

BRYNKINALT HALL, BRYNKINALT, WREXHAM, LL14 5NS

Harry Whittaker Dip Arch [Oxford] RIBA AABC

METHOD STATEMENT FOR THE REPAIR OF CAST AND WROUGHT IRON

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1.1 INTRODUCTION

Following the request from Iain Hill Trevor of Brynkinalt Hall, we have carried out an inspection of the site and prepared the following specification/ method statement for the removal of the inappropriate hard cement mortar and its replacement with gauged lime mortar together with the proposed rebuilding of structually insecure masonry.

This document describes the methodology behind the proposed repair and cleaning of the historic metalwork.

1.2 EXISTING CONDITION

The metalwork included in this report include -

- Cast iron rainwater goods including gutters, downpipes, hoppers, swan necks, running outlets etc
- Wrought iron supporting straps and ties

1.3 IRONWORK

Cleaning ironwork

Routine maintenance should include cleaning ironwork with water and a cloth, or a bristle brush if the soiling is light, so that dirt does not accumulate on the surface and trap moisture. Excessive amounts of water should not be used. High-pressure power hoses should not be used on historic ironwork as they can drive water into small cracks and crevices from where it will be difficult to dry out. Ironwork should be thoroughly dried off after cleaning. Localised areas of corrosion can be removed using a chisel, wire brush (preferably bronze wire) and sandpaper before painting over the cleaned metal. If routine maintenance is carried out, this should prevent more serious problems from developing, which would require far more time consuming and costly repairs at a later date.

The purpose of cleaning ironwork is to remove dirt, corrosion and, in some cases, existing layers of paint. Good surface preparation is necessary to ensure that new paint layers adhere properly to the iron surface and perform well. The degree of cleaning needed will depend on a number of factors, including the type and condition of ironwork (wrought or cast, robust or fragile) and the significance of any underlying paint, coatings, or decorative schemes. These may contain valuable and irreplaceable information on historic paint schemes, such as the decorative history of the element and the paint technology used. Other factors, such as the presence of mill scale (a stable oxide layer on the surface of iron which has a protective function)may also influence the choice of cleaning method. In some cases, the existing paint may be reasonably sound and it will only be necessary to remove surface dirt with water, and small localised areas of corrosion using a chisel, wire brush and sandpaper before repainting. Where corrosion or paint decay are more severe, it may be necessary to clean ironwork back to bare metal to provide the best base surface for fresh paint. The current recommended international standard for cleaning is the Swedish Standard, with SA 21/2 (very thorough blast cleaning) the most commonly applied. Certain levels of cleaning may not be appropriate for different types and condition of traditional ironwork.

The method used to clean ironwork should always be considered carefully. Some methods are more appropriate than others, and using the wrong cleaning technique can damage ironwork. Cleaning back to bare metal can be problematic. It removes all traces of previous coatings, destroying any evidence of earlier decorative schemes. To overcome this, it might be feasible to retain either a strip or patches of the existing paint layers that are of particular merit (preferably in areas that get the least direct sunlight), cleaning all other areas of the ironwork back to bare metal. Cleaning to SA 21/ 2 is also problematic for wrought iron. When wrought iron was made, the rolling process produced a surface layer referred to as ‘mill scale’ which is widely considered to protect ironwork from corrosion. Cleaning wrought ironwork to SA 21/ 2 standard will remove this mill scale and the protection it provides the iron. Tooling marks can also be lost by overly-aggressive cleaning techniques. However, there are a number of cleaning techniques, outlined below, that can be sensitive enough to allow a skilled operator to retain the mill scale layer.

Swedish Standard for cleaning steel:

- SA 1: Light blast cleaning
- SA 2: Thorough blast cleaning
- SA 21/2 : Very thorough blast cleaning
- SA 3: Blast cleaning to visually clean steel

1.4 Methods of cleaning ironwork

MANUAL CLEANING

Cleaning by hand using a chisel, wire brush and sandpaper is the most economical method of cleaning ironwork. However, care should be taken not to damage or score the surface of fragile ironwork. This method is not as effective as other cleaning methods

at removing all rust and dirt, and is most appropriate for mild, localised areas of corrosion.

MECHANICAL TOOLS
Hand-held tools such as grinders and rotary brushes are more efficient than manual cleaning, but still will not remove corrosion and dirt from narrow joints and difficult-to-reach areas. Such tools must be used with extreme caution, and only by an experienced craftsperson as, in the wrong hands, they can cause damage to the surface of ironwork and are likely to remove the mill scale surface from wrought iron. Needle guns offer an effective means of removing heavy corrosion by means of needle heads which pound the iron surface, but are also unable to clean hard-to-reach areas such as joints.

FLAME CLEANING
This is a traditional and common means of cleaning wrought iron in particular. A flame is passed over the surface of the iron (or it is placed on the forge) to soften paint and loosen corrosion material, which can then be brushed off. Flame cleaning should only be carried out by an experienced craftsperson. The use of a blow torch poses a significant fire hazard and is to be avoided at Brynkinalt.

CHEMICAL CLEANING
Chemical cleaners can offer an effective means of removing thick layers of paint while retaining delicate surface features such as mill scale and tooling. However, they should be used with caution and only by an experienced craftsperson.

ACID DIPPING OR ACID PICKLING
This method is used to remove corrosion material from ironwork and involves submerging ironwork in a vat of dilute phosphoric or sulphuric acid. This type of cleaning should only be carried out by an experienced craftsperson. It is an effective means of removing corrosion without damaging the surface of the ironwork. However, as with chemical cleaners, there is the risk that acid may soak into crevices and cracks and lead to future corrosion of the metal. It is therefore essential to thoroughly rinse the iron immediately after acid dipping to remove as much of the chemical as possible. The use of hydrochloric acid or sodium hydroxide (caustic soda) is not recommended.

BLAST CLEANING
Blast cleaning is a standard means of cleaning cast iron and is also used for wrought iron. Due to the health hazard posed by surviving layers of lead paint which might be disturbed and become airborne during the cleaning process, appropriate personal protection equipment should be worn and all other appropriate precautions taken when carrying out blast cleaning. The process involves blasting grit under pressure onto the surface of ironwork. The pressure can be adjusted. It is generally best to start at a low pressure and gradually increase it until the desired pressure is achieved. Fragile sections of iron, particularly delicate wrought ironwork such as leaf-work, can be vulnerable to damage if the pressure is too high. Blast cleaning should therefore be done with caution by an expert craftsperson and is best avoided for delicate or fine wrought ironwork. A variety of blast mediums can be used, ranging from inert mineral grit to glass beads, plastic pellets, and crushed walnut shells. Sand used as a blast medium is now subject to an international ban due to the danger of silicosis. The use of chilled iron and copper slag is not recommended. An inert mineral grit is one of the most effective blast mediums for cast iron, and will provide a good surface for new paint.

Where blast cleaning is to be carried out on ironwork this is to be to cast iron only and to be carried out on elements of rainwater goods which have been taken down and are not in situ. It is important to ensure that surrounding materials are carefully protected and that appropriate safety measures are taken to protect members of the public.

Note the individual caset iron elements are fragile and prone to damage from heavy handling. All leadwork is to be kept in situ with no cleaning works required

1.5 Ironwork repairs. Refixing cast iron guttering.

Before commencing the installation, inspect all supporting timber and brickwork to ensure they are in good condition and will adequately support the refixed cast iron gutters.

Determine the direction for fitting the gutters beginning with socketed end of the gutter. Position the first bracket 150mm from the end of the run. Fix subsequent brackets at 900mm maximum centres using a string line for alignment of brackets and ensuring a slight fall towards outlet positions. Gutters may be cut with a powered disc cutter or tipped hacksaw. When cutting gutters, ensure there are no loose filings left on the surface as these will cause discolouration of the paint finish. All cut ends, bolt heads and damaged paint areas should be retouched immediately.

Where building designs incorporate no fascia board, other types of bracket will be required, the most popular being side fixing rafter, top fixing rafter and rise and fall brackets with built in spikes.

JOINTING METHODS FOR CAST IRON GUTTERS
The cleaned and treated cast iron guttering is to be sealed at each joint with a low modulus silicone sealant or specialist





This page : images of typical cast iron and lead rainwater goods. Above right dated rainwater hopper.







This page : images of typical cast iron and lead rainwater goods together with wrought iron structural ties and bracing. Top left dated rainwater hopper.

rubberised bitumen gutter mastic.

The sealant should be spread evenly within the gutter socket applying additional sealant around the jointing hole before placing the gutter spigot into the socket and compressing both parts using M6 X25mmstainless steel mushroom head bolts, ensuring the bolt head is on the inside of the gutter.

The washer and nut should be lightly tightened from the underside of the gutter to allow excess sealant to be removed. Do not over tighten as this could result in damage to the fitting.

FIXING METHODS FOR CAST IRON DOWNPIPES
The traditional fixing for eared cast iron rainwater pipes in by using large headed pipe nails which are available in 75mm and 100mm lengths. These are secured in wooden plugs fitted in the brickwork/masonry background. Alternatively non corrosive coach screws, or other proprietary fixings may be used.

When fixing on an uneven or unstable surface the recommended method is to secure fixings by means of epoxy resin in pre-drilled holes.

JOINTING METHODS FOR CAST IRON DOWNPIPES
Vertical rainwater pipes would not normally be sealed. Only seal joints between gutter outlet and rainwater pipe or offset plus any joints in a horizontal position such as a 98 degree branch arm or bend.

It is recommended that three small wedges made from timber or sheet lead off-cuts are used to centralise the pipe joints and prevent any wind rattle.

1.6 PAINTING METHODS FOR CAST IRON RAINWATER GOODS.

It is important when painting cast iron to ensure that all surfaces are completely covered.
New and refurbished Cast Iron Rainwater products are supplied in a grey metal primer with rust inhibitors. Before fixing on site, the products should be inspected for damage to the finish and, where necessary, wire brushed and spot primed with an appropriate metal primer. This should be followed by two undercoats and one top coat or one undercoat and two top coats of a good quality, solvent based, exterior paint.

After installation ensure that any damage to the coating, jointing nuts, bolts and fixing screws is made good with the appropriate paint. All fittings are to be painted prior to installation to ensure adequate coating on all surfaces. This will reduce long term maintenance.

Signed: ....

Harry Whittaker, Dip. Arch (Oxford) RIBA. AABC 29th April 2024