

**Tender Specification**

**TENDER REFERENCE BOB\_002**

**TENDER FOR**

**SPECIALIST FIT-OUT CONTRACTOR**

**BATTLE OF BRITAIN80th ANNIVERSARY EXHIBITIONS**

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**1.0 INTRODUCTION**

The RAF Museum (RAFM) is seeking a Specialist Fit-out Contractor for the construction of its new Battle of Britain (BoB) 80th Anniversary exhibitions in Hangars 4/5 at our north-west London site in Colindale, and in our War in the Air hangar at our West Midlands site at Cosford.

These two exhibitions are part of the programme that will open in August 2020 as part of the marking of the BoB 80th anniversary.

**2.0 BACKGROUND**

2.1 THE ROYAL AIR FORCE MUSEUM – HISTORY AND PURPOSE

The RAF Museum is a National Museum, a non-departmental body sponsored by the Ministry of Defence, and a Registered Charity, governed by a board of trustees.

The Museum exists on two public sites: one in north-west London on the site of former RAF Hendon, in Colindale, and one in the West Midlands, co-located with RAF Cosford. It maintains a further site at MoD Stafford for the storage of collection items.

The Museum was set up as the legacy of the 50th anniversary of the formation of the Royal Air Force in 1918. It opened in 1972 on the London site of two First World War hangars.

During the course of its last strategic plan, the Museum concentrated its efforts on being outward-focused and people-centred, exploring the history of the RAF over its hundred-year history through its incredible people and ensuring that our collection is relevant, shared and well cared for.

2018 marked the Centenary of the Royal Air Force and the Museum was privileged to support it across the year as one of the partners in a formal Joint Venture with our sister charities the RAF Association, RAF Benevolent Fund and RAF Charitable Trust. In June 2018, we opened the major transformation at our London site and, across both Cosford and London, had our most successful year since the Museum’s formation, welcoming a total of 990,000 visitors, an increase of 39% on the previous financial year.

Equally importantly, our visitor profile has broadened and diversified significantly, and the partnerships – and friendships – that have developed over the period give us a firm and inspiring foundation to build on for this next chapter of the Museum’s history.

In March 2019, the Trustees of the Royal Air Force Museum signed off a new Strategic Plan 2019–2030 and an associated Development Plan for the Museum.

**Our vision for the next ten years:**

Inspiring **everyone** with the RAF story – the people who shape it and its place in our lives.

To share the story of the Royal Air Force, past, present and future – using the stories of its people and our collections in order to engage, inspire and encourage learning.

At the Royal Air Force Museum, our work and our behaviour are underpinned by six guiding values:

**IN**tegrity: we are open, transparent and ethical

**S**haring: we work as a team to ensure our collections and expertise are accessible to all

**P**assion: we care deeply about sharing our collections and their stories

**I**nnovation: we tell our stories and develop our business with creativity and imagination

**R**elevance: we ensure our legacy by linking our histories with today and tomorrow

**E**xcellence: we are professional and strive for excellence in all we do

We will achieve our vision and purpose through five strategic priorities that focus outwards with our collections at our heart:

* Inspiring innovative engagement, debate and reflection
* Inspiring our people within a dynamic, diverse and collaborative culture
* Embedding an entrepreneurial, agile and sustainable approach
* Leading the way with brilliant basics
* Connecting with communities and partners

2.2 THE BATTLE OF BRITAIN 80th ANNIVERSARY PROGRAMME

The Royal Air Force and the nation will celebrate and commemorate the 80th anniversary of the Battle of Britain in 2020.The Royal Air Force Museum will take this opportunity to share this RAF story in innovative and diversified ways through the delivery of the Battle of Britain 80th Anniversary Programme.

The Programme will be delivered in London, Cosford, online and at other national venues. It will feature many independent projects.

The new displays will create two new semi-permanent galleries with a life span of a minimum of five years in Cosford and longer in London, to open in August 2020.

For the first time, our visitors will explore:

* + the role of the RAF in the Battle of Britain
	+ the importance of the Battle of Britain, locally, nationally and internationally
	+ the contemporary relevance of the Battle of Britain

Furthermore, these exhibitions will be an opportunity to pilot new methods of interpreting the collection, which can be incorporated into the future major redevelopment of galleries in Cosford and London.

 The key objectives of the BoB Programme are to:

Celebrate the 80th anniversary of an iconic moment in the RAF’s history, in accordance with the Museum’s stated aims

Create and reinforce partnerships with other organisations that own Battle of Britain heritage, to maximise audience reach

Engage with existing and new audiences

* Incorporate and test new technologies and interpretation techniques to inform the Cosford and London Master Plans’ development and delivery

**The Battle of Britain 80th Anniversary Programme has a driving principle that informs all our activities: Access for All: physical, social, intellectual, aesthetic and emotional.**

**3.0 DEFINITIONS AND INTERPRETATIONS**

3.1 PARTIES REFERENCED

The parties referred to in this document are as follows.

CLIENT: RAF Museum – represented by nominated individual member of staff

PRINCIPAL DESIGNER: Haley Sharpe Design member of staff liaising on production of the project as required.

PM (PM): Member of client team acting as PM and contract administrator during production and installation

FIT-OUT CONTRACTOR (FOC): Specialist contractor appointed by client to deliver works as defined by this Contract

PRINCIPAL CONTRACTOR: Refers to FoC as defined above responsible for overseeing H&S of the construction sites

CONTRACTOR: Within this document refers to FoC as defined above or their Sub-Contractors.

3.2 IN WRITING: When required to advise, notify, inform, instruct, agree, confirm, obtain information, obtain approval or obtain instructions including change approvals, do so in writing.

3.3 APPROVAL (and words derived there from) means the approval in writing of the PM unless specified otherwise.

3.4 PRODUCTS means materials (including naturally occurring materials) and goods (including components, equipment and accessories) intended for permanent incorporation in the Works as defined by the specification and drawings.

* 1. CROSS-REFERENCES TO THE SPECIFICATION
* Where a numerical cross-reference to a section or clause in this Tender Specification is given on drawings or in any other document, the Contractor must verify its accuracy by checking the remainder of the annotation or item description against the terminology used in the referred to section or clause
* Where a numerical cross-reference is not given the relevant section(s) and clause(s) of the Tender Specification will apply, cross-reference thereto being by means of related terminology
* Where a cross-reference for a particular type of work, feature, material or product is given, relevant clause(s) elsewhere in the referred to specification section dealing with general matters, ancillary products and workmanship also apply
* The Contractor must, before proceeding, obtain clarification or instructions in relation to any discrepancy or ambiguity that they may discover.

3.6 EQUIVALENT PRODUCTS

* Where the specification permits substitution of a product of different manufacture to that specified and such substitution is desired, before ordering the product notify the PM and, when requested, submit for verification documentary evidence that the alternative product is equivalent in respect of material, safety, reliability, function, compatibility with adjacent construction, availability of compatible accessories and, where relevant, appearance. Submit certified English translations of any foreign language documents.
* Any proposal for use of an alternative product must also include proposals for substitution of compatible accessory products and variation of details as necessary, with evidence of equivalent durability, function and appearance of the construction as a whole. If such substitution is sanctioned, and before ordering products, provide revised drawings, specification and manufacturer's guarantees as required by PM.

3.7 BRITISH STANDARD PRODUCTS

* Where any product is specified to comply with a British Standard for which there is no equivalent European Standard it may be substituted by a product complying with a grade or category within a national standard of another Member State of the European Community or an international standard recognised in the UK specifying equivalent requirements and assurances in respect of material, safety, reliability, function, compatibility with adjacent construction, availability of compatible accessories and, where relevant, appearance. In advance of ordering notify the PM of all such substitutions and, when requested, submit for verification documentary evidence confirming that the products comply with the specified requirements. Any submitted foreign language documents must be accompanied by certified translations into English.

3.8 REFERENCES TO BSI DOCUMENTS

* References to BSI documents are to the versions and amendments listed in the BSI Standards catalogue.

3.9 SIZES

* Unless otherwise stated Products are specified by their co-ordinating sizes.
* Cross section dimensions of timber shown on drawings are nominal sizes before any required planning.

3.10 FIX ONLY means all labours in unloading, handling, storing and fixing in position, including use of all plant.

3.11 SUPPLY AND FIX: Unless stated otherwise all items given in the Pricing Schedules and/or on the drawings are to be supplied and fixed complete.

**4.0 THE WORKS OVERVIEW**

4.1 SCOPE OF WORKS

* The Contractor is responsible for the timely provision of all works as described within the tender documentation. Works include but are not limited to:
1. Development of shop-drawings for exhibit fixtures and fittings
2. Prototyping of certain elements
3. Production of samples for approval
4. Production and installation of exhibit fixtures and fittings
5. Production and installation of specialist scenographic works
6. Production and installation of AV-IT casings
7. Supply and installation of exhibition lighting
8. Co-ordination of specialist consultants and Sub-Contractors
9. Oversee construction phase and H&S compliance of all other parties
10. Supply and installation of all required M&E works necessary to furnish, deliver and install the exhibitions.
* The Contractor should provide a separate quote for the installation of the AV hardware (as detailed in section 22), which will be provided by the Client.
* The Contractor should manage the installation of the banner hanging systems at both sites by Praxis.
* The Contractor is expected to provide full site management and co-ordination at London and Cosford, and is expected to provide transport to, and installation of, components for the exhibition at both sites.
* The FoC will be the Principal Contractor, responsible for H&S on the construction sites.
* The Contractor will not have ownership of either site, as the exhibitions will be installed in galleries that are otherwise open to the public. The Contractor will therefore need to undertake inductions, provide permits to work, and comply with RAFM site safety guidelines (as detailed in Contractor Site Safety Notes 2020).
* The Contractor will not be able to access the site or undertake a site visit in advance of the tender submission. Please see the additional site information included as part of the tender package.

4.2 RESPONSIBILITIES

* The Fit-out Contractor will at all times ensure:
1. Compliance with RAFM regulations
2. Compliance with Health & Safety at Works Act including risk assessments, method statements and relevant certifications
3. Compliance with HSE guidelines on Principal Contractor roles and responsibilities (as detailed here: <https://www.hse.gov.uk/construction/cdm/2015/principal-contractors.htm>)
4. Equality Act requirements
5. A sustainable use of building materials and the sympathetic materiality, incorporating where possible recycled materials.

4.3. LOCATION

* The Battle of Britain 80th Anniversary exhibition is located at both of RAFM’s sites – London and Cosford
* All project meetings to take place at Royal Air Force Museum premises in London, unless required otherwise due the nature of works.

4.4 TIMESCALES

* Practical completion of the works at Royal Air Force Museum premises in London and Cosford no later than 21 August 2020. By this date the exhibition must be in complete working order with all commissioning tasks successfully completed. From the completion of works date the Fit-out Contractor shall allow for three weeks for snagging procedures
* RAFM and its Sub-Contractors will need access for installation of exhibits into cases/open display, graphics and software
* Soft opening of Cosford and London exhibitions, 29 August 2020
* Formal opening of all exhibitions, 12 September 2020.

4.5 PROJECT LIFESPAN AND GUARANTEE

* The project lifespan is a five-year period from the public opening date
* All finishes and moving parts to last the expected lifespan of the project
* The Contractor shall guarantee fit-for-purpose of all products for a five-year period
* The Contractor to ensure that products have service intervals of no less than one year.

**5.0 SUBMISSIONS REQUIRED**

5.1 MASTER PROGRAMME

* Immediately after award of Contract, the Contractor shall prepare a programme for the Works in consultation with the Client. The programme shall be related to the PM’s programme and the entire project to the extent required by the Tender Specification. This programme shall indicate the dates for the starting and completion of the various stages of construction and shall be revised as required by the conditions of the work, subject to the PM's approval
* When preparing the Master programme make reasonable allowance, based on the information provided, for completing such design/production information, checking, for comment and inspection by the PM and any of RAFM’s consultants, and any subsequent amendment(s), resubmission(s) and re-inspection(s).

5.2 LIST OF PROPOSED MANUFACTURERS/SUPPLIERS

* Submit at tender consideration a complete list of products, including all items for which the choice of manufacturer/supplier is at the discretion of the Contractor.

5.3 SUBSTITUTE PRODUCTS

* If the Contractor wishes to substitute products of different manufacture to those specified, details must be submitted with the tender giving reasons for each proposed substitution.

5.4 SHOP DRAWINGS

* The Contractor shall make thorough Shop Drawings of all custom-built items. Contractor shall not fabricate or deliver items to the job site until approval of any necessary Shop Drawings is obtained from the Client
* Prior to making Shop Drawings, the Contractor shall check, on the basis of the information available, that dimensions are correct, that account is taken of all related Works and that construction is practicable. Any discrepancies or queries must be relayed immediately to the PM
* Drawings shall include the manufacturer's part numbers for all commercially procured components.
* Shop Drawings shall show design, materials (kind, thickness, and finish), dimensions, connections, and other details as necessary at full or very large scale to ensure that they accurately interpret the Tender Specification. Shop drawings shall show adjoining Works in such detail as required to provide proper connection with same. Shop drawings shall provide details describing structural fixings to other fit-out elements or base-build elements where the intentions are not indicated
* Shop Drawings shall confirm colour and material specifications by showing their specific applications on all surfaces
* Contractor shall submit Shop Drawings to the PM electronically with two additional hard copies to be provided in A3 size. Shop Drawings shall be numbered consecutively. Dates of submittals and reviews shall be set forth in the Master Programme. A maximum of ten working days shall be allowed by the contractor for review and sign-off of Shop Drawings by the Client
* Inspection and any comments made by the Client will not relieve the Contractor and Sub-Contractor(s) of responsibility for design, co-ordination and documentation
* The PM shall return Shop Drawings to the Contractor as follows:

STATUS A ‘Approved’ – Contractor must submit approved drawing to the PM who will instruct them to proceed with fabrication.

STATUS B ‘Approved with Revisions’ – Contractor shall make revisions to the ShopDrawings as noted, and resubmit same to the PM who will instruct them to proceed with fabrication.

STATUS C ‘Not Approved’ Contractor shall make such corrections per revisions to Shop Drawings as required and resubmit same to the PM.

* The Contractor to ensure that any necessary amendments are made without delay. Unless and until the PM confirms that resubmission is not required, obtain copies of amended drawings, etc., check, resubmit to the PM, and ensure incorporation of necessary amendments all as before
* Contractor to obtain final version of the information and submit to the PM the number of copies required. On behalf of the PM distribute additional copies as appropriate to all affected Sub-Contractors and others, and keep at least one copy on site.

5.5 AS-BUILT DRAWINGS

* The Contractor shall provide to the Client one set of prints and electronic files (in pdf & dwg format) of all Tender Submission documents, upon which a qualified representative of the Contractor shall have entered as required the actual As-Built record of the construction. These prints and data files shall be delivered to the Client upon completion of the construction.

5.6 MAINTENANCE INSTRUCTIONS AND GUARANTEES

* The Contractor shall retain copies delivered with components and equipment (failing which, obtain), register with manufacturer as necessary and hand over to the PM on or before Practical Completion
* The Contractor shall provide the Client with three bound instruction and maintenance manuals and 1 data stick with a PDF version upon completion of the Works, specifying manufacturers’ recommendations for operation, cleaning, maintenance, and regular use of equipment; instructions on overall cleaning routines; and any other information required by the Client for the maintenance and operations of the exhibits, including COSHH sheets and risk assessments.

5.7 CONTRACTOR DESIGNED ELEMENTS

* The Contractor is responsible for detailed design of all structural fixings to other fit-out elements or base build elements within the works. All fixings to be discussed with the PM and samples of all bolts etc. to be provided for approval
* Detailed design of large display elements is the responsibility of the contractor. Structural steel & acrylic/glass spec & thickness, connections, fixings etc are all to be developed by contractor’s designers/ engineers in consultation with the PM
* Detailed design of all steelwork/joinery items is the responsibility of the Contractor

Steelwork/glass spec & thickness, connections, fixings etc are all to be developed by the Contractor’s designers / engineers in consultation with the PM. The Contractor to ensure there is minimal movement/deflection on units under reasonable load (to be determined) & units are easily removable for access/maintenance. All structural calculations & design to achieve units fit for purpose is the responsibility of the Contractor

* Detail design of all AV Hardware casings is the responsibility of the Contractor. The Contractor shall work in close co-ordination with the Client and Client’s Contractors to ensure a fully working system in accordance with the project specifications and requirements.
* Detail design of all rigging fittings is the responsibility of the Client’s Contractor. The Contractor shall be responsible for the design and install of all exhibition structures (in close co-ordination with the Client and the Client’s Contractors) to provide a fully working system in accordance with the project specifications and requirements.

5.8 RISK ASSESSMENT

* The Contractor shall take note of the designers’ risk assessments produced in accordance with the Construction (Design & Management) Regulations 2015
* The Contractor shall produce their own design risk assessments and associated method statements with their Tender Submission.

**6.0 SAMPLES / APPROVALS / PROTOTYPES**

6.1 SAMPLES AND PROTOTYPES IN GENERAL

* All samples and prototypes listed in the Drawings, Schedules, Briefs and Specifications are to be submitted free of charge for approval at no additional cost. Any materials in the works, which do not correspond with approved samples, are liable for rejection
* Unless indicated, no samples or prototypes are intended for inclusion in the Works.
* However, prototypes may, upon individual approval by the Client, be approved for inclusion in the Works.
* Based on the requirements, Contractor shall devise a timetable for fabrication and submittal of samples and prototypes so that a submittal and review process of reasonable duration shall have no adverse effect on project schedule.

6.2 MATERIAL AND PRODUCT SAMPLES

* Where approval of a product is specified, the requirement for approval relates to a sample of the product and not to the product as used in the Works. Submit a sample or other evidence of suitability. Do not confirm orders or use the product until approval of the sample has been obtained
* Product samples shall bear clear identification as to manufacturer, product, type, colour range, texture, finish and other identifying data. Samples shall be accompanied by a letter or transmittal and manufacturer's brochures, any special installation requirements, or any other supporting information
* Samples shall not be used in the Works and shall remain in the Client's possession, unless specified otherwise. Copies of all approved samples must be retained in good, clean condition on site to ensure that the product used in the Works matches the approved sample.

6.3 SAMPLES OF FINISHED WORK

* Where a sample of finished Works is specified for approval, the requirement for approval relates to the sample itself (if approval of the finished Works as a whole is required this is specified separately)
* Obtain approval of the stated characteristic(s) of the sample before proceeding with the Works
* Retain approved sample in good, clean condition on site
* Ensure that the relevant characteristic(s) of the Works match the approved characteristic(s) of the sample
* Remove samples that are not part of the finished Works when no longer required.

6.4 FIELD CONSTRUCTED IN-PLACE PROTOTYPES

* Where listed in the Tender Specifications, designated items may be considered in-place prototypes. Where designated, notify the PM so they can be in attendance when these items begin their installation.
* Field constructed in-place prototypes shall be in addition to samples and prototypes required for submission and review at the Client’s premises
* Do not proceed with the balance of the Works until the Client has accepted this portion of the Works based on workmanship, finishes, and overall appearance
* The review of prototypes shall be programmed by the Contractor to minimise the number of site reviews required by the Client

6.5 PROTOTYPES FOR SUBMITTAL PRIOR TO INITIAL INSTALLATION

* Where listed in listed in the Drawings, Schedules, Briefs and Specifications prototypes are required to be submitted by the Contractor to the Client for review of configuration, craftsmanship, materials, and finishes as specified. Prototypes shall be complete in every respect
* The Contractor shall not proceed with fabrication of the component in question until the Client has accepted the prototype based on its overall quality and appearance
* The Contractor shall devise a timetable for fabrication and submittal of prototypes so that a submittal and review process of reasonable duration shall have no adverse effect on project schedule
* The Contractor shall co-ordinate the Works of other trades to assure fabrication of prototypes featuring all required materials and finishes.

6.6 APPROVALS

* Where and to the extent that products or Works are specified to be approved or the PM instructs or requires that they are to be approved, the same must be supplied and executed to comply with all other requirements and in respect of the stated or implied characteristics either:
1. To the express approval of the PM; or
2. To match a sample expressly approved by the PM as a standard for the purpose.
* Inspection or any other action by the PM must not be taken as approval of products or Works unless the PM so confirms in writing in express terms referring to:
1. Date of inspection
2. Part of the Works inspected
3. Respects or characteristics which are approved
4. Extent and purpose of the approval
5. Any associated conditions.

6.7 PROTOTYPES SCHEDULE

* All prototypes to be developed in consultation with the PM and agreed by the Client before fabrication of the final item commences
* Prototype to be approved by the Client and to remain on site until after Practical Completion
* Refer to BoB\_002 Design Package for details.

|  |
| --- |
| **BoB\_002**  |
| Item/Exhibit | Description | Drawing Ref. |
| People Wall | ‘Flip panels’ with content on both sides  | MF-1.15 MF-1.16 |
| Aircraft ID Panel | Lectern including AV/audio integration (featured in Type 1, 4 and 5) | MF-1.8MF-1.7MF-1.4 |
| Primary Panel | Graphic support structure | MF-1.12 |

**7.0 MATERIALS AND WORKS GENERALLY**

7.1 GOOD PRACTICE

* Where, and to the extent that materials, products and workmanship are not fully detailed or specified, they are to be of a standard appropriate to the Works and suitable for the functions stated in, or reasonably to be inferred from the project documents, and in accordance with relevant good building practice.
* All Works is to conform to the best modern practice and be carried out by fully competent tradesmen of appropriate grade or experience.

7.2 RAF MUSEUM REGULATIONS

* All Works must comply with all the regulations listed below:
1. RAFM Site Safety Rules 2015
2. RAFM Exhibition Display Specifications 2017

7.3 STATUTORY REGULATIONS

* All Works must comply with all the regulations listed below:
1. Building Regulations applicable in UK
2. Local Authority requirements
3. CIBSE requirements
4. Fire and Rescue Service requirements
5. CDM Regulations
6. All ASTM and IBC
7. IEE Wiring
8. ASHRAE Standard
9. IEC Standard
10. National Fire Protection Association (NFPA)
11. Local Environmental Protection Department
12. Local Telecommunication
13. Any other statutory regulations, codes of practice or current standards.

7.4 SITE SAFETY

* The Contractor to ensure as a priority in all activities connected with the Works, the safety and health of all persons on or adjacent to the site
* The Contractor to provide and employ on site only such personnel who have received adequate training including safety and health training relevant to their tasks and adopt safe working practices at all times and shall ensure his Sub-Contractors comply with this recommendation
* The Contractor to not allow any person to Works on site who has repeatedly breached safety requirements. A notice of such sanction shall be displayed at a prominent place on site
* The Contractor to follow the local safety and health regulations of the City of London and RAFM Site Safety Rules 2015. A copy of legislation and relevant certificates should be kept on site at all times and be made available upon request
* The regulations should include, but not be limited to the following:
1. Construction Site Safety Regulations
2. Code of Practice for Scaffolding Safety
3. Lifting Appliances Regulations
4. Occupational Safety & Health Regulations
5. Electricity (Wiring) Regulations
6. Suspended Working Platforms Regulations
7. High Access Equipment Requirements - IPAF-PAL or similar
8. Factories & Industrial Undertakings Regulations:

Eye Protection

Cartridge operated fixing tools

Confined spaces

Woodworking machinery

Abrasive wheels

Safety Officers and Safety Supervisors

* The Contractor must prepare and submit to the PM a full Safety Plan including the above as well as Emergency Preparedness, Accident Plan, Personal Protective Equipment, Works Hazard Analysis, Safety & Health Inspections and Process Control, before any Works commence, with updates as required.

7.5 SITE SECURITY

* The Contractor must, before any Works commence, prepare and submit to the PM a full Site Security Plan stipulating the Contractor’s site security processes in full, and including proposed working hours in accordance with RAFM Site Safety Rules 2015. This Plan to be updated as required.

7.6 ADJACENCY AREA PROTECTION

* The Contractor is to allow for all sheeting/masking of finishes to adjacent areas to minimize spread of dust, debris and damage outside of the site boundary. Protection and hoarding between the exhibition space, hangar lobby and services areas must be installed to ensure a tidy and functional interface between areas.

7.7 GENERAL QUALITY OF PRODUCTS

* Products to be new unless otherwise specified
* For products specified to a British or European Standard obtain certificates of compliance from manufacturers when requested by the PM.
* Where a choice of manufacturer or source of supply is allowed for any particular product, the whole quantity required to complete the Works must be of the same type, manufacture and/or source unless otherwise approved. Produce written evidence of sources of supply when requested by the PM
* Ensure that the whole quantity of each product required to complete the Works is of consistent kind, size, quality and overall appearance
* Where consistency of appearance is desirable ensure consistency of supply from the same source. Unless otherwise approved do not use different colour batches where they can be seen together
* If products are prone to deterioration or have a limited shelf life, order in suitable quantities to a programme and use in appropriate sequence. Do not use if there are any signs of deterioration, setting or other unsatisfactory condition
* All materials and construction to comply with BS 476.

7.8 FIRE RATING

* Refer to BoB\_002 Design Packages for specifications
* Where the works result in new exposed timber and other flammable surfaces the Contractor is to allow for either treating all new faces in a clear coat surface spread of flame retardant or apply the specified fire rating level specified elsewhere in the Drawings, Schedules, and Briefs
* Ensure that any imperfections of fit between building elements which are required to have fire resistance and/or resist the passage of smoke, are completely sealed. Where not specified otherwise, tightly pack any such gaps with mineral fiber.

7.9 PROHIBITED MATERIALS

* In general, all products and materials used in the Works are to be nontoxic and non-deleterious. The Contractor shall exercise skill, care and attention and shall use all reasonable endeavours to ensure that it does not specify or (as appropriate) authorize or approve the specification or use by others, of any of the following:
1. High alumina cement
2. Woodwool slabs in permanent formWorks to concrete or in structural elements
3. Calcium chloride in admixtures for use in reinforced concrete
4. Asbestos or asbestos-containing products as defined in The Asbestos Regulations 1969 or 1987or any statutory modification or re-enactment thereof
5. Aggregates for use in reinforced concrete which do not comply with the requirements of British Standards 882 (1983) or for use in concrete which do not comply with the relevant provisions of British Standards 8110(1985) and sea-dredged aggregates, save where those sea-dredged have been tested in accordance with British Standards 812 (1975) and 812 (1976) and conform in all respects to British Standard 882 (1983)
6. Lead or any materials containing lead which may be ingested, inhaled or absorbed, except where copper alloy fittings containing lead are specifically required in drinking water pipeWorks by any relevant statutory requirements;
7. Urea formaldehyde foam or materials which may release formaldehyde in quantities which may be hazardous, with reference to the limits set from time to time by the Health and Safety Executive
8. Calcium silicate bricks or tiles
9. Materials which are generally composed of mineral fibres either man made or naturally occurring which have a diameter of three microns or less and a length of two hundred microns or less or which contain any fibres not sealed or otherwise stabilized to ensure that fibres mitigation is prevented
10. Sprayed vermiculite on steelWorks as fire protection
11. Contractor should note that Exhibit Showcases exclude certain materials due to artifact conservation requirements.

7.10 PROPRIETARY PRODUCTS

* Handle, store, prepare and use or fix each product in accordance with its manufacturer's current printed or written recommendations/instructions. Inform PM if these conflict with any other specified requirement. Submit copies to PM when requested
* The Tender will be deemed to be based on the products specified and recommendations on their use as described in the manufacturers' literature current at the time of tender
* Obtain confirmation from manufacturers that the products specified and recommendations on their use have not been changed since that time. Where such change has occurred, inform the PM and do not place orders for or use the affected products without further instructions
* Where British Board of Agreement certified products are used, comply with the limitations, recommendations and requirements of the relevant valid certificates.

7.11 CHECKING COMPLIANCE OF PRODUCTS

* Check all delivery tickets, labels, identification marks and, where appropriate, the products themselves to ensure that all products comply with the project documents. Where different types of any product are specified, check to ensure that the correct type is being used in each location. In particular, check that:
1. The sources, types, qualities, finishes and colours are correct, and match any approved samples
2. All accessories and fixings which should be supplied with the goods have been supplied
3. Sizes and dimensions are correct. Where tolerances of components are critical, measure a sufficient quantity to ensure compliance
4. The delivered quantities are correct, to ensure that shortages do not Cause delays in the work
5. The products are clean, undamaged and otherwise in good condition
6. Any products which have a limited shelf life are not out of date.

7.12 PROTECTION OF PRODUCTS

* Prevent over-stressing, distortion and any other type of physical damage
* Keep clean and free from contamination. Prevent staining, chipping, scratching or other disfigurement, particularly of products exposed to view in the finished work
* Keep dry and in a suitably low humidity atmosphere to prevent premature setting, moisture movement and similar defects. Where appropriate store off the ground and allow free air movement around and between stored products
* Prevent excessively high or low temperatures and rapid changes of temperature in the products
* Protect adequately from rain, damp, frost, sun and other elements as appropriate. Ensure that products are at a suitable temperature and moisture content at time of use
* Ensure that sheds and covers are of ample size, in good weatherproof condition and well secured
* Keep different types and grades of products separately and adequately identified.
* So far as possible keep products in their original wrappings, packing or containers, until immediately before they are used
* Wherever possible retain protective wrappings after fixing and until shortly before Practical Completion
* Ensure that protective measures are fully compatible with and not prejudicial to the

products/materials.

7.13 PROTECTION OF EXISTING FACILITIES

* Care shall be exercised while doing all Works to ensure that the existing buildings, equipment, utilities, and site improvements are not damaged
* The Contractor shall protect finished surfaces, including jambs and soffits of openings used as passageways, through which equipment and materials are handled.
* The Contractor shall provide protection for finished floor surfaces before allowing equipment or materials to be moved over such surfaces.
* The Contractor shall be held responsible for any damage to existing areas due to failure on their part to properly protect those areas. Any damage resulting from Works under these sections shall be repaired at the expense of the Contractor.

7.14 PROTECTION AND LABELING OF EXHIBIT COMPONENTS

* The Contractor shall ship, store and handle all exhibit components in such a way that they shall be perfect, free of dust and dirt and abrasions, and unmarred when installation is complete. Care shall be taken not to separate or crack any joint by racking, twisting or in any way applying stress. Each exhibit component shall be adequately protected with bubble-wrap and cardboard corner protectors, or otherwise protected to prevent any damage up to the point of installation
* Each exhibit component shall be appropriately labeled in a concealed position on the element with the unit identification number used on the Drawings and applicable schedules.

7.15 PROTECTION OF INSTALLED EXHIBITS

* The Contractor shall not deliver finished exhibit to the job site unless there is a suitable storage facility provided or installation can be immediate
* The Contractor shall maintain finished exhibit and architectural surfaces clean, unmarred, and suitably protected until accepted by the Client. Where possible, leave protective film or wrapping on Perspex and metals
* Until acceptance thereof, adequately protect all glass and replace all broken and imperfect glass at no additional cost to the Client
* The interior of any installed CaseWorks which has not been enclosed with glass or Perspex shall be protected with securely taped polyethylene sheet.

7.16 SUITABILITY OF RELATED WORKS AND CONDITIONS

* Ensure that all trades are provided with necessary details of related types of work. Before starting each new type or section of work, ensure that:
1. Previous, related Works is appropriately complete, in accordance with the project documents, to a suitable standard and in a suitable condition to receive the new work
2. All necessary preparatory Works has been carried out, including provision for services, openings, supports, fixings, damp proofing, priming and sealing
3. The environmental conditions are suitable, particularly that the building is suitably weather tight when internal components, services and finishes are installed.

7.17 GENERAL QUALITY OF WORKMANSHIP

* The Contractor’s operatives and all Sub-Contractors shall be recognised and established companies producing the highest quality, first-class construction and installation of their Works in their respective fields
* The Contractor and all Sub-Contractors shall at all times enforce strict discipline among their employees and shall not employ on the Works any unfit person or anyone not skilled in the task assigned to them
* Take all necessary precautions to prevent damage to the Works from frost, rain and other hazards
* Inspect components and products carefully before fixing or using and reject any which are defective
* Where not specified otherwise, select fixing and jointing methods and types, sizes and spacings of fastenings in compliance with clauses in this document. Fastenings to comply with relevant British Standards
* Provide suitable, tight packings at screwed and bolted fixing points to take up tolerances and prevent distortion. Do not over-tighten fixings
* Adjust location and fixing of components and products so that joints which are to be finished with mortar or sealant or otherwise left open to view are even and regular
* Ensure that all moving parts operate properly and freely. Do not cut, grind or plane pre-finished components and products to remedy binding or poor fit without approval.

7.18 SHOP FABRICATION

* All exhibits included in the Tender Specification shall be shop fabricated. No on-site fabrication is permitted, except as noted in drawings. Some on-site assembly will be required to enable integration of services into exhibits, suitable precautions must be taken to protect and make safe the site during any on-site assembly.

7.19 STRUCTURAL INTEGRITY

* The Contractor is responsible for the design and engineering of all structures within their scope of works as well as structural interface within the building envelope
* The Contractor is responsible of ensuring structural integrity of all structures within their scope of works
* The exhibits must accommodate without damage all drying shrinkage, creep, deflections and thermal movements during installation and design life
* All exhibits to be designed to resist all dead and live loads that may be expected in an installation of this type including all cladding, paneling and associated features

7.20 BS 8000: BASIC WORKMANSHIP

* Where compliance with BS 8000 is specified, this is only to the extent that the recommendations therein define the quality of the finished work
* Where BS 8000 gives recommendations on particular working methods or other matters which are properly within the province and responsibility of the Contractor, compliance therewith will be deemed to be a matter of general industry good practice and not a specific requirement of the PM under the Contract
* If there is any conflict or discrepancy between the recommendations of BS 8000 on the one hand and the project documents on the other, the latter will prevail.

7.21 CO-ORDINATION BETWEEN TRADES

* Note: Refer to section 12. The CO-ORDINATION
* The Contractor shall co-operate with all other trades to obtain the most practical arrangement of the work. Make known to other trades the intended positioning of materials and equipment and intended order of work. Co-ordinate the Works with that of other trades and proceed with the installation in such a manner to assure no delays to other trades. Similarly, determine the intended locations of the Works of other trades and the intended order of work. Examine drawings and specifications of all other trades and determine exact locations and sizes of equipment, roughing-in requirements and equipment to be connected. Contractor shall refer to the Architectural and Structural Drawings and Specifications for the general conditions of the construction area, and shall be guided accordingly
* Failure of this Contractor to make known their own needs and to determine the requirements of others shall not be cause for additional compensation to correct interferences, or for extra Works which could have been avoided by proper co-ordination
* If any part of the Contractor's Works depends for proper execution or results upon the Works of any other Contractor, the Contractor shall inspect and promptly report to the PM any defects in such Works that render it unsuitable for such proper execution and results. Their failure to inspect and report shall constitute an acceptance of the other contractor's Works as fit and proper for the reception of their work, except as to defects which may develop in the other contractor's Works after the execution of their work
* To ensure the proper execution of this subsequent work, the Contractor shall measure Works already in place and shall at once report to the PM any discrepancy between the executed Works and the drawings.

**8.0 ACCURACY/SETTING OUT GENERALLY**

8.1 SETTING OUT

* The Contractor shall set out their Works and be responsible for all necessary lines, levels, elevations, and measurements
* The Contractor must complete a full site survey before ordering any materials or doing any work
* The Contractor is responsible for verification of all levels and dimensions on site against those shown on the Design Package
* Any discrepancy in dimensions that may be found shall be submitted to the PM for instruction before the Contractor proceeds with the Works in the affected areas.
* No extra charge or compensation shall be allowed due to differences between actual dimensions and dimensions indicated on any Drawings
* The Shop Drawings for production and installation must then reflect the site conditions and all necessary design adjustments based on the survey. All adjustments must be submitted to the PM for approval prior to fabrication
* During the site survey the Contractor is expected to familiarize themselves with all aspects of the building envelope, including but not limited to the following:
1. Physical build constraints
2. Existing M & E services and necessary alterations
3. Structural capabilities of building envelope
4. Access routes for build elements entering the site
* The Contractor is to inform the PM when overall setting out is complete and before commencing construction and installation. Construction and installation shall not commence prior to approval of final setting out by the PM
* The Contractor shall be prepared to guarantee to each of their Sub-Contractors the dimensions, which Sub-Contractor may require for the layout and fitting of their Works to the surrounding work.

8.2 APPEARANCE AND FIT

* Arrange the setting out, erection, juxtaposition of components and application of finishes (working within the practical limits of the design and the specification) to ensure that there is satisfactory fit at junctions, that there are no practically or visually unacceptable changes in plane, line or level and that the finished Works has a true and regular appearance
* Wherever satisfactory accuracy, fit and/or appearance of the Works are likely to be critical or difficult to achieve, obtain approval of proposals or of the appearance of the relevant aspects of the partially finished Works as early as possible
* Without prejudice to the above and unless specified otherwise, tolerances will (where applicable) be not greater than those given in BS 5606, Tables 1 and 2.

8.3 DIMENSIONAL CO-ORDINATION

* All elements must be detailed to ensure compliance with requirements for accuracy in manufacture and erection, and to accommodate deviations in the building structure
* Select types and methods of fixing which will give ample adjustability in three dimensions
* Submit details of the proposed system of tolerances and adjustments.

**9.0 SERVICES GENERALLY**

The Contractor is responsible for providing all electrical works required by the exhibition, AV hardware installations, and lighting scheme.

9.1 SERVICES REGULATIONS

* Any Works carried out to or which affects new or existing services must be in accordance with the Bye Laws or Regulations of the relevant Statutory Authority.

9.2 SERVICE RUNS

* Make adequate provision for services, including unobstructed routes and fixings.
* Wherever possible ducts, chases and holes are to be formed during construction rather than cut.

9.3 MECHANICAL AND ELECTRICAL SERVICES

* All mechanical and electrical services must have final tests certification and commissioning carried out so that they are in full working order at Practical Completion.

**10.0 SUPERVISION / INSPECTION / DEFECTIVE WORK**

10.1 SUPERVISION

* In addition to the constant management and supervision of the works provided by the Contractor's person-in-charge, all significant types of Works must be under the close control of competent trade supervisors to ensure maintenance of satisfactory quality and progress.

10.2 PERSON-IN-CHARGE

* Give maximum possible notice to the PM before changing the person-in-charge or site agent.

10.3 ACCESS FOR THE PM

* Provide at all reasonable times access to the Works and to other places of the Contractor or Sub-Contractors where Works is being prepared for the Tender Submission.

10.4 DEFECTS IN EXISTING CONSTRUCTION

* Any defects in existing construction are to be reported to the PM without delay to obtain instructions before proceeding with work, which may:
1. Cover up or otherwise hinder access to the defective construction, or
2. Be rendered abortive by the Carrying out of remedial work.

10.5 TIMING OF TESTS AND INSPECTIONS

* Agree dates and times of tests and inspections with the PM several days in advance, to enable the PM and other affected parties to be present. On the previous working day to each such test or inspection confirm that the Works or sample in question will be ready or, if not ready, agree a new date and time.

10.6 TEST CERTIFICATES

* Submit a copy of each certificate to the PM as soon as practicable and keep copies of all certificates on site.

10.7 PROPOSALS FOR RECTIFICATION OF DEFECTIVE WORK/PRODUCTS

* As soon as possible after any part(s) of the Works or any products are known to be not in accordance with the Tender Submission, or appear that they may not be in accordance, submit proposals to PM for opening up, inspection, testing, making good, adjustment of the Contract Sum, or removal and re-execution
* Such proposals may be unacceptable to the PM, and they may issue contrary instructions.

10.8 MEASURES TO ESTABLISH ACCEPTABILITY

* Wherever inspection or testing shows that the work, materials or goods are not in accordance with the Tender Submission and measures (e.g. testing, opening up, experimental making good) are taken to help in establishing whether or not the Works is acceptable, such measures:
1. Will be at the expense of the Contractor
2. Will not be considered as grounds for extension of time.

10.9 QUALITY CONTROL

* Establish and maintain procedures to ensure that the Works, including the Works of all Sub-Contractors, comply with specified requirements. Maintain full records, keep copies on site for inspection by the PM, and submit copies of particular parts of the records on request.
* The records must include:
1. Identification of the element, item, batch or lot including location in the Works
2. The nature and dates of inspections by the Contractor or the PM, tests and approvals
3. The nature and extent of any nonconforming Works found
4. Details of any corrective action.

**11.0 WORKS AT OR AFTER COMPLETION**

11.1 GENERALLY

* Make good all damage consequent upon the work
* Remove from products and remove from site all temporary markings, coverings and protective wrappings unless otherwise instructed
* Clean the works thoroughly inside and out including all accessible ducts and voids; remove all splashes, deposits, efflorescence, and rubbish and surplus materials consequent upon the execution of the work
* Cleaning materials and methods to be as recommended by manufacturers of products being cleaned, and to be such that there is no damage or disfigurement to other materials or construction
* Obtain COSHH dated data sheets for all materials used for cleaning and ensure they are used only as recommended by their manufacturers
* Touch up minor faults in newly painted/repainted work, carefully matching colour, and brushing out edges. Repaint badly marked areas back to suitable breaks or junctions
* Adjust, ease and lubricate moving parts of new Works as necessary to ensure easy and efficient operation, including doors, windows, drawers, ironmongery, appliances, valves and controls.

11.2 PROGRESS CLEANING

* The Contractor shall retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials
* The Contractor shall not allow accumulation of scrap, debris, waste material, and other items not required for construction of the Work, and shall maintain the site in a neat and orderly condition at all times
* The Contractor shall provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the environment. Store volatile waste in covered metal containers and remove from premises daily. Disposal of volatile fluid wastes in storm or sanitary systems or streams or waterways is not permitted
* Daily, and more often if necessary, the Contractor shall inspect the site and pick up all scrap, debris, and waste material
* Weekly, and more often if necessary, Contractor shall clean the job site and legally dispose of waste materials and rubbish from the Client's property.

11.3 MATERIALS

* Contractor shall use only the cleaning materials and equipment, which are compatible with the surface being cleaned, as specified by the Client and as recommended by the manufacturer of the material.

11.4 MAKING GOOD DEFECTS

* Make arrangements with the PM and give reasonable notice of the precise dates for access to the various parts of the Works for purposes of making good defects
* Inform the PM when remedial works to the various parts of the Works are completed.

11.5 FINAL CLEANING

* ‘Clean,’ for the purpose of this Tender Specification, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.
* Prior to completion of the Works, Contractor shall remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. The Contractor shall conduct final progress cleaning as described in Section 11.2 entitled PROGRESS CLEANING.
* Exhibit Site:
* The Contractor shall clean all interior and exterior floor surfaces in the vicinity of the Works to remove all debris, dust, and dirt
* All painted and finished surfaces shall be touched-up and restored where damaged and/or defaced and the entire site shall be left free of blemishes. Paint specification to be obtained from main Contractor to ensure colour match and adhesion with specialist paint finishes.
* Exhibits:
* Just prior to acceptance or occupancy the Contractor shall visually inspect all exposed surfaces
* The Contractor shall remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from interior and exterior of finished surfaces as follows:
1. Glass: Carefully and completely remove all markings, pads and labels. Wash both faces of glass, with a recommended commercially available glass cleaner and lint less static-free cloth, not more than one day prior to date scheduled for Substantial Completion. There should be no evidence of streaking, fingerprints or clouding on either face
2. Acrylic Components: Clean with soft lint less rags, or cheese-cloth, and an anti-static acrylic cleaner. Follow the manufacturer's directions for applying the cleaner
3. Painted surfaces: All painted and finished Works shall be touched-up and restored where damaged and/or defaced and the entire Works shall be left free of blemishes. The Contractor shall provide a sixteen (16) ounce container of each, paint, stain, or lacquer colour for use by the Client for future touch-up repair of exhibits
4. Casework: Contractor shall apply the polish or cleaner recommended by the manufacturer of the material being polished or cleaned. CaseWorks interiors shall be vacuumed at least once after CaseWorks is installed, and once just before glass or Perspex enclosure is installed. Note: Water based cleaning products only to be used in case interiors – no cleaning products containing solvents to be used. Refer to RAFM Exhibition Display Specifications 2017 for details of acceptable products for use within showcases
5. Metal: Remove all temporary protective covering, clean as required
* Contractor shall schedule final cleaning as approved by the Client Representative to enable the Client to accept a completely clean work.

11.6 SECURITY AT COMPLETION

* Leave the Works secure with all accesses locked. Account for and adequately label all keys and hand over to Client with itemised schedule, retaining duplicate schedule signed by Client as a receipt.

**12.0 CO-ORDINATION**

12.1 CO-ORDINATION BETWEEN TRADES UNDER THE MAIN CONTRACTOR,

AND CONTRACTORS PERMITTED ACCESS UNDER CLIENT DIRECT WORKS

* The Contractor and all Sub-Contractors shall co-operate with the Client direct suppliers and the Client’s own teams to ensure the timely co-ordination of development and installation of works
* The Contractor shall co-ordinate the Works of all subcontracted trades and proceed with the installation in such a manner to assure no delays to other trades. Similarly, determine the intended locations of the Works of other trades and the intended order of work. Examine drawings and specifications of all other trades and determine exact locations and sizes of equipment, roughing-in requirements and equipment to be connected. All Contractors shall refer to the Architectural and Structural Drawings and Specifications for the general conditions of the construction area, and shall be guided accordingly
* Failure of any Contractor to make known their own needs and to determine the requirements of others shall not be cause for additional compensation to correct interferences, or for extra Works which could have been avoided by proper co-ordination
* If any part of any Contractor or Sub-Contractor’s Works depends for proper execution or results upon the Works of any other Contractor, the Contractor or Sub-Contractor shall inspect and promptly report to the relevant Contractor any defects in such Works that render it unsuitable for such proper execution and results. Their failure to inspect and report shall constitute an acceptance of the other Contractor's Works as fit and proper for the reception of their work, except as to defects which may develop in the other Contractor's Works after the execution of their work.
* To ensure the proper execution of this subsequent work, the Contractor shall measure Works already in place and shall at once report to the PM any discrepancy between the executed Works and the drawings.

12.2 ADJOINING WORK

* Where Works of one trade joins or is on part of other work, there shall be no discrepancy when same is completed. In engaging one kind of Works with another, marring or damaging same shall not be permitted. Should improper Works of any trade result in damage or defects, the whole Works affected shall be made good without expense to the Client. Any trade which must do Works in an area previously prepared by another trade shall approve such prior Works before commencing.
* Any unsatisfactory conditions shall be reported to the Contractor and the PM, and no Works shall be done in the affected area until the unsatisfactory conditions have been eliminated. Starting Works shall be construed as acceptance of the areas as satisfactory.

12.3 SPECIFIC CO-ORDINATION TASKS

* The nature of the project site requires a high level of co-ordination between the Contractor, the Main Contractor and their Sub-Contractors, the Client’s direct contractors and the Client including but not limited to:

|  |  |  |
| --- | --- | --- |
| EXHIBITION | EXHIBIT / ITEM | DESCRIPTION |
| General | Aircraft ID Panels | TBA - Client’s Fit-out ContractorTBA - Client’s Graphics ContractorClient’s AV-IT SpecialistsClient’s specialist mini-aircraft builderMetal fabricator to provide template (MDF or similar) to Graphics Contractor for the different panel types |
| General | Vehicle ID Panels | TBA - Client’s Fit-out ContractorTBA - Client’s Graphics ContractorClient’s AV-IT SpecialistsClient’s specialist mini-aircraft builderMetal fabricator to provide template (MDF or similar) to Graphics Contractor for the different panel  |
| General | Primary Panels | TBA - Client’s Fit-out ContractorTBA - Client’s Graphics ContractorMetal fabricator to provide template (MDF or similar) to Graphics Contractor for the different panel types |
| General | In-case Labels | TBA - Client’s Fit-out ContractorTBA - Client’s Graphics ContractorFabricator to provide template (MDF or similar) to Graphics Contractor for the different panel types |
| General | Timeline Walls | TBA - Client’s Graphics ContractorTBA - Client’s Fit-Out ContractorClient’s AV-IT Specialists  |
| General | Cases | TBA - Client’s Graphics ContractorClick Netherfield – Client’s Showcase ContractorTBA - Client’s Fit-out Contractor |
| General | People Walls | TBA - Client’s Graphics ContractorTBA - Client’s Fit-Out ContractorClient’s AV-IT Specialists |
| General | Banners | TBA – Client’s Fit-out ContractorTBA - Client’s Graphics ContractorPraxis – Client’s banner hanging systemClient’s Collections Services |
| General | Lighting | TBA - Client’s Fit-out ConsultantTBA - Client’s Graphics ContractorHaley Sharpe Design - Designer |

**13.0 EXHIBITION LIGHTING**

13.1 SCOPE OF WORK

* The Contractor shall provide materials, labour, equipment and services necessary to furnish, deliver and install all Works of this Section as shown on the drawings and/or as required by job conditions.

13.2 SAMPLES

* Note: In situ mock-ups are required for approval.
* List of Samples and Mock-ups required to be agreed between the Contractor and the Client. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents.

13.3 INTEGRATION INTO EXHIBITS

* Where lighting is integrated into exhibits it is the responsibility of the Contractor to ensure that specification is met and that the exhibits are fit for purpose – including providing adequate ventilation for lighting sources and protecting visitors from exposed heat sources.

13.4 ELECTRICAL INSTALLATION

* Any inadequacies in circuitry (e.g. overloading, or lack of data cabling) must be brought to the Client’s attention prior to installation.
* The Contractor should accommodate the base build electrical information into their own design drawings to give the client one full and complete set
* Please refer to the Client’s lighting information for location of power feeds to track, low level power, and ensure electrical compatibility between base build and fit-out installations
* The final installation should operate seamlessly with no delay between the phases of installation
* Lighting is controlled manually by the RAFM staff.

**14.0 AV-IT CASINGS**

14.1 WORKS INCLUDED

* The Client will purchase the specified AV Hardware and provide the Contractor with the cut sheets.
* The Contractor will provide casings for all of the AV Hardware
* The Client will provide the Contractor with 1no. of each type of media screen and sound device to be test fitted in the workshop and approved by the Client
* Workshops will be needed with intended AV hardware to ensure integration of hardware systems and cabling within certain items.

14.2 SAMPLES

* The Samples and Prototypes listed in the in the Drawings, Schedules, Briefs and Specifications are required to be submitted by the Contractor to the Client for review. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents, of which this is a part.

14.3 SHOP DRAWINGS

* Submit Shop Drawings for review in accordance with the Tender Submission.
* Shop Drawings shall be based on Drawings, Specifications and Site Survey measurements essential for proper fitting of sealants with other construction or existing Architecture, and shall present complete information as to illustrate for the Contractor the general character of the exhibition item.
* To include hardware casing dimensions fully and indicate all materials.

14.4 PROTOTYPES

* The Prototypes and Mock-ups listed in the in the Drawings, Schedules, Briefs and Specifications of this document are required to be submitted by the Contractor to the Client for review. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents, of which this is a part.

**15.0 METAL WORK**

15.1 WORKS INCLUDED

* The Contractor shall provide materials, labour, equipment and services necessary to furnish, deliver and install all Works of this Section as shown on the drawings and/or as required by job conditions.

15.2 SAMPLES

* Submit the Samples and Prototypes listed in the in the Drawings, Schedules, Briefs and Specifications of this document for review in accordance with the Contract Documents. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents, of which this is a part.

15.3 SHOP DRAWINGS

* Submit Shop Drawings for review in accordance with the Contract Documents
* Shop Drawings shall indicate by plans, elevations, sections and details of the Works of this Section, showing in detail large scale construction, methods of installation and attachment, type, size, spacing and location of welds, bolts or other anchorage devices and shall give all pertinent data as to thickness, dimensions and exposed finishes
* Where installed metal fabrications are indicted to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by the qualified professional engineer who was responsible for their preparation
* Shop drawings shall clearly identify those items designated ornamental/miscellaneous steel as well as bold letters to show its finish treatment.
* Shop drawings shall indicate the Works which is furnished by this Section and installed by other trades and the Works of other trades which adjoin or butt the Works of this Section
* As requested by the PM provide additional details, sections and Calculations to fully describe the Works to be provided
* Where items, anchorages, inserts are scheduled to be set into the concrete or built into the Works by other Trade Contractors for the installation of metal fabrications, provide setting drawings, templates, instructions and directions for their installation. Co-ordinate delivery with other Works to avoid delay.

15.4 MATERIALS GENERALLY

* Grades of metals, section dimensions and properties to be to the appropriate British Standard. When not specified, select grades and sections appropriate for the purpose.
* Prefinished metal may be used if methods of fabrication do not damage or alter appearance of finish and finish is adequately protected
* Fastenings to be to the appropriate British Standard and, unless specified otherwise, to be of the same metal as the component, with matching coating or finish.
* Incorporate only metals that are free from visible defects which impair strength or durability. All metals used to be free from rust or waves and buckles and to be clean, straight and sharply defined profiles.

15.5 FABRICATION GENERALLY

* Fabricate components carefully and accurately to ensure compliance with design and performance requirements
* Do not permit contact between dissimilar metals in components
* Finished components to be rigid and free from distortion, cracks, burrs and sharp arises. Moving parts must move freely and without binding
* Unless specified otherwise, mitre corner junctions of identical sections
* Comply with the latest edition of the National Structural SteelWorks Specification (NSSS) unless specified otherwise
* Fit and assemble Works in shop. When this is not possible, make trial shop assembly.

15.6 COLD FORMED WORK

* Use brake presses or cold rolling to produce accurate profiles with straight arises.

15.7 STAINLESS STEEL STRIP/SHEET/BAR/TUBE/ROD/CABLE

* To BS EN 10088-2, BS EN 10258, BS EN 10259 and BS 1449:Part 2, grade 316, dimensions/thickness as specified
* Submit samples of specified finish for approval for all types of stainless steel material
* Stainless steel tubes shall be seamless
* Sharp edges shall be given a minimal radius to prevent injury
* Finish: satin to approval in accordance with BS EN 10088-2, 1K/2K ‘satin polished’.

15.8 WELDING/BRAZING GENERALLY

* Thoroughly clean surfaces to be joined
* Ensure accurate fit using clamps and jigs where practicable. Use tack welds only for temporary attachment
* Make joints with parent and filler metal fully bonded throughout with no inclusions, holes, porosity or cracks
* Prevent weld spatter falling on surfaces of materials which will be self-finished and visible in completed work
* Remove all traces of flux residue, slag and weld spatter
* Stainless steel welding method to be approved and samples submitted for approval
* Note: no Oxy Acetylene cylinders are permitted on site.

15.9 WELDING OF STEEL

* Metal arc welding to BS 5135, or other methods subject to approval.

15.10 FINISHING WELDED/BRAZED JOINTS

* Butt joints which will be visible in completed Works to be smooth, flush with adjacent surfaces
* Fillet joints which will be visible in completed Works to be executed neatly. Grind smooth where specified.

15.11 APPLYING COATINGS

* Apply after fabrication is complete and all fixing holes have been drilled, unless otherwise specified
* Before applying coating remove all paint, grease, flux, rust, burrs and sharp arises.
* Make good all defects which would show after application of coating and finish surfaces smooth
* Prior to PPC application all steelwork should be shot blasted to create an even finish and colouration across component including welds, folds and junctions.

15.12 SHOT BLASTING

* Prior to finishing with any clear coat all steelwork should be shot blasted to create an even finish and colouration across component including welds, folds and junctions.

15.13 SHOP PRIMING FOR COLOURED POLYESTER POWDER COATING

* Cleaning: chip, scrape, disc sand and grind surfaces to remove all fins, burrs, sharp edges, weldspatter, loose rust and loose scale. Clean out all crevices. Thoroughly degrease using emulsion cleaners followed by thorough rinsing with water. Apply primer when surface is dry and on the same day as cleaning.
* Primer: one full coat of zinc phosphate modified alkyd brush applied to all surfaces, free from runs and sags.

15.14 SHOP PRIMING FOR CLEAR POLYESTER POWDER COATING

* Cleaning: chip, scrape, disc sand and grind surfaces to remove all fins, burrs, sharp edges, weld spatter, loose rust and loose scale. Clean out all crevices. Thoroughly degrease using emulsion cleaners followed by thorough rinsing with water. Shot blasted to create even finish across welds and surfaces.

15.15 APPLICATION

* It is intended that entire coatings system be applied in the shop. Provisions shall be made for proper handling at all stage of the painting, shipping, storing at job site, and erecting, that will protect finished surfaces from damage or soiling.
* Allow two weeks for full hardening & off gassing before painted surfaces are brought into the exhibition galleries
* Surface preparation for steel shall be in accordance with pertinent BSI standards
* Prior to blasting or wheel abrading, oil and grease shall be removed, welds shall be ground smooth and all splatter removed. Sharp cut edges shall be uniformly relieved by grinding or filing to form a slight radius sufficient to permit proper wrap of the coatings
* Care shall be exercised to maintain clean surfaces. All dust and residue thoroughly removed just prior to painting. Apply primer coat on the same day to each area that cleaning is performed, and before rust-bloom occurs
* Application shall be by spray. Spray each coat with care, to thoroughly clean surfaces in a smooth, uniform, unbroken film free of runs and sags, with dry film thicknesses maintained on edges and corners
* For field-welded connections the coating system shall be held back for field touch-up using the same primer and finish coat. Allow 2 weeks for full hardening & off-gassing before exhibits are brought into the vicinity of the paintwork
* Manufacturer’s recommendations for handling, thinning, applying and re-coat intervals shall be followed. No Works shall be performed when temperature and humidity conditions are outside the limitations stated by the coating manufacturer.

15.16 INSTALLATION

* Pre-assemble items in the shop to the greatest extent possible to minimize field splicing and assembly of units at the site. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation
* The finished Works shall be strong, rigid, neat in appearance and free from defects, the members clean cut, straight and true
* Perform shimming using non-ferrous and non-corrosive metal or fibre shim stock. Material subject to deterioration will not be permitted
* Where recesses, pockets, holes or other provisions are required to be made in the Works by other trades, provide templates and/or setting drawings to assure that they will be properly formed and located. Furnish such information sufficiently in advance to avoid delay in the construction progress
* Accurately locate and erect the Works in a plumb and level manner at the designed lines and elevations, and in true planes. Check positioning of members carefully to produce continuity of line and design.

15.17 SECURING TO OTHER WORK

* Do all cutting, drilling and fitting and Works of similar character required in fitting and setting the materials in place, and perform all cutting and fitting required in connection with the fitting of the metal Works to the adjoining Works of other trades
* Anchors, bolts, etc., which are to be used on the exterior or placed in exterior walls, shall be hot dipped galvanized after fabrication
* Install connecting members and devices, which are to be concealed as far as practicable as the Works progresses, so as to avoid cutting or drilling
* Paint or coat ferrous metal in contact with aluminum or dissimilar metal with a heavy coat of alkali-resistant bituminous paint before installation.

15.18 GROUT AND ANCHORING CEMENT

* Non-shrink non-metallic grout: pre-mixed, factory-packaged, non-staining, non-corrosive, nongaseous grout complying with CE CRD-C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this Section
* Interior anchoring cement: factory-pre-packaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with water at project site to create pourable, anchoring, packing and grouting compound. Use for interior applications only
* Erosion-resistant anchoring cement: Factory-prepackaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with water at project site to create pourable anchoring, patching and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer.

**16.0 ACRYLIC**

16.1 WORKS INCLUDED

* NOTE: for reference only
* The Contractor shall provide materials, labour, equipment and services necessary to furnish, deliver and install all Works of this Section as shown on the drawings and/or as required by job conditions.

16.2 SAMPLES

* Submit the Samples and Prototypes listed in the in the Drawings, Schedules, Briefs and Specifications of this document for review in accordance with the Contract Documents. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents, of which this is a part.

16.3 SHOP DRAWINGS

* Submit Shop Drawings for review in accordance with the Tender Submission.
* Shop Drawings shall be based on Drawings, Specifications and Site Survey measurements essential for proper fitting of all glass with other construction or existing Architecture, and shall present complete information as to illustrate for the Contractor the general character of the exhibition item
* Dimension fully and indicate all materials including species, thicknesses, jointing details, locations of shop and field joints, attachment methods and finishes and relationship to abutting construction.

16.4 MATERIALS GENERALLY

* The Contractor to use a grade of polycarbonate which has increased levels of impact performance, for example Perspex XT
* The Contractor to bond the polycarbonate to the supporting frames, and other pieces of polycarbonate a structural silicone adhesive.

16.5 FABRICATION GENERALLY

* Where practicable the protective covering of the acrylic sheet shall be left in position until all cutting, drilling, machining and assembling operations have been completed. It is preferable however to remove some of the paper to provide a margin approximately one inch wide on each side of the machining lines, to prevent swarf collecting
* The protective covering shall then be removed in accordance with Appendix 1 included in this section
* Where high dimensional stability is required for flat panels, a normalising cycle shall be defined by the manufacturer for each material and sheet thickness
* Before commencement of production a forming cycle shall be defined by the fabricator for each component. This cycle will depend upon material, forming technique, sheet thickness, tools and workshop temperature.

16.6 TREATMENT OF FLAT PANELS REQUIRING NO BONDING OPERATIONS

* All panels after being trimmed and polished as required shall be cleaned as defined in Appendix 1 included in this section and annealed as defined in Appendix 3 also included in this section.

16.7 TREATMENT OF FLAT PANELS REQUIRING BONDING OPERATIONS

* Each piece of acrylic which is to be bonded after being trimmed and machined as necessary shall be cleaned as defined in Appendix 1 included in this section
* Each piece of acrylic shall then be bonded as defined in Appendix 3 included in this section
* All bonded panels shall be machined and polished as required

16.8 NORMALISING TREATMENT FOR FLAT PANELS

* The acrylic sheet shall be cleaned as defined in Appendix 1 included in this section and inspected to ensure that no adhesive or foreign matter remains on the surface of the material
* The normalising heat treatment shall be as defined in the manufacturer’s approved instructions.

16.9 TREATMENT OF SHAPINGS REQUIRING NO BONDING OPERATIONS

* If necessary the sheet may first be cut to the approximate size required for the shaping operation
* The sheet shall then be cleaned as defined in Appendix 1 included in this section
* The sheet shall then be shaped in accordance with the requirements and to the forming conditions defined in Appendix 2 included in this section.

16.10 TREATMENT OF SHAPINGS REQUIRING BONDING OPERATIONS

* If necessary the sheet may first be cut to the approximate size required for the shaping operation
* The sheet shall then be cleaned as defined in Appendix 1 included in this section
* The sheet shall then be shaped in accordance with the requirements and to the forming conditions defined in Appendix 2 included in this section
* The shaping shall then be bonded as defined in Appendix 3 included in this section

16.11 PROTECTIVE COATINGS

* Panels and shapings shall finally be coated with a protective coating to manufacturers’ recommendation to avoid damage to the surfaces during handling and storage.

16.12 REFERENCE STANDARDS

* Where there is existence a relevant British Standard Code of Practice draft BS ASTM or DIN Standard applicable to this work, then the recommendations and requirements of such documents shall be considered as a minimum standard for the Works described and must be complied with.

16.13 APPENDIX 1

* Cleaning:
1. Each sheet shall be stripped of its protective covering, and washed in water at 50°C to 60°C containing a small amount of liquid detergent and rinsed at about 50°C in clean water containing a small amount of anti-static agent
2. The excess water shall be removed with a clean grit-free soft sponge, cloth or leather and the sheet allowed to dry. Every care should be taken to avoid scratches during these operations
3. Tanks, if used, should be lined with soft cloth or rubber
* Note 1: Where a pressure sensitive masking paper is used, unleaded petrol or white spirits may be employed to remove particles of latex adhesive prior to the cleaning method detailed above.
* Note 2: Every care should be taken to ensure that dust does not come into contact with the acrylic after the original protective covering has been removed and before it is given a subsequent protective coating.

16.14 APPENDIX 2

* Forming conditions:
1. Forming shall be carried out by draping, blowing, vacuum forming or any other method which can be demonstrated to be suitable. Each sheet of acrylic or preform shall, where practicable, be suspended freely in a clean air-circulating oven at the defined forming temperature. During the heat treatment the temperature of the air-stream near to the sheet shall not exceed 170°C. Upon removal from the oven the forming operation shall be completed as quickly as possible in a draught free area. Heating may be applied during the forming operation provided that the temperature of the material does not exceed 170°C.

16.15 APPENDIX 3

* Prior to bonding components shall preferably be assembled dry in a jig or matched detail jigs
* Surface preparation, adhesive application and curing shall be carried out in accordance with the manufacturer’s approved instructions. Where the adhesive is hot cured the assemblies shall be allowed to cool to room temperature under draught free conditions. During the bonding of double skinned panels and shapings the interspaces shall be purged of solvent vapours by means of clean dry air at the same temperature as the panel. All bonded assemblies shall be trimmed and polished as required.

**17.0 RIGID SHEET MATERIAL/STRUCTRAL TIMBER WORK**

17.1 WORKS INCLUDED

* The Contractor shall provide materials, labour, equipment and services necessary to furnish, deliver and install all Works of this Section as shown on the drawings and/or as required by job conditions.

17.2 SAMPLES

* Submit the Samples and Prototypes listed in the in the Drawings, Schedules, Briefs and Specifications of this document for review in accordance with the Contract Documents. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents, of which this is a part.

17.3 SHOP DRAWINGS

* Submit Shop Drawings for review in accordance with the Tender Submission.
* Shop Drawings shall be based on Drawings, Specifications and Site Survey measurements essential for proper fitting of rigid sheet material/structural timber with other construction or existing Architecture, and shall present complete information as to illustrate for the Contractor the general character of the exhibition item
* Dimension fully and indicate all materials including species, thicknesses, jointing details, locations of shop and field joints, attachment methods and finishes and relationship to abutting construction.

17.4 INSTALLATION GENERALLY

* In the absence of manufacturer's recommendations, store, prepare and fix boards in accordance with the recommendations of the relevant trade association.
* Keep boards dry and do not fix to timber supports having a moisture content greater than 18%
* Set out boards with joints accurately aligned, of constant width and parallel to perimeter edges
* Protect boards/sheets from dirt, stains and damage until Practical Completion.

17.5 CONDITION

* All boards other than hardboard by storing on site, in conditions similar to those that will prevail after the building is occupied, for at least 48 hours before fixing. Ensure free circulation of air to all surfaces
* Heating/Air-conditioning: agree arrangements for operating the heating/air-conditioning installation up to the date of Practical Completion of the Works to ensure that excessive moisture movement of flooring/linings does not take place.

17.6 MOISTURE CONTENT OF TIMBER

* When instructed by the PM, test timber with an approved moisture meter to manufacturer’s recommendations.

**18.0 PURPOSE MADE JOINERY**

18.1 WORKS INCLUDED

* The Contractor shall provide materials, labour, equipment and services necessary to furnish, deliver and install all Works of this Section as shown on the drawings and/or as required by job conditions.

18.2 SAMPLES

* Submit the Samples and Prototypes listed in the in the Drawings, Schedules, Briefs and Specifications of this document for review in accordance with the Contract Documents. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents, of which this is a part.

18.3 SHOP DRAWINGS

* Submit Shop Drawings for review in accordance with the Tender Submission.
* Shop Drawings shall be based on Drawings, Specifications and Site Survey measurements essential for proper fitting of rigid sheet material/structural timber with other construction or existing Architecture, and shall present complete information as to illustrate for the Contractor the general character of the exhibition item
* Dimension fully and indicate all materials including species, thicknesses, jointing details, locations of shop and field joints, attachment methods and finishes and relationship to abutting construction
* Where installed timber fabrications are indicted to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by the qualified professional engineer who was responsible for their preparation
* Shop drawings shall indicate the work which is furnished by this Section and installed by other trades and the work of other trades which adjoin or abutt the Works of this Section
* As requested by the PM, provide additional details, sections and calculations to fully describe the Works to be provided.

18.4 FABRICATION GENERALLY

* Fabricate joinery components to BS 1186: Part 2
* Form sections out of the solid when not specified otherwise. Carefully machine timber to accurate lengths and profiles. After machining, sections to be free from twist and bowing, and surfaces to be smooth and free from tearing, wooliness, chip bruising and other machining defects
* Assemble with tight, close fitting joints to produce rigid components free from distortion
* All screws to have pilot holes. Screws of 8 gauge or more and all screws into hardwood to have clearance holes. Screw heads to be countersunk not less than 2mm below timber surfaces that will be visible in completed work
* Do not use timber members which are damaged, crushed or split beyond the limits permitted by their grading
* Ensure that notches and holes are not so positioned in relation to knots or other defects that the strength of members will be reduced
* Do not use scarf joints, finger joints or splice plates without approval.

18.5 CROSS-SECTION DIMENSIONS OF TIMBER

* Dimensions on drawings are finished sizes.
* Maximum permitted deviations from finished sizes for softwood sections to be as stated in BS EN 1313: Part 1:
* Clause 6 for sawn sections
* Clause NA. 2 for further processed sections
* Maximum permitted deviations from finished sizes for hardwood sections to be as stated in BS 5450:
* Clause 6.1 for sawn sections
* Clause 8.3 for further processed sections.

18.6 PRESERVATIVE TREATED TIMBER

* Carry out as much cutting and machining as possible before treatment.
* Retreat all timber which is sawn along the length, ploughed, thicknessed, planed or otherwise extensively processed
* Treat surfaces exposed by minor cutting and drilling with two flood coats of a solution recommended for the purpose by main treatment solution manufacturer.

18.7 MOISTURE CONTENT

* Timber and wood-based boards to be maintained within the range specified for the component during manufacture and storage.

18.8 FINISHING AND PROTECTING

* Sand all joinery to give smooth, flat surfaces suitable to receive specified finishes. Arises to be eased unless specified otherwise
* Before assembly, seal all end grains for external components with primer or sealer as specified in section and allow to dry
* Protect completed joinery against damage, dirt, moisture and other deleterious substances
* Keep timber dry and do not overstress, distort or disfigure sections or components during transit, storage, lifting, erection or fixing
* Store timber and components under cover, clear of the ground and with good ventilation
* Support on regularly spaced, level bearers on a dry, firm base. Open pile to ensure free movement of air through the stack
* Arrange sequence of construction and cover timber as necessary during and after erection to ensure that specified moisture content is not exceeded.

**19.0 COATING**

19.1 WORKS INCLUDED

* The Contractor shall provide materials, labour, equipment and services necessary to furnish, deliver and install all Works of this Section as shown on the drawings and/or as required by job conditions
* Making good around fixing points and junctions with building. Fixing and making good any damage to building.

19.2 SAMPLES

* Submit the Samples and Prototypes listed in the in the Drawings, Schedules, Briefs and Specifications of this document for review in accordance with the Contract Documents. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents, of which this is a part.

19.3 SHOP DRAWINGS

* Submit shop drawings for review in accordance with the Contract Documents.
* Shop drawings shall be based on Drawings, Specifications and Site Survey measurements essential for proper fitting of rigid sheet material/structural timber with other construction or existing Architecture, and shall present complete information as to illustrate for the Contractor the general character of the exhibition item.
* Dimension fully and indicate all materials including species, thicknesses, jointing details, locations of shop and field joints, attachment methods and finishes and relationship to abutting construction
* Where installed timber fabrications are indicted to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by the qualified professional engineer who was responsible for their preparation
* Shop drawings shall indicate the work which is furnished by this Section and installed by other trades and the works of other trades which adjoin or abut the work of this Section.
* As requested by the PM provide, additional details, sections and Calculations to fully describe the Works to be provided.

19.4 GENERALLY

19.4.1 HANDLING AND STORAGE

* Coating materials must be delivered in sealed containers, each clearly labelled with the brand name, type of material and manufacturer's batch number
* Wherever possible materials must be from one manufacturing batch. Inform the PM if materials from more than one batch are to be used, store separately and allocate to distinct parts or areas of the work
* Store materials in accordance with manufacturer's recommendations. Use in order of delivery and before expiry of any shelf life date.

19.4.2 PROTECTION

* Adequately protect internal and external surfaces, fixtures and fittings which are not to be coated, by covering with dust sheets, masking or other suitable materials.
* Exhibit 'Wet paint' signs and provide barriers where necessary to protect other operatives and the general public, and to prevent damage to freshly applied coatings.

19.4.3 PREPARATION GENERALLY

* To BS 6150, Section 4
* Materials used in preparation must be types recommended by their manufacturers and the coating manufacturer for the situation and surfaces being prepared
* Prevent or control exposure of operatives to dust, vapour and fumes exceeding occupational exposure standards set in the current Health and Safety Executive (HSE) document EH40
* Substrates must be sufficiently dry in depth to suit the coating to be applied
* Remove efflorescence salts from surfaces. Repeat removal if efflorescence recurs.
* Clean off dirt, grease and oil from surfaces. If contamination of surfaces/substrates has occurred, obtain instructions before proceeding
* Smooth surface irregularities. Fill joints, cracks, holes and other depressions with stoppers/fillers worked well in and finished off flush with surface. Abrade to a smooth finish
* Apply oil-based stoppers/fillers after priming. Apply water-based stoppers/fillers before priming unless recommended otherwise by manufacturer. Patch prime water based stoppers/fillers when applied after priming
* Remove dust and particles from dry abrasive preparation of surfaces
* Remove residues from wet preparation of surfaces by rinsing with clean water, wiping and allowing to dry
* Ensure that doors, etc, are 'eased' as necessary before coating. Prime any resulting bare areas.

19.4.4 UNCOATED TIMBER

* Abrade to a smooth, even finish with arrises and moulding edges lightly rounded or eased
* Ensure that heads of fasteners are countersunk sufficiently to hold stoppers/fillers
* Apply two coats of knotting to resinous areas and knots and allow to dry.

19.4.5 UNSUITABLE CONDITIONS

* Take all necessary precautions including restrictions on working hours, providing temporary protection and allowing extra drying time, to ensure that coatings are not adversely affected by climatic conditions during and after application
* Prevent or control exposure of operatives to solvent vapour levels exceeding occupational exposure standards set in the current Health and Safety Executive (HSE) document EH40
* Unless it is specifically permitted by the coating manufacturer, do not apply coatings:
	+ To surfaces affect by moisture, frost or airborne dust
	+ When the air or substrate temperature is below 5**°** C
	+ When the relative humidity is above 80%
	+ When heat is likely to Cause blistering or wrinkling.

19.4.6 COATING GENERALLY

* To BS 6150, Section 5
* Do not use materials which show any bittiness or other defects when applied. Do not thin or intermix unless specified or recommended otherwise
* Apply priming coats as soon as possible on the same day as preparation is completed. They must be of adequate thickness and suit surface porosity
* Apply coatings by spray gun unless otherwise specified or approved
* Keep brushes and equipment in a clean condition. Dispose safely of cleaning and waste materials; do not pour into sanitary appliances or drains
* Subsequent coats of the same pigmented material must be of a different tint to ensure that each coat provides complete coverage
* Apply coatings to clean, dry surfaces in accordance with the manufacturer's recommended intervals between coats
* Apply coatings evenly to give a smooth finish of uniform colour, free from brush marks, sags, runs and other defects. Cut in neatly and cleanly. Do not splash or mark adjacent surfaces
* Adequately protect drying and completed Works from damage.

19.4.7 CONCEALED JOINERY SURFACES

* Where one or more additional coats are specified to be applied in the factory, they must be applied to all surfaces, including those which will be concealed when components are fixed in place.

19.4.8 COMPLETION

* Ensure that all moving parts move freely. Remove all masking tape and temporary coverings.

19.5 CLEAR COATINGS TO VENEER AND TIMBER SURFACES

* NOTE: for reference only
* Manufacturer:

Morrells Woodfinishes Limited Wellington Works Mill

Lane Woodley Stockport Cheshire SK6 1RN

* Product Reference: 312 High Performance Waterborne Lacquers
* Description: ultra high-performance waterborne lacquers ideally suited to spray application, offering excellent clarity and build
* Formulated on an internally crosslinking aqueous polymer system and recommended for use as a coat-on-coat system
* Properties: This range offers similar performance and properties as a high-quality Acid Catalyst lacquer. It is certified to FIRA 6250 for horizontal surfaces (excluding kitchen worktops) in Heavy/Severe Use and BS 6222, Part 3 – Domestic Kitchen Equipment Finish Performance, Other Surfaces
* Mixing Guidelines: Supplied ready for use (RFU) but can be thinned with water up to a maximum of 5%, if required. In winter months thinning to this degree is not recommended and may result in poor film formation
* Handling:Touch Dry: 30 minutes @ 18oC
* Sandable: 1.5 hours @ 18oC. Use 320 or finer Silicone Carbide paper
* Recoatable: 1.5 hours minimum @ 18oC
* Packing Time: Overnight minimum, dependent on conditions
* Cleaning: Water should be used for cleaning equipment after use. Dried/cured lacquer Residue can be removed with X001 – Fast Thinners or 2007/100 Gun Cleaner. After use of these solvents it is recommended to flush with X008 - No.78 Prep Coat/Cleaner and then water to avoid contamination
* Coverage: Approximately 40m2 per 5Lts dependent upon the size, orientation and surface quality of the item being coated
* Morrells recommends the following guidance for use of this product range:
* Typical Finish: 2-3 coats at 75g/m2 per coat (Dry Film Thickness ~ 27**μ** m per coat)
* Using these products in systems outside these guidelines can lead to immediate and latent problems with the integrity of the finish
* It is advisable that the suitability of application equipment (guns, pumps and booths) and all associated components (substrates, glues, fillers etc.) should be considered when switching from solvent based to water based finishing systems.
* Waterborne products should have nominated finishing equipment
* Avoid contact with iron, copper, zinc, aluminum and platinum as these can attack the aqueous polymer. Ensure these metals are not present in finishing equipment.
* Excessive coating weights can lead to cracking or lifting
* Leave adequate time between coats. Do not apply more than 3 coats in one day. Denib between coats to aid adhesion
* Do not overcoat with 1K or 2K Polyurethane (PU) products
* When coating darker timbers, such as walnut, mahogany or teak, slight bleaching may occur
* This type of finish reaches is full cure cycle 21-28 days after application
* This range is not suitable for ‘pulling over’
* Product should be stored above 5oC and protected from frost
* Optimum application is achieved between 18oC and 22oC with suitable air movement and ventilation
* Finished products should not be subjected to environments with temperatures of

< 5oC

* Out of scope with 2004/42/EC.

19.6 ‘SCREEN GOO’ PAINT FINISH TO PROJECTION SCREENS

* NOTE: for reference only
* Surface(s): all exposed surfaces
* Manufacturer: Goo Systems Inc.4 Harvey Street, Kingston, Ontario, Canada
* Supplier: NexNix Ltd, The Byre, The Street, Bolney. West Sussex RH17 5PG Tel: 08452 603090 www.goosystems.co.uk
* Product Reference: Screen Goo White (screens in galleries/ambient light levels) / Screen Goo Ultra Grey (Universal Odyssey projection screen).
* 2No Coats Screen Goo base coat & 2No Coats Screen top coat to each screen (colours TBC)
* NOTE: Specification of Screen Goo products to be confirmed in consultation with AV Hardware supplier & lighting designer. Screen Goo colour may change subject to specification of projectors and ambient light levels anticipated in galleries
* Description: Goo Systems' Screen Goo products are specially formulated, colour corrected, screen coatings in liquid form. They are designed to achieve the highest performance levels possible for a given display situation
* Range of Application: Front projection Screen Goo can be applied to any smooth paintable surface. Many materials other than the products listed below can be used succesfully. For best results the surface should be flat and smooth. If this surface to be coated is not smooth, it should be sanded down and wiped off prior to applying the Screen Goo basecoat. Porous surfaces such as drywall, gyproc, and wood based materials such as plywood, particle board, MDF, should be sealed with a flat, white latex primer prior to applying Screen Goo basecoat. Coloured surfaces should also be primed with a flat, white latex
* Quantities: The Topcoat and Basecoat Works together; both are required to create a screen. Topcoat and Basecoat coverage per sq. ft. can vary somewhat, depending on the surface conditions. 1 litre will typically cover approximately 50 sq. ft. with two thin coats, under ideal conditions on an ideal non-absorptive surface. Starting with a primed white surface is strongly recommended for peak performance
* Spray application: Surface preparation: Ensure that the surface to be coated is clean and grease-free. The smoother the surface the better finished product will be. Porous surfaces such as drywall, gyproc, and wood-based materials such as plywood, particle board, MDF, should be sealed with a flat, white latex primer prior to applying Screen Goo basecoat. Coloured surfaces should also be primed with a flat, white latex
* Equipment: Goo Systems recommend using an HVLP and/or pressurized cup spray system employing a gun with a 1.5-2mm tip diameter. The specific type of gun is less important than the user's familiarity with it. It is very important that none of the spray equipment be contaminated with solvent-based coatings or cleaning agents as these will ruin the water-based Screen Goo coatings
* Basecoat: Screen Goo basecoat should be thinned 5-10% by volume with filtered or distilled water prior to a sprayed application. If using a pressurized cup system, set the air/paint mixture in the following manner: Turn off the atomizing pressure. Set the paint tank pressure so that when the trigger is fully depressed the paint stream will travel about two feet. Set the atomizing pressure at a approximately 10X the PSI of the paint tank pressure or enough to completely atomize the coating. If there is no gauge for cup pressure, set the atomizing pressure to a maximum of 44 PSI. For other types of guns, follow the manufacturer's instructions for high solids, water-based coatings

Keep the gun at a constant 6’ - 8’ away from the project. Release the trigger at the end of each stroke. Then, depress the trigger and overlap the previous pass by about 1/3. Continue in this fashion for consistent coverage. When the surface is fully and evenly covered, let dry for 30-45 minutes and then repeat the procedure for the second and final coat of basecoat

* Topcoat: Screen Goo topcoat will not require thinning. Follow the same procedure as for the basecoat but allow 45-60 minutes drying time between the two coats of topcoat
* Curing Times: The product can be used immediately after spraying and will look very good after the first day, but its performance will continue to improve for up to 6 weeks by which time the acrylic mixtures should be fully cured and clarified
* Health & Safety: Screen Goo basecoats
* Inhalation: Pigment powders in this paint are not in the form of respirable dusts, hence they do not pose the hazards associated with the inhalation of fine mineral particles. Sanding of dried paint surfaces may result in these pigments becoming airborne and causing respiratory irritation

Under spray-painting conditions, exposure may cause respiratory irritation

* Eye Contact: Prolonged or repeated contact may result in eye irritation
* Skin Contact: Prolonged or repeated contact may result in skin irritation
* Ingestion: May cause irritation to the gastrointestinal system

Additional Exposure Information: Existing skin, eye, or respiratory conditions may be aggravated by exposure

* INGREDIENTS %Wt/Wt C.A.S.# TLV LD50 (g/KG)
* Propylene Glycol 1.0 - 12.5 57-55-56 NA 20 (RAT)

Texanol 1.0 - 2.0 25265-77-4 NA < 3.2 (RAT)

* Flammability Classification:Not Applicable

Flash Point:Not Combustible

Flammable Limits (% vol. in air): LEL: N. App. UEL: N. App.

Extinguishing Media: Not Applicable.

* Storage of Paint: Keep from freezing. Keep containers closed. Keep jar or cylinder tightly closed
* General Protective and Hygiene Measures: Do not eat, drink, smoke or sniff while working. Wash hands before breaks and at the end of work
* Respiratory Protection: If spray painting or sanding, wear appropriate government approved mask. Ensure room has adequate ventilation
* Ventilation: For professional (daily) use adequate ventilation is recommended, (i.e. window fan)
* Eye Protection: Wear safety glasses (with side shields) or goggles
* Skin Protection: Gloves that do not absorb liquids( i.e. rubber or latex) are recommended
* Physical & Chemical Properties:
	+ Form: Liquid
	+ Colour: White or Colored Liquid
	+ Odour: Very Mild Ammonia Odour
	+ Change in Condition
	+ Melting Point: Undetermined
	+ Boiling Point:100 - 130 Deg. C
	+ Flash Point: Not Applicable
	+ Auto Ignition: Product is not self-igniting
	+ Danger of Explosion: Product does not present an explosion hazard
	+ Specific Gravity: 1.0 - 1.7 (Water = 1.0)
	+ Solubility in Water: Dilutable
* Maintain storage between 0 and 30˚C. Avoid strong oxidizing and reducing agents; strong acids and bases. Keep product away from open flame.

Keep product from excessive heat

* Low molecular weight hydrocarbons, CO, CO2, NOx, trace HCl and H2S (with Ultramarine Blue). All are toxic.
* The Screen Goo basecoats contain ingredients found in the WHMIS Ingredient Disclosure List:
	+ INGREDIENTS %Wt/Wt C.A.S.# TLV LD50 (g/KG)
	+ Propylene Glycol 1.0 - 12.5 57-55-56 NA 20 (RAT)
	+ Texanol 1.0 - 2.0 25265-77-4 NA < 3.2 (RAT)
	+ Paint Disposal: Dispose of paint soaked rags and empty containers in accordance with local regulations.

**20.0 ERECTION//FIXING/JOINTING**

20.1 WORKS INCLUDED

* The Contractor shall provide materials, labour, equipment and services necessary to furnish, deliver and install all Works of this Section as shown on the drawings and/or as required by job conditions
* Making good around fixing points and junctions with building. Fixing and making good any damage to building.

20.2 SAMPLES

* Submit the Samples and Prototypes listed in the Drawings, Schedules, Briefs and Specifications of this document for review in accordance with the Contract Documents. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents, of which this is a part
* In situ mock-ups are required for all junctions with building.

20.3 SHOP DRAWINGS

* Submit Shop Drawings for review in accordance with the Contract Documents.
* Shop Drawings shall be based on Drawings, Specifications and Site Survey measurements essential for proper fitting of rigid sheet material/structural timber with other construction or existing Architecture, and shall present complete information as to illustrate for the Contractor the general character of the exhibition item
* Dimension fully and indicate all materials including species, thicknesses, jointing details, locations of shop and field joints, attachment methods and finishes and relationship to abutting construction.

20.4 PROTECTION

* Prevent mechanical damage and disfigurement. Separate units during transport and storage to prevent chaffing. Pad all slings, ropes, bearers, ladders, etc.
* Support units as necessary so that they do not bow, twist or distort
* Adequately protect units from the weather. Surfaces not having a weathering gel coat must not have prolonged exposure to direct sunlight or water
* Do not cover units with plastics sheeting or stick adhesive tape on exposed surfaces.
* Store fixing and jointing materials indoors
* Do not deliver to site any units which Cannot be erected immediately or unloaded into a suitable well protected storage area.

20.5 DAMAGED UNITS

* Do not repair without approval: such approval will not be given where the units are badly damaged or where the proposed repair will impair appearance or performance.
* Obtain approval of appearance of all repaired units.

20.6 FIXING GENERALLY

* Use fixing and jointing methods and types, sizes, quantities and spacings of fasteners which are suitable having regard to:
	+ Nature of and compatibility with product/material being fixed and fixed to
	+ Recommendations of manufacturers of fasteners and manufacturers of components, products or materials being fixed and fixed to
	+ Materials and loads to be supported
	+ Conditions expected in use
	+ Appearance, this being subject to approval.

20.7 FIXING THROUGH FINISHES

* Ensure that fasteners and plugs (if used) have ample penetration into the backing.

20.8 PACKINGS

* Provide suitable, tight packings at fixing points to take up tolerances and prevent distortion
* Use non-compressible, rot proof, non-corrodible materials positioned adjacent to fixing points
* Ensure that packings do not intrude into zones that are to be filled with sealant.

20.9 CRAMP FIXING

* When not specified otherwise, position cramps not more than 150 mm from each end of frame sections and at 600 mm maximum centres
* Secure cramps to frames with matching screws as masonry Works proceeds, and fully bed in mortar.

20.10 NAILING

* To BS 1202
* In joints, use not less than two nails and opposed skew nailing unless specified otherwise
* Drive nails fully in without splitting or crushing the material being fixed
* Punch nail heads below surfaces that will be visible in the completed work.

20.11 PLUGS

* Proprietary types selected to suit the background, loads to be supported and conditions expected in use
* Locate plugs accurately in correctly sized holes in accordance with manufacturer's recommendations.

20.12 SCREW FIXING

* To BS 1210
* All screws to have clearance holes. Screws of 8 gauge or more and all screws into hardwood to have pilot holes about half the diameter of the shank
* Before using brass, aluminum or other soft metal wood screws precut the thread with a matching steel wood screw
* Do not hammer screws unless specifically designed to be hammered
* Drive countersunk heads flush with timber surface, or not less than 2 mm below it if they are to be stopped
* Washers and screw cups, where specified, to be of the same material as the screw.

20.13 PELLETING

* Countersink screw heads 6 mm below timber surface and glue in grain-matched pellets not less than 6 mm thick, cut from matching timber
* Pellets to occupy the whole depth of the holes and be finished off flush with surface.

20.14 PLUGGING

* Countersunk screw heads 6 mm below timber surface and glue in plugs
* Plugs to occupy the whole depth of the holes and projection from the surface.

20.15 POWDER ACTUATED FIXING SYSTEMS

* Do not use without approval
* Tools to be to BS 4078: Part 2 and Kitemark certified, and used in accordance with BS 4078: Part 1. Operatives to be trained and certified as competent by tool manufacturer
* Fasteners, accessories and consumables to be types recommended by the tool manufacturer
* Ensure that operatives take full precautions against injury to themselves and others
* Remove all unspent Cartridges from the site when no longer required
* Apply zinc rich primer to heads of fasteners used externally, in external walls or in other locations subject to dampness
* Use top hat section plastics washers to isolate Cartridge fired nails from stainless steel components fixed externally, in external walls or in other locations subject to dampness.

20.16 ADHESIVES

* Adhesive types: As specified in the relevant section
* Surfaces to receive adhesive to be sound, unfrozen, free from dust, grease and any other contamination likely to affect bond. Where necessary, clean surfaces using methods and materials recommended by adhesive manufacturer
* Adjust surface regularity and texture as necessary to suit bonding and gap filling characteristics of adhesive
* Ensure that operatives observe manufacturer's and statutory requirements for storage and safe usage of adhesives
* Do not use adhesives in unsuitable environmental conditions or beyond the storage period recommended by the manufacturer
* Apply adhesives using recommended spreaders/applicators to ensure correct coverage. Bring surfaces together within recommended time period and apply pressure evenly over full area of contact to ensure full bonding
* Remove surplus adhesive using methods and materials recommended by adhesive manufacturer and without damaging surfaces.

20.17 MAKING GOOD

* The Contractor to make good around all junctions with building.

**21.0 SEALANTS**

21.1 WORKS INCLUDED

* The Contractor shall provide materials, labour, equipment and services necessary to furnish, deliver and install all Works of this Section as shown on the drawings and/or as required by job conditions.

21.2 SAMPLES

* Submit the Samples and Prototypes listed in the in the Drawings, Schedules, Briefs and Specifications of this document for review in accordance with the Contract Documents. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents, of which this is a part.

21.3 SHOP DRAWINGS

* Submit Shop Drawings for review in accordance with the Tender Specification.
* Shop Drawings shall be based on Drawings, Specifications and Site Survey measurements essential for proper fitting of sealants with other construction or existing Architecture, and shall present complete information as to illustrate for the Contractor the general character of the exhibition item
* Dimension fully and indicate all materials including specifications, thicknesses, jointing details, locations of shop and field joints, attachment methods and finishes and relationship to abutting construction.

21.4 SUITABILITY OF JOINTS

* Before commencing, check that:
	+ Joint dimensions are within limits specified for the sealant.
	+ Surfaces are smooth and undamaged.
	+ Preparatory work which must be done before assembly of the joint has been carried out.
* Inform the PM if joints are not suitable to receive sealant and submit proposals for rectification.

21.5 PREPARING JOINTS

* Clean surfaces to which sealant must adhere using methods and materials recommended by sealant manufacturer
* Remove all temporary coatings, tapes, loosely adhering material, dust, oil, grease and other contaminants which may affect bond
* Keep joints clean and protect from damage until sealant is applied
* Backing strip, bond breaker, primer: Types recommended for the purpose by sealant manufacturer
* Insert backing strips and/or bond breaker tape into joint leaving no gaps
* Cover adjacent surfaces with masking tape to prevent staining and protect surfaces which would be difficult to clean if smeared with primer or sealant.

21.6 APPLYING SEALANTS

* Ensure that operatives observe manufacturer's and statutory requirements for storage and safe usage of sealants
* Use equipment and methods recommended by sealant manufacturer and apply within the recommended application life of primer and sealant, and the recommended air and substrate temperature ranges
* Do not apply to damp surfaces (unless recommended otherwise), to surfaces affected by ice or snow or during inclement weather. Do not heat joints to dry them or raise the temperature
* Fill joints completely, leaving no gaps, excluding all air and ensuring firm adhesion of sealant to required joint surfaces. Tool the sealant to a neat, slightly concave profile unless specified otherwise. Protect until cured.

**22.0 AV-IT INSTALLATION**

The Client will purchase the specified AV Hardware. The Contractor should provide a quote, separate from the rest of the fit-out and installation costs, for the installation of the AV Hardware. This will include:

* Handset - 34 total
* NUC i5 – 18 total
* 42” touchscreen – 4 total
* 22” touchscreen – 12 total
* Audio player – 6 total
* Button – 18 total
* Scissor bracket – 4 total

22.1 WORKS INCLUDED

* The Contractor will install the AV Hardware, ensuring alignment with hardware casings and other setworks
* Power and data points will be presented above floor level close to the position of the intended AV systems
* The Contractor will be responsible for routing and terminating all data and power cables from the supplied power and data points to the AV hardware which will be embedded in the exhibition design
* RAFM require all cabling to be labelled and documentation detailing the cable plan and labelling schedule
* The Contractor will liaise with the RAFM team when they require power and data to enable them to test the systems.

22.2 POWER UP & POWER DOWN OF EXHIBITION

* All sockets will be powered at all times
* The AV systems will be controlled via Wake-on-Lan or via the Show Controller and will be automated.