

ST. KATHARINE'S THE DANISH CHURCH IN LONDON:
A12r MASONRY CLEANING

GENERAL REQUIREMENTS

- 100 TO BE READ with Preliminaries, Schedule of Work, Drawings and Specialist Report / Specification (as appropriate) which have been prepared specifically for this Contract.
- 105 **GENERALLY:** This Specification sets out the trade materials and workmanship requirements for the repair work in the Contract, which must be read with the General Conditions and other Contract Documents, particularly those listed above. The Contractor is required by this Specification to provide details of proposed sub-contractors or suppliers, and these must be supplied with his tender. Where method statements, drawings, samples and other proposals are required, these must be supplied at least three weeks in advance of the work commencing. These dates should be indicated on the Contractor's programme.
- 110 **FOREMAN:** The Contractor shall provide all reasonable personal supervision, including employing a thoroughly competent Foreman exclusively for this operation.
- 120 **SUB-CONTRACTORS** The masonry cleaning work may be sub-contracted to one of the following conservators, or another experienced specialist to be named by the contractor; or carried out by the contractor's own suitably qualified team. The Contractor must submit the company name and references with his tender for approval by the CA.
- Holden Conservation Ltd (contact Martin Holden 020 8740 1203)
 - Cliveden Conservation Ltd (contact Tony Herridge 01628 604721)
 - Hirst Conservation Ltd (contact Matthew Webster 01529 497449)
- 130 **SKILLED WORKMEN:** Cleaning is to be carried out by the cleaning contractor's own skilled operatives. Further sub-contracting of the cleaning work will NOT be permitted. Provide evidence of experience of the operatives and details of work previously carried out by them.
- 140 **DEDICATED TEAM:** Work is to be carried out by a dedicated team. Submit names to the CA with CVs and references. New operatives joining the project after its commencement will be required to prepare a range of samples for the approval of the CA before commencing any of the main works.
- 150 **CLEANING GENERALLY:** In keeping with the building's historic character, the intention of cleaning is to produce a 'sympathetic' rather than a severe clean. This means that the natural toning of surfaces (i.e. by long term weathering) is to be respected and retained but that areas of severe grime (normally caused by soot staining) and general surface dirt are to be removed. The degree of clean will normally be expressed as a % in the schedule and will be confirmed on site during sample area/s. Hard edges and rundown stains are to be graded off. It is not necessary or desired to remove all dirt completely; minor ingrained dirt flecks might be left. Paint drips from adjacent downpipes, or around window reveals are to be removed.
- 160 **CHECK DRAINS** before cleaning begins to ensure that the drainage system is able to cope with the quantity of water to be used. Provide adequate means of disposal of water throughout the trials and cleaning work. Do not allow dirty or excess water to run indiscriminately over the face of the building or onto pavements beneath.
- 170 **ACCESS:** Provide suitable access for the work by the use of mobile lifting platforms and/ or scaffold platforms. Ensure that design of scaffolding allows operatives to stand sufficiently far from the elevation being cleaned to avoid the formation of 'snail tracks' in the finished work. Scaffold levels are to allow for sufficient convenient and safe working to cornices, enrichments, etc. Co-ordinate the scaffold design and erection with the requirements of the cleaning contractor.
- 180 **PROTECTION:** Before commencing cleaning operations, protect window and door openings to prevent ingress of water and infiltration of fine dust particles to interior of building. Seal windows with tape, peelable plastic coating and sheet. Contain clouds of dust and abrasive by tightly screening the scaffold

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with reinforced translucent fire-proof sheeting. Ensure that window glass and painted wood are protected from damage. Finely carved or painted detail should be protected from general abrasive, water or steam cleaning, prior to any more selective cleaning. Existing electric conduits, switch boxes, sockets or other installations should be protected from excess soaking, falling dust and debris.

185 PAINTED SURFACES: Take care to avoid any historic painted surfaces which are to be protected and conserved only by the consultant conservator.

MATERIALS

190 WATER from mains supply, to be clean and uncontaminated, tested to BS 3148 if required.

195 DE_IONIZED WATER to be clean and uncontaminated supplied in labelled containers

200 BIOCIDES: LITHOFIN ALGEX, based on quaternary ammonium as manufactured by Lithofin GmbH D-73236 Wendlingen POB 1134 (Tel: 070 24 94 03-0); distributed in Great Britain by Casdron Enterprises Ltd, Arlesford, Hampshire SO24 9QF (Tel: 01962 732126).

210 ABRASIVES for dry and wet systems:

1. Aluminium oxide grades 80/120/A and 280/500/SS (dry).
2. Archifine (dry).
3. Calcium carbonate fine grade white carboniferous limestone granules, 150-300 microns (wet and dry).

220 BRUSHES FOR USE ON STONWORK:

1. Phosphor bronze brushes to be made of phosphor bronze bristles in close formation as obtainable from Picreator Enterprises Ltd, 44 Park View Gardens, London NW4 2PN. (Under no circumstances should ferrous brushes may be used).
2. Bristle brushes: A variety of bristle brushes may be employed such as toothbrushes, nail brushes and general-purpose hardware brushes. Bristle to be of uniform height in close formation.

230 AMMONIUM HYDRO-CARBONATE:

To be used in solution up to 5% maximum with de-ionized water

240 COTTONWOOL:

Acid free PH neutral natural cotton wool for swabs

250 PAPER

Acid free PH neutral natural tissue paper for poultices

260 LATEX CLEANING PASTE:

Proprietary film- producing thixotropic latex cleaning paste containing ammonia cleaning agent-

- Clean Film No. 1 by Stonehealth Ltd of Dursley Gloucester (tel. 01453 540600, dursley@stonehealth.co.uk)
- Clean Film No. 3 to selected areas only.

270 SYNTHETIC CLAY POULTICE:

Proprietary highly purified synthetic colloidal clay for poultices-

- Laponite RD by Southern Clay Products of Gonzales, Texas USA (Tel 830 672 2891; www.gelwhite.com)

280 DOFF and JOS SYSTEMS:

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- Proprietary cleaning systems supplied by Stonehealth Ltd of Dursley Gloucester (tel. 01453 540600, dursley@stonehealth.co.uk) which can only be used by licensed companies and individual operatives trained by the supplier.

WORKMANSHIP

- 290 CODE OF PRACTICE: Comply with all the relevant British Standards and Codes of Practice; in particular with BS 6270: Part 1: 1982 Cleaning and Surface Repair of Buildings with BS 5390: Section 5 – Work on Site.
- 300 CONSTANT VIGILANCE: Operatives must remain alert to changes which may become apparent in the surface which they are working and respond, as necessary, by adjustments in pressure or size of abrasive.
- 310 STEADY PACE: Work must never be hurried. Rushed air abrasive work can result in a mottled 'gun-shading' which becomes apparent with subsequent weathering.
- 320 NOZZLES: Select nozzles appropriate to nature of surface. Any nozzle employed must be capable of delivering even particle spread and a constant flow of abrasive to the work surface with the air/grit mix at any pressure being as lean as possible.
- 330 PROTECTIVE CLOTHING: Operatives must have the protection of 'air-line' helmets supplied with filtered air when cleaning with dry abrasives so as to maintain a positive pressure inside to prevent ingress of dust. Full protective clothing must be worn at all times during the application of dry and wet abrasives.
- 340 APPROVALS: Obtain all necessary approvals from Local Authorities and Public Undertakers. Comply with all police regulations and restrictions when working externally adjacent to the public highway.
- 350 HEALTH AND SAFETY: Comply with all current health and safety regulations and restrictions.
- 360 SAMPLE/S: A sample area/s of approximately 2m² in an agreed location shall be cleaned initially for approval and be returned as a reference panel for the remainder of the cleaning contract. The Contractor must allow for 3 such panels for each different method and for each different material or condition to be cleaned in order to establish the degree of clean and best method. Samples are to meet CA's approval, before proceeding with the work. Allow for samples in the programme of work and to be protected and maintained during the work for reference.
- 370 STANDARD OF CLEANING: Ensure cleaning processes are consistent throughout and reach the standard of the selected sample. Monitor the works and ensure that the methods, quantity and extent of cleaning in different areas are in accordance with CA's Instructions.
- 380 DIFFICULT AREAS, INCLUDING SEVERE RUST STAINING: If to achieve the standard of cleaning shown on the sample panel special processes are needed, these must be agreed with the CA prior to commencement.
- 390 TAR STAINS: Keep wetting to the minimum to lessen the likelihood of staining by water soluble tars. If such staining occurs, inform the CA.
- 400 CHECKING PROTECTION DURING CLEANING: The Contractor is to be responsible for ensuring that if water or dust is found to penetrate to the inside of the building cleaning should be stopped immediately and the point of penetration made good, and any damage promptly reported to the CA.
- 410 DRAINS: Prior to cleaning, all drainage systems in the affected area should be protected and, wherever possible, temporarily diverted to prevent blockages by the ingress damp cleaning powder. Land drains are to be protected using hessian, geotextile sheeting or other dust barriers to prevent infection of the drainage system. Be prepared to stop cleaning during rain so that the drains are not overloaded.

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Maintain the rainwater drains in working order throughout the Contract, ensuring that any abrasive materials used are prevented from entering the drains. It is important that gullies are left clear and unimpeded by debris, wires, conduits and fixings, etc during the works. Clear routes to gullies to be maintained, especially at natural blockage points.

- 420 WASHING DOWN: All dry debris is to be collected at the level on which it lies by means of brooms and vacuum cleaners. At the end of each day, after the removal of dust, wash down all surfaces with clean water. The scaffold is not to be swept in such a manner that materials fall to a lower level.

METHODS OF CLEANING

- 430 PRELIMINARY CLEAN TO ROBUST EXTERNAL SURFACES: Before any water, abrasive or chemical is applied to the face of the building, clean off heavy deposits with wooden scrapers, soft bristle or bronze wire brushes.
- 440 PRELIMINARY CLEAN TO FRIABLE AND INTERNAL SURFACES: Before any water, abrasive or chemical is applied to the face of the building, clean off heavy deposits of dust with specialist vacuum cleaner and gently brush down friable areas carefully. Vacuum cleaners must be back pack mounted units designed for conservation work with a variety of soft brush nozzles.
- 450 INSPECTION: Following initial clean carry out an inspection of all areas with the CA to establish the method of clean in each area. Identify damaged stones that should not be cleaned. Mark up drawings and keep a record of instructions.
- 460 'DOFF' STEAM CLEANING: The DOFF cleaning system involves specialist equipment available from Stonehealth Limited. Cleaning is to be carried out by a qualified operator who has received instruction and whose work is, in any case, to the satisfaction of the CA. The contractor must conform to all health and safety requirements when working with dust producing appliances. Use appropriate pressure and nozzles depending upon the friability of the areas to be cleaned and avoid over cleaning or 'tide' marks. Use on moss growth and weathering surfaces prior to biocide treatment. Carry out trial areas prior to proceeding with general clean. DOFF clean may be carried out prior to CA's inspection with prior agreement.
- 470 WASHING ROBUST EXTERNAL SURFACES: Water is to be used sparingly. Rinsing and washing by water will be permissible on surfaces of the building where biocide treatment is to be applied for the removal of organic matter. Selectively spray the soiled surface of the stone using garden type mist sprays with clean water to soften deposits prior to brushing or other cleaning method. Work down in horizontal bands starting from the top and lightly brush or scrub with the specified brushes. Avoid drips and staining when rinsing down stone with clean water and scrubbing with soft bristles brushes. The final clean off of all surfaces will be a wash down with high pressure low-volume water lance.
- 475 WASHING may also be adopted as the sole cleaning method if it can be established that no previous cleaning utilising chemicals had been undertaken and where the accumulation of hardened dirt or stubborn staining is not severe. In those circumstances the washing will be achieved by scaffold-mounted, flexible-head, fine-nozzle water jets to provide a nebulous spray with intermittent (pulse) controls giving approximately 10 seconds spray in four minute cycles. The process is manually assisted with soft natural bristle or soft bronze bristle brushes and small gritstone blocks. Adjust cycling as required to allow the minimum effective wetting to be established and maintained.
- 480 LATEX COMPOUND CLEANING: Apply compound in accordance with manufacturers instructions by hand held spray or soft long haired brush or sponge as appropriate for different area. Allow to form a continuous film coating over area to be cleaned and leave to dwell for optimum time determined following trials, to be at least 24 hours. Do not spray deep into undercut carving or mouldings so as to avoid damage. Carefully peel from surfaces as a sheet. Retain and note position of any feed fragments of

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stone ready for refixing. Lightly sponge surface with a damp but not wet sponge immediately to lift off the residual dirt. Second clean may be necessary in the most stubborn areas.

490 **POULTICE CLEAN OF STAINING:** Make up paper or Laponite clay compound with pure water to form a poultice compound and apply to agreed areas. Hold in position with suitable media and cover with polythene sealed to surrounding surfaces to retain moisture. Do not apply into undercut areas of carving. Allow to dwell for optimum time as determined during trials. Carefully remove and lightly sponge with damp cloth. Second clean may be necessary in the most stubborn areas. Add chemical agents to subsequent poultices following trials where staining is severe. Start with a weak solution and gradually increase concentration of additives by incremental degrees, recording results of trial areas before proceeding. Thoroughly rinse on completion.

500 **SWAB CLEAN OF CARVED AREAS:** Clean carved areas of stonework with cotton wool swabs and de-ionized water. Use plain water in first instance, adding a solution of ammonium hydro-carbonate to more stubborn areas up to a maximum of 5% solution, following trials. Blend-in perimeters of cleaned areas to surrounding surfaces to give a consistent appearance to each wall area or bay.

510 **ABRASION:** One or more of the following methods may be adopted with the approval of the CA:

A: Hand-held dry abrasive technique controlled to a maximum pressure of 20 psi using aluminium oxide / archifine abrasive, 50-100 microns diameter, complying with current COSH Regulations, with powered extraction, as Jackson and Cox MICRO PARTICLE RESTORATION SYSTEM (Tel: 020 8960 3131), brushed down with dry bristle brushes, and final vigorous wash with clean water.

B: Hand-held bronze bristle brush, washed down with clean water.

C: Hand rubbing with soft gritstone block, to flat ashlar, etc, but not to moulded, incised or otherwise decorated surfaces.

D: Dry Brushing Technique: Remove dirt, matter, etc, by lightly brushing with soft phosphor bronze bristle brushes or with nylon or fibre bristle brushes or wooden spatulas, or knife blades or scalpels, etc.

E: Air Abrasive cleaning of carved detail: Subject to WRITTEN CAS INSTRUCTION clean carved detail with dry abrasive air suction tool using minimum effective pressure but this not to exceed 14kPa (100 psi). Test clean areas to establish suitable abrasive and nozzle type with a preference for the final abrasives. After cleaning wash off residual dust and abrasive with a high pressure, low volume water lance or similar approved method. Stonework must be thoroughly dry before commencing air abrasive cleaning.

F: JOS cleaning

The JOS cleaning system involves specialist equipment available from Stonehealth Limited. Cleaning is to be carried out by a qualified operator who has received instruction and whose work is, in any case, to the satisfaction of the CA. The contractor must conform to all health and safety requirements when working with dust producing appliances. All openings, areas not to be cleaned and potential dust traps must be protected prior to carrying out any works. Test clean areas to establish suitable abrasive and nozzle type with a preference for the finer abrasives and a preference to a micro nozzle or fine carved detail (20 psi max). Wash off residual dust and an abrasive after cleaning using integral low pressure water lance or similar approved method (30 psi max). Work from the top, down. Remove resulting dust and slurry as works progress. Do not allow excessive build-up of dust on the scaffold or building. Dust is to be collected, sealed in bags and removed from the scaffold as work progresses. On completion of the cleaning all residual dust is to be brushed off and cavities flushed out leaving the building free of dust prior to stonework repairs.

G: Removing soluble salts from stonework: poultice method

Provide temporary drainage at base of area to undergo desalination.

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Saturate specified area with clean water using fine mist sprays. Allow approximately three days to achieve full saturation. Prepare poultice by adding attapulgitic clay, or other approved absorbent clay, to clean water to make a workable paste. The clay poultice may be mixed using a small mechanical mixer or by hand.

Apply poultice using a plaster's float or broad trowel to approximately 25mm thickness, ensuring full contact with stone face. Reinforce with light gauge galvanised steel wire mesh pressed into the clay surface and carefully secured with staples into mortar joints.

Protect poultice from direct sun and wind and allow to dry slowly (approximately 1 month). Take down clay and reinforcement when instructed. Brush down wall surface to remove all remains of contaminated clay. Note that all used clay must be removed from site without being allowed to recontaminate any part of the building. Pay particular attention to the removal of dry clay dust. Repeat entire process as directed until salt concentration has been reduced sufficiently.

H: Removing paints and tar from stonework

Undertake test clean to a designated area to determine exact concentration and dwell time before proceeding with the work. Prepare surface i.e. plugholes, etc. Apply Nitomors Green Range Gel with brush. Allow to dwell 15 to 30 minutes. Carefully scrape off softened paint with spatula. Rinse residual from stonework using low-pressure hot water lance (20 psi max).

- 520 CHEMICAL CLEAN: One or more of the following methods may be adopted with the approval of the CA:
A: Detergent wash using non-ionic, chemically neutral and biodegradable, proprietary 'soup'; as an additive to clean water; warm or hand-hot water will be permitted.
B: Proprietary biocides applied strictly in accordance with manufacturer's instructions to remove biological matter.

- 530 REMOVAL OF MOSS, LICHEN, etc
Obtain approval from CA for the degree of clean and the areas to be cleaned; it is not always appropriate to remove lichens from areas of weathered stonework; although moss should always be removed and the spores killed on copings, sills and weather moulds.

A: Dry Technique

Remove as much growth as is possible in the form of plants and thick cushions of moss, without damaging the stone beneath, using wooden spatulae, scrapers, knife blades and stiff bristle and non-ferrous soft wire brushes. If the surface below the growth is delicate or liable to be marked or scoured in any way this preparation must be limited to the lifting of moss only.

B: Minimum Water Technique with biocide

- a) Remove as much growth as is possible in the form of plants and thick cushions of moss, without damaging the stone beneath, using wooden spatulae, scrapers, knife blades and stiff bristle and non-ferrous soft wire brushes.
- b) Prepare a solution of biocide to the manufacturer's specification. Observe manufacturer's safety instructions. Rubber gloves and boots, masks and eye goggles should be worn.
- c) Sparingly and selectively spray solution onto dry stone surface with a garden-type sprayer or sponge with a cloth. Wear gloves and other protective gear as the manufacturer directs.
- d) Leave the treated area until stone is completely dry, at least 24 hours.
- e) Brush off dead growth with stiff bristle or non-ferrous phosphor bronze soft wire brushes.
- f) If necessary, and only where instructed by the CA, repeat the process in localised areas.

C: Flood Spray Technique with biocide

- a) and b) as Minimum Water Technique a) and b)
- c) Fill a pneumatic garden-type sprayer two-thirds full with the diluted biocide. Adjust the nozzle to a coarse spray setting. There should be sufficient pressure at the wand nozzle, after pumping the container, to saturate the surface of the masonry without causing excessive 'bounce back' and spray drift.

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Apply a flood coat. Commence at the top of the vertical surface to be treated and move across horizontally and slowly to allow approximately 100mm run down. The next horizontal pass should be made across the previous run down.

d) Leave the treated area until the stone is completely dry and in no case for less than 24 hours.

e) Brush off as much dead growth as possible with bristle brushes, making sure that any adjacent gutters and hoppers are kept clear.

f) If necessary, and only where instructed by the CA, repeat the process in localised areas.

540 **REMOVAL OF MAJOR IVY GROWTH**

Cut out a section of the main stem in a convenient position as close as possible to the ground.

Cut and peel back the bark of the root stump in strips to form a "frill girdle" all round.

Make up a toxic paste from ammonium sulphamate crystals and apply thoroughly to the exposed areas of the root stump. Fold back the cut bark over the paste and cover the end of the stump with polythene.

NOTE: The remaining sulphamate is chemically incompatible with lime mortar, and great care should be taken to provide adequate protection to the walls while the paste is being applied.

Spray the upper section of the plant with glyphosate weedkiller strictly in accordance with the manufacturer's recommendations. Allow the plant to absorb the toxins and die.

When dead, the plant may be carefully removed. Do not attempt to pull growth off in one go, as this can cause considerable damage. Proceed carefully, removing one stem at a time, in sections if necessary.

Consult CA if any large stems are found to have penetrated the masonry, as mature growth must be carefully cut out each joint individually, and wedging and / or repacking carried out as work proceeds.

550 **REMOVAL OF PERENNIAL HERBACEOUS and WOODY WEEDS FROM WALL HEADS and PAVINGS, etc.** Spot spray with glyphosate in accordance with manufacturers recommendations. Leave the treated area until the plant is dead and the stone or brick is completely dry, at least 24 hours. Brush off dead growth with stiff bristle or non-ferrous phosphor bronze soft wire brushes. If necessary, repeat the process in localised areas.

UPON COMPLETION

560 **DRAINS:** Flush all drains and rod where required. Leave clean and in working order at the end of the contract. Ensure also that blockages are not left in rainwater pipes.

570 **ON COMPLETION:** Finally remove all dust and spent abrasive by final wash down with high pressure, low-volume water lance. Avoid indiscreet or careless lancing. After washing down but before removal of temporary protection and access scaffolding, gain the approval of the CA for the cleaning. Remove and take away all protection, equipment, waste and other materials.

580 **REINSTATE** any damaged material to match existing at the Contractor's expense and as instructed by the CA.

590 **CONSERVATION RECORD**

Keep a photographic record of cleaning works before, during and after the works. Mark up drawings to show the areas of the different methods employed. Present two hard and one disc copy of report at Practical Completion including reference to all materials, suppliers and specialists employed.