DISCLAIMER

The New Model Building is a set of design principles that demonstrates a methodology for building mid-rise residential properties using a low-carbon engineered timber structure. This has been prepared for Build by Nature in collaboration with other professionals including structural engineers and fire specialists. All involved have exercised reasonable skill and care to develop a methodology that performs to the relevant standards, UK Building Regulations and NHBC technical standards current at the time of writing, if correctly implemented.

These details and supporting information are provided on an ‘as is’, ‘with all faults’ basis, and no warranties, guarantees, conditions or other terms are given or implied.

This study was prepared for Built by Nature and is not to be relied upon by any third party. The use of this methodology and information does not relieve any consultant of their responsibility to ensure the suitability, performance, compliance and robustness of their designs and we expressly exclude liability to any party for any loss or damage (whether direct or indirect, and whether or not foreseeable) arising from the use of the following information.
INTRODUCTION
The New Model Building (NMB) comprises three documents:

The Guide is an overview of the New Model Building methodology.

The Details brings together the requirements described by Waugh Thistleton, Buro Happold and UCL in the philosophy reports in an easily accessible format which can be used by teams to inform the design of their buildings.

The Evidence is the full documentation submitted to and pre-assessed by NHBC in support of the New Model Building. It is made up of three separate documents: Waugh Thistleton’s Design Philosophy, Buro Happold’s Structural Design Philosophy and UCL’s Fire Strategy Report.

THE DETAILS

In this document we have taken the details required to deliver a New Model Building and identified the requirements for each as set out in the evidence documents. The details are grouped into:

- External Wall
- Internal Structure
- Ground Slab
- Roof
- Balcony
- Penetrations

The details describe the key interfaces pre-assessed by NHBC and are accompanied with checklists that highlight the important considerations that need to be addressed, providing designers, developers and contractors with an easy-to-use document which will help them successfully deliver a New Model Building.

The Performance Specification is included at the rear of the document. This lists the items labelled in the details and provides their performance requirements. The required performance of the materials is stated and not individual products to allow for flexibility in procurement.

The architects, structural and fire engineers, and designers for a project delivered in line with the New Model Building approach will need to carry out a fully detailed design and provide a complete set of drawings, specifications, and fire strategy which is specific to their project. The Detail Guide should be viewed as supplementary guidance, which does not replace existing standards but helps to fast track the process of approval with NHBC.
STRUCTURAL DESIGN APPROACH

The New Model Building structural design approach outlines the key considerations when using mass timber for the primary structure:

- Concrete ground bearing or suspended ground floor slab
- Façade is non-structural
- Simply supported timber floors spanning between vertical supports
- Downstand beams may be required to support high perimeter or interior loads
- Columns/walls supported directly on appropriately designed foundations
- Vertical support formed of timber walls or timber beam elements supported on timber or steel columns
- Columns/walls supported directly on appropriately designed foundations
- Lateral loads on facades transferred by overall diaphragm action of the floors to stability elements
- Vertical loads from façades and associated support systems resisted at each floor level, bottom supported and restrained by the slab at the head
- Lateral stability system comprises lateral load-resisting construction around the cores
DEFINITIONS

Air and vapour control layer (AVCL) - Continuous layer of impermeable material to prevent the movement of air and water vapour.

Balcony - Accessible external amenity platform over an open space above ground level, with direct access from a building.

CLT / Cross laminated timber - Structural timber boards stacked in perpendicular layers and glued together under high pressure.

External wall – As defined in Building Regulations Approved Documents B with additional detailed clarification for the NMB to be the build-up from the internal finished face of the plasterboard to the outside face of the cladding material or any protruding cills.

Flat roof - A roof with a maximum slope of less than 10 degrees from the horizontal.

Glulam / Glue laminated timber - Manufactured by bonding together layers of parallel timber lamellae, with ends finger jointed

LSF - Light steel frame. Construction framing members made from cold-formed profiles 0.5-4mm thick.

LVL / Laminated Veneer Lumber - Thin rotary cut veneers bonded together under pressure using water-resistant adhesive to form columns and beams.

NMB - New Model Building.

Pitched roof - A roof with a slope of greater than 10 degrees from the horizontal.

Sheathing - Board applied to the outside of the steel frame (installed where required by the design).

Terrace - External surface for amenity use, above an internal space, above ground level and with direct access from a building.
The New Model Building Design documents should be read alongside all relevant Building Regulations and Approved Documents, British Standards and NHBC Technical Standards 2023.

Designers must also refer to the following guidance:

**GENERAL**
- TRADA CrossLaminated Timber Design and Performance
- SCI Technical Report ED017 Design and Installation of Light Steel External Wall Systems

**STRUCTURE**
- Building Regulations (England) Approved Document Part A
- Building Regulations (England) Approved Document Part B
- BS EN 1990: (Eurocode 0) Basis of structural design - UK National Annexe
- BS EN 1991: (Eurocode 1) Actions on structures - UK National Annexe
- BSEN 1992: (Eurocode 2) Design of concrete structures - UK National Annexe
- BS EN 1993: (Eurocode 3) Design of steel structures - UK National Annexe
- BS EN 1995: (Eurocode 5) Design of timber structures - UK National Annexe
- NHBC Standards and Technical Requirements Chapter 2.1 sections R3 (materials) and R5 (competent designer) and all other relevant NHBC technical guidance notes

**STANDARDS AND CODES OF PRACTICE**

**FIRE**
- STA Structural Timber Buildings Fire Safety In Use Guidance Volume 6 - Mass Timber Structures; Building Regulation compliance B3(1) STA Fire Safety and Guidance Project Version 2.1 May 2023
- STA 16 Steps to Fire Safety, Promoting good practice on construction sites. Version 4.3 October 2017

**MOISTURE MANAGEMENT**
- Swedish Wood/TDUK’s Moisture-proof CLT Construction without a Full Temporary Shelter Edition 1:2022
- STA Advice Note 14 - Robustness of CLT Structures - Part 1 - Key Principles for Moisture Durability
- STA Technical Note 24 - Moisture Protection During Construction - STA 2020
The use of the New Model Building Design methodology is limited to the following:

| **TYPOLOGY** | Residential dwellings in accordance with ‘Table 0.1 Classification of purpose groups’ as found in Approved Document B (fire safety) volume 1: Dwellings, 2019 edition incorporating 2020 amendments |
| **UPPER FLOOR USE** | Multi-occupancy residential |
| **GROUND FLOOR USE** | Multi-occupancy residential, Retail, F&B, Plantrooms & Storage, Office |
| **BASEMENTS/ PODIUMS/ UNDERCROFTS** | Not applicable – assumed alternative non-combustible construction to be used for any below ground level elements |
| **HEIGHT** | Less than 18m, measured in accordance with Diagram D4 as found in Approved Document B (fire safety) volume 1: Dwellings, 2019 edition incorporating 2020 amendments |
| **SPRINKLERS** | Sprinklers should be installed throughout the building in accordance with Approved Document B (fire safety) volume 1: Dwellings, 2019 edition incorporating 2020 amendments |
| **COMPARTMENT** | The minimum fire resistance of compartments should be 60 minutes, in accordance with ‘Table B4 Minimum periods of fire resistance as found in Approved Document B (fire safety) volume 1: Dwellings, 2019 edition incorporating 2020 amendments |
| **LOCATION** | England and Wales |
| **CONSEQUENCE CLASS** | Class 1, 2A or 2B |
| **FIRE PROTECTION STRATEGY** | Full encapsulation by plasterboard or other fire-resistant system to K260 |
| **MAXIMUM FIRE PERIOD** | 60 minutes |
| **EXPOSED TIMBER** | No visually exposed timber |
| **SERVICE CLASS** | (BS EN 1995) – Service Class 1 only |
The New Model Building approach is based on the following primary structural components:

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>APPLICABLE STRUCTURAL SYSTEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FLOORS</strong></td>
<td>Cross laminated timber slabs except under bathrooms/utility rooms where a joisted and decked solution is also acceptable.</td>
</tr>
<tr>
<td><strong>SUPERSTRUCTURE</strong></td>
<td>Cross laminated timber walls, glue-laminated timber beams and glue-laminated columns or combinations of these. Steel beams and columns may be used but should be encapsulated for fire protection.</td>
</tr>
<tr>
<td><strong>PODIUMS</strong></td>
<td>Assumed to be from non-combustible material e.g steel, concrete masonry etc.</td>
</tr>
<tr>
<td><strong>ROOFS</strong></td>
<td>Cross laminated timber (laid to fall) or timber joists/sheathing.</td>
</tr>
<tr>
<td><strong>STABILITY SYSTEM</strong></td>
<td>Concrete, cross laminated timber or braced steel stability core incorporating the vertical circulation for the building.</td>
</tr>
<tr>
<td><strong>STAIR</strong></td>
<td>Timber, steel or concrete to the designers preference.</td>
</tr>
<tr>
<td><strong>FAÇADE</strong></td>
<td>Lightweight (not precast concrete or solid masonry), non-structural facades supported at every level.</td>
</tr>
<tr>
<td><strong>BALKONIES</strong></td>
<td>Balconies of non-combustible construction can be used and included in the design.</td>
</tr>
<tr>
<td><strong>PARAPET WALLS</strong></td>
<td>Roof level parapet wall can be included if required and included in the design allowance.</td>
</tr>
<tr>
<td><strong>TERRACES</strong></td>
<td>No specific assumption has been made regarding terraces, but these can be incorporated if they do not change the overall compliance and principles of the NMB.</td>
</tr>
<tr>
<td><strong>CANOPY ROOF</strong></td>
<td>Canopy roof of non-combustible construction can be used but needs to be included in the design allowance.</td>
</tr>
<tr>
<td><strong>VISUALLY EXPOSED TIMBER</strong></td>
<td>Not applicable, all timber to be encapsulated.</td>
</tr>
<tr>
<td><strong>COMBUSTIBLE MATERIALS WITHIN FAÇADE</strong></td>
<td>No – All structural timber elements (floors, beams, walls, columns etc) to be kept inboard of the external wall, up to and including any wall linings.</td>
</tr>
</tbody>
</table>

**MATERIALS SPECIFICATION**

**GENERAL**

All timber to be sustainability sourced timber to FSC/PEFC or other globally recognised responsible sourcing accreditation.

Timber elements to be in accordance with relevant BS standard as follows:

- Glulam in accordance with BS EN 14080:2013
- Solid section timber in accordance with BS EN 14081:2016
- OSB in accordance with BS EN 300:2006
- Plywood in accordance with BS EN 688:2012
- LVL in accordance with BS EN 14374:2004
- Cross laminated timber in accordance with BS EN 16351:2021

**PERMANENT AND VARIABLE LOADING**

The New Model Building approach has been developed on the basis of loadings and their combinations as defined in the UK NA to BS EN 1990 and BS EN 1991.

The approach is applicable to any wind, snow and live loadings as defined in these codes, provided the structure sizing is done to suitably resist these loads. The timber structure should be designed and detailed to provide sufficient robustness against disproportionate collapse in accordance with the Building Regulations Part A.

**SERVICEABILITY LIMITS**

The NMB approach has been developed on the basis that serviceability limits as defined in the UK NA to BS EN 1995 for the timber elements and BS EN 1993 for the concrete elements, and to generally meet NHBC Standard requirements, whichever is more onerous. Vibration for floors should be assessed and designed out in accordance with UK NA to BS EN 1995.

**SPECIFICATION, ACCURACY AND TOLERANCE**

The timber structure tolerances (both fabrication and erection) and overall design and performance must be in accordance with the current version of the National Structural Timber Specification, BS 5606:2022 and the BS 8000 series.
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXTERNAL WALLS</strong></td>
<td></td>
</tr>
<tr>
<td>General Checklist</td>
<td>25</td>
</tr>
<tr>
<td>Slab Edge Section</td>
<td>26</td>
</tr>
<tr>
<td>Slab Edge Plan</td>
<td>29</td>
</tr>
<tr>
<td>Junction with Column Section</td>
<td>31</td>
</tr>
<tr>
<td>Junction with Column Plan</td>
<td>33</td>
</tr>
<tr>
<td>Junction with Column - Internal Corner Plan</td>
<td>37</td>
</tr>
<tr>
<td>Typical Window Section</td>
<td>39</td>
</tr>
<tr>
<td>Full Height Window Section</td>
<td>41</td>
</tr>
<tr>
<td>Typical Window Plan</td>
<td>43</td>
</tr>
<tr>
<td><strong>INTERNAL STRUCTURE</strong></td>
<td></td>
</tr>
<tr>
<td>General Checklist</td>
<td>45</td>
</tr>
<tr>
<td>Core Junction with Floor Plan</td>
<td>54</td>
</tr>
<tr>
<td>Core Junction with Floor Section</td>
<td>57</td>
</tr>
<tr>
<td><strong>GROUND SLAB</strong></td>
<td></td>
</tr>
<tr>
<td>General Checklist</td>
<td>61</td>
</tr>
<tr>
<td>Junction with Glulam Column</td>
<td>62</td>
</tr>
<tr>
<td>Junction with CLT Wall/ Column</td>
<td>65</td>
</tr>
<tr>
<td>Junction with External Wall</td>
<td>67</td>
</tr>
<tr>
<td><strong>ROOF</strong></td>
<td></td>
</tr>
<tr>
<td>General Checklist</td>
<td>71</td>
</tr>
<tr>
<td>Junction with Core</td>
<td>72</td>
</tr>
<tr>
<td>Parapet Junction</td>
<td>75</td>
</tr>
<tr>
<td>Junction with External Wall</td>
<td>77</td>
</tr>
<tr>
<td>Junction with Party Wall</td>
<td>79</td>
</tr>
<tr>
<td><strong>BALCONY</strong></td>
<td></td>
</tr>
<tr>
<td>General Checklist</td>
<td>83</td>
</tr>
<tr>
<td>Typical Balcony Connection Plan</td>
<td>84</td>
</tr>
<tr>
<td>Typical Balcony Connection Section</td>
<td>87</td>
</tr>
<tr>
<td>External Door Threshold Plan</td>
<td>89</td>
</tr>
<tr>
<td>External Door Threshold Section</td>
<td>91</td>
</tr>
<tr>
<td><strong>PENETRATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>General Checklist</td>
<td>95</td>
</tr>
<tr>
<td>Penetration to Party Wall</td>
<td>96</td>
</tr>
<tr>
<td>Penetration to Shaft</td>
<td>99</td>
</tr>
<tr>
<td>Penetration to Internal Walls / Slab</td>
<td>103</td>
</tr>
<tr>
<td>Penetration to Internal Walls / Slab</td>
<td>105</td>
</tr>
<tr>
<td>Penetration to Façade</td>
<td>107</td>
</tr>
<tr>
<td>Penetration to Roof Soil Vent Pipe</td>
<td>111</td>
</tr>
<tr>
<td>Penetration to Roof Rainwater Pipe</td>
<td>113</td>
</tr>
</tbody>
</table>
GENERAL APPROACH

The design utilises a non-combustible external wall system (EWS) constructed from materials as defined in Approved Document Part B, Requirement B4: External fire spread - Regulation 7 – Materials and workmanship. In line with this, all materials within the external wall system are of European Classification A2-s1, d0 or A1, or better, classified in accordance with BS EN 13501.

The EWS is not designed to be load-bearing and is constructed from a continuous LSF system, supported from the floor slab, with a ventilated rain-screen cladding system.

All primary structural elements must sit inboard of the external wall. The external wall is defined as the build-up from the internal finished face of the plasterboard to the outside face of the cladding material or any protruding cills.

To allow for a wide range of cladding materials, the external finish of the New Model Building is not defined within the philosophy. Any rain-screen cladding system can be used if designed in accordance with NHBC Technical Standards 2023 and BS 8200:1985 Code of Practice for the Design of Non-loadbearing External Vertical Enclosures of Buildings. Example materials that could be applied include non-combustible lightweight cladding such as brick slips, clay tiles or fibre cement panels.

SEQUENCING

The principles for connecting the EWS to the structure are illustrated in the details and the sequencing of works is illustrated in the sequencing diagrams to the left.

1. Engineered timber structure
2. Linear fire stop fixed to slab
3. Facade/ slab connections fixed to engineered timber structure
4. Light steel framing system fixed to engineered timber slab
5. Full fill insulation applied to slab edge
6. Sheathing board and breather membrane installed
7. Horizontal cavity barrier installed at slab edge
8. Helping hand brackets installed
9. Rainscreen insulation and fixing system installed
10. Cladding installed
11. Wall lining insulation installed to light steel framing system
12. Vapour control layer installed and taped to engineered timber
13. Encapsulation applied to steel balcony connections
14. Floor finishes installed
15. Wall finishes and skirting installed; suspended ceiling added
The below principles should be applied to all details.

1. Ensure all elements in the external wall are of A2-s1-d0 or better in accordance with BS EN 13501 unless excluded via Regulation 7(3).

2. Use a non-load-bearing continuous LSF system supported from the top of the floor slab.

3. Use a ventilated rainscreen cladding system.

4. Provide fire test data of External wall construction showing REI 60 from outside and inside.

5. Internal wall lining boards provide finish encapsulation to the external wall system. External wall build-up and products specified must demonstrate fire performance of REI 60 minutes.

6. Provide an airtight vapour control layer, AVCL, to the internal lining of the EWS.

7. Ensure the AVCL will be sealed against the engineered timber to ensure continuous airtightness across the external wall.

8. All joints and penetrations in the AVCL should be lapped and taped in accordance with the manufacturer’s guidance.

9. Adhesive tapes (or sealants) should be used to seal window/door frames and membrane interfaces. NHBC Technical Standards 2023 and BS 8200:1985 Code of Practice.

10. Close all cavities at the top and bottom of walls, as well as around openings and penetrations, and at separating walls and floors.

11. Install breather membrane to the outside of the sheathing board. This should protect the sheathing board during construction.

12. Rainscreen insulation should be resilient to moisture to allow the breather membrane to be installed behind.

13. Parapet walls, lift overruns and any other such walls that enclose the building must be constructed as external walls.
**CHECKLIST**

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

- **Encapsulation to all timber elements to be REI 60 and K2-60.** (311)
- **End-grain sealant is to be provided to all slab and wall edges.** (203)
- **Linear firestop is to be provided to wall and slab edge to seal any potential gaps between LSF system and mass timber elements.** (341)
- **Full-fill mineral wool insulation to LSF framing over the party floor. Insulation is to be installed to the ceiling soffit level to allow for visible checking onsite.** (325)
- **Plasterboard junctions are to be set out so intumescent sealants will not fall out with gravity.** (312)
- **Steel fixings into CLT floor slab to be encapsulated.** (324)
- **Horizontal cavity barrier to be rated for 60 mins.** (342)
- **Horizontal cavity barrier to have intumescent specified for the required cladding cavity.** (342)
- **Ensure the AVCL will be sealed against the engineered timber to ensure continuous airtightness across the external wall.** (352)

---

**SLAB EDGE SECTION**

- **WALL LINING BOARD** (311)
- **SHEATHING BOARD** (323)
- **FAÇADE/SLAB CONNECTION** (324)
- **LIGHT STEEL FRAMING INSULATION** (322)
- **LIGHT STEEL FRAMING SYSTEM** (321)
- **FIRE RESISTANT GAP SEALER** (312)
- **HORIZONTAL CAVITY BARRIER** (342)
- **FULL FILL INSULATION** (325)
- **LINEAR FIRESTOP** (341)
- **FIRE RESISTANT GAP SEALER** (312)
- **FIXING SYSTEM** (331)
- **RAINSCREEN INSULATION** (332)
- **CLADDING** (333)
- **VAPOUR BARRIER** (352)
- **BREATHER MEMBRANE** (351)

---

**LIGHT STEEL FRAMING SYSTEM**

- **HEIGHT** (321)
- **EXTERNAL WALL**
- **INTERNAL**
- **MIN. 150 mm**
- **MAX. 150 mm**
- **NMB - EW-01**
- **NMB - FL-01**

---

**CLT FLOOR PANEL** (302)

- **CLT FLOOR PANEL** (302)
- **Vapour barrier lapped over steel connection**
- **Acoustic flanking strip**
- **Service zone**

---

**EXTERNAL WALLS**

- **EXTERNAL**
- **INTERNAL**
- **WALL LINING BOARD** (311)
- **SHEATHING BOARD** (323)
- **FAÇADE/SLAB CONNECTION** (324)
- **LIGHT STEEL FRAMING INSULATION** (322)
- **LIGHT STEEL FRAMING SYSTEM** (321)
- **FIRE RESISTANT GAP SEALER** (312)
- **HORIZONTAL CAVITY BARRIER** (342)
- **FULL FILL INSULATION** (325)
- **LINEAR FIRESTOP** (341)
- **FIRE RESISTANT GAP SEALER** (312)
- **FIXING SYSTEM** (331)
- **RAINSCREEN INSULATION** (332)
- **CLADDING** (333)
- **VAPOUR BARRIER** (352)
- **BREATHER MEMBRANE** (351)
**CHECKLIST**

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Encapsulation to all timber elements to be REI 60 and K2-60. (311)</td>
</tr>
<tr>
<td>2</td>
<td>End-grain sealant is to be provided to all slab and wall edges. (203)</td>
</tr>
<tr>
<td>3</td>
<td>Linear firestop is to be provided to wall and slab edge to seal any potential gaps between LSF system and mass timber elements. (341)</td>
</tr>
<tr>
<td>4</td>
<td>Intumescent sealants are to be installed at plasterboard junctions. (312)</td>
</tr>
<tr>
<td>5</td>
<td>Full-fill mineral wool insulation to LSF framing over party wall junction. Insulation to be installed between vertical studs to prevent insulation from moving. (325)</td>
</tr>
<tr>
<td>6</td>
<td>Vertical cavity barrier to be aligned with internal compartmentation and rated for 60 mins. (343)</td>
</tr>
<tr>
<td>7</td>
<td>Vertical cavity barrier to be full-fill to the rear of cladding with zero gaps. (343)</td>
</tr>
<tr>
<td>8</td>
<td>Ensure the AVCL will be sealed against the engineered timber to ensure continuous airtightness across the external wall. (352)</td>
</tr>
</tbody>
</table>
CHECKLIST

Please refer to the performance specification information (p. 108 - 115) for the relevant listed item numbers.

REF ITEM

1. Encapsulation to exterior faces of columns are to be provided with a board suitable for external use. (346) ✓

2. Encapsulation to all timber elements to be REI 60 and K2-60. (346) ✓

3. Ensure the AVCL will be sealed against the engineered timber column and floor slab to ensure continuous airtightness across the external wall. (352)

4. Encapsulation to column to be installed prior to the internal lining of the external wall. (311)

5. End-grain sealant is to be provided to all slab, column and wall edges. (301&303)

6. Full-fill mineral wool insulation to LSF framing over the party floor. Insulation is to be installed to the ceiling soffit level to allow for visible checking onsite. (325)

7. Plasterboard junctions to be set out so intumescent sealants will not fall out with gravity. (312)

8. Horizontal cavity barrier to be rated for 60 mins. (342)

9. Horizontal cavity barrier to have intumescent specified for the required cladding cavity. (342)
**CHECKLIST**

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Encapsulation exterior faces of columns are to be provided with a board suitable for external use. (346)</td>
</tr>
<tr>
<td>2</td>
<td>Encapsulation to all timber elements to be REI 60 and K2-60. (391)</td>
</tr>
<tr>
<td>3</td>
<td>Encapsulation to column to be installed prior to the internal lining of the external wall. (351)</td>
</tr>
<tr>
<td>4</td>
<td>Encapsulation to exterior faces of columns are to be provided with a board suitable for external use. (346)</td>
</tr>
<tr>
<td>5</td>
<td>Exterior wall lining and external encapsulation to column define the line of the external wall. (346)</td>
</tr>
<tr>
<td>6</td>
<td>End-grain sealant is to be provided to all slab and wall edges. (301)</td>
</tr>
<tr>
<td>7</td>
<td>Linear firestop to be provided to wall and slab edge to seal any potential gaps between LSF system and mass timber elements. (341)</td>
</tr>
<tr>
<td>8</td>
<td>Intumescent sealants are to be installed at plasterboard junctions.</td>
</tr>
<tr>
<td>9</td>
<td>Full-fill mineral wool insulation to LSF framing over party wall junction. Insulation to be installed between vertical studs to prevent insulation from moving.</td>
</tr>
<tr>
<td>10</td>
<td>Vertical cavity barrier to be aligned with internal compartmentation and rated for 60 mins.</td>
</tr>
<tr>
<td>11</td>
<td>Vertical cavity barrier to be full-fill to the rear of cladding with zero gaps.</td>
</tr>
<tr>
<td>12</td>
<td>Ensure the AVCL will be sealed against the engineered timber to ensure continuous airtightness across the external wall. (352)</td>
</tr>
</tbody>
</table>
CHECKLIST

Please refer to the performance specification information (p. 116-119) for the relevant listed item numbers.

REF ITEM

1. Encapsulation to all timber elements to be REI 60 and K2-60. (311)

2. Encapsulation to column to be installed prior to the internal lining of the external wall. (311)

3. Intumescent sealants are to be installed at plasterboard junctions.

4. Ensure the AVCL will be sealed against the engineered timber to ensure continuous airtightness across the external wall. (352)
CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60 min rated cavity barriers to be provided to all windows. (344)</td>
</tr>
<tr>
<td>2</td>
<td>Water and airtight membrane seal to between window frame and outer face to be installed prior to cavity barrier installation.</td>
</tr>
<tr>
<td>3</td>
<td>Encapsulation to all timber elements to be REI 60 and K2-60. (311)</td>
</tr>
<tr>
<td>4</td>
<td>End-grain sealant is to be provided to all slab and wall edges. (301)</td>
</tr>
<tr>
<td>5</td>
<td>Linear firestop to be provided to wall and slab edge to seal any potential gaps between LSF system and mass timber elements. (341)</td>
</tr>
<tr>
<td>6</td>
<td>Full-fill mineral wool insulation to LSF framing over the party floor. Insulation is to be installed to the ceiling soffit level to allow for visible checking onsite. (325)</td>
</tr>
<tr>
<td>7</td>
<td>Plasterboard junctions are to be set out so intumescent sealants will not fall out with gravity. (312)</td>
</tr>
<tr>
<td>8</td>
<td>Steel fixings into CLT floor slab to be encapsulated. (344)</td>
</tr>
<tr>
<td>9</td>
<td>Horizontal cavity barrier to be rated for 60 mins. (342)</td>
</tr>
<tr>
<td>10</td>
<td>Horizontal cavity barrier to have intumescent specified for the required cladding cavity. (342)</td>
</tr>
<tr>
<td>11</td>
<td>AVCL to be sealed against the engineered timber to ensure continuous airtightness across the external wall. (352)</td>
</tr>
</tbody>
</table>

TYPICAL WINDOW SECTION
# Checklist

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>CHECKLIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60 min rated cavity barriers to be provided to all windows. (344) ✓</td>
</tr>
<tr>
<td>2</td>
<td>The cavity barrier to the window to be coordinated with the horizontal compartmentation cavity barrier and cladding fixing system. (342) Ø</td>
</tr>
<tr>
<td>3</td>
<td>Water and airtight membrane seal to between window frame and outer face to be installed prior to cavity barrier installation. Ø</td>
</tr>
<tr>
<td>4</td>
<td>Encapsulation to all timber elements to be REI 60 and K2-60. (311) Ø</td>
</tr>
<tr>
<td>5</td>
<td>End-grain sealant is to be provided to all slab and wall edges. (301) Ø</td>
</tr>
<tr>
<td>6</td>
<td>Linear firestop to be provided to wall and slab edge to seal any potential gaps between LSF system and mass timber elements. (341) Ø</td>
</tr>
<tr>
<td>7</td>
<td>Full-fill mineral wool insulation to LSF framing over the party floor. Insulation is to be installed to the ceiling soffit level to allow for visible checking onsite. (325) Ø</td>
</tr>
<tr>
<td>8</td>
<td>Plasterboard junctions to be set out so intumescent sealants will not fall out with gravity. (312) Ø</td>
</tr>
<tr>
<td>9</td>
<td>Steel fixings into CLT floor slab to be encapsulated. (344) Ø</td>
</tr>
<tr>
<td>10</td>
<td>Horizontal cavity barrier to be rated for 60 mins. (342) Ø</td>
</tr>
<tr>
<td>11</td>
<td>Horizontal cavity barrier to have intumescent specified for the required cladding cavity. (342) Ø</td>
</tr>
<tr>
<td>12</td>
<td>AVCL to be sealed against the engineered timber to ensure continuous airtightness across the external wall. (352) Ø</td>
</tr>
</tbody>
</table>
CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

REF ITEM

1 60 min rated cavity barriers to be provided to all windows. (344)
2 Water and airtight membrane to seal between window frame and outer face to be installed prior to cavity barrier installation.
3 Encapsulation to all timber elements to be REI 60 and K2-60. (311)
4 End-grain sealant is to be provided to all slab and wall edges. (301)
5 Linear firestop to be provided to wall and slab edge to seal any potential gaps between LSF system and mass timber elements. (341)
6 Intumescent sealants are to be installed at plasterboard junctions. (312)
7 Full-fill mineral wool insulation to LSF framing over party wall junction. Insulation to be installed between vertical studs to prevent insulation from moving. (325)
8 Vertical cavity barrier to be aligned with internal compartmentation and rated for 60 mins. (343)
9 Vertical cavity barrier to be full-fill to the rear of cladding with zero gaps. (343)
10 Ensure the AVCL will be sealed against the engineered timber to ensure continuous airtightness across the external wall. (352)
The New Model Building uses a combination of internal load-bearing walls, floors, columns and beams constructed from engineered timber. These are fully encapsulated with gypsum board applied to achieve K2-60 classification with a maximum temperature limit of 200 degrees C. All structural timber elements to achieve REI 60 classification in accordance with BS EN 13501-2.

The encapsulation is fixed directly to the soffit before services are installed. This is to provide a robust layer of fire protection to the CLT slab. Light fittings and services must be installed in a suspended ceiling so they do not impact the performance of the encapsulation.

Test data from plasterboard manufacturers demonstrates that wall penetrations such as sockets do not affect the performance of the encapsulation, therefore encapsulation to timber walls and columns can be installed with a service void behind.

The designer must ensure all internal load-bearing walls, floors, columns and beams meet the relevant codes and standards.

**ENGINEERED TIMBER PERFORMANCE CRITERIA**

General performance criteria for engineered timber can be found in TRADA’s National Structural Timber Specification for Building Construction Version 2.0.

Further guidance and requirements can be found in the following documents:

- Minimum dimensions of timber sections: In accordance with BS EN 1995-1-1.
- Vibration performance: In accordance with BS 6472-1.
- Design life: In accordance with BS EN 1990: Category 4.
- Wood preservation: DIN 68800
- Procurement: CLT should be obtained from well-managed forests and/or plantations in accordance with PEFC or FSC accreditation schemes.

Use timber products only within the limits recommended by their manufacturers. Do not use timber products that are damaged or apparently defective.
INTERNAL STRUCTURE

FABRICATION TOLERANCES FOR ENGINEERED TIMBER

- Nominal dimensions of materials: The Harmonised Technical Specifications lists tolerances of nominal dimensions of timber products.
- Dimensions of elements: Table 2 in prEN 14732 Timber structures. Structural prefabricated wall, floor and roof elements. Requirements lists production tolerances of elements and openings.

ENGINEERED TIMBER ERECTION

Setting-out

Setting-out the building in accordance with BS 5964-1. Building setting out and measurement. Methods of measuring, planning and organisation and acceptance criteria. Measure any deviations relative to this system.

Handling and storage

Handle and store components safely and in a manner that minimises the risk of damage. Follow the method of handling and storage in the erection method statement.

Alignment of the structure

Align each part of the timber structure and stair within tolerances as soon as practicable after it has been erected. Do not make permanent connections between panels or elements until a sufficient amount of the structure or stair has been aligned, levelled, plumbed and temporarily connected to ensure that components will not be displaced during subsequent erection or alignment of the remainder of the structure or stair.

Take due account of the effects of temperature on the structure/stair and on tapes and instruments when measurements are made for setting out, during erection, and for subsequent dimensional checks. The reference temperature is 20°C.

Connections

Make permanent connections as work progresses to ensure that the structure remains correctly aligned, levelled and plumbed.

Damaged components

Assemble the structure in such a way that over-stressing of its members or connections is avoided. Replace members which are warped, split or badly fitting at the joints.

INTERNAL STRUCTURE

Remedial works

Employer to obtain the structural engineer’s and architect’s acceptance of remedial work.

If it is unacceptable to perform remedial work on site, modify or replace defective components before dispatch to site.

LININGS AND FINISHES

Internal load-bearing walls should be fully encapsulated with gypsum board applied to achieve Ka-60 classification in accordance with BS EN 13501-2 with a maximum temperature limit of 200 degrees C.

STA publication Vol 6 Fire Safety; Section 2.6.2 Encapsulation advocates a limiting temperature behind the inner lining of 200°C. The New Model Building performance specification for plasterboard reflects this requirement.

For minimum specification requirements as defined by the New Model Building design, refer to (310) in Fire Performance Specification.

TIMBER PRESERVATION

Preservation against moisture

The structural timber frame must be protected from moisture during construction and throughout the building’s life.

Moisture management in design, during construction and during the life of the building is described in the Design Philosophy Document within the Evidence document.
MOISTURE PROTECTION OF STRUCTURAL TIMBER

Once timber products absorb water above the intended in-service moisture content, then loss of strength, dimensional changes and a higher likelihood of decay will occur. Different structural timber products and species behave differently. The designer should consider how to reduce the risk of damage from moisture through all project stages. Early consideration of how to minimise moisture damage while the building is in use can reduce the likelihood and severity of leaks and related damage.

DETAILING, DURABILITY, STRUCTURAL INTEGRITY AND ROBUSTNESS

The NMB approach has been developed based on the following assumptions on detailing:

- All timber elements are kept within a Service Class 1 environment throughout their life (Dry and heated)
- No external timber or timbers at risk of wetting (service class 2 or 3)
- All ground floor perimeter timber walls/columns are to be stopped a minimum 150mm above the external ground level.
- All internal timber walls and columns to separate from the supporting slab/foundation with an appropriate DPC layer in accordance with NHBC TG No: 6.3/03

MOISTURE MANAGEMENT THROUGH DESIGN

During the design process, designers must pay careful attention to the detailing of areas at highest risk of leaks/moisture damage, such as: roofs; ‘wet’ areas with active plumbing fixtures; areas in contact with the ground floor slab and connections and fixings. Protection from moisture can be provided through a range of measures, from careful detailing and preventive designs to including practical measures for leak detection such as automatic cut-off valves. A vapour control layer must be provided to all walls and ceilings unless condensation risk analysis shows it is not required.

Further information can be found regarding roofs, ground floor details and penetrations in their respective sections.

‘WET’ AREAS

The design team should identify all areas in the building with active plumbing fixtures or appliances. Typically, these include bathrooms and kitchens, but also additional areas such as utility cupboards, cleaning facilities and cycle/refuse stores.

Protection and risk reduction strategies need to be implemented in all identified wet areas, some possible mitigations measures are outlined below:

- Localised timber joist construction: Install a timber joisted floor locally throughout the wet area. This reduces the risk of structural damage, improves drying times and allows for simplified remediation if needed.
- Or at least two of the following strategies should be adopted to ensure the use of timber is kept within Service Class 1:
  - Tanking membrane: Install a tanking membrane to a minimum of 1400mm AFFL throughout the wet area with a full height tanking membrane applied to areas of heavy exposure such as showers and baths. Additional protection can be provided by linking the tanking membrane to a gully that connects with the main waterproofing line e.g., tiles and grout with sanitary fixtures and bathroom furniture installed above. This mitigates the risk of water damage should a tap or pipe leak or an element overflow.
  - System leak detection monitor: A ‘smart’ leak detection monitor should be installed to the mains water connection, monitoring the building’s water flow and pressure. A valve associated with the monitor will automatically shut off the supply should a leak be detected to reduce consequential damage. Leak detection to be in accordance with BS EN 13160-1:2016 Leak detection systems.
  - Local leak detection system: A ‘smart’ leak detection needs to be installed in all high risk locations, such as under/near plumbing fixtures. When water or high humidity occurs, sensors set off a physical alarm or trigger an alert sent via WiFi to the building management system. Detectors connected to mains power with battery back up must be used to ensure continuity of protection. Leak detection to be in accordance with BS EN 13160-1:2016 Leak detection systems.
- Ventilation zone: Provide provision for a 50mm ventilation zone to allow any moist timber to dry out.
- Preservative treatment: Apply a service class 2 treatment to WPA guidance. Timber elements can be factory treated or treatment can be site applied. Information on treatment needs to be sent and confirmed with NHBC prior to application and installation.
MOISTURE MANAGEMENT DURING CONSTRUCTION

When designers/developers submit an application to NHBC using the New Model Building Philosophy they must incorporate a Risk Assessment and Method Statement (RAMS) to outline the design, methods, and requirements for protecting the system from weather exposure and mechanical damage during storage, transportation and installation.

Engineered timber is vulnerable to moisture damage during construction from several sources: precipitation, humidity, ambient sources, and mechanical, plumbing and fire protection. The project team must ensure that as part of the RAMS an on-site moisture management control plan (MMCP) is provided before construction, for use during fabrication, delivery to site, erection and delivery phases. MMCPs must be specific to the project. MMCPs must be developed in conjunction with the timber supplier and project engineer.

Refer to the following guidance for details of what should be included in an MMCP:

- TRADA’s National Structural Timber Specification, Section 4.7: Moisture Content Control Plan
- Swedish Wood/TDUK’s Moisture-proof CLT construction without a full temporary shelter Edition 1:2022
- STA Moisture management strategy, process guidance for structural timber buildings, Version 1.0, July 2022
- STA Technical Note 23 - Durability by design – mass timber structures – STA 2021-https://members.structuraltimber.co.uk/get-download/16129
- STA Technical Note 24 - Moisture protection during construction

The MMCP should include moisture management statements that will include but not be limited to a methodology for the following, where relevant:

- Removing free water and snow immediately e.g. by brushing or hoovering water off the timber
- The design of temporary weather protection to avoid the risk of standing water on tops of volumetric units.
- Specification of sheeting for damp-proofing must be breathable. Membranes must be specified to ensure they are fit for purpose and achieve compliance with NHBC Technical Requirement R4 c) iii) proper protection during storage and v) protection against weather during construction (including excessive heat, cold, wetting or drying)
- A statement on the maximum duration that temporary water protection measures can be applied. Exposure time limits for protection materials e.g. unit wrappings, breather membranes, roof membranes shall be controlled for both external storage and following installation until permanent claddings are installed.

- Details of any temporary openings that may be required in the protection layers e.g. for lifting installation/connection of units.
- How water can escape and how ventilation can be implemented in conjunction with regular quality assurance checks.
- CLT elements with high moisture content must dry out, moisture checks must be conducted on an ongoing basis. The surface moisture content should be no more than 18 % prior to enclosure.
- Damp-proofing of end-grain wood, element joints and connections.
- The process for ensuring the continuity of temporary weathering post installation and quality assurance checks.
- How seals between units and sealing around lifting points are installed.
- The choice of protection materials shall be suitable for use in cold or wet conditions.
- Ensure UV exposure of protective membranes does not cause degradation.

ON-SITE MOISTURE MEASUREMENTS

The expected moisture content of mass timber in the finished building is in the range of 14-18%. The moisture content of engineered timber elements must be recorded in an on-site moisture monitoring document. This must include a matrix of components and their target moisture contents at key milestones. Most notably during the build and particularly before the components is covered.

Refer to BM Trada’s WIS 4-14 Moisture in timber and BS EN 13183-2:2002 for further information on moisture measurement and Swedish Wood/TDUK’s Moisture-proof CLT construction without a full temporary shelter Edition 1:2022 for instruction on the type of moisture probes to use and how to use them.

TIMBER INSTALLATION PROGRAMME AND CRITICAL FOLLOW-ON TRADES

The construction programme should ensure engineered timber is covered as soon as installation is complete. The contractor should allow for the provision of interim protection should any unforeseen changes to the programme occur, such as delays to follow-on subcontractor packages or the completion of engineered timber installation ahead of programme.
TEMPORARY PROTECTION CONSIDERATIONS

The timber structure should be protected from moisture caused by adverse weather conditions. The MMCP should specify the type of protection chosen for the building phase and an estimate on the necessary protection duration. Options for protection include:

- Providing a high level temporary shelter that covers all exposed timber
- Applying a temporary waterproofing membrane to the engineered timber prior to installation suitable to protect for short periods of time. Base protection should be lapped up one side only to allow moisture to drain. Note, temporary membranes do not preclude the need for testing elements for moisture content during construction.
- Lose laid sheeting protection can be used for short periods of time to provide interim protection, for example overnight protection while installing a roofing membrane, however it is not a suitable measure for longer durations as can cause moisture to build underneath.
- Ensuring all areas are allowed to dry and moisture content to return to below 18% before works continue and made weather tight.

END GRAIN PROTECTION

The end grain of engineered timber can be vulnerable to moisture damage. Applying a coloured end grain sealer to all cut openings and penetrations protects from moisture ingress:

- Apply a coloured end-grain sealer to end grain surfaces of engineered timber before delivery to site.
- When on site, apply additional coloured end grain sealer to prevent the ingress of water into engineered timber products that will be exposed in the permanent works. Areas of application include: bases of all wall panels at all levels and external ends of floor and roof panels.
- Apply the end grain sealer at the ends of the elements and continue along the adjacent face by at least 50mm.
- Further protection is provided through taping joints with waterproofing/air tightness tape to prevent water from tracking to unprotected end grain.

MOISTURE MANAGEMENT POST COMPLETION

Occupants must be aware of the risks and seek assistance if any leaks or damage from moisture is found. In most cases if moisture is discovered early and is allowed to dry out, the timber will be undamaged.

REMEDICATION STRATEGY

If engineered timber is found to have been exposed to moisture, the affected area should be assessed to determine the extent of any damage and a suitable remediation strategy. The assessment should consider the following:

- Total area of engineered timber exposed to moisture
- How long the engineered timber has been exposed to moisture
- Depth of moisture exposure to the engineered timber elements
- Presence of mould or decay to the engineered timber
- Ability to dry the affected area, including factors such as site access, exposure, reliance on secondary contractors etc.

In many cases, allowing the timber to dry to a moisture content of <20% will be sufficient and the engineered timber will not need to be replaced, however if the assessment recommends repair or replacement, this work should be carried out by a contractor familiar with the material. Methods for this will depend on the extent of the damage, but will typically include:

- Surface lamella damage: rout and infill with locally supplied plywood or chipboard with a suitable structural assessment.
- Multi-lamella damage: rout and infill with locally supplied plywood or CLT panel board with a suitable structural assessment.
- Largescale multi-lamella damage: partial or full panel replacement with a suitable structural assessment.
The below principles should be applied to all details.

1. Internal load-bearing walls should be fully encapsulated with gypsum board applied to achieve K2-60 classification in accordance with BS EN 13501-2 with a max limit temperature of 200 degrees C.

2. Vibration for floors should be assessed and designed out in accordance with UK NA to BS EN 1995.

3. Fire test data should also be provided to demonstrate REI 60 performance of the encapsulation system.

4. If the site is located in an area with a high risk of House Longhorn Beetles and additional measures are required in accordance with Approved Document A, then a preservative such as - Imprägnierung Klasse 2 zum Schutz vor Pilz- und Insektenbefall entsprechend DIN 68800 should be applied to the timber.

5. Frame to be designed in accordance with performance criteria for engineered timber to TRADA’s National Structural Timber Specification for Building Construction Version 2.0.

6. Timber must be sourced from well-managed forests and/or plantations in accordance with PEFC or FSC accreditation schemes.

7. Basis of loadings and their combinations as defined in the UK by NA to BS EN 1990 and BS EN 1991.

8. The timber structure should be designed and detailed to provide sufficient robustness against disproportionate collapse in accordance with the Building Regulations Part A.


10. Demonstrate moisture protection methods during the use of the building.

11. Provide at least two methods of protection and risk reduction strategies to all identified wet areas.

12. The designer must ensure each element of the internal load bearing walls, floors, columns and beams meets the relevant codes and standards.

13. End grain sealant to all penetrations and edges of element.

14. Acoustic performance is project specific. Designers must therefore ensure that the floor meets the applicable British Standards and local planning guidance on acoustic performance.
CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

REF ITEM

1. Internal load-bearing walls (302) should be fully encapsulated with gypsum board applied to achieve K2-60 classification in accordance with BS EN 13501-2 with a max limit temperature of 200 degrees C (311).

2. Design team to establish acoustic requirements and provide evidence of wall and floor performance.

3. The size and location of voids and insulation (317) used to provide service zones and meet acoustic requirements must be in accordance with K2-60 encapsulation limitations.

4. Encapsulation must be continuous. If fixing brackets (304) cause obstructions these must be over boarded with encapsulation. Recessed brackets can be used to simplify encapsulation installation.

5. Intumescent sealants are to be installed at plasterboard junctions (312).

6. Sockets can be surface mounted or recessed using REI 60 tested back boxes in accordance with plasterboard manufacturer details.
CHECKLIST
Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

1. Internal load-bearing timber walls (302) should be fully encapsulated with gypsum board applied to achieve K2-60 classification in accordance with BS EN 13501-2 with a max limit temperature of 200 degrees C (311).

2. Soffit to all floor slabs (302) should be fully encapsulated with gypsum board applied to achieve K2-60 classification in accordance with BS EN 13501-2 with a maximum limit temperature of 200 degrees C (311).

3. Design team to establish project acoustic requirements and provide evidence of wall and floor construction.

4. The size and location of voids and insulation (317) used to provide service zones and meet acoustic requirements must be in accordance with K2-60 encapsulation limitations.

5. Encapsulation must be continuous. If fixing brackets (304) causes obstructions these must be over boarded with encapsulation. Recessed brackets can be used to simplify encapsulation installation.

6. Plasterboard junctions are to be set out so intumescent sealants will not fall out with gravity (312).

7. Sockets can be surface mounted or recessed using REI 60 tested back boxes in accordance with plasterboard manufacturer details.
GENERAL APPROACH

The interface with the ground floor slab is a high risk area in all buildings regardless of the material used for the superstructure. Particular attention needs to be paid where mass timber meets the ground. The New Model Building addresses the key risk details at the base of an external wall and the base of an internal structural timber element.

EXTERNAL WALL INTERFACE

The external wall interface with the ground must provide a robust barrier to prevent moisture from entering the building. The New Model Building system does not permit timber to be installed as part of the external wall system, therefore this detail needs to satisfy all of NHBC’s standard technical requirements which include:

- All framing elements are required to sit on an upstand with a minimum of 150mm above external ground level.
- External ground should fall away from the property with sufficient perimeter drainage.

INTERNAL STRUCTURE INTERFACE

Where engineered timber internal load bearing walls or columns are in contact with the ground floor slab the bottom of the timber must be on or above the internal finished floor level on a brick, block, or concrete upstand to prevent undetected moisture building up underneath floor finishes and affecting the timber. A DPC and end grain sealant must be installed to prevent moisture from wicking into the timber.

Note: end grain sealers are not waterproof and do not prevent timber from absorbing moisture, they merely slow the process, elevating timber to above finished floor level reduces the risk of the timber coming into contact with moisture.

SEQUENCING

The principles for installing an upstand and connecting a mass timber element to the ground floor slab have been illustrated in the details and sequencing diagrams.
The below principles should be applied to all details.

**KEY DETAILS**

**DESCRIPTION**

1. Ensure all elements in the external wall are of A2-s1,d or better in accordance with BS EN 13501 unless excluded via Regulation 7(3).
2. External wall elements to use a non-load bearing continuous LSF system supported from the top of the floor slab above and sit on a continuous upstand.
3. All external wall construction to have a minimum upstand height of 150mm above external ground level.
4. DPM waterproofing membrane to form a continuous waterproofing barrier and be connected to the DPC to the top of the upstand.
5. All joints and penetrations in the DPM should be lapped and taped in accordance with the manufacturer’s guidance.
6. Localised drainage provided to all level access thresholds to NHBC requirements.
7. Provide fire test data of external wall construction showing REI 60 from outside and inside.
8. External cladding system to use a ventilated cavity.
9. Close all cavities at the top and bottom of walls, around openings and penetrations, and at separating walls and floors.
10. Cladding specification - to a height of 1.5m above ground - will need to be suitable for Use Class A (publicly accessible, vandal prone) or B (not vandal prone) and meet the requirements of NHBC Technical Standards 2023 and BS 8200:1985 Code of Practice.

**EXTERNAL**

- Ensure all elements in the external wall are of A2-s1,d or better in accordance with BS EN 13501 unless excluded via Regulation 7(3).
- External wall elements to use a non-load bearing continuous LSF system supported from the top of the floor slab above and sit on a continuous upstand.
- All external wall construction to have a minimum upstand height of 150mm above external ground level.
- DPM waterproofing membrane to form a continuous waterproofing barrier and be connected to the DPC to the top of the upstand.
- All joints and penetrations in the DPM should be lapped and taped in accordance with the manufacturer’s guidance.
- Localised drainage provided to all level access thresholds to NHBC requirements.
- Provide fire test data of external wall construction showing REI 60 from outside and inside.
- External cladding system to use a ventilated cavity.
- Close all cavities at the top and bottom of walls, around openings and penetrations, and at separating walls and floors.
- Cladding specification - to a height of 1.5m above ground - will need to be suitable for Use Class A (publicly accessible, vandal prone) or B (not vandal prone) and meet the requirements of NHBC Technical Standards 2023 and BS 8200:1985 Code of Practice.

**INTERNAL**

- Where engineered timber internal load bearing walls or columns are in contact with the ground floor slab the bottom of the timber must be at or above the internal finished floor level on a brick, block or concrete upstand.
- DPC to be installed to upstand and end grain sealant applied to the end of all timber elements. (p.30&303)
### CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Where engineered timber internal load-bearing walls or columns are in contact with the ground floor slab the bottom of the timber must be at or above the internal finished floor level on a brick, block or concrete upstand.</td>
</tr>
<tr>
<td>2</td>
<td>DPC to be installed to upstand and protrude 100mm beyond the edge of the timber element.</td>
</tr>
<tr>
<td>3</td>
<td>End grain sealant applied to the end of all timber elements. (306&amp;303)</td>
</tr>
<tr>
<td>4</td>
<td>Internal load-bearing walls (302) should be fully encapsulated with gypsum board applied to achieve Ka-60 classification in accordance with BS EN 13501-2 with a max limit temperature of 200 degrees C (311).</td>
</tr>
<tr>
<td>5</td>
<td>The size and location of voids and insulation (317) used to provide service zones and meet acoustic requirements must be inline with Ka-60 encapsulation limitations.</td>
</tr>
<tr>
<td>6</td>
<td>Encapsulation must be continuous. If fixing brackets (304) causes obstructions these must be over boarded with encapsulation. Recessed brackets can be used to simplify encapsulation installation.</td>
</tr>
</tbody>
</table>
### CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engineered timber internal load-bearing walls or columns must be at or above the internal finished floor level on a brick, block or concrete upstand.</td>
</tr>
<tr>
<td>2</td>
<td>DPC to be installed to upstand and protrude 100mm beyond the edge of the timber element.</td>
</tr>
<tr>
<td>3</td>
<td>End grain sealant must be applied to the end of all timber elements.</td>
</tr>
<tr>
<td>4</td>
<td>Internal load-bearing walls should be fully encapsulated with gypsum board applied to achieve K2-60 classification in accordance with BS EN 13501-2 with a max limit temperature of 200 degrees C.</td>
</tr>
<tr>
<td>5</td>
<td>The size and location of voids and insulation used to provide service zones and meet acoustic requirements must be in line with K2-60 encapsulation limitations.</td>
</tr>
<tr>
<td>6</td>
<td>Encapsulation must be continuous. If fixing brackets cause obstructions these must be over boarded with encapsulation. Recessed brackets can be used to simplify encapsulation installation.</td>
</tr>
</tbody>
</table>

---

**Diagram:**

- **NMB - IW-01-A**
- **WALL LINING BOARD (311)**
- **WALL LINING INSULATION (317)**
- **SLAB CONNECTION (324)**
- **End grain sealer**
- **DPC membrane extends min. 100mm beyond CLT thickness**
- **Base of internal walls to be at or above internal finished floor level**
- **Acoustic flanking strip**

---

**Ground Slab Details - Section 2**

**New Model Building**

**PROJECT DATE:** 22/09/2023
CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

REF ITEM

1. Cladding specification - to a height of 1.5m above ground - will need to be suitable for Use Class A (publicly accessible, vandal prone) or B (not vandal prone) and meet the requirements of NHBC Technical Standards 2023 and BS 8200:1985 Code of Practice.

2. Ensure all elements in the external wall are of A2-s1,d0 or better in accordance with BS EN 13501 unless excluded via Regulation 7(3).

3. External wall elements to use a non-load-bearing continuous LSF system supported from the top of the floor slab above and sit on a continuous upstand.

4. All external wall construction to have a minimum upstand height of 150mm above external ground level.

5. DPM waterproofing membrane to form a continuous waterproofing barrier and be connected to the DPC at the top of the upstand.

6. All joints and penetrations in the DPM should be lapped and taped in accordance with the manufacturer’s guidance.

7. Provide localised drainage to all level access thresholds to NHBC requirements.

8. Provide fire test data of external wall construction showing REI 60 from outside and inside. [323]

9. Close all cavities at the top and bottom of walls, around openings and penetrations, and at separating walls and floors. [333-342]

10. Internal wall lining boards provide finish encapsulation to the external wall system. External wall build-up and products specified must demonstrate fire performance of REI 60 minutes. [318]

11. Provide an airtight vapour control layer to the internal lining of the EWS. [352]
GENERAL APPROACH

The New Model Building approach has two roof construction options: flat roofs (<10° roof angle) or pitched roofs (>10° roof angle). Flat roofs must be constructed from a lightweight timber roof system, whereas pitched roofs can be either constructed from CLT panels or a lightweight timber roof system.

If the overall building height exceeds 15 metres, all roof decking within 1.5m of any separating walls must be non-combustible in accordance Approved Document B (Diagram 8.2).

All parapet walls are to be constructed from non-combustible materials and considered as external walls. They must therefore not be constructed from CLT or other timber components.

Proprietary waterproofing systems applied to roofs and terraces should be expected to fail during the building's lifespan, therefore the design must prevent an accumulation of standing water. The designer needs to consider ways to ensure the early detection of moisture. Examples of this include:

- Provision of overflow outlets to all roof areas to discharge standing water.
- Provide small pilot holes in the roof/terrace structure at the lowest point of deflection. This can alert building occupants to standing water leaks more quickly.
- Provide inspection holes under parapet gutters.

SEQUENCING

1. Produce/consult the comprehensive on-site Risk Assessment and Method Statement (RAMS) and moisture management control plan (MMCP) refer to Waugh Thistleton NMB Design Philosophy Document in the Evidence book for guidance on content of the RAMS and MMCP.

2. Construct structural roof decking.


4. Apply roof build-up in a way that the area covered remains protected and water can not track back into the covered areas.
The below principles should be applied to all details.

1. All timber is to be tested to <18% moisture content prior to installation of any coverings.

2. Parapet walls, lift overruns and other protruding vertical elements must not be constructed from CLT or other timber components.

3. For CLT roof decks a minimum roof angle of 1:5.5/10° is required.

4. Other lightweight roof systems must allow for a minimum fall of 1:40/1.5° so water can run off.

5. Terraces must be constructed from a lightweight system and allow for a minimum fall of 1:40/1.5° so water can run off.

6. If the overall building height exceeds 15 metres, all roof decking within 1.5m of any separating walls must be non-combustible in accordance with Approved Document B (Diagram 5.2).

7. Condensation risk analysis must be carried out for the construction build-up of all timber roofs and terraces, analysing the type, thickness and location of the insulation material.

8. Proprietary waterproofing systems applied to roofs and terraces should be expected to fail during the building’s lifespan. As such the designer needs to consider ways to ensure the early detection of moisture and prevent standing water.

9. The roof and/or terrace must be protected from moisture during construction and throughout the building’s life.

10. The specification of roof coverings should be in accordance with AD Part B and as designated by BS 899-2:2015 Table 8 or equivalent European classifications.

KEY DETAILS

- Mass timber primary structure
- A2-s1,d0 Non-loadbearing external wall construction
- K2 REI 60 Encapsulation to timber
- Fire cavity barriers
- Waterproofing strategy
- Roof finishes

DESCRIPTION

- Junction with core
- Parapet junction
- Junction with external wall
- Junction with party wall
CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

REF ITEM

1. All timber is to be tested to be ≤18% moisture content dry prior to installation of any coverings. (362&363)

2. Parapet walls, lift overruns and other protruding vertical elements must not be constructed from CLT or other timber components. (NMB EW-01)

3. For CLT roof decks a minimum roof angle of ≤5.5/10° is required. (363)

4. Other lightweight roof systems must allow for a minimum fall of ≤40/1.5° so water can run off. (362)

5. Terraces must be constructed from a lightweight system and allow for a minimum fall of ≤40/1.5° so water can run off.

6. End-grain sealant is to be provided to all slab and wall edges. (203)

7. Encapsulation to all timber elements to be REI 60 and K2-60. (311)

8. Intumescent sealants are to be installed at plasterboard junctions. (312)

9. Close all cavities at the top and bottom of walls, as well as around openings and penetrations, and at separating walls and floors. (333&342)

10. Proprietary waterproofing systems applied to roofs and terraces should be expected to fail during the building’s lifespan, as such the designer needs to consider ways to ensure the early detection of moisture and prevent standing water. (361)

11. The specification of roof coverings should be in accordance with AD Part B and as designated by BS 9991:2019 Table 8 or equivalent European classifications. (361)
CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

REF ITEM

1. All timber is to be tested to <18% moisture content prior to installation of any coverings. (362 & 363)

2. Parapet walls, lift overruns and other protruding vertical elements must not be constructed from CLT or other timber components. (NMB EW-01)

3. For CLT roof decks a minimum roof angle of 1:5.5/10° is required. (363)

4. Other lightweight roof systems must allow for a minimum fall of 1:40/1.5° so water can run off. (362)

5. Terraces must be constructed from a lightweight system and allow for a minimum fall of 1:40/1.5° so water can run off.

6. End-grain sealant is to be provided to all slab and wall edges. (303)

7. Encapsulation to all timber elements to be REI 60 and K2-60. (311)

8. Intumescent sealants are to be installed at plasterboard junctions. (312)

9. Close all cavities at the top and bottom of walls, around openings and penetrations, and at separating walls and floors. (333 & 342)

10. Proprietary waterproofing systems applied to roofs and terraces should be expected to fail during the building’s lifespan, as such the designer needs to consider ways to ensure the early detection of moisture and prevent standing water. (361)

11. The specification of roof coverings should be in accordance with AD Part B and as designated by BS 9991:2015 Table 8 or equivalent European classifications. (361)
Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>CHECKLIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All timber is to be tested to be &lt;18% moisture content dry prior to installation of any coverings. (362&amp;363)</td>
</tr>
<tr>
<td>2</td>
<td>Parapet walls, lift overruns and other protruding vertical elements must not be constructed from CLT or other timber components. (NMB EW-01)</td>
</tr>
<tr>
<td>3</td>
<td>For CLT roof decks a minimum roof angle of 1:5.5/10° is required. (363)</td>
</tr>
<tr>
<td>4</td>
<td>Other lightweight roof systems must allow for a minimum fall of 1:40/1.5° so water can run off. (362)</td>
</tr>
<tr>
<td>5</td>
<td>Terraces must be constructed from a lightweight system and allow for a minimum fall of 1:40/1.5° so water can run off.</td>
</tr>
<tr>
<td>6</td>
<td>End-grain sealant is to be provided to all slab and wall edges. (203)</td>
</tr>
<tr>
<td>7</td>
<td>Encapsulation to all timber elements to be REI 60 and K2-60. (311)</td>
</tr>
<tr>
<td>8</td>
<td>Intumescent sealants are to be installed at plasterboard junctions. (312)</td>
</tr>
<tr>
<td>9</td>
<td>Close all cavities at the top and bottom of walls, around openings and penetrations, and at separating walls and floors. (333&amp;342)</td>
</tr>
<tr>
<td>10</td>
<td>Proprietary waterproofing systems applied to roofs and terraces should be expected to fail during the building’s lifespan, as such the designer needs to consider ways to ensure the early detection of moisture and prevent standing water. (361)</td>
</tr>
<tr>
<td>11</td>
<td>The specification of roof coverings should be in accordance with AD Part B and as designated by BS 9991:2019 Table 8 or equivalent European classifications. (361)</td>
</tr>
</tbody>
</table>
### CHECKLIST

Please refer to the performance specification information (p. 116-119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>If the overall building height exceeds 15 metres, all roof decking within 1.5m of any separating walls must be non-combustible in accordance with Approved Document B (Diagram 5.2). (364)</td>
</tr>
<tr>
<td>2</td>
<td>All timber is to be tested to &lt;18% moisture content prior to installation of any coverings. (362&amp;363)</td>
</tr>
<tr>
<td>3</td>
<td>For CLT roof decks a minimum roof angle of 1:5.5/10° is required. (363)</td>
</tr>
<tr>
<td>4</td>
<td>Other lightweight roof systems must allow for a minimum fall of 1:40/1.5° so water can run off. (362)</td>
</tr>
<tr>
<td>5</td>
<td>Terraces must be constructed from a lightweight system and allow for a minimum fall of 1:40/1.5° so water can run off.</td>
</tr>
<tr>
<td>6</td>
<td>End-grain sealant is to be provided to all slab and wall edges. (203)</td>
</tr>
<tr>
<td>7</td>
<td>Encapsulation to all timber elements to be REI 60 and K2-60. (311)</td>
</tr>
<tr>
<td>8</td>
<td>Intumescent sealants are to be installed at plasterboard junctions. (312)</td>
</tr>
<tr>
<td>9</td>
<td>Proprietary waterproofing systems applied to roofs and terraces should be expected to fail during the building's lifespan, as such the designer needs to consider ways to ensure the early detection of moisture and prevent standing water. (361)</td>
</tr>
<tr>
<td>10</td>
<td>The specification of roof coverings should be in accordance with AD Part B and as designated by BS 5950:2013 Table 8 or equivalent European classifications. (361)</td>
</tr>
</tbody>
</table>
1. Engineered timber structure
2. Steel balcony bracket fixed to engineered timber structure
3. Liquid waterproofing sealtant applied to steel balcony bracket
4. Linear freestop fixed to slab
5. Thermally broken balcony connector fixed to steel balcony
6. Facade/slab connections fixed to engineered timber structure
7. Light steel framing system fixed to engineered timber slab
8. Balcony fixing installed
9. Full fill insulation applied to slab edge
10. Sheathing board added; breather membrane installed
11. Cavity barriers installed at slab edge and surrounding balcony fixing filled with mineral wool
12. Helping hand brackets installed
13. Rainscreen insulation installed; fixing system installed
14. Cladding and fascia board installed
15. Prefabricated balcony installed
16. Wall lining insulation installed to light steel framing system
17. Vapour control layer installed and taped to engineered timber
18. Encapsulation applied to steel
19. Floor finishes installed
20. Wall finishes and skirting installed

**GENERAL APPROACH**

Where required, the New Model Building uses prefabricated steel balconies, either fixed to the engineered timber structure or as independent steel structures. The design of these is not specific to the system and the designer should ensure compliance with all relevant standards and guidance.

Following the principles shown in the details, designers should ensure the steel balcony bracket is fully encapsulated with gypsum board to achieve K2-60 classification in accordance with BS EN 13501-2 and surrounded by cavity barriers with infilled mineral wool insulation.

Balcony connections that fix back to the internal structure can be at risk of providing a path for moisture to track to the internal structure. To mitigate this risk, liquid waterproofing must be applied to the balcony brackets and additional barriers provided at key junctions, for example at the thermal break. All balcony connections should be thermally broken with evidence of performance and condensation risk analysis.

**SEQUENCING**

The principles for connecting the balcony to the structure are illustrated in the sequencing diagrams to the left.

**CONNECTION SYSTEMS**

**System 1: balcony connected back to floor slab**

**System 2: structurally independent balcony system**
The below principles should be applied to all details.

1. Balconies are to be fixed with steel fixings either back to the engineered timber or as an independent structure.
2. Balcony brackets are to be wetproofed to mitigate the risk of moisture tracking back to the structure.
3. The sequence of installing balconies and providing moisture protection is to be coordinated between design and construction teams.
4. All internal balcony brackets should be fully encapsulated with K2-60 protection.
5. Cavity fire barriers are to be provided around primary brackets and coordinated with barriers for compartmentation to provide a continuous line of compartmentation.
6. Bracketry to be sealed to sheathing board and breather membrane.
**CHECKLIST**

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Balcony connections are to be coordinated with façade slab connections. (324)</td>
</tr>
<tr>
<td>2</td>
<td>All balcony and façade connections to be encapsulated. (326)</td>
</tr>
<tr>
<td>3</td>
<td>Liquid-applied waterproofing sealant to be applied to fixings to ensure water does not track back into the primary structure.</td>
</tr>
<tr>
<td>4</td>
<td>Balcony to be thermally broken. Calculations to be undertaken by the design team</td>
</tr>
<tr>
<td>5</td>
<td>Bracketry to be sealed to sheathing board and breather membrane.</td>
</tr>
</tbody>
</table>

**TYPICAL BALCONY CONNECTION PLAN**
**CHECKLIST**

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

**REF ITEM**

1. Balcony brackets are to be waterproofed and mitigate the risk of moisture tracking back to the structure.

2. The sequence of installing balconies and providing moisture protection to be coordinated between design and construction teams.

3. Linear fire stops are to be installed to fill any voids between the structure and bracketry.

4. All internal balcony brackets should be fully encapsulated with K2-60 protection. (326)

5. Cavity fire barriers are to be provided around primary brackets and coordinated with barriers for compartmentation to provide a continuous line of compartmentation. (324)

6. Bracketry to be sealed to sheathing board and breather membrane. (323)
## Checklist

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

### REF ITEM

1. Balcony brackets are to be wetproofed to mitigate the risk of moisture tracking back to the structure.

2. The sequence of installing balconies and providing moisture protection to be coordinated between design and construction teams.

3. All internal balcony brackets should be fully encapsulated with Ka-60 protection. (326)

4. Cavity fire barriers to be provided around primary brackets and coordinated with barriers for compartmentation to provide a continuous line of compartmentation. (324)

5. Cavity fire barriers to doors and windows to be coordinated with cavity barriers to primary brackets to ensure a continuous line of compartmentation. (344)

6. Balcony bracketry to be coordinated with door openings and façade connectors.

---

**EXTERNAL DOOR THRESHOLD PLAN**

- VAPOUR CONTROL LAYER (352)
- EPDM
- CLADDING (333)
- CAVITY BARRIER TO WINDOWS (344)
- WALL LINING BOARD (311)
- SHEATHING BOARD (322)
- RAINSCREEN INSULATION (332)
- BREATHER MEMBRANE (351)
- LIGHT STEEL FRAMING SYSTEM (321)
- Balcony fixing by supplier

---

**CLADDING**

- (333)
- (323)
- (311)
- (332)
- (331)
- (321)
- (351)
- (352)
**CHECKLIST**

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Balcony brackets are to be wetproofed to mitigate the risk of moisture tracking back to the structure.</td>
</tr>
<tr>
<td>2</td>
<td>The sequence of installing balconies and providing moisture protection to be coordinated between design and construction teams.</td>
</tr>
<tr>
<td>3</td>
<td>Linear fire stops to be installed to fill any voids between structure and bracketry.</td>
</tr>
<tr>
<td>4</td>
<td>All internal balcony brackets should be fully encapsulated with Ka-6o protection. (326)</td>
</tr>
<tr>
<td>5</td>
<td>Cavity fire barriers to be provided around primary brackets and coordinated with barriers for compartmentation to provide a continuous line of compartmentation. (324)</td>
</tr>
<tr>
<td>6</td>
<td>Cavity fire barriers to doors and windows to be coordinated with cavity barriers to primary brackets to ensure a continuous line of compartmentation.</td>
</tr>
<tr>
<td>7</td>
<td>Bracketry to be sealed to sheathing board and breather membrane. (323)</td>
</tr>
<tr>
<td>8</td>
<td>Balcony bracketry to not obstruct waterproofing to door threshold.</td>
</tr>
<tr>
<td>9</td>
<td>Balcony bracketry to be coordinated with door openings and façade connectors.</td>
</tr>
</tbody>
</table>
GENERAL APPROACH

In general, penetration locations and sizes should be coordinated to minimise the amount and size of openings and voids that need to be filled.

Typical penetrations shown in the standard details demonstrate example methods for fire stopping to ensure the fire performance of the wall/floor is maintained around the opening. On each project, the designer must seek confirmation from the manufacturer that the specified fire-stopping products are suitable to be used in each application and will achieve the required 60 minutes REI fire performance. This could be through following manufacturer’s standard details or through project-specific, bespoke fire engineering judgements.

SEQUENCING

Careful attention and coordination need to be applied to each penetration. A typical construction sequence could be:

1. CLT erected
2. Penetration to have end grain sealant applied if not applied off-site
3. Penetration to be covered during construction until services are to be installed.
4. Service pipework installed.
5. Weatherproofing to be installed to servicing and penetrations.
6. Encapsulation to timber applied and sealed to pipework.
7. Voids between pipework and mass timber elements to be backfilled with mineral wool.
8. Fire stopping products to be installed to manufacturers’ requirements to match standard detail or project-specific bespoke engineering judgements.
GENERAL CHECKLIST

The below principles should be applied to all details.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material of pipework / service to be identified for each penetration.</td>
</tr>
<tr>
<td>2</td>
<td>Fire-stopping product to be suitable for size and material of pipe</td>
</tr>
<tr>
<td>3</td>
<td>End-grain sealant to be applied to all openings in mass timber elements.</td>
</tr>
<tr>
<td>4</td>
<td>Fire stopping product to be installed at compartment line and to be installed to manufacturers’ requirements to match standard detail or project-specific bespoke engineering judgements.</td>
</tr>
<tr>
<td>5</td>
<td>All remaining voids between pipework/service and mass timber to be filled with mineral wool.</td>
</tr>
</tbody>
</table>

DESCRIPTION

- Mass timber primary structure
- K2 REI 60 Encapsulation to timber

KEY DETAILS

Penetration to party wall  
Penetration to shaft  
Penetration to internal walls/slab  
Penetration to façade  
Penetrations to roof
CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

1. Material of pipework/service to be identified for each penetration.
2. Fire-stopping product to be suitable for size and material of pipe. (314)
3. End-grain sealant is to be applied to all openings in mass timber elements. (301 & 302)
4. Mineral wool to be provided in voids around pipework/service and mass timber voids.
5. Fire stopping product to achieve the required 60 minutes REI fire performance and be installed to manufacturers’ requirements to match standard detail or project-specific bespoke engineering judgements.
6. Internal load-bearing timber walls (302) should be fully encapsulated with gypsum board applied to achieve K2-60 classification in accordance with BS EN 13501-2 with a max limit temperature of 200 degrees C. (311)
7. Soffit to all floor slabs (302) should be fully encapsulated with gypsum board applied to achieve K2-60 classification in accordance with BS EN 13501-2 with a max limit temperature of 200 degrees C. (311)
CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

REF ITEM

1 Internal load-bearing timber elements (302) should be fully encapsulated with gypsum board applied to achieve K2-60 classification in accordance with BS EN 13501-2 with a max limit temperature of 200 degrees C. (311&320)

2 Line of encapsulation to be continuous with no areas of exposed timber.

3 Non-loadbearing shaft wall linings to be designed to suit compartmentation requirements. (320)

4 Soffit to all floor slabs (302) should be fully encapsulated with gypsum board applied to achieve K2-60 classification in accordance with BS EN 13501-2 with a max limit temperature of 200 degrees C. (311)

5 End-grain sealant is to be applied to all openings in mass timber elements. (302)
**CHECKLIST**

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material of pipework/service to be identified for each penetration.</td>
</tr>
<tr>
<td>2</td>
<td>Fire-stopping product to be suitable for size and material of pipe. (314)</td>
</tr>
<tr>
<td>3</td>
<td>End-grain sealant is to be applied to all openings in mass timber elements. (301 &amp; 302)</td>
</tr>
<tr>
<td>4</td>
<td>Fire-stopping product to achieve the required 60 minutes REI fire performance and be installed to manufacturers’ requirements to match standard detail or project-specific bespoke engineering judgements.</td>
</tr>
<tr>
<td>5</td>
<td>Mineral wool to be provided in voids around pipework/service and mass timber voids.</td>
</tr>
<tr>
<td>6</td>
<td>Internal load-bearing timber walls (302) should be fully encapsulated with gypsum board applied to achieve Ka-60 classification in accordance with BS EN 13501-2 with a max limit temperature of 200 degrees C. (311)</td>
</tr>
<tr>
<td>7</td>
<td>Ka-60 encapsulation to be used to box in services to ensure all mass timber elements and openings are fully encapsulated.</td>
</tr>
<tr>
<td>8</td>
<td>Soffit to all floor slabs (302) should be fully encapsulated with gypsum board applied to achieve Ka-60 classification in accordance with BS EN 13501-2 with a max limit temperature of 200 degrees C. (311)</td>
</tr>
</tbody>
</table>
CHECKLIST
Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material of pipework/service to be identified for each penetration.</td>
</tr>
<tr>
<td>2</td>
<td>Fire-stopping product to be suitable for size and material of pipe. (314)</td>
</tr>
<tr>
<td>3</td>
<td>End-grain sealant is to be applied to all openings in mass timber elements. (301&amp;302)</td>
</tr>
<tr>
<td>4</td>
<td>Mineral wool is to be provided in voids around pipework/service and mass timber voids.</td>
</tr>
<tr>
<td>5</td>
<td>Fire-stopping product to achieve the required 60 minutes REI fire performance and be installed to manufacturers’ requirements to match standard detail or project-specific bespoke engineering judgements.</td>
</tr>
<tr>
<td>6</td>
<td>Internal load-bearing timber walls (302) should be fully encapsulated with gypsum board applied to achieve K2-60 classification in accordance with BS EN 13501-2 with a maximum limit temperature of 200 degrees C. (311).</td>
</tr>
<tr>
<td>7</td>
<td>K2-60 encapsulation to be used to box in services to ensure all mass timber elements and openings are fully encapsulated.</td>
</tr>
</tbody>
</table>
CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material of pipework/service to be identified for each penetration.</td>
</tr>
<tr>
<td>2</td>
<td>Fire-stopping product to be suitable for size and material of pipe. (314)</td>
</tr>
<tr>
<td>3</td>
<td>End-grain sealant to be applied to all openings in mass timber elements. (301+302)</td>
</tr>
<tr>
<td>4</td>
<td>Fire-stopping product to achieve the required 60 minutes REI fire performance and be installed to manufacturers’ requirements to match standard detail or project-specific bespoke engineering judgements.</td>
</tr>
<tr>
<td>5</td>
<td>Full-fill mineral wool insulation to LSF framing around service penetrations. (345)</td>
</tr>
<tr>
<td>6</td>
<td>Cavity barriers rated to REI 60 to be installed around service penetrations if fire rated ducts and collars are not installed. (343)</td>
</tr>
<tr>
<td>7</td>
<td>Ensure the AVCL will be sealed against the service penetrations to ensure continuous airtightness across the external wall. (352)</td>
</tr>
<tr>
<td>8</td>
<td>Voids between internal lining and service penetrations to be sealed with intumescent gap sealer. (312)</td>
</tr>
</tbody>
</table>

WITH FIRE RATED DUCT

- WALL LINING BOARD (311)
- Opening in LIGHT STEEL FRAMING SYSTEM (321)
- Opening framed using SHEATHING BOARD (323)
- FIRE RATED DUCT (316)
- FIRE RESISTANT GAP SEALER (312)
- VAPOUR BARRIER (352)
- BREATHER MEMBRANE (351)
- RAiNSCREEN INSULATION (332)
- CLADING (333)
- Allow for free area OR air brick OR termination duct as required

EXTERNAL

INTERNAL
### Checklist

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

<table>
<thead>
<tr>
<th>REF ITEM</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material of pipework/service to be identified for each penetration.</td>
</tr>
<tr>
<td>2</td>
<td>Fire-stopping product to be suitable for size and material of pipe. (314)</td>
</tr>
<tr>
<td>3</td>
<td>End-grain sealant to be applied to all openings in mass timber elements. (301+302)</td>
</tr>
<tr>
<td>4</td>
<td>Fire-stopping product to achieve the required 60 minutes REI fire performance and be installed to manufacturers’ requirements to match standard detail or project-specific bespoke engineering judgements.</td>
</tr>
<tr>
<td>5</td>
<td>Full-fill mineral wool insulation to LSF framing around service penetrations. (325)</td>
</tr>
<tr>
<td>6</td>
<td>Cavity barriers rated to REI 60 to be installed around service penetrations if fire rated ducts and collars are not installed. (343)</td>
</tr>
<tr>
<td>7</td>
<td>Ensure the AVCL will be sealed against the service penetrations to ensure continuous airtightness across the external wall. (352)</td>
</tr>
<tr>
<td>8</td>
<td>Voids between internal lining and service penetrations to be sealed with intumescent gap sealer. (312)</td>
</tr>
</tbody>
</table>

### Penetration to Façade

**Proprietary Fire Collar**

- Opening framed using SHEATHING BOARD (323)
- Opening in LIGHT STEEL FRAMING SYSTEM (321)
- LIGHT STEEL FRAMING INSULATION (322)
- VAPOUR BARRIER (352)
- WALL LINING BOARD (311)
- ABLATIVE COATED BATT (345)
- INTUMESCENT FIRE STOP COLLAR (315)

**Cavity Closed Locally**

- VAPOUR BARRIER (352)
- WALL LINING BOARD (311)
- FULL FILL INSULATION (325)
- FIRE RESISTANT GAP SEALER (312)
- CLADDING (333)
- RAINSCREEN INSULATION (332)
- BREATHER MEMBRANE (351)


Allow for free area OR air brick OR termination duct as required.
CHECKLIST

Please refer to the performance specification information (p. 116 - 119) for the relevant listed item numbers.

REF ITEM

1. Service to be sealed and taped with water-resistant tape during construction.
2. Service penetration is to be taped and sealed to the structural deck. (361 & 363)
3. Material of pipework/service to be identified for each penetration.
4. Fire-stopping product to be suitable for size and material of pipe. (314)
5. End-grain sealant is to be applied to all openings in mass timber elements. (301 & 302)
6. Fire-stopping product to achieve the required 60 minutes REI fire performance and be installed to manufacturers requirements to match standard detail or project-specific bespoke engineering judgements.
7. Full-fill mineral wool insulation to LSF framing around service penetrations. (315)
8. Voids within roof construction around service to be filled with mineral wool insulation.
9. Ensure the AVCL will be sealed against the service penetrations to ensure continuous airtightness across the external wall. (352)
10. End-grain sealant is to be applied to all openings in mass timber elements. (301 & 302)

Lead, aluminium, aluminium alloy, uPVC, (complies with BS4514/BS5255) or fibre cement pipe. Max. internal diameter 160mm

Opening taped during construction

Lightweight timber roof structure (361)

Fire-resistant gap sealer (312)

WALL LINING BOARD (311)

FULL FILL INSULATION (325)

Intumescent fire stop collar (315)

WALL LINING BOARD (311)
1. Material of pipework/service to be identified for each penetration.
2. Fire-stopping product to be suitable for size and material of pipe (314).
3. End-grain sealant is to be applied to all openings in mass timber elements (301&302).
4. Fire-stopping product to achieve the required 60 minutes REI fire performance and be installed to manufacturers’ requirements to match standard detail or project-specific bespoke engineering judgements.
5. Full-fill mineral wool insulation to LSF framing around service penetrations (325).
6. Voids within roof construction around service to be filled with mineral wool insulation.
7. Ensure the AVCL will be sealed against the service penetrations to ensure continuous airtightness across the external wall (352).
8. Voids between the internal lining and service penetrations to be sealed with intumescent gap sealer (312).
### SPECIFICATION REFERENCES

<table>
<thead>
<tr>
<th>FIRE PERFORMANCE</th>
<th>REACTION TO FIRE</th>
<th>FIXING METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A – fire resistance is provided through encapsulation</td>
<td>Euroclass D-s2, d0 in accordance with BS EN 13501-1</td>
<td>Steel anchor bolts and stops some fabric to CLT panel</td>
</tr>
<tr>
<td>N/A – fire resistance is provided through encapsulation</td>
<td>Euroclass D-s2, d0 in accordance with BS EN 13501-1</td>
<td>Steel anchor bolts and stops some fabric to CLT panel</td>
</tr>
<tr>
<td>N/A – fire resistance is provided through encapsulation</td>
<td>Euroclass D-s2, d0 in accordance with BS EN 13501-1</td>
<td>Steel anchor bolts and stops some fabric to CLT panel</td>
</tr>
<tr>
<td>N/A – fire resistance is provided through encapsulation</td>
<td>Euroclass D-s2, d0 in accordance with BS EN 13501-1</td>
<td>Steel anchor bolts and stops some fabric to CLT panel</td>
</tr>
<tr>
<td>N/A – fire resistance is provided through encapsulation</td>
<td>Euroclass D-s2, d0 in accordance with BS EN 13501-1</td>
<td>Steel anchor bolts and stops some fabric to CLT panel</td>
</tr>
</tbody>
</table>

### INTERNAL STRUCTURE

<table>
<thead>
<tr>
<th>GROUP</th>
<th>GROUP NAME</th>
<th>PRODUCT NO.</th>
<th>PRODUCT NAME</th>
<th>LOCATION</th>
<th>DESCRIPTION</th>
<th>DIMENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>340</td>
<td>INTERNAL CLAD</td>
<td>C11 wall panel</td>
<td>All internal structural walls (BS as encased)</td>
<td>Cross laminated timber wall panels</td>
<td>Years</td>
<td></td>
</tr>
<tr>
<td>341</td>
<td>INTERNAL SYSTEM</td>
<td>C11 floor panel</td>
<td>All internal floor slabs (fully encapsulated)</td>
<td>Cross laminated timber floor panels</td>
<td>Years</td>
<td></td>
</tr>
<tr>
<td>342</td>
<td>Glazed column</td>
<td>Through thickness (fully encapsulated)</td>
<td>Glazed timber column</td>
<td>Years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>343</td>
<td>Glazed beam</td>
<td>Through thickness (fully encapsulated)</td>
<td>Glazed timber beam</td>
<td>Years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>344</td>
<td>Steel bracket</td>
<td>Internal structural panels</td>
<td>Steel anchor bolts and stops connecting timber elements</td>
<td>Years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>345</td>
<td>Glazed beam</td>
<td>Through thickness (fully encapsulated)</td>
<td>Glazed timber beam</td>
<td>Years</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### INTERNAL FINISHES

<table>
<thead>
<tr>
<th>PRODUCT NO.</th>
<th>PRODUCT NAME</th>
<th>LOCATION</th>
<th>DESCRIPTION</th>
<th>DIMENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>346</td>
<td>Wall lining board</td>
<td>To internal face of all external walls and connecting encapsulation to CLT internal walls</td>
<td>Wall lining board</td>
<td>Minimum 1 layer</td>
</tr>
<tr>
<td>347</td>
<td>Fire resistant gap seal</td>
<td>At head and base junctions to wall lining boards</td>
<td>Flexible fire resistant seal for enclosing unplugged joints</td>
<td>N/A</td>
</tr>
<tr>
<td>348</td>
<td>Cavity closer</td>
<td>Into CP joint of cavity closer to the cavity between window sill</td>
<td>Calcium silicate cement-based board</td>
<td>Minimum score thick</td>
</tr>
<tr>
<td>349</td>
<td>Insulation</td>
<td>Installed around combustible parts</td>
<td>Insulation Batt, flexible firestop strips</td>
<td>Years</td>
</tr>
<tr>
<td>350</td>
<td>Insulation</td>
<td>Insulation board</td>
<td>Insulation Batt, flexible firestop strips</td>
<td>Years</td>
</tr>
<tr>
<td>351</td>
<td>Insulation</td>
<td>To senior presentation in tunnel face, as required</td>
<td>Insulation Batt, flexible firestop strips</td>
<td>Years</td>
</tr>
<tr>
<td>352</td>
<td>Fire resistant</td>
<td>Inserted between studs in partitions with walls as required</td>
<td>Intumescent firestop for delaying penetration</td>
<td>Years</td>
</tr>
<tr>
<td>353</td>
<td>Wall lining board</td>
<td>Supporting wall lining board to CLT internal walls where an external wall is required</td>
<td>Steel stud and fire-resistant floorboard</td>
<td>Years</td>
</tr>
<tr>
<td>354</td>
<td>Shell beam</td>
<td>Supporting wall lining board to CLT internal walls where an external wall is required</td>
<td>Steel stud and fire-resistant floorboard</td>
<td>Years</td>
</tr>
<tr>
<td>355</td>
<td>Insulation</td>
<td>To internal face of stud walls and service cores</td>
<td>Insulation Batt, flexible firestop strips</td>
<td>Years</td>
</tr>
<tr>
<td>356</td>
<td>Light steel framing</td>
<td>To all structural walls</td>
<td>Light steel framing system, fully load-bearing and non-load-bearing applications</td>
<td>Years</td>
</tr>
<tr>
<td>357</td>
<td>Lightweight insulation</td>
<td>To all external walls</td>
<td>Lightweight insulation suitable for use in steel frames</td>
<td>Years</td>
</tr>
<tr>
<td>358</td>
<td>Shuttering board</td>
<td>To all external walls</td>
<td>Masonry bonded particle board</td>
<td>Years</td>
</tr>
<tr>
<td>359</td>
<td>Connection detail</td>
<td>To all external walls</td>
<td>Brickwork detail</td>
<td>Years</td>
</tr>
<tr>
<td>360</td>
<td>Full fill insulation</td>
<td>At steel edge according to BS EN 13501-1</td>
<td>Full fill insulation suitable for use in steel frames</td>
<td>Years</td>
</tr>
<tr>
<td>361</td>
<td>Balcony connection</td>
<td>At all balconies</td>
<td>Brickwork detail</td>
<td>Years</td>
</tr>
<tr>
<td>362</td>
<td>Closed cell insulation</td>
<td>At junction of CP slab and external walls</td>
<td>Closed cell perimeter insulation suitable for use below DPC</td>
<td>Years</td>
</tr>
<tr>
<td>GROUP NO.</td>
<td>GROUP NAME</td>
<td>PRODUCT NO.</td>
<td>PRODUCT NAME</td>
<td>LOCATION</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
<td>-------------</td>
<td>--------------</td>
<td>----------</td>
</tr>
<tr>
<td>330</td>
<td>CLADDING SYSTEM</td>
<td>330</td>
<td>Firestop wrap</td>
<td>Intumescent firestop wrap</td>
</tr>
<tr>
<td>330</td>
<td>CLADDING SYSTEM</td>
<td>331</td>
<td>Cladding</td>
<td>External cladding</td>
</tr>
<tr>
<td>331</td>
<td>CLADDING SYSTEM</td>
<td>340</td>
<td>Linear facing</td>
<td>To end grain of side edges</td>
</tr>
<tr>
<td>331</td>
<td>CLADDING SYSTEM</td>
<td>342</td>
<td>Horizontal cavity barrier</td>
<td>To edge with horizontal fire compartment in all external walls</td>
</tr>
<tr>
<td>331</td>
<td>CLADDING SYSTEM</td>
<td>343</td>
<td>Vertical cavity barrier</td>
<td>To edge with vertical fire compartment in all external walls</td>
</tr>
<tr>
<td>331</td>
<td>CLADDING SYSTEM</td>
<td>344</td>
<td>Cavity barrier</td>
<td>To summarise of all stud work</td>
</tr>
<tr>
<td>331</td>
<td>CLADDING SYSTEM</td>
<td>345</td>
<td>Adhesive control batt</td>
<td>Installed at service penetrations in external walls</td>
</tr>
<tr>
<td>331</td>
<td>CLADDING SYSTEM</td>
<td>346</td>
<td>Fire board</td>
<td>Applied to external face of glulam columns</td>
</tr>
<tr>
<td>331</td>
<td>CLADDING SYSTEM</td>
<td>350</td>
<td>Breather membrane</td>
<td>Applied to outer face of rainscreen</td>
</tr>
<tr>
<td>331</td>
<td>CLADDING SYSTEM</td>
<td>351</td>
<td>Non-combustible roof sheeting</td>
<td>Describing inherent fire resistant properties of non-combustible materials</td>
</tr>
<tr>
<td>331</td>
<td>CLADDING SYSTEM</td>
<td>352</td>
<td>Roof system</td>
<td>Multi-layer system</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FIRE PERFORMANCE</th>
<th>REACTION TO FIRE</th>
<th>FIXING METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>Euroclass A1, d1 or better in accordance with BS EN 13501-1</td>
<td>Mechanically fixed to cladding-support system</td>
</tr>
<tr>
<td>N/A</td>
<td>Euroclass A1, d1 or better in accordance with BS EN 13501-1</td>
<td>Mechanically fixed to cladding-support system</td>
</tr>
<tr>
<td>N/A</td>
<td>Euroclass A1, d1 or better in accordance with BS EN 13501-1</td>
<td>Mechanically fixed to rainscreen</td>
</tr>
</tbody>
</table>
**FLOOR BUILD-UPS**

**FLOOR TYPE: NMB - FL-01**
- Location: Apartment / Apartment (Party Floor)
- Permeability: No requirement
- Physical location: BROOF (t4) / Internal (Dammed)
- F-rated performance: N/A
- Minimum sound reduction: To meet project requirements, 40 ft² is minimum

- 205 mm Rigid closed cell insulation
- 25 mm Suspended ceiling support system
- 140 mm CLT floor panel (302)
- 15 mm Wall lining board (311)
- 8 mm Acoustic matting
- 3 mm Waterproof membrane to specialist supplier/subcontractor specification
- 3 mm Skim and paint

**FLOOR TYPE: NMB - FL-02**
- Location: Ground Floor Slab
- Permeability: No requirement
- Physical location: BROOF (t4) / Internal (Dammed)
- F-rated performance: To meet project requirements, AD Part E as minimum
- Minimum sound reduction: To meet project requirements, 40 ft² is minimum

- 200 mm Services zone
- 25 mm Suspended ceiling support system
- 140 mm CLT floor panel (302)
- 15 mm Wall lining board (311)
- 3 mm Skim and paint

**ROOF BUILD-UPS**

**ROOF TYPE: NMB - RF-01**
- Location: Roofs with minimum fall of 1:5.5/10 degrees
- Permeability: BROOF T(4); Min. 30 minutes REI where part of a means of escape
- Physical location: BROOF (t4) / Internal (Dammed)
- F-rated performance: To meet project requirements, AS Part E as minimum
- Minimum sound reduction: To meet project requirements, 40 ft² is minimum

- 208 mm Lightweight roof structure (362)
- 250 mm BROOF (t4) roof build up (361)
- 200 mm Services zone
- 50 mm Suspended ceiling support system
- 15 mm Wall lining board
- 3 mm Skim and paint

**ROOF TYPE: NMB - RF-02**
- Location: Roofs with minimum fall of 1:40/1.5 degrees
- Permeability: BROOF T(4); Min. 30 minutes REI where part of a means of escape
- Physical location: BROOF (t4) / Internal (Dammed)
- F-rated performance: To meet project requirements, AS Part E as minimum
- Minimum sound reduction: To meet project requirements, 40 ft² is minimum

- 200 mm Services zone
- 50 mm Suspended ceiling support system
- 208 mm Lightweight roof structure (362)
- 200 mm BROOF (t4) roof build up (361)
- 350 mm BROOF (t4) roof build up (361)
- 350 mm BROOF (t4) roof build up (361)
The following open source guidance documents are referenced in the text above. It is up to the user of this guide to ensure that they refer to the current version of each document listed below:

**GENERAL**
- TRADA Cross-laminated Timber Design and Performance
- SCI Technical Report ED017 Design and Installation of Light Steel External Wall Systems

**FIRE**
- STA Structural Timber Buildings Fire Safety In Use Guidance Volume 6 - Mass Timber Structures; Building Regulation compliance By(x) STA fire safety and guidance project Version 2.1 May 2023
- STA 16 Steps to fire safety. Promoting good practice on construction sites. Version 4.3 October 2017

**MOISTURE MANAGEMENT**
- Swedish Wood/TDUK’s Moisture-proof CLT construction without a full temporary shelter Edition 1:2022
- STA Moisture management strategy, process guidance for structural timber buildings, Version 1.0, July 2022
- STA Advice Note 14 - Robustness of CLT Structures - Part 1 - Key principles for moisture durability
- STA Technical Note 23 - Durability by design – mass timber structures – STA 2021
- STA Technical Note 24 - Moisture protection during construction - STA 2020

**PHOTO CREDITS**
- P10 The Green House ©Tim Crocker
- P70 Dalston Lane ©Waugh Thistleton Architects
- P94 Curtain Place ©Will Pryce
- P126 Pitfield Street ©Lewis Khan

This book is book 2 of 3.

Please scan this QR code using your phone for a digital version of the three documents.