at compartment lines, floors, edges of cavities and the perimeter of windows, doors, and openings.
- Replacement of the external panels, secondary support structure, insulation and trapezoidal corrugated sheet, if necessary. Also following surveys of both the primary structure and the front and rear faces of the trapezoidal corrugated sheet and installation of cavity barriers at compartment lines, floors, edges of cavities and the perimeter of windows, doors, and openings. This would require new insulation and the introduction of a cavity for appropriate ventilation and drainage. This option would be required to meet Part L refurbishment criteria and would likely increase the wall depth.