Project:
809_20 **Kidderpore Avenue**

Work Section: **EWS: External Wall Systems**

To be read in conjunction with the Project General Requirements and Appendix Z sections of this Specification

Specification Status: Stage 4 (Technical Design)

Issue number:	Date:	Reviewed by:	Checked by:
T1 – Stage 4 Clauses 500-550, 600-630 and 700-725 only	24.07.2015	AS	JC

Terms: **Specification Types**

Prescriptive Specification:
Where items are to be consultant designed, the specification is in prescriptive form. All paragraphs are prescribed requirements.

Descriptive Specification:
The contractor shall complete the detail design complying with the Functional, Visual and Detailed Descriptions and Performance Requirements respectively as recorded in this Specification and the contract documents. Where a particular material, product or supplier is referenced, this shall be deemed to be indicatively representing the design intent only. The contractor remains fully responsible for the detailed design whether or not indicative products within the specification are incorporated into the detailed design.

Tag Ref.	External Wall Systems – Scope Summary	Spec. Type
EWS-300	External masonry brickwork insulated cavity walling on blockwork backing wall	Descriptive
EWS-500	External masonry brickwork insulated cavity walling on light steel framed backing wall	Prescriptive/ Descriptive
EWS-510	External render system	Descriptive
EWS-550	External timber rainscreen cladding on light steel framed backing wall	Descriptive
EWS-600	External insulated render system	Descriptive
EWS-610	Insulated walling on structural concrete backing wall	Descriptive
EWS-620	External metal cladding facade to infill piece	Descriptive
EWS-630	Natural stone dressings to windows	Descriptive
EWS 700	External masonry brickwork insulated cavity walling on light steel framed backing wall	Prescriptive/ Descriptive
EWS 701	External masonry brickwork insulated cavity walling to gable	Descriptive
EWS 702	External masonry brickwork un-insulated cavity walling to roof level balconies	Descriptive
EWS-708	External masonry brickwork uninsulated cavity walling on blockwork backing wall	Prescriptive/ Descriptive
EWS-725	Metalwork rainscreen cladding dormer assembly	Descriptive

EWS EXTERNAL WALL SYSTEMS: SYSTEM GENERAL REQUIREMENTS

REQUIREMENTS FOR PERFORMANCE

General

- All systems to be square, true and accurately positioned in relation to adjacent elements.
- Systems shall be consistent from module to module and unit to unit, without variation in colour, gloss levels, texture or shade.
- Systems shall not fracture, peel, delaminate, corrode, rattle, deform, vibrate or generate noise in end use occupation (i.e. from door closure, or Design Load application).
- Systems shall be secure, free-draining and weather tight. The works shall be designed and installed such that cavity drainage, weathering and water shedding shall not cause unsightly stains on visible elements.
- Finishes shall not significantly change colour, tone, gloss level or pattern under anticipated environmental conditions during the Design Life of the Works.
- The performance requirements cover envelope build-ups including outer claddings, intermediate layers and structural support layers.
- The performance requirements for rain screen cladding shall apply to the facing panels and backing wall collectively and individually.
- The performance requirements apply to composites in their composite form.
- The system and/or components within the system shall comply with the European Product Regulations in respect of testing, declaration and marking products applicable to the regulations.
- Unless stated otherwise in the Services Engineer's Report or the Project General Requirements section of this specification, the service temperatures assumed shall be as listed in CWCT Standard for Systemised Building Envelopes.
- Comply with the current issue of the NHBC Standards as a minimum standard. Where the specification requirements exceed those standards, the specification shall take precedence.

Definitions:

Wall definition:

- For fire considerations, the term external wall includes roof surfaces pitched at an angle of more than 70° to the horizontal, where these surfaces adjoin a space within the building to which persons have access (but not access only for repair or maintenance), in accordance with Appendix E definition of Approved Document B.
- For thermal calculations, the term wall refers to an element at an angle of more than 60°to the horizontal, in accordance with BR 443 and BS EN ISO 6946.
- For reference to CWCT, the term wall refers to an element for which the mean slope of the envelope is 15° or less from the vertical.

Systemised Elements:

- are defined as those constructed from finished components and assemblies. These include windows, curtain walls, assembled backing walls, doors, cappings, flashings, parapet assemblies, louvres

Traditional Elements:

- are defined as those requiring wet trades or fabrication from traditional materials on site.
- Sloped glazing shall include systems with a slope of less than 75° from the horizontal, in accordance with CWCT Standards.

Light Steel Framed Wall Construction Definitions in Accordance with BR 443:

- Warm frame, where insulation is placed on the outside, i.e. 'cold' side of the steel frame
- Hybrid frame, where insulation is placed on the outside, i.e. 'cold' side of the steel frame and between the steel studs.

'Open state' Cavity Barriers:

- are defined as cavity barriers that allow ventilation and drainage in the cold state, but which either close in a fire, or are inherently fire resisting providing fire separation in the cavity, in accordance with ASFP Technical Guidance Document - TGD 19: Definitions.

Concealed Space or Cavity:

- A space enclosed by elements of a building (including a suspended ceiling) or contained within an element, but not a room, cupboard, circulation space, protected shaft or space within a flue, chute, duct, pipe on conduit, in accordance with Approved Document B

Appendix E: Definitions.

Security:

- Low level components accessible from pedestrian areas shall be secured against unauthorised removal.
- Curtain walling (excluding windows and doors within) shall be certified to the latest version of:
    - BS EN 1627 so long as it is tested by a UKAS certified body or one recognised under the EEA Multi-lateral Agreement.
- All components or systems associated with security shall be certified by the Loss Prevention Certification Board (LPCB), and listed in the BRE Red Book

Structural and Mechanical:

- The completed works shall accommodate loading requirements in accordance with the relevant European and national code requirements.
- The contractor shall assess the use class of the building as defined in BS EN 1991-1-1, and design the elements and guardings in compliance with the loading and structural requirements in BS EN 1991-1-1 and its National Annex, guidance in PD 6688-1-1 and BS 6180.
- The works shall be capable of accommodating movement and tolerances associated with any element and adjacent elements without degradation of performance, tolerance limits, operability or aesthetics to either. Movements may include: Elastic deformation induced by dead/live loads and/or excessive temporary loads, axial shortening, ground movement/differential settlement, shrinkage, moisture movement, creep, thermal movement, movement due to chemical action and movement due to the expansion of absorbed or retained moisture caused by freezing. Movement in this context includes both reversible and irreversible movement. The design and detailing of the works including fixings shall prevent degradation due to locked-in stresses.
- The contractor shall take full account of all the anticipated building movements including those arising with the supporting structure to the works as described in the Building Movement and Tolerances report, prepared by the Structural Engineer. The works shall perform without adverse effects under such movements.
- Where guarding is provided by moveable panels on restrictors, they shall provide guarding performance in their open position.
- When a restraint system is incorporated on the cladding for building maintenance units (BMU) or temporary suspended platforms (TSP), for calculation purposes the minimum imposed load applied to the restraints shall be 1kN in accordance with BS EN 1808 paragraph 6.7.
- Wind loads: Particular attention shall be paid to areas subject to increased wind velocities and pressures arising from localised eddies and vortices such as at eaves, canopies, external corners, fins, shelves, signage, brise soleil, and other projections to ensure stability, freedom from vibration and security of fixture.
- Systemised elements:
    - In addition to the requirements above, the loading requirements of the CWCT Standard for Systemised Building Envelopes shall be met.
    - Where rain screen cladding is designed as pressure equalised, the guidelines in CWCT Standard for Systemised Building Envelopes is to be followed. Advice in CWCT TN 77 is to be followed in the design of the rain screen.
- Masonry wall systems:
    - Refer to Structural Engineer's information for performance requirements for all structural components including backing wall, head restraints, shelf angles, lintels, wind posts, frame connections, support brackets, plates, ties, bedding reinforcement and sundries.

- Deflections:
- Systemised elements:
    - Allowable deflections for all components shall be as listed in Part 3 of CWCT Standard for Systemised Building Envelopes and shall ensure maintenance of visual criteria, support for related components and infill, performance of the envelope at interfaces and effectiveness of seals.
- Masonry systems:
    - Refer to Structural Engineer's information.
- For the sake of deflection calculations, both thin and thick build render shall be considered a brittle material.

Robustness and Impact:
- The contractor shall design the system to resist applied or transferred impacts that occur during normal use and maintenance of the system, without degradation.
- Opening elements shall be secure, operate smoothly and not drop, foul adjacent linings or finishes and operate without noise, rattle or vibration.
- Vertical building envelope systems shall resist the hard and soft body impact values in accordance with the CWCT Technical Note 75.
- Refer to Appendix A of TN75 for vertical building envelope impact performance requirements and relevance of tests to particular components and materials.
- Requirements for impact energies for safety and serviceability tests shall be as TN 75 Table 4 for soft body tests and TN 75 Table 5 for hard body tests. Exposure categories for each area of facades shall be as TN 75 Table 3. Particular care shall be made to ensure all facades within 1.5m of public accessible pedestrian levels shall resist loads of at least exposure category B of TN 75 Table 3.
- Serviceability after impact of all vertical building envelope systems shall exhibit failure modes not worse than class 1 to TN 75 Table 2 for all visible elements up to 5m above pedestrian level; not worse than class 2 to TN 75 Table 2 for all visible elements over 5m above pedestrian level. No other failure modes shall be acceptable. Failure modes of hidden components shall be no worse than class 2 to TN 75 Table 2.
- Serviceability of curtain wall elements as defined in EN 14019 shall be maintained after impact as EN 14019 classes I1 and E3.
- Safety after impact of all vertical building envelope systems shall be no worse than Low Risk as defined in TN 75 Table 1.
- Safety of curtain wall elements as defined as Low Risk in TN 75 Table 1 shall be maintained after impact as EN 14019 classes I3 and E4.
- Locations for soft and hard body impacts tests for glass shall be as BS EN 14019 plus interpretive information in TN 75 for curtain wall glazing and BS EN 13049 for window glazing. Reference shall also be made to interpretive information in ACOP SBD Interpretive Document where Secured by Design is required.
- Special consideration shall be given to hail impact resistance on surfaces exposed to potential hail.
- Accommodation of horizontally applied loads arising from maintenance equipment (e.g. ladder, maintenance cradle) to CWCT Standard for Systemised Building Envelopes requirements: Any part of the cladding surface of the works shall sustain safely and maintain serviceability without permanent deformation to any component, a static 500N horizontally applied load through a square of 100mm sides on any part of the building envelope and/or loads arising through impact from maintenance equipment if defined in the project specific maintenance access report, whichever is the greater. Should maintenance cradles impart larger loads than the one stated herein, the contractor to liaise with specialist cradle contractor and ensure the envelope shall sustain these impacts without any reduction in performance.
- The impact performance of transparent glass shall be as required by the Building Regulations plus additional performance as required under 'Security' in this specification.
- External thermal insulation composite systems with rendering: The systems shall be suitable for use in Category I areas to ETAG 004, Table 8, i.e. in zones readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use.

Fire:
- Refer to Fire Strategy Report by Fire Engineer.
- Fire resistance of wall systems for load bearing capacity, integrity and insulation shall meet the requirements of Approved Document B of the Building Regulations. The contractor shall ensure these provisions are met taking into account building class, height of the top storey above ground and proximity to the relevant boundary. Walls less than 1000mm from any point on the relevant boundary shall meet the requirements from each side separately. The contractor shall also take note of any uplift in these requirements or guidance contained in the Fire Strategy Report and in system specific requirements within this specification.
- External surface reaction to fire shall be as the classifications in Approved Document B of the Building Regulations. The contractor shall ensure these provisions are met taking into account building class, building height above ground and proximity to the relevant boundary. The contractor shall also take note of any uplift in these requirements or guidance contained in the Fire Strategy Report and in system specific requirements within this specification.
- Fire rating of doors, windows, curtain walls, roof light and other glazed systems: See system specific requirements in this specification, plus the fire strategy drawings and report.

- Fire and smoke stopping (excluding curtain walling horizontal fire stop): To BS EN 1366 relevant parts, or BS 476 Parts 20 and 22.
- Horizontal linear gap fire seals installed in association with curtain walls shall be tested to BS EN 1364-4.
- Cavity barriers shall achieve minimum 30 minutes integrity and 15 minutes insulation to BS 476 or E30 and EI15 to BS EN 13501, when exposed to fire from each side separately.
- Maximum spacing of cavity barriers:
    - Non residential buildings & residential buildings (excluding open joint rainscreen cladding systems in residential buildings): Cavity barriers shall be installed at no greater intervals than the ones stipulated in Table 13 of Approved Document B, unless the system complies with paragraph 9.10.
    - Open joint rainscreen cladding systems in residential buildings: Cavity barriers shall be installed at the following intervals in accordance with Clause 6.9-D8 (f) of the NHBC Standards, in addition to the Approved Document B requirements:
        - Horizontal cavity barriers shall be installed at each floor level,
        - Vertical cavity barriers shall be installed at no greater intervals than 6m,
        - Vertical cavity barriers centres shall not exceed 1.5m within 6m of an internal or external corner, and
        - A vertical cavity barrier shall be installed within 300mm from an external corner
- Cavity barriers shall also be installed at compartment interfaces with the facade and around openings as required in the Approved Document B. The final strategy shall meet the approval of the building control body.
- Cavity barriers in drained and ventilated rain screen cladding, shall not inhibit ventilation and drainage, or where applicable, pressure equalisation of the rain screen system.
- Cavity barriers around openings may be formed by the window or door frame so long as it is consistent with the requirements of section 9.13 of AD B Volume 2 of the Building Regulations.
- Fire stopping shall be installed around penetrations through any facade that has a fire rating for boundary purposes and shall be of equal performance to wall through which they are penetrating.
- Fire stopping at compartment lines shall equal the resistance of the compartment separation as defined on the fire strategy drawings or report.
- Fire and smoke stops shall be positively supported. All fire and smoke stopping shall be capable of accommodating all structural, settlement, drying shrinkage, creep, thermal, and moisture movements of the building frame and/or the façade without dislodging.
- The surface spread of flame of materials within any wall cavity shall be Class 0 or 1or equivalent European classification to BS EN 13501-1. This includes breather membranes and insulation.
- Insulation materials within any facade cavity of a building with a storey over 18m above the lowest ground level shall be of limited combustibility as required in the Approved Document B. Where a storey is above 18m and the insulation material holds a test certificate meeting the requirements of BR135, the construction of the wall shall be as that in the test certificate, unless specific permission is obtained from the Building Control Body and the Insurance provider (eg. In the case housing: NHBC).
- Composite components shall not delaminate while performing for specified fire resistance periods.
- Provide certified evidence, in the form of a product conformity certificate. Such certification by an approved third party certification or testing body must cover all materials and their installation.
- Fire stopping systems shall suit location and application conditions, shall be certified by the Loss Prevention Certification Board (LPCB) or equivalent UKAS accredited third party product certification body, and listed in the BRE or the Association for Specialist Fire Protection (ASFP) Red Book latest editions.
- Cavity barriers shall suit location and application conditions. Proprietary cavity barrier systems shall be certified by the Loss Prevention Certification Board (LPCB) or equivalent UKAS accredited third party product certification body, and should be listed in the BRE or the Association for Specialist Fire Protection (ASFP) Red Book latest editions.

Condensation:

- The contractor is to ensure that surface condensation does not form on the works when used under temperature and humidity conditions referred to the Services Engineer's Report or the Project General Requirements of the architectural specification.
- No interstitial condensation shall form in non-breathing construction under the same environmental conditions as above.
- Interstitial condensation shall not build-up in breathing construction under the same environmental

conditions as above. Short term accumulations of interstitial condensation shall not cause staining, rotting, corrosion or any detriment to performance or aesthetics of the works, as determined by BS EN ISO 13788.
- The contractor shall evaluate the risk of interstitial and surface condensation forming on the works by using acceptable risk analysis calculation methods stipulated under 'Post Contract Submittals 'in this specification.
- Special consideration shall be given to thermal bridges in the construction, in order to predict the risk of surface or interstitial condensation (see Thermal clauses herein). The contractor shall ensure that thermal bridging is eliminated, or where this is not possible thermal bridging shall be limited to ensure no degradation to performance or risk of condensation forming within or on the surface of the works.
- The guidance in BS 5250: Code of practice for control of condensation in buildings and 'Thermal Insulation: Avoiding the Risks', BRE 2002 shall be used to reduce condensation risks.

Water Ingress:
- Any systemised vertical or sloped building envelope, including curtain walling, sloped glazing, window walling, sealed composite cladding and backing wall for rain screen cladding shall meet the requirements of BS EN 12154 class R7 and the CWCT Standard for Systematised Building Envelopes, i.e. no leakage onto the internal surfaces up to peak pressure 600Pa
- Any masonry, render, precast concrete cladding or traditionally constructed system shall provide a weather tight envelope to the building and shall not allow the ingress of moisture to inner layers during and after prolonged periods of wet weather. Interfaces with adjacent construction are to remain water tight under the CWCT AAMA site hose test.
- Particular attention shall be given to eliminate the risk of capillary action and cavity bridging.
- Weather performance louvres shall have test certification for prevention of water ingress through louvres at the worst case intake velocity stated in the Mechanical Services Specification by the services engineer or HEVAC class C, whichever has the latest water ingress.
- Movement and other fixed joints shall remain sound and accommodate all thermal, building structure or other movements and any applicable loads without compromising watertightness.

Ventilation:
- Insect and vermin mesh to rainscreen facades: mesh size to be sufficient to exclude infestation from nest building insects, and mesh size to ventilation louvers to exclude all airborne insects.

Earth Bonding:
- Any exposed metal components shall be earth bonded in accordance with BS EN 62305, BS 7430, and BS 7671.
- Refer to Mechanical Services information.

Infestation:
- The works shall be constructed to prevent insect, bird and vermin infestation arising in inaccessible cavities using guidance contained in BRE Digest 415. See requirements for size of insect mesh under Ventilation.

Health and Safety:
- In completing the design, the contractor shall assess hazards associated with the construction, maintenance and demolition of the works and risk of such shall be eliminated, or where not possible minimised and communicated to the Designated Contact.
- The contractor shall ensure performance of the system whilst discharging designer's duties under the CDM Regulations 2015.
- In addition, the contractor shall assess the hazards to building users and the public arising from the works throughout the service life of the building and risk of such shall be eliminated, or where not possible minimised and communicated to the designated contact.
- In the instance where the external face of the façade is to be cleaned by via an open window, the contractor shall produce a risk assessment in accordance with BS 8213 Part 1 to assess the risk of somebody falling out of an open window when in use.
- Glazing is being utilised to act as a barrier and shall be designed to meet the requirements of BS 6180, BS 8200 and BS 6262 relevant parts and the Building Regulations. All safety glazing shall be marked in accordance with BS 6262 Part 4.
- The contractor shall mitigate against specific risks of nickel sulphide failure in toughened glass, thermal shock in annealed glass and delamination in laminated glass. The performance level of

mitigation against thermal shock shall be equal to that provided by heat soak testing to BS EN 14179 Part 1.
- The contractor shall produce a glass risk assessment to justify the choice of glazing for each location. This shall include the possible failure modes, probability of failure and consequence of failure i.e. degree of containment and the risk of injury due to this consequence. It shall also consider non-safety related failure modes to justify commercial drivers in glass selection.
- The contractor shall take account of guidance given in CIRIA C632 Guidance on Glazing at Height, CWCT TN63, 65, 66, 67, 68, 69 and other current guidance from relevant industry bodies. See also requirements for mitigation of thermal shock under Thermal requirements.
- Manifestation of glazing to be applied in accordance with the Building Regulations.
- Blockwork: The contractor shall carry out a risk assessment regarding access, handling, cutting etc to determine the actual size of blocks used and take responsibility for such risks. The contractor shall use blocks which are safe to install, whilst meeting all performance requirements.

Acoustic:
- External sound reduction: refer to acoustic specification.
- Horizontal flanking transmission: refer to acoustic specification.
- Vertical flanking transmission: refer to acoustic specification.
- Rainfall noise: The completed works are to incorporate damping on horizontal or sloping light metal surfaces. Where the performance target or prescriptive means of achieving rainfall reduction is not stated in the acoustic report, assume performance equal to resilient plasto-elastic material of 6kg/m² bonded to underside of any outer lightweight cladding, sills etc. Where the interior space is intended as a room for study, performance or sleeping, target to be equal to resilient plasto-elastic material of 10kg/m². Note resilient material and bond to be heat and freeze resistant with design life equal to that of the components to which it is attached.
- Noise arising from thermal movement of the works shall not be detectable from the interior.
- Where thin linear components are required on the facades, the contractor shall carry out a risk assessment for likelihood of wind generated noise and mitigate risks of drumming, humming and whistling within the completed works. Particular attention shall be paid to open ended tubes and hollow components.

Thermal:
- Maximum U value target for area weighted average transmittance for whole wall systems including repeating linear and point thermal bridges: See System Specific Requirements.
- Maximum U value target for windows and curtain walls, including brackets, framing and spandrel members: See System Specific Requirements.
- Glazing unit centre panel transmittance: See System Specific Requirements.
- Non repeating linear and point thermal bridges shall have equal or better thermal resistance than the equivalent Accredited Construction Detail for any interface, junction or corner.
- Thermal calculations are to be provided by the Contractor in accordance with BR 443 and all standards referred to therein. The Contractor shall take account of 1, 2 and 3 dimensional heat flow, including thermal bridges through the construction in accordance with EN ISO 6946, BR443, BS EN ISO 10211-1, BRE IP 1/06 and BR497.
- Curtain wall U value calculations shall be in accordance with BS EN ISO 12631. Curtain walling and metal window walling shall be calculated and declared as one area including transparent and opaque areas together with framing members.
- Glass shall be designed, manufactured and installed to reduce the likelihood of thermal shock arising in any pane. Guidance from CWCT TN 65 shall be taken into account. The glass risk assessment mentioned under requirements for Health and Safety shall take thermal shock into account.
- The contractor shall carry out a thermal risk assessment to identify any key areas of thermal bridging in the works and shall mitigate against risks of concentrated heat loss.

Air Tightness:
- Refer to the Project General Requirements of the architectural specification for the whole building air tightness target and means of achieving it. The works are to be designed, fabricated and installed so as to contribute to the achievement of this target.
- Systems and interfaces with adjacent systems are to form continuous barrier against uncontrolled air leakage.
- Air infiltration rates for systemised building envelopes are to meet the requirements of the CWCT Standard for Systematised Building Envelopes and BS EN 12152 as follows: rendered systemised

backing walls, masonry in front of systemised backing walls and rain screen cladding on systemised backing walls: maximum 1.5m³/h/m² at 600Pa infiltration and corresponding infiltration for lower pressures as per the standard. Any joints within opening vents, windows and doors (excluding high usage access doors with low or flush thresholds, or low exposure entrance doors) as part of a systemised walling system are to meet the requirements of the CWCT Standard for Systematised Building Envelopes, i.e. max 2.0m³/h/m at 600Pa infiltration and leakages for lower pressures as per the standard.
- Exfiltration shall be limited to values equivalent to infiltration at 100Pa as above.
- Any masonry, render or traditionally constructed system will not be subject to a CWCT test, but must be constructed with backing wall to equal the air tightness of an equivalent area of curtain walling.

Service Life, Durability and Degradation:
- Atmospheric conditions in accordance with:
  - BS EN ISO 12944-2: Paints and varnishes - Corrosion protection of steel structures by protective paint systems. Classification of environments.
  - BS EN ISO 14713: Zinc coatings - guidelines and recommendations for the protection against corrosion of iron and steel in structures
  - BS EN 10169: Continuously organic coated (coil coated) steel flat products.

External: C3 i.e. urban industrial, coastal low salinity.
Internal: C1 i.e. internal heated and C2 i.e. internal unheated.

- Building Service Life: Refer to Project General Requirements.
- System Service Life: Refer to table below
- Single source product and installation warranties shall be provided for the works and its components from date of practical completion in accordance with the contract, and where appropriate as the following table:

System Component	**Service Life**	**Warranty**
Cladding (excluding timber), rain screen or louvre system	40 years	12 years
Coated/ Uncoated timber cladding panels	30 years	12 years
External thermal insulation composite systems with rendering	30 years	25 years
Backing walls	60 years	12 years
Secondary structural steelwork	60 years	12 years
Powder coating gloss retention and colour fastness	60 years	25 years (or less if including consequential loss clauses)
Powder coating adhesion	60 years	12 years
Paint coatings (except timber)	60 years	5 years
Anodizing	60 years	12 years
Gaskets and dry seals (except moving swipe seals and brushes)	40 years	12 years
Wet seals accessible for maintenance *	25 years	12 years
Insulation and fire stopping	60 years	12 years
Render, cement board and other cladding materials	40 years	12 years
AVCL/ VCL membranes, in accordance with BS 5250 requirements	60 years	12 years
Breather/ Weather Membranes	50 years	12 years
Structural load bearing masonry	100 years	As contract
Facing and non structural masonry	60 years	As contract
Damp proof courses and cavity trays	60 years	Not applicable
* For generic life expectancy of sealants refer to Table 2.2 of CIRIA, Sealant joints in the external envelope of buildings: a guide on design, specification and construction and Table 1 of CWCT TN19		

- The system and all parts thereof shall be serviceable for the design life required above. No parts shall suffer significant degradation or failure during the service life required above.

- The works shall be designed and installed to weather effectively. Water running off or within cavities in the system shall be managed and directed in such a way that waterborne pollutants are not leached out onto either adjacent cladding or surrounding structure in a manner likely to cause staining, long term dampness or algae growth.
- The completed works shall resist abrasion from cleaning methods specified in the works manufacturers' maintenance information without any discernible change in appearance.
- Where material or system performance reduces or erodes during the course of its service life, such as in the case of vacuum insulated products, the predicted performance at the end of the service life shall be used as the basis for the design.
- The contractor shall ensure that electrolytic corrosion between dissimilar metals does not occur under the environmental conditions expected to prevail during the life of the building. This shall include prevention of electrolytic corrosion due to the following:
    - direct contact of dissimilar metals
    - water runoff from electrolytically dissimilar metals
- The works shall be designed to prevent the occurrence of crevice corrosion by avoiding details and interfaces where water may be trapped over long periods of time. Narrow openings between metal components in contact with other metal or non metal components in locations prone to wetting shall be avoided. Particular attention shall be given to fasteners where crevices may be formed under bolt, screw or rivet heads or within the thread. Appropriate sealing shall be carried to avoid crevice corrosion.
- Corrosion resistance of items that have a structural or load bearing function, whether accessible or inaccessible for inspection and repair, shall have a life to first maintenance equal that the entire system service life stated in the Service Life and Durability section of this specification above.
- The Life to First Maintenance of ferrous metal items shall be Very High (VH) as defined in Table 2 of BS EN ISO 14713-1 Zinc coatings – Guidelines and recommendations for the protection against corrosion of iron and steel in structures, Part 1: General principles.
- All externally visible ferrous metal surfaces shall have corrosion resistance of equal performance to hot dipped galvanised steel with a minimum average coating thickness of 85 um to ISO 1461 or stainless steel grade 1.4401 to BS EN 10088-2 or, where not visible, develop natural patination to meet service life of the components, equal to steel grade 304. This also applies to components or parts of components within rain screen. All cavity fixings supporting or restraining masonry, stone any other porous material shall be stainless steel.
- Where fixings connect dissimilar metals, the fixings shall be made of a material which is at least as noble of the noblest material fixing being fixed. Ie. an aluminium to mild steel bracket should be fixed with stainless steel screws.
- The works shall be designed to prevent the risk of corrosion or staining by direct contact of metal components with timber.
- Water runoff:
    - The works shall be designed to prevent the risk of corrosion by water run-off from timber onto electrolytically dissimilar metal surfaces.
    - The works shall be designed to prevent the risk of acidic corrosion by water run-off from bitumen onto metal surfaces such as copper and zinc.
    - The completed works shall ensure that water runoff from metals, such as copper, bronze, brass etc, shall not result in staining of porous materials below.
    - Water runoff from concrete, stone or other materials containing lime shall not affect the performance or degrade the appearance of adjacent materials, such as metals particularly anodised aluminium, stone and glass surfaces/assemblies or finishes to components.
- Where wood preservatives are used, the contractor shall eliminate the risk of any adverse reaction with metals, polymers and other materials.
- Sealant systems shall not bleed, discolour or cause staining of any facing materials which they are likely to come into contact.
- Timber components shall not be used in areas where they cannot be readily inspected and replaced without disturbing the system.
- Timber cladding specific requirements:
    - Species minimum natural durability classes for out-of-ground contact use (Use class 3 to BS EN 335), based on natural durability classes given in BS EN 350- 2, in accordance with BS 8417:
    - Coated timber components: Durability class 3 (Moderately durable)
    - Uncoated timber components: Durability class 2 (Durable)
    - General durability requirements: timber cladding and any supporting, trimming or associated timber components shall be durable, not degradable by moisture or water

vapour, and not show signs of degradation including disfiguring and destroying fungal and insect attack for the service life of the element. Fungal resistance requirements of timber panel products shall be in accordance with BS 1982.

- Rendered finishes: The render top coat shall accommodate temperature, moisture and building induced movement without cracking, detachment from the building (adhesion) or blistering.
- Sheathing boards:
    - Wood based panels such as cement bonded particleboards shall be suitable for use in exterior conditions that correspond to Service Class 3 to BS EN 1995-1-1
    - Minimum required weather resistance category of fibre cement boards to BS EN 12467:
        - Sheathing boards behind facade/rainscreen cladding: Class B, suitable for applications subjected to heat, high moisture and occasional frost.
- Durability of sealants:
    -Sealants selected to seal a joint shall be able to maintain their performance while accommodating variations in joint sizes due to manufacturing and erection deviations, and repeated building movements induced by mechanical and environmental stresses. They shall withstand climatic conditions and any specific environmental conditions to which they are subjected.
- Frost resistance:
    - Clay bricks: F2 freeze/thaw resistance and S2 active soluble salts content to BS EN 771-1
    - Aggregate concrete and autoclaved aerated concrete blocks: minimum unit density/ compressive strength and aggregate type requirements for particular exposure conditions of finished masonry, shall be in accordance with PD 6697 Table 15.
    - Mortars: Refer to particular requirements for performance
    - External thermal insulation composite systems with rendering (ETICS): The systems shall be classified as being freeze/thaw resistant in accordance with ETAG 004 assessment requirements.
- Alkali damage:
    - Aluminium components shall not suffer alkali corrosion or staining from cement based materials.
    - Glass components shall not suffer visual or performance degradation arising from waterborne alkalis from components above.
- UV and IR resistance:
    - All materials that are sensitive to UV/ IR shall maintain their integrity, visual appearance and performance over the service life of the element of the works in which they are incorporated.
- Sulphate reaction:
    - Masonry and cement based components either near or in contact with ground shall not suffer degradation by sulphate attack.

Maintainability:

- The design of the works shall take account of the requirements for maintenance after completion of the works. Components which require cyclical maintenance shall be accessible, either directly, or indirectly following removal of associated components.

Environmental

Responsible Sourcing Generally:

- Materials shall be responsibly sourced from manufacturers who are independently third party certified to BS EN ISO 14001/EMS or equivalent standard or who have a structure that is in compliance with BS 8555:2003 and has reached phase four of the implementation stage, 'implementation and operation of the environmental management system', and has completed phase audits one to four, as defined by BS 8555 as a minimum to meet the Project Environmental Assessment Method requirements (refer Project General Requirements) and shall have certified manufacturer's Environmental Product Declarations for:
    - Aluminium Framed Systems: Accreditations must cover the aluminium metal product manufacturing plant and the aluminium ingot production plant.
    - Steel Framed Systems: Accreditations must cover steel product production and electric arc furnace or basic oxygen furnace
    - Glass: Accreditations must cover the glass production and sand extraction or soda lime

production or extraction.
- Brick: Accreditations must cover product manufacture and clay extraction process
- Resin based composites and materials: Accreditations must cover composite product manufacture, glass fibre and polymer production.
- In situ concrete: Accreditations must cover ready mixed concrete plant, cement production, aggregate extraction and production.
- Precast concrete and other concrete products: Accreditations must cover concrete product manufacture, cement production, aggregate extraction and production.
- Plastics and rubbers (including EPDM): Accreditations must cover plastic/ rubber product manufacture and main polymer production.
- Cement bonded particleboard: Accreditations must cover cement production and timber from certified sources
- Mineral based materials, including fibre cement and calcium silicate: Accreditations must cover product manufacture, cement/ lime production, other mineral extraction and production.
- Products with 100% recycled content: Accreditations must cover product manufacture and recycled input by default
- Products with lower % of recycled content: Accreditations must cover product manufacture, supply chain process(es) for any virgin material and recycled input by default.
- For Timber and Timber-based Products/Components: Refer to Project General Requirements

Responsible Sourcing of Insulation:
- Insulation products are to be A or A+ rated by the BRE Green Guide to Specification or a manufacturer's independently certified Environmental Product Declaration and be sourced from manufacturers who are independently third party certified to BS EN ISO 14001/EMS or equivalent standard or who have a structure that is in compliance with BS 8555:2003 and has reached phase four of the implementation stage, 'implementation and operation of the environmental management system', and has completed phase audits one to four, as defined by BS 8555 as a minimum to meet the Project Environmental Assessment Method requirements and shall have certified manufacturer's Environmental Product Declarations for both the insulation manufacturing plant and the raw material suppliers to the manufacturing plant.
- Insulation blowing agents shall have zero Ozone Depletion Potential (ODP), be CFC and HFC free and have a Global Warming Potential (GWP) of <5.
- All insulation products shall be 100% recyclable and manufacturers should be operating or participating in a recognized off-cut collection and/or recycling scheme.

Recycled Content:
- To BS EN ISO 14021

Volatile Organic Compounds (VOCs):
- Products listed shall meet the VOC testing and emission requirements of BREEAM Domestic Refurbishment 2012, Hea 03 Volatile Organic Compounds, Table –14: VOC criteria by product type.
- All decorative paint, seals and varnishes to be water-based, zero solvent, less than 7.99% (low) VOC content when tested to BS EN ISO 11890-2:2006) supplied by a BS EN ISO 14001 accredited company generally.

Additional Requirements for Performance: Masonry Walling Systems

General:
- Square, true, accurately positioned in relation to adjacent elements, fully co-ordinated with door and other structural openings.
- Refer to Structural Engineer's information for performance requirements for all structural components including backing wall, head restraints, shelf angles, lintels, wind posts, frame connections, support brackets, plates, ties, bedding reinforcement and sundries.

Standards:

- Design of masonry structures: To PD 6697, BS EN 1996 relevant parts, and their UK National Annexes
- Comply with NHBC Design Standards

Water Management:
- All cavities shall be free draining to outside at the base of each cavity zone.

Masonry Cladding to Framed Structures:
- The masonry cladding shall be designed to prevent cracking due to stresses generated by differential movement between the masonry and the framed substrate.

Preventing the Risk of Cracking:
- Masonry wall systems shall be designed to prevent the risk of cracking either at stress concentrations around openings or as a result of movement, including shrinkage.

Movement Control:
- Comply with PD 6697, BS EN 1996-2 and BS 6093
- Movement shall be controlled by the provision of movement joints and, where required, bed reinforcement. For bed reinforcement, refer to Structural Engineer's information.
- Movement joints shall be provided to accommodate thermal and moisture movement, creep and deflection and internal stresses caused by vertical or lateral loading, so that the masonry does not suffer damage.
-The width of the movement joints shall be sufficient to accommodate both reversible and irreversible movements, without damage to the masonry.

Weep-holes:
- Visually unobtrusive, free-draining durable plastic to prevent entry of large nest building insects into the cavity.

Lintels:
-Prefabricated precast/pre-stressed concrete and steel lintels for maximum spans of 4.5m: To: BS EN 845-2

Fire Protection
- Where a masonry wall is a fire separating element or fire rated for structural or proximity reasons all exposed structural accessories shall be fire protected as required to meet the fire performance of the wall. Fire protection shall be intumescent paint (as specified by the structural engineer) or fire encasement.

Additional Requirements for Performance: Sealant Joint Design

- The design of joints shall be in accordance with the requirements set out in BS 6093. For systemised elements, the contractor should follow the guidance in CWCT TN 16.
- All sealed joints shall be designed in consultation with the sealant manufacturer and shall comply with the requirements and guidance provided in:
    - BS 6093
    - BS 6213
    - CIRIA, Sealant joints in the external envelope of buildings: a guide on design, specification and construction
    - For systemised elements, the contractor should follow the guidance in CWCT TN 20.
- Sealant joints shall provide durable, weathertight seals, and shall be able to accommodate variations in joint sizes arising from induced deviations (tolerances) and inherent deviations (movement).
- Sealed joints shall allow the relative movement between the structure and the cladding to take place without overstressing cladding units and fixings.
- Sealed joints shall be capable of accommodating the accumulated tolerances of both the structure and cladding units, whilst maintaining the joint width within the acceptable deviation limits.
- Sealants between porous materials shall not migrate into or discolour adjacent materials.
- The design and installation of sealant joints is required to mitigate against mechanical and aesthetic

failure of the sealed joints. Unacceptable failure modes are as follows:
- Mechanical failure:
    - Loss of adhesion
    - Loss of cohesion (splitting)
- Aesthetic failure:
    - Poor workmanship (mixing, masking, gunning, tooling, unevenness, discolouration)
    - Surface deterioration (cracking, discoloration, chemical attack)
    - Staining of adjacent surfaces

Additional Requirements for Performance: Traditional Handset Limestone Claddings/Dressings and Rainscreen Claddings/Dressings

Standards:
- Design and installation of natural stone cladding and lining to: BS 8298 Parts 1, 2 and 4
- In completing the design the contractor should follow the guidance in 'BS 8298 A User Guide' published by the Stone Federation Great Britain 2012.

General:
- The contractor shall determine sizes and thickness of slabs/ panels, sizes, number and spacing of fixings, configuration and location of support systems and incorporation of accessories to ensure the cladding system will resist factored dead, imposed and design live loads, and accommodate deflections and thermal movements without damage.
- The contractor shall ensure that adequate provision is made to ensure that water run-off from stone surfaces shall not affect the performance or degrade the appearance of adjacent materials, such as metal, stone, glass surfaces/assemblies or finishes to components.
- The contractor shall ensure that adequate provision is made to ensure that projecting surfaces do not cause uneven washing, discolouration or deterioration of the stonework.
- Cavities shall have adequate provision for drainage and for damp-proofing over openings.
- Any water getting past the cladding/ rainscreen joints shall be drained outward without adversely affecting the system's the Visual, Functional and Detailed Descriptions and Performance Requirements respectively.
- Weepholes shall be provided at points where any trapped moisture could accumulate in the cavity.

Jointing:
- Joints shall always take account of the respective manufacturing, setting out and assembly deviations of the materials used in accordance with BS 5606 and BS 6093.
- Traditional handset cladding:
    - Comply with BS 8298-2
    - Movement and other fixed joints shall accommodate all thermal, building structure or other movements and any applicable loads without compromising watertightness.
    - All cured hard and soft cladding joints shall be free of cracks
    - Where narrower joint widths are specified to those stipulated in BS 8298, the contractor shall assess suitability of selected mortar.
    - Movement and compression joints: The contractor shall provide all necessary sealant type vertical movement and horizontal compression joints to ensure compliance with the performance criteria.

Rainscreen cladding joints:
    - Comply with BS 8298-4

Sealants:
- Selection criteria: To BS 8298-1:2010 Table 7 and BS 6213.
- Sealants shall be compatible with the adjacent elements of construction and shall not migrate into or stain/discolour adjacent materials.
- All sealant filled joints shall include backing strip material to control the sealant depth, prevent over spill at the rear of the joint and to provide a compressible space into which the sealant can deform under compression.

Design of Support Frame/Fixings:
- Comply with BS 8298 Part 1 and 4

- Stainless steel fixings and support brackets for natural stone cladding shall be Grade 1.4401 to BS EN 10088 complying with BS 8298.
- Bolts and nuts selected for fixing the stonework shall be stainless steel grade A4.
- The design shall ensure that any water that may flow along any framing members shall not be trapped against the back of the stone panels nor bridge the air gap to the backing wall or insulation.

Weep-holes:
- Visually unobtrusive, free-draining durable plastic to prevent entry of large nest building insects into the cavity.

Additional Requirements for Performance: Rainscreen Cladding

- The design of rainscreen cladding systems shall be in accordance with the CWCT Standard for systemised building envelopes, the NHBC standards and the system manufacturer's recommendations.
- Support frame:
    - The secondary support frame, fixings and fasteners shall accommodate the loading requirements stated in the Structural and Mechanical section of this specification without rattling or deflecting beyond the allowable limits stated in the CWCT Standard.
    - The secondary support frame, rails, fixings and fasteners shall be capable of providing adequate adjustment to suit building movement and erection deviations.
    - Fixing assemblies installed in the wet side of envelope shall be austenitic stainless steel grade 304 or 316, or aluminium.
    - Fixing assemblies installed in the dry side of envelope shall be hot dip galvanised steel, austenitic stainless steel grade 304 or 316, or aluminium.
    - Austenitic stainless steel and shall conform to the grades as required under 'Materials' in this specification.
- Cladding panels:
    - The cladding panels shall be designed to withstand the design wind loads, without deforming or deflecting beyond the allowable limits stated in the CWCT Standard.
    - The design shall allow the replacement of damaged or broken panels without disturbing/ removing adjacent panels.
    - All panels shall be suitably fixed to prevent them from being lifted off the support frame by wind and unauthorised people.
    - Metal pressed panels: All panels shall feature drainage holes to prevent water being trapped on panel edges.
- Water management:
    - Any water getting past the rainscreen joints shall be drained downward and outward without adversely affecting the system's performance.
    - The air gap between the face of the insulation and the back of the rainscreen panels shall be adequately ventilated to dry out any residual water or water vapour.
    - All drainage paths and openings shall be designed and installed free from obstructions to prevent the risk of water ponding and overflowing.
    - Provisions, such as installing continuous dpc cavity trays with stop ends, shall be made to ensure water is drained to the outside above openings, at the base of the rainscreen and at interfaces where required.
- Backing wall:
    - The backing wall shall be designed to withstand the full wind loading on the facade.
    - It shall provide an air barrier either by itself or by an associated layer such as an air leakage barrier membrane.

Additional Requirements for Performance: Light Steel Framed External Backing Wall

- The design and construction of the backing wall shall:
    - provide an air and weather tight line within the building envelope.
    - accommodate barrier loads, wind loads, cladding loads and any other loads necessary to function as a backing wall and be determined by structural calculations and where required prototype testing to ensure system shall withstand applied live and dead loads.

- ensure that thermal bridging is eliminated, or where this is not possible thermal bridging shall be limited to ensure no degradation to performance or risk of condensation forming within or on the surface of the works.
- eliminate the risk of interstitial condensation
- eliminate adverse moisture on steel surfaces due to precipitation or condensation
- accommodate the differential movement of the primary structure.

- The contractor shall carry out condensation risk analysis for each framed wall type, including warm and hybrid frame constructions, using the methods stipulated under 'Post Contract Submittals 'in this specification, to demonstrate performance requirements are met.
- Sheathing shall be durable and capable of providing mechanical resistance to racking to the extant required by the structural design of the backing wall and where identified by being required by the contractor's design.
- Sheathing boards: In buildings with a floor over 18m above ground level, where the insulation in the cavity is not a material of zero or limited combustibility, then the sheathing board shall be Class A1 to BS EN 13501-1to prevent fire break through the sheathing line.
- The design of the works shall accommodate any dimensional changes that the sheathing boards might be subjected to due to variation in relative humidity in service.
- Cladding treatments:
    - Masonry cladding: The backing wall shall be designed to provide lateral support to the masonry outer leaf i.e. restraint from wind loads, but shall not be used to provide vertical support for masonry or other such heavy-weight cladding.

Additional Requirements for Performance: Timber Rainscreen Cladding

- The design of the rainscreen cladding shall be in accordance with the guidance provided in TRADA publications and the NHBC standards.
- The contractor shall take reasonable precautions to avoid unwanted noise including creaking, rattling and whistling being generated by the works when subject to environmental conditions (including wind) and thermal expansion over the life of the element.
- The contractor shall ensure that adequate provision is made to ensure that water run-off from timber elements shall not affect the performance of non-visible metal surfaces/ assemblies or finishes to components/ assemblies.
- The contractor shall ensure that water run-off from timber elements shall not affect the warranty or predicted service life of visible metal components or finishes.
- The contractor shall where necessary demonstrate through testing that no adverse reactions of the construction will occur through the life of the building that maybe detrimental to the durability of the façade. Where necessary components shall be isolated to avoid adverse reactions.
- For open jointed cladding systems, ensure that the open joint widths between panels shall be within the allowable limits placed by the breather membrane manufacturer, to ensure that the warranty and the predicted service life of the breather membrane shall not be affected.
- Provide sufficient allowance for moisture movement in the detail design of the timber cladding system to prevent the risk of the wood splitting, and limit wood warping to the acceptable limits set within this Specification.

Additional Requirements for Performance: Rendered External Wall Insulation Systems

- The design of the system shall comply with BS EN 13914-1 and the guidance given in NHBC Standard Part 6.
- The system shall carry full and current BRE certification and/or BBA certification relevant to the specified system (including insulation type and thickness, method of attachment, render and reinforcement type, and type of decorative finish(es) and appropriate for the structural substrate types.
- The system shall be compliant with current Technical Guidance issued by the Insulated Render & Cladding Association (INCA).
- The render top coat shall be resistant to or be able to accommodate temperature, moisture and building induced movement without cracking, detachment from the building (adhesion) or blistering.
- Fixings shall be capable of dealing with differential movement between backing wall and the render face without imposing undue stress.

REQUIREMENTS FOR SAMPLES, SUBMISSIONS, MOCK-UPS AND TESTING

Submissions Generally:
- Submit for approval in accordance with the protocol detailed in the Project General Requirements.

Pre Contract Submittals

Product and Test Data:
- Provide manufacturer's product and test data for all materials in this specification, including manufacturer's installation instructions and maintenance data, components, assemblies, products that meet the requirements of the Design Intent.
- The following technical submittals are required:
    - Natural stone used for claddings/Dressings: Recent (less than 18 months old at point of installation) test certificates declaring natural stone properties/ characteristics to BS EN 1469. Test data previously performed shall only be accepted if they are performed on the same type of stone extracted from the same quarry, with the same characteristics in accordance with the requirements of BS EN 1469.

Pre Contract Samples:
- In accordance with the Project General Requirements, submit pre contract control and product samples that meet the requirements of the design intent and as defined in each System Specific Requirement work section.

Post Contract Submittals:
- The following technical submittals are required:
- Wind load /snow load calculations
- Barrier calculations
- Impact load calculations
- Structural calculations, test data and technical literature for framing members, brackets, architectural feature connections, fixings, etc, to demonstrate compliance with Specification and BS EN standards.
- U Value calculations
- Condensation risk analysis calculations:
    - Traditional constructed walls for blocks D,F,G,H shall be assessed in accordance with the method used in BS 5250 and BS EN ISO 13788.
    - Traditional constructed walls for blocks A-C shall be assessed using WUFI analysis and dewpoint calculations.
    - Systemised and non breathing wall constructions, containing elements such as framing members that may form thermal bridges, shall be assessed using the methods described in BS 5250 and CWCT 'Standard for specifying and assessing for condensation risk',
- Manufacturing and installation tolerances document
- Detailed installation checklists
- CWCT testing certificates
- Material precedence: Evidence of long term non staining of porous substrates by selected sealant
- Fire stopping:
    - LPCB or equivalent UKAS approved third party product certification body approvals
    - Test reports and/ or assessments by UKAS approved laboratories representative of end use application
    - Where systems are proposed to be used in special application conditions, where the manufacturer's instructions and tested methods cannot be followed, submit engineering appraisal compiled under the terms of the Passive Fire Protection Federation (PFPF) 'Guide to Undertaking Assessments in Lieu of Fire Tests'
- Quality plan in accordance with ASFP Technical Guidance Document – TGD 14 documenting the sequence of activities required to deliver the works and the inspection stages. The layout for the quality plan shall be in accordance with Annex A of ASFP Technical Guidance Document – TGD 14

Post Contract Samples:
- In accordance with the Project General Requirements, submit post contract control and product samples that meet the requirements of the design intent and as defined in each System Specific Requirement work section.

Fabrication/ Working Drawings:
- In accordance with the Project General Requirements, submit fabrication/working drawings for comment to demonstrate compliance with the Functional, Visual, Detailed descriptions and Performance requirements respectively.

Mock Ups:
- In accordance with the Project General Requirements, submit full scale mock ups that meet the requirements of the design intent and as defined in each System Specific Requirement work section.

Masonry Brickwork Reference Panel:
- Prior to commencement of the Works, a reference panel of masonry brickwork walling shall be constructed and assessed on site in accordance with PAS 70 and the following requirements;
- The reference panel shall be constructed on level, firm foundation in a dry location, having good natural daylight. It shall be sited so that it can be retained for further inspection and reference, protected from damage and adverse weather conditions with adequate provision for lateral stability.
- Allowance shall be made for minimum viewing distance of 3m.
- The selected brick(s) supplied by the manufacturer or supplier shall be reasonably representative of the average quality of the whole order, or, randomly sampled in accordance with BS EN 771-1.
- Build the reference panel to the specification and contract requirements of the finished work so that it exposes for assessment those faces that will be visible in the finished work. Lay bricks to the bond selected, to the horizontal and vertical gauge proposed using mortar of the same class and colour and finished with the same joint profile.
- Refer design intent drawings for reference panel size, layout and specific project masonry brickwork requirements

Assessment of Masonry Brickwork Reference Panel:
- Allow to cure for 7 days minimum before assessing appearance.
- Inspection of the reference panel shall be carried out and accepted by the Designated Contact prior to commencement of laying on site
- Minor defects, cracks, chips or surface blemishes that are representative of the brick and what may reasonably be expected to be delivered together with special details, bond, pointing or other project specific options incorporated within the panel shall be assessed and level of acceptability agreed

Natural Stone Reference Samples, Visual Inspection and Acceptance Criteria:
- Reference samples shall conform to BS EN 1469.
- 5 no. slabs minimum of stone cladding1000mm x 500mm minimum face size to indicate the range of appearance regarding colour, texture, veining, shell content and the distribution character and frequency of these, and all other features that are deemed to be part of the geological characteristics of the stone.
- The design team, with the assistance of a qualified experienced geologist, shall view the samples and confirm acceptable range of visual features to the contractor. Any features deemed unacceptable shall also be defined and recorded.
- Once approved, the contractor shall distribute two sets of samples for use during factory production quality control at the quarry and masonry factory.
- All duplicate control stone samples shall be approved by the design team before dispatch.
- The contractor shall photograph and record all approved samples.

Quality Benchmarks:
- Provide notice of the first installed/ completed walling installation of each type specified to form the Quality Benchmark in accordance with the protocol set out in the Project General Requirements.

Testing

Systemised Building Envelope Testing:
- Including the following systems:
    - Rainscreen walls comprising rainscreen panels and a backing wall.
- Where the contractor designs and installs proprietary pre-tested constructions systems to function within the performance envelope of their original type testing, the contractor shall supply copies of test results and proof that the installed elements are within the environmental, spatial and performance

parameters of the type tests. Where the contractor designs and installs bespoke or untested solutions, or proprietary construction systems to function outside their original type testing parameters, the contractor shall undertake project specific testing, as follows:

- CWCT Standard for Systemised Building Envelopes laboratory test Sequence B as follows:
    - Air permeability – Infiltration & exfiltration: To CWCT Test Method Clause 5
    - Watertightness – static: To CWCT Test Method Clause 6
    - Wind resistance – serviceability: To CWCT Test Method Clause 11
    - Repeat air permeability – Infiltration & exfiltration: To CWCT Test Method Clause 5
    - Repeat watertightness – static: To CWCT Test Method Clause 6
    - Watertightness – dynamic: To CWCT Test Method Clause 7
    - Watertightness – hose: To CWCT Test Method Clause 9
    - Wind resistance – safety: To CWCT Test Method Clause 12
    - Impact tests: Refer to Appendix A of CWCT Technical Note 75 to determine required test methods to particular components and materials.
    - Rainscreen panels - wind load test: Open jointed rainscreen panels, which are not subjected to differential pressures of CWCT Test Methods 11 and 12, shall be tested to CWCT Test Method Clause 13

- Additional testing required:
    - Site hose test – In accordance with CWCT TN 41 and AAMA. Minimum 5% of critical joints within each system and interfaces between system shall be tested.
    - Equipotential testing: To CWCT Test Method Clause 20
    - Acoustic– laboratory testing: To BS EN ISO 10140, relevant parts. Test results reported in accordance with BS EN ISO 717.
    - Acoustic- site testing: Refer Acoustic Engineers information.
    - Safety anchor tests in accordance with the standard governing such anchors.
    - Off site and site testing of fixings: To CWCT Test Method Clause 19, BS 5080 Parts 1 and 2, and Construction Fixings Association guidance note 'Procedure for site testing construction fixings'.

Air-tightness:

- The building will be subject to whole building air testing in accordance with the Project General Requirements.

Materials Testing

Natural Stone Testing:

- All sampling and testing of the stone cladding panels shall be carried out in accordance with BS EN 1469. Testing shall be conducted by a third party United Kingdom Accreditation Service (UKAS) approved independent laboratory.

The contractor shall undertake project specific testing as follows:

- Where appropriate recent test certificates are not available, as required under pre contract submittals, carry out initial type testing to determine stone properties/ characteristics that meet the performance requirements, in accordance with BS EN 1469:2015. List of required initial type testing and compliance criteria as BS EN 1469:2015 Table 4.
- Carry out initial type testing when significant variations occur in the material, determined visually or by significant changes in FPC test results.
- Produce sampling report in accordance with BS EN 1469:2015 Table 3
- Perform additional initial type testing and sampling in the event of test failures, when performance requirements are not met.
- Carry out factory production control (FPC) testing in accordance with the test methods and frequency as stated in BS EN 1469.

- The following tests are required for natural stone slabs for cladding as an external wall finish as BS EN 1469:2015 Table ZA.1.2:
    - Reaction to fire: Class A1 without testing or to BS EN 1350-1
    - Water vapour permeability: To BS EN ISO 12572 or BS EN ISO 10456 declared as coefficient
    - Mechanical resistance (as flexural strength): To BS EN 12372 declared in MPa
    - Resistance to fixing: To BS EN 13364 declared in N

- Resistance to thermal shock: To BS EN 14066 declared in %
- Direct airborne sound insulation: To BS EN 1936 declared in kg/m³
- Thermal resistance: To BS EN 1936 declared in kg/m³
- Durability of flexural strength against freeze thaw: To BS EN 12371 declared in MPa
- Resistance of marble to thermal and moisture cycling: To BS EN 16306

Testing of Sealants:
- Stain testing on each type of masonry unit in contact with sealant.
- Quality control site adhesion testing: Non-destructive site adhesion test in accordance with guidance provided in paragraph 5.4 of CIRIA publication 'Sealant joints in the external envelope of buildings: a guide on design, specification and construction'.
- Properties of sealants to be measured using the test methods listed in BS EN ISO 11600
- Additional test procedures recommended by the sealant manufacturer shall be conducted in order to verify satisfactory sealant cure and / or adhesion to joint surfaces.

Testing of Mortars:
- Testing of mortars shall be carried out in advance of any walling and in accordance with BS EN 998-2, BS EN 4551 and BS EN 1015 (relevant parts).
- All material sources shall be submitted to the Designated Contact for acceptance prior to testing.
- Fresh mixed mortar consistency shall be of the standard recommended in BS EN 1015-1 unless otherwise agreed or specified.
- Frequency of Testing: to be no less than that required by BS EN 4551and BS EN 1052 (relevant parts)
- Failure of mortar: Brick/ Block walling containing mortar that does not comply with the requirements of the Specification shall be demolished, debris carted away, and rebuilt.
- Building limes to be tested to BS EN 459-2.

Testing of Fixings in Concrete and Masonry:
- Site and off-site testing of fixings: To CWCT Standard test methods for building envelopes Clause 19: Tests for Fixings, BS 8539 and the Construction Fixings Association (CFA) Guidance note 'Procedure for site testing construction fixings – 2012' or updates thereof.
- Testing shall be carried out by a member of the CFA Approved Testers scheme
- Bonded anchors testing shall only be carried out after at least the recommended curing time has elapsed.
- Test reports: Submit.

Fire Stopping Inspection Generally:
- Comply with ASFP Technical Guidance Document – TGD 17: Code of practice for the installation and inspection of fire stopping systems in buildings: Linear joint seals, penetration seals, small cavity barriers.
- Visually examine 100% of each penetration seal for proper installation, adhesion and curing as appropriate for respective seal materials for evidence of compliance with this Specification.
- Critical thicknesses and other dimensions should be recorded and checked against specification.
- Re-examine the penetration seals immediately prior to concealment by other construction to ensure that no damage has occurred since the initial inspection.
- Submit installation certifications of conformity in accordance with the procedures in the Project General Requirements. Photographic evidence may be used in reports of inspections.
- Inspections shall be undertaken during installation (pre-handover inspections) and at installation completion (final inspection) by FIRAS or similar third party Accredited Installers. If an independent inspection is required, then third party inspectors may be used.

Certificates:
- Where performance criteria are required to be met, submit evidence of meeting the performance in the form of third party accreditation.- Submit data substantiating manufacturer and installer qualifications and where requested, details of operative experience.
- Submit certified data attesting fire rated materials comply with specifications.
- Submit certificates of conformity and marking in accordance with the project environmental assessment method requirements.
- Submit certificates from fixing manufacturers declaring that fixing design is in accordance with their

recommendations and it is suitable for the intended use.
- Submit current ETAG/EAD certificates from fixing manufacturers declaring that the fixing and fixing design is in accordance with their recommendations and it is suitable for the intended use.
- Submit records of heat soak testing of glass components

Operation and Maintenance Manual:
- Submit information in accordance with the Project General Requirements.

REQUIREMENTS FOR WORKMANSHIP AND MATERIALS

Fabrication Tolerances:
- Rain screens– tolerances shall be limited to:
    - Length/ width: maximum allowed deviation +0/-1mm up to 3 metres; +0/-2mm over 3 metres.
    - Straightness/ flatness: Any surface or edge shall not deviate more than 2mm from a straight edge of length 2 metres placed against it.
    - Twist: No section shall twist more than ± 1° over the length of the section.

- Alluminium rainscreen panels:
    - Flatness: ±1mm under a 1000mm straightedge.
    - The twist, warping and bow shall not cause any point of the panel to be more than 0.5mm out of plane.

- Natural stone claddings/dressings:
    - Manufacturing tolerances to BS 8298 and BS EN 1469, with the following exception:
    - Dressings slab length/ width: maximum allowed deviation ±1mm

- Cross section dimensions of structural softwood and hardwood:
    - Dimensions in this specification and shown on the design drawings are target sizes as defined in BS EN 336.
    - Tolerance indicators (T1) and (T2) specify the maximum permitted deviations from target sizes as stated in BS EN 336, clause 4.3:
        - Tolerance class 1 (T1) for sawn surfaces.
        - Tolerance class 2 (T2) for machined or planed surfaces.
- Cross section dimensions of non-structural softwood:
    - Dimensions: Dimensions in this specification and shown on drawings are finished sizes.
    - Maximum permitted deviations from finished sizes: As stated in BS EN 1313-1:
        - Clause 6 for sawn sections.
        - Clause NA.2 for further processed sections.
- Cross section dimensions of non-structural hardwood:
    - Dimensions: In this specification and shown on the design intent drawings are finished sizes.
    - Maximum permitted deviations from finished sizes: As BS EN 1313-2:
        - Clause 6 for sawn sections.
        - Clause NA.3 for further processed sections.
- Warping of timber:
    - Bow, spring, twist and cup: Not greater than the limits set down in BS 4978 or BS EN 14081-1 for softwood, or BS 5756 for hardwood.

- Timber cladding boards:
    - Maximum permitted deviations:
    - Length: ±1mm.
    - Width: ±1mm.
    - Cross section: ±1mm
    - Squareness of rectilinear element face: ±1.5mm in 1m
    - Flatness: ±1mm under a 1m straightedge.

Installation Tolerances:
- In order to ensure good fit and compliance with performance requirements, allowance shall be made for in-plane tolerance of preceding adjacent elements by others, eg. primary structure. The specified tolerance allowances of such elements shall be consulted to ascertain spatial zones

required. In particular, the Structural Movement and Tolerance Report shall be consulted in respect of primary structural tolerance zones. In the case where insufficient data is available for primary structural tolerances, assume a zone of 25mm beyond the designed surface plane of the structural element, however, this shall be verified as sufficient by the structural engineer.
- All parts of any designed surface plane, cut-out, edge or feature shall be constructed and installed within ±2mm, and ± 5mm cumulative, of the designed setting out location in line, level, plumb and plane.
- Steps between adjacent panels or components designed to be in the same plane shall not exceed 2mm mm between any two adjacent sections.
- The bow of any flat surface shall not exceed more than ± 3mm from a 2000mm straightedge placed against it in any direction.
- Joint width: The width of an individual joint between components should not vary by more than 10% of nominal design width.
- Joint consistency: Within the length of any joint (including in-line continuations across transverse joints) the greatest width shall not exceed the least width by more than 5% plus 1mm. Any variation shall be evenly distributed with no sudden changes in width.
- Joints: The offset in elevation between nominally in-line edges across a transverse joint shall not be more than 5% of the width of the transverse joint plus 1mm.
- Joints: The offset in plan or section between flat surfaces of adjacent panels across any joint shall not be more than 5% of the width of the joint plus 1mm.

- Masonry permissible deviations when measured in accordance with BS 5606 Annex D:
    - Position in plan of any point in relation to the specified building reference line and/ or point at the same level: ± 10 mm
    - Straightness in any 5 m length, horizontally, vertically, diagonally: ± 5mm
    - Verticality:
        - Walls up to 5m in height: ± 8mm, limited to 8mm in a storey height (approx 2.5m).
        - Walls over 5m in height: ± 12mm, limited to 8mm in a storey height (approx 2.5m).
    - Vertical joints in stretcher bond face-work: Plumb at every fifth cross joint.
    - Overall thickness of walls: ± 10mm
    - Level of bed joints for walls up to 5m long: ± 8mm (pro rata for wall less than 5m long)
    - Level of bed joints for walls over 5m long: ± 12mm
    - The thickness of an individual bed joint should not vary from the average of any 8 successive joints by more than 5mm.
    - Straightness of external window reveals: Alignment of inward facing edges of reveal brickwork shall take precedence over the thickness and alignment of the perps.
    - Flatness along window sills and boards: ± 3mm in1m straight edge
    - Verticality of window/opening reveals:
        - Openings up to 1.5m high: ± 5mm
        - Openings more than 1.5m high: ± 8mm
    - Accuracy at window/opening head and sill:
        - Maximum out of level tolerance for openings up to 1.5m wide: ± 5mm
        - Maximum out of level tolerance for openings more than 1.5m wide: ± 8mm

Materials

General:
- All materials shall be suitable for intended use.
- Materials used in the manufacture of the envelope, or its components, shall not be liable to reduction of their service life by infestation or attack by micro-organisms, fungi, insects or other vermin.
- As a general rule successive system layers when considered from inside to outside of the external envelope shall have decreasing vapour resistance.
- The contractor shall take into account applicable UV/IR exposure limits, set by manufacturers, for all materials during construction.

Facing Brickwork:
- Clay masonry units: To BS EN 771-1 and BS EN 772 relevant parts
- Size: To BS 4729

- Brick Specials: To BS 4729
- Air bricks: To BS 493
- Facing Blockwork:
- Aggregate concrete masonry units: To BS EN 771-3

Conditioning of Clay Bricks:
- Bricks delivered warm from manufacturing process: Do not use until cold.
- Absorbent bricks in warm weather: Wet to reduce suction. Do not soak.

Colour Consistency Of Masonry Units:
- Colour range: Colour of bricks and mortar to be consistent across entire elevation of each wall. Mix from 3 packs minimum within each batch or delivery, and from a single consignment or blended consignments as agreed with the manufacturer.
- Conformity: Check each delivery with previous deliveries for consistency of appearance with accepted reference panels; do not use if variation is excessive.
- Finished work: Free from patches, horizontal stripes and racking back marks.

Insulation:
- All insulation products shall hold BBA certification.
- The insulation shall be dimensionally stable, inert, durable, rot-proof, fungus- proof and vermin-proof and shall not be degradable by moisture, extreme temperatures or water vapour.
- All insulation below DPC adjacent to ground level or in areas of cavities subject to constant wetting shall equal to or better than the moisture absorbency resistance of extruded polystyrene (XPS).
- Material standards:
    - Mineral wool (MW) and glass wool insulation boards: To BS EN 13162
    - Expanded polystyrene (EPS) bead boards: To BS EN 13163
    - Extruded polystyrene (XPS) boards: To BS EN 13164
    - Polyisocyanurate (PIR) foam boards: To BS 4841
    - Polyurethane (PUR) foam boards: To BS EN 13165
    - Phenolic foam (PF) insulation boards: To BS EN 13166
    - Cellular glass (CG) insulation products: To BS EN 13167
    - Wood wool (WW) insulation products: To BS EN 13168
    - Expanded perlite (EPB) board: To BS EN 13169
    - Expanded cork (ICB) insulation products: To BS EN 13170
    - Wood fibre (WF) insulation products: To BS EN 13171
    - Thermal insulation products. Evaluation of conformity: To BS EN 13172
- Moisture resistance in masonry solid and cavity walls:
    - The selected insulation products shall not transmit water to inner layers nor will they transmit moisture by capillary action across the wall cavity or from below DPC level.
- In warm and hybrid light steel frame construction the insulation placed over the external face of the stud walling shall have adequate thermal resistance to:
    - eliminate cold bridging
    - maintain the metal frame components above the dew point temperature, preventing interstitial condensation

Mortars for Masonry:
- Factory made mortar: To BS EN 998-2
- Site made mortar: To PD 6678
- Where masonry mortar designation has not been specified (either in the relevant Work Section of this Specification or within the Structural Engineer's Specification), the following mortar designations for particular exposure conditions with regard to durability for finished work are recommended in accordance with PD 6697 and BDA Design Note 7- Brickwork Durability (if the designation has been specified, that within the work section prevails). The selected mix shall have the maximum movement accommodation whilst meeting the requirements for durability and load bearing capacity :

Masonry condition or situation	Appropriate mortar designation	
	Clay Units	Aggregate concrete Blocks (excluding aerated concrete blocks)

(A) Work below ground level DPC		
High risk of saturation with freezing MX3.2	M12 or M6	M6
	Note: In conditions of highly mobile groundwater, the manufacturer shall be consulted on the selection of materials.	
(B) Unrendered external walls (other than chimneys, cappings, copings, parapets, sills)		
B1- Low risk of Saturation MX3.1	M4	M4
B2 - High risk of saturation MX3.2	M6	M4
(C) Rendered external walls (other than chimneys, cappings, copings, parapets, sills)		
Rendered external walls	M6 or M4	M4
(D) Inner leaves of cavity walls		
Inner leaves of cavity walls MX1	M6 or M4	M4
(E) Unrendered parapets (other than cappings and copings)		
E1- Low risk of saturation e.g. low parapets on some single storey buildings MX3.1	M6 or M4	M4
E2 - High risk of saturation e.g. where a capping only is provided for the masonry MX3.1, MX3.2	M12 or M6	M6
(F) Chimneys		
F1 Unrendered with high risk of saturation MX3.1, MX3.2	M12 or M6	M6
(G) Cappings, copings and sills		
Cappings, copings and sills MX3.1,MX3.2	M12	M6
(H) Freestanding boundary and screen walls (other than cappings and copings) between ground and coping DPC		
With coping MX3.1,MX3.2	M6	M4
With capping MX3.1,MX3.2	M6	M6
(I) Facing brickwork to concrete retaining walls		
I1- Low risk of Saturation MX3.1	M6	M6
I2 – Inclined walls with high risk of saturation MX3.2	M12	M12
NOTES: 1. The mortar designation recommendations above may be overridden by structural requirements (including wall tie type requirements) and the type of construction and exposure of the building. 2. When masonry mortar is used in exposure classes MX4 or MX5 the manufacturer's advice should be sought as to its suitability.		

Classification of micro conditions of exposures of completed masonry to BS EN 1996-2:2006,Annex A

Class	Micro condition of the masonry	Examples of masonry in this condition

MX1	In a dry environment	Interior of buildings for normal habitation and for offices, including the inner leaf of external cavity walls not likely to become damp. Rendered masonry in exterior walls, not exposed to moderate or severe driving rain, and isolated from damp in adjacent masonry or materials.
MX2	Exposed to moisture or wetting	
MX2.1	Exposed to moisture but not exposed to freeze/thaw cycling or external sources of significant levels of sulfates or aggressive chemicals	Internal masonry exposed to high levels of water vapour, such as in a laundry. Masonry exterior walls sheltered by overhanging eaves or coping, not exposed to severe driving rain or frost. Masonry below frost zone in well drained nonaggressive soil.
MX2.2	Exposed to severe wetting but not exposed to freeze/thaw cycling or external sources of significant levels of sulfates or aggressive chemicals	Masonry not exposed to frost or aggressive chemicals, located: in exterior walls with cappings or flush eaves; in parapets; in freestanding walls; in the ground; under water.
MX3	Exposed to wetting plus freeze/thaw cycling	
MX3.1	Exposed to moisture or wetting and freeze/thaw cycling but not exposed to external sources of significant levels of sulfates or aggressive chemicals	Masonry as class MX2.1 exposed to freeze/thaw cycling.
MX3.2	Exposed to severe wetting and freeze/thaw cycling but not exposed to external sources of significant levels of sulfates or aggressive chemicals	Masonry as class MX2.2 exposed to freeze/thaw cycling.
MX4	Exposed to saturated salt air, seawater or de-icing salts	Masonry in a coastal area. Masonry adjacent to roads that are salted during the winter.
MX5	In an aggressive chemical environment	Masonry in contact with natural soils or filled ground or groundwater, where moisture and significant levels of sulphates are present. Masonry in contact with highly acidic soils, contaminated ground or groundwater. Masonry near industrial areas where aggressive chemicals are airborne.
NOTE: In deciding the exposure of masonry the effect of applied finishes and protective claddings shall be taken into account.		

- Masonry mortar groups: Where mix has not been prescribed or performance specified (either in the relevant Work Section of this Specification or within the Structural Engineer's Specification), the following nominal mixes are recommended (if the mix has been specified, that within the work section prevails) as National Annex (NA) BS EN 1996-1-1: 2005+ A1: 2012 Table NA.2. and BS EN 998-2:2010 Table NA.1, durability and exposure class as BS EN 1996-2:2006 Annex B Table B.2.:

Compressive strength class	M12	M6	M4

Prescribed mortars (traditional proportion of materials by volume)	Cement : lime : sand with or without air entrainment	1 : 0 to ¼ : 3	1 : ½ : 4 to 4½	1 : 1 : 5 to 6
	Cement : sand with or without air entrainment	1 : 3	1 : 3 to 4	1 : 5 to 6
	Masonry cement: sand (inorganic filler, other than lime)	Not suitable	1 : 2½ to 3½	1 : 4 to 5
	Masonry cement: sand (lime)	Not suitable	1 : 3	1 : 3½ to 4
Mortar designation		(i)	(ii)	(iii)
Suitable for use in environmental: condition		Severe (S)	Severe (S)	Moderate (M)

- Ready mixed lime: sand for cement gauged masonry mortar:
    - Standard: To BS EN 998-2.
    - Lime: Nonhydraulic to BS EN 459-1.
    - Type: CL 90S.
    - Pigments for coloured mortars: To BS EN 12878.
- Cements suitable for mortar mixes in accordance with NA BS EN 1996-1-1 Table NA.3 and BS EN 998-2 Table NA.2:
- Cement to BS EN 197-1 and CE marked:
    - Portland cement: CEM I
    - Portland limestone cement: CEM II/A-L and CEM II/A-LL
    - Portland-slag cement: CEM II/B-S
    - Portland-fly ash cement: CEM II/B-V
    - Strength class to BS EN 197-1: 32.5, 42.5 or 52.5
- White cement: To BS EN 197-1 and CE marked.
    - Type: Portland cement, CEM I.
    - Strength class: 52.5.
- Sulfate resisting Portland cement to BS EN 197-1 and CE marked:
    - Sulfate resisting Portland cement: CEM I /SR
    - Portland-fly ash cement: CEM II/B-V
    - Strength class to BS EN 197-1: 32.5, 42.5 or 52.5
- Masonry cement to BS EN 413-1and CE marked:
    - Class MC 12.5
- Sand for site made cement gauged masonry mortars:
    - Standard: To BS EN 13139.
    - Grading: 0/2 (FP or MP).
    - Fines content where the proportion of sand in a mortar mix is specified as a range (e.g. 1:1: 5-6):
        - Lower proportion of sand: Use category 3 fines.
        - Higher proportion of sand: Use category 2 fines.
    - Sand for facework mortar: Maintain consistent colour and texture. Obtain from one source.
- Admixtures for site made cement gauged mortars:
    - Air entraining (plasticizing) admixtures: To BS EN 934-3 and compatible with other mortar constituents.
    - Other admixtures: Submit proposals.
    - Prohibited admixtures: Calcium chloride, ethylene glycol or admixtures containing these materials.
- Retarded ready to use cement gauged mortar:

- Standard: To BS EN 998-2.
- Lime for cement:lime:sand mortars: Nonhydraulic to BS EN 459-1.
- Type: CL 90S.
- Pigments for coloured mortars: To BS EN 12878.
- Time and temperature limitations: Use within limits prescribed by mortar manufacturer.
- Retempering: Restore workability with water only within prescribed time limits.

- Additional requirements for mortar materials are specified in the appropriate work sections.

Traditional handset natural stone claddings/dressings mortar:
- Comply with BS 8298 Parts 1 and 2
- Limestone and sandstone cladding mortar mixes: 1:1:5 or 1:1:6 cement: lime: sand or 1:2:8 or 1:2:9 cement: lime: stone dust shall be used in accordance with BS 8298-1.
- Sands from natural sources shall conform to BS EN 13139.
- Lime shall conform to BS EN 459-1.
- Admixtures and pigments:
  - Mortar plasticizers shall conform to BS EN 934-3.
  - Pigments shall conform to BS EN 12878.
  - Prohibited admixtures: Calcium chloride or admixtures containing calcium chloride.
  - Water for mortar mix: Water shall be from the public mains or other potable supply. If mains water is not available, the water shall be clean and shall not contain any material, either in solution or in suspension, in quantity sufficient to have a harmful effect on the mortar or stone, or on metals or to impair the durability of the construction. Sampling and testing of the water shall be in accordance with BS EN 1008.

Lime/Sand Mortars:
- Lime product standard: BS EN 459-1:2010 Building Lime
- Use factory made natural hydraulic lime masonry mortars without additives to BS EN 998-2, pre-batched or premixed lime-sand-masonry mortar supplied and mixed to the manufacturer's specification and conditions to BS EN 998-2.
- Mortar mixes using natural hydraulic lime (NHL): Where no other guidance exists in either the structural specification, from the manufacturer or the specification work section, use NHL3.5 to 'moderate' and 'passive' degree of exposure for renders and masonry bonding above ground, but not in exposed zones; and NHL5 for 'severe' below DPC and in exposed zones as described in BS EN 998-2:2010 Annex B (informative) and BS EN 1996-2 generally.
  - HLM3.3: Use a 1:1.5 ratio using a NHL3.5 lime or a 1:2.5 ratio using a NHL5 lime
  - HLM5: Use a 1:1 ratio using a NHL3.5 lime or a 1:2 ratio using a NHL5 lime
- Refer to lime manufacturer for recommendations on mix and suitable sand types.
- For natural hydraulic lime mortars the maximum height of wall shall be no more than 0.5m per day.
- Cold weather working: Work with hydraulic limes should not take place when the night and/or day temperatures are at or below 5 degrees C.
- Workable life: To be declared by manufacturer and that actual value to be no less than declared value when tested to BS EN 1015-9
- Workmanship to be in accordance with NF 12 'The use of lime-based mortars in new build' published by the NHBC Foundation
- Additional guidance can be found in BRE Good Building Guide 66 'Building masonry with lime based bedding mortars' (GBG66) and design, materials and workmanship generally.
- Sand/ aggregates for lime: sand mortars:
  - For standard masonry use a mortar mix with well graded course aggregate to BS EN 13139
  - For thin joint masonry mortar use a mortar mix with a well graded fine aggregate to BS EN13139
  - For renders use sharp sand unless required in work section to be crushed granite
  - Grading for crushed granite: to be 3mm clean consistent granules with no contamination

Sealant Systems:
- Selection of construction sealants: To BS 6213.
- Classification and requirements for sealants: To BS EN ISO 11600
- The contractor should follow the guidance in:
  - BASA Industry Guide to the Professional Application of Construction Sealants on Site,

prepared by the British Adhesives and Sealant Association.
- CIRIA, Sealant joints in the external envelope of buildings: a guide on design, specification and construction
- CWCT TN 19 and TN 20

- All sealants shall comply with the test procedures listed in BS EN ISO 11600 and BS 3712 Parts 1, 2, 3 and 4.
- Weatherproofing sealants shall be high performance grade, low modulus, neutral cure sealants suitable for the purpose intended and tested for special requirements.
- Where providing a primary line of defence, weatherproofing seals shall comprise a minimum of two sealant lines.
- Substrate compatibility: Sealants and primers shall be compatible with the materials with which they are likely to come into contact.
- Adhesion: Sealant systems shall achieve good adhesion to the substrates to which they are applied. The adhesion shall be sufficient to survive the mechanical and environmental stresses to which the sealed joint is likely to be exposed.
- When recommended by the sealant manufacturer, primers shall be used to :
    - enhance adhesion between sealant and substrate
    - strengthen or consolidate weak or friable materials
    - provide a barrier film between the substrate and the sealant to prevent staining of the sealant or the substrate.
- Where dissimilar surfaces form the joint, two different primers may be required.
- Sealant shall be applied against a compatible back up material that can provide sufficient resistance so that it is forced against the sides of the joint substrates during application and tooling.
- Sealants used in movement joints shall not adhere to the backup material and three sided adhesion shall be avoided.
- Back up materials, joint fillers and bond breakers shall be tested for sealant compatibility.

DPCs and Cavity Trays:

- DPCs and cavity trays systems including all associated cloaking/ stop end and jointing accessories shall hold BBA or certification.
- They shall provide a free draining and watertight installation. They shall prevent rising damp from the ground, and moisture or water passing from one part of a construction to another.
- DPCS and cavity trays shall be formed from materials that are compatible with adjoining materials and that will not degrade and stain wall finishes.
- DPCS and cavity tray shall have adequate strength to resist accidental damage during construction, and they shall have good workability at temperatures typically encountered during building operations.
- Masonry walls/ cladding DPCs and cavity trays:
    - Selection criteria: To PD 6697 and BS 8215- Required physical properties and performance of materials for DPCs: To Table 1 of PD 6697
    - Masonry wall DPCs and cavity trays shall have the following additional properties in accordance with PD 6697:
        - resistance to compression without significant extrusion
        - resistance to sliding where necessary
        - good adhesion to units and mortar where necessary
    - Typical and high compressive load applications: Flexible pitch polymer DPCs and cavity trays shall match the performance of BBA certified Hyload Original DPC, by IKO Plc.
    - Low and minimal compressive load applications (e.g. parapet walls, below window sills): Flexible bitumen polymer DPCs and cavity trays shall match the performance of BBA certified Hyload Permabit DPC, by IKO Plc.
- Rainscreen cladding (excluding stone cladding) DPCs and cavity trays:
    - Polyethylene to BS 6515, or
    - EPDM, or
    - Neoprene

Aluminium Rainscreen Panels:

- Standards: BS EN 485, BS EN 515, BS EN 573, relevant parts
- The contractor shall determine the required alloy, temper and thickness of the panels to ensure that the visual and performance requirements of the rainscreen are met.
- Pressed aluminium panels shall be factory fabricated, complete with all bends, joints, notches prior to

delivery on site.
- Support angles and panel reinforcement trims shall be factory welded to concealed rear panel faces.

Timber Rainscreen Cladding:
- Timber cladding shall comply with the following standards:
    - BS 1186-3
    - BS EN 942, with the following exceptions for uncoated cladding boards:
        - Arris, splay, margin and branched knots are not acceptable on visible faces.
        - Loose, dead or unsound knots shall not be present on any visible faces. Making good of loose, dead or unsound knots, as described in BS EN 942, shall not be acceptable on visible faces.
    - Wood based panels conformity and marking: To BS EN 13986
    - Solid wood panelling and cladding conformity and marking: To BS EN 14915
- Sapwood: Not permitted
- Splits: Not permitted
- Wane: Not permitted
- Biological attack: Not permitted
- Reaction wood: Not permitted
- Finger jointing: Not permitted
- End jointing: Not permitted
- Edge jointing: Not permitted
- Use Class to BS EN 335 and BS 8417: the timber shall be utilised in 'Use Class 3 (UC 3)' – Exterior joinery that is not covered and not in contact with the ground and is subject to wetting.
- Moisture content of timber cladding and any supporting, trimming or associated timber components at the time of delivery and installation: To TRADA recommendations and BS 8000-5, Table 10:16% +/-2%. Check moisture content on delivery and confirm the readings to Designated Contact.
- Cladding board profile:
    - Horizontal boards in an 'open jointed' cladding system: top and bottom edges of the board shall be chamfered, to drain water to the outside.
    - Vertical boards: top and bottom of vertical boards shall be cut at an angle to prevent water being trapped on the upper edge, or hanging on the underside where it could be absorbed by the end grain.
- Support battens:
    - Regularized and treated softwood free from decay, insect attack and with no knots wider than half the section width. Timber sections shall be sufficiently thick and wide to accommodate the cladding board fasteners.
    - Treated timber horizontal battens: Top edge of batten cut to a minimum 15° fall to shed water:
        - away from cladding into the cavity, when vertical counter battens are used, or
        - away from supporting wall, when counter battens are not used, i.e. on a board-on-board or an open-jointed type of vertical cladding.
- Fasteners: All hardwood and softwood cladding panels shall be fixed with austenitic stainless steel fasteners. Refer also to particular requirements for metal fasteners.
- Coatings: Site applied coatings to be in accordance with BS EN 927-1
- Timber preservatives:
    - Preservative treatment shall be appropriate for the proposed timber species and adhesives, and shall be assessed in accordance with the requirements of BS EN 599-1 and BS 8417.
    - Treatment shall be in accordance with Table 4 of BS 8417, and shall be suitable for the specified design service life of the timber component/ system and Use Class.
    - Factory production and control shall be as required by BS EN 351.

Limestone Claddings/Dressings:
- Standards:
    - Requirements of natural stone slabs for cladding to: BS EN 1469
    - Natural stone products – Dimensional Stone Work: Requirements: BS EN 12059
    - BS 8298, relevant parts: Code of practice for the design and installation of natural stone cladding and lining.
    - The contractor should follow the guidance in 'Selecting the Correct Stone' published by the Stone Federation Great Britain 2010.

- Quality: Stone slabs shall be thoroughly seasoned and free from cracks, vents, holes, seams, fissures or other defects that may adversely affect appearance, strength, weathering qualities or durability.
- The contractor shall undertake all necessary initial type, factory production control and project specific testing itemised to demonstrate compliance with BS EN 1469 and project specific requirements.
- All physical and mechanical characteristics of the cladding stone slabs shall be declared in a CE certificate format in accordance with Annex ZA of BS EN 1469.
- Flexural strength for traditional handset cladding: The flexural strength (in MPa) shall be determined in accordance with BS EN 12372 or BS EN 13161 and shall be not less than that shown in Table 2, Table 3 or Table 4 of BS 8298 Part 2, as relevant to the greatest panel span and thickness.
- Stone profile for drained and ventilated rainscreen systems: the profile of the slabs shall be such that no water can be trapped on the upper horizontal edge of the panels.

Light Steel External Backing Walls:
- Conformity assessment of structural components for steel structures: To BS EN 1090-1
- All metal framing components, including studs, channels, cleats, z bars, slotted angles, straps etc shall be constructed from cold-rolled pre-hot dipped galvanised steel to BS EN 10346.
- Continuously hot galvanised components shall have a minimum zinc coating mass of 275 g/m² to BS EN 10346.
- Continuously hot dipped galvanised components shall have a minimum zinc aluminium alloy (ZA) coating mass of 255 g/m² to BS EN 10346.
- Sheathings and fixings used in conjunction with the light steel frame system must have a valid BBA or UKAS accredited equivalent third party certification.
- Sheathing boards: In buildings with a floor over 18m above ground level, where the insulation in the cavity is not a material of zero or limited combustibility, then the sheathing board shall be Class A1 to BS EN 13501-1to prevent fire break through the sheathing line.

Fibre Cement Sheets:
- Fibre cement sheets shall hold BBA or UKAS accredited equivalent third party certification.
- Standards: Fibre cement sheets shall conform to BS EN 12467
- Fibre cement sheets used for external wall sheathing applications shall be weather/ freeze/thaw resistant and shall not be degradable by moisture or water vapour.
- The sheets shall be subjected to very limited dimensional movement when exposed to varying relative humidity, without degradation of performance.

Breather Membranes:
- Standards: BS EN 13859-2
- Selection of breather membrane: To BS 5250 and CWCT TN33 guidance
- Breather membranes shall hold BBA or UKAS accredited equivalent third party certification and shall:
    - provide a barrier against water penetration
    - allow migration of water vapour through the membrane to the outside of the building
    - protect against wind driven rain or snow and dust ingress.
    - contribute to air sealing the wall, where applicable in the airtightness strategy
    - have adequate strength to resist site damage
- As defined in BS 5250, breather membranes shall have a vapour resistance less than 0.6 MNs/g.
- Water tightness: The breather membrane shall be Class W1 Pass, when tested to Method A of BS EN 1928.
- Open-jointed rainscreen cladding systems:
    - Breather membranes shall pass the artificial aging test according to BS EN 13859-2, and match the resistance to artificial aging by permanent ultra violet radiation of Tyvek® UV Facade, by DuPont.
    - No logos on visible faces.
- Membranes not subject to any UV radiation when the building works are complete: The breather membrane shall have minimum 4 months UV exposure resistance, without degradation to performance

Air and/or Vapour Control Layers (AVCL/VCL):
- Standards: BS EN 13984
- Selection of AVCL/CVL: To BS 5250 and CWCT TN33 guidance
- Air and/or Vapour control layers shall hold BBA or UKAS accredited equivalent third party

certification and shall:
- have resistance to water vapour transmission
- form an air barrier, where applicable in the airtightness strategy
- have adequate strength to resist loads associated with wall construction
- have adequate resistance to heat ageing

- Reinforced polyethylene vapour control sheet layers shall be minimum 500 gauge

Stainless Steel Generally:

- The performance requirements for degradation and corrosion resistance of stainless steel components, excluding components covered in the Structural Engineer's specification, might be met by use of stainless steel in locations as the following table:

Table of appropriate austenitic stainless steel grades

Key to terms:
- Exterior: exterior surfaces; drained or ventilated cavities, whether partial of fully ventilated; cavities within masonry construction; items near or in contact with ground; items within or on the cold side of insulation; items exterior to a warm framed backing wall.
- Interior: items within or internal to a warm framed backing wall; items wholly within the inner leaf of a traditional masonry wall, but not exposed to the cavity.
- Visible: visible after completion of the works from inside or outside the building.
- Concealed: non visible after completion of the works.
- A2/ A4 : austenitic stainless steel grades of fasteners

Corrosivity category *	Minimum Requirements			
	Exterior visible (refer to Functional and visual Requirements for outer surface finish)	Exterior concealed	Interior visible (refer to Functional and visual Requirements for outer surface finish)	Interior concealed
C1	N/A	N/A	Stainless steel grade 1.43xx (304) (A2)	Stainless steel grade 1.43xx (304) (A2)
C2	Stainless steel grade 1.44xx (316) (A4)	Stainless steel grade 1.43xx (304) (A2)	Stainless steel grade 1.43xx (304) (A2)	Stainless steel grade 1.43xx (304) (A2)
C3	Stainless steel grade 1.44xx (316) (A4)	Stainless steel grade 1.43xx (304) (A2)	Stainless steel grade 1.44xx (316) (A4)	Stainless steel grade 1.44xx (316) (A4)
C4	Stainless steel grade 1.44xx (316) (A4)	Stainless steel grade 1.44xx (316) (A4)	Contractor to undertake an independent assessment of the suitable grade to be utilised	Contractor to undertake an independent assessment of the suitable grade to be utilised

* Corrosivity categories in accordance with BS EN ISO 14713-1
NOTES: Minimum grade requirements assume smooth surface finish

Mild Steel Generally:

- The performance requirements for degradation and corrosion resistance of mild steel components, excluding components covered in the Structural Engineer's specification, might be met by use of stainless steel in locations as the following table:

Table of appropriate treatments for mild steel

Key to terms:
- Exterior: exterior surfaces; drained or ventilated cavities, whether partial of fully ventilated; cavities within masonry construction; items near or in contact with ground; items within or on the cold side of insulation; items exterior to a warm framed backing wall.
- Interior: items within or internal to a warm framed backing wall; items wholly within the inner leaf of a traditional masonry wall, but not exposed to the cavity.
- Visible: visible after completion of the works from inside or outside the building.
- Concealed: non visible after completion of the works.
- HDG: hot dip galvanised (may be painted or powder coated over protective coating)
- HZS: hot zinc sprayed plus sealed (must be painted or powder coated over protective coating)
- H: life to first major maintenance of a paint system high (more than 15 years)
- P: painted
- PPC: Polyester Powder Coated to at least Qualicoat standard

Corrosivity category *	Minimum Requirements			
	Exterior visible (refer to Functional and visual Requirements for outer surface finish)	Exterior concealed	Interior visible (refer to Functional and visual Requirements for outer surface finish)	Interior concealed
C1	N/A	N/A	P(H) or PPC	HDG or HZS
C2	HDG or HZS	HDG	P(H) or PPC	HDG
C3	HDG or HZS	HDG	HDG	HDG
C4	HDG	HDG	HDG	HDG
* Corrosivity categories in accordance with BS EN ISO 14713-1				

Additional Requirements for Workmanship: External Masonry Walling

Workmanship Generally:
- To: BS 8000-3 Code of practice for masonry and PD 6697
- Comply with NHBC Design Standards
- Comply with masonry unit manufacturer's written instructions.

Conditioning of Clay Bricks and Clay Blocks:
- Bricks delivered warm from manufacturing process: Do not use until cold.
- Absorbent bricks in warm weather: Wet to reduce suction. Do not soak.

Conditioning of Concrete Bricks/Blocks:
- In accordance with manufacturer's written instructions.
- Autoclaved concrete bricks/ blocks delivered warm from manufacturing process: Do not use.
- Age of non-autoclaved concrete bricks/ blocks: Do not use until at least four weeks old.
- Avoidance of suction in concrete bricks/ blocks: Do not wet.
- Use of water retaining mortar admixture: Submit details.

Storage and Handling of Masonry Brick/ Block Units:
- In accordance with manufacturer's written instructions.
- Unload masonry units with care to prevent soiling, chipping and breakage.
- Protect the stacks from rain and frost, and from soiling from the ground and passing traffic. Protect the bottom of the stack from becoming wet from ground moisture.

Storage of Cement Gauged Mortar Materials:
- Sands and aggregates: Keep different types/ grades in separate stockpiles on hard, clean, free-draining bases.
- Factory made ready-mixed lime:sand/ ready to use retarded mortars: Keep in covered containers to prevent drying out or wetting.
- Bagged cement/ hydrated lime: Store off the ground in dry conditions.

Making Cement Gauged Mortars:
- Batching: By volume. Use clean and accurate gauge boxes or buckets.
- Mix proportions: Based on dry sand. Allow for bulking of damp sand.
- Mixing: Mix materials thoroughly to uniform consistency, free from lumps.
- Mortars containing air entraining admixtures: Mix mechanically. Do not overmix.
- Working time (maximum): Two hours at normal temperatures.
- Contamination: Prevent intermixing with other materials.

Laying Generally:
- Shrinkage of masonry can be minimised by laying dry blocks and by protecting the work as it proceeds.
- Mortar joints:
    - All bricks and blocks shall be laid on a full bed of mortar to correct lines and levels and all vertical joints shall be solidly filled, without any voids. Internal and external mortar joints shall be tooled to ensure that leakage paths are prevented.
    - Maintain courses to uniform widths. Vertical and horizontal joints shall be equal and of uniform thickness.
    - Tooling of joints shall be carried out while the mortar is thumbprint hard. Any excess mortar that extrudes from the joints of fair-faced units shall be cut away as work proceeds and not smeared on to the face of the works.
    -Weepholes shall be formed by leaving out the mortar from the cross joints in the outer leaf immediately above the cavity tray at the specified intervals.
    - Vertical joints in brick and concrete block face-work: Even widths. Plumb at every fifth cross joint. Slushing of perpend joints or furrowing of bed joints is not permitted.
- Do not shift or tap units after mortar has taken initial set. Where adjustment is necessary, mortar shall be removed and replaced.
- Overhand laying shall be avoided unless dictated by site constraints and accepted by the designated contact.
- Use sulphate resisting cement when ground conditions dictate or where the risk of salt spray is present, including brickwork in proximity to roads that may be salted during winter.

Movement Joints:
- Movement joints shall be continuous through the full thickness of the wall leaf.
- Where masonry systems have applied finishes that are not adequately flexible to accommodate movement, such as render or plaster, the movement joint shall be continuous through the finishes.
- The horizontal spacing of vertical movement joints in non-loadbearing, unreinforced masonry walls shall take into account the type of wall, masonry units, mortar and the specific construction details and shall not exceed the following maximum recommended horizontal distances in accordance with BS EN 1996-2:

Type of masonry	Maximum recommended horizontal distance, lm (m), between vertical movement joints for external unreinforced, non-loadbearing walls
Clay masonry	12
Aggregate concrete and manufactured stone masonry	6
Any masonry in parapets and freestanding walls	Half the above spacings (6m and 3m for clay and concrete masonry respectively) and 1.5m from corners
NOTES: 1. The maximum horizontal spacing of vertical movement joints may be increased for walls containing bed joint reinforcement conforming to Structural Engineer's. 2. Factors that may override the maximum recommended spacing of vertical movement joints are as follows: - the physical properties of the specified masonry blocks/ bricks (including the moisture movement characteristics of the units). Combinations of different brick colour types (polychromatic) may require movement joints at denser centres. - mortar type/strength, i.e. high strength/ dense mortars have reduced	

movement accommodation compared to weak strength mortars.

- In addition to the maximum distance requirements above, movement joints shall also be placed in the following areas/ conditions:
    - In any wall return of clay masonry that is less than 1000 mm to prevent the development of a mechanical couple and the risk of cracking.
    - In any change in wall height or thickness
    - In abutments of walls and columns
    - In junctions with dissimilar materials
    - In any wall section spanning over a structural movement joint
- Movement joints may also need to be provided at:
    - masonry walls containing multiple/ large openings, movement joints may need to be provided at more frequent intervals or the masonry above and below the opening may need to be reinforced to restrain movement.
    - wall chases or recesses for fixtures, piping etc.
- Cavity wall inner leaf movement joint positions: Where materials with differing expansion coefficients are used in outer and inner cavity wall leafs, movement joints to the inner leaf, wherever possible should be staggered with those of the outer leaf

Movement Joints with Sealant:
- Movement joint width: To match design width of joint.
- All soft joints shall be filled with a fire rated seal. This shall take the form of mastic sealant or expanding foam tape. Where walls form part of fire compartment separation, the soft joint shall equal the fire resistance of the wall.
- Joint preparation and sealant application: Refer to Particular Requirements for Workmanship: Sealants
- Placement: Build in as work proceeds with no projections into cavities and to correct depth to receive sealant system.

Movement Joints without Sealant:
- Thickness: To match design width of joint.
- Placement: Build in as work proceeds filling the joint but without projecting into cavities.

Fire Resistant Movement Joints without Sealant:
- Placement: Compress and insert into place in open joint.
- Adhesives and accessories: Types recommended by filler manufacturer.

Height of Lifts in Walling using Cement Gauged or Hydraulic Lime Mortar:
- Quoins and advance work: Rack back.
- Lift height (maximum): 1.2 m above any other part of work at any time.
- Daily lift height (maximum): 1.5 m for any one leaf.

Levelling of Separate Leaves:
- Locations for equal levelling of cavity wall leaves: As follows:
- Every course containing vertical twist type ties or other rigid ties.
- Every third tie course for double triangle/ butterfly ties.
- Courses in which lintels are to be bedded

Coursing Brickwork:
- Gauge: Four brick courses including bed joints to 300mm.

Coursing Brickwork with Existing:
- To match existing.

Laying Frogged Bricks:
- Single frogged bricks: Frog uppermost.
- Double frogged bricks: Larger frog uppermost.
- Frog cavity: Fill with mortar.

Fixing of Brick Slips:

- Concrete substrate:
Preparation: Remove laitance and expose aggregate.
Substrate surface: Clean and free of loose material.
- Slips:
Preparation of slips: Clean and free of loose material.
Slips: Fully bonded.
- Movement joints in substrate: Do not bridge.
- Pointing: Allow adhesive bedding to set. Use same mortar as adjacent face-work and finish to same profile.

Fabrication of Brick Specials including Cutting and Bonding:
- Special bricks formed by cutting and bonding shall be fabricated off-site using specialist machine cutting equipment and appropriate external quality adhesives
- Brick adhesives shall match the colour and finish of the base unit, flush finished and applied in accordance with the adhesive manufacturer's recommendations
- Joints shall be straight, plumb and consistently formed, of uniform width and free from irregularities
- Fabricated brick specials shall conform with the recommendations of BS 4729
- Adjacent surfaces shall be free from smears or adhesive residues
- Once fabricated, brick specials shall be adequately cured and protected from damage from both off-site and on-site transport, storage or construction activities.

Cavities:
- General: Form uniform cavities to the specified width. Keep the cavity and ties free from mortar and debris to ensure cavity zone is free draining.
- Cleaning of cavities: Carefully clean off any surplus mortar from joints on the cavity faces as the work proceeds, before mortar droppings have had time to harden.

Mortar Droppings:
- Use removable cavity boards or battens to protect cavities and cavity insulation as work proceeds. After each lift remove excess mortar and mortar droppings and clean exposed edges of installed cavity insulation before commencement of the next lift.

Lintels:
- Bearing: Ensure full length masonry units occur immediately under lintel ends.

Support of Existing Work:
- Joint above inserted lintel or masonry: Fully consolidated with semidry mortar to support existing structure.

Jointing:
- Profile: Consistent in appearance.

Accessible Joints not Exposed to View:
- Jointing: Struck flush as work proceeds.

Fire Stopping:
- Avoidance of fire and smoked penetration: Fit tightly between cavity barriers and masonry. Leave no gaps.

Adverse Weather:
- General: Do not use frozen materials or lay on frozen surfaces.
- Air temperature requirements: Do not lay bricks/ blocks:
    - In cement gauged mortars when at or below 3°C and falling or unless it is at least 1°C and rising.
    - In hydraulic lime:sand mortars when at or below 5°C and falling or below 3°C and rising.
    - In thin joint mortar glue when outside the limits set by the mortar manufacturer.
- Temperature of walling during curing: Above freezing until hardened.

Protection:
- Newly erected walling shall be protected at all times from:

- Rain, frost and snow by protecting walling when precipitation occurs and at the completion of each day's work. Particular care shall be taken to allow the protected walling to dry out beneath the cover.
- Mortar splashing and staining
- Drying out too rapidly in hot conditions and in drying winds.
- Marking and staining from following trades.

Additional Requirements for Facework

Definition:
- Applicable in this specification to brick/ block walling finished fair.
- Painted facework: The only requirement to be waived is that relating to colour.

Finished Masonry Brickwork Reference Panels:
(See Requirements for Samples, Submissions, Mock-ups and Testing)
- General: Before proceeding to construct the walling types, construct sample/reference panels as specified. Give notice when panels are dry.

Colour Consistency of Masonry Brick Units:
- Colour range: Colour of bricks and mortar shall be consistent across entire elevation of each wall. Mix from 3 packs minimum within each batch or delivery, and from a single consignment or blended consignments as agreed with the manufacturer.
- Conformity: Check each delivery with previous deliveries for consistency of appearance with approved reference panels; do not use if variation is excessive.
- Finished work: Free from patches, horizontal stripes and racking back marks.

Appearance:
- Brick selection: Do not use units with damaged faces or arrises.
- Cut masonry units: Where cut faces or edges are exposed cut with table masonry saw. Saw blade type to be in accordance with manufacturer's written instructions. Cutting residue should be removed completely from units before they are used.
- Quality control: Lay masonry units to match relevant sample and quality control reference panels.
- Setting out: To produce satisfactory junctions and joints with built-in elements and components.
- Coursing: Evenly spaced using gauge rods.
- Lifts: Complete in one operation.
- Methods of protecting face-work: Submit proposals.
- Where areas of the works incorporate service openings, recessed panels or projecting panels, the reveal edges to these shall be treated as fair-faced.
- Efflorescence: Undertake all necessary measures, including adequately protecting the brickwork, to prevent the risk of efflorescence during construction.

Ground Level:
- Commencement of face-work: Not less than 150mm below finished level of adjoining ground or external works level.

Putlog Scaffolding:
- Not permitted in face-work.

Cleanliness:
- Face-work: Keep clean.
- Mortar on face-work: Ensure mortar does not come into contact with adjacent aluminium or other metal flashings, copings, framing, etc.
- Removal of marks and stains: Rubbing not permitted.
- Removal of cement staining from clay bricks: Follow manufacturer's written instructions

Final Clean:
- Clean down all work immediately prior to completion or prior to the handing over of any part of the work and leave clean, to the acceptance of the Designated Contact.
- Do not use wire brushes, acid type cleaning agents or other cleaning compounds with caustic or

harsh constituents.

Additional Requirements for Workmanship: Accessories Sundry Items for Brick/ Block Walling

Workmanship Generally:
- To: BS 8000-3 Code of practice for masonry and PD 6697
- Comply with NHBC Design Standards

Concrete Fill to Base of Cavity:
- Concrete generally: To BS EN 206-1 and BS 8500-2.
- Extent: Maintain 75 mm between top of fill and external ground level and a minimum of 225 mm between top of fill and ground level dpc.
- Placement: Compact to eliminate voids.

Cleanliness:
- Cavity base and faces, ties, insulation and exposed DPCs: Free from mortar and debris.

Air Bricks in External Walling:
- Standard: To BS 493, class 1.
- Placement: Built in with no gaps at joints.

Masonry Cladding to Framed Backing Wall:
- Masonry wall ties shall be located into vertical channels fixed to the light steel framework, through the insulation and sheathing board. Masonry ties and restraint fixings shall not to be fixed to sheathing board alone, unless the sheathing board has been specifically designed to accommodate such fixings and transfer loads into the primary structure via the light steel studs.

Partial Fill Cavity Insulation:
- Storage/ handling/ installation: In accordance with BBA certificate requirements and manufacturer's written instructions.
- Minimum clear cavity depth between face of insulation and rear face of facing masonry in accordance with PD 6697: 50mm
- Placement: Secure against face of inner leaf. Insulation shall not bulge, sag, delaminate or detach from supporting substrate.
- Residual cavity: Clear and unobstructed.
- Joints between boards, at closures and penetrations: No gaps and free from mortar and debris.
- Protection of insulation: After each section of the leading leaf is built, excess mortar shall be removed from the cavity face and mortar droppings cleaned from exposed edges of installed board before the installation of the next run of boards.

Flexible DPCs/Cavity Trays Generally:
- Installation in accordance with PD 6697, BS 8000-3, BS 8215, BBA certificate requirements and manufacturer's written instructions.
- DPCs/ cavity trays shall be installed to provide a free draining and watertight installation with fully sealed laps.
- Cavity trays shall be installed above all openings and other cavity bridgings, such as door/ window openings and cavity barriers.
- Preformed cloaks shall be used at cavity tray corners, changes in level and at junctions in accordance with manufacturer's written instructions and PD 6697 requirements.
- Stop ends shall be fitted when cavity trays are isolated or discontinuous. Stop ends should be made from preformed cloaks.
- Where cavity trays are penetrated or broken by windposts, service pipes/ conduits, columns and other irregular elements, cavity trays shall be modified such that any moisture within the cavity shall be directed outwards and away from the inner layers. This should take the form of preformed collars affixed and bonded to the vertical surfaces of the penetrating element and the cavity tray.
- Protection of damp proof course materials:
    - Coarse aggregates that might damage the damp proof course materials shall not be used.
    - Removable cavity barriers shall be used to prevent mortar droppings and other debris from

reaching the cavity tray.
- DPCs and cavity trays shall not be pierced by services, reinforcement, fixings.
- Implements such as steel rods or similar sharp utensils shall never be used for cleaning.
- Damp proof courses shall be examined for damage as work proceeds.

Storage of DPCs/ Cavity Trays:
- In accordance with manufacturer's written instructions.
- Flexible bitumen/ pitch polymer DPC rolls: Store level, on their ends, under cover in dry area and protect against damage. Ensure that DPCs are not contaminated by exposure to organic solvents.

Horizontal DPCs:
- Placement: In continuous lengths on a full, even bed of fresh mortar with fully sealed 100mm minimum laps at joints and full laps at angles. Keep number of joints as minimum as possible.
- Width: At least full width of leaf unless otherwise specified. Edges of DPC not covered with mortar or projecting into cavity.
- Overlying construction: Immediately cover with full even bed of mortar to receive next masonry course.
- Overall finished joint thickness: As close to normal as practicable.

Ground level DPCs:
- The DPCs must be continuous with the ground slab damp-proof membrane. Where there is doubt about the compatibility of materials, the advice of the manufacturers shall be sought.
-DPCs shall be joint with damp proof membrane. Continuous and effectively sealed.

Stepped DPCs in External Walls on Sloping Ground:
- Install not less than 150mm above adjoining finished ground level.

Sill DPCs:
- Form and placement: In one piece and turned up at back when sill is in contact with inner leaf.

Coping/Capping DPCs:
- Placement: Bed in one operation to ensure maximum bond between masonry units, mortar and DPC
- Overlaps and junctions: Seal with proprietary jointing tape to manufacturers recommended details.
DPC/Cavity Tray detail at leading edge
- Refer System Specific Requirements

Vertical DPCs:
- Form In one piece wherever possible.
- Upper part overlapping lower not less than 100 mm.

Jamb DPCs at Openings:
- Joint with cavity tray/ lintel at head: Full underlap.
- Joint with sill/ horizontal DPC at base: Full overlap.
- Projection into cavity: Not less than 25 mm.
- Relationship with frame: In full contact.

Sealing DPCs:
- DPCs joint treatment shall comply with the requirements set in Table 1 of PD 6697
- Overlaps and junctions shall be sealed with adhesive recommended by DPC manufacturer

Cavity Trays over Openings and other Cavity Bridgings:
- Length: To extend not less than 150 mm beyond ends of lintels/ bridgings.

Site Formed Cavity Trays:
- Profiles to match those shown on drawings.
- Use un-jointed wherever possible, otherwise lap at least 100 mm and seal to produce a free draining and watertight installation.
- Horizontal cavity trays: Use rigid support plates below joints between adjacent trays, cloakings, collars etc.
- Preformed cloaks shall be used at corners, changes in level and at junctions in accordance with

manufacturer's written instructions and PD 6697 requirements.
- Stop ends shall be fitted when cavity trays are isolated or discontinuous. Stop ends should be made from preformed cloaks.
- Sloping cavity trays: Prevent sagging.
- Cleanliness: Free from debris and mortar droppings.

Perpend Joint Plastic Weepholes:
- Locations: Through outer leaf immediately above base of cavity, at cavity trays, stepped DPCs and external openings. 75 mm above top of cavity fill at base of cavity.
- Provision: At not greater than 1000 mm centres and not less than two over each opening.
- Provision for dwellings: Where fairfaced masonry is supported by lintels weepholes shall be provided at 450mm (maximum) centres with at least two weep holes per opening.

Additional Requirements for Workmanship: Cavity Barriers

Generally:
- Within each cavity barrier solution, fully tested products from a single manufacturer shall be used. 'Mixing and matching' components from different manufacturers, or different systems made by the same manufacturer, when installing proprietary cavity barrier systems is not acceptable.
- The installation shall comply with the guidance provided in the ASFP Technical Guidance Document – TGD 17: Code of practice for the installation and inspection of fire stopping systems in buildings: Linear joint seals, penetration seals, small cavity barriers.

Storage:
- In accordance with manufacturer's written instructions

Installation Generally:
- Cavity barriers shall be installed strictly in accordance with the manufacturer's written instructions and the system's fire certificate installation instructions.
- The contractor is responsible for verifying that the supporting system, fixings and jointing methods are within the limitations of fire tested applications.
- Cavity barriers shall be mechanically fixed to satisfy Approved Document B clauses 9.14 and 9.15.
- Cavity barriers shall be continuous, with minimum joints.
- Spacing: Installed in voids so the maximum unobstructed dimension satisfies Approved Document B requirements.
- Fixing: Secure at perimeters and joints with no gaps, to provide a complete barrier to smoke and flame.
- Maintain required separation of penetrating items from edges of openings and from each other.
- Sequence: Ensure cavity barriers are installed in accordance with the manufacturer's written instructions prior to covering, concealing or eliminating access.

Foil Faced Mineral Wool Small Cavity Barriers:
- Type: Pre-compressed mineral fibre insulation slabs, factory faced on two sides with Class O, reinforced aluminium foil.
- Installation method: Compression fitted in cavity and mechanically fixed to substrate by means of support angle brackets.
- Orientation: Non foil faced mineral fibre edges shall be in contact with the sides of the cavity
- Cavity barrier width: Cavity barrier slabs shall be site cut to suit cavity widths and provide the required compression fit within the cavity, in accordance with manufacturer's written instructions and test certificate installation instructions.
- Support brackets:
    - Type: Galvanised steel fixing brackets, supplied by the system manufacturer.
    - Placement: Support brackets shall be impaled into the cavity barrier fibre core at mid-thickness, to achieve the required penetration and shall be mechanically fixed to the inner structure with non combustible fixings, e.g. steel anchors. No plastic shims shall be used.
    - Spacing: In accordance with manufacturer's written instructions and test certificate instructions.
- Joints and intersections: Butted, with barriers compressed along full length to give complete seal. Joints shall be taped with self-adhesive reinforced foil tape, supplied by the manufacturer.

- External masonry cavity wall applications:
    - Prevention of moisture movement:
    - All installed cavity barriers shall be damp proofed in accordance with PD 6697.
    - Vertical cavity barriers: A DPC strip shall be installed between the cavity barrier and the outer masonry leaf. The DPC strip shall be continuous and extend minimum 25mm into the cavity on either side.
    - Horizontal cavity barriers: A cavity tray shall be installed immediately above the cavity barrier. The tray should have a minimum upstand of 100mm.

'Open State' Cavity Barriers for Use in Drained and Ventilated Facades:
Refer: Appendix Z41

Additional Requirements for Workmanship: Construction Sealants

Workmanship Generally:
- To: BS 8000-16 Code of practice for sealing joints in buildings using sealants, BASA Industry Guide to the Professional Application of Construction Sealants on Site and Special Publication SP 80: Manual of good practice in sealant application published by CIRIA 1991.

Storage:
- In accordance with manufacturer's written instructions

Suitability of Joints:
- Pre-sealing checks:
    - Joint dimensions: Within limits specified for the sealant.
    - Substrate quality: Surfaces regular, undamaged and stable.
- Joints not fit to receive sealant: Submit proposals for rectification

Preparing Joints:
- Preparation of joints to be sealed shall be in accordance with sealant manufacturer's written instructions.
- Surfaces to which sealant must adhere:
    - Remove temporary coatings, tapes, loosely adhering material, dust, oil, grease, surface water and contaminants that may affect bond.
    - Clean using materials and methods recommended by sealant manufacturer.
- Vulnerable surfaces adjacent to joints: Mask to prevent staining or smearing with primer or sealant.
- Primer, backing strip, bond breaker: Types recommended by sealant manufacturer.
- Priming: Prime the substrate as necessary, in accordance with the manufacturer's written instructions, ensuring that joint surfaces are fully coated, but with no excess left within the joint cavity.
- Backing strip and/ or bond breaker installation: Insert into joint to correct and uniform depth in line with manufacturer's written instructions, without stretching or twisting, leaving no gaps. Use backer rod whose width or diameter is greater than the width of the joint (at its widest point), such that it is held firmly in compression when in place (refer to see the manufacturer's recommendations for required compression).Tight butt joints between backing rod lengths to ensure no discontinuity. Where bond breaker tape is required, apply carefully so as not to displace the backer rod.
- Masonry walls movement joints:
    - Backing strip/ filler shall completely fill the joint space when the masonry is in its expansive and in its contraction state. Partially filling the joint with strip material is not permitted.
    - The material for filling movement joints to accommodate expansion shall be easily compressible to approximately 50% of its original thickness. Materials such as fibreboard, hemp and cork are not suitable for clay masonry movement joints.

- Protection: Keep joints clean and protect from damage until sealant is applied.

Applying Sealants:
- Sealants shall be applied in strict accordance with manufacturer's written instructions. The contractor should also follow the guidance in BASA and CIRIA publications.
- Substrate: Dry (unless recommended otherwise) and unaffected by frost, ice or snow.
- Environmental conditions: Check the sealant/primer manufacturer's guidance on recommended air

and component temperature limits of application. Sealants shall only be used within the range of component temperatures stated by the manufacturer, typically 5°C to 40°C (unless recommended otherwise by manufacturer). Do not dry or raise temperature of joints by heating.
- Sealant application: Fill joints completely without voids and neatly, ensuring firm adhesion to substrates.
- Tooling: Tooling shall be done before the sealant surface cures with suitable tooling devices in accordance with the sealant manufacturer's written instructions. Do not use finger or thumb to tool.
Sealant profiles:
- Butt and lap joints: Slightly concave.
- Fillet joints: Flat or slightly convex, in order to prevent too thin a section of sealant.
- Protection: Protect finished joints from contamination or damage until sealant has cured.
- Butt (tension/compression) joints: Unless recommended otherwise by sealant manufacturer, typical sealant width/ depth ratios shall be in accordance with CIRIA guide and CWCT TN20 guidance.
- Lap (shear) joints: To maximise movement accommodation, the seal width (seal width is the dimension perpendicular to the direction of joint movement, assuming that the joint sides move parallel to each other) shall be greater than the seal depth.
- Fillet joint: Joints shall be the correct shape and size. To maximise movement, the use of diagonal geometry backing rods that omit the sealant at the root of the fillet, may be used. The sealant shall ideally be applied such that it is at least 6 mm thick, with at least 6 mm 'bite' onto the adjacent surfaces.
- Double seal joints (precast concrete cladding):
    - Panel to panel joints shall incorporate two weather seals to inner and outer sides of each joint.
    - Weepholes shall be provided at regular intervals across outer seal jointwork.

Cleaning:
- If using masking tape, carefully remove immediately after tooling without damaging or smearing the seal and before the sealant skins or cures.
- Sealant that has spread or been dropped onto adjacent surfaces shall be removed by the sealant manufacturer's recommended methods.

Appearance:
- Sealed joints shall be straight, smooth, uniform in texture and colour, free from blisters, irregularities, bubbles and adjacent surfaces shall be free of smears or traces of sealant.

Additional Requirements for Workmanship: Natural Stone Claddings/Dressings

Production Workmanship:
- To: BS 8298 and BS EN 1469 and stone supplier's recommended installation details.
- The stone shall be sourced from a single quarry holding sufficient reserves to meet the works requirements.
- The stone panels shall be equal to the approved sample or fall within the approved range of samples.
- Bedding: Appropriate to position.
- Oversize stones: Leave selected stone units oversize, to accommodate deviations within building structure. Cut to precise dimensions taken on site.
- Selected units: Clearly identify on shop drawings.
- All stone components shall be clearly marked with an identification symbol identifying their position on the building envelope. No marking shall be permitted on surfaces visible in the complete installation.
- Natural bed: Indicate on a non exposed surface of each stone.
- Stone slabs shall be cut accurately to sizes indicated on the drawings, without any defects that may degrade the strength of the fixings.
- Any special shaping of exposed faces is to be accurately worked before delivery to site other than in those exceptional circumstances where this can only be carried out on-site.
- The contractor shall ensure that the stone is not subjected to excessive heat generated by any factory process.
- Where fine work is necessary, particular care is to be taken to prevent chipping or damage to

arrises or faces.
- Finish for stonework: No saw marks or staining from extraction or finishing processes shall be visible on the finished surface of the works.
- Mortices, sinkings and notches for cramps, dowels and corbel plates shall be:
    - Carefully formed in production plant and not on site with suitable machinery to ensure no cracks are formed from the process
    - Accurately positioned to ensure alignment of adjacent cladding panels, in accordance with shop drawings
    - Formed to permissible tolerances to Table 14 of BS 8298-1:2010

Storage:
- Production and storage of stone cladding components shall be arranged so that the delivery is accurately sequenced for site fixing.
- All materials shall be stored clear of the ground, protected from inclement weather conditions or solar radiation and kept dry. Prevent soiling, chipping and contamination by salts and other harmful substances.
- Pallets containing stone material shall not be stacked on top of each other on site.

- **Storage of Cement Gauged Mortar Materials:**
- Sands and aggregates: Keep different types/ grades in separate stockpiles on hard, clean, free-draining bases.
- Factory made ready-mixed lime:sand/ ready to use retarded mortars: Keep in covered containers to prevent drying out or wetting.
- Bagged cement/ hydrated lime: Store off the ground in dry conditions.

Making Cement Gauged Mortars:
- Batching: By volume. Use clean and accurate gauge boxes or buckets.
- Mix proportions: Based on dry sand. Allow for bulking of damp sand.
- Mixing: Mix materials thoroughly to uniform consistency, free from lumps.
- Mortars containing air entraining admixtures: Mix mechanically. Do not overmix.
- Working time (maximum): Two hours at normal temperatures.
- Contamination: Prevent intermixing with other materials.

Inspection of Stone Units:
Give notice:
- At appropriate stages of production.
- Before dispatch to site.

Suitability of Substrate:
Contractor's survey:
- Scope: Geometric survey of supporting structure, checking line, level and fixing points.
- Coordinate: With surveys for adjacent cladding.
- Give notice: If the structure will not allow the required accuracy or security of erection.
- Setting out: Establish erection datum points, lines and levels for a complete elevation at a time unless otherwise agreed.

Installation Workmanship:
- To: BS 8000-11, BS 8298-1, BS 8298-4 and stone supplier's recommended installation details.
- All laying and jointing of the cladding works shall be carried out by qualified and skilled installers with proven experience.
- The works shall be set out accurately as shown on the design drawings and the finished works shall be free from undulations, steps, ridges, bumps, ripples and rocking.
- Location of joints: Joints must occur only at positions indicated on final detailed drawings.
- Electrolytic corrosion: Isolate dissimilar metals.
- Natural bed: Indicate on a non exposed surface of each stone.
- Cleanliness: Keep facework clean. Rubbing to remove marks and stains not permitted.
- Site formed cuts or drilling on non exposed stone faces shall be avoided where possible, and shall only be carried out by a qualified mason using the appropriate equipment.
- No finishing of any exposed finished stone faces shall be permitted on site.
- The contractor shall carefully handle stone when unpacking pallets and laying on site to ensure that

the arris remains undamaged.
- All stone cladding slabs shall be cleaned from any dirt, in accordance with the manufacturer's written instructions. Rubbing to remove marks and stains not permitted.

Repairs:
- Prior to undertaking any repair works, the contractor shall submit remedial method statement and seek approval from designated contact.

Partial Fill Cavity Insulation:
- Placement: Secure against face of inner leaf.
- Residual cavity: Clear and unobstructed.
- Joints between boards, at closures and penetrations: No gaps and free from mortar and debris.

Interfaces:
- Continuous cavity trays and associated closers shall be provided above any facade openings and above fire stops, so that the water is drained to the outside.

Fixings:
- Comply with BS 8298-1and BS 8298-4 workmanship clauses
- The contractor shall ensure that a gap is created between the face of the horizontal rails and the back of the stone panels so as not to restrict the flow of water against the back of the panels.
- The use and positioning of fixing components in the structure before the application of the cladding shall be carefully supervised at all times.
- Torque figures and shim dimensions: Do not exceed fixing manufacturer's recommendations.
- Grouting: Secure fixings in place in cladding and support structure/ background with cement:sand, epoxy or modified polymer mix, as recommended by the stone supplier.
- External cladding: Do not use mortar spacer dabs
- Give notice before covering up loadbearing fixings to designated contact.
- Inspection of fixings and cavities shall be allowed at every course before proceeding with the next course of stone units.

Jointing:
- The condition of all cladding panel edges shall be carefully examined, and cleaned from dirt, dust grease or other deleterious material prior to application of jointing materials.
- Mortar- filled joints:
    - Comply with BS 8298-1 workmanship clauses
    - Laying: Full mortar bed with all joints and voids fully filled
    - Keep cavity clear of mortar spillage.
    - Preformed and compressible backer rod may be used at the rear edge to prevent any loss of mortar into the cavity.
    - Carefully point stonework, ensuring no mortar spillage on face of stone

Sealant jointing for compression and movement joints:
- Comply with BS 8298-1 and BS 8000-16 workmanship clauses
- Install in accordance with manufacturer's written instructions.
- Keep free compression and movement joints from non compressible material.
- Install suitable sealant backing strips under a degree of compression prior to applying the sealant.
- Suitable sealant primer(s) shall be used as recommended by the sealant manufacturer to ensure that no 'leaching' occurs between adjacent materials.
- Sealed joints shall not be disturbed, moved, twisted or distorted until the sealants have properly cured and set.
- Carefully clean all excess sealant from exposed surfaces and edges, in accordance with manufacturer's written instructions.
- Finished sealed joints shall have a smooth continuous surface to the full width of the joint.

Cement: lime: sand mortar jointing:
- Comply with BS 8298-1 workmanship clauses
- Preparation: Wet stones thoroughly.
- Laying: Full mortar bed with joints and voids filled.
- Cavities: Clear of mortar.

- Appearance: Neat and consistent.
- Temporary distance spacers: Remove.

Cement: lime: crushed stone mortar jointing:
- Comply with BS 8298-1 workmanship clauses
- Crushed stone: Colour matched and passing a 1.4 mm sieve.
- Colour matching: Submit samples.
- Preparation: Wet stones thoroughly.
- Laying: Full mortar bed with joints and voids filled.
- Cavities: Clear of mortar.
- Appearance: Neat and consistent.
- Temporary distance spacers: Remove.

Additional Requirements for Workmanship: Fire Stopping Systems

Fire Stopping Generally:
- Fire stopping systems shall be listed in the BRE or the Association for Specialist Fire Protection (ASFP) Red Book latest editions and supplied by LPCB or equivalent UKAS accredited third-party certification body certified manufacturers.
- All fire stopping systems shall be installed by LPCB, or FIRAS, or equivalent UKAS accredited third-party certification body certified installers.
- Within each fire-stopping solution, fully tested products from a single manufacturer shall be used. 'Mixing and matching' components from different manufacturers, or different systems made by the same manufacturer, when installing fire stopping is not acceptable.
- Fire-stopping solutions shall encompass all joints and penetrations with no exceptions

Labelling/Recording:
- All fire stopping shall be labelled with a unique reference number indicating as a minimum, date of installation, date of inspection and name of installer.
- All penetration seals shall be recorded with locations and other data for completion of the Health & Safety file
- Installers shall subscribe to or maintain a 'Firestop Documentation Management System' (cloud-based system) wherever possible

Installation Generally:
- Generally: Fire stopping/ sealing / protective insulation shall be installed by an LPCB or FIRAS accredited contractor with a minimum of 3 years experience in accordance with the manufacturer's recommendations.
- Evidence of accreditation to be submitted to Contractor and Designated Contact before work commences including evidence that the specialist firestop contractor has undertaken installation training from the manufacturer of the products and systems used.
- Install fire stopping material with sufficient pressure to maintain uniform density and texture, and to ensure proper filling and sealing of openings/gaps to provide fire resistance and resist the passage of smoke. All to be in accordance with manufacturer's written instructions.
- Openings: Excessive openings shall be supported by appropriate framework, in accordance with manufacturer's details.
- Adjacent Surfaces: Prevent overrun of sealant or mortar on to finished surfaces.
- Maintain required separation of penetrating items from edges of openings and from each other.
- Sequence: Ensure fire stopping measures are installed in accordance with the Specification prior to covering, concealing or eliminating access.
- Installation Depth: Install fire stop material to the depth required to achieve the Performance criteria.

Installing Fire Stop Laminate:
- Fitting of strips: Compress strips and fit into joint, so that as they decompress the strips wedge themselves in the void.
- Shrink wrapping: To manufacturers recommended detail

Joints:
- Ends of strips: Fit intumescent 'end piece' at the end of joints.
- Joints in strips: Fit two intumescent 'end pieces' at each butt joint.

Installing Intumescent Foam:
- The use of aerosol dispensed 'Fire Foam' is strictly prohibited. Refer ASFP Advisory Note-PU Data sheet.
- New joints: Remove builder's debris, mortar droppings, grease, and the like.
- Old joints: Clean and remove existing sealant from the joint.
- Application: To specialist manufacturer's details generally

Applying Intumescent Mortar:
- Sequence: Install mortar after services are permanently installed.
- Loose dust and combustible materials: Remove from the opening.
- Shuttering: Install suitable shuttering panels to the faces of the opening.
- Temperature: Do not apply mortar when it could be damaged by frost.
- Powder: water ratio: To specialist manufacturer's written instructions generally
- Mortar cure: Do not disturb mortar before final set has taken place.
- Shuttering: Remove after mortar has cured.

Intumescent Putty:
- Submit test data demonstrating suitability of intumescent putty use above 1000mm from finished floor level
- Installations shall provide acoustic insulation/separation in excess of 70dB

Applying Intumescent Putty:
- Sequence: Install putty after services are permanently installed.
- Loose dust and combustible materials: Remove from the opening.

Installing Mineral Wool Batts:
- Installing batts: Fit tight into void between the penetrating services and the surrounding construction to form a solid barrier.
- Face of batts: Flush with the surface of wall, floor or soffit.
- Gaps between services and barrier: Seal with fire resisting sealant.

Joint Sealant:
- Proprietary joint sealants shall be certified to provide in excess of 12% flexibility under fire load and other installation movement

Application:
- Temperature: Do not apply water based sealants when they could be damaged by frost.

Completion:
- Remove masking tapes/ material.
- Cleaning: Clean off splashes and droppings. Wipe down finishes.

Finishing:
- Tool or trowel exposed surfaces to a smooth finish, flush with surrounding surfaces unless otherwise specified.

Storage and Use of Materials:
- All fire protection materials shall be stored under cover in dry conditions, on a flat base, clear of the ground in accordance with manufacturer's written instructions.
- Adhesives shall be stored at temperatures in the range 5 - 30°C and any water-based adhesives shall be protected from frost.
- Material containers shall remain unopened until needed and shall be used in date order.
- The installer shall maintain full delivery, usage, product stock identification marks etc as necessary to justify the installation being made.

Additional Requirements for Workmanship: Rainscreen Cladding

Generally:
- The contractor shall take necessary measures to prevent electrolytic corrosion
- Identification of products shall be marked or tagged to facilitate identification during assembly, handling, storage and installation. Visible surfaces shall not be marked in the complete installation.

Assembly:

- The contractor shall carry out as much assembly as possible in the workshop.
- Joints: Other than movement joints and designed open joints, must be rigidly secured, reinforced where necessary and fixed with hairline abutments.
- Displacement of components in assembled units: The contractor shall submit proposals for reassembly on site.

Fixing Assemblies, Secondary Frame and Brackets:
- When installed in the dry side of envelope, site drilling and cutting is permitted for hot dip galvanised components, but all exposed cut surfaces/ edges shall be sealed with zinc rich paint.
- All support cleats/ brackets shall be thermally isolated from the backing wall.

Site Welding:
- Not permitted.

Rainscreen Cladding Installation:
- Tightening mechanical fasteners: To manufacturer's recommended torque figures. Do not overtighten fasteners intended to permit differential movement.
- Protective coverings shall be removed only where necessary to facilitate installation and from surfaces which will be inaccessible on completion.
- Anti-rattle compression gaskets shall be utilised.

Damage:
- Prior to undertaking any repair works, the contractor shall submit remedial method statement and seek approval from designated contact.

DPC/ Cavity Tray Installation:
- The works shall incorporate continuous dpc cavity trays with stop ends above openings such as windows and doors, at the base of the rainscreen and at interfaces where required to ensure that the water is drained to the outside.
- The contractor shall locate flashings, closers etc. correctly and neatly overlap cladding to form a weathertight junction.

Thermal Insulation:
- Storage/ handling: In accordance with BBA certificate requirements and manufacturer's written instructions.
- Installation: In accordance with BBA certificate requirements and manufacturer's written instructions. All horizontal joints shall be staggered and all joints tight butted. Trimming must be accurate, to achieve close butting joints and continuity of insulation. The insulation shall be neatly cut and tightly fitted around fixings, brackets and penetrations where these occur.
- Placement: Insulation shall not bulge, sag, delaminate or detach from supporting substrate during installation or in situ during the life of the rainscreen cladding.
- The works shall ensure that all horizontal thermal insulation edges are protected from standing water.

Air and Vapour Control Layer:
- Continuity: No breaks and with the minimum of joints.
- Penetrations and abutments shall be sealed to vapour control layer. If recommended by the manufacturer the substrates shall be primed to achieve full bond.
- Sheet laps: Not less than 150 mm, sealed with tape. Substrates shall be primed as necessary to achieve full bond.
- Sheet tape type as recommended by AVCL manufacturer. Vapour resistivity of tape shall not be less than the vapour control sheet.
- Sheet repairs and punctures shall be sealed in accordance with manufacturer's written instructions.

Breather Membrane:
- Storage/ handling: In accordance with BBA certificate requirements and manufacturer's written instructions.
- Installation: In accordance with BBA certificate requirements and manufacturer's written instructions
- Continuity: No breaks are permitted. Minimize joints.
- Penetrations and abutments: Attach to breather membrane with tape. Achieve full bond.
- Laps: Not less than 150 mm, fully bonded with tape. Achieve full bond.

- Tape: As recommended by breather membrane manufacturer.
- Repairs: In accordance with membrane manufacturer's instructions
- Junctions at flashings, sills, gutters etc. Overlap and allow free drainage to exterior.

Additional Requirements for Workmanship: Timber Rainscreen Cladding

- Comply with BS 8000-0, BS 8000- 5 and with TRADA External Timber Cladding workmanship clauses

Checking:
- Carry out detailed checks on delivery in accordance with criteria set out in BS 8000-5, Table 1 to Table 4. In particular:
    - check quantities during unloading;
    - check for damage to manufactured components during unloading;
    - carry out moisture measurement on all joinery components as soon as possible after delivery, checking against the values set out in BS 8000-5, Table 10;
- Moisture content on site shall me measured with an approved moisture meter, to the manufacturer's recommendations.
- Selection and use of Timber: Timber members damaged, crushed or split beyond the limits permitted by their grading shall not be installed.

Handling:
- Ensure that items are not subject to stresses greater than those that they will sustain once installed, during transit, storage, lifting, erection or fixing. In particular:
    - support flat, planar items at all corners;
    - support linear items adequately along their length to avoid undue "bow".
- Prevent transfer of contaminants by hand such as when handling cladding.

Storage:
- Provide storage in accordance with BS 8000-5 Table 5 to Table 8 to ensure that materials and components are:
    - maintained free from damage,
    - protected from construction dirt or other contaminants in storage
    - in conditions suitable for their specified moisture contents.
- Ensure that there is adequate cross-ventilation over the top of the items stored at all times.
- Timber Cladding joinery particular storage requirements:
    - When storing cladding for any length of time, the boards shall be suitably stacked to allow sufficient air circulation. Sticks between board layers may be used to ensure free circulation of air to all faces and edges. The sticks shall be clean and dry before use to prevent stick marking.
    - Particular care shall be taken in storing and handling fully finished components, in order to prevent damage to the finishes.
    - No metal grinding or other construction processes shall be carried out adjacent to stored cladding joinery, in order to avoid the risk of staining and damage.
    - The stored cladding shall be kept well away and protected from sources of water runoff or leakage from metallic roof coverings.
    - Edges of boards shall be adequately protected and damage by overtight banding shall be prevented.

Preparation:
- The contractor shall check and ensure that the moisture content of cladding, joinery timber sections and components is within the range specified within this Specification immediately before installation.
- Timber cladding shall not be fixed to timber supports that have moisture content greater than18%.

Treated Timber:
- Surfaces exposed by minor cutting/ drilling shall be treated with two flood coats of a solution recommended by main treatment solution manufacturer.

Battens:

- Battens shall be spaced evenly, securely fixed and adjusted as necessary to give a true, level finished surface.
- Intermittent packing shims shall be fitted between horizontal support battens and support wall to create a gap for draining water.

Notches, Holes and Joints in Timber:
- Notches and holes shall be positioned in relation to knots or other defects such that the strength of members will not be reduced.

Fixing Battens/ Counter Battens to Masonry:
- Setting out: In straight, vertical lines.
- Batten/ Counter batten length (minimum): 1200 mm.
- Installation: Fastener heads to finish flush with or slightly below batten face.

Fixing Battens/ Counter Battens to Framing Sheathing:
- Setting out: In straight, vertical lines at centres coincident with vertical framing members.
- Batten/ Counter batten length (minimum): 1200 mm.
- Installation: Where sheathing is provided, fix through sheathing into framing. Fastener heads to finish flush with or slightly below batten face.

- Fixing battens to counter battens:
  - Setting out: In straight, horizontal lines. Align on adjacent areas.
  - Batten/ Counter batten length (minimum): 1200 mm.
  - Joints: Square cut, butted centrally on counter battens and not occurring more than once in any group of four battens on any one counter batten.
  - Installation: Fix each batten to each counterbatten. Use splay fixings at joints. Fastener heads to finish flush with or slightly below batten face.

Fixing Boarding:
- Boards shall be fixed securely to give true surfaces free from undulations, splits, marks, scratches, defects, flaws, steps, waves, protruding fastenings, or damage of any nature.
Movement: Allow for movement of boards and fixings to prevent cupping, springing, excessive opening of joints or other defects.
- Heading joints shall be positioned centrally over supports and at least two board widths apart on any one support.
- Nail heads shall be punched below surfaces that will be seen in the completed work.

Fixings:
- Jointing/ Fixing: Where not specified precisely, select methods of jointing and fixing and types, sizes and spacings of fasteners in compliance with Appendix Z20.
- Fasteners shall be in a regular pattern both horizontally and vertically.
- Softwood boards nailing:
  - When using nails for softwood boards, nails shall be not less than 20mm from board ends and 15mm from the edges.
  - Nails shall be driven marginally below the surface of the board with a punch narrower than the nail head.
  - Nail embedment into the support batten shall be 2 times the thickness of the cladding board when annular ring shank nails are used and 2.5 times the thickness of the cladding board when round wire nails are used.
- Hardwood board screw fixing:
  - Pre-drill holes in the boards to provide a clearance around the shank of the screw to allow for seasonal variations in moisture content.
  - For small or medium movement timber species, allow a 2mm clearance between the shank of the screw and the hole in the board, when the boards are installed at about the recommended 16% moisture content.
  - If screw heads are to be left exposed, they shall be left with slots aligned in one direction.
  - Do not deface screw heads during insertion of the screws.
  - If boards are left unfinished, screws (unless they are designed to be recessed) shall be driven to lie marginally beneath the surface of the wood.
- Pelleting:
  - Sink screw heads to a minimum of 6 mm below the timber surface leaving a neat hole

vertical to the surface and with clean edges.
- Bond pellets to match the timber species and grain of the surrounding surface.
- Finish pellets flush with the timber surface.

Coatings:
- Materials forming paint, seals or varnishes shall be responsibly sourced and independently third party accredited (such as BES 6001) from manufacturers holding ISO 14001 or BS 8555 certification (for small companies as defined by the Companies Act 1985) as a minimum
- Painted Finishes: Provide a smooth, complete and consistent painted finish free from paint film defects arising during, or shortly after application as Table 19 or after a period of exposure Table 20, BS 6150.
- Clear Finishes: Keep clean and apply first coat of specified finish before delivery to site.

Breather membrane installation:
- Breather membranes shall be installed strictly in accordance with manufacturer's written instructions and the requirements of the BBA or BRE certificate.
- Storage: Strictly in accordance with manufacturer's written instructions and the requirements of the BBA or BRE certificate. Protect membrane rolls form direct sunlight at all times.
- Handling: Care shall be taken when handling the membrane in order to prevent tears and punctures occurring.
- Preparation: Where timber treatments are used, ensure they are touch-dry before the installation of the membrane.
Installation:
  - Fix carefully and neatly to provide a complete barrier to water, snow and wind blown dust. Extend membrane below lowest timber member, into reveals of openings and external corners.
  - Laps: Horizontal: 100 mm minimum. Vertical: 150 mm and staggered, to shed water away from substrate. Seal lap joints with compatible tape, supplied by the manufacturer.
  - Fasteners: Galvanized, or stainless steel large head nails or stainless steel staples.
  - Before covering membrane check for tears and punctures and repair in accordance with manufacturer's written instructions.
  - Seal all penetrations including fixing penetrations accordance with manufacturer's written instructions
- Protection: Once installation is complete and prior open joint cladding is fitted, cover membrane to protect from UV radiation and damage, in accordance with manufacture's written recommendations. Protect membrane from any spray applied micro emulsions (i.e. preservative treatment) that may degrade polymer based materials such as breather membranes.

Additional Requirements for Workmanship: Light Steel Framed Backing Wall

Workmanship Generally:
- Light steel framed backing walls systems shall be installed strictly in accordance with manufacturer's written instructions, the requirements of the BBA or BRE certificates, BS EN 1090 Parts 1 and 2, National Structural Steelwork Specification (NSSS) and the NHBC Standard 6.10 sitework standards.
- All light steel frames shall be installed by appropriately trained and experienced installers approved by the system manufacturer.

Storage and Handling:
- All components shall be handled and stored in accordance with the manufacturers' recommendations.
- Steel frame components shall be handled and transported in a safe manner, to prevent deformation and surface damage. Handling and storage preventive measures as specified in Table 8 of BS 1090-2 shall be applied as appropriate.
- Sheathing boards shall be stored flat on leveled supports, and shall never be stored on edge or upright.

Moisture Level Conditioning of Sheathing Boards:
- When conditioning prior to installation is required, the boards shall be conditioned, in accordance

with manufacturer's written instructions.

Suitability of Substrate:
- The contractor's shall undertake geometric survey of supporting structure, checking line, level and fixing points, prior to ordering the light steel frame components to minimise site cutting.
- Setting out: Establish erection datum points, lines and levels for a complete elevation at a time unless otherwise agreed.

Metal Wall Framing Erection:
- Light steel framed backing walls shall only be installed higher than damp proof membrane (DPM) level and adjacent ground level.
- Setting out: Framing shall be accurately aligned, vertical and securely fixed to surrounding structure. All board edges shall be supported.
- The works shall ensure that any moisture that occurs in the framework during installation shall be drained away, without causing degradation to performance.- Differential movement of the primary structure shall be typically accommodated:
    - at the head connection of the vertical studs to the head track, in infill framing applications
    - at the connections of the vertical studs to the support cleats, in oversail/ continuous framing applications
- Infill framing:
    - Head and base tracks shall be accurately and securely fixed to the primary structure with appropriate fixings in accordance with the manufacturer's approved details. Any tolerance in level shall be made up with appropriate galvanized steel shims at each stud location.
    - Studs shall be plumbed, aligned and securely attached/located within the base and head tracks.
    - Deflection head detail shall be used at the top of the studs in accordance with the manufacturer's approved details.
- Oversail/ continuous/ off- slab framing:
    - Base tracks shall be accurately and securely fixed to the primary structure with appropriate fixings in accordance with the manufacturer's approved details. Any tolerance in level shall be made up with appropriate galvanized steel shims at each stud location.
    - Intermediate base and head tracks shall be installed in accordance with the manufacturer's approved details.
    - Studs shall be plumbed, aligned and securely attached/located within the base track and restrained back to the main structure with steel cleats.
    - Cleats shall accommodate deflection of the primary structure and shall be anchored to slab edges and screwed to studs, in accordance with the manufacturer's approved details.

Additional Supports/ Bracing:
- The works shall incorporate the necessary additional cold rolled or hot rolled steel bracing/ restraining components, where structural strengthening is required to complete the detail design of the framed wall.
- Provision: In accordance with board and metal frame manufacturer's recommendations
- Particular care shall be taken to ensure all structural openings such as window/ door openings have adequate fixing/ load capacities.- Temporary bracing shall be provided where required until completion of erection.

Masonry Cladding Ties to Framed Structures:
- Masonry wall ties shall be secured to the light steel framework, through sheathing board. Masonry ties and restraint fixings shall not to be fixed to sheathing board alone, unless the sheathing board has been specifically designed and reinforced to accommodate such fixings and transfer loads into the primary structure via the light steel studs.

Fixing/ Cutting/ Drilling of Frame Components:
-The design of all connections from the light steel framing to any interfacing structure or material shall be checked for suitability with the light steel frame and fixings manufacturers.
- Generally framing components shall be fixed together using self-drilling / self-tapping screws, unless advised otherwise by the manufacturer.
- All screw fixings must be installed perpendicular to the surfaces, unless advised otherwise by the manufacturer.

- When installed in the wet side of envelope, site drilling and cutting of hot dip galvanised components shall not be permitted.
- When installed in the dry side of envelope, site drilling and cutting is permitted for hot dip galvanised components, but all exposed cut surfaces/ edges shall be sealed with zinc rich paint.
- Where components need to be cut on site they shall be cut in accordance with the manufacturer's written instructions. Care shall be taken to cut the components square where they are used in right-angled connections, or as required for an angular fit against abutting members.
- No holes shall be cut or formed on site in without prior agreement with the steel frame manufacturer.
- Service holes: where service holes are required to enable services to pass through the steel studs, the contractor shall ensure that these shall not compromise the structural integrity of the system. Holes on framing components shall be formed in strict accordance with manufacturer's written instructions.

Cutting/ Mounting/ Fixing of Sheathing Boards:
- Site cutting of boards shall be in accordance with the manufacturer's written instructions. When sawing, all sheets shall be adequately supported so that they do not sag. The sheets shall be free of vibration and tension during sawing.
- Boards shall be fixed securely to each support without distortion and true to line and level.
- Sheathing boards shall be fixed using countersunk or low-profile, self-drilling, self-tapping screws to the board manufacturer's recommendations.
- Fasteners shall be evenly spaced in straight lines and, unless otherwise recommended by board manufacturer, in pairs across joints.
- Distance from edge of board/ sheet shall be sufficient to prevent damage.
- All intermediate horizontal sheathing joints shall be staggered. No 4 way board joints shall be formed.
- The jointing and fixing of the boards shall accommodate any dimensional changes that the sheathing might be subjected to due to variation in relative humidity in service.

Sheathing boards used as weather barrier:
- The contractor shall carry out a risk assessment to ascertain potential moisture ingress and air leakage and apply appropriate solution to prevent such risks. These include:

1. Sealing all joints between adjacent boards and interfaces with other elements such as primary structure and screw-holes with fire rated mastic sealant, and
Incorporating continuous breather membrane between cavity insulation and sheathing board. The selection of breather membrane shall be carried out through condensation risk assessment by the contractor (Refer to Submittals).

OR

2. Sealing all joints between adjacent boards and interfaces with other elements such as primary structure and screw-holes with fire rated mastic sealant, and
Taping all joints between adjacent boards and interfaces with other elements such as primary structure shall be taped to prevent air leakage and weather ingress. Tapes should be high quality foil or polythene faced butyl, acrylic tape or bitumen based adhesive tapes. All tape shall be appropriate for the substrates to which it is applied. All tape shall adequately cover interfaces and fastener heads. Substrates shall be prepared or primed as necessary and in accordance with manufacturer's recommendations. Tape shall remain securely in place for the service life of the works and shall resist debonding from building pressurisation and exposure to weather before being covered by subsequent works. Interior grade foil faced tapes shall not be used

Mineral Wool Insulation Within Metal Framing Zone:
- Storage/ handling: In accordance with BBA certificate requirements and manufacturer's written instructions.
- Installation: In accordance with BBA certificate requirements and manufacturer's written instructions. Neat and secure with close butted joints and no gaps.
- Where insulation is not self supporting, it shall be fixed to the frame in accordance with light steel frame and insulation manufacturers' instructions to prevent slumping.

Air and Vapour Control Layer (AVCL):
-The air/vapour control membrane plane for each element of construction shall be continuous over the

whole of the element it is applied upon and shall be jointed to the air/vapour control planes of adjoining elements.
- Continuity: No breaks and with the minimum of joints.
- The AVCL/VCL shall always be located on the warm side of the insulation layers within the wall construction, in accordance with BS 5250.
- Sheet laps: Not less than 150 mm, sealed with tape. Substrates shall be primed as necessary to achieve full bond
- Sheet tape type as recommended by AVCL manufacturer. Vapour resistivity of tape shall not be less than the vapour control sheet.
- Penetrations through AVCL/VCL membranes shall be eliminated where possible. Where penetrations cannot be avoided these shall be sealed to prevent vapour and air from transmitting from within the building into the wall construction layers.
- Penetrations and abutments shall be sealed to AVCL. If recommended by the manufacturer the substrates shall be primed to achieve full bond.
- Special consideration shall be given to enable services to be installed without compromising the AVCL/VCL membranes.
- Sheet repairs and punctures shall be sealed in accordance with manufacturer's written instructions.

Insulation to External Face of Metal Framing:
- Storage/ handling: In accordance with BBA certificate requirements and manufacturer's written instructions.
- Installation: In accordance with BBA certificate requirements and manufacturer's written instructions. Neat and secure with tight butted joints and no gaps. Insulation shall not bulge, sag, delaminate or detach from substrate during installation or in situ during the required service life of the works. Fit insulation tightly between/ around cladding supports.
- Trimming must be accurate, to achieve close butting joints and continuity of insulation.
- All horizontal insulation joints shall be staggered, in accordance with manufacturer's recommendations.
- Insulation boards shall be fixed to the backing wall frame in accordance with manufacturer's instructions.

Additional Requirements for Workmanship and Materials: Rendered External Wall Insulation Systems

Workmanship Generally:
- The contractor shall comply with the requirements and guidance in the following:
    - BS 8000 Part 0
    - BS EN 13914-1 Design, preparation and application of external rendering and internal plastering. External rendering
    - NHBC Standard Part 6
    - BBA system certificate
    - System component manufacturer's written instructions.
    - Manufacturer's warrantee: The work must be carried out in strict accordance with the warrantee conditions.

Uniformity of Colour and Texture of Coating Mixes:
- Type/ proportion of constituent materials: Unchanged once samples of coatings have been approved.
- Supplies of materials: Sufficient to give consistent and uniform colour and texture.

Adverse Weather:
- Materials/ Surfaces: Do not use frozen materials and do not apply materials to frost bound surfaces.
- Adhesives/ mortars/basecoats/ renders must not be applied when:
    - exposure to frost is likely
    - in damp/wet conditions
    - when air temperature is at or below 5°C on a falling thermometer or below 3°C on a rising thermometer, or when temperature of the air or wall surface is above 30°C and the surface is not protected
    - when air temperature is outside range recommended by manufacturer, if different from

above
- Maintain temperature of the work above minimum level recommended by manufacturer until adhesive/ mortar/basecoat/ render has fully hardened.
- Newly rendered surfaces shall be protected against adverse weather conditions.
- Render coatings damaged by adverse weather shall be replaced.

Suitability of Substrates:
- Soundness: Structurally sound, free from loose areas and significant cracks and gaps.
- Tolerances: Adequately true and level permitting specified flatness/ regularity of finished coatings.
- Cleanliness: Free from dirt, dust, organic growths or other deleterious substances and in a suitable condition to receive specified insulation system.

Application Generally:
- System installation shall be carried out by approved installers recommended or recognised by the manufacturer.
- Installation shall be carried out in accordance with the system manufacturer's recommendations.
- Appearance of finished surfaces: Even and consistent. Free from rippling, hollows, ridges, cracks and crazing.
- Accuracy: Finish to a true plane, to correct line and level, with angles and corners to a right angle unless specified otherwise, and with walls and reveals plumb and square.
- Drying: Prevent excessively rapid or localized drying out.

Insulation:
- Storage/ handling: In accordance with BBA certificate requirements and manufacturer's written instructions.
- Installation: In accordance with BBA certificate requirements and manufacturer's written instructions.
- Insulation boards should be installed with staggered joints, including staggered joints at the building corners in accordance with manufacturer's written instructions. All insulation board edges shall be butted tightly together, and alignment shall be checked as work proceeds
- Bonding: The insulation boards should be bonded to the wall using adhesive supplied and approved by the system manufacturer. The adhesive should be applied to the board in strict accordance with the manufacturer's written instructions.
- Mechanical fixing: Mechanical fixings shall be installed in strict accordance with the manufacturer's written instructions. The fixings must fit tightly but care must be taken to ensure that they are not overdriven.
- The surface of the boards should be smooth, free from protrusions or irregularities.

Crack Control at Junctions between Dissimilar Solid Substrates:
- In accordance with manufacturer's recommendations.

Movement Joints:
- In accordance with system manufacturer's recommendations.
- Installation: Centred over joint in substrate.

Basecoat/ Reinforcing/ Priming:
- The system basecoat shall be trowel applied to the insulation layer to the thickness recommended by the manufacturer.
- Reinforcing mesh - around openings: Reinforcement mesh shall be placed at areas recommended by the manufacturer where there is a likelihood of increased stress, such as the corners of windows, doors, and other similar openings prior to the installation of entire wall with reinforcing mesh.
- Reinforcing mesh – entire wall: After the installation of the reinforcement mesh at openings, install reinforcing mesh to entire wall in accordance with system manufacturer's written instructions. The mesh shall be positioned into the basecoat and trowelled into position ensuring it is fully embedded within the basecoat. The top surface of the basecoat shall be trowelled smooth.
- Stainless steel fire-fixings (non- combustible fixings) must be provided in addition to the other mechanical fixings and shall be installed in accordance with the system manufacturer's written instructions.
- Trims shall be provided at corners, openings, edges, movement joint interfaces in accordance the system manufacturer's written instructions.
- Curing: The basecoat must be allowed to cure in accordance with the system manufacturer's written

instructions prior to the application of the primer coat.
- Primers (mineral and silicone systems): The primer coat shall be applied as required with the system manufacturer's written instructions and shall be allowed to fully dry prior to the application of the finishing coat.

Rendering:
- The render finish coat shall be applied in accordance with the system manufacturer's written instructions, after the primer has dried.
- The finish shall be prevented from drying too rapidly, and it should not be applied in direct sunlight.
- Continuous surfaces must be completed without a break.
- Completion: The finished coat shall be free from cracking and crazing.

Inspection of Completed Installation:
Timing: As soon as possible after completion of the work and before removing scaffolding.
The contractor shall submit description of inspection and remedial works carried out.

Appendices all Sections

Purpose Made Joinery:
- Refer Appendix Z10

Purpose Made Metalwork:
- Refer Appendix Z11

Preservative/ Fire Retardant Treatment:
- Refer Appendix Z12

Fixings and Adhesives:
- Refer Appendix Z20

Purpose Made Mortars:
- Refer Appendix Z21

Sealants:
- Refer Appendix Z22

Glass and Coatings:
- Refer Appendix Z25

Powder Coatings:
- Refer Appendix Z31

Anodizing:
- Refer Appendix Z33

Building Hardware/ Ironmongery:
- Refer Appendix Z40

Cavity Barriers:
- Refer Appendix Z41

EWS-300 EXTERNAL MASONRY BRICKWORK INSULATED CAVITY WALLING ON BLOCKWORK BACKING WALL: SYSTEM SPECIFIC REQUIREMENTS

Type of Specification: Prescriptive for brick masonry, weep holes, dpc, dpm and cavity trays.

Descriptive for insulation cavity barriers, fire stopping, backing wall and breather/AVCL membrane. Refer to Structural Engineer's information for masonry blockwork and masonry structural components/ accessories.

1. Functional and Visual Description:
External masonry brickwork cavity walling with partial-fill insulation on blockwork backing wall. Outer leaf brickwork supported via masonry support systems to supporting structure and restrained via masonry restraint fixings to inner leaf blockwork backing wall.

Brick bond and joint type: Stretcher bond with 10mm mortar joints.

2. Detailed Description:

The strategy for the proposed insulation may have implications on the construction of other components of the wall build up as a result of the requirements of Approved Document B, Volume 2. The responsibility for final choice of the insulation and the wall build up lies with the contractor.

Suggested Build Up:
- Facing brickwork outer leaf
- Brickwork accessories
- Partial-fill cavity insulation
- Cavity barriers/ Fire stopping
- Damp proof membrane
- Concrete blockwork inner leaf
- Concrete blockwork accessories
- Waterproofing render
- Paint finish

Facing brickwork outer leaf:
Product: TBC
Contact details(TBC)
Size: Nominally 215 x 102 x 65mm (TBC)
Durability: F2 (TBC)
Soluble salt content: Category S2 (TBC)

Bond: Stretcher bond

Brick specials:
Pistol bricks over shelf angles and lintels.

Architectural features: (TBC)
As indicated on the design drawings:
- 1/2 brick deep recesses used at window reveals and at movement joint locations

Joint/Mortar: (TBC)
Perpend: Nominally10mm(TBC)
Bed: Nominally10mm(TBC)
Joint profile: Flush
Mortar designation: M6 except M12 at parapet(TBC)
Mortar product and colour: CPI Euromix (or similar) M3AN K100
Manufacturer: CPI Euromix , www.euromix.com

Sealant filled movement joints:
Sealant: Sealant colour to match mortar, to Designated Contact acceptance, to be agreed following masonry sample approval.
Joint width: Nominally 10mm(TBC)
Spacing/location of joints: Refer to Design Drawings for setting out info.
Product: Arbomast BR(TBC)
Contact: www.arbo.co.uk

Movement Control: Refer Structural Engineers' information

Brickwork accessories: (TBC)
Masonry support, movement and restraint systems:
Refer to Structural Engineer's information for support angles, restraint fixings, head detail, wall ties, lintels, movement joints, masonry reinforcement etc.

DPCs: (TBC)
Selection criteria: To BS 8215
DPCs to provide watertight installation, sealed laps. DPCs materials shall have the appropriate properties: an ability to adhere to mortar, consistent membrane colour, durability, flexibility, resistance to loading, thermal efficiency, fire resistance.
Product: Hyload Original
Contact details: www.ikogroup.co.uk

Cavity Trays: (TBC)
Selection criteria: To BS 8102 and BS 8000
Proprietary preformed moulded with matching corner, column, steps, angles etc including self-supporting upstand/returns.
Cavity trays to provide a free draining and watertight installation, sealed laps.
Materials shall have the appropriate properties: an ability to adhere to mortar, consistent membrane colour, durability, flexibility, resistance to loading, thermal efficiency, fire resistance. Product to be confirmed at later design stage.
Product: Hyload Original
Contact details: www.ikogroup.co.uk

Airbricks required????????
Air bricks connected to MVHR system. Insulation, cavity tray and fire stopping to be made good around services duct penetration. Vermin mesh installed to the inner face of the air brick.
Low resistance inlet/outlet air brick
Product name: Low resistance inlet/outlet air brick
Colour: RAL (TBC)
Product reference no: (TBC)
Manufacturer: Vent-Axia Ltd, (TBC)
www.vent-axia.com (TBC)

Weep holes: (TBC)
Clear plastic weep holes.
Product: TW1 low profile cavity weep manufactured by Timloc – 15mm-65mm height x 100mm length x 10mm width, with 4mm wide aperture with integral front grille. Colour: 'natural (clear)' or 'buff' to match mortar colour, to be confirmed at later work stage
Contact details: www.timloc.co.uk

Partial-fill cavity insulation: (TBC)
Above DPC: Rigid phenolic foam insulation board, factory faced on both sides with a low emissivity composite foil
Indicative product: Kingspan Kooltherm K15 Rainscreen board, by Kingspan Insulation UK
Contact details: www.kingspan.co.uk
Thickness: 75mm(TBC)
Fixing method: Break-bonded with board edges lightly butted. Fixings should be evenly distributed over the whole area of the board. Additional fixings should be assessed in accordance with BS-6399-2.
Cavity: 50mm minimum clear residual cavity between the outer surface of the insulation and the inner face of outer masonry wall. Refer to design drawings for cavity widths.

Cavity barriers: (TBC)
Fire resistant cavity barriers to provide effective cavity seals at external wall junctions with fire compartment walls and floors, cavity edges/openings and in any extensive cavities to meet the requirements of Approved Document B.
Product certification: Third party United Kingdom Accreditation Service (UKAS) approved cavity

barrier system.

System: (TBC)
Horizontal above window proprietary cavity closer.
Product: Lamatherm EW-FS60 including proprietary fixing bracket
Installation: In accordance with manufacturer's instructions
Contact: www.siderise.com
Metalwork backing angle: Refer Structural Engineers' information

Vertical compartmentation. (TBC)
Product: Lamatherm EW-FS60 including proprietary fixing bracket
Installation: In accordance with manufacturer's instructions
Contact: www.siderise.com

Fire resistance: minimum performance of 30 minutes integrity and 15 minutes of insulation in accordance with BS 476-20
Thermal resistance: Cavity barriers at cavity edges: Minimum thermal resistance path through the cavity barrier to be equal or better than 0.45 m2 k/W.
Cavity barriers around window/door openings: Refer to system work sections WIN and EDR.

Fire Stopping: (TBC)
Fire stopping at compartment lines to external walling/envelope to equal the resistance of the compartment separation as defined on the fire strategy drawings and report. All fire stopping systems to be certified by the Loss Prevention Certification Board (LPCB) or equivalent UKAS accredited third party product certification body, and listed in the BRE or the Association for Specialist Fire Protection (ASFP) Red Book latest editions.

Damp proof membrane: (TBC)
Product: Torch on applied as Hyload 3100 tanking membrane
Contact details: www.ikogroup.co.uk

Blockwork wall inner leaf: (TBC)
Refer to Structural Engineer's information.
Solid, load bearing, masonry concrete blockwork wall spanning vertically between floor slabs.

Concrete block type: Paint grade solid block
Compressive strength: Refer to Structural Engineer's specification and drawings.
Size: Refer to Structural Engineer's information

Mortar: (TBC)
Perpend: Nominally10mm(TBC)
Bed: Nominally10mm(TBC)
Joint profile: Bucket handle
Mortar designation: Refer to Structural Engineer's specification and drawings.

Sealant filled movement joints: (TBC)
Sealant: Sealant colour to match mortar, to Designated Contact acceptance.
Joint width: 10mm(TBC)
Spacing/location of joints: Refer to Design Drawings for setting out info.
Product: Arbomast BR
Contact: www.arbo.co.uk
Movement Control: Refer Structural Engineers' information

Blockwork accessories:
Masonry support, movement and restraint systems:
Refer to Structural Engineer's information for head detail, lintels, movement joints, wall ties, masonry reinforcement etc.
- Where windposts are required for fairfaced blockwork, these shall be 'spine' post type, i.e. they shall be concealed, and they shall not protrude beyond either wall face.

Waterproofing render:
Refer to Structural Engineer's specification.

Paint Finish:
Refer to FIN systems.

3. Performance:
Refer to System General Requirements for Performance, and in addition:

Fire:
Generally: Refer to Fire Strategy report and 08 Series drawings

Acoustic:
N/A

Thermal:
N/A

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials

EWS-500 EXTERNAL MASONRY BRICKWORK INSULATED CAVITY WALLING ON LIGHT STEEL FRAMED BACKING WALL: SYSTEM SPECIFIC REQUIREMENTS

Type of Specification:
Prescriptive for masonry, weep holes, dpcs, dpm and cavity trays. Descriptive for insulation, cavity barriers, fire stopping, backing wall and breather/ AVCL membranes. Refer to Structural Engineer's information for masonry structural components/ accessories**.**

1. Functional and Visual Description:
External fair-faced masonry brickwork cavity walling with partial-fill insulation on light steel framed backing wall. Outer leaf brickwork supported via masonry support systems to supporting structure and restrained via masonry restraint fixings to inner leaf light steel framed backing wall.

Brick bond and joint profile: Stretcher bond with 10mm mortar joints.

2. Detailed Description:
The strategy for the proposed insulation may have implications on the construction of other components of the wall build up as a result of the requirements of Approved Document B, Volume 2. The responsibility for final choice of the insulation and the wall build up lies with the contractor.

Suggested Build Up:
- Facing brickwork outer leaf
- Brickwork accessories
- Partial-fill cavity insulation
- Cavity barriers/ Fire stopping
- Damp proof membrane
- Weather and air control layer
- Backing wall sheathing board
- Backing wall light steel frame system (SFS)

Facing brickwork outer leaf:
Indicative Product: Berkshire Orange manufactured by Ibstock Brick Ltd
Contact details: www.ibstock.com
Size: Nominally 215 x 102 x 65mm
Durability: F2
Soluble salt content: Category S2
Brick type TBC following planning condition response

Bond: Stretcher bond

Brick specials:
As indicated on the design drawings including:
Pistol bricks over shelf angles and lintels.

Architectural features:
As indicated on the design drawings:

Joint/Mortar:
Perpend: Nominally10mm
Bed: Nominally10mm
Joint profile: Flush
Mortar designation: M6 except M12 at parapet
Mortar product and colour: TBC following planning condition response
Manufacturer: CPI Euromix , www.euromix.com

Sealant filled movement joints:
Sealant: Sealant colour to match mortar, to Designated Contact acceptance, to be agreed following masonry sample approval.

Joint width: Nominally 10mm
Spacing/location of joints: Refer to Design Drawings for setting out info.

Brickwork accessories:
Masonry support, movement and restraint systems:
Refer to Structural Engineer's information for support angles, restraint fixings, head detail, wall ties, lintels, movement joints, masonry reinforcement etc.

Wall Ties:
Thermally insulating, compatible with proposed insulation system with retaining clip and double drip:
Refer Structural Engineers' information for type, location and spacing.

DPCs:
Selection criteria: To BS 8215
Product: Hyload Original
Contact details: www.ikogroup.co.uk

Cavity Trays:
Selection criteria: To BS 8102 and BS 8000
Proprietary preformed moulded with matching corner, column, steps, angles etc including self-supporting upstand/returns.
Product: Hyload Original
Contact details: www.ikogroup.co.uk

Air bricks:
Air bricks connected to MVHR system. Insulation, cavity tray and fire stopping to be made good around services duct penetration. Vermin mesh installed to the inner face of the air brick.
Low resistance inlet/outlet air brick
Product name: Low resistance inlet/outlet air brick
Colour: RAL 2013
Product reference no: 449227
Manufacturer:
Vent-Axia Ltd,
www.vent-axia.com

Load-bearing insulation block for brickwork:
Required where noted on design drawings.
Product: FOAMGLAS Perinsul by Pittsburgh Corning (U.K.) Ltd.
Contact details: www.foamglas.co.uk

Weep holes:
Clear plastic weep holes.
Product: TW1 low profile cavity weep manufactured by Timloc – 15mm-65mm height x 100mm length x 10mm width, with 4mm wide aperture with integral front grille. Colour: 'natural (clear)' or 'buff' to match mortar colour, to be agreed
Contact details: www.timloc.co.uk

Damp proof membrane:
Two coats of cold applied liquid asphaltic compound.
Product: Synthaprufe LAC
Contact details: www.ikogroup.co.uk

Partial-fill cavity insulation:
Above DPC: Rigid phenolic foam insulation board, factory faced on both sides with a low emissivity composite foil
Indicative product: Kingspan Kooltherm K15 Rainscreen board, by Kingspan Insulation UK
Contact details: www.kingspan.co.uk
Thickness: **75**mm
Fixing method: Break-bonded with board edges lightly butted. Fixings should be evenly distributed over the whole area of the board. Additional fixings should be assessed in accordance with BS-6399-

2.
Cavity: 50mm minimum clear residual cavity between the outer surface of the insulation and the inner face of outer masonry wall. Refer to design drawings for cavity widths.

Below DPC: Rigid extruded polystyrene (XPS) insulation board
Indicative product: Kingspan N300R, by Kingspan Insulation UK, www.kingspan.co.uk
Contact details: www.kingspan.co.uk
Fixing method: In accordance with manufacturer's instructions.

Cavity barriers:
System:
Horizontal above window proprietary cavity closer.
Product: Lamatherm EW-FS60
Installation: In accordance with manufacturer's instructions
Contact: www.siderise.com
Fixing bracket by same manufacturer. Bracket spacing to manufacturer's recommendation.

Vertical compartmentation.
Product: Lamatherm EW-FS60
Installation: In accordance with manufacturer's instructions
Contact: www.siderise.com
Fixing bracket by same manufacturer. Bracket spacing to manufacturer's recommendation.

Thermal resistance: Cavity barriers at cavity edges: Minimum thermal resistance path through the cavity barrier to be equal or better than 0.45 m2 k/W.
Cavity barriers around window/door openings: Refer to system work sections WIN and EDR.

Fire Stopping:
Fire stopping at compartment lines to external walling/envelope to equal the resistance of the compartment separation as defined on the fire strategy drawings and report. All fire stopping systems to be certified by the Loss Prevention Certification Board (LPCB) or equivalent UKAS accredited third party product certification body, and listed in the BRE or the Association for Specialist Fire Protection (ASFP) Red Book latest editions.

Weather and air control layer:
The contractor shall provide either:

Continuous breather membrane providing primary air-tightness barrier lapped and sealed to DPCs surrounding openings using acrylic tape.
Indicative products: DuPont Tyvek breather membrane and DuPont Tyvek Acrylic Tape for sealing joints and overlaps, by DuPont
Contact details: www.dupont.co.uk

OR:

All joints between sheathing boards and between sheathing boards and surrounding structure to be externally sealed with a compatible high bond, water resistant single sided tape. Substrates shall be primed as necessary and tapes shall be fully bonded using pressure roller.

Backing wall sheathing board:
BBA certified, exterior grade, non combustible sheathing board fixed to steel frame.
Fire performance: Non combustible, classified as Class A1 to BS EN 13501-1.
Thickness: minimum 12mm
Indicative product: Y-wall, by Roofing and Cladding Materials Limited
Contact details: www.rcmltd.biz

Backing wall light steel frame system (SFS):
Refer to Structural Engineer's specification.
Non gravity load bearing, external infill light steel framing providing lateral support to brickwork cladding and external windows and doors. System supported on structural slab and restrained to

structural soffit and reveals. Framing system comprising studs, base and head tracks and additional cold rolled or hot rolled steel bracing/ restraining components, where structural strengthening is required to complete the detail design of the framed wall. System complete with a deflection head detail at top of studs. Suitably reinforced framed openings for external windows and doors.

3. Performance:
Refer to System General Requirements for Performance, and in addition:

Fire:
Generally: Refer to Fire Strategy report and 08 Series drawings

Acoustic:
External sound reduction/flanking transmission:
Refer Acoustic Engineer's information

Thermal:
The System shall achieve the following area weighted average U value: 0.15W/m²K. in conjunction with IWS-501

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing

Masonry Brickwork Reference Panel
Refer to Phase 1 reference panel

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials

EWS-510 EXTERNAL RENDER SYSTEM: SYSTEM SPECIFIC REQUIREMENTS

Type of Specification: Descriptive

1. Functional and Visual Description:
External render system on insulation on blockwork backing wall.

2. Detailed Description:

Suggested Build Up:
- External render
- Accessories
- Backing wall

External render system:
Product: StoRend manufactured by Sto Ltd
Contact details: www.sto.co.uk

Accessories:
As required to complete and warrant the installation

Backing wall:
Concrete to structural engineer's design

3. Performance:
Refer to System General Requirements for Performance.

4. Samples, Submissions, Mock-ups and Testing:

Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing.

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials

EWS-550 EXTERNAL TIMBER RAINSCREEN CLADDING ON LIGHT STEEL FRAMED BACKING WALL: SYSTEM SPECIFIC REQUIREMENTS

Type of Specification: Descriptive

1. Functional and Visual Description:
Ventilated timber rainscreen cladding system over breather membrane, insulation and AVCL to light steel framed backing wall. Vertical timber rainscreen cladding comprising consistent dimension battens at regular centres, forming a vertically louvred cladding panel grid over fibre cement board substrate. Concealed fixings. System to incorporate powder coated base plinth detail, secret fixed to substrate. Side reveals to have metal cladding

Timber species: Western Red Cedar
Finish to timber: Fine sawn outer face. Acceptable finish to be agreed by sample
Note that insulation foil must not be visible through gaps in rainscreen

2. Detailed Description:

Suggested Build Up:
- Decorative timber battens at regular centres
- Fibre cement facade material
- Insect mesh
- Cavity barriers
- Insulation
- Breather membrane
- Backing wall sheathing board
- Backing wall light steel frame system (SFS)
- Accessories

Decorative timber battens at regular centres:
Consistent dimensioned timber battens fixed at regular centres, profiles as shown on design intent drawings
Orientation: Vertical
Timber Species: Oak
Appearance Class for visible timber cladding faces: J10 to BS EN 942, Table 1. Acceptable finish to be agreed by sample.
Dimension: 100 nominal with equally space gaps mm
Fixings: Counter sunk screw fixings flush with timber.
Timber Finish: Osmo 420 UV-Protection-Oil Extra, satin-matt, clear finish for exterior application, with biocides. Or acceptable equivalent
By:
Osmo UK
www.osmouk.com

Fibre cement facade material:
Consistent dimensioned cladding panels to form consistent substrate, profiles as shown on design intent drawings
Orientation: Vertical
Timber Species: Western Red Cedar, free from sapwood
Appearance Class for visible timber cladding faces: J10 to BS EN 942, Table 1. Acceptable finish to be agreed by sample.
Thickness: nominal12mm

Joints: Overlapping boards on repeating module with 5mm wide recess joints, as shown on Design Drawings
Fixings: Cladding boards fixed to vertical battens, fixed to continuous T-channels, supported with aluminium split battens fixed through insulation to SFS sheathing board with thermal break
Timber Finish: Osmo 420 UV-Protection-Oil Extra, satin-matt, clear finish for exterior application, with biocides
Or acceptable equivalent
By:
Osmo UK
www.osmouk.com

Accessories:
Metal fascia panel at base of cladding: Colour matched to window system, WIN-500

Insect mesh:
Black PVC coated fibreglass mesh secured on support battens.

Cavity barriers:
System: As EWS - 500.

Insulation:
Above DPC: Rigid phenolic foam (PF) insulation board, factory faced on both sides with a low emissivity composite foil
Indicative product: Kingspan Kooltherm K15 Rainscreen board, by Kingspan Insulation UK, or acceptable equivalent to meet the functional requirements.
www.kingspan.co.uk
Thickness: To suit performance requirements, nominally 225mm

Breather membrane:
As EWS - 500
System to be continuous with EWS-500

Backing wall sheathing board:
As EWS - 500
System to be continuous with EWS-500

Backing wall light steel frame system (SFS):
Refer to Structural Engineer's specification.
As EWS-500

Accessories:
Pressed metal kickplate to base to protect DPC. Including anti-drumming absorbent layer to internal face and all fixings necessary tom complete and warrant the installation.
Finish: PPC to match adjacent WIN - 500

3. Performance:
Refer to System General Requirements for Performance, except for:

Fire:
Refer to Fire Consultant's Fire Strategy Report

Acoustic:
As EWS-500

Thermal:
The System shall achieve the following area weighted average U value: 0.15 W/m²K in conjunction with IWS-501

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing, and in

addition:

Pre Contract Samples:
- In accordance with the Project General Requirements, pre contract timber samples of the following shall be provided:
- At least 4 no. 600mm length of each type of timber boarding in proposed profile
- 300x300mm sample of proposed insect mesh

Post Contract Timber Rainscreen Sample Panel:
- Required: extent to be agreed
- Assessment of brickwork reference panel: Refer System General Requirements

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials

EWS-600 EXTERNAL RENDERED INSULATED WALLING ON BLOCKWORK BACKING WALL: SYSTEM SPECIFIC REQUIREMENTS

Type of Specification: Descriptive

1. Functional and Visual Description:
External render system on insulation on blockwork backing wall.

2. Detailed Description:

Suggested Build Up:
- External render
- Accessories
- Insulation
- Adhesive layer
- Cavity barriers/ Fire stopping
- Backing wall blockwork
- AVCL
- Acoustic insulation
- Internal lining

External render system:
Product: StoRend manufactured by Sto Ltd
Contact details: www.sto.co.uk

Accessories:
As required to complete and warrant the installation

Insulation:
EPS to achieve the thermal performance.

Blockwork backing wall:
As IWS-740 with the following additions
Density:
1800kg/m3

Acoustic insulation:
Refer to acoustic report

AVCL:
Parge coat: Minimum thickness of 13mm in two coats. Product suggestion: British Gypsum.

Thermal performance:
The System shall achieve the following area weighted average U value: 0.15 W/m²K in conjunction with IWS - 600

Internal lining:
Refer to IWS internal walling systems.

3. Performance:
Refer to System General Requirements for Performance.

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing.

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials

EWS-610 INSULATED WALLING ON STRUCTURAL CONCRETE BACKING WALL: SYSTEM SPECIFIC REQUIREMENTS

Type of Specification: Descriptive

1. Functional and Visual Description:
Full-fill cavity blockwork wall on structural concrete backing wall to basement storey.

2. Detailed Description:

Suggested Build Up:
- Structural concrete retaining wall
- Damp control layer
- Full fill cavity insulation
- Blockwork internal leaf
- AVCL
- Internal lining

Structural concrete retaining wall:
- Water-proof concrete construction to structural engineer's specification and documentation

Damp control layer:
- Integral to structural concrete

Full fill cavity insulation:
EPS To achieve thermal performance

Blockwork internal leaf:
As EWS -600

AVCL:
As EWS -600

Internal lining:
Refer to IWS - 603

Thermal performance:
The System, including structural concrete and IWS-603 shall achieve the following area weighted average U value: 0.15 W/m²K.

3. Performance:
Refer to System General Requirements for Performance.

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing.

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials

EWS-620 METAL RAINSCREEN CLADDING ON BLOCKWORK BACKING WALL : SYSTEM SPECIFIC REQUIREMENTS

Type of Specification: Descriptive

1. Functional and Visual Description:
Metal cladding to match item AMT-602

2. Detailed Description:

As EWS-600, in addition:

Omit
- External render

Add
- Aluminium rainscreen system

Insulation:
Insulation to be Non-combustible
Indicative product: Rockwool - Rainscreen duo slab
Contact details: www.rockwool.co.uk

Rainscreen system:
Product: Sotech Optima FC, Secret Fix by Sotech Optima
Contact details: www.sotech-optima.co.uk

Thermal performance:
The System, including structural concrete shall achieve the following area weighted average U value: 0.15 W/m²K.

3. Performance:
Refer to System General Requirements for Performance.

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing.

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials

EWS-630 NATURAL STONE CLADDING / DRESSINGS TO WINDOWS: SYSTEM SPECIFIC REQUIREMENTS

Type of Specification: Descriptive

1. Functional and Visual Description:

Natural stone side panel, jamb and cill cladding/dressings to windows.

2. Detailed Description:

Natural stone:
Yorkstone to acceptable visual range and sample

Thermal performance:
The System, including structural concrete shall achieve the following area weighted average U value: 0.15 W/m²K.

3. Performance:
Refer to System General Requirements for Performance.

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing.

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials

EWS-700 EXTERNAL MASONRY BRICKWORK INSULATED CAVITY WALLING ON LIGHT STEEL FRAMED BACKING WALL: SYSTEM SPECIFIC REQUIREMENTS

Type of Specification:
Prescriptive for masonry, weep holes, dpcs, dpm and cavity trays. Descriptive for insulation, cavity barriers, fire stopping, backing wall and breather/ AVCL membranes. Refer to Structural Engineer's information for masonry structural components/ accessories.

1. Functional and Visual Description:
External fair faced masonry brickwork cavity walling with partial-fill insulation on light steel framed backing wall. Outer leaf brickwork supported via masonry support systems to supporting structure and restrained via masonry restraint fixings to inner leaf light steel framed backing wall.

Brick bond and joint profile: Stretcher bond with flush mortar joints.

2. Detailed Description:
The strategy for the proposed insulation may have implications on the construction of other components of the wall build up as a result of the requirements of Approved Document B, Volume 2. The responsibility for final choice of the insulation and the wall build up lies with the contractor.

Suggested Build Up:
As EWS - 500

Facing brickwork outer leaf:
As EWS- 500 except:

Product: Reno Red Multi
By: Wienerberger
www.wienerberger.co.uk
subject to agreement by planning authorities

Brick Specials:
Required including
1. Pistol bricks over shelf angles and lintels, where noted on Design Drawings
2. Queens closers for brick walls with angled eave
3. Bird and bat boxes to be incorporated, details to be advised at later work stage

4 Copings with associated mitred bricks
5 Chamfered coping bricks

Joint/Mortar:
Perpend: Nominally10mm
Bed: Nominally10mm
Joint profile: Bucket handle
Mortar designation: M6 all over except M12 at parapet
Mortar product and colour: Light buff E080
Manufacturer: CPI Euromix, www.euromix.com

Sealant filled movement joints:
Sealant: Sealant colour to match mortar, to be agreed following masonry sample approval.
Joint width: To match brick perpends, or as advised by Structural Engineer
Spacing/location of joints: Refer to Design Drawings for setting out info.

Brickwork accessories:
As EWS – 500
Also:
Scaffolding restraint MAE-701 to be installed coordinated with brick joints.
Crease tiles to parapet

Partial-fill cavity insulation:
As EWS – 500

Cavity barriers:
As EWS – 500

Weather and air control layer:
As EWS – 500

Backing wall sheathing board:
As EWS – 500

Backing wall light steel frame system (SFS):
As EWS – 500

3. Performance:
Refer to System General Requirements for Performance, and in addition:

Fire:
Generally: Refer to Fire Consultant's Fire Strategy report and 809_04_08 Series drawings
Fire performance: Insulation boards shall be fire tested to BS 8414: 2002 and BS 8414:2005 and BR135 to be acceptable for use in building higher 18m in height.

Acoustic:
Refer to Acoustic Consultant's Report

Thermal:
The System shall achieve the following area weighted average U value: 0.15 W/m²K in conjunction with IWS-701

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing, and in addition:

Masonry Brickwork Reference Panel
- Refer to phase 1 reference panels

5. Workmanship and Materials:

Refer to System General Requirements for Workmanship and Materials

EWS-701 EXTERNAL MASONRY BRICKWORK INSULATED CAVITY WALLING TO GABLE: SYSTEM SPECIFIC REQUIREMENTS

1. Functional and Visual Description:
External fair-faced masonry brickwork insulated cavity walling on steel framed backing wall. Brickwork cladding supported via masonry support systems to supporting structure and restrained via masonry restraint fixings to.

2. Detailed Description:
As EWS-700 except

Backing wall:
Framing system restrained by roof structure to Structural Engineers information

3. Performance:
Refer to System General Requirements for Performance, except or in addition:

As EWS-700

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials

EWS-702 EXTERNAL MASONRY BRICKWORK UN-INSULATED CAVITY WALLING AT ROOF LEVEL BALCONIES: SYSTEM SPECIFIC REQUIREMENTS

1. Functional and Visual Description:
External fair-faced masonry brickwork insulated cavity walling on backing wall. Brickwork cladding supported via masonry support systems to supporting structure and restrained via masonry restraint fixings to lightweight infill structural system.

2. Detailed Description:

Suggested Build Up:
- Facing brickwork outer leaf
- Brickwork accessories
- Cavity
- Cavity barriers
- Damp proof membrane
- Internal brickwork on backing wall

Facing brickwork outer leaf:
As EWS- 700

Brickwork accessories:
As EWS – 700

Cavity barriers:
As EWS – 500

Weather and air control layer:
As EWS – 500

Backing wall sheathing board:
As EWS – 500

Backing wall light steel frame system (SFS):
As EWS – 500

3. Performance:
Refer to System General Requirements for Performance, and in addition:

Fire:
Generally: Refer to Fire Consultant's Fire Strategy report and 809_04_08 Series drawings

Acoustic:
Refer to Acoustic Consultant's Report

Thermal:
Not relevant

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials

EWS-708 EXTERNAL MASONRY BRICKWORK UN-INSULATED CAVITY WALLING ON BLOCKWORK BACKING WALL: SYSTEM SPECIFIC REQUIREMENTS

Type of Specification:
Prescriptive for brick masonry, weep holes, dpc, dpm and cavity trays. Descriptive for cavity barriers and backing wall. Refer to Structural Engineer's information for masonry blockwork and masonry structural components/ accessories.

1. Functional and Visual Description:
External fair-faced masonry brickwork un-insulated cavity walling on blockwork backing wall. Outer leaf brickwork supported via masonry support systems to supporting structure and restrained via masonry restraint fixings to inner leaf blockwork backing wall.

Brick bond and joint type: Stretcher bond with 10mm mortar joints.

2. Detailed Description:

Suggested Build Up:
- Facing brickwork outer leaf
- Brickwork accessories
- Cavity
- Cavity barriers
- Damp proof membrane
- Concrete blockwork inner leaf
- Concrete blockwork accessories
- Paint finish

Facing brickwork:
Same as EWS-700

Mortar:
Same as EWS-700

Sealant filled movement joints:
Same as EWS-700

Brick specials:
Same as EWS-700

Brickwork accessories:
Masonry support, movement and restraint systems:
Refer to Structural Engineer's information for support angles, restraint fixings, head detail, wall ties, lintels, movement joints, masonry reinforcement etc.

DPCs:
Same as EWS-700

Cavity Trays:
Same as EWS-700

Weep holes:
Same as EWS-700

Cavity:
Un-insulated cavity, free draining to outside at the base of each cavity zone.

Cavity barriers:
System: As EWS:700

Damp proof membrane:
As EWS:700

Blockwork wall inner leaf
Refer to Structural Engineer's information.
Solid, load bearing, masonry concrete blockwork wall spanning vertically between floor slabs.

Concrete block type: Paint grade solid block
Compressive strength: Refer to Structural Engineer's specification and drawings.
Size: Refer to Structural Engineer's information

Mortar:
Perpend: Nominally10mm
Bed: Nominally10mm
Joint profile: Bucket handle
Mortar designation: Refer to Structural Engineer's specification and drawings.

Sealant filled movement joints:
Sealant: Sealant colour to match mortar, to Designated Contact acceptance.
Joint width: 10mm
Spacing/location of joints: Refer to Design Drawings for setting out info.

Blockwork accessories:
Masonry support, movement and restraint systems:
Refer to Structural Engineer's information for head detail, lintels, movement joints, wall ties, masonry reinforcement etc.
- Where windposts are required for fairfaced blockwork, these shall be 'spine' post type, i.e. they shall be concealed, and they shall not protrude beyond either wall face.

Paint Finish:

Render to receive paint finish on exposed face to car park areas: Refer to FIN systems.

3. Performance:
Refer to System General Requirements for Performance, and in addition:

Fire:
Generally: Refer to Fire Strategy report and 08 Series drawings

Acoustic:
N/A

Thermal:
N/A

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials

RFS-725 METALWORK RAINSCREEN CLADDING DORMER ASSEMBLY: SYSTEM SPECIFIC REQUIREMENTS

Type of Specification: Descriptive

1. Functional and Visual Description:

Metal dormer surround. Open jointed metal rainscreen cladding forming surround to WIN-706, 712 as per design team drawings. Pressed sheet aluminium panels with concealed fixings.

2. Detailed Description:

Dormer Cheeks:
- Aluminium panels
- Concealed brackets and rails
- Breather membrane
- Insulation
- Vapour control layer
- Structural substrate

Aluminium panels:
Pressed sheet aluminium panel with concealed stiffening as required.
Single panel for each cheek, avoid panel joints.
Secretly fixed cleats or similar for hanging on brackets and rails or similar. No visible fixings.
Finish: Polyester Powder Coated (PPC), as, and to match WIN-400

Concealed brackets and rails:
Suitable concealed, metal brackets and rails or similar to receive aluminium panels.
Support system shall enable adjustment to ensure alignment and plumbness etc.
All metal components and fixings and accessories shall have suitable corrosion resistance.
Quantity of brackets shall be minimised to minimise thermal bridging and penetrations in the weather line.

Breather membrane:
As EWS-500

Insulation:

Rigid board insulation tightly fitted between brackets and in accordance with manufacturer's written recommendations.
Indicative product:
Kingspan K8 Cavity Boards, by:
www.kingspan.com
Vapour control layer:
As IWS-501

Structural Substrate:
Timber trusses - refer to structural engineers specification

Internal:
Refer to dry-lining work section. 809-20-IWS_Internal Wall systems

3. Performance:
Refer to System General Requirements for Performance, except or in addition:

Thermal:
Uw: 1.4 W/m²K
Ug: 1.0 W/m²K

4. Samples, Submissions, Mock-ups and Testing:
Refer to System General Requirements for Samples, Submissions, Mock-ups and Testing

5. Workmanship and Materials:
Refer to System General Requirements for Workmanship and Materials