

DRAFT

Conservation specification for the conservation and repair of architectural cast iron on the properties in the care of Scottish Ministers.

1.0 Summary Description

This specification is intended for the conservation, restoration and replication of historic architectural cast ironwork and structures on the properties in the care of Scottish Ministers.

2.0 General

2.1 Conservation, repair and maintenance shall be as defined in BS 7913

2.2 Unless specified otherwise the assumption shall be to conserve historic fabric.

2.3 Conservation and repairs shall be respectful to the original materials and craft employed in the original manufacture.

2.4 All Health and Safety, CDM and COSHH considerations are in place as a result of this specification or for its deployment.

2.5 These specifications shall be taken as being generally applicable to the drawings and other documents forming part of the building agreement or contract.

2.6 Plant and Labour. In accordance with the contract the practitioner shall supply materials tools, scaffolding, plant, and do or have done works in all trades necessary to carry out the work indicated on the drawings and in these specifications.

3.0 Materials

3.1 Cast Iron

Cast Iron shall be grey iron manufactured to BS EN 1561:2011 / EN 1561:2011. Manufacture in accordance with Section 11.0 of this specification. Ductile or Spheroidal Graphite shall not be used to replace original fabric.

3.2 Wrought Iron

Wrought iron shall be retained and re-used where appropriate except for fixings. Where replacement wrought iron is required this should be in agreement with the Project Manager to determine quality or alternative materials.

3.3 Mild Steel

For general purposes, steel to BS 970 : Part 1 : 1996 will be used. BS EN 10034 : 1993 - Structural steel I and H sections Tolerances on shape and dimensions BS EN 10219-2 : 1997 - Cold formed welded structural hollow sections of non-alloy and fine grain steels Part 2. Tolerances, dimensions and sectional properties and BS 4360 : 1990 Weldable structural steels as per drawings and application.

3.4 Stainless Steel

Stainless Steel shall be Grade 316 (1.4401) or 316L (1.4404). In extreme corrosive environments 2205 Duplex Stainless Steel shall be used.

4.0 Survey

Prior to any works commencing the practitioner shall undertake a comprehensive photographic record of the site and the structure. Files will be named according to location or feature and shall be Jpeg in format for printing at 300DPI. Photographs will be well illuminated and sharp. In low light conditions a tripod should be used.



A full measured survey should be undertaken on site for recording purposes.

5.0 Documentation

Assuming removal of fabric is required, individual components should be identified by labelling with stamped metal tags, securely wired to the component. These tags should not be removed until re-erection on site is being undertaken. The practitioner will create an Excel spreadsheet or Access database on which each component shall be identified. This will be used to record assessments and repairs to components and to produce a Conservation History on completion of the project. Further photographs should be taken throughout the project to create a comprehensive record.



A complete paint analysis shall be undertaken by the practitioner with a sampling rate relative to the structure and its potential ornamentation.

On completion a digital and two paper copies of Conservation History recording the project and interventions made.

New fabric introduced to the structure shall be dated accordingly - particularly metalwork. The manufacturer's or practitioner's name will also be stamped or cast into new fabric discreetly.



6.0 Down taking and dismantling

A method statement for any dismantling works shall be provided to the Project Manager a week in advance for approval prior to commencement. The works should deploy a methodical and technically sound approach which will minimise risk to the historic fabric. Whilst historic fixings may have to be destroyed in the process, samples should be retained and documented. A Structural Engineer should be deployed where appropriate to mitigate risk to the structure.

Lifting and slinging shall be undertaken by a competent person who shall ensure that no damage to the structure shall occur during the process. Custom lifting cradles, bars and the use of soft slings are required.

Where fixings cannot be removed by hand tools they may be drilled out or cut by hand or mechanical means. Care should be taken not to cut into adjacent fabric. The application of heat may be appropriate subject to a hot works permit system.

The practitioner shall provide a safe and secure lay down area. The practitioner shall ensure the security of the dismantled structural components and identify this in the method statement provided.

Where unforeseen circumstances or problems arise, the practitioner shall stop the dismantling process where it is safe to do so and seek the advice and approval of the Project Manager to proceed.

7.0 Transportation and storage

The transportation of elements shall be undertaken by a suitably experienced practitioner and in a manner which minimises the risk to the historic fabric. Cast iron components should not be stacked or transported loose in containers. Fine or fragile ironwork should be transported in appropriate racks of timber or steel with appropriate packing materials used. Care must be taken not to place load on components using span set or similar ratchet devices.

The practitioner must supply a safe and secure storage environment with sufficient space to lay out ironwork for inspection. The work area must be climate controlled to achieve relative humidity of 60% or less on a constant basis. Materials in storage should be acclimatised for at least 48 hours in this environment. The practitioner shall make provision to ensure there will be no cross - contamination or other accidental risk to the ironwork for the duration of the project.

8.0 Cleaning

Heavy contaminants may require to be removed by hand tools or pneumatic tools. This should be undertaken to Hand or Power Tool standard SA 2.



For initial assessment the material will then be blast cleaned to SA 1 standard. A RED blast holding primer shall be applied as an interim measure.

Following assessment with the Project Manager and repairs being undertaken the components should be cleaned to Blast Clean SA 2.5 prior to painting. The holding primer must be entirely removed and special attention taken to ensure all material is removed from crevices and occlusions.

The blast medium should be approved by the Project Manager. No metallic media should be used at any stage. An inert mineral grit is the preferred medium but other mediums may be considered depending on the circumstance and appropriateness of use.

Chemical cleaning may not be used at any stage of the process. The quality of the cleaning process and the environment in which it is undertaken is of critical importance. The practitioner

shall take all steps to ensure Rh control and to ensure there is no moisture absorption into the ironwork.

9.0 Repair techniques

The practitioner shall undertake a full and detailed inspection to develop a component based repair schedule for approval with the Project Manager. The Practitioner shall mark areas for intervention. A proprietary dye penetrant product shall be used to identify surface defects and fractures in castings particularly.

The repair schedule should consider the most appropriate intervention from the following techniques. The practitioner may propose other techniques to be used subject to approval.

9.1 Plating and pinning

The plating and pinning material shall be stainless steel 316L. Plates shall be shaped to the rear surface profile of a casting and drilled and tapped into the casting. Countersunk screws shall be used. A compatible filler medium with the paint system to be used should be used to bed the mating faces together. The filler should be carefully applied to ensure no air entrapment and sufficient material deployed that excess will squeeze out on compression.

Pinning will use stainless steel 316L as plain or threaded rod as appropriate. The penetration into the casting shall be filled with a compatible filler medium for assembly and mating cast iron faces likewise. any surface fracture should be filled to ensure no water penetration prior to final painting.

9.2 Porosity or decay

Areas of decay which demonstrate surface porosity must be adequately cleaned out and dried. The use of flame cleaning here is of benefit. Careful treatment following the final blast preparation is required. Aside from aesthetic appearance the filling of porous or decayed areas prevents water entrapment and ingress. Again heating the casting to around 2-300 degrees C is required in a continuously controlled Rh environment is of utmost importance.

The filler medium should match the paint system to be used.

Red lead paste from red oxide and boiled linseed oil or quality polysulphide mastics should be used in conjunction with oil or oil alkyd paint systems.

Epoxy fillers and silicone based products should not be used in conjunction with alkyd paint systems.

9.3 Brazing and Welding

This is not a preferred method but may be required in some cases. It should only be undertaken by an experienced and competent practitioner. Brazing is preferable to electric arc welding.

9.4 Metal Stitching

Generally should not be used as a repair technique unless specific circumstances dictate.

10.0 Fixings, Fittings and Joints

All fixings and fittings should be minimum 316L Stainless Steel. Every effort should be taken to insulate fixings from ironwork to prevent sacrificial corrosion. Nylon or PTFE sleeves or collars



should be used. Bolt length should be appropriate for application and not over -long. Stainless steel washers should be used in conjunction with an insulator. Fixings should be tightened by hand only and not over torqued.

Traditional profiles should be used. Square and Hexagon shaped heads are acceptable. Countersunk fixings should be slot head only.

11.0 Replication of cast ironwork

Where cast iron components require to be re-made in agreement with the Project Manager the following principles apply ;

- Existing castings are the principle reference.
- Where non exist, photographic or manufacturers catalogues should be used as reference.
- Existing castings may only be used as a pattern where the resulting shrinkage and loss of detail is considered to be acceptable.



- The aesthetic of the pattern should match the original casting in form and detail to provide an identical casting.
- Castings should be made in traditional green sand and hand moulded.
- Grey cast iron should be used.
- The casting should be sharp and have character to match that of the original component.
- Excessive porosity or distortion is not acceptable.

- Castings may not be filled, welded or re-worked in any way.

The Project Manager should approve sample castings as datums prior to production commencing.

12.0 Coatings, sealants and flexible joints

Red or white lead paste from red oxide and boiled linseed oil is the preferred sealant or flexible jointing material. High quality polysulphide mastic can be used in some circumstances to prevent water ingress. Product should meet BS EN ISO 11600 F 25 LM / BS 4254:1983.

Paint

INSERT COATING SPECIFICATION

TOTAL MINIMUM DFT : 200 DFT

All sharp edges and penetrations in the ironwork must be stripe painted by hand using un-thinned paint of a contrasting colour. In particular :
Gutter edges, column heads and capitals, bolted or riveted ironwork and ornamental fine cast work.

Gilding

Gilding must be undertaken using an artisan experienced in the craft. Finest 24 Carat Gold leaf is to be used onto a compatible size or cream coloured paintwork. See Specification XXXXXX



13.0 Site erection

All civil and preparatory works should be complete prior to delivery to site of restored components and structure. Transportation to site on finished components should allow for safe carriage, in particular to ensure no damage to the paint coatings.

Secure and safe storage should be provided by the practitioner. The methodology for construction should be approved by the Project Manager prior to execution. Extreme care should be taken not to cause damage to the paint system particularly. If this should occur a prompt remediation technique should be in place.

No metal cutting is allowed on site. The use of metal grinders is prohibited.

14.0 Quality Assurance

A Pre-Construction Meeting – A meeting between the Project Manager, the practitioner, the material supplier, and any sub contractor, shall be held at the site in order to review the project outcomes and approach, and to clarify any matters relating to this specification or programme.

B The Project Manager shall provide approvals to technical queries and approval routes outlined in this specification. Only approvals or instructions given in writing or by electronic means shall have contractual standing.

C The practitioner will provide evidence of monitoring of the relative humidity in workshop.

D The practitioner shall provide a log of paint inspection and sampling of quality including measures of DFT.

15.0 Reference Standards

If there is a conflict between the given specifications and reference standards, the specifier will make the final determination of applicable documents.

1 BS 7913:2013 Conservation of Historic Buildings

2 BS EN 1560:2011 / EN 1560:2011 - Founding. Designation system for cast iron. Material symbols and material numbers

3 BS EN 1561:2011 / EN 1561:2011 - Founding - Grey Cast Irons

4 BS 460:2002+A2:2007 - Cast Iron Rainwater Goods - specification

5 BS 51:1939 (Amended 1939, Revised 1948) (Withdrawn) Wrought Iron for general engineering purposes

6 ASTM F593 - 13a - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

7 BS EN ISO 3506-1:2009 Mechanical properties of corrosion-resistant stainless steel fasteners. Bolts, screws and studs

8 ISO 8501-1 Blast Cleaning incorporating SA1, SA2, SA 2.5, SA3, ST2, ST3, F1

9 BS EN 10034 : 1993 - Structural steel I and H sections Tolerances on shape and dimensions

10 BS EN 10219-2 : 1997 - Cold formed welded structural hollow sections of non-alloy and fine grain steels Part 2. Tolerances, dimensions and sectional properties

11 BS 4360 : 1990 Weldable structural steels

12 BS 970 : Part 1 : 1996 - Wrought steels for mechanical and allied engineering purposes

13 BS EN ISO 11600 F 25 LM BS 4254:1983 - Building construction. Jointing products.

Classification and requirements for sealants