Specification of External Repair Works

Phase 2A – Timber Windows and Cast Iron Columns

At

The Pavilion Gardens,
St. John's Road,
Buxton,
Derbyshire,
SK17 6BE

For

High Peak Borough Council

External Repairs - Buxton Pavilion Gardens Specification

9th January 2018

This document includes:

C40
Cleaning masonry/ concrete

Section Revision History

No.	Purpose

C40 Cleaning masonry/concrete

To be read with Preliminaries/ General conditions.

5 PRINCIPAL DRAWINGS

- **15171/P/538** - Proposed stone plinth cleaning scope

10 NBS / CAWS REFERENCES

The following NBS reference specifications refer to ownership are associated with this C41 specification.

C41 - Repairing / Renovating / Conserving Masonry BA.

F30 - Accessories for Stone Walling BA.

L10 – Windows

R10 - Rainwater drainage systems BA.

R12 - Below ground drainage systems BA.

Z20 - Fixings and Adhesives BA.

Z21 - Mortars BA.

20 HEALTH & SAFETY

The recommendations of this clause concern the manner of dealing with typical hazards to health and safety that can be encountered in the cleaning of buildings and structures.

• The public should not be admitted to cleaning operation sites.

• The least hazardous product and system of working that is effective should be selected for the cleaning operation. All risks should be identified, assessed and managed.
NOTE Whichever cleaning materials and methods are used, building cleaning presents site operatives with a number of risks when working:
a) at heights where falling can have serious consequences;
b) on building elements of unknown stability and integrity;
c) on scaffolding which depends on correct erection, and which, by its nature, involves unusual and potentially dangerous situations;
d) in harsh and unsafe weather conditions;
e) with potentially hazardous materials, but especially corrosive chemicals (e.g. acids and alkalis) and those with tribological qualities (e.g. soaps, oils and greases); and
f) with certain cleaning methods which involve electrical equipment, trailing leads, ropes, high pressure jetting; combinations of water and rubber materials with
other materials and liquids are also potentially hazardous.

Health and safety issues should be clearly identified at the project appraisal stage. Hazard data sheets, and health and safety information should be available on site, with their exact location known to all staff.

Cleaning consultants and contractors should identify the types of residue (i.e. effluent) of building cleaning operations - residues from soiling (including the products of pollution), paint and other surface treatments, especially those involving chemicals which, when discharged to drains, are described as trade effluents. The safe disposal of these residues should be planned before any cleaning work is started.

NOTE Attention is drawn to The Control of Substances Hazardous to Health Regulation 2002 (COSHH), the Health and Safety Executive [3J.

BIOCIDES : Attention is drawn to the **Control of Pesticides Regulations 1986 (1997)**

GENERAL/ PREPARATION

110B SCOPE OF WORK Cleaning to perimeter stone plinths
• Cleaning rationale: removal of paint from existing sandstone plinths to allow stone to breathe and prevent salt build up.
• Scope: Allow for chemical paint strip as C40 314 and subsequent steam clean as C40 315 to all existing stone plinths.
• Extra over: Additional abrasive cleaning as C40 320 to all existing stone plinths.

110C SCOPE OF WORK
• Cleaning rationale: removal of paint from existing sandstone column bases to allow stone to breathe and prevent salt build up.
Scope: Allow for chemical paint strip as C40 314 and subsequent steam clean as C40 315 to all existing column bases.
Extra over: Additional abrasive cleaning as C40 320 to all existing column bases.

115 BRITISH STANDARD

• Standard: In accordance with **BS 8221-1**.

120 RELATED REPAIR AND REMEDIAL WORKS
• Work to be carried out before cleaning work: Refer to C41.

142 REMOVAL OF FITTINGS
• Timing: Before commencement of cleaning work.
• Disturbance to surfaces: Minimize.
• Items for disposal: All unused or as marked elements.
• Items to be kept for reuse: Refer to drawings and seek CA approval.

160 PROTECTION
• Surfaces not designated for cleaning: Prevent damage, including marking and staining.
• Openings: Prevent ingress of water, cleaning agents, and detritus.
- Vents and grilles: Seek instructions before sealing up.
• Temporary mechanical fastenings:
- In masonry: Locate in joints.
- In other surfaces: Seek instructions.
• Additional protection: Contractor's choice to prevent damage to adjacent structures.

175 CONTROL AND DISPOSAL OF WASH WATER AND DETRITUS
• Disposal: Safely. Obtain approvals from relevant Authority.
• Control of wash water: Collect and divert to prevent ingress and damage to building fabric and adjacent areas.
• Above and below ground drainage systems: Keep free from detritus and maintain normal operation.

190 CLEANING GENERALLY
• Operatives: Appropriately trained and experienced for each type of cleaning work.
- Evidence of training: Submit on request.
• Control of cleaning: Confine cleaning processes and materials to designated areas. Prevent wind drift.
• Detritus: Remove regularly. Dispose of safely.
• Monitoring: Frequently check results of cleaning compared to approved trial samples. If results established by trials are not achieved, seek instructions.
• Modifications to cleaning methods and materials: Seek instructions.

191 COLD WEATHER
• Cleaning procedures using water: Do not use when air temperature is at or below 5°C.
• Damp surfaces: Protect from frost.
• Chemical cleaning agents: Do not use when surface temperatures are below those recommended by manufacturer.

215 RECORD OF CLEANING WORKS
• Written report: Record cleaning methods and procedures used for each type of surface and deposit.
- Content: Relevant attributes of cleaning methods used including:
Equipment and settings.
Dwell times.
Number of applications.
Ambient temperatures.
• Additional documentation: None.
• Submission: At completion of cleaning works.

230 TRIAL SAMPLES
• Trial sample reference: **C40 01**.
- Surface: A sample for each type of masonry to be cleaned.
- Location/ Size: 1m x 1m or to be agreed with CA.
- Type of soiling: A sample for each type within the scope of works.
- Cleaning methods: All listed below.
• Records: Maintain written records for each trial area, including cleaning methods and conditions, to enable replication of results elsewhere.

PRODUCTS/ EQUIPMENT

311 REMOVAL OF LOOSELY ADHERED DEPOSITS
- Timing: Before commencement of other cleaning methods.
- Surfaces: Prevent damage, including abrasion.

312 SURFACE BIOCIDES
- Types: Registered by the Health and Safety Executive (HSE) and listed on the HSE website under non-agricultural pesticides.
- Compatibility with surface: Free from staining or other harmful effects.

314 PAINT REMOVAL
- Manufacturer: Paint stripper to be approved.
- System: Used in full accordance with manufacturer's instructions.

Allow trail area in discrete location. Area TBC
Allow for between 1-3m2 per litre
Adjacent areas: Protect from finish removal and falling scrapings.
Removed coatings: Dispose of safely.

315 STEAM CLEANING EQUIPMENT - ORGANIC GROWTH REMOVAL
- Manufacturer: Approved system.

- NOTE: systems are only to be used by contractors approved by the cleaning system manufacturer - i.e. Licenced or Approved Contractors.

Apply steam at the lowest pressure and allow when removing stains the appropriate temperature that will remove/soften/loosen deposits without abrading or disrupting the surface (s). If removing biological growth it may be possible to be removed at a lower temperature but to ensure that the re-growth does not occur, the full temperature of 150ºC should be applied over the whole surface in order to kill off the spores. In such instances there is no need to use a chemical biocide.

For each area/surface, establish the optimum settings (temperature, volume and pressure), nozzle type and distance of nozzle from substrate. Keep a written record of these variables but allow an operator to vary.

Assist removal of softened deposits with suitable corrosion resistant brushes and scrapers/spatulas that do not abrade or gouge the surface.

Steam cleaning (with suitable detergents or chemicals) should be used to remove isolated deposits (e.g. bitumastic paint, oil, grease, and chewing gum). Care should be taken to ensure that steam cleaning does not cause deposits to move to the edge of the cleaning area, giving an uneven appearance.

Low pressure hot water spray at a minimum set temperature of 80°C (Glass, putty, paintwork, plastics pipes, window frames, and guttering should be protected, for example with sheeting material, when using low pressure hot water spray at a minimum set temperature of 80°C. Sulfated limestone surfaces can quickly soften and erode with steam cleaning. Trials should be carried out to (see clauses C40.110, 482;) ascertain the effect of steam temperatures on stone, brick, and their joints. Steam and condensation can cause problems in interiors of buildings.

Protect adjacent paint, timber and rendered surfaces.

APPLICATION

412 REMOVAL OF LOOSELY ADHERED DEPOSITS
• Timing: Before commencement of other cleaning methods.
• Surfaces: Prevent damage, including abrasion.

422 BIOCIDE APPLICATION
• Preparation: Dampen dry growths and Remove loose growths.
• Surfaces: Prevent damage, including abrasion.
• Biocide treatment: Appropriate solutions to kill growths and inhibit further growths.
- Dead growths: Remove.

432 TOOLING
• Tooling of surfaces: Not permitted.

442 ABRASIVE BLOCKS
• Types: Suitable grades of carborundum or gritstone.
• Application: Lubricate with water. Remove detritus.
• Abrasive power tools: Prohibited.

452 ABRASIVES CLEANING
• Surfaces: Minimize abrasion.
- Ingrained deposits: Seek instructions.
• Equipment settings (including nozzle type and distance from surface): Adjust regularly to achieve optimum cleaning performance for each surface.
• Detritus: Remove with clean water.

462 WATER SPRAYED CLEANING (MOUNTED NOZZLES)
• Surfaces: Minimize water run-off. Prevent damage.
• Adjustment of washing cycle and nozzle positions: Regularly to achieve optimum cleaning performance.

472 PRESSURIZED WATER CLEANING
• Surfaces: Prevent damage, including abrasion.
• Equipment settings (including nozzle type and distance from surface): Adjust regularly to achieve optimum cleaning performance for each surface.

482 STEAM CLEANING
• Surfaces: Prevent damage, including abrasion.
• Equipment settings (including nozzle type and distance from surface): Adjust regularly to achieve optimum cleaning performance for each surface.

495 TESTING pH VALUES FOR CHEMICAL CLEANING
• pH indicator: To distinguish pH values between 1-14.
• Testing before cleaning:
- Clean rinsing water, wetted surfaces and joints: Test for pH. Record as 'control' values.
• Testing after water rinsing and neutralization:
- Wetted surfaces and joints: Record pH values.
- Acceptance criteria: Seek instructions.

500 CHEMICAL CLEANING

• Surfaces: Prevent damage, including discolouration, bleaching and efflorescence.
• Product variables (including concentrations, dwell times and number of applications): Adjust for each surface to achieve optimum cleaning performance.
• Application: To wetted surfaces.
- Drying out: Prevent unless recommended otherwise by cleaning product manufacturer.
• Removal of chemicals and neutralization: As recommended by product manufacturer, including rinsing with clean water.
- Additional treatment: Where water rinsing is insufficient to neutralize surface, apply compatible neutralizing agent.
- Surfaces and joints: Minimize absorption of chemicals. Prevent damage, including abrasion.

515 PLAIN POULTICING

• Surfaces: Prevent damage, including abrasion.
• Application: To wetted surfaces. Maintain contact with surfaces as poultice dries out.
• Poultice reinforcement: Not required or Submit proposals.
- Drying: Prevent excessively rapid or localized drying out.
• Spent poultice material: Do not reuse.

C41
Repairing/ Renovating/ Conserving masonry
Revision E

Section Revision History

No.	Purpose

C41 Repairing/ Renovating/ Conserving masonry

To be read with Preliminaries/ General conditions

110A SCOPE OF WORK
- Schedule: Refer to drawings.
- Removal of decaying mortar between masonry units and repoint.
- Repairs to damaged masonry units.

115 TYPES OF REPAIR
- REPOINTING

Refer to Z21 Mortars:
Refer to clause **C41.810-861** below for pointing / repointing:

116 STONE REPAIR
Stone type & source clause **C41.241.**
Replacement stone clause 340
Stone insert clause 350A
Pinning clause 640A

117 SURFACE REPAIR TO STONE
Stone type & source clause **C41.241.**
Stone insert clause 350A
Pinning clause 640A

118 WORKMANSHIP
- Ensure that competent and trained masons carry out all work.

BRITISH & European STANDARDS: comply with the following British and European Standards –

BS EN 459 -1 (2015) Building Lime - Pt.1 Definitions, Specifications and Conformity Criteria.

BS EN 771-6 - [Code of Practice for Stone Masonry - work on site].

BS EN 5628-3 (2005) - Code of practice for use of Masonry.

BS EN 8221-1 (2012) - Code of practice for cleaning and surface repair of buildings. Cleaning of natural stone, brick, terracotta and concrete.

BS EN 16572 (2015) - Conservation of cultural heritage. Glossary of technical terms concerning mortars for masonry, renders and plasters used in cultural heritage.

120 SITE INSPECTION
- Purpose: To confirm type and extent of repair/ renovation/ conservation work shown on drawings and described in survey reports and schedules of work.
- Parties involved:
- Contract administrator;
- Contractor's representative;
- Foreman mason; and
- Structural engineer.
- Timing: At least 5 working days before starting each section of work.
- Instructions issued during inspection: To be confirmed by CA.

125 REMOVAL OF FITTINGS/ FIXTURES
• Items to be removed, and reinstated on completion of repair work:
- Identification: Attach labels or otherwise mark items using durable, non-permanent means, to identify location and describe refixing instructions, where applicable.
- Treatment following removal: Seek guidance.
- Storage: Protect against damage, and store until required.
Storage location: Submit proposals.
- Reinstatement: Refit in original locations using original installation methods.
• Items unsuitable or not required for reuse:
- Disposal: Obtain instructions.
• Masonry fabric and surfaces: Do not damage during removal and replacement of fittings/ fixtures.

140 RECORD OF WORK
• General: Record work carried out to masonry clearly and accurately using written descriptions, sketches, drawings and photographs, as necessary.
• Specific records: TBC.
• Documentation: Submit on completion of the work.
- Number of sets: Two.

WORKMANSHIP GENERALLY

150 POWER TOOLS
• Usage for removal of mortar: Permitted only with prior approval.

155 PUTLOG SCAFFOLDING
• Usage: Not permitted.

170 DISTURBANCE TO RETAINED MASONRY
• Retained masonry in the vicinity of repair works: Disturb as little as possible.
• Existing retained masonry: Do not cut or adjust to accommodate new or reused units.
• Retained loose masonry units and those vulnerable to movement during repair works: Prop or wedge so as to be firmly and correctly positioned.

180 WORKMANSHIP
• Skill and experience of site operatives: Appropriate for types of work on which they are employed.
- Documentary evidence: Submit on request.

185 ADVERSE WEATHER
• General: Do not use frozen materials or lay masonry units on frozen surfaces.
• Air temperature: Do not bed masonry units or repoint:
- In cement gauged mortars when ambient air temperature is at or below 3°C and falling or unless it is at least 1°C and rising, unless mortar has a minimum temperature of 4°C when laid and the masonry is adequately protected.
- In hydraulic lime:sand mortars when ambient air temperature is at or below 5°C and falling or unless it is at least 3°C and rising.
- In nonhydraulic lime:sand mortars in cold weather, unless approval is given.
• Temperature of the work: Maintain above freezing until mortar has fully set.
• Rain, snow and dew: Protect masonry by covering during precipitation, and at all times when work is not proceeding.
• Hot conditions and drying winds: Prevent masonry from drying out rapidly.
• New mortar damaged by frost: Rake out and replace.

190 CONTROL SAMPLES
• General: Complete an area of each of the following types of work, and arrange for inspection before proceeding with the remainder:

MATERIAL/ PRODUCTION/ ACCESSORIES

215 MATERIAL SAMPLES
• Representative samples of designated materials: Submit before placing orders.
- Designated materials: Sands for bedding and pointing, grouting and mortar repairs.
• Retention of samples: Unless instructed otherwise, retain samples on site for reference. Protect from damage and contamination.

220 RECORDING PROFILES
• Profiles: Take measurements from existing masonry units, as instructed, to allow accurate matching of replacements.
• Recording in situ: If there are no suitable joints to allow use of inserts, seek instructions.
• Drawings and templates: Prepare as necessary. Templates must be clearly and indelibly marked to identify use and location.

240A ANALYSIS OF MASONRY TYPES
In order to successfully match masonry repairs to existing stone, site samples of both ashlar and walling masonry are to be dispatched to masonry suppliers for analysis. Samples of the proposed masonry are to be provided for matching with the original and approved by the CA before ordering.

241B STONE - TYPE
• TYPE: The ashlar is probably Carboniferous Gritstone, suitable quarries for matching stone repairs can be found at the following locations:
a) **Marshall's Stancliffe Stone Co ltd** [0845 302 0702] www.stancliffe.com - Fletcher Bank/ ***Halldale*** / Stanton Moor/ ***Stoke Hall*** / ***Dale View*** /
b) **Lumshill Stone Co** - Contact: P.S Rawden [+44 01246855794] - www.lumshillstone.co.uk - ***Lumshill Gritstone*** / ***Peakmoor.***
c) **Realstone Ltd** - [+44 01246270244] - Bolehill / ***Peak Moor***
d) **Natural Stone Sales** - [+44 01629 735507] - High Moor
e) **Chinley Moor Gritstone -** http://bmerrick.co.uk/contact-us
f) **Hayfield Sandstone** http://www.bbsnaturalstone.com/

http://www.derbyshire.gov.uk/images/Sources%20of%20Stone_tcm44-209702.pdf

(Note: the contractor may arrange for delivery elsewhere in the locality or collect from the supplier direct if the stone is to be worked off site). The contractor shall be responsible for quantifying and sizing the blocks to enable the required stones to be cut and shaped, and shall place an order covering quality and quantity, together with delivery to suit building programme.

242 SOURCE GUARANTEES
Obtain written evidence from the supplier that all new stone is local Carboniferous Gritstone stone as specified. Site reclaimed masonry from demolished structures, may be used for repairs subject to suitability and proof of close match.

243B QUALITY
Stone is to be free from defects that will adversely affect integrity in use and free from face defects visible in completed work.

243C DIMENSIONS
The contractor shall be responsible for sizing individual stones, but should agree sizes with the SO for 'piecing in' and indenting repairs.

243D FINISH
The ashlar is to be supplied to match the original, which it is to replace.

243E PREPARATION FOR LIFTING
Arrange for stones requiring individual lifting to be prepared for type of lifting grip to be used on site.

243F STONE FOR CARVING
To be specially selected, consistent in grain and colour throughout and to approval.

243H SAMPLES
Submit samples of stone sufficiently large to show natural variations and specified finishes for approval before ordering. Ensure the delivered commodities match samples. Execute sample of piecing in new stonework for approval by CA.

245 REPLACEMENT STONE UNITS
• Sizes and profiles: To match existing masonry. Maintain existing joint widths.
• Sinkings for fixings, joggles and lifting devices: Accurately aligned and positioned in relation to existing masonry.
• Marking: Mark each block/ dressing clearly and indelibly on a concealed face to indicate the natural bed and position in the finished work.

246 STONE HANDLING AND STORAGE
TRANSPORT & HANDLING: transport stone with least handling possible. Stack carefully in vehicle with packing material to prevent damage. Provide adequate lifting plant to unload and handle stones into position.
STORING STONE: store clear of ground to prevent leaching in of ground salts and/or moisture staining. Protect from frost in winter.

250A STONE ORIENTATION
Orientation of natural bed:
- In plain walling: Horizontal.
- Vertical and at right angles to wall face in cornices and other projecting stones.
- In projecting stones and copings: Vertical and perpendicular to wall face.
- In arches: Perpendicular to line of thrust
- Horizontal in mullions and transoms: however, is this is not possible in mullions due to limited depth of stone bed, the stone may be vertically bedded (subject to agreement by the CA) but the stone must be specially selected to be as compact and free of laminations/bedding joints as possible.

251 SETTING OUT
INSPECT the work with the CA and identify the nature and extent of the work.
MARK stones to be replaced/repaired in-situ with coloured pen on the drawings.
NOTE bond, joint size, style of pointing and any special or unusual features to be replicated or retained in the finished work (i.e. patterns or designs or inconsistencies in the bond).
ADDITIONAL WORK: bring to the CA's attention any stone encountered during the work (other than those already identified) which should also be considered for repair/replacement especially those at high level.

255 ASHLAR BLOCKS/ DRESSINGS
• Cutting and dressing stone: To true and regular surfaces, free from hollow or rough areas.

258 EXISTING TEMPLATES
• General: Templates for replacement stones are available for making copy templates.

REPLACEMENTS AND INSERTIONS

330 PREPARATION FOR REPLACEMENT MASONRY

• Defective material: Carefully remove to the extent agreed. Do not disturb, damage or mark adjacent retained masonry.
• Existing metal fixings, frame members, etc: Report when exposed.
• Redundant metal fixings: Remove.
• Recesses: Remove projections and loose material; leave joint surfaces in a suitable condition to receive replacement units. Protect from adverse weather if units are not to be placed immediately.

330A PREPARATION FOR REPLACEMENT MASONRY

• **Use of stone** :
In most cases natural stone should be used for surface repairs. Before starting work, the original stone should be identified, and enquiries should be made to find out if it is still quarried. If available, the
quality should be checked. If the original stone is not available, a matched alterative should be chosen. It is important to match block size, but stone should primarily be matched on colour, texture, porosity,
strength, and durability.
Where a Substitute stone is used, differences between it and the original should be understood. The two stones should be petrographically compatible.
Stones should be bedded in accordance with BS 5300. Generally, stones should be laid on their natural bed (edge or joint bedding can be used for projecting features and copings). Arch stones should
be bedded at right angles to the thrust.

• **Full stone replacement** :
Defective stones should be carefully cut or sawn out, without overruns, to a depth sufficient to remove all decay and to give a good sealing for replacements.
The minimum depth for replacement ashlar units should be 100 mm.
NOTE - Greater bedding depths may be required for overhanging stones or where a stone is replaced to its full original depth.
Cavities should be cleared of stone and mortar residues and rinsed with clean water.
Replacement stones should match the size, profile and finish (surface tooling) of the original un-weathered face and wall alignment, where these can be established.
Joints to the rear and sides of new ashlar blocks should be filled with mortar slurry of appropriate constituents and softness. The stone should be supported on shims to ensure the original joint widths are maintained. Supports should not impose excessive point loads on the stone. Joints surrounding new stone should be repointed to match the original pointing.
Stones should be secured within the original opening using stainless steel dowel fixings where necessary.
NOTE Replacement of larger stones (e.g. cornice units) may require more elaborate fixing procedures.

• **Replacement of carved stone** :
Carving of replacement stone should be carried out by a stone carver where appropriate. New pieces should match the features, size, nature, and quality of carving of the original work. Installation of new
pieces should be undertaken by a mason experienced in fixing techniques.

• GENERAL PREPARATION OF AREAS:
CLEAN: for cleaning of walls see **C40.**
ORGANIC GROWTH: for removal of organic growth see Trade Preamble C40, including **C40. 315**.
DIMENSIONS: cut stones to full dimensions for bonding with facework and with backing,
EXPOSED AND JOINT FACES: work the exposed and joint faces of each stone to a square and true planed surface free from hollow or rough areas.
SELECTION: stones for particularly exposed conditions (quoins, end stones, window dressings, etc.) are to be selected from stone, which is as compact and free of laminations/bedding joints as possible.

NUMBERING: number each stone in accordance with approved numbering system.

340 REPLACEMENT OF STONE
• Stone: Sandstone as clause 240.
• Bedding depths: 150 mm.
• Mortar: As section Z21.
- Mix: 1:2.5 - NHL3.5 hydraulic lime:sand.
- Sand source/ type: Mercaston Quarry SK 267 445 Ashbourne - Building Sand - supplemented by Sharp grit sand or course washed sand.
• Fixings: Bonded dowels as clause 405.
• Joints: Recessed weathered between existing retained stones and new work; flush between new stones.
• Other requirements: TBC.

350A STONE INSERTS/PIECING IN
• Stone: As clause 240.
• Finish: Flush and to match existing.
• Preparation and insertion: As clause 395.
• Mortar: As section Z21.
- Mix: 1:2 NHL3.5 hydraulic lime:sand with stone dust.
- Sand source/ type: Fine sand to approval to match masonry colour - subject to trials.
• Adhesive
• Fixings: Replacement cramps as clause 410.
• Joints: to match existing.

• CUT BACK the section of existing decayed stone to a neat plane at a junction agreed with the CA, retaining the maximum original work and clean down surfaces. Provide temporary structural support as necessary during repair work.

• INSERT stainless steel dowels into pre-drilled locating holes, minimum 25mm depth and set in epoxy resin to tie existing and new work together.

• LOCATE new stone into existing stone and fix with a thin coating of epoxy resin, to finish well back from the stone face. Clean any resin spillage or seepage immediately from the stone face. Fill joint flush with stone dust mix to match colour of stone.
• **Piecing-in repairs** :
New stone for repair work may gradually tone in as it weathers, but is unlikely to appear exactly the same as the original stone, In the long term, the visual match achievable with new stone is usually better than with a mortar repair.
Repair of local damage to large stones (e,g. damage caused by rusting cramps or fixings) may be carried out by piecing in matching stone.

NOTE Piecing in repairs usually require a minimum depth related to the surface area and ranging between 50mm and 100mm. This may also vary depending on the stone, size and extent of the repair and the degree of decay.
The damaged area should be cut out to a rectilinear surface shape of appropriate depth. The new piece of stone should fit the prepared cavity exactly with no joint between the edges of the repair within the block. No jointing material should be visible at the Interface of the stone with the stone indent. Natural stone indents should not cross over existing joints.
The rear of stone indents may be secured to the main block with non-ferrous or stainless steel dowels. Epoxy resin should be used only to secure dowels, not to fill the side or rear faces of the repaired area. A fine-grained modification of repair mortar should be used.
The finished face of the repair should exactly match the original masonry outline. The final profile or surface texture of the repair should be worked in situ to ensure this.

385 LAYING REPLACEMENT MASONRY UNITS

• Exposed faces of new material: Keep to agreed face lines.
• Faces, angles and features: Align accurately. Set out carefully to ensure satisfactory junctions with existing masonry and maintain existing joint widths.
• Joint surfaces: Dampen to control suction as necessary.
• Laying units: On a full bed of mortar, all joints filled.
• Exposed faces: Keep clear of mortar and grout.

390A GROUTING JOINTS

• Grout mix: Refer to St. Astier's data sheet for Gravity Fill Mortar (enclosed) = NHL5 1bag 30Kg / 1bag 55kg soft fine sand / + casein + water to obtain a paste with required fluidity.
• Joints that cannot be fully filled with bedding mortar: Grout thoroughly around replacement masonry units.
• Grouting: Keep grout back from exposed face to allow for the depth of pointing, using an approved temporary sealing material. Prevent grout staining exposed face.
• Subsequently, point in a continuous operation, with mortar scheduled Z21.

395 STONE INSERTS

• Pockets to receive inserts:
- Cut out accurately. Undercut sides of pocket where necessary to provide space for bonding material.
- Adjust depth so that insert stands proud of existing stone for finishing in situ.
- Clean out thoroughly.
• Inserts: Cut to the smallest rectangular shape necessary to replace the defective area and provide a firm seating. Install accurately and securely.
- Exposed faces: Keep clear of bonding material.
• Existing joint widths: Maintain. Do not bridge joints.

405A BONDED DOWELS / LOCATING PINS

• Dowels: Phosphor bronze - BS 2874 PBlO2 or Grade 316 stainless steel.
• 12 mm diameter, 100 mm king as manufactured by
• Manufacturer - Ancon Building Products
• Adhesive: Epoxy resin.
• Holes for dowels: Suitably sized and accurately aligned in masonry background and in rear of replacement/ insert stone; clean and dry.
• Other requirements: Do not use adhesive to bond stones at joints unless instructed.

410 CORRODED FIXINGS

• Removal: Cut out carefully, causing the least possible disturbance to surrounding masonry. Remove associated rust debris.
• Replacement: Compatible fixings as clause 280/281.

CRACK REPAIRS/TIES/REINFORCEMENT

610 MORTAR REPAIR OF CRACKS
• Mortar: As section Z21.
- Mix: **1:3 feebly hydraulic lime:sand**, to approval - CONTRACTOR TO CONFIRM NHL.2 MANUFACTURER - and compliance with BS EN 459 -1 (2015).
- Sand source/ type: sharp/grit sand with softer Mercaston sand.
• Preparation: Clean out cracks to remove debris, dust and dirt. Dampen recesses, as necessary, to control suction.
• Applying mortar: Press well into cracks so that they are fully filled. Ensure that mortar does not encroach upon exposed faces. Finish mortar flush with masonry face.
• Other requirements: Exclude isolated hair line cracks (less than about 1.0 mm wide).

POINTING/REPOINTING

810A PREPARATION FOR REPOINTING
• Existing mortar: Working from top of wall downwards, remove mortar carefully, without damaging adjacent masonry or widening joints, refer to guidance in following clauses.
- Loose or friable mortar: Seek instructions when mortar beyond specified recess depth is loose or friable and/ or if cavities are found.
INSPECT the work with the CA and agree details of areas to be replaced or repaired, pointing style, method and appearance.
Sound mortar, which is full in the joint and protecting the edges of the stones, is to be left. Where repointing is specified, this will be to match the weathering of the pointing in the general area, which will vary from flush in unexposed areas to deeply recessed in exposed areas.
INAPPROPRIATE MORTAR: where specified, carefully prise off hard modern mortar (whether flush or projecting) to behind the existing line of the wall face, avoiding damage to the adjacent stonework. The use of angle grinders for this purpose will not be permitted. Notify the CA if this reveals perished mortar beneath. If removal of mortar cannot be achieved without damage to stone arises, notify the CA for further instructions.

810B RAKING OUT

CUT-OUT loose and perished mortar with extreme care to avoid damage to adjacent masonry. Fine points between ashlar and dressed stones are to be cut out with a raking tool or hacksaw blade narrower than the joint; other joints are to be cut out by hand using fine tools or a plugging chisel. The use of angle grinders for this purpose will not be permitted. Raked joints: Remove dust and debris.

815 POINTING STONEWORK GENERALLY
• Preparation of joints: Carefully brush away loose mortar and Dampen joints, as necessary, to control suction.
• Mortar: As section Z21.
- Mix: 1:2.5 - NHL3.5 hydraulic lime:sand - CONTRACTOR TO CONFIRM NHL3.5 MANUFACTURER - and compliance with BS EN 459 -1 (2015).
- Sand source/ type: sharp/grit sand with softer Mercaston sand.
• Joints profile/ finish: Recessed back from weathered arrises to retain original joint widths. Excess fines should be removed from the mortar face after initial stiffening using a stick or coarse sacking. (Alternatively, the face should be stippled or brushed with a natural bristle brush) as clause 860.
• Other requirements: TBC.

821 SHALLOW REPOINTING
SHALLOW REPOINTING: rake out joints to a depth of twice their width (for flush pointing) or correspondingly deeper where the pointing is to finish recessed. Point up in a single application of repointing mix.

822 DEEP POINTING
Where existing mortar is perished or eroded back further than 50-60 mm from the wall face, rake back to sound mortar (subject to a maximum depth of 100-125mm), clean out the joint and tamp in general mortar (clause Z21.M180 Mix 1). Force and compress mortar to the back of the joint, to finish 20mm back from the pointing face. (Note: where joints open out within wall to large voids, grouting will be necessary - see section C4OJ). When general mortar has set, point up in a single application of repointing mix.

823 REPOINTING (GENERAL)
Where existing mortar is perished or eroded back further than 50-60 mm from the wall face, rake back to sound mortar (subject to a maximum depth of 100-125mm), clean out the joint and tamp in general mortar (clause Z21.M180 Mix 1). Force and compress mortar to the back of the joint, to finish 20mm back from the pointing face. (Note: where joints open out within wall to large voids, grouting will be necessary - see section C4OJ). When general mortar has set, point up in a single application of repointing mix.

824 REPOINTING (FINE JOINTS)
Where stone joints are very narrow it may be necessary to screen the mortar aggregates to remove the coarser material. It will also be necessary to protect the adjoining stonework from discolouration from mortar spreading out beyond the sides of the joint. This may be done by:
(a) Taping over the edges of the adjoining stones beforehand; or
(b) Applying a brush-applied latex over the edges of the adjoining stones, which can be peeled off afterwards with no resulting damage: or
(c) Any other method, subject to approval by the CA.

840 POINTING WITH TOOLS/ IRONS
• General: Press mortar well into joints using pointing tools/ irons that fit into the joints, so that they are fully filled.
• Face of masonry: Keep clear of mortar. Use suitable temporary adhesive tape on each side of joints where necessary. Finish joints neatly.

860A BRUSHED FINISH TO JOINTS
• POINTING FINISH: at an appropriate stage of setting, either spray the face of the pointing or brush with a bristle brush to expose the aggregate. Leave the surface with a rough or stippled finish, free of brush marks. Clean any 'run off' or mortar from the surrounding stone immediately.

861 PROTECTION: protect all adjacent surfaces from spillage or materials or damage during cutting out. Do not point in frosty weather or when frost is anticipated during the first 48 hours of setting. Protect from rain during initial setting and protect from excessively fast drying out in hot weather by shading from the sun and/or draping with wet sacking.

C49
Preparation and Cleaning Metalwork

Section Revision History

No.	Purpose

C49 Preparation and Cleaning Metalwork

To be read with Preliminaries/ General conditions.

11 COSTING OPTIONS - SCOPE OF PREPARATORY CLEANING
• **PRICE OPTION 1: FULL PAINT REMOVAL** - Clause **C49.230-250** CLEANING TRIALS fol lowed by contractor's recommendations for final preparation and cleaning methodology to achieve bare metal prepared to ISO 8501-1 SA 2 ½, utilising a crushed garnet or UNIL blast medium.

12 PARAMETERS - SURFACE ROUGHNESS CHARACTERISTICS OF CLEANED METAL
• Clause **C49.230-250 CLEANING TRIALS** followed by contractor's recommendations for final preparation and cleaning methodology to achieve bare metal prepared to ISO 8501-1 SA 2 ½, utilising a crushed GARNET or UNIL (coal burning power stations angular waste material) blast mediums.
• Required surface roughness characteristics of cleaned metal in micrometres specified by paint manufacturers - **MEDIUM (G) 50-70 µm.**
• Sample testing of blast cleaned metalwork will be required in accordance with **BS EN ISO 8503** - Surface Roughness Comparator / Replica Tape / Focusing microscopes or Stylus device.

20 ASSOCIATED BRITISH & EUROPEAN STANDARDS
Comply with the following British & European Standards –

21 BS EN - HEALTH & SAFETY
• Control of Lead at Work (CLAW) Regulations 2002
• Lifting Operations and Lifting Equipment Regulations (LOLER) 1998
• Working at Height Regulations (WAHR) 20055

25 BS EN - PREPARATION & CLEANING METALWORK

• **BS EN ISO 4618: 2006** - Paints and Varnishes - Terms and definitions.

• **BS 7079: 2009** - General introduction to standards for preparation of steel substrates before application of paints and related products.

• **BS EN ISO 8501: 2000** - Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness.
· Part 1: 2001 - Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.
· Part 2: 2001 - Preparation grades of previously coated steel substrates after localized removal of previous coatings
· Part 3: 2007 Preparation grades of welds, edges and other areas with surface imperfections.

• **BS EN ISO 8502: 2000** - Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness.
· Part 1: 2001 - Field test for soluble iron corrosion products.
· Part 2: 2001 - Tests for the assessment of surface cleanliness. Laboratory determination of chloride on cleaned surfaces.
· Part 3: 2000 - Assessment of dust on steel surfaces prepared for painting (pressure sensitive tape method).
· Part 4: 2000 - Guidance on the estimation of the probability of condensation prior to paint application.
· Part 5: 2001 - Measurement of chloride on steel surfaces prepared for painting (ion detection tube method).
· Part 6: 2001 - Extraction of soluble contaminants for analysis. **The Bresle** method
· Part 7: 2001 - Spare.
· Part 8: 2001 - Field method for the refractometer determination of moisture.

· Part 9: 2001 - Field method for the conductometric determination of water-soluble salts.
· Part 10: 2001 - Field method for the titrimetric determination of water-soluble chloride.
· Part 11: 2001 - Field method for the turbidimetric determination of water-soluble sulfate.
· Part 12: 2004 - Field method for the titrimetric determination of water-soluble ferrous ions.

• **BS EN ISO 8504 - 2000** - Preparation of steel substrates before application of paints and related products. Surface preparation methods
· Part 1: 2001 - General principles
· Part 2: 2001 - Abrasive blast cleaning
· Part 3: 2001 - Hand- and power-tool cleaning.

• **BS EN ISO 11126** - Preparation of steel substrates before application of paints and related products. Specifications for non-metallic blast-cleaning abrasives -
· Part 1: 1997 - General introduction and classification.
· Part 2: 2001 - Spare.
· Part 3: 1998 - Specifications for non-metallic blast-cleaning abrasives. Copper refinery slag.
· Part 4: 2001 - Coal furnace slag.
· Part 5: 1998 - Nickel refinery slag
· Part 6: 2001 - Spare.
· Part 7: 2001 - Specification for fused aluminium oxide
· Part 8: 1998 - Olivine sand.
· Part 9: 2001 - Staurolite.
· Part 10: 2001 - Almandite garnet
• **BS EN ISO 11127: 2011** - Preparation of steel substrates before application of paints and related products. Test methods for non-metallic blast-cleaning abrasives.

• **BS EN - 12944 - Part 4:** Types of surface and surface preparation.

GENERAL/ PREPARATION

100 HEALTH AND SAFETY

• Take all necessary precautions to protect site operatives and the general public from health hazards associated with the materials and procedures for the cleaning method(s) used.

• LEGISLATION & SAFETY PRACTICES - comply with the Control of Lead at Work Regulations 1998 SI543, Control of Lead at Work ACOP 1985 and the Construction (Design and Management) Regulations 2015. These regulations require specifiers and employers to avoid foreseeable risks and protect the health and safety of employees, and to keep them informed of these risks.

• Painters using lead-based paints are required to dispose of wastes in accordance with the Environmental Protection (Duty of Care) Regulations 1992, and may also need to check with their local Environmental Health Officer or Waste Regulatory Authority for any special disposal provisions that may pertain locally.

• Although the use of lead-based paints may now be relatively rare, conservators will often encounter objects with older lead coatings. Damage or abrasion is likely to release lead dust or debris, and this can contaminate the surrounding ground. Therefore, if lead paints are suspected, project managers and contractors must take precautionary measures to protect their employees, the general public, and the environment. The immediate hazards are skin contact and inhaling airborne dust. Workers will require disposable protective equipment to avoid inhalation, ingestion or contact; wet cleaning methods will keep dust to a minimum; (all operatives working on site will have to undergo lead testing, before during and after completion). The slurry and other waste from treatments such as cleaning must be properly handled, and disposed of according to the local requirements.

• Provide High-efficiency particulate arrestance (HEPA) - high-efficiency particulate arresting or high-efficiency particulate air filters ventilation and extraction. To qualify as HEPA, an air filter must remove (from the air that passes through) 99.97% of particles that have a size of 0.3 µm.

• Provide High Efficiency Particulate Air (HEPA) vacuuming and washing with tri-sodium phosphate (TSP) solution.

110A SCOPE OF WORK

• **TYPE 1 - ITEMS TO BE REMOVED, REPAIRED & REINSTATED - Workshop Specification**

• Roof Crestings/Railings

• **TYPE 2 - ITEMS TO BE RETAINED INSITU FOR REPAIRS - Exterior Specification**

• Roof Cresting/Railing Posts
• Steel Columns

120 RELATED REPAIR AND REMEDIAL WORKS
• Work to be carried out before cleaning work: demolition and removal of components for discarding or removal, repair and reinstatement.

150 ELECTRICAL EQUIPMENT AND SUPPLIES

• Where necessary ensure that all unprotected electrical supplies and external equipment have been disconnected. If specified, remove fittings and associated cables.

155 CONDITIONS OF SURFACES

• Before commencing cleaning of each area, ensure that surfaces are in a suitable condition to be cleaned and that:
·Walling, fenestration and associated features/components are stable and that preparatory repair works are complete.
·Fixtures and fittings have been removed.

160A PROTECTION
• Surfaces not designated for cleaning: Prevent damage, including marking and staining.
• Prevent damage to all components and finishes that can reasonably be protected during cleaning procedures, including lightning conductors, roof coverings, flashings, rainwater goods, glass, metal work, services equipment, signage and pavings.
• Openings: Prevent ingress of water, cleaning agents, and detritus.
- Vents and grilles: Protect but do not seal up ventilation grilles, air bricks, or other ventilation opening without first seeking instructions.
• Temporary mechanical fastenings:
- In masonry: Locate in joints.
- In other surfaces: Seek instructions.
• Additional protection:
All glass / joinery and masonry: Submit proposals
Staining of surfaces from ferrous or other reactive metals.

165 PROTECTIVE MEMBRANES/BOARDS

• Refer to clause **C50.101** for the **ENCAPSULATION** of the scaffold / temporary works. Do not execute C49 Preparation and Cleaning until ENCAPSULATION in place.

• Use approved protective boards, sheetings, films, sealants and sealing tapes that do not stain protected materials and that can be readily removed after cleaning without damaging or staining the protected material.

• Do not use temporary fastenings into components, masonry features, joinery and fittings without approval. When fixing into masonry, locate fastenings in joints.

175 CONTROL AND DISPOSAL OF WASH WATER AND DETRITUS
• Disposal: Safely. Obtain approvals from relevant Authority.
• Control of wash water: Collect and divert to prevent ingress and damage to building fabric and adjacent areas.
• Above and below ground drainage systems: Keep free from detritus and maintain normal operation.

180 TEMPERATURE CONDITIONS
• Do not use water based cleaning procedures when air and surface temperatures are 5ºC or less. Protect damp surfaces from frost during drying out periods.
• Do not use any chemicals when surface temperatures are below those recommended by the manufacturer.

220 CLEANING OF METALWORK STANDARDS

230A HAND & MACHINE ABRADING / POWER-TOOL CLEANING TRIAL SAMPLES
• Trial sample reference: **TS-001**.
- Surface: Cast-iron; Wrought-iron.
- **Location/ Size** : 1 sample of each of the following - Full girth - **a)** 1LM Column Base; **b)** 1LM Column Capital; **c)** 600mm lattice rafter.
- Type of soiling: Preparation & cleaning metalwork for painting.
- Cleaning methods: removal of **DEFECTIVE COATINGS, RUST, LAMINATED RUST SCALE, LOOSE MILL SCALE, CORROSION** by the following de-scaling methods
¬ **HAND-TOOL CLEANING**: cleaning or preparing steel substrates by the use of hand tools, without power assistance. *NOTE - chipping hammers, hand scrapers, hand wire brushes, abrasive papers and plastic fleece with embedded abrasives are generally used initially in order to remove relatively loose contaminants prior to the use of power tools.*
¬ **MACHINE ABRADING / POWER-TOOL CLEANING**: surface preparation procedure comprising cleaning by thorough mechanical roughening and, if necessary, by rotating wire brushes, and if required needle guns. Chipping hammers, abrasive papers and plastic fleece with embedded abrasives all driven by electric or pneumatic power; (excludes blast cleaning).
• Records: Maintain written records for each trial area, including cleaning methods and conditions, to enable replication of results elsewhere.

232 CHEMICAL CLEANING: (PAINT SOFTENERS PRIOR TO STEAM CLEANING) TRIAL SAMPLES
• Trial sample references: **TS-002** or **TS-003**.
- Surfaces: Cast-iron; Wrought-iron.
- **Location/ Size:** 1 sample of each of the following - Full girth - **a)** 1LM Column Base; **b)** 1LM Column Capital; **c)** 600mm lattice rafter.
- Type of soiling: Preparation & cleaning metalwork for painting.
- Cleaning methods:
TS-002: **STONEHEALTH No: 7S** - PAINT SOFTENERS PRIOR TO **DOFF STEAM CLEANING** - as clause 350 and 360 below; **OR**,
TS-003: **TENSID UK - TAVEC 203**: LIQUIDS/GELS USED AS PAINT SOFTENERS PRIOR TO **TORIK STEAM CLEANING** - as clause 355 and 365 below.
• Records: Maintain written records for each trial area, including cleaning methods and conditions, to enable replication of results elsewhere.

234 STEAM CLEANING TRIAL SAMPLES
• Trial sample reference: **TS-004** or **TS-005**.
- Surface: Cast-iron; Wrought-iron.
- Location/ Size: 1 sample of each of the following - Full girth - **a)** 1LM Column Base; **b)** 1LM Column Capital; **c)** 600mm hip rafter.
- Type of soiling: Preparation & cleaning metalwork for painting.
TS-004: STONEHEALTH DOFF STEAM CLEANING - as clause 360 below; OR,
TS-005: TENSID UK - TORIK STEAM CLEANING - as clause 365 below
• Records: Maintain written records for each trial area, including cleaning methods and conditions, to enable replication of results elsewhere.

236 [WET] ABRASIVE CLEANING TRIAL SAMPLES
• Trial sample reference: **TS-006** or **TS-007**.
- Surface: Cast-iron; Wrought-iron.
- Location/ Size: 1 sample of each of the following - Full girth - **a)** 1LM Column Base; **b)** 1LM Column Capital; **c)** 600mm hip rafter.
- Type of soiling: Preparation & cleaning metalwork for painting.
- Cleaning methods: Abrasives.
TS-006 : **STONEHEALTH TORC ABRASIVE SYSTEM** - as clause **C49.370** below; OR,
TS-007 : **Hodge Clemco Ltd - DRY AND WET ABRASIVE CLEANING** - as clause **C49.37 5** below

237 [DRY] ABRASIVE BLAST CLEANING
• Dry abrasive blast cleaning – Not to be used on wrought iron.

240 INTERIM REPORT FOR FINAL TRIAL COMBINATION
On the completion of clause **C49.230-236** sample trials produce an intermediate report on each specified removal method. Submit report on methodologies, effectiveness with recommendation for final preparation and cleaning methodology.
Update unit rates.
241 CONTRACTORS RECOMMENDATION - FINAL TRIAL COMBINATION
• Trial sample reference: Contractors recommendation of Trial Sample combinations Types **TS-001** to **TS-007** producing **TS-008**.
- Surface: Cast-iron; Wrought-iron.
- Location/ Size: Cast-iron; Wrought-iron.
- Type of soiling: Preparation & cleaning metalwork for painting.
- Cleaning methods: Submit proposals.
• Records: Maintain written records for each trial area, including cleaning methods and conditions, to enable replication of results elsewhere.

250 BS EN ISO 8502 TEST METHODS
Immediately on the completion of TS-008 execute relevant BS EN ISO 8502 test methods to determine the cleanliness of the steel substrate prior to the application of the specified paint system -
• ISO 8502-3 Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method).
• ISO 8502-4 - Guidance on the estimation of the probability of condensation prior to paint application.
• ISO 8502-6 - ***Extraction of soluble contaminants for analysis. The Bresle method***
• ISO 8502 - test extraction samples for ferrous irons / sulfate / chloride / salts.

260 EXECUTE PAINT SAMPLING ON CLEANED TS-008 TRIAL AREA
• Refer to C50 reference specification trial items **C50.80** to **C50.83.**

PRODUCTS/ EQUIPMENT

305 HAND -TOOL CLEANING
• Before commencing any other methods of cleaning, remove loosely adhered deposits and heavy deposits of biological matter using suitable corrosion resistant brushes and scrapers/spatulas that do not abrade or gouge the surface. Do not use brushes with ferrous bristles.
• Refer to clause **C49.221** above for equipment type.

312 SURFACE BIOCIDES
• Types: Registered by the Health and Safety Executive (HSE) and listed on the HSE website under non-agricultural pesticides.
• Compatibility with surface: Free from staining or other harmful effects.

315 POWER-TOOL CLEANING
Following hand-tool cleaning and before any other methods of cleaning, execute power-tool cleaning by rotating wire brushes, and if required needle guns. Where appropriate chipping hammers, abrasive papers and plastic fleece with embedded abrasives driven by electric or pneumatic power can be utilised; (excludes blast-cleaning).
Do not use brushes with ferrous bristles.
Refer to clause ***C49.230A*** above for trial-samples.

APPLICATION

412 REMOVAL OF LOOSELY ADHERED DEPOSITS
• Timing: Before commencement of other cleaning methods.
• Surfaces: Prevent damage, including abrasion.

422 BIOCIDE APPLICATION
• Preparation: Remove loose growths.
• Surfaces: Prevent damage, including abrasion.
• Biocide treatment: Appropriate solutions to kill growths and inhibit further growths.
- Dead growths: Remove.

432 TOOLING
• Tooling of surfaces: Not permitted.

442 ABRASIVE BLOCKS
• Types: Suitable grades of carborundum or gritstone.
• Application: Lubricate with water. Remove detritus.
• Abrasive power tools: Prohibited.

452 ABRASIVES CLEANING
• Surfaces: Minimize abrasion.
- Ingrained deposits: Seek instructions.
• Equipment settings (including nozzle type and distance from surface): Adjust regularly to achieve optimum cleaning performance for each surface.
• Detritus: Remove with clean water.

462 WATER SPRAYED CLEANING (MOUNTED NOZZLES)
• Surfaces: Minimize water run-off. Prevent damage.
• Adjustment of washing cycle and nozzle positions: Regularly to achieve optimum cleaning performance.

472 PRESSURIZED WATER CLEANING
• Surfaces: Prevent damage, including abrasion.
• Equipment settings (including nozzle type and distance from surface): Adjust regularly to achieve optimum cleaning performance for each surface.

482 STEAM CLEANING
• Surfaces: Prevent damage, including abrasion.
• Equipment settings (including nozzle type and distance from surface): Adjust regularly to achieve optimum cleaning performance for each surface.

495 TESTING pH VALUES FOR CHEMICAL CLEANING
• pH indicator: To distinguish pH values between 1-14.
• Testing before cleaning:
- Clean rinsing water, wetted surfaces and joints: Test for pH. Record as 'control' values.
• Testing after water rinsing and neutralization:
- Wetted surfaces and joints: Record pH values.
- Acceptance criteria: Submit proposals.

500 CHEMICAL CLEANING
• Surfaces: Prevent damage, including discolouration, bleaching and efflorescence.
• Product variables (including concentrations, dwell times and number of applications): Adjust for each surface to achieve optimum cleaning performance.
• Application: To wetted surfaces.
- Drying out: Prevent unless recommended otherwise by cleaning product manufacturer.
• Removal of chemicals and neutralization: As recommended by product manufacturer, including rinsing with clean water.
- Additional treatment: Where water rinsing is insufficient to neutralize surface, apply compatible neutralizing agent.
- Surfaces and joints: Minimize absorption of chemicals. Prevent damage, including abrasion.

515 PLAIN POULTICING
• Surfaces: Prevent damage, including abrasion.
• Application: To wetted surfaces. Maintain contact with surfaces as poultice dries out.
• Poultice reinforcement: Submit proposals.
- Drying: Prevent excessively rapid or localized drying out.
• Spent poultice material: Do not reuse.

520 COMPLETION
• Obtain CA's approval of cleaning to each area/surface and before removal of temporary protection.
• After removal of temporary protection, thoroughly clean all glazing, window frames, doors, sills and other affected surfaces.
• Check that all gutters, hoppers, downpipes and gullies are free from obstruction and debris arising from cleaning works.
• Give the CA 2 weeks notice before striking each stage of scaffolding, to allow for final inspections.
• Complete all necessary documentation, review and record final results with supportive drawings and photographs.

C50
Repairing/ Renovating/ Conserving metal

Section Revision History

No.	Purpose

C50 Repairing/ Renovating/ Conserving metal
TO BE READ WITH PRELIMINARIES / GENERAL CONDITIONS
GENERAL REQUIREMENTS/ INFORMATION

COMPONENTS SCHEDULE:

• Roof Cresting/Railings
• Structural Columns

ASSOCIATED BRITISH & EUROPEAN STANDARDS

Comply with the following British & European Standards –

21 BS EN - DEMOLITION / PROTECTION SHORING / HEALTH & SAFETY / METALWORK DISMANTLING

• **BS 6187: 2011** Code of practice for full and partial demolition.

• Lifting Operations and Lifting Equipment Regulations (LOLER) 1998

• Working at Height Regulations (WAHR) 2005

22 BS EN - BENCHMARKING, SAMPLING, TESTS
• **BS 7910:** 2005 Guide to methods for assessing the acceptability of flaws in metallic structures
• ISO 20807:2004 - Non-destructive testing -- Qualification of personnel for limited application of non-destructive testing

23 BS EN - ENVIRONMENT
• Control of Lead at Work Regulations 1998 SI543 - Control of Lead at Work (CLAW) Regulations 2002.

• Environmental Protection (Duty of Care) Regulations 1992

25 BS EN - PREPARATION & CLEANING METALWORK

• **BS EN ISO 4618: 2006** - Paints and Varnishes - Terms and definitions.

• **BS 7079: 2009** - General introduction to standards for preparation of steel substrates before application of paints and related products.

• **BS EN ISO 8501: 2000** - Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness.
· Part 1: 2001 - Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.
· Part 2: 2001 - Preparation grades of previously coated steel substrates after localized removal of previous coatings
· Part 3: 2007 Preparation grades of welds, edges and other areas with surface imperfections.

• **BS EN ISO 8502: 2000** - Preparation of steel substrates before application of paints and related products. **Tests for the assessment of surface cleanliness.**
· Part 1: 2001 - Field test for soluble iron corrosion products.
· Part 2: 2001 - Tests for the assessment of surface cleanliness. Laboratory determination of chloride on cleaned surfaces.
· Part 3: 2000 - Assessment of dust on steel surfaces prepared for painting (pressure sensitive tape method).
· Part 4: 2000 - Guidance on the estimation of the probability of condensation prior to paint application.
· Part 5: 2001 - Measurement of chloride on steel surfaces prepared for painting (ion detection tube method).
· Part 6: 2001 - Extraction of soluble contaminants for analysis. The Bresle method
· Part 7: 2001 - *Spare.*

· Part 8: 2001 - Field method for the refractometric determination of moisture.
· Part 9: 2001 - Field method for the conductometric determination of water-soluble salts.
· Part 10: 2001 - Field method for the titrimetric determination of water-soluble chloride.
· Part 11: 2001 - Field method for the turbidimetric determination of water-soluble sulfate.
· Part 12: 2004 - Field method for the titrimetric determination of water-soluble ferrous ions.

• **BS EN ISO 8504 - 2000** - Preparation of steel substrates before application of paints and related products. Surface preparation methods
· Part 1: 2001 - **General principles**
· Part 2: 2001 - **Abrasive blast cleaning**
· Part 3: 2001 - **Hand- and power-tool cleaning.**

• **BS EN ISO 11126** - Preparation of steel substrates before application of paints and related products. Specifications for non-metallic blast-cleaning abrasives -
· **Part 1: 1997 - General introduction and classification.**
· Part 2: 2001 - *Spare.*
· Part 3: 1998 - Specifications for non-metallic blast-cleaning abrasives. Copper refinery slag.
· *Part 4: 2001 - Coal furnace slag.*
· Part 5: 1998 - Nickel refinery slag
· Part 6: 2001 **-** *Spare.*
· Part 7: 2001 - Specification for fused aluminium oxide
· Part 8: 1998 - Olivine sand.
· Part 9: 2001 - Staurolite.
· **Part 10: 2001 - Almandite garnet**

• **BS EN ISO 11127: 2011** - Preparation of steel substrates before application of paints and related products. Test methods for non-metallic blast-cleaning abrasives.

• **BS EN - 12944** - Part 4: Types of surface and surface preparation.

26 BS EN - METALWORK REPAIRS AND FIXINGS
• **PD 6484: 1979** Commentary on corrosion at bimetallic contacts and its alleviation. Refer to clauses **C50.410-435** below.
• **BS 7371-1:1991** - Coatings on metal fasteners. Specification for general requirements and selection guidelines
• **BS 7371-2:1993** - Coatings on metal fasteners. Specification for torque/clamping force relationship
• **BS 7371-6:1998+A1:2011** Coatings on metal fasteners. Specification for hot dipped galvanized coatings

27 BS EN - METALWORK PROTECTIVE PAINT / COATING SYSTEMS

• **BS EN ISO 12944** - Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Parts 1 to 8

30 OTHER NORMATIVE REFERENCES
Comply with the recommendations and methodology in the following normative references –

34 SPECIFICATION STANDARD
• Standard: Comply with latest edition of **National Structural Steelwork Specification (NSSS).**
• Document availability: Make available during the course of the Works at fabrication shop and on site.

50 HEALTH & SAFETY ISSUES

• **LEGISLATION & SAFETY PRACTISES** - comply with the ***Control of Lead at Work Regulations 1998 SI543, Control of Lead at Work ACOP 1985*** and the Construction (Design and Management) Regulations 2015. These regulations require specifiers and employers to avoid foreseeable risks and protect the health and safety of employees, and to keep them informed of these risks.

• Painters using lead-based paints are required to dispose of wastes in accordance with the ***Environmental Protection (Duty of Care) Regulations 1992.*** Check with the local Environmental Health Officer or Waste Regulatory Authority for any special disposal provisions that may pertain locally.

• Take precautionary measures to protect employees, the general public, and the environment. The immediate hazards are skin contact and inhaling airborne dust. Workers will require protective equipment to avoid inhalation, ingestion or contact; wet cleaning methods will keep dust to a minimum; (all operatives working on site will have to undergo lead testing, before during and after completion). The slurry and other waste from treatments such as cleaning must be properly handled, and disposed of according to the local requirements.

• The Contractor is to ensure that damage to the environment and all health & safety risks are minimized **ISO 12944-1 & 8.**

• Refer to HSE - Controlling airborne contaminants at work - A guide to local exhaust ventilation (LEV) ISBN 978 0 7176 6415 3

70 BENCHMARKING, SAMPLING & TESTS
The following tests are required and the Principal Contractor is to commission suitably accredited testing organisations to execute the tests itemized below –

72 COLUMN WALL / WROUGHT-IRON PLATE THICKNESSES -
ULTRASONIC FLAW DETECTION INVESTIGATIONS
• Commission a British Institute of Non-Destructive Testing accredited Licensed Engineering Practitioner (LEP) to under take execute ***Ultrasonic Flaw Detection and Thickness Gauging*** of the 36no cast-iron columns (including bases and capitals). [http://www.bindt.org ISO 20807 – Inspection of Wrought Plate and BS EN ISO 9712 Non-destructive testing and Qualification and certification of NDT personnel].
• The main disadvantages of ultrasonic testing are: cast iron is difficult to inspect due to low sound transmission and high signal noise due to the presence of ***graphite flakes*** . Clean and vacuum column interiors as described clause **C50.71** above.

101 ENCAPSULATION

Fully encapsulate the scaffold and temporary works to comply with the Control of Lead at Work Regulations 1998 SI543, Control of Lead at Work ACOP 1985, Environmental Protection (Duty of Care) Regulations 1992.

• SUPPLIER and INSTALLER – Contractor choice

• Conformity to **EN 13501-1:2007** Reaction Class B-s1, d0 - Fire classification of construction products and building elements.

150 TAKING DOWN METALWORK

151 DISMANTLING SCOPE

• Oriental panels between posts, eave cresting/railing.

The ironwork should be taken apart in reverse order to the way it was originally assembled. Great care is needed to avoid partially dismantled structures becoming unstable and straining the remaining components. Temporary Works / ties and braces will be required. DETAILED METHOD STATEMENTS WITH PROGRAMMING INPUT for all dismantled and retained structures are to be prepared by the Principal Contractor and approved in advance by the PM.

152 RECORDING & LABELLING

Photographic records and measurements are to be made before any dismantling begins, and all stages of conservation and re-assembly must be recorded thoroughly. Individual components must be labelled, with metal tags wired in place. Each is to have a unique code recording its in-situ position and orientation, its relationship to the adjoining components, and the sequence for re-assembly. Bar-codes can be utilise for this. For large structural assemblies, it is usually better to identify the joints rather than the components.

153 STORAGE

Dismantled ironwork is vulnerable to theft or loss, so insecure loose components must not be left unsupervised.
As well as being clean and secure, the Contractors storage must be dry: (ironwork can deteriorate in damp conditions).
Components must not be stacked, and may require some support to prevent bending; as well as protection from abrasion with padding, and a covering to exclude dust. To minimise stress it is advisable to store ironwork, particularly cast iron, in the plane in which it was designed to serve in the building. For long-term storage, regular inspections are needed to ensure the ironwork remains in good condition.

200 PREPARATION / CLEANING AND REPAIRING METALWORK

Refer to reference specification **C49** for the types of metal surface and surface preparation scope.

201 SCOPE OF PREPARATORY CLEANING
• Where ISO 8501-1 SA 2 ½ surface preparation is not achievable (because of converging or closely joining surfaces) - inform the PM of such locations. Allow sufficient time to investigate and open-up these locations. The contractor is to implement appropriate preparation methods - i.e. BS EN ISO 8504-3 and BS EN ISO 8501 - **St.2** through hand and power tool cleaning or **St.3** very through hand and power tool cleaning to allow the application of the **C5I** paint specifications.

220 REPAIRS / RENOVATING / CONSERVING HISTORIC METALWORK **WORK SCOPE**

221 COLD REPAIRS OF CAST-IRON

• **Cold repairs** are particularly suitable for on-site conservation of metalwork. It is an excellent choice for ***cast iron*** - there is less risk of mechanical or thermal shock, and the graphite content in cast iron facilitates the necessary drilling and tapping by acting as a lubricant - but it is also useful for wrought iron and mild steel.
Traditional techniques include bolting, studding, stitching, and plating. These techniques are traditional, well-proven, relatively cheap, employ lightweight hand tools and - most importantly - are free of fire risk.
They have now been joined by modern adhesives, which can sometimes solve otherwise intractable problems.

• **METALLIC COLD REPAIRS**
There are some simple guidelines to follow detailing pins, bolts and stitches:
" Wherever possible, plates, pins and studs should be contained within or behind components, to make them as invisible as possible
" Repairs should be weaker than the original material, so that the repairs fail first if the metalwork comes under stress
" Steel is much stronger than cast iron or wrought iron, so thinner sections can be used, whilst still providing the same strength
" Holes drilled into an original component weaken it, so they should be kept as small and few as possible, and staggered to minimise development of lines of weakness

" A repair can fail through fastenings that are over-sized or near an edge tearing out of the side of a component
" Countersunk bolts can be used to minimise visual intrusion on a flat face
" Bolts and pins can be assembled with wet paint to help exclude water from threads. Refer to clauses **C50.405-335** below.

• **PLATES & FASTENINGS**
" Iron castings commonly fracture with a clean break, which makes a simple bolted or plated repair the cheapest and least intrusive option. The design of the plate is usually a compromise between providing enough strength to hold the pieces together, and retaining the maximum amount of original material.
" Normally, zinc-plated mild steel is used for the plates, studs, pins, dowels and fastenings. Holes for fastenings should be staggered so as not to create a line of weakness. Fastening should prevent the ingress of moisture, whilst allowing normal thermal movement. The fastenings, the plates and the broken surfaces should all be bedded to exclude water. Traditional bedding compounds were based on red or white lead, but today two-pack epoxies are widely used, as are mastics.
" External plating must be bedded on two-pack epoxy putty to exclude water - ref to clause **C5 0.420.**

222 NON-METALLIC COLD REPAIRS
• Two-pack epoxy adhesives available can be used to make small non-structural repairs to ferrous metals. Most can be used to fill small gaps, and are reasonably water-resistant, though they may break down under high temperature. Fibre-reinforced epoxies can also be used to strengthen structural castings, in conjunction with other techniques such as stitching or welding. Filaments of carbon or glass, bonded with polymer resin onto the blast-cleaned surface, may be used to strengthen or repair a component. Additions of this nature should be as unobtrusive and reversible as possible.
• **Belzona Polymerics Ltd** - http://www.belzona.com - ***Geoffrey fox*** 079735 60129 gfass@btinternet.com / ***Kyle Flanagan*** - kflanagan@belzona.com - +44 (0) 1423 567641 EX 6254; 07973859655

223 WELDING

• Arc welding induces an electric arc between an electrode and the metal, producing a very high
-temperature plasma that is able to melt the metals being joined in a very localised area. Electrodes can be made of many different materials; some are consumed during the process, and indeed inert-gas (helium or argon) arc welding only became a practical option after continuously-fed wire electrodes were introduced in 1948.
Common methods include:
" **Manual metal arc welding** [MMA], or 'stick welding' Widely used for fabricating and repairing steels, but it should only be used on wrought ironwork where it is not possible to use a traditional technique.
" **Metal inert gas welding** [MIG]
" **Tungsten inert gas welding** [TIG] TIG welding can be used on almost any metal, and indeed can be used to join dissimilar metals. It is commonly used in the fabrication and repair of stainless steel.
Joints of high integrity are possible, but TIG is slower than MIG welding, and demands greater skill.

• Arc welding is effective for joining wrought iron and steel.

• Welding cast iron - is highly specialized - Refer to KOBE STEEL (2011) - Arc Welding of Specific Steels and Cast Irons: Chapter 4: Arc Welding of Cast iron. [pp 4.1 - 4.21].

224 RIVETING

• If the rivet-heads have corroded and the rivets must be removed, this must be done carefully to avoid damaging the plates and the holes. The heads should first be ground away, and then the shanks drilled out; the remaining material can then be punched out. A quicker method is to use a 'rivet buster' (a long pneumatic gun, operated by two workers, which has a chisel to shear off the head and a punch to drive out the shank). Rivet busters are very effective, but the flying rivet-heads can easily cause injury.

• If necessary, rivets can be made flush with the surface by counter-sinking.

• It is proposed to replace - decayed rivets with ***domed-headed bolts (designation 8.8)*** or where appropriate welded connections.

225 BRAZING

• To braze metal elements together they must form a very tight joint, so that a molten filler metal can be drawn in by capillary action. The surfaces to be joined are cleaned, fluxed, and flame heated to around 600°C, and the filler is melted at the joint. Brazing uses fillers with high melting temperatures, such as bronze. Brazing is suitable for non-structural and lightly loaded repairs of wrought iron, and is occasionally used to join thin sections of mild steel. Cast iron can be brazed, if care is taken to heat and cool the metal slowly.

• Brazing with fillers having lower melting points (such as silver solder, which melts at temperatures just below 450°C) is often called 'silver soldering' or 'hard soldering'.

226 SOLDERING

• Like brazing, solder relies on running a filler metal into a tight joint, but the filler melts at a much lower temperature (around 200°C). Most are alloys of tin and lead, sometimes with traces of antimony. The surfaces to be soldered together are cleaned and protected with a liquid or paste flux, and then heated by a flame or an electric soldering iron.7

• The clause **C50.260 Arch-Spandrel foliage decoration** is fixed with soldered rivets. [**Unit cost** of typical repair say for clause C90.260 Arch-Spandrels].

227 STUDDING

• Broken rod-shaped components can be repaired by drilling and tapping both parts and screwing together onto a threaded bar (studding), beaded on a two-pack epoxy putty. If components cannot be rotated, the studding can be screwed into one-part and secured by epoxy putty into the other. If the component is wide enough a stud and dowel repair can be executed. [**Unit cost** of typical repair say for clause **C90.290 CAST-IRON 'EYE-BROWS']**

255 PREPARATION / PAINT SYSTEM - See **C50.324** ; or **C50.344** ; or **C50.364** below.

NOTE: OFF-SITE PREPARATION, THERMAL SPRAYING AND PAINTING -
To be carried out under cover in properly lit, heated and ventilated conditions.
Cost all fabrications options below - agree sequences of working from one of the following and inform CA before starting work; [options subject to approval by Historic England]:

· **C50.255.A** - components prepared / repaired / zinc thermal sprayed & painted - then delivered to site and assembled utilising anti-corrosion/anti-bimetallic products specified clauses **C50.405-435.**

301 EXECUTION & SUPERVISION OF PAINTWORK

• Refer and conform to **ISO 12944-2** parts 1 to 8.

302 ISO 12944-2 ENVIRONMENT CLASSIFICATION

• **BS EN 12944 - part 2** : **C5-I very high risk environment** classification with a coating life exceeding 20+ years.

303 ISO 12944-3 DESIGN CONSIDERATIONS

• The recommendations of **ISO 12944-3** are incorporated into this specification. Historic England have sanction welded component jointing in lieu of bolted assemblies.

304 ISO 12944-4 SURFACE PREPARATION

• Surface preparation is specified in BA reference specification C49 - Preparation & Cleaning Metalwork.

305 ISO 12944-5 PROTECTIVE PAINT SYSTEM

• Refer to clauses **C50-306** to **435** below.

306 ISO 12944-7 EXECUTION & SUPERVISION OF PAINT

Comply with **ISO 12944-7** -
• Section 3 - Preconditions for the execution of the paint work.
• Section 4 - Coating materials.
• Section 5 - Execution of the paint work.
• Section 6 - Supervision of the paintwork.
• Section 7 - Reference areas.

The Contractor is to establish a programme of inspections to be executed during the works ISO 12944-7 & 8.

307 SITE & OFFSITE PREPARATION AND PAINTING

• Working area: Covered and properly lit, heated and ventilated.

• Sequence of working: Select from the following and submit proposals:
- Fabricate, blast clean, prime.
- Blast clean, fabricate, remove flash rust with a light overall sweep blast, prime.
- Blast clean, apply weldable prefabrication primer, fabricate, prime.

• Prefabrication primer (option 3): Type recommended by manufacturer of post fabrication primer.
- Thickness of post fabrication primer coat: May be reduced if and as recommended by manufacturer.

• Surfaces inaccessible after assembly: Apply full treatment and coating system including, if necessary, local application of site coatings.

309 FILLING

• Any small surface defect - such as a pinhole, a cavity or a crater - is a potential water trap. It is rarely possible to fill such defects with welding filler-rod or bronze, so they should be filled after the second coat of paint has been applied with a material compatible with the coating; a common choice is the sandable two-pack polyester compound used for car body fillers. To avoid masking the surface detail and texture, the least possible amount of filler material should be used, and when dry it must be rubbed down to blend with the surrounding metal.

• Filling of holes and imperfections in the wrought-iron / carbon-steel surfaces with ISOPON P38 polyester filler (two component chemical paste). WWW.U-POL.COM. Technical T: +44(0) 1933 230 310. ISOPON P38 polyester filler can be used on bare steel / cast-iron, degreased and abraded. Trial smaller area of filler before general execution.

311 MANUAL CLEANING OF NEW METALWORK [NOT GALVANIZED]

• Preparation: Remove fins, burrs, sharp edges, weld spatter, loose rust and loose scale.
• Surface finish: Clean but unpolished to BS EN ISO 8501-1, grade St 2½.
• Finishing: Thoroughly degrease and clean down. Remove any consequent rusting back to grade St 2½. Prime without delay.

312 FAYING SURFACES OF FRICTION GRIP JOINTS

• Protection: Immediately after blast cleaning and before coating surrounding areas, mask faying surfaces to protect from contamination and deterioration.
- Paint systems comprising more than one coat: Step each coat 30 mm back from edge of preceding coat and away from masked areas.

• Removal of protection: Immediately before bolting, remove masking. Check faying surfaces are free from adhesive. Clean with solvent if necessary.

313 UNCOATED FASTENERS

• Treatment: After steelwork erection and before applying site coatings, thoroughly degrease and clean. Without delay, coat to match adjacent shop (or site) painted areas.

314 GALVANIZED FASTENERS

• Treatment: After steelwork erection and before applying site coatings, thoroughly degrease and clean. Etch prime.

315 ENVIRONMENTAL CONDITIONS

• General requirements prior to starting coating work:
- Surfaces: unaffected by moisture or frost.
- Steel temperature: At least 3°C above dew point, with conditions stable or improving, and not high enough to cause blistering or wrinkling of the coating.
- Relative humidity: Below 80%.

316 COATINGS

• Surfaces to be coated: Clean, dust free and suitably dry. Previous coats to be adequately cured.
• Multiple coats of same material: Use different tints to assist checking of complete coverage.
• Penultimate coat: Colour recommended by paint manufacturer to suit top coat colour.
• Finish required: Smooth and even, of uniform thickness and colour, free from defects.

317 STRIPE COAT

External angles, nuts, bolt heads, rough weld seams, and areas difficult to coat: Apply an additional stripe coat of primer and undercoat. (*This is a supplementary coat, applied to ensure adequate protection of critical areas. Paint films tend to migrate away from sharp external angles, resulting in a thinner coating. External corners are also more prone to abrasion during handling and in service*).

318 ALTERNATIVE PAINT MANUFACTURERS

A Short list of manufacturers are provided below - with the tender submission provide COMPREHENSIVE costings for the **Tikkurila** specifications:
• **C5-I VERY** HIGH CORROSIVITY CATEGORY - ***www.tikkurila.com*** - ISO 12944-2 specifications **C50.319A**, **360-365**.
• www.tikkurila.com - Tim Haythornthwaite + Jamie Hancox +44 07730145925 - Tim.h@valtti.co.uk - +44 01313344999 - Edinburgh EH 12 9EG - FINISH PAINT.
Alternative approved manufacturers:
The Contractor may also provide alternative C5-I costings from the following manufacturers - complete with detailed specifications for all coating types identical with clauses **C50.319A, 360-365**.
• **http://protective.sherwin-williams.com - Alex Sandilands** +44 (0) 7969 922357; Tel +44 (0) 1204 521771 BOLTON - UK.
• **www.protegacoatings.com - David Thomas** +44 07740401055 - dave.thomas@protegapaints.com - West Bromwich B70 7JZ.
On tender analysis - the Employer/CA will direct the Contractor on the **C5-I** specification manufacturer for the C50 metalwork.
Selected manufacturer: Submit details before ordering materials.

319A ISO 12944-2 CLASSIFICATION OF ENVIRONMENTS - TIKKURILA PHILOSOPHY

Taking into consideration the complexities of the project and combination of metal surfaces, existing coatings, preparation methods etc TIKKURILA recommend specification for the main works around one simple high performance system suitable for all the surfaces and preparation standards; (with different primer for metal sprayed and new galvanised surfaces)

TIKKURILA propose Temabond ST200, Temacoat RM40 and Temadur 50 for this work. This system is suitable for application onto both abrasive blasted and hand prepared surfaces and is also suitable for both non-submerged and submerged exposure. (Omitting Temadur 50 for submerged structures); this keeps things simple and reduces the potential for mistakes on site.

The system is a high solids/surface tolerant epoxy polyurethane system specifically formulated for maintenance projects , widely in the industry with an excellent track record. The system has also been independently tested by a well-respected testing house (ESG) and meets the requirements of Network Rail Maintenance System M24 (Certificate Attached). System M24 is specifically designed as a maintenance system for critical structures and is also tested on known hand prepared surface (ISO ST3) at a much lower film thickness (260um) with a durability still indicated of 15 years+ in a ISO *C5 I* environment.

TIKKURILA believe it would be prudent/sensible to treat the structure as if exposed in more aggressive ISO C5 I environment. The structure is complex and potentially difficult to maintain in the future and a higher performing system designed for exposure in a more aggressive C5 I environment will help provide increased protection and film thickness. It perhaps should also be noted that cast structures particularly when abrasive blasted will have a higher than normal profile so the increased film thickness afforded by the C5 I specification will also help ensure adequate film build/cover is achieved over the peaks of the profile. Ultimately these systems work on the principle of barrier protection and therefore adequate film thickness is important if HPBC are to maximise performance/durability. The C5 I specification seems prudent at when the structure is being fully refurbished and parts renewed to maximise the protection afforded.

System summaries for the cast/steel surfaces below: -

Corrosivity categories/durability C4, C5-I-H, C5-M-H
Steel surfaces exposed to marine environment, chemical dust, gases and other special stress, with demands on good gloss retention, durability and easiness of cleaning.

• Corrosivity categories/durability Im1, Im2, Im3 EPPUR340/3-FeSt3/Sa2.5 Non Submerged
Temabond ST 200 1 x 100 µm
Temacoat RM 40 2 x 100 µm
Temadur 50 1 x 40 µm
Minimum DFT 340 µm

• EPPUR400/3-FeSt3/Sa2.5 Submerged (Gutters etc.)
Temabond ST 200 1 x 100 µm
Temacoat RM 40 3 x 100 µm
Minimum DFT 400 µm

The systems meets the requirements set out in ISO 12944 in these environments with a life expectancy of 'H' High.

• Primer – Temabond ST200 is a high solids surface tolerant epoxy aluminium primer formulated for application onto both hand prepared and abrasive blasted surfaces. It provides excellent barrier protection and very high dry film thicknesses are achievable by brush application. The product unlike a conventional epoxy primer is formulated so it does not 'flow away' from sharp edges therefore maintaining a more uniform thickness across the entire surface. Also suitable for protecting in its own right submerged structures (At the correct film thickness)
http://www.tikkurila.com/industrial_coatings/products/temabond_st_200

• Intermediate – Temacoat RM40 – a high build modified epoxy resin based epoxy coating suitable for protecting both submerged structures such as jetties, pontoons etc as well as non-submerged structures and has an excellent and long track record.
http://www.tikkurila.com/industrial_coatings/products/temacoat_rm_40

• Finish – Temadur 50 – A high quality semi-gloss polyurethane (acrylic urethane) top coat providing outstanding stable topcoat. Used as a topcoat in a wide range of applications in aggressive environments including, bridges, tanks, structural steel, Piers etc http://www.tikkurila.com/industrial_coatings/products/temadur_50

• In line with good practice TIKKURILA would also strongly recommend where possible a regular maintenance regime is put in place to repair local damage/failures and keep the paint system in good condition. This will significantly improve the overall material condition and help realise the durability demands – With this in mind TIKKURILA have attached a typical maintenance proposal for the various systems proposed.

360 TIKKURILA

• Valtti Specialist Coatings - Unit B3, south Gyle Crescent Lane Edinburgh EH 12 9EG. Call Centre: (+44) 0131 334 4999.
Contacts - Jamie Hancox / Tim Haythornthwaite: E-mail: Tim.h@valtti.co.uk +44 07730145925. www.valtti.co.uk
The specifications below provides a life to first major maintenance of +15 years. ISO 12944 states that Durability is not a guarantee time. Durability should be considered as the coating design life, where regular minor maintenance should be scheduled to achieve the required life to first major maintenance.

Notes on this specification
a) Dry film thicknesses (d.f.t.) quoted are NOMINAL as defined by BS EN ISO 12944-5.
b) Stripe coat all edges, welds and areas of difficult access, to ensure full film thickness.
c) Coated steelwork should be protected to prevent the ponding of water.
d) Finish /Topcoat is available in a full range of colours
e) Subject to shade, 2 coats of the finish coat may be required for full colour obliteration
f) ISO 12944 states that Durability is not a guarantee time. Durability should be considered as the coating design life, where regular minor maintenance should be scheduled to achieve the required life to first major maintenance.
g) All materials should be obtained from Tikkurila/Valtti Specialist Coatings and must be applied in accordance with our Technical Data Sheets.
h) The same material is used for site touch up following suitable cleaning and re-preparation of affected areas.

For application details, spread rates etc. please see attached Technical Data Sheets

362A T2 - INSITU & SITE DISMANTLED – TIKKURILA PAINT SYSTEMS (Pricing Option 1)
• Use/ location:
• Roof crestings/railings
• Structural steel columns

PAINT ANALYSIS TO BE EXECUTED BEFORE ANY PREPARATION TO ORIGINAL COATINGS.
Paint manufacturer: http://www.tikkurila.com.

• Shop or site preparation:
- Generally: Blast cleaning to BS EN ISO 8501-1, preparation grade Sa 2½ to achieve a profile of 50-75 microns.
- Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P3 - very through preparation.

• Primer: ***TEMABOND ST200*** .
- Dry film thickness: @ 100 microns d.f.t.

• Intermediate coat: ***x 2 TEMACOAT RM40***.
- Dry film thickness: @ 200 microns d.f.t.

• Shop top coat: ***TEMADUR 50.***
- Dry film thickness: @ 40 microns d.f.t.
- Colour: TBC.

• Special requirements:
Filling of holes and imperfections in the wrought-iron / carbon-steel surfaces with ISOPON P38 polyester filler (two component chemical paste). WWW.U-POL.COM. Technical T: +44(0) 1933 230 310. ISOPON P38 polyester filler can be used on bare steel / cast-iron, degreased and abraded. Trial smaller area of filler before general execution.

362B T2 - INSITU & SITE DISMANTLED – TIKKURILA PAINT SYSTEMS (Pricing Option 2)
• Use/ location:
• Roof crestings/railings
• Structural steel columns

PAINT ANALYSIS TO BE EXECUTED BEFORE ANY PREPARATION TO ORIGINAL COATINGS.
Paint manufacturer: http://www.tikkurila.com.

• Site preparation:
- Remove flaking paint and sand down all surfaces, prime areas of bare metal, fill as required to make-up paint levels. .

• Intermediate coat: ***x 2 TEMACOAT RM40*** .
- Dry film thickness: @ 200 microns d.f.t.

• Shop top coat: ***TEMADUR 50.***
- Dry film thickness: @ 40 microns d.f.t.
- Colour: TBC.

• Special requirements:
Filling of holes and imperfections in the wrought-iron / carbon-steel surfaces with ISOPON P38 polyester filler (two component chemical paste). WWW.U-POL.COM. Technical T: +44(0) 1933 230 310. ISOPON P38 polyester filler can be used on bare steel / cast-iron, degreased and abraded. Trial smaller area of filler before general execution.

363A T3 - Old Cast Iron - Immersion (Guttering) - FRESH WATER IMMERSION TIKKURILA PAINT SYSTEMS - Environment: ISO C5 I (Pricing Option 1)
Paint manufacturer: http://www.tikkurila.com.

• Shop or site preparation:
- Generally: Blast cleaning to BS EN ISO 8501-1, preparation grade Sa 2½ to achieve a profile of 50-75 microns.
- Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P3 - very through preparation.

• Shop primer: ***TEMABOND ST200***
- Dry film thickness: @ 100 microns d.f.t..

• Shop intermediate/finish coats: ***x 3 TEMACOAT RM40*** .
- Dry film thickness: 300 microns d.f.t..

• External faces of gutters painted with Polyurethane Special Finish. Dry film thickness: @ 40 microns d.f.t. As clause C50.362 above.

• **PROVISIONAL EXTRA-OVER** :
R10.345 - www.caldan.co.uk - BLOCKSIL® ONE Gutter lining. [NB - manufacturers to confirm compatibility with substrate paint-system and test-trial with possible application of LIQUASIL ac primer].The durability of the above specification will depend upon the condition of the old cast iron and how well the porosity can be filled. This system on new blasted carbon steel-work can provide a life to first major maintenance of up to 20 years.

363B T3 - Old Cast Iron - Immersion (Guttering) - FRESH WATER IMMERSION TIKKURILA PAINT SYSTEMS - Environment: ISO C5 I (Pricing Option 2)
Paint manufacturer: http://www.tikkurila.com.

• Site preparation
- Remove flaking paint and sand down all surfaces, prime areas of bare metal, fill as required to make-up paint levels.

• Shop intermediate/finish coats: ***x 3 TEMACOAT RM40*** .
- Dry film thickness: 300 microns d.f.t..

• External faces of gutters painted with Polyurethane Special Finish. Dry film thickness: @ 40 microns d.f.t. As clause C50.362 above.

• **PROVISIONAL EXTRA-OVER** :
R10.345 - www.caldan.co.uk - BLOCKSIL® ONE Gutter lining. [NB - manufacturers to confirm compatibility with substrate paint-system and test-trial with possible application of LIQUASIL ac primer].The durability of the above specification will depend upon the condition of the old cast iron and how well the porosity can be filled. This system on new blasted carbon steel-work can provide a life to first major maintenance of up to 20 years.

400 REASSEMBLING AND RE-FIXING

• The Contractor must provide with the tender return - an access strategy and method statement for dismantling, reassembling and re-fixing metalwork complete with all programming implications.
This must consider and identify the following:
¬ DISMANTLING.
¬ REMOVAL OF LEAD-BASED PAINTS.
¬ PAINTING.
¬ REASSEMBLING AND RE-FIXING.

425 GAP CLOSURE SEALANTS

To edges of abutting metal sections - paintable once installed:

• Manufacturer: Adshead Ratcliffe & Co Ltd.
Web: www.arbo.co.uk.
Email: arbo@arbo.co.uk. Tel: +44 (0)1773 826661.
Address: Derby Road, Belper, Derby, Derbyshire. DE56 1WJ.
Product reference: **Arbomeric MP20 or Arbosil XL 1099**
Colour: TBC.
Accessories: Arbo Primer 2650; Arbo Cleaner No.16 - Alcohol Based.

435 SEPARATING BUSHES / GROMMETS
• Contractor's choice.

C51
Repairing/ Renovating/ Conserving timber

Section Revision History

No.	Purpose

C51 Repairing/ Renovating/ Conserving timber

To be read with Preliminaries/ General conditions

5 PRINCIPAL DRAWINGS

• As Townsend and Renaudon's Drawings P.11606 AL[0]03 to AL[0]21.

15 SCOPE OF WORK

REPAIR TYPES :

SAMPLE REPAIRS MUST BE PROVIDED OF ALL JOINERY TYPES - FOR APPROVAL BY THE PM BEFORE PROCEEDING WITH THE REPAIRS GENERALLY .

• **SPAB type timber-timber repairs in Douglas Fir** - **C51.222** , [and **229A-E**].

• **Timber RESIN REPAIR systems** - **C51.221** ; [and **229A-E**].

• New **HARDWOOD TIMBER REPLACEMENT** - **C51.223** [and **229A-E**].

• **Joinery** / **Cast-Iron Column Interface Sealants** – **C50/425**.

COMPONENTS TO BE REPAIRED

• All fenestration

• Timber Fascias

• External doors and frames

16 JOINERY - RESIN BASED REPAIRS

Resin repairs are specified in clauses **C51.221** and **C51.229A-E** .

Note - the following normative references regarding the use of resins for joinery repairs: -

• Resin are to be used judicially with no repairs exceeding 300 cubic cm [i.e. 10 x 10 x 3cm].

• If utilised - there is a preference for resin based repairs to be utilised in a vertical applications (with horizontal cill and transom members being renewed in an appropriate timber). I.e. in lieu of SPAB type **5.2** , **5.8** and **5.9** stile repairs.

• **SAMPLE REPAIRS MUST BE PROVIDED OF ALL JOINERY TYPES - FOR APPROVAL BY THE PM BEFORE PROCEEDING WITH THE REPAIRS GENERALLY.**

18 PREPARATION AND PAINTING

• SEE FLOYD CONSULT TIMBER REPORT.

• SEE UNIVERSITY PAINT ANALYSIS REPORT.

20 BRITISH & EUROPEAN STANDARDS

• **BRITISH & EUROPEAN STANDARDS** : comply with the following British and European Standards –

BS EN 335 (2013) Durability of wood and wood-based products. Use classes: definitions, application to solid wood and wood-based products.

BS EN 350-2 (1994) Durability of wood and wood-based products. Natural durability of solid wood. Guide to natural durability and treatability of selected wood species of importance in Europe.

BS 1186-2 (1988) Timber for and workmanship in joinery. Specification for workmanship.

BS 1186-3 (1990) Timber for and workmanship in joinery. Specification for wood trim and its fixing.

BS EN 1313-1 (2010) Round and sawn timber. Permitted deviations and preferred sizes. Softwood sawn timber.

BS EN 1313-2 (1999) Round and sawn timber. Permitted deviations and preferred sizes. Hardwood sawn timber.

BS 4978 (2007) +A1:2011 - Visual strength grading of softwood. Specification.

BS 5756 (2007) +A1:2011 Visual strength grading of hardwood. Specification.

BS 8000-5: (1990) - WORKMANSHIP ON BUILDING SITES - Code of practice for carpentry, joinery and general fixings.

BS 8213-1: (2004) - Windows, doors and rooflights - Design for safe use.

BS 8213-4 (2007) - Windows, doors and rooflights. Code of practice for the survey and installation of windows and external doorsets

30 BRE DIGESTS

• Comply with the following BRE Digests –

BRE Digest 422 - Painting exterior wood.

50 HEALTH & SAFETY

LEGISLATION & SAFETY PRACTISES - comply with the Control of Lead at Work Regulations 1998 SI543, Control of Lead at Work ATOP 1985 and the Construction (Design and Management) Regulations 2015. These regulations require specifiers and employers to avoid foreseeable risks and protect the health and safety of employees, and to keep them informed of these risks.

Contractors working with lead-based paints are required to dispose of wastes in accordance with the Environmental Protection (Duty of Care) Regulations 1992. Check with the local Environmental Health Officer or Waste Regulatory Authority for any special disposal provisions that may pertain locally.

Take precautionary measures to protect employees, the general public, and the environment. The immediate hazards are skin contact and inhaling airborne dust. Workers will require protective equipment to avoid inhalation, ingestion or contact; wet cleaning methods will keep dust to a minimum; (all operatives working on site will have to undergo lead testing, before during and after completion). The slurry and other waste from treatments such as cleaning must be properly handled, and disposed of according to the local requirements.

The Contractor is to ensure that damage to the environment and all health & safety risks are minimized ISO 12944-1 & 8.

Refer to HSE - Controlling airborne contaminants at work - A guide to local exhaust ventilation (LEV) ISBN 978 0 7176 6415 3

GENERAL

110A INSPECTION

• Purpose: To confirm nature and extent of repair/ renovation/ conservation work shown on drawings and described in survey reports and schedules of work.
• The Contractor is to identify on an elevation-by-elevation basis his proposed strategy for joinery repairs - allowing sufficient time for the CA's inspection of final proposed repair types.
• Before the CA's inspection - the Contractor is to strip-back paint (to the agreed work-scope) as described M60.440B, and mark-up the proposed repairs on the joinery with an indelible-pen in
conjunction with annotation of the joinery drawings (principally P/550-559).
• Once the full scope of decay is known - the contractor will be required to re-price these repairs against his tendered unit-rates.
• The Client will then prioritise the repair-scope and a final scope of repairs will be agreed.
• Parties involved:
- Contract administrator;
- Contractor's representative;
- Foreman carpenter; and
- Structural engineer.
• Timing: At least 14 days before starting each section of work.
• Instructions issued during inspection: Confirm in writing, with drawings and schedules as required, before commencing work.

130 OPENING UP

• Purpose: To reveal previously concealed areas of structure or fabric not recorded during initial surveys.
• Extent: Previous opening up works have been carried out to typical areas. The non-typical areas may require opening up to enable proposals to be confirm and measurements taken to enable ordering. This should be done at earliest convenience and programmed to allow amendments to the design as not to cause programme delays.
The structural and weather tightness should not be compromised.
• Timing: Give notice before starting opening up.
- Period of notice: At least two working days.
• Retained building structure/ fabric: Do not damage or destabilize.

150 TIMBER PROCUREMENT

• Timber (including timber for wood based products): Obtained from well managed forests and/or plantations in accordance with:
- The laws governing forest management in the producer country or countries.
- International agreements such as the Convention on International Trade in Endangered Species of wild fauna and flora (CITES).
• Documentation: Provide either:
- Documentary evidence (which has been or can be independently verified) regarding the provenance of all timber supplied.
- Evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood based products.

160 TIMBER SUPPLIER

• Supplier: Submit proposals.

170 TIMBER CONVERSION

• Dimensional Stability - timber for the repairs is to be **radially or quarter sawn** to maximize dimensional stability.

221 TIMBER SECTION REPAIR - RESIN REPAIR SYSTEM

- 2 pack epoxy resin system. Contractors choice. Approved
- Preparation: ensure all decayed timber is cut out to sound timbers
- Application: Install in strict accordance with manufacturers printed instructions
- Surface finish: sand to provide a smooth, un pitted surface flush with adjacent wood
- Sundries: Provide any supporting framework required etc.

222 TIMBER SECTION REPAIR - NEW TIMBER REPAIR

- Defective timber: Where decayed timber is to be removed to form a splice repair, the minimum amount of existing timber should be removed to allow an effective repair to be formed.
- Adhesive: Phenol Resorcinol Formaldehyde / Resorcinol Formaldehyde / Phenol Formaldehyde / Epoxy Resin - refer to clause **C51.541** below.
- Brass Screws with pelleted
- Reinforcement where necessary:
- Type: Stainless steel dowels.
- Number/ size: TBA.
- Replacement timber: **PROVISIONAL - Douglas Fir** to match existing - allow for laboratory analysis of existing timbers species (both original 1875 and newer) - www.floydconsult.co.uk 01562885806 M- 07762614364.
- Sectional profiles of mating surfaces: To match cut ends of existing timber. **NOTE - the timber is to be slow grown with growth rings not exceeding 1.5mm** .

Always work new material to the line of the existing and avoid unnecessary trimming of the original timber. Repairs should be follow any existing deformations in the line of the window.

- Avoid mixing timber species between new and existing in a repair as the join between the two is likely to fail from different rates of expansion and contraction during dry and damp conditions.

- When carrying out a repair, try to ensure that the structural integrity of the window is maintained and that the window continues to work as it was designed to do.

- Where possible, spliced repairs should be designed to ensure that moisture is directed towards the outer face of the timber and that moisture does not lay on the repair join. The length of the splice is governed by the section of timber and the nature of component to ensure an effective bond between the new and existing section of timber.

- Wherever possible, splice repairs should be formed which include mechanical fixings (e.g. Timber pegs/dowels or non-ferrous screws/pins) as well as adhesive. Screw of pin fixings should ideally be made from the inner face of the window.

- Well-seasoned timber should be used in forming a repair with the line and density of the grain of the new timber matching the existing as closely as possible. As with all joinery work, timber with shakes, fissures, warping, sapwood or numerous/large knots be avoided for use in repair.

- Avoid previous design faults when carrying out repairs. Consider modifying a method of construction or previous repair where it is liable to led to further decay.

- If possible, repair to window frames should be formed in-situ especially where the frame is built-in and cannot be removed without damaging either the window or surrounding wall. In general, casements/sashes can be easily removed without damage to be repaired on site or in a joiner's workshop.

- Where windows are to be dismantled as part of the repair process, always mark and record the constituent parts before dismantling. Similarly, always number glass panes/quarries before removal.

• Glass replacement. Where possible reuse existing original or 1920 replacement glass. Non-original, broken or poor quality units (such as obscured glass to be replaced. Refer to L40. Allow 50% replacement of glass that is not identified as broken,

223 NEW HARDWOOD TIMBER REPLACEMENT

• Where new timber elements are required in whole, such as window bays or casements then this clause should be utilised.
Defective timber elements: Removed, but retained to provide template/profile information. Recycled once used.
• Size: match existing
• Profile: match existing unless shown otherwise
• Appearance Class: A1
• Adhesive: refer to clause 545
• Fixings and Ironmongery: Stainless steel or non-ferrous
-The use of corrosion-proof steel fastenings that conform to EN 10088-1 is recommended such as A2, A4 quality stainless steel.
• Glass replacement. Where possible reuse existing original or 1920 replacement glass. Non-original, broken or poor quality units (such as obscured glass to be replaced. Refer to L40. Allow 50% replacement of glass that is not identified as broken,
• Glazing Sealant:
Option 1: A comparability test would be required before proceeding - Repair-Care - Dry-Seal MP

224A JOINERY/COLUMN INTERFACE

As clause C50/A25

PRODUCTS

361 SOFTWOOD FOR JOINERY INTERNAL
• Species: Douglas fir.
• Quality: Generally to BS EN 942; free from decay and insect attack (except pinhole borers).
- Appearance class: Class J2 = small sections - free of all defects; J5 = intermediate sized sections i.e. c50mm x 25mm sections; J10 on large sections.
• Treatment: None required.
• Moisture content on delivery: 9-13%.
• Moulding Profiles TBC

371 JOINERY REPAIRS **Douglas Fir**
• Species: Douglas Fir.
• Quality: Generally to BS EN 942; free from decay and insect attack (except pinhole borers).
- Appearance class: Class J2 = small sections i.e. glazing bars, drip mouldings and the like - free of all defects; J5 = intermediate sized sections i.e. c50mm x 25mm sections; J10 on large structural sections.
• Treatment: Organic solvent wood preservative - site brushed or spray Boron Wood preservative.
• Moisture content on delivery: 12-16% - should be 14%.

375 REPLACEMENT/REPAIRS JOINERY Hardwood
• Species: approved.
• Quality: Generally to **BS EN 942** ; free from decay and insect attack (except pinhole borers).
- Appearance class: Class A1.
• Fixings/Ironmongery: to be non-ferrous

420 STAINLESS STEEL SECTIONS AND PLATES Hardwood members
• Standard: To **BS EN 10088** .
• Grade: 316.
• Source: Obtain steel from a source accredited to a national or internationally accepted quality standard.

480A SCREWS Timber Repairs
• Standard: As section Z20.
• Material: Brass.
• Tensile strength (minimum): TBC.

481 SCREWS Hardwood Repairs
• Standard: As section Z20.
• Material: Stainless steel.
• Tensile strength (minimum): TBC.

541 ADHESIVE TIMBER REPAIRS
• Type: Phenol Resorcinol Formaldehyde / Resorcinol Formaldehyde / Phenol Formaldehyde / Epoxy Resin.
• Manufacturer: Refer to TRADA adhesives suppliers .
- Product reference: Contractor to confirm adhesives selection.

545 ADHESIVE FOR Hardwood
• Type: polyurethane (PU), emulsion polymer isocyanate (EPI), epoxy and phenol resorcinol formaldehyde (PRF) adhesives - seek approval before proceeding.
• Manufacturer: Refer to Accoya for Approved Supplier.
• Insure computability with Resin Repair System and Hardwood Timber Repair Adhesive

EXECUTION

600 WORKMANSHIP
• Skill and experience of site operatives: Appropriate for types of work on which they are employed.
- Documentary evidence: Submit on request.

610A TEMPORARY SUPPORTS/ PROPPING
• General: Provide adequate temporary support at each stage of repair work to prevent damage, overstressing or uncontrolled collapse of any part of the structure.
• Bearings for temporary supports/ propping: Suitable to carry loads throughout repair operations.
• The timber fenestration provides stability and rigidity to the structural frame. A method statement should be submitted for approval to CA and SE before proceeding.

620 PROTECTION OF TIMBER AND WOOD COMPONENTS BEFORE AND DURING INSTALLATION
• Storage: Keep dry, under cover, clear of the ground and with good ventilation. Support sections/ components on regularly spaced, level bearers on a dry, firm base.
• Handling: Do not overstress, distort or disfigure sections or components during transit, storage, lifting, erection or fixing.

630 MATERIAL SAMPLES
• Representative samples of designated materials: Submit before placing orders.
- Designated materials: All visual timber profiles that are to match existing in Hardwood and Accoya Timber.

640 PROTOTYPES
• General: Prepare one of each of the following items and arrange for inspection before starting repetitive fabrication: All typical conditions, were new and repair sections are carried out to allow benchmarking of typical bays or areas requested by CA before proceeding with all areas.

650 DIMENSIONS GENERALLY
• Site dimensions: Take as necessary before starting fabrication.
- Discrepancies with drawings: Report without delay and obtain instructions before proceeding.

660 CROSS SECTION DIMENSIONS OF STRUCTURAL SOFTWOOD AND HARDWOOD
• General: Dimensions given on drawings and in schedules of work are finished sizes.
• Maximum permitted deviations from finished sizes:
- Sawn surfaces:
Thickness and widths < 100 mm: -1, +3 mm.
Thickness and widths > 100 mm: -2, +4 mm.
- Further processed surfaces:
Thickness and widths < 100 mm: -1, +1 mm.
Thickness and widths > 100 mm: -1.5, +1.5 mm.

670 CROSS SECTION DIMENSIONS OF NONSTRUCTURAL SOFTWOOD AND HARDWOOD
• General: Dimensions given on drawings and in schedules of work are finished sizes.
• Maximum permitted deviations from finished sizes:
- Sawn surfaces:
Thickness and widths < 100 mm: -1, +3 mm.
Thickness and widths > 100 mm: -2, +4 mm.
- Further processed surfaces: -0, +1.

680 WARPING OF TIMBER
• Bow, spring, twist and cup: Not greater than the limits set down in **BS 4978** or **BS EN 14081-1 for softwood** , or **BS 5756** for hardwood.

690 PROCESSING TREATED TIMBER
• Cutting and machining: Carry out as much as possible before treatment.
• Extensively processed timber: Retreat timber sawn lengthways, thicknessed, planed, ploughed, etc.
• Surfaces exposed by minor cutting and/ or drilling: Treat with two flood coats of a solution recommended by main treatment solution manufacturer.

700 WOOD COMPONENTS - AS DELIVERED FINISH
• Components to be painted: Final Coat, site touch up or additional coat if required.
• Components to be clear finished: N/A.

710 REUSE OF TIMBER SECTIONS/ WOOD COMPONENTS
• Sections/ components scheduled to be removed but not reused in existing locations: Agree extent of retention for reuse elsewhere in the works.
- Treatment following removal: Required.
- Storage: Protect against damage, and store until required.
Storage location: On site.
• Reuse: Adapt sections/ components, as necessary, and install in agreed locations.

720 TEMPORARY REMOVAL AND REINSTATEMENT OF FITTINGS/ FIXTURES
• Items to be removed, and reinstated on completion of repair work:
- Identification: Attach labels or otherwise mark items using durable, non-permanent means, to identify location and refixing instructions, where applicable.
- Treatment following removal: As specification and drawings.
- Storage: Protect against damage, and store until required.
Storage location: On site.
- Reinstatement: Refit in original locations using original installation methods.
• Items unsuitable or not required for reuse: Obtain instructions regarding disposal.

730 PARTIAL REMOVAL OF EXISTING DECORATIVE/ PROTECTIVE FINISH
• Extent: Remove minimum necessary to expose damaged or decayed wood. Feather the edge of remaining coating around repair site.
• Method: Careful abrasion using moistened waterproof abrasive paper.

740 REMOVAL OF EXISTING DECORATIVE/ PROTECTIVE FINISH
• Extent: Remove completely back to bare wood.
• Method: Refer to C51.

750 CLEANING DIRTY OR STAINED WOOD
• Generally: Scrub with neutral pH soap and clean, warm water.
• Old varnish: Remove using mixture of turpentine (not turpentine substitute) and acetone in proportions determined by experiment, followed by washing down.

760A REPAIR OF MEMBERS - CUTTING OUT MEMBERS
• Refer to SPAB Guidance - Technical Pamphlet 13 - The Repair of wood windows 1998
• Extent of timber removal: Cut out full cross section of member where wood is defective or decayed, plus 50 mm of sound wood.
• Distance from face of support to cut end of existing timber: Obtain instructions if dimension exceeds maximum shown on drawing.
• Joint profile: As drawings.

770 REPAIR OF COMPRESSION MEMBERS - PIECING IN
• Defective wood: Remove only decayed or defective wood. Finish cut-outs to clean, regular profiles.
• Timber inserts: Cut accurately to fit. Glue and pin in place. Lie of grain to match as closely as possible that of parent timber.
• Joint profile: Refer to **SPAB Guidance - Technical Pamphlet 13** - The Repair of wood windows 1998.

780 REPAIR OF DISTORTED TIMBER MEMBERS
• Generally: Repair to shape that member has assumed.

790 PEGS FOR MORTISE AND TENON JOINTS IN STRUCTURAL TIMBER
• Wood species: Oak.
• Condition: Dry, preferably oven 'baked' before use.
• Shape: Round and tapered.
• Second hand pegs: Do not use.
• Peg holes: Slightly offset such that when pegs are driven home, sections being joined are pulled together.

800A CONDITION OF DOWELS TO BE BONDED INTO TIMBER
• Condition at time of installation:
- Dowels generally: Free from corrosive pitting, loose mill scale, loose rust and contaminants that may adversely affect dowels, adhesive, or bond between the two.

820 MAKING CONNECTORED JOINTS
• Connector location: Where not shown otherwise, spacings, end and edge distances to be not less than Standard values to BS 5268-2, Section 6.
• Bolt hole: As close as practical to nominal diameter of bolt, and not more than 2 mm greater.
• Centres of bolt holes: Not more than 2 mm from positions shown on drawings.
• Assembly: Do not crush timber, deform washers or overstress bolts.

840 FIXING FRAMING ANCHORS AND CLEATS
• Before installation: Submit details if joint geometry prevents installation to manufacturer's recommendations.
• Installation: Secure using not less than number of fasteners recommended by manufacturer.

850 ADHESIVE JOINTS
• Moisture content of sections to be joined: Within 5% of equilibrium moisture content for conditions of service, and differing from each other by not more than 3%.
• Surfaces to be bonded: Close fitting, structurally sound, dry, and free from contamination by dirt, dust, grease or other deleterious substances.

870 MOISTURE CONTENT TESTING
• Procedure: When instructed, test timber sections with an electrical moisture meter with deep probes, that has been carefully calibrated against oven drying tests or otherwise guaranteed by an independent testing authority.
• Test sample: Test 5% but not less than 10 lengths of each cross-section in the centre of the length.
• Test results: 90% of values obtained to be within the specified range. Provide records of all tests.

COMPLETION

910 MECHANICALLY FASTENED JOINTS
• General: Inspect accessible bolted, coach screwed and timber pegged joints and tighten fasteners if necessary.
- Timing: On Completion and at end of Defects Liability Period or Rectification Period.

920 DATING TIMBERS USED IN STRUCTURAL REPAIRS
• Principal replacement members: Mark by carving or branding with date of repair and, when appropriate, initials of carpenter, in characters 20-25 mm high.
• Location of marks: To be agreed.

L40
General glazing

Section Revision History

No.	Purpose

L40 General glazing

To be read with Preliminaries/ General conditions.

50 NORMATIVE REFERENCES

Comply with the following normative references plus those cited below:
- BS 952-1:1995 - Glass for glazing. Classification
- BS 6262-1:2005 - Glazing for buildings. General methodology for the selection of glazing
- BS 6262-3:2005 Glazing for buildings. Code of practice for fire, security and wind loading.
- BS 6262-4:2005 Glazing for buildings. Code of practice for safety related to human impact.
- BS 6262-6:2005 Glazing for buildings. Code of practice for special applications.
- BS 6262-7:2005 Glazing for buildings. Code of practice for the provision of information.
- BS 8000-7: 1990 Workmanship on building sites - CoP Glazing.

GENERAL REQUIREMENTS

130 REMOVAL OF GLASS/ PLASTICS
- Existing glass/ plastics and glazing compound, beads, etc: Remove carefully, avoiding damage to frame, to leave clean, smooth rebates free from obstructions and debris.
- Deterioration of frame/ surround: Submit report on defects revealed by removal of glazing.
- Affected areas: Do not reglaze until instructed.

150 WORKMANSHIP GENERALLY
- Glazing generally: To BS 6262.
- Integrity: Glazing must be wind and watertight under all conditions with full allowance made for deflections and other movements.
- Dimensional tolerances: Panes/ sheets to be within ± 2 mm of specified dimensions.
- Materials:
- Compatibility: Glass/ plastics, surround materials, sealers, primers and paints/ clear finishes to be used together to be compatible. Avoid contact between glazing panes/ units and alkaline materials such as cement and lime.
- Protection: Keep materials dry until fixed. Protect insulating glass units and plastics glazing sheets from the sun and other heat sources.

152 PREPARATION
- Surrounds, rebates, grooves and beads: Clean and prepare before installing glazing.

155 GLASS GENERALLY
- Standards: To BS 952 and relevant parts of:
- BS EN 572 for basic soda lime silicate glass.
- BS EN 1096 for coated glass.
- BS EN 1748-1 for borosilicate glass.
- BS EN 1748-2 for ceramic glass.
- BS EN 1863 for heat strengthened soda lime silicate glass.
- BS EN 12150 for thermally toughened soda lime silicate safety glass
- BS EN 12337 for chemically strengthened soda lime silicate glass.
- BS EN 13024 for thermally toughened borosilicate safety glass.
- BS EN ISO 12543 for laminated glass and laminated safety glass.
- Panes/ sheets: Clean and free from obvious scratches, bubbles, cracks, rippling, dimples and other defects.
- Edges: Generally undamaged. Shells and chips not more than 2 mm deep and extending not more than 5 mm across the surface are acceptable if ground out.

165 HEAT SOAKING OF THERMALLY TOUGHENED GLASS
- Standard: BS EN 14179.
- Holding period (minimum): 2 hours.
- Mean glass temperature: 290° ± 10°C.
- Certified evidence of treatment: Submit.

• Designated locations:

TYPES OF GLAZING

210A PUTTY FRONTED SINGLE GLAZING Replacement Glazing to Timber Windows and Doors
• Pane material: 4.5mm Toughened goethe-Machine-Drawn-Glass .
• Surround: Existing, Refurbished and New timber window surrounds. .
- Type of putty: Refer to clauses 400A & 400B .
• Glass installation:
- Glass: Located centrally in surround using setting and location blocks, and secured with glazing sprigs/ cleats/ clips at 300 mm centres.
- Finished thickness of back bedding after inserting glazing (minimum): 1.5 mm.
- Front putty: Finished to a smooth, neat triangular profile stopping 2 mm short of sight line. Surface lightly brushed to seal putty to glass and left smooth with no brush marks.
• Sealing putty: Seal as soon as sufficiently hard but not within 7 days of glazing. Within 28 days apply either:
- Refer to M60 for paint finish.
• Opening lights: Keep in closed position until putty has set sufficiently to prevent displacement of glazing when opened.
Refer to clause 610A for back painting glass

400A PUTTY - LINSEED OIL

• Where part repair/replacement of putty, Linseed Oil Putty should be used. Where full replacement around whole glass unit, refer to clause 400B.

• Reference product:
Arbo Linseed Oil Putty
Traditional linseed oil putty manufactured in accordance to BS544.
Intended for hand or knife application for bedding and front puttying of glass to frame.
Protective treatment with a paint system and regular subsequent maintenance is essential to the long term performance of the putty.

Main Applications
Recommended for face glazing of primed softwood and absorbent hardwood frames.
Softwood frames should be primed with a suitable
primer to BS7956. Maximum recommended fillet size 30mm x 13mm.
Not recommended for use with laminated glass or flush edged double glazed units.

• Application Instructions
Joint preparation
All glazing surfaces must be clean, dry and free from all contamination.
-Arbo Linseed Oil Putty may be applied by hand or knife. Glazing should be carried out in accordance with BS8000 Part 7:1990 and the relevant clauses of BS6262

Colour: Natural

Application Temperature: + 5º C to + 30º C
Painting: Paint within 4 weeks of application after the putty has sufficiently skinned and firmed up to accept the paint finish. Both undercoat and final paint coats must be applied within this 4 week period.

Trial area is recommended to ensure compatibility.
Service Life: 20 years + when applied in accordance with established best practise and with regular maintenance of the paint finish.

400B GLAZING PUTTY – FOR WHOLE PANEL REPLACEMENT

For reinstallation of complete panes (i.e. no existing putty is retained).

Approved multi-purpose glazing sealant: Contractor's choice.
Preparation: Ensure all loose putty / paint is removed from existing frames. All glazing surfaces must be clean, dry and free from all contamination.
Installation: Glazing sealant in strict accordance with manufacturers written instructions

M60

Painting/ clear finishing

Section Revision History

No.	Purpose

To be read with Preliminaries/ General conditions.

12 REFER TO SPECIFICATION SECTION C50 REPAIRING/ RENOVATING/ CONSERVING METAL FOR METAL PAINT SPECIFICATION

22 NORMATIVE REFERENCES
Comply with the following normative references –

• **BS 6150: 2006 + A1:2014,** Painting of Buildings Code of Practice.

• **BS EN 1062-1: 2004** – Paints and varnishes. Coating materials and coating systems for exterior masonry and concrete. Classification

• **BRE Digest 422** – Painting exterior wood

• **Department of the Environment – Circular 3/92** – Environmental protection (control of injurious substances) regulations 1992

150A EXTERNAL SATIN PAINT EXISTING TIMBER (Price Option 1)

• FOR PREPARATION and REDECORATION - **BS 6150, clause 11.5.2 - complete removal of all previous paint coatings**

EGGSHELL/ SATIN PAINT

• Manufacturer: Dulux Trade – a brand by AkzoNobel.
Web: www.duluxtrade.co.uk
Email: john.ashford@akzonobel.com

• Product reference: Dulux Trade Weathershield Exterior Quick Drying Satin.
Surfaces: Non-resinous softwood, hardwood etc.
Preparation: Degrease and provide key.
Initial coats: To Bare area of timber exposed by removal of poorly adhered or defective coatings or areas of resin/timber repair : As recommended by manufacturer - Dulux Trade Weathershield Preservative
Primer: Dulux Weathershield preservative primer
Number of coats: 1
Undercoats: Dulux Trade Weathershield quick drying undercoat
Number of coats: 2
Finishing coats: Dulux Trade Weathershield Quick Dry Exterior Satin
Number of coats: 1
• Colour: (TBC)

150B EXTERNAL SATIN PAINT EXISTING TIMBER – EXISTING PAINT FINISH NOT REMOVED (Price Option 2)

EGGSHELL/ SATIN PAINT

• Manufacturer: Dulux Trade – a brand by AkzoNobel.
Web: www.duluxtrade.co.uk

• Product reference: Weathershield Exterior Quick Drying Satin
Surfaces: Existing painted woodwork.
Preparation: Remove all loose flaking paint and sand down all surfaces, prime areas of bare wood and fill to make-up paint levels.
Undercoats: Dulux Trade Weathershield Exterior Quick Drying undercoat
Number of coats: 2
Finishing coats: Dulux Trade Weathershield Quick Dry Exterior Satin
Number of coats: 1
• Colour: (TBC).

160 EXTERNAL PAINT EXISTING ALUMINIUM GUTTERS

• Manufacturer: Dulux Trade – a brand by AkzoNobel.
Web: www.duluxtrade.co.uk.
• Product reference: Weathermax HBR
Surfaces: Existing powder coated aluminium.
Preparation:
Clean the Substrate: - Any dirt or grease on the metal surface will prevent the subsequent coating from clinging, so all contaminates and debris must be removed. The aluminium can be hand washed using a soft brush or jet washed if the aluminium is extremely dirty. Any alkaline degreasing detergent used for cleaning needs to be rinsed off with water and left to dry.
Undercoats: Dulux Trade Weathershield Exterior Quick Drying undercoat
Remove Corrosion: - The powder coated aluminium may have corroded and the resulting corrosion deposits need to be mechanically stripped off. If powder coating appears chalky this white rust had better be removed and a scouring nylon pad should suffice. A power sander can be used to get rid of any red rust and to reveal a smooth metal surface. Then next stage is to wipe down the substrate with tack cloths to clean off any dust resulting from the removal of corrosion.
Abrade the Metal Surface: - One of the most difficult obstacles in painting over powder coating is ensuring the new coating adheres to the aluminium. Sanding the substrate removes the gloss from the original powder coating in order to provide a key so that the fresh coating will stick. It is worth noting that anodised aluminium will require more abrading than usual. If parts of the powder coating still remain it is important to feather the edges, so that there aren't any bumps or ridges on the surface. As with the process of removing corrosion, residues resulting from abrading must then be cleaned off.
Mask off Adjacent Surfaces: - Mask off the adjacent areas that need to be protected from primer or paint. Plastic sheeting, decorators tape and masking paper can all be used to stop finished surfaces from being ruined through overspray.
Prime: - Ensure that the entire surface is completely dry and contaminant-free and then prime as soon as practical after preparation before the surface oxidises or becomes re-contaminated with Luxepoxy 4 white primer.
Finishing coat: Dulux Weathermax HBR two pack coating system applied in strict accordance with manufacturers written instructions
• Colour: (TBC).

GENERAL

215 HANDLING AND STORAGE
• Coating materials: Deliver in sealed containers, labelled clearly with brand name, type of material and manufacturer's batch number.
• Materials from more than one batch: Store separately.

280 PROTECTION
• 'Wet paint' signs and barriers: Provide where necessary to protect other operatives and general public, and to prevent damage to freshly applied coatings.

PREPARATION

400 PREPARATION GENERALLY

• Standard: In accordance with BS 6150.
• Suspected existing hazardous materials: Prepare risk assessments and method statements covering operations, disposal of waste, containment and reoccupation, and obtain approval before commencing work.
• Preparation materials: Types recommended by their manufacturers and the coating manufacturer for the situation and surfaces being prepared.
• Substrates: Sufficiently dry in depth to suit coating.
• Efflorescence salts: Remove.
• Dirt, grease and oil: Remove. Give notice if contamination of surfaces/ substrates has occurred.
• Surface irregularities: Remove.
• Joints, cracks, holes and other depressions: Fill flush with surface, provide smooth finish.
• Dust, particles and residues from preparation: Remove and dispose of safely.
• Water based stoppers and fillers:
- Apply before priming unless recommended otherwise by manufacturer.
- If applied after priming: Patch prime.
• Oil based stoppers and fillers: Apply after priming.
• Doors, opening windows and other moving parts:
- Ease, if necessary, before coating.
- Prime resulting bare areas.

420 FIXTURES AND FITTINGS

• Removal: Before commencing work remove: Coverplates, grilles, wall clocks, and other surface mounted fixtures .
• Replacement: Refurbishment as necessary, refit when coating is dry.

425 IRONMONGERY

• Removal: Before commencing work remove ironmongery from surfaces to be coated.
• Hinges: Remove and to be cleaned and stripped as necessary.
• Replacement: Refurbish as necessary; refit when coating is dry.

430 EXISTING IRONMONGERY

• Refurbishment: Remove old coating marks. Clean and polish.

440B EXTERNAL JOINERY - EXTERNAL PREVIOUSLY COATED SURFACES GENERALLY

• Preparation: In accordance with **BS 6150, clause 11.5.2** - **complete removal of all previous paint coatings**.
• Contaminated or hazardous surfaces: Give notice of:
- Coatings suspected of containing lead.
- Substrates suspected of containing asbestos or other hazardous materials.
• Suspected existing hazardous materials: Prepare risk assessments and method statements covering operations, disposal of waste, containment and reoccupation, and obtain approval before commencing work.
• Significant rot, corrosion or other degradation of substrates.
• Removing coatings: Do not damage substrate and adjacent surfaces or adversely affect subsequent coatings.
• Organic growths and infected coatings:
- Remove with assistance of biocidal solution.
- Apply residual effect biocidal solution to inhibit regrowth
• Completely stripped surfaces: Prepare as for uncoated surfaces.
Degraded or weathered surface wood: Take back surface to provide suitable substrate.
Degraded substrate wood: Repair in accordance with C51 Conserving Timber Repair.
Heads of fasteners: Countersink sufficient to hold stoppers/ fillers.
Resinous areas and knots: Apply two coats of knotting.
Defective primer: Take back to bare wood and reprime.

445 FIXTURES AND FITTINGS

• Risk assessment and method statement for hazardous materials: Prepare for operations,

disposal of waste, containment and reoccupation, and obtain approval before commencing work.
• Removal: Before commencing work: Ironmongery, coverplates, grilles, wall clocks, and other surface mounted fixtures.
• Replacement: Refurbish as necessary, refit when coating is dry.

457A PREVIOUSLY COATED SURFACES - INFRARED STRIPPING
• Risk assessment and method statement: Prepare, and obtain approval before commencing work.
• Adjacent areas: Protect from finish removal and falling scrapings.
• Exposed resinous areas and knots: Apply two coats of knotting.
• Removed coatings: Dispose of safely.
• Manufacture : Speedheater System
• Supplier : Tensid
• Use appropriate sized Speedheater:
SH IR COBRA
SH IR SYSTEM 1100 RS
SH IR SYSTEM STANDARD
SH IR SYSTEM PROFESSIONAL T
• Follow Manufactures recommendations and guidance

458 PREVIOUSLY COATED SURFACES - PAINT STRIPPER
• Risk assessment and method statement: Prepare, and obtain approval before commencing work.
• Adjacent areas: Protect from finish removal and falling scrapings.
• Exposed resinous areas and knots: Apply two coats of knotting.
• Removed coatings: Dispose of safely.
• Manufacturer : Approved.
• System: Approved.
• Follow manufacturer's recommendations

461A PREVIOUSLY PAINTED WINDOW FRAMES
• Paint encroaching beyond glass sight line: Remove.
• Loose and defective putty: Remove.
• Putty cavities and junctions between previously painted surfaces and glass: Clean thoroughly.
• Finishing:
Patch prime, reputty, as necessary and allow to harden.
Seal and coat as soon as sufficiently hard.
• Repair in accordance with C51 Conserving Timber

471 PREPRIMED WOOD
• Areas of defective primer: Take back to bare timber.

481 UNCOATED WOOD
• General: Provide smooth, even finish with arrises and moulding edges lightly rounded or eased.
• Heads of fasteners: Countersink sufficient to hold stoppers/fillers.
• Resinous areas and knots: Apply two coats of knotting.

580 UNCOATED PLASTER
• Nibs, trowel marks and plaster splashes: Scrape off.
• Overtrowelled 'polished' areas: Key lightly.

622 ORGANIC GROWTHS
• Dead and loose growths and infected coatings: Scrape off and remove from site
• Treatment biocide: Apply appropriate solution to growth areas and surrounding surfaces.
• Residual effect biocide: Apply appropriate solution to inhibit re-establishment of growths.

631 PREVIOUSLY PAINTED WINDOW FRAMES

• Paint encroaching beyond glass sight line: Remove.
• Loose and defective putty: Remove.
• Putty cavities and junctions between previously painted surfaces and glass: Clean thoroughly.
• Finishing:
- Patch prime, reputty as necessary, and allow to harden.
- Seal and coat as soon as sufficiently hard.

APPLICATION

711 COATING GENERALLY
• Application standard: In accordance with BS 6150, clause 9.
• Conditions: Maintain suitable temperature, humidity and air quality during application and drying.
• Surfaces: Clean and dry at time of application.
• Thinning and intermixing of coatings: Not permitted unless recommended by manufacturer.
• Overpainting: Do not paint over intumescent strips or silicone mastics.
• Priming coats:
- Thickness: To suit surface porosity.
- Application: As soon as possible on same day as preparation is completed.
• Finish:
- Even, smooth and of uniform colour.
- Free from brush marks, sags, runs and other defects.
- Cut in neatly.
• Doors, opening windows and other moving parts: Ease before coating and between coats.

730 WORKSHOP COATING OF CONCEALED JOINERY SURFACES
• General: Apply coatings to all surfaces of components.

731 SITE COATING OF CONCEALED JOINERY SURFACES
• General: After priming, apply additional coatings to surfaces that will be concealed when fixed in place.
- Components: External door frames and built in window frames.
- Additional coatings: One undercoat.
770A EXTERNAL DOORS

• Repaired and new doors to be fully painted before re hanging, local touching up only.

780 BEAD GLAZING TO COATED WOOD
• Before glazing: Apply first two coats to rebates and beads.

790 PUTTY GLAZING
• Setting: Allow putty to set for seven days.
• Sealing:
- Within a further 14 days, seal with an oil based primer.
- Fully protect putty with coating system as soon as it is sufficiently hard.
- Extend finishing coats on to glass up to sight line.

Z20 FIXINGS/ ADHESIVES

To be read with Preliminaries/General Conditions.

110 FIXINGS GENERALLY

- Integrity of supported components: Types, sizes and quantities of fasteners/ packings and spacings of fixings selected to retain supported components without distortion or loss of support.
- Components/ substrates/ fasteners of dissimilar metals: Fixed with isolating washers/sleeves to avoid bimetallic corrosion.
- General usage: To recommendations of fastener manufacturers and/ Or manufacturers of components, products or materials fixed and fixed to.
- Appearance: As approved samples.

130 FASTENER DURABILITY

- Fasteners in external construction:
- Fasteners not directly exposed to weather: Of corrosion resistant material or with a corrosion resistant finish.
- Fasteners directly exposed to weather: Of corrosion resistant material.

140 FIXINGS THROUGH FINISHES

- Penetration of fasteners/ plugs into substrate: To achieve a secure fixing.

150 PACKINGS

- Function: To take up tolerances and prevent distortion of materials/ components.
- Materials: Noncompressible, noncorrodible, rot proof.
- Locations: Not within zones to be filled with sealant.

160 CRAMP FIXINGS
- Cramp positions: Maximum 150 mm from each end of frame sections and at 600 mm maximum c centres.
- Fasteners: Cramps fixed to frames with screws of same material as cramps.
- Cramp fixings in masonry work: Fully bedded in mortar.

230 PELLETED COUNTERSUNK FIXINGS
- Finished level of countersunk screw heads: Minimum 6 mm below timber surface.
- Pellets: Cut from matching timber, grain matched and glued in to full depth of hole.
- Finished level of pellets: Flush with surface.

250 POWDER ACTUATED FIXING SYSTEMS
- Powder actuated fixing tools: To BS 4078-2 and Kitemark certified. Operatives trained and certified as competent by tool manufacturer.
- Types of fastener, accessories and consumables: As recommended by tool manufacturer.
- Protective coating to exposed fasteners used externally or in other locations subject to dampness: Zinc rich primer to fastener heads.

510 ADHESIVES
- Storage/ Usage: In accordance with manufacturer's and statutory requirements.
- Surfaces: Clean. Regularity and texture adjusted to suit bonding and gap filling characteristics of adhesive.
- Finished adhesive joints: Fully bonded. Free of surplus adhesive.

Z21 MORTARS

To be read with Preliminaries/General Conditions.

CEMENT GAUGED MORTARS

110 MIX PROPORTIONS
- Specification: Proportions and special requirements for mortar materials are specified elsewhere in relevant mortar mix items.

120 SAND FOR CEMENT GAUGED MORTARS
- Standard: To BS 1200.
- Grades: Where the proportion of sand in a mortar mix is specified as a range (e.g. 1:1: 5 – 6) use: Lower proportion with type G sands.
Higher proportion with type S sands.
- Sand for facework mortar: Obtain from one source. Mix different loads if necessary to maintain consistent colour and texture.

131 READY-MIXED LIME:SAND FOR CEMENT GAUGED MORTARS
- Standard: To BS 4721.
- Pigments for coloured mortars: To BS EN 12878.

135 SITE PREPARED LIME:SAND FOR CEMENT GAUGED MORTARS
- Permitted use: Where a special colour is not required and in lieu of factory made ready-mixed material.
- Lime: Hydrated nonhydraulic lime to BS 890.

- Mixing: Thoroughly mix with sand, in the dry state. Add water and mix again. Allow to stand, without drying out, for at least 16 hours before using.

160 CEMENTS FOR MORTARS
- Cement:
- Standard: To BS EN 197-1.
- Types: Portland cement, CEM I.
  Portland slag cement, CEM II/ B-S.
  Portland fly ash cement, CEM II/ B-V.
- Strength class: 42.5 or 52.5.
- Sulfate resisting cement:
- Standard: To BS 4027.
- Strength class: 42.5 or 52.5.
- Masonry cement:
- Standard: To BS 5224.
- Class: MC 12.5 (with air entraining agent).
- Certification for all cements: BSI Kitemark scheme.

170 RETARDED READY TO USE CEMENT GAUGED MORTARS
- Standard: Generally to BS 4721, using materials specified in this section.
- Time and temperature limitations: Use within limits prescribed by mortar manufacturer.
- Retempering: Restore workability with water only within prescribed time limits.

180 ADMIXTURES FOR SITE PREPARED MORTARS
- Air entraining (plasticizing) admixtures: To BS 4887-1 and compatible with other mortar constituents.
- Usage: _____.
- Other admixtures: Submit proposals.
- Prohibited admixtures: Calcium chloride and any admixture containing calcium chloride

200 STORAGE OF CEMENT GAUGED MORTAR MATERIALS
- Sands and aggregates: Keep different types/ grades in separate stockpiles on hard, clean, free-draining bases.
- Factory produced ready-mixed lime:sand/ ready to use retarded mortars: Keep in covered containers to prevent drying out or wetting.
- Bagged cement/ hydrated lime: Store raised off the ground in dry conditions.

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

LIME:SAND MORTARS

310 MIX PROPORTIONS
- Specification: Proportions and special requirements for mortar materials are specified elsewhere in relevant mortar mix items.

320 SAND FOR LIME:SAND MORTARS
- Type: Sharp, well graded.
- Quality, sampling and testing: To BS 882 or BS 1200 as appropriate.
- Grading/ Source: As specified elsewhere in relevant mortar mix items.

330 READY PREPARED LIME PUTTY
- Type: Slaked directly from CL 90 (high calcium) quicklime to BS 890, using an excess of water.
- Maturation: In pits/ containers that allow excess water to drain away.
- Density of matured lime putty: 1.3 – 1.4 kg/litre.
- Maturation period before use (minimum): 30 days.

350 STORAGE OF LIME:SAND MORTAR MATERIALS
- Sands and aggregates: Keep different types/ grades in separate stockpiles on hard, clean, free-draining bases.
- Ready prepared nonhydraulic lime putty: Prevent drying out and protect from frost.
- Nonhydraulic lime:sand mortar: Store on clean bases or in clean containers that allow free drainage. Prevent drying out or wetting and protect from frost.
- Bagged hydrated hydraulic lime: Store raised off the ground in dry conditions.

360 MAKING LIME:SAND MORTARS GENERALLY
- Batching: By volume. Use clean and accurate gauge boxes or buckets.
- Mixing: Mix materials thoroughly to uniform consistency, free from lumps.
- Contamination: Prevent intermixing with other materials, including cement. Keep plant and banker boards clean.

370 SITE PREPARED NONHYDRAULIC LIME:SAND MORTARS
- Mixing: Mix materials thoroughly by compressing, beating and chopping. Do not add water.
- Equipment: Roller pan mixer or submit proposals.
- Maturation period before use (maximum): 7 days.

390 KNOCKING UP NONHYDRAULIC LIME:SAND MORTARS
- Knocking up before and during use: Achieve and maintain a workable consistency by compressing, beating and chopping. Do not add water.
- Equipment: Roller pan mixer or submit proposals.

400 MAKING HYDRAULIC LIME:SAND MORTARS
- Mixing hydrated hydraulic lime:sand: Follow the lime manufacturer's recommendations for each s stage of the mix.
- Water quantity: Only sufficient to produce a workable mix.
- Working time: Within limits recommended by the lime manufacturer.

Z22 Sealants

To be read with Preliminaries/General conditions.

50 NORMATIVE REFERENCES

Comply with the following normative references –

• **BRE Digest 463** - Selecting building sealants with **ISO 11600**.

• **BS EN ISO 11600:2003+A1:2011** - Building construction. Jointing products. Classification

• **BS EN ISO 6927:2012** - Buildings and civil engineering works. Sealants. Vocabulary

• **BS ISO 19861:2015** Buildings and civil engineering works. Sealants. Determination of curing Behaviour

• **BS 6213:2000+A1:2010** - Selection of construction sealants.

• **BS 6093:2006+A1:2013** - Design of joints and jointing in building construction

PRODUCTS

310 JOINTS **GENERALLY**
• Primer, backing strip, bond breaker: Types recommended by sealant manufacturer.

EXECUTION

610 SUITABILITY OF JOINTS
• Presealing checks:
- Joint dimensions: Within limits specified for the sealant.
- Substrate quality: Surfaces regular, undamaged and stable.

• Joints not fit to receive sealant: Submit proposals for rectification.

620 PREPARING JOINTS
• Surfaces to which sealant must adhere:
- Remove temporary coatings, tapes, loosely adhering material, dust, oil, grease, surface water and contaminants that may affect bond.
- Clean using materials and methods recommended by sealant manufacturer.

• Vulnerable surfaces adjacent to joints: Mask to prevent staining or smearing with primer or sealant.

• Backing strip and/ or bond breaker installation: Insert into joint to correct depth, without stretching or twisting, leaving no gaps.

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

630 APPLYING SEALANTS
• Substrate: Dry (unless recommended otherwise) and unaffected by frost, ice or snow.
• Environmental conditions: Do not dry or raise temperature of joints by heating.
• Sealant application: Fill joints completely and neatly, ensuring firm adhesion to substrates.
• Sealant profiles:
- Butt and lap joints: Slightly concave.
- Fillet joints: Flat or slightly convex.
• Protection: Protect finished joints from contamination or damage until sealant has cured.