Amspec Limited
Kilshaw Street
Lamberhead Industrial Estate
Pemberton
Wigan
WN5 8EA

Telephone: 01942 621 342
Fax: 01942 226 552
https://amspec.co.uk/

1.0 Method statement

Document created: 17 Jul 24
Document updated: 09 Oct 24
Revision number: 4
Document approved: 09 Oct 24
Approved by: Michelle Aidley
Prepared by: Michelle Aidley
Position: Health, Safety & Compliance Co-Ordinator

Kings House - Masonry Brickwork / Mortar Repairs

Location of works:
Kings House External

Site address:
40-42 King Street West
Manchester
M34WY

Project reference: 2126.
Client: Bruntwood SciTech
Principal contractor: Amspec Ltd
Start date and end date: 22/07/2024 to 27/05/2025

1.1 Description of activity

Amspec will follow the Historic England best Practice guide for Repointing Brick and Stone walls. (attached for reference)

Repointing of the brickwork will typically take place where scaffolding ties are currently fixed. In accordance with guidance documents provided and surveys carried out by Mono Masonry. Amspec will use a hydraulic Lime mortar as outlined below.

REPOINTING MORTAR & MIXES FOR REPAIRS STATEMENT

Repointing mortar should be chosen on the basis of the resistance of the masonry unit to weathering and should match the appearance, permeability and mechanical properties of the original mortar, including adhesion, ability to tolerate movement, strength, and durability (resistance to damage by frost and salts).

Original mortars should be repaired with materials and mixes that match the original as closely as possible. We envisage that repair mortars will be a either OB3 1:3 KA30 F/D or OB3 1:3 KA30 C/D (Otterbein Natural Hydraulic Lime NHL2 with either Fine or Coarse Sand).

NOTE: There are no standard mixes for repair work, and adjustments should be made to match the appearance and composition of the original mortar, type and condition of stones or bricks, and the degree of exposure. Amspec have therefore proposed to use the below mix which is suitable for bedding and jointing external walls.

Repointing methodology

1. Clean all cracks with a compressed air gun prior to filling. Carefully rake out any existing repairs to holes and cracks prior to cleaning to a minimum depth of 25mm or 3 x width. Embedded iron and hardwood inserts to be loosened by limited drilling and sharp masonry chisels, then removed.

2. Tools must not wedge the joint or cause spalling. Disc cutters or similar must NOT BE USED.

3. All cutting out should leave a clean, square face at the back of the joint to provide optimum contact with the new mortar.

4. Carefully clean open and prepared faces with a soft or stiff bristle brush and flush out with clean water, avoiding unnecessary saturation. Fine openings should be cleaned with water using a hypodermic syringe. All dust and loose material must be removed working from top to bottom of the element/ wall.

5. If joints dry out after cleaning re-wet prior to placing new mortar, to avoid undue suction taking too much water too soon from the mortar. Area to be cleaned to receive mortar repair including austenitic stainless steel armature if depth and width excessive.

6. Infill in layers with hydraulic lime mortar followed by a top fill of hydraulic lime mortar, stone dust, and sand to match surrounding existing mortar colours. The joints should be filled flush.

7. Where fine joints are to be repointed, masking tape or latex masking paint may be used.

Mix

- 1 part hydraulic lime 2 NHL
- 1 part pit sand sieved to <2.36mm
- ½ part fine red sand sieved to <600 microns
- 1 parts silica quartz sand sieved to <1000 microns
- Lime: St Astier NHL. 2

Brickwork repair methodology

1. For small areas of brickwork that have decayed less than 50% a plastic repair (mortar repair is appropriate). Process and methodology is to be followed as with above repair categories, with the exception that the mortar should be colour matched to the surrounding brickwork.

2. Methodology: Carefully rake out any deteriorated brickwork to a minimum depth of 25mm or 3 x width. Hand tools only are to be used, with the understanding that the minimum historic fabric is to be removed.

3. All cutting out should leave a clean, square face at the back of the area to provide optimum contact with the new mortar.

4. Carefully clean open and prepared faces with a soft or stiff bristle brush and flush out with clean water, avoiding unnecessary saturation. Fine openings should be cleaned with water using a hypodermic syringe. All dust and loose material must be removed working from top to bottom of the element/ wall.

5. If areas dry out after cleaning re-wet prior to placing new mortar, to avoid undue suction taking too much water too soon from the mortar.

6. Infill in layers with hydraulic lime mortar followed by a top fill of hydraulic lime mortar, stone dust, and sand to match surrounding existing brickwork colours. The joints should be maintained and remain distinct, and filled flush.

7. Where fine joints are to be repointed, masking tape or latex masking paint may be used.

Mix

- 1 part hydraulic lime 2 NHL
- 1 part pit sand sieved to <2.36mm
- ½ part fine red sand sieved to <600 microns
- 1 parts silica quartz sand sieved to <1000 microns
- Lime: St Astier NHL. 2

Adverse Weather Statement

1. Frozen materials: Do not use. Do not lay masonry units on frozen surfaces.

2. Air temperature: Do not bed masonry units or repoint.

3. In cement gauged mortars when at or below 3°C and falling or unless it is at least 1°C and rising (unless mortar has a temperature of not less than 4°C when laid and the masonry is thoroughly protected).

4. In hydraulic lime sand mortars when at or below 5°C and falling or unless it is at least 3°C and rising.

5. In nonhydraulic lime sand mortars in cold weather without approval.

6. Temperature of the work: Maintain above freezing until mortar has fully set.

7.Rain and snow: Protect masonry by covering during precipitation and at all times when work is not proceeding.

8.Hot conditions and drying winds: Prevent masonry from drying out too rapidly.

9. New mortar damaged by frost: Rake out and replace.

1.2 PPE Requirements

Safety Hats

Safety Boots

Hi Vis Vest

Safety Gloves

Dust Mask

Safety Goggles

Long Sleeves and Trousers

1.3 Specific PPE requirements

- Mandatory PPE requirements are: Hard hat, High Visibility Vest, Safety Footwear with an S3 rating, gloves (specified types as follows)

Gloves conform to EN388:2003

The traffi TG1210 glove must be worn when moving or handling, materials or for manual handling activities

The Beeswift Kutstop amber glove must be worn when using utility knives.

Kevlar gloves (and sleeves-gauntlets) must be worn when handling glass, regardless of the size or quantity

- Additional PPE requirements may include, goggles, safety glasses, dust masks, ear defenders. These will be specified in the task specific risk assessments, please ensure you read the PPE requirements carefully before work begins
- Dust masks must have FFP3 filters
- Operatives must be face fit tested
- Check COSHH assessments as they will specify any additional PPE requirements for products being used

1.4 Risk assessment register

- 2.1 Manual Handling - page 9
- 2.2 Fire - page 10
- 2.3 COSHH (Control of substances hazardous to health) - page 11
- 2.4 Slips, trips and falls - page 12
- 2.5 Working on fixed scaffolds - page 12
- 2.6 Exposure and release of asbestos - page 13
- 2.7 Repetitive works patterns - page 14
- 2.8 Working in occupied areas - page 14
- 2.9 Working outside - page 15
- 2.10 Using hand tools - page 16
- 2.11 Use of power tools - page 17
- 2.12 Movement of boxed materials - page 18
- 2.13 Moving pipes, rolls or irregular shaped or sized materials - page 19

1.5 COSHH register

- Flint, Quartz, Silica Sand - page 22
- NHL 2 - page 26

1.6 Sequence of operations

1.6.1 General

General actions

- Inform anyone who may be affected by the work any dangers or hazards present.
- Erect signs and/or barriers as required.
- Ensure the safe use of all tools and equipment in accordance with risk assessment.
- Ensure all tools required are in good working order.
- Ensure you have all PPE as named in risk assessment.
- Carry out pre-use inspection on all PPE to check for signs of damage, defect or tampering
- Store all materials in safe piles away from common walk through areas and fire exits.

1.6.2 Manual handling

Pushing and pulling

- Pushing and pulling is done using the body's own weight; lean forward when pushing, lean backwards when pulling
- Ensure you have enough grip on the floor to be able to lean forward/ backwards
- Avoid twisting and bending your back
- Handling devices have handles/hand grips so that you can use your hands to exert a force; handle height should be between the shoulder and waist so that you can push/pull in a good, neutral posture
- Handling devices are well-maintained so that the wheels have appropriate size and they run smoothly
- Floors are hard, even and clean

1.7 Legislation

- Health and Safety Work Act 1974
- Fire Safety Act 2021
- The Management of Health and Safety at Work Regulations 1999, amendment 2006
- Workplace (Health, Safety and Welfare) Regulations 1992
- The Control of Asbestos Regulations 2012
- Provision and Use of Work Equipment Regulations (PUWER) 1998
- The Reportable Injuries Diseases & Dangerous Occurrence Regulations 2013 (RIDDOR)
- Control of Substances Hazardous to Health Regulations 2002
- The Work at Height Regulations 2005
- The Personal Protective Equipment at Work Regulations 2022
- The Manual Handling Operations Regulations 1992
- The Construction (Design and Management) Regulations 2015

1.8 Welfare requirements

Welfare arrangements will be provided at induction and will be outlined in the construction phase plan

Welfare facilities will consist of

- Toilets with hand washing and drying provisions
- Washing facilities suitable for the work taking place
- Drinking water, hot and cold or warm water
- All welfare areas will have adequate shelter, heating, lighting, ventilation and be suitable cleaned
- Rest areas with tables and chairs
- Provisions for heating food and water

Welfare areas must be kept clean and tidy at all times

Waste must be removed immediately after use and placed in waste bins provided

Smoking, vaping or e-cigarettes are not permitted in any welfare locations

1.9 Hazardous substances

COSHH Assessments will be in place for all hazardous substances

These must be read before work begins

1.10 Manual handling

Manual handling aids will be used if available

The Manual Handling Operations Regulations (MHOR) 1992 establish a clear hierarchy of measures for dealing with risks from manual handling, these are:

- Avoid hazardous manual handling operations so far as is reasonably practicable.
- Assess any hazardous manual handling operations that cannot be avoided.
- Reduce the risk of injury so far as is reasonably practicable.
- The workforce will be trained to, observe safe lifting techniques, and safely handle loads.
- No one will be expected to lift on their own, materials weighing more than 25kg.
- Safe manual handling procedures should be followed at all times.

There are some basic principles that everyone should observe prior to carrying out a manual handling operation:

- Ensure that the object is light enough to lift, is stable and unlikely to shift or move.
- Heavy or awkward loads should be moved using a handling aid.
- Make sure the route is clear of obstructions.
- Make sure there is somewhere to put the load down wherever it is to be moved to.
- Stand as close to the load as possible, and spread your feet to shoulder width.
- Bend your knees and try and keep the back's natural, upright posture.
- Grasp the load firmly as close to the body as you can.
- Use the legs to lift the load in a smooth motion as this offers more leverage reducing the strain on your back.
- Carry the load close to the body with the elbows tucked into the body.
- Avoid twisting the body as much as possible by turning your feet to position yourself with the load.

When ever manual handling is to be undertaken, especially if it is an uncommon or high risk task, an assessment of four specific activities – Task, Individual, Load and Environment (easily remembered by the acronym TILE) needs to be implemented:

T - The Task

Does the activity involve twisting, stooping, bending, excessive travel, pushing, pulling or precise positioning of the load, sudden movement, inadequate rest or recovery periods, team handling or seated work?

I - The Individual

Does the individual require unusual strength or height for the activity, are they pregnant, disabled or suffering from a health problem. Is specialist knowledge or training required?

L - The Load

Is the load heavy, unwieldy, difficult to grasp, sharp, hot, cold, difficult to grip, are the contents likely to move or shift?

E- The Environment

Are there space constraints, uneven, slippery or unstable floors, variations in floor levels, extremely hot, cold or humid conditions, poor lighting, poor ventilation, gusty winds, clothing or Personal Protective Equipment that restricts movement?

All work will be undertaken by qualified competent persons with experience of the type of work described above, and in all cases in full accordance with safety procedures specified in the company's health and safety Policy.

The work activities described within this method statement and all associated safety measures are not to be deviated from in any way. If, for any reason, the method statement cannot be implemented in full or should the described process be found inadequate for the purpose of providing a safe working environment, the affected activities must cease until such time as the method statement has been amended and re-approved as appropriate with any changes communicated by a toolbox talk to all employees involved before work recommences.

Amspec Limited
Kilshaw Street
Lamberhead Industrial Estate
Pemberton
Wigan
WN5 8EA

Telephone: 01942 621 342
Fax: 01942 226 552
https://amspec.co.uk/

2.0 Risk assessment

Document created: 17 Jul 24
Document updated: 09 Oct 24
Revision number: 4
Document approved: 09 Oct 24
Approved by: Michelle Aidley
Prepared by: Michelle Aidley
Position: Health, Safety & Compliance Co-Ordinator

Kings House - Masonry Brickwork / Mortar Repairs

Location of works:
Kings House External

Site address:
40-42 King Street West
Manchester
M34WY

Project reference: 2126.
Client: Bruntwood SciTech
Principal contractor: Amspec Ltd
Start date and end date: 22/07/2024 to 27/05/2025

Example risk matrix

Likelihood 4
x
Severity 5
=
Risk/residual risk 20

			Likelihood				
			Very Unlikely	Unlikely	Possible	Likely	Very likely
			1	2	3	4	5
Severity	Negligible	1	1	2	3	4	5
	Minor	2	2	4	6	8	10
	Moderate	3	3	6	9	12	15
	Major	4	4	8	12	16	20
	Extreme	5	5	10	15	20	25

2.1 Manual Handling

2.1.1 Task: Moving of materials of a regular shape and size

Hazard	Risk	Control measures	RR
Injuries sustained from incorrect manual handling of materials with a regular shape and size	5 x 3 = 15	PE: Gloves (with grip properties), goggles or spectacles, safety boots, hard hat Manual handling training provided, if a formal certificate is unavailable a detailed toolbox talk will be implemented before work commences All manual handling tasks take into account the TILEO method (task, individual, load, environment, other) – refer to tool box talk Mechanical lifting used where required Ensure that all aspects of manual handling are considered, including: Lifting Carrying Twisting Stooping Reaching Pushing Pulling Offloading Repetitive handling Longer distance carrying If any issues are identified this must be reported to site management immediately Break the load into more manageable loads where possible. Ensure lighting is adequate and walkway is cleared from debris and materials. Secure load properly before moving Check the weight of the load before handling	2 x 3 = 6

Persons at risk: User

2.2 Fire

2.2.1 Task: Fire

Hazard	Risk	Control measures	RR
Serious injury / fatality	5 x 4 = 20	Trained and competent Fire Marshal/warden to be identified before work commences Emergency procedure in place and delivered at induction Fire risk assessment to be carried out before work commences Emergency escape routes to be identified and kept free from obstruction at all times Flammable materials must be sufficiently stored , held in small quantities and segregated in line with the COSHH assessment(s) Emergency signage to be provided Fire fighting equipment to be positioned throughout at designated points. Fire fighting equipment only to be used by trained operatives and not to be used for anything other than their intended use A Fire assembly point to be established and all operatives informed of the location Method of raising the alarm to be identified and covered in site induction Smoke/Heat detection to be in place and identified before work begins (this must be outlined in the construction phase plan and fire risk assessment before work begins) Hot works permits to be carried out for any hot works taking place No hot works to be carried out 1 hour before closure Designated hot works stations to be implemented Display warning signage to warn others of areas of no access and hot works taking place Fire Risk assessment in place Fire emergency escape plan in plan	1 x 5 = 5

Persons at risk: All site operatives

2.3 COSHH (Control of substances hazardous to health)

2.3.1 Task: COSHH (Control of substances hazardous to health)

Hazard	Risk	Control measures	RR
Major or minor injuries	2 x 3 = 6	PPE: Review all COSHH Assessments before work begins to ensure PPE requirements are understood and in place before work begins Ensure a COSHH assessment is in place for the following; Chemicals Products containing chemicals Fumes Dusts Vapours Mists Nanotechnology Gases and asphyxiating gases and Biological agents (germs). If the packaging has any of the hazard symbols then it is classed as a hazardous substance. Germs that cause diseases such as leptospirosis or legionnaires disease and germs used in laboratories. All COSHH items kept in small quantities and must be stored in a, well ventilated, lockable & secure area (in line with COSHH assessment storage information) MSDS available along with COSHH assessments Ensure area is well ventilated.	1 x 3 = 3

Persons at risk: All site operatives

2.4 Slips, trips and falls

2.4.1 Task: Movement at ground level

Hazard	Risk	Control measures	RR
Severe strains, sprains and muscle breaks	3 x 3 = 9	PPE: Safety footwear with steel toe cap and mid sole protection, hard hat, high visibility vest Good housekeeping monitored on site by all operatives Keep walkways and working areas clear at all times Ensure emergency exit routes are clear and free from obstruction at all times Ensure any spillages are cleaned up immediately. Ensure lighting is sufficient. Ensure safety footwear is worn and kept in good condition, particularly the sole and grip Carry out regular checks on footwear to ensure that the sole/grip is in good condition If any issues are identified this must be rectified before work continues	2 x 3 = 6

Persons at risk: All site operatives

2.5 Working on fixed scaffolds

2.5.1 Task: Working on fixed scaffolds

Hazard	Risk	Control measures	RR
Falls from height, collapse of scaffold	5 x 3 = 15	Scaffolding to be assembled by a trained and competent scaffolding sub-contractor Once erected, a certificate of inspection must be completed and obtained from the scaffold inspector A weekly inspection to be arranged and in place (carried out by the scaffold sub-contractor) Foreman & Site Managers to undergo scaffold awareness course The scaffold must be tagged after assembly and updated after each inspection Any issues are identified must be reported to site management immediately Scaffold structures must be updated on the temporary works register and managed by the Temporary works coordinator and the Temporary works supervisor.	1 x 3 = 3

Persons at risk: All site operatives, Public

2.6 Exposure and release of asbestos

2.6.1 Task: Exposure and release of asbestos

Hazard	Risk	Control measures	RR
Fatal disease (asbestosis) caused by inhaling asbestos fibres	4 x 5 = 20	PPE: Safety footwear with steel toe cap and mid sole protection, hard hat, high visibility vest Asbestos refurbishment and demolition survey to be carried out to identify location, condition and type of any asbestos containing materials within the building before work commences The asbestos survey must be read at induction by all operatives to ensure ACM locations are known before work begins If the existing survey does not cover the area(s) where work is carried out STOP WORK and report to site management immediately If asbestos is suspected, STOP WORK -Report to site management immediately - Refer to the HSE guidance document EM1 ‘Asbestos essentials’ before work continues -Display warning signage and put physical barriers around the area to prevent access -An approved asbestos contractor must be appointed immediately, and samples taken of the suspected ACM - Work must not continue until results of the samples are returned. - If results are negative, work can re-commence - If results are positive this will be removed by a licenced contractor before works commence Asbestos awareness training provided for employees	2 x 5 = 10

Persons at risk: All site operatives

2.7 Repetitive works patterns

2.7.1 Task: Repetitive works patterns

Hazard	Risk	Control measures	RR
Upper limb injuries	2 x 2 = 4	Ensure adequate rest breaks are given to the operative, possibly more than normal. Where possible try to use job rotation with another operative.	1 x 2 = 2

Persons at risk: User

2.8 Working in occupied areas

2.8.1 Task: Working in areas of high volume of movement

Hazard	Risk	Control measures	RR
Collisions or falls from high traffic areas	3 x 3 = 9	Work areas to be visibly cordoned off and alternative routes marked Traffic management plan to be implemented, detailing the designated vehicle and pedestrian routes. Plant and vehicle movements will only be allowed under the direction of a traffic marshal Pedestrian routes to be protected by fixed barriers such as stop blocks	1 x 3 = 3

Persons at risk: All site operatives

2.9 Working outside

2.9.1 Task: Working outside

Hazard	Risk	Control measures	RR
Heatstroke/ sunburn	4 x 5 = 20	In advance of significantly hot weather, operatives will receive a toolbox talk regarding the hazards, risks and control measures in place. In warmer months, sun-protective clothing," such as long sleeves and full length trousers" A minimum of SFP30 sun cream will be provided for all operatives, where required, operatives are expected to re-apply it every 2-3 hours when working outdoors. Operatives are to take regular breaks, rehydrating and resting in the shade where possible.	1 x 5 = 5

Persons at risk: All site operatives

2.9.2 Task: Working outside

Hazard	Risk	Control measures	RR
Cold weather	4 x 5 = 20	In advance of significantly cold weather, operatives will receive a toolbox talk regarding the hazards, risks and control measures in place. In colder months, suitable warm clothes will be worn, suitable heating will be arranged within the welfare areas. Operatives are to take regular breaks, drinking warm drinks and resting in the warmth.	1 x 5 = 5

Persons at risk: All site operatives

2.10 Using hand tools

2.10.1 Task: Using portable hand tools

Hazard	Risk	Control measures	RR
Injuries to hands sustained from incorrect use of portable hand tools	4 x 2 = 8	Always choose the right tool for the job All operatives to be trained in the safe use of hand tools before starting works and have necessary experience to use each hand tool Tools used shall have inherent safety features where possible, such as retractable blades for knives Keep cutting tools sharp, so that they cut true without needing to be forced Tools should be checked regularly for damage and any item to be found damaged or defective taken out of use immediately Guards to be used where available and never removed or adjusted from the intended position All portable hand tools are to be used as per the manufacturers instruction	1 x 2 = 2

Persons at risk: User

2.10.2 Task: Using retractable knife

Hazard	Risk	Control measures	RR
Cuts to body or hands whilst using retractable knife	4 x 3 = 12	Retractable knife or chosen cutting device to be used that is suitable for the job, only utilise knifes with molded plastic guard or retractable blade Knives should be checked before use and fitted with a sharp blade before beginning work Knife to be stored in a safely away when not in use Damaged or defective tools to be discarded using appropriate methods if they cannot be repaired	1 x 3 = 3

Persons at risk: User

2.11 Use of power tools

2.11.1 Task: Use of power tools

Hazard	Risk	Control measures	RR
Electrocution causing serious or fatal injuries whilst using portable power tools	3 x 5 = 15	Only 110v tools used on site. Examine each tool before use and do not use damaged tools. Check all guarding is in place before use. Ensure you have abrasive wheel or cartridge tool training before using these specific tools. Tools must be PAT tested annually. (arrange this with the office) Vibration tools should only be used for short periods of time. Ensure you have all required PPE. Goggles must be worn at all times and ear defenders if noise is excessive.	1 x 5 = 5

Persons at risk: User

2.12 Movement of boxed materials

2.12.1 Task: Movement of general boxed materials

Hazard	Risk	Control measures	RR
Injuries sustained from incorrect manual handling of boxed materials	4 x 3 = 12	All hazardous manual handling operations should be avoided so far as is reasonably practicable The workforce will be trained to observe safe lifting techniques, and safely handle loads for materials of boxed materials Any heavy or awkward loads should be moved using a handling aid If not using handling aids, consider reducing weight of load by breaking up materials to a more manageable size If breaking up into smaller loads consider frequency of bending and how this can be managed efficiently with site operatives Consider lifting in teams if load is already considered within acceptable limits Any of the regular shaped materials should be light, stable and unlikely to shift or move during lifting Before undertaking any manual handling operations, make sure the route is clear of obstructions and somewhere to put the load down wherever it is to be moved to All operatives to be wearing correct PPE for the job The operative should stand as close to the load as possible, with feet spread to shoulder width, bent knees and the back in a natural, upright posture The user should grasp the load firmly and as close to the body as possible The legs should be used to lift the load in a smooth motion, this offers more leverage reducing the strain on the user's back Carry the load close to the body with the elbows tucked into the body Avoid twisting the body as much as possible by turning your feet to position yourself with the load Individual fitness for task to be confirmed; HSE recommended lifting load guidance to be followed; avoid twisting / stopping where possible; toolbox talk on manual handling to be completed Reduce the risk of injury so far as is reasonably practicable	1 x 3 = 3

Persons at risk: User

2.13 Moving pipes, rolls or irregular shaped or sized materials

2.13.1 **Task:** Moving pipes, rolls or irregular shaped or sized materials

Hazard	Risk	Control measures	RR
Injuries sustained from incorrect manual handling of pipes, rolls or irregular shape or sized materials	4 x 3 = 12	All hazardous manual handling operations should be avoided so far as is reasonably practicable The workforce will be trained to observe safe lifting techniques, and safely handle loads for materials of regular shape or size Any heavy or awkward loads should be moved using a handling aid If not using handling aids, consider reducing weight of load by breaking up materials to a more manageable size If breaking up into smaller loads consider frequency of bending and how this can be managed efficiently with site operatives Consider lifting in teams if load is already considered within acceptable limits It may be possible to roll drums of cable, this should be undertaken as a last resort if the above fails; the area should be cleared and movement of drum controlled by a team of operatives Before undertaking any manual handling operations, make sure the route is clear of obstructions and somewhere to put the load down wherever it is to be moved to All operatives to be wearing correct PPE for the job The operative should stand as close to the load as possible, with feet spread to shoulder width, bent knees and the back in a natural, upright posture The user should grasp the load firmly and as close to the body as possible The legs should be used to lift the load in a smooth motion, this offers more leverage reducing the strain on the user's back Carry the load close to the body with the elbows tucked into the body Avoid twisting the body as much as possible by turning your feet to position yourself with the load Individual fitness for task to be confirmed; HSE recommended lifting load guidance to be followed; avoid twisting / stopping where possible; toolbox talk on manual handling to be completed Reduce the risk of injury so far as is reasonably practicable	1 x 3 = 3

Persons at risk: All site operatives

Kings House - Masonry Brickwork / Mortar Repairs

All persons who have signed below confirm that they have been briefed on the safe working methods and arrangements detailed in this method of work statement.

Date	Name	Signature

Supervision and personnel

Name	Role	Phone	Date	Signature

COSHH assessment

Flint, Quartz, Silica Sand

Overview

- **Reference:** 13163
- **Composition:** Quartz., Silica.
- **Quantity kept on site:** 2 bags
- **Quantity expect to be used:** 2 bags
- **Quantity used in one day:** 1 bag
- **Method of use:** Filling
- **Number of people involved in activity:** 2
- **Person(s) at risk:** All site operatives
- **Duration of exposure:** 2 to 4 hours
- **Frequency of exposure:** Every day
- **Location of use:** Outside

Level of risk

L

Low
First aid required

First aid

Eyes

Irrigate immediately with copious amounts of water for 15 minuets, paying particular attention to under the eyelid. Seek medical attention if irritation persists.

Skin

Remove contaminated clothing & wash affected areas with soap & water. If irritation persists, seek medical attention.

Inhalation

Remove patient to fresh air, loosen tight clothing and seek medical attention. Keep patient warm & comfortable while seeking medical attention.

Ingestion

Do not induce vomiting, If the patient is conscious rinse mouth out with water, & give200-300ml (1/2 a pint) of milk or water to drink. Seek medical advice.

Handling precautions and PPE

Respiratory

Where LEV is not practicable and exposure is likely to be excessive, approved respiratory protection should be worn.

Hand

Protective gloves and overalls are recommended for prolonged contact.

Skin

N/A

Eye

N/A

- **Maximum/workplace exposure limit:**
  - **Long term exposure limit (LTEL 8hr TWA):** N/A
  - **Short term exposure limit (STEL 15min TWA):** N/A
- **Factors which increase risks:** N/A
- **Storage precautions:** Store in a cool dry area in sealed containers.
- **Flashpoint:** N/A
- **Transport precautions:** N/A
- **Disposal precautions:** Dispose in accordance with current waste Disposal regulations (for UK - Control of Pollution (Special Waste) Regulations 1996). Landfill is the most appropriate method.
- **Spill procedures:** Remove dry materials either by a vacuum cleaner fitted with an efficient particular filter or by damping down and scooping in to a receptacle. Place reclaimed spills in a suitable closed container before disposal . Small quantities may be run into drains with plenty of water, provided that local effluent control limits are adhered to.

Bath Potters' Supplies

MATERIAL SAFETY DATA SHEET

1. Identification of the preparation/Supplier reference

Trade Name	**Flint – 441244, Quartz- 444314, Silica Sand- 444514**
Chemical name	Silicon dioxide, Quartz, SiO_2
Synonyms	Quartz; known as L.A.Sand by trade. Forms of Silica also known as Silica flour.
Supplier Emergency numbers	Bath Potters Supplies, Unit 18, Fourth Avenue, Westfield Trading Estate, Radstock, Nr. Bath. BA3 4XE Tel: 01761 411077 E:mail: sales@bathpotters.co.uk

2. Composition

Components.	CAS	EINECS	% of composition
Quartz.	14808-60-7	2388784	>10
Silica.	7631-86-9	2315454	<90

Many forms of silica flour are >90% quartz & <10% other silica, but the hazards are the same.

3. Health Hazard Identification

Inhalation	Excessive exposure to any dusty residue may cause irritation of the respiratory tract and mucous membranes, and cause symptoms of chronic lung disease. Prolonged exposure to silica dust is likely to cause silicosis of the lungs, impaired pulmonary function & cause chronic lung damage.
Ingestion	The product is of low solubility in body fluids and likely to be of low acute toxicity.
Eyes	May cause physical irritation and inflammation.
Skin	Not a primary irritant. Any abrasive powder may give minor irritation.
General	These products are supplied in a moist water suspension, 'damp/dry', to minimise dust formation & therefore reduce the likelihood of inhalation of the material.

4. First Aid Measures

Inhalation	Remove patient to fresh air, loosen tight clothing and seek medical attention. Keep patient warm & comfortable while seeking medical attention.
Ingestion	Do not induce vomiting, If the patient is conscious rinse mouth out with water, & give200-300ml (1/2 a pint) of milk or water to drink. Seek medical advice.
Eyes	Irrigate immediately with copious amounts of water for 15 minuets, paying particular attention to under the eyelid. Seek medical attention if irritation persists.
Skin	Remove contaminated clothing & wash affected areas with soap & water. If irritation persists, seek medical attention

5. Fire Fighting Measures

Extinguishing Media	Suitable for surrounding fire conditions. The product is not explosive or combustible. Standard fire fighting techniques only are required, i.e. water, sand, carbon dioxide, chemical foam extinguishers etc.
Special Exposure hazard	In the event of fire the product may emit harmful or toxic fumes.
Protective equipment	Self-contained breathing apparatus.

6. Accidental Release Measures

Leaks & Spills	Remove dry materials either by a vacuum cleaner fitted with an efficient particular filter or by damping down and scooping in to a receptacle. Place reclaimed spills in a suitable closed container before disposal (see section 13). Small quantities may be run into drains with plenty of water, provided that local effluent control limits are adhered to.
Protective equipment	Respiratory protective equipment.

7. Handling & Storage

Handling	Do not eat, drink, or smoke in areas where the material is used. Wash thoroughly after handling material. Local exhaust ventilation is required to comply with occupational exposure limits (refer to Guidance Note EH4O -latest edition). It is essential that bags are resealed immediately after use to prevent moisture loss as far as possible. As the residual moisture will eventually be lost, we strongly recommend damping down periodically or conversion to a paste or slurry in order to minimise inhalation hazards. Note - Silica sand. Although the material is of a much larger overall grain size it still contains a significant amount of fine particle size material. It is advisable therefore to afford the same standards of care and hygiene to it during handling so as to ensure that the required safety standards are complied with, particularly as the material is usually supplied in a drier state.
Storage	Store in a cool dry area in sealed containers.

8. Exposure Control/Personal protective Equipment

Engineering controls	Adequate ventilation should be provided so that Occupational Exposure Limits are not exceeded. Local Exhaust Ventilation is normally recommended
Personal protective equipment	Where LEV is not practicable and exposure is likely to be excessive, approved respiratory protection to CEN standards prEN 140, 141, 143 or 149 should be worn. Protective gloves and overalls are recommended for prolonged contact.

9. Physical & Chemical properties

Appearance & Odour	White, off-white or buff moist powder or paste, odourless
Flash point (°C)	Not applicable
Flammability	Not flammable
Explosive properties	Non-explosive
Oxidising properties	Non-oxidising
Specific gravity	2.6 (dry material)
pH value	7 (Insoluble in water)
Melting point (°C)	>1100°C

10. Stability & Reactivity

Chemical stability	The material is stable
Conditions/materials to avoid	None known
Hazardous decomposition products	None known
Hazardous polymerisation products	None known

11. Toxicology Information

Acute toxicology	LD_{50} Oral	Not known
	LD_{50} Dennal	Not known
	LD_{50} Inhalation	Not known
Health effects	Excessive exposure to any dusty residue, above Occupational Exposure Standards. may cause irritation of time respiratory tract amid mucous inc exposure to silica dust is likely to cause fibrosis of the pulmonary function and cause chronic lung damage.	

12. Ecological information

Ecotoxicity	Not known.
Persistence	Chemically stable and will persist in the environment.

13. Disposal

Dispose in accordance with current waste Disposal regulations (for UK -Control of Pollution (Special Waste) Regulations 1996). Landfill is the most appropriate method.

14.	Transport Information	
UN/SI No.		Not classified
UN Class		Not classified
Packing group		Not classified
Road	UK	Not classified
ADR		Not classified
Sea	IMO	Not classified
Air	ICAO	Not classified

15. Regulatory information

EC Supply Labelling	**Harmful X,**	
R-Phrases	R20	Harmful by inhalation.
	R48	Danger of serious damage to health by prolonged exposure.
S-Phrases	S20/21	When using do not eat, drink or smoke.
	S22/23	Do not breath dust or fumes/spray.
	S38	In case of insufficient ventilation wear suitable respiratory equipment.

UK Occupational exposures limits*	Mg/mn^3 8 hr TWA		% in product
Crystalline silica	inhalable	0.3	>10%
	-respirable	0.1	

* Refer to HSE Guidance note EH4O

In accordance with the H.S.E. Approved Code of Practice for CHIP. the recipient is reminded of their obligations under both the Health and Safety at Work Act (HSWA) and the Control of Substances Hazardous to Health Regulations (COSHH), and that the information in any safety data sheet does not constitute the user's assessment of workplace risk

16. Other information

General industrial hygiene practices are recommended when handling and using this product.

COSHH ACOP:	H.S.C. Approved Code of Practice for the Control of Substances Hazardous to Health Regulations 1994.
CHIP 96:	Chemicals (Hazard Information and Packaging for Supply) Regulations 1996.
CHIP SDS ACOP:	H.S.C. Approved Code of Practice for Safety Data Sheets in accordance with regulation the CHIP regulations.
HSE EH4O:	HSE Guidance note EH4O on Occupational Exposure Limits, to be used in conjunction v the COSI-IH regulations.

The information contained in this safety data sheet has been prepared using the best available information. However in view of technical developments this may alter.

The material must only be used for its stated purpose and time information contained within this data sheet is offered solely for use in the evaluation of this product in respect of safety, health and environmental hazards.

Due to the many factors outside our control when using this product we cannot accept liability for any injury, accident, loss or damage caused through its use.

26.08.21

COSHH assessment

NHL 2

Overview

- **Reference:** 786
- **Composition:** Calcium Dihydroxide, Calcium silicate, Calcium carbonate
- **Quantity kept on site:** 1
- **Quantity expect to be used:** 1
- **Quantity used in one day:** 1
- **Method of use:** Filling
- **Number of people involved in activity:** 1
- **Person(s) at risk:** All site operatives
- **Duration of exposure:** 4 to 6 hours
- **Frequency of exposure:** Every day
- **Location of use:** Outside

Level of risk

M **Medium**
Lost time, medical treatment required

Hazards

First aid

Eyes
Wash eyes immediately with clean water or, if possible, with an isotonic liquid, obtain medical advice

Skin
Gently and carefully brush off all traces of the substance on the affected areas, abundantly wash with clean running water the affected area, take off contaminated clothing, if necessary seek medical advice

Inhalation
Move away the source generating dust or bring the victim away from the source of dust and place the victim outside to breathe fresh air, consult a doctor without delay

Ingestion
Rinse mouth with clean water, drink water abundantly, do not induce vomiting, call a doctor as soon as possible

Handling precautions and PPE

Respiratory
Local ventilation is recommended to keep dust levels below indicated maximum values, a filter mask is recommended

Hand
Wear protective rubber gloves (nitrile rubber with minimum failure > 480)

Skin
Wear protective clothes offering total protection for the skin (long trousers , long sleeves, close fitting at openings) and shoes resistant to caustic products

Eye
Do not wear contact lenses, wear tight fitting goggles with side shields or large vision full goggles, it is also recommended to carry an eyewash

- **Maximum/workplace exposure limit:**
  - **Long term exposure limit (LTEL 8hr TWA):** 1 mg/m3 (breathable dust)
  - **Short term exposure limit (STEL 15min TWA):** 4 mg/m3 (breathable dust)
- **Factors which increase risks:** Strong acids and azotate composites, organic matter, avoid contact with air and moisture, do not use aluminium for transport or storage if there is a risk of contact with water
- **Storage precautions:** Keep away from children reach, store in a dry place, bulk storage has to be in dedicated silos.
- **Flashpoint:** N/A (solid, not combustible)
- **Transport precautions:** The product is not classified as hazardous by the international transport regulations
- **Disposal precautions:** Disposal must be in accordance with National or Local legislation and directives, bags are exclusively for containing the product and must not be utilised for other use, dispose of the contents and bags at a point of refuse collection, harden the product before disposal by wetting it, bags should be totally emptied

- Spill procedures: Ensure adequate ventilation, avoid release of dust as much as possible, keep away persons not wearing appropriate protective equipment, avoid all contact with skin, eyes and clothing, wear appropriate protective equipment, avoid inhaling dust, ensure adequate ventilation or wear respiration masks, wear appropriate protective clothing

Saint Astier Natural Hydraulic Limes (NHL) Safety data sheet
Conforming to European Regulations (CE) n°1907/2006
NHL 2

Section 1: Substance identification and Manufacturer

Name : Natural Hydraulic Lime (NHL) conforming with EN 459.1
Synonyms: None
Chemical name and formula: Natural Hydraulic Lime
Trade name: Terechaux NHL 2 (as per Standard NF/BS EN 459-1)
CAS: 85117-09-5
EINECS: 285-561-1
REACH registration number: 01-2119475523-36-0006 (CSA)

1.2 IDENTIFIED USES and uses advised against.

The product uses are identified in Table 1 of the Annex available with this document.
Uses advised against: none.

Details of the supplier of the Safety data sheet.

Name : CESA (CHAUX ET ENDUITS DE ST ASTIER) Address :
La Jarthe
24110 SAINT-ASTIER
France
Telephone : + 33 5 53 54 11 25
Fax : + 33 5 53 04 67 91
E.mail : cesa@c-e-s-a.fr

1.4 Emergency telephone numbers

European emergency number: 112
France
N° du Centre national de Prévention
et de Traitement des Intoxications (CENTRE ANTI-POISON) + 33 1 45 42 59 59
S.A.M.U. : 15
POMPIERS : 18
Manufacturer urgency number : + 33 5 53 54 11 25
UK
National Centre for Prevention and Treatment of Intoxications: 0121 5074123
The Lime Line: 0800 7839014 (office hours)

SECTION 2 : Hazards identification

Substance classification.

The substance is classified in accordance to Regulation 1272/2008/CE and the directive 67/548/CEE.

2.1.1 Classification conforming to Regulation 1272/2008/CE

H335 : Can irritate respiratory ways
Specific toxicity for certain organs: exposure, category 3, way of exposure: inhalation.
H315 : Can cause skin irritation
Corrosion/Skin Irritation – category 2
H318 : Can cause serious eye damage
Eye damage and eye irritation: category 1

2.1.2 Classification conforming to directive 67/548/CEE

Danger(s) CE : Xi – Irritant
R37/38 : Irritant for respiratory ways and skin
R41 : Risk of serious eye damage

2.2 Label Elements

2.2.1 Labelling conforming to regulation CLP :

Hazard pictograms:

Hazards statements:
H315 : Causes skin irritation
H318 : Causes serious eye damage
H335 : May cause respiratory irritation

Precautionary statements:
P102 : Keep out of reach of children
P280 : Wear protective gloves/clothing/eye and face protection
P305+P351+P338+P310 : in case of contact with the eyes, rinse carefully with clean water for several minutes. In relevant cases, take off contact lenses if possible. Immediately call a Poison Centre or a doctor/physician.
P302+P352 : if in contact with skin: wash abundantly with soap and water.
P332+P313 : For skin irritation: consult a doctor.
P261+P304+P340 : Avoid powder inhalation. In case of inhalation, bring the affected individual outside into fresh air and make the individual relax in a comfortable position for breathing.
P312 : Call a Poison Centre in case of general feeling of sickness.
P501 : Dispose of bags content/empty bags at a point of refuse collection. Before disposal, NHL lime should be made inert by wetting it to induce hardening and bags should be completely emptied.

2.2.2 Labelling conforming to directive 67/548/CEE:

Indicator of Danger: Xi –irritant

Risk phrases:
R36/37/38 : Irritant for the eyes, respiratory ways and skin.
R41 : Risk of serious eye damages.

Precaution suggestions:
S2 : Keep oit of reach of children.
S22 : Do not inhale powder/dust.
S24/25 : Avoid contact with skin and eyes.
S26 : In case of contact with the eyes, wash immediately and abundantly with clean water and consult a specialist.
S36 : Wear protective clothing.
S37 : Wear gloves.
S39 : Wear adequate protection to the eyes and the face.
S46 : In case of ingestion, consult a doctor immediately and show him the bag or the label.

2.3 Other hazards

The criteria for PBT or vPvB in conformity with annexe XIII of REACH regulations are not applicable to the substance.
No other hazard identifiable.

SECTION 3: COMPOSITION / INFORMATIONS ON THE COMPONENTS

Natural Hydraulic Lime (NHL) (CAS : 85117-09-5 ; EINECS : 285-561-1) is produced by the calcination of a calcareous stone with more or less content of clays and silica and is reduced to powder by slaking with or without crushing.
NHL has the property of setting and hardening in presence of water. The carbon dioxide present in the air also contributes to the hardening process.

Principal components:
Name : Calcium Dihydroxide

CAS : 1305-62-0
EINECS : 215-137-3
Concentration : 15–65 % (m/m) – 30 % (m/m)
Name : Calcium silicate
CAS : 10034-77-2
EINECS : 233-107-8
Concentration : 10–45 % (m/m) – 30 % (m/m)
Name : Calcium carbonate
CAS : 471-34-1
EINECS : 207-439-9
Concentration : 10–40 % (m/m) – 25 % (m/m)
Impurities : no impurities relevant to classification and labelling.

SECTION 4 : FIRST AID

4.1 Description:

General advice:
No delayed effects known. Consult a doctor/phisician in all case of severe exposure to the substance or in case of doubt.

In case of inhalation:
Move away the source generating dust or bring the victim away from the source of dust and place the victim outside to breathe fresh air. Consult a doctor without delay.

In case of contact with the skin:
Gently and carefully brush off all traces of the substance on the affected areas.
Abundantly wash with clean running water the affected area.
Take off contaminated clothing.
If necessary seek medical advice.

In case of contact with the eyes:
Wash eyes immediately with clean water or, if possible, with an isotonic liquid. Obtain medical advice.

In case of ingestion:
Rinse mouth with clean water. Drink water abundantly.
Do not induce vomiting.
Call a doctor as soon as possible.

4.2 Principal symptoms and acute or delayed effects.

NHL lime does not have acute toxicity in respect of oral, skin or respiratory exposure.
The substance is classified as irritant for the skin and respiratory ways and presents a risk of serious eyes damage.
No deadly effects are suspected; the principal danger is restricted to localised effects (effect pH).

4.3 Indication of eventual immediate medical attention and particular treatments necessary.

As at present there is no indication on immediate medical care or particular treatments apart from indications given in Section 4.1.

SECTION 5 : FIRE FIGHTING MEASURES

5.1 Extinguishing methods

5.1.1 Appropriate extinguishing methods

The product is not combustible. Use all methods appropriate to the source of the fire.

5.1.2 Inappropriate extinguishing methods.

None

Particular hazard emanating from the product in case of fire.

The product is not combustible.
It does not emit any toxic substance in case of fire.

5.3 Advice for fire fighters

Avoid powders and dust dispersion.
Use respiratory equipment.
Use extinguishing methods taking in account local circumstances and the surrounding environment.

Avoid if possible to discharge into the environment water used for extinguishing fire.

SECTION 6 : ACCIDENTAL RELEASE METHODS

6.1 Personal precautions, protective equipment end emergency procedures

6.1.1 For non emergency personnel

Ensure adequate ventilation
Avoid release of dust as much as possible.
Keep away persons not wearing appropriate protective equipment.
Avoid all contact with skin, eyes and clothing
Wear appropriate protective equipment (see Section 8).
Avoid inhaling dust
Ensure adequate ventilation or wear respiration masks
Wear appropriate protective clothing (see Section 8).

6.1.2 For emergency personnel

Avoid release of dust as much as possible
Ensure adequate ventilation.
Keep away persons not wearing appropriate protective equipment
Avoid all contact with skin,eyes and clothing
Wear appropriate protective equipment (see Section 8).
Avoid inhaling dust
Ensure adequate ventilation or wear respiration masks
Wwear appropriate protective clothing (see Section 8).

6.2 Precautions for the protection of the environment.

Contain spillages. Keep product dry if possible. Use covers to avoid creation of dust if possible.
Avoid large, uncontrolled spillages into watercourses and drains (pH increase).
All spillages in watercourses must be notified to the Environment Agency or other competent Authority.

6.3 Method and material for containment and cleaning.

Label all recipients where dust has been collected
Impede or limit dust formation and dispersion
Keep product dry if possible
Collect product mechanically and dry.
Use a vacuum suction unit or shovel into bags.
Harden the product before disposal as described in Section 13.

6.4 Reference to other Sections

For more detailed information on exposure, individual protection and disposal measures consult Section 8 and Section 13 and the annex to this document.

SECTION 7 : HANDLING AND STORAGE

7.1 Precautions to be taken for safe handling.

7.1.1 Protective measures

Avoid contact with skin, eyes and respiratory ways.
Wear appropriate protective equipment (see Section 8 of this document).
Do not wear contact lenses when handling this product.
It is also recommended to keep eye drops at hand.
Keep formation or dispersion of dust to a minimum.
Enclose dust sources and use extraction equipment (dust collection at handling point).
Respect Directive 90/269/EEC when handling NHL bags.

7.1.2 General advice on occupational hygiene

Avoid inhalation, ingestion and contact with skin and eyes.
Appropriate barrier creams can be used.
Wash hands after each manipulation.
General measures of hygiene at work are essential to ensure safe handling of the product. These include: Good personal practices, regular cleaning of the place of work, no alcohol drinking, eating or smoking at the place of work.
Shower and change clothing at the end of work.
Do not bring home any contaminated clothing.

Separate work clothing from other clothing. Clean them separately.

7.2 Conditions necessary to ensure safe storing and eventual incompatibilities.

Safe storing conditions:
Keep away from children reach.
Store in a dry place.
Bulk storage has to be in dedicated silos.
Incompatible materials:
Strong acids and azotate composites.
Organic matter.
Avoid contact with air and moisture.
Do not use aluminium for transport or storage if there is a risk of contact with water.

7.3 Specific final use(s).

Use conditions have to be respected (see technical note).
For more information refer to the Exposure Scenario available and precisely to section 2.1- "Control of workers exposure"

SECTION 8 : EXPOSURE CONTROLS/ INDIVIDUALS

8.1 Control parameters

Exposures limits (France): dust limits for innocuous effect:
Total dust: VME : 10 mg/m^3
Alveolar dust: VME : 5 mg/m^3
Calcium Dihydroxide: VME : 5 mg/m^3
Recommendations of the Scientific Committee for Occupational Exposure (SCOEL [1])
Natural Hydraulic lime (NHL):
Acute effect: DNEL : 4 mg/m^3 (breathable dust)
Long term effect: DNEL : 1 mg/m^3 (breathable dust)
This value is cross referenced to Natural Hydraulic Lime in view of the anticipated equivalent local effect (pH is comparable to that of CaO and $Ca(OH)_2$).

8.2 Exposure Controls

To control potential risks, avoid generating dust.
Wear protective equipment. Eyes protection equipment (goggles or visors for example) are necessary unless contact with the eyes is avoided by the nature and type of application (closed process for example).
In any case protection of the face, protective clothing and safety shoes must be worn.
Refer to the Exposure Scenario annex available.

8.2.1 Appropriate technical controls

If the product application generates dust, use enclosures, local ventilation or other technical methods to maintain dust limits below the maximum recommended.

8.2.2 Individual protection measures and personal protective equipment

8.2.2.1 Eyes and face protection

Do not wear contact lenses.
Wear tight fitting goggles with side shields or large vision full goggles.
It is also recommended to carry an eyewash.

8.2.2.2 Skin protection

As NHLs are classified as irritant for the skin, dermal exposure has to be reduced to the minimum as much as possible.
Wear protective rubber gloves (nitrile rubber with minimum failure > 480) conforming with Directive 89/686 and to the corresponding Standard EN 374.
Wear protective clothes offering total protection for the skin (long trousers , long sleeves, close fitting at openings) and shoes resistant to caustic products.

8.2.2.3 Respiratory protection

Local ventilation is recommended to keep dust levels below indicated maximum values.
A filter mask is recommended (P1). Refer to the Exposure Scenario annex available

8.2.2.4 Thermal hazards

The product does not present any thermal hazards

8.2.3 Environmental exposure controls

Before discharging into the atmosphere, filter all discharges from ventilation and other extraction systems. Contain spillages. All spillages in watercourses must be notified to the Environment Agency or other competent Authority.
For detailed information on risk management measures adequately controlling exposure of the environment refer to the Exposure Scenario annex available.

SECTION 9 : PHISICAL AND CHEMICAL PROPERTIES

9.1 Information on the essential Physical and Chemical properties

Appearance: powder
Average granulometry: 20-30 % : < 5 µm
Colour: white or light grey
Odour: none
Odor threshold : not applicable
pH : 12-13
Melting point: > 450 °C
Initial boiling point: not applicable
Flash Point: not applicable (solid, not combustible)
Evaporation rate :not applicable (solid mineral)
Flammability: not applicable (substance not flammable)
Higher and lower limits for flammability or explosion risk: not applicable (substance not flammable)
Vapour pressure: not applicable (solid mineral)
Vapour density: not applicable (solid mineral)
Apparent bulk density: 0.5 – 0.76 g/cm^3 @ 20°C
Specific gravity: 2.5 – 2.66 g/cm^3 @ 20°C
Relative density: 2.66
Solubility in water: 1,5 g/l @ 20°C
Partition coefficient: not applicable (inorganic)
Auto ignition temperature: not applicable (solid, non flammable)
Decomposition temperature: not available
Viscosity : not applicable (solid)
Explosive properties: not applicable (substance not explosive)
Oxidizing properties: not applicable (substance not combustible)

9.2 Other information:

No information available on miscibility or liposolubility.

SECTION 10 : STABILITY AND REACTIVITY

10.1 Reactivity

In aqueous media $Ca(OH)^2$ disassociates, forming Calcium cations and hydroxyl anions (when below the water solubility limit).

10.2 Chemical stability

The product is stable at ambient temperature and within the normal application and storing conditions.

10.3 Possibility of dangerous reactions

The substance produces an exothermic reaction in contact with acids.
Heated above 580°C, the Calcium dihydroxide decomposes producing Calcium Oxide (CaO) quick lime and water (H_2O): $Ca(OH)_2$ --> $CaO + H_2O$. The Calcium Oxide reacts with the water and generate heat. This could be a risk in the presence of flammable materials.

10.4 Conditions to be avoided

Minimise exposure to air and humidity to avoid degradation.

10.5 Incompatible materials

NHLs produce an exothermic reaction in contact with acids to form salts.
In presence of humidity the NHLs react with aluminium and brass producing hydrogen $Ca(OH)_2 + 2Al + 6H_2O$ --> $Ca[Al(OH)_4]_2 + 3\ H_2$

10.6 Hazardous decomposition products

None to our knowledge

Complementary information: Calcium dihydroxide reacts with Carbon dioxide forming Calcium Carbonate which is a natural occurring material.

SECTION 11 : TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

NHL are classified as irritant for the skin, respiratory ways and present a risk of serious eyes damage. The limit of exposure to prevent sensorial local irritation and the parameters of critical effects for the lungs is OEL ou VLEP (8h) = 1 mg / m^3 of breathable dust.

Acute toxicity:

None observed. A study on acute skin toxicity and inhalation effects has been considered scientifically not necessary.

Oral : DL50 > 2000 mg/kg (OCDE 425, substance tested $Ca(OH)_2$,rat). By cross reference these results are applicable to NHLs.

Dermal: not available

Inhalation: not available For respiratory irritation see below.

Skin corrosion/irritation

Calcium Dihydroxide is irritant for the skin. By cross reference this result is applicable to NHLs. On the basis of experimental tests on similar substances the NHLs are classified as irritant for the skin [skin Corrosion/Irritation, category 2 (H315- Cause skin irritation / R38, irritant for the skin)].

Serious eyes damage/irritation Calcium Dihydroxide has a risk of causing serious eyes damage (live studies in vivo, rabbit). By cross reference these results are applicable to NHLs.

On the basis of experimental tests on similar substances the NHLs are classified as severe irritants for the eyes [serious eyes damage/irritation category 1 (H318 – Causes serious eye damage/R41 Risk of serious eye damage)].

Respiratory Irritation

On the bases of studies on Calcium Oxide and Dihydroxide, by cross reference NHLs are classified as Irritant for the respiratory ways.[Toxicity specific to target organs-single exposure category (H335 –can cause irritation of respiratory ways / R37 – Irritant for the respiratory system)].

Respiratory or skin sensitisation

No data available.

Bases upon the known effects (pH modification) and on the basic human need for calcium in food, NHLs are considered as not producing a sensitisation effect to the skin. None of its components are known to have a sensitisation effect (ie: calcium carbonate calcium silicate and calcined clay mineral). The definition “sensitising” is not justified.

Germ cells mutagenicity

Bacterial reverse mutation tests ($Ca(OH)_2$ and CaO, Tests d'Ames, OCDE 471) : negative.

Mammalian chromosome aberration test [$Ca(OH)_2$]: negative.

By cross reference these results are applicable to NHLs.

None of the components of NHLs is known as genotoxic.

Considering the pH effect, there is no mutagenicity.

The definition "genotoxic" is not justifiable.

Carcinogenicity

Calcium (administered as Ca-lactate) is not carcinogenic (experimental result rat).

The pH effect does not present a carcinogenic risk.

The definition "carcinogenic" is not justifiable.

Reproductive toxicity

Calcium (administered as Ca-carbonate) is not toxic to reproduction (experimental studies on mice). The pH effect does not present a risk to reproduction.

Clinical studies on humans and animals with different calcium slats have not shown ant effect on reproduction or developmental.

NHLs are not toxic for reproduction or development.

The definition “ toxic to reproduction” conforming to Regulation (CE)1272/2008 is not justified.

Specific toxicity for target organs (STOT)-single exposure

Calcium dihydroxide does not have specific toxicity for any exposure medium (dermal, oral, inhalation).

Specific toxicity for target organs (STOT)-repeated exposure

The toxicity of Calcium ingested is specified by the maximum tolerable limit (UL) for adults:
UL = 2500 mg of Ca corresponding to 36 mg of Ca per kg of body weight for an adult weighing 70kg (Data from CSAH: Comité Scientifique en matière d'Alimentation Humaine).

The toxicity of NHLs by skin absorption is not considered pertinent due to its insignificant absorption and the primary effect of local irritation (effect pH).

The toxicity due to inhalation (localised effects, mucous irritation) due to the CaO and the $Ca(OH)_2$ is determined by SCOEL (Scientific Committee on exposure levels) as follows: DNEL = 1 mg / m^3; breathable dust (see section 8.1) and VLEP (8h) = 1 mg / m^3.

The definition "toxic after repeated exposure" is not justified.

Hazards due to ingestion

Ingesting large quantity causes burns in the mouth, oesophagus, digestive track, nausea and vomit.

SECTION 12 : ECOLOGICAL INFORMATION

12.1 Toxicity:

In water environment and in the soil, exposure to NHLs means exposure to Calcium and hydroxide ions.

12.1.1 Acute/chronic toxicity to fish

LC50 (96h) for fresh water fish : 50,6 mg/l (Calcium dihydroxide)
LC50 (96h) for salt water fish : 457 mg/l (Calcium dihydroxide)

12.1.2 Acute/chronic toxicity to aquatic invertebrates

EC50 (48h) for fresh water invertebrates : 49,1 mg/l (Calcium dihydroxide)
LC50 (96h) for salt water invertebrates: 158 mg/l (Calcium dihydroxide)

12.1.3 Acute/chronic toxicity to aquatic plants

EC50 (72h) for fresh water plants : 184,57 mg/l (Calcium dihydroxide)
NOEC (72h) for salt water plants : 48 mg/l (Calcium dihydroxide)

12.1.4 Toxicity to micro-organisms such as bacteria

In high concentration because of increases in temperature and pH, calcium oxide is used for the disinfection of sewage sludges.

12.1.5 Chronic toxicity to aquatic organisms

NOEC (14d) for seawater invertebrates : 32 mg/l (Calcium dihydroxide)

12.1.6 Toxicity to organism in the soil

EC10/LC10 or NOEC for soil macro organisms : 2000 mg/kg of dry soil(Calcium dihydroxide)
EC10/LC10 or NOEC for soil micro organisms : 12000 mg/kg of dry soil (Calcium dihydroxide)

12.1.7 Toxicity to terrestrial flora

NOEC (21d) for terrestrial plants: 1080 mg/kg (Calcium dihydroxide)

12.1.8 General effects

The product modifies the pH.

Although this product is useful for the modification of the Ph of the water (acidity reduction), a dosage of over 1g/l can be harmful to aquatic life.

A pH value >12 will decrease rapidly due to dilution and carbonation.

12.2 Persistence and degradability

Not relevant (inorganic substance).

12.3 Potential bio-accumulation

Not relevant (inorganic substance).

12.4 Mobility in soil

Calcium dihydroxide reacts with moisture and/or Carbon dioxide forming Calcium Carbonate and water $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$ which is sparingly soluble, presenting a low mobility in most soils.

12.5 Results of PBT et vPvB evaluations

Not relevant (inorganic substance).

12.6 Other adverse effects

Not identified.

SECTION 13 : DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Disposal must be in accordance with National or Local legislation and directives.

Bags are exclusively for containing the product and must not be utilised for other use.
Dispose of the contents and bags at a point of refuse collection.
Harden the product before disposal by wetting it. Bags should be totally emptied.

SECTION 14 : TRANSPORT INFORMATION

The product is not classified as hazardous by the international transport regulations ADR (road), RID (train), OMI/IMDG (sea) and OACI/IATA (air).
Note: rules described below are the ones valid when this document was prepared. Considering possible changes, it is advisable to consult your supplier. This also applies if you consult this document 12 months after its publication.

14.1 United Nations Number

Not regulated.

14.2 United Nations Shipping name

Not regulated.

14.3 Transport hazards class(es)

Not regulated.

14.4 Packing group

Not regulated.

14.5 Environmental hazards

None

14.6 Particular precautions to be taken by the user

Avoid dust spillages during transport.

14.7 Bulk Transport conforming to Annex II of the MARPOL73/78 convention and to the IBC Code

Not regulated

SECTION 15 : REGULATORY INFORMATION

Authorisations : none required
Use restrictions: none
Other EU regulations
NHLs are not:
A SEVESO substance.
Ozone layer depleting substance
Persistance organic pollutant
Nationa Regulations (France): Code du travail : Articles L4411-1 et suivants.

15.2 Evaluation of chemical safety

An evaluation of chemical safety of the substance has been carried out.

SECTION 16 : OTHER INFORMATION

All data are based on our current knowledge but do not constitute a guarantee for the properties of the product and do not form a contractual relationship.
Hazard mentions, precaution recommendations and risk phrases are detailed in section 2.

16.1 Scope of revision

To establish a Safety data sheet in conformity with annex II of the European regulation 1907/2006/CE modified by regulation 453/2010 dated 20 May 2010.

16.2 Abbreviations and et acronyms

OIM: International Maritime Organization
IMDG: International Maritime Dangerous Goods IATA: International Air Transport Association
ADR/RID : Agreement on the transport of dangerous goods by road / Regulations on the international transport of dangerous goods by rail
SCOEL: Scientific Committee on Occupational Exposure Limits
CSAH: Comité Scientifique en matière d'Alimentation Humaine
EC50: Median Effective Concentration : concentration with medium effect.
NOEC: Non Observable Effect Concentration : concentration with no observable effects
LC50: Lethal Concentration (concentration létale) : 50% of tested animals die.
DL50: Dose létale (lethal dose) : 50% of tested animals die.

16.3 Principal bibliography and Sources

16.3 Principal bibliography and Sources Bureau Européen des substances Chimiques (ECB)
CIRC (Centre International de Recherche sur le Cancer)
HSDB (Hazardous Substances Data Bank) (National Library of Medicine)
INRS (Institut National de Recherche et de Sécurité)
IUCLID (International Uniform Chemical Information data Base)
RTECS (Registry of Toxic effects of Chemical Substances)
[1] SCOEL : Anonymous, 2008: Recommendation from the Scientific Committee on Occupational Exposure Limits (SCOEL) for calcium oxide (CaO) and calcium dihydroxide ($Ca(OH)_2$), European Commission, DG Employment, Social Affairs and Equal Opportunities, SCOEL/SUM/137 February 2008
[2] Anonymous, 2006: Tolerable upper intake levels for vitamins and minerals Scientific Committee on Food, European Food Safety Authority, ISBN: 92-9199-014-0 [SCF document].

ANNEXE:

Exposure Scenario: available as a Downloadable PDF.

PLEASE NOTE:

This document accompanies the application information for the product but does not replace it. The information contained in this document represent our knowledge as at the time of publishing. It is given in good faith.
The user attention is drawn to the possible risk incurring when using the product for applications other than those for which it is designed.
This document does not dispense the user from knowing and applying all rules and practices related to his activity and the responsibility for the precautions to be taken are solely his.
The information contained in this document is given to assist the user to comply with the obligations related to the use of hazardous products.
The information provided must not be considered exhaustive and it does not exonerate the user from other obligations to be respected, supplementary or prescribed, outside the content of this document for which he remains solely responsible.

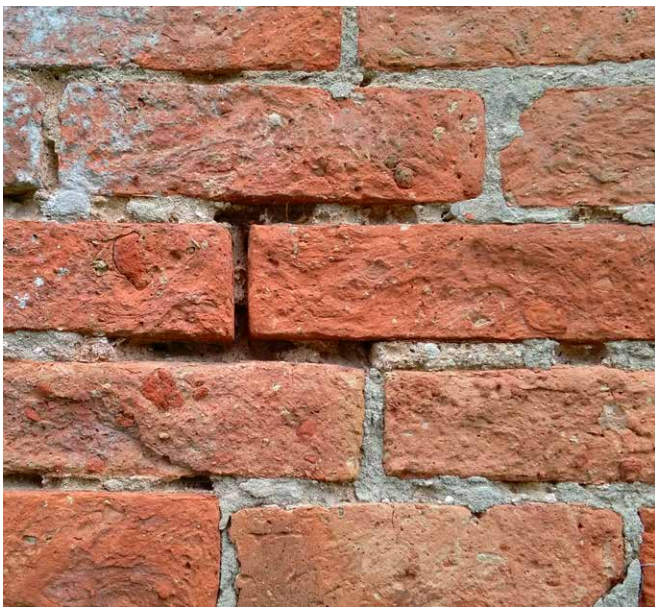
For further Guidance, contact your St Astier Distributor.

Copyright © 2016 CESA, Chaux et Enduits de St Astier

Historic England

Repointing Brick and Stone Walls

Guidelines for Best Practice



Summary

The appearance of brick and stone masonry owes as much to the character of the mortar joints as to the stone and bricks themselves. Unsuitable repointing can affect not only the look but also the durability of masonry, and is amongst the most frequent causes of damage to the character and fabric of historic buildings.

The comprehensive repointing of a building is rarely necessary. Generally only those parts that are most exposed to the weather or are affected by specific problems such as leaking rainwater pipes or gutters are likely to be in need of attention. Sound historic mortar should be left undisturbed as it can be an important part of the character and significance of a building.

This guidance, aimed at homeowners and non-specialist building professionals, provides a brief technical guide to the key issues and stages that need to be considered when repointing brick or stone walls of older buildings.

This guidance note has been prepared by David Pickles with contributions from Alison Henry, John Stewart and Iain McCaig.

Published by Historic England January 2017.
All images © Historic England unless otherwise stated.

For further practical advice on maintaining, repairing and making changes to older homes see:

www.HistoricEngland.org.uk/your-home

Front cover
Top left: Example of friable and deeply eroded joints.
Top right: Removing cement mortar with a sharp chisel.
Bottom left: Repointing rubble stonework.
Bottom right: Matching mortar with a pattie or biscuit.

Contents

Introduction 1

What is pointing? 1
Why is pointing important? 5
What is repointing? 5
Why is repointing important? 5
Why is repointing necessary? 7

1 Deciding the Scope of Work 9

1.1 Getting professional help 9
1.2 Nature and scope of work 9
1.3 Mortar mixes and appearance 9
1.4 Does repointing need consent? 13

2 Repointing 14

2.1 Preparing the joints 14
2.2 Filling the joints 17
2.3 Protection during the works 17
2.4 Finishing the joints 17
2.5 Protection at completion 24

3 Where to Get Advice 25

3.1 Historic England website 25
3.2 Further reading 25
3.3 Contact Historic England 26

Acknowledgements 27

Introduction

What is pointing?

Pointing is the process of filling the outer part of the joints between masonry units with mortar. This can be done either as work proceeds, by striking off the bedding mortar flush with the face of the masonry, or as a separate exercise if the outer part of bedding mortar has been deliberately left recessed or is raked back from the surface.

For brickwork and stonework the width, profile and texture of the joints affect their visual character. Often these respond to locally available materials and can have a local distinctiveness.

Over the centuries, bricklayers have always tried to make their work look as regular and even as the bricks they were working with would allow. From the Tudor and Elizabethan periods onwards there was a trend towards increasingly narrow joints, as bricks of more consistent size and shape became available. Joint width was associated with status; the higher the quality of the brickwork, the narrower the joints would be, culminating in gauged work when joints could be less than a millimetre wide.

The profile of mortar joints can also contribute greatly to the appearance, regularity and uniformity of brickwork, particularly when the joint widths vary due to the irregularities of the bricks. It can also make the joints appear narrower, as in the case of penny struck joints or tuck pointing.

Similarly, high quality stonework (ashlar) featured narrow joints and regular, even surfaces. In lower status work, such as random rubble walls, joints would often be filled flush, with mortar spreading onto the surface of the stone, to give the wall a smoother, more even appearance. Regular limewashing enhanced the effect and gave protection.

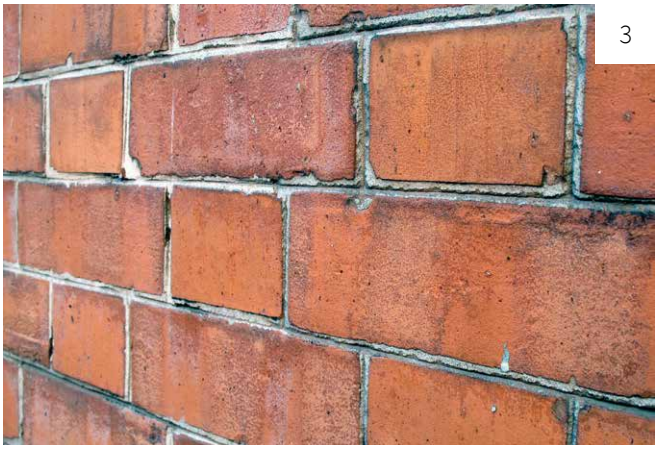
Specialist repointing techniques such as ‘tuck pointing’ are not covered by this guidance, but further information can be found in the Practical Building Conservation series particularly in *Mortars, Renders & Plasters and Earth, Brick & Terracotta.*

For further technical information see Section 3 Where to Get Advice.

Repointing in progress

2

5


3

6

4

7

Some of the different styles of joint finish used on historic brickwork

2 Flush pointed brickwork, where the outer surface of the mortar lies flush with the face of the wall. This brickwork shows signs of having been limewashed.

3 The mortar is incised so a groove runs through the centre of the joint. This is called penny round or struck pointing.

4 This shows an example of tuck pointing where wide mortar joints between unevenly shaped bricks are coloured to match the brickwork and a narrow 3-5mm joint of lime putty is then placed in scored grooves to create the impression of fine joints and uniform bricks.

5 The mortar joint has been given a convex V-shaped profile which is referred to as beak or double struck pointing.

6 This joint has been indented to form a V–shaped groove which is referred to as keyed pointing.

7 In gauged pointing fine joints between brickwork, usually in arches are filled with lime putty so that the joint almost disappears.

8

11

9

12

10

13

Some of the different styles of joint finish used on historic stonework

8 Ashlar stonework usually has fine joints sometimes just a few millimetres wide.

9 This shows rubble stone flush pointed and incised to give the appearance of regular 'squared work' when limewashed.

10 Squared coursed stone with a flush mortar.

11 Where an irregular facing stone such as flint is used, small pieces of stone, tile or brick are pushed into the wet mortar to reduce the volume of mortar and shrinkage problems. This is known as galleting.

12 This shows squared stone with a narrow flush joint.

13 This mortar joint has been given a convex v-shaped profile referred to as a beak or double truck joint.

Two modern styles of pointing are often found on older masonry but should be avoided as they give the joint too much emphasis against the masonry. They also tend to be associated with hard cement based mortars.

14

15

Weather-struck pointing to brickwork (14)
This is slightly proud of the masonry and smoothed off at an angle.

Ribbon or strap pointing to brickwork (15)
A style similar to weather-struck being proud of the masonry and smoothed off. Often used to give a regular joint width to irregular brick and stone masonry.

Why is pointing important?

The mortar joint is not only a key part of the appearance and character of a masonry wall; it also helps to keep the building dry. It does this in two ways: by preventing rainwater finding its way into the core of the wall or even to the inside face of the building though the joints between the bricks or stones; and by allowing moisture already in the wall to dissipate once weather conditions become drier.

When rainwater hits a building some of it may be absorbed by the stone or brick and the mortar, and some is drawn into the wall via any small cracks between the masonry units and the mortar. To prevent problems occurring, this moisture needs to be able to escape back to the atmosphere once its stops raining. The most effective route for this is through permeable mortar joints. However, if the joints are not able to release moisture, as would occur if hard cement mortar is used, then all moisture movement is concentrated in the bricks or stones, which increases the chance of frost damage or damage due to the crystallisation of soluble salts.

What is repointing?

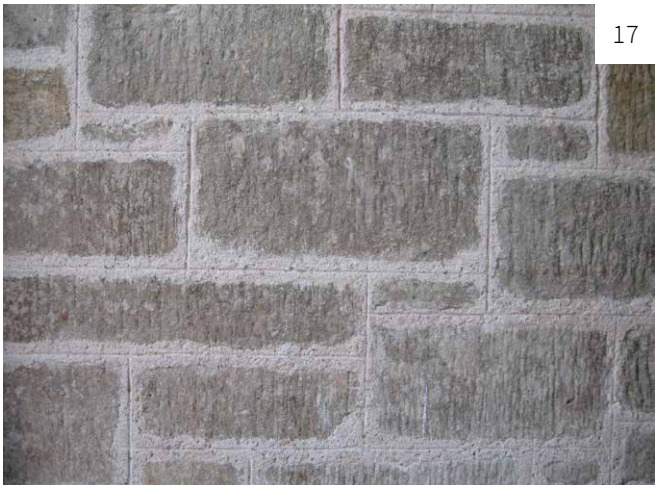
Repointing is the refilling of the outer part of the joints where the previous mortar has weathered away or has been removed because it is unsuitable. Some older brick and stone buildings show signs of having been repointed at different times, often with a variety of mortar mixes and styles.

Why is repointing important?

Repointing can significantly affect not only the look but also the durability of masonry. If done badly or using the wrong materials, it can damage stone and brickwork, sometimes beyond repair.

16

19



17

20

18

21

Examples of good repointing (16-18)

16 The mortar joint has a good colour and texture to complement the brickwork and carefully follows the variable joint widths.

17 This stone work has been given a carefully incised joint to match the original work.

18 Rubble stone repointed flush with the aggregate exposed to give a good texture.

Examples of poor repointing (19-21)

19 A cement mortar has been used on rubble stonework. The mortar is cracking thereby trapping moisture and accelerating decay.

20 This shows damage to soft brickwork by the use of cement mortar.

21 A ribbon cement mortar has been applied here over rubble stonework.

Why is repointing necessary?

Masonry walls need to be able to regulate water penetration and evaporation. If the condition of the mortar joints is poor or if the wrong mortar has been used for repointing in the past, then this process can be compromised.

There are three main reasons for repointing:

- Mortar joints are crumbling or loose
- Mortar joints are open or have weathered back to such an extent that the edge of the masonry units are exposed forming a ledge that encourages water to seep into the masonry
- A hard impermeable cement-based mortar (usually grey in colour) has been introduced trapping moisture and accelerating the deterioration of the masonry. Mortar of this type should only be removed if this can be done without causing even more damage to the adjoining masonry. The style of repointing may also be visually unsuitable

Repointing is usually only necessary on more exposed parts of a building, low level areas affected by rising damp or areas affected by specific problems such as leaking rainwater goods, so sound existing mortar should always be left alone. Lime mortar with some surface loss may still be performing well and if it takes much effort to remove it the chances are that it does not need to be replaced. It may feel a little soft but this may still be acceptable.

Where masonry is clearly decaying it is important to identify the true cause so that the correct remedies can be selected. The pointing itself may not be the cause of the problem so the condition of the whole structure should be reviewed along with the severity of exposure, and any defects contributing to deterioration of the pointing should be remedied before repointing is carried out.

Professional condition survey

An independent condition survey of an older property should be undertaken by a professional such as an architect, surveyor or architectural technologist who is familiar with older buildings and their associated problems. Consider using a professional who is accredited in building conservation.

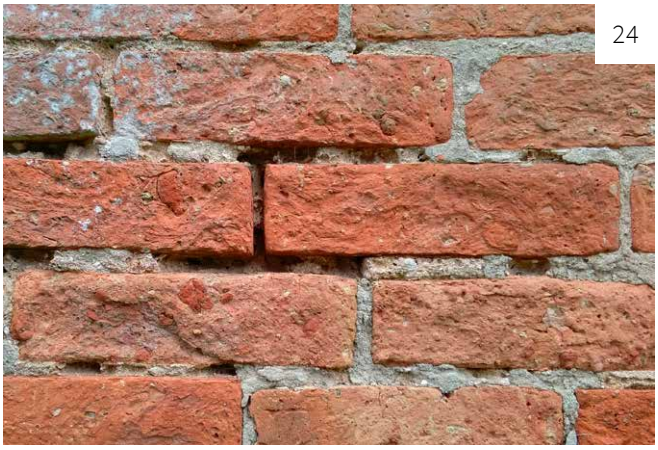
See our website pages Finding Professional Help

22

Poor repointing
The pointing on the left has been sloppily carried out which has a significant visual impact not only on the building itself but the wider streetscape.

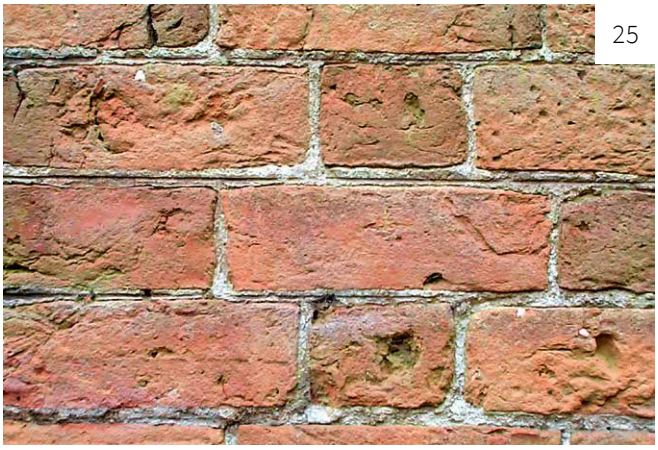
23

26



24

27



25

28

Assessing condition

23 If a sharp tool can be driven into the surface of a lime mortar joint it does not mean that repointing is necessary. However, if there are open or poorly filled joints that offer no resistance at all then selective repointing will be required.

24 This shows the joints which are friable and deeply eroded. Wind–driven rain can make its way into the core of the wall through open joints.

25 This joint dating from the 18th century shows signs of gradual erosion of the mortar due to weathering, but it is still performing satisfactorily and can be left alone.

26 Cement mortar applied over a stone joint. The hard mortar is cracking and potentially trapping moisture which will damage the stonework.

27 This stone wall has been repointed with a cement mortar which has driven moisture up the wall and caused decay higher up in the zone of evaporation.

28 This shows sound lime mortar below a shallow layer of cement repointing mortar which is cracking and falling away.

1 Deciding the Scope of Work

1.1 Getting professional help

If a visual inspection indicates that some repointing may be necessary (see Why is repointing necessary?) professional help may be required to establish how much of the wall to repoint, and what type of mortar and style of repointing to use. Professional help may also be required to carry out the repointing.

Going directly to a building contractor may provide the advice and service needed if the works are minimal but it is important to find out about the contractor's experience and competency with this type of work, particularly their experience using lime mortars rather than cement mortars.

Repointing might be carried out as part of a larger work programme in which case the main contractor may bring in a sub-contractor to carry out the repointing work.

For more extensive works and for buildings that are historically significant, such as listed buildings or ones in a conservation area, the help of a surveyor or architect might be needed to specify and oversee the works. Although this might seem like an unnecessary expense it can help to ensure that the work is carried out properly and avoid expensive mistakes or failures.

Our website has advice on Finding Professional Help.

1.2 Nature and scope of work

Various issues need to be agreed before work starts:

- Areas requiring repointing may need to be established by physically testing the pointing. Loose mortar can be identified by tapping with a chisel. If it sounds hollow this may indicate that the mortar has detached from the backing. This is particularly the case where thin cement mortars have been used over older lime mortars.
- What different styles, profiles, textures and colours of repointing have been carried out in the past and are these suitable in terms of appearance and permeability for the existing masonry? Is it possible to identify the original or earliest pointing?
- Will different mortar mixes be required for different areas?

1.3 Mortar mixes and appearance

It may be possible to find a sound example of pointing in a sheltered part of the building, for example under the eaves or behind downpipes, particularly on north and east elevations, that is contemporary with the initial construction.

For domestic buildings constructed before the early 20th century, this will almost certainly be a lime-based rather than a cement mortar. A close inspection of the mortar will help determine how the joints are finished and whether the aggregate

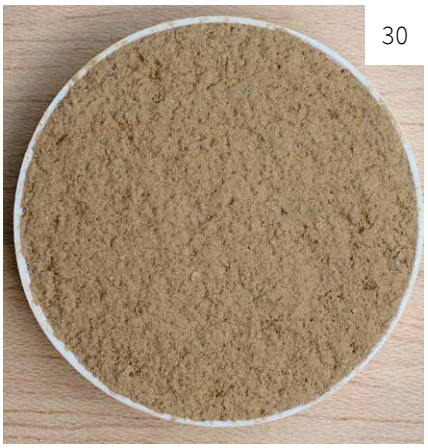
is coarse or fine grained. There may be other additions, such as ash or bits of broken brick or shell, that contribute to the character of the mortar. This can then be used as the basis for designing a new mortar and joint finish to match the historic pointing. In choosing an example to copy, care should be taken to ensure that it is not later inappropriate work that is selected.

Patch repointing may initially look clean and bright compared to surrounding original mortar that is retained. Providing the new mortar mix is a good match for the existing mortar it will soon weather and tone down so that the contrast between old and new is less marked.

A mortar mix that is compatible with the permeability of the particular stones or bricks in the wall and suitable for the degree of exposure should be chosen. The key principle is that the mortar should be slightly weaker and more permeable than the stone or brick. Mortar that is less permeable than the masonry, such as most cement-based mortars, will prevent moisture from evaporating out through the joints. Instead moisture will move largely through the stones or bricks, increasing the rate of decay and leaving the hard mortar standing proud.

Mortar that is harder than the masonry is at risk of cracking and causing mechanical damage to the stone of bricks. For this reason the inclusion of any cement-rich mixes should be avoided. Mixes will vary considerably according to circumstances from pure lime putty with no aggregate to 1 part binder to 3 parts aggregate.

29



30

31

Mortar samples

This shows mortar ‘patties’ or ‘biscuits’ that have been based on an analysis of the historic mortar which is sometimes necessary on very significant historic buildings. They can then be used *in-situ* to check for a suitable match to the existing mortar and the preparation of sample panels.

Pointing trial panels

It is always worth experimenting with various mixes to see which works best in the context. A discreet area should be selected for these to be done. Sample panels can also be used where consent is required prior to the work commencing.

Samples

Preparation of samples can be a cost-effective way of assessing what mortar mix to use in a particular context. Samples allow everyone involved to agree on the best approach before any work begins and can be left in place as standard that the actual work should meet.

Work involving new mortars on listed buildings or ancient monuments may require a number of sample mortar ‘patties’ or ‘biscuits’ to be made as part of the consent process prior to the work commencing.

Once the samples have been discussed, the mortar mixes that look most suitable should be used to do a trial panel of repointing on the wall. These should be properly finished and allowed to dry so that the final appearance can be judged and a decision can be made on which mortar mix to use.

The strength of mix also needs to be related to the degree of exposure. Areas such as parapets and chimney stacks usually require relatively stronger mixes than more sheltered areas.

If the building to be repointed is of particular significance, for instance it is listed, it may be necessary to accurately match the historic mortar by sending a sample to a specialist in historic mortars for analysis. This will give information on the aggregates and binders used in the original mix which can be used as a guide for the repair mortar.

Types of lime

There are two main types of lime that can be used in mortar mixes:

- Non–hydraulic lime
- Natural hydraulic lime (NHL)

Non-hydraulic lime

Non-hydraulic lime is the most permeable of all binders. It hardens very slowly by reacting with carbon dioxide in the atmosphere. Non-hydraulic lime mortar has good adhesive properties and can accommodate some movement. It is suitable for repointing in sheltered locations or for use on soft, permeable masonry or brick. Non-hydraulic lime is available in two forms, lime putty and powder:

- Lime putty
  The best quality non-hydraulic mortars are made from mature lime putty- a stiff whitish coloured paste – which is supplied in sealed plastic tubs. Pre-mixed mortars made with lime putty are also available from specialist suppliers. Lime putty and lime-putty mortars can be stored indefinitely in airtight containers protected from frost.
- Non-hydraulic powdered lime (known as hydrated lime)
  This powdered lime is widely available at builders' merchants and is usually used with sand in cement-based mortars. However, it can also be used to make non-hydraulic lime mortar. Best results are obtained if the lime has recently been manufactured. It can either be mixed with water to make lime putty, which can then be added to aggregate to make mortar, or it can be mixed directly with aggregates and water to produce mortar. The properties of mortar made with powdered non-hydraulic lime and lime putty are similar.
- Non-hydraulic lime with hydraulic additives (pozzolans)
  When non-hydraulic lime mortar is mixed with certain additives known as pozzolans (such as finely ground brick dust, for example) it will develop strength more quickly whilst still having a good level of workability. Pozzolanic mortars have slightly less permeability than pure lime putty mortars. Such mortars may be suitable for use in more exposed locations than pure non-hydraulic mortars. Pozzolans should always be added immediately before the mortar is used. Cement is not a suitable additive for lime putty mortar.

Natural hydraulic lime

Natural hydraulic lime (NHL) is widely available and is supplied as a ground powder that sets by chemical reaction with water as well as by a longer term reaction with carbon dioxide. Its initial set is faster than non-hydraulic lime but the actual rate is dependent on temperature and strength. It is available in three different strengths (NHL2, NHL3.5, NHL5). Hydraulic lime mortars have lower permeability and higher compressive strength compared to non-hydraulic mortars, and may be appropriate for use in locations that are permanently wet or very exposed.

The terms ‘hydrated’ and ‘hydraulic’ are often confused by contractors and builders’ merchants. ‘Hydrated’ refers to the process of converting burnt limestone to a lime binder by the addition of water, and all commercial limes (both non-hydraulic and hydraulic) are hydrated. ‘Hydraulic’ describes lime that sets partly due to a chemical reaction with water.

When considering which type of mortar to use, three issues need to be considered by the specifier:

- The type of masonry being repointed – less permeable and denser materials can accommodate stronger mortars, such as hydraulic lime mortars, if extra strength is needed due to exposure.
- The condition of the masonry – masonry that is decayed and highly permeable will require weaker mortar.
- The degree of exposure – areas of high exposure such as a chimney or roof parapet can require stronger mortars.

Aggregates

The aggregate contributes to the colour, texture and performance of lime mortar. There is a wide range of aggregates suitable for making mortar. The most common aggregate used today is sand. Most sands are composed of grains of quartz (silica) but calcareous sand or crushed well-graded limestone is a useful addition to non-hydraulic and pozzolanic mortars as it helps to speed up carbonation. However, fine ‘stone dust’ should be avoided or only added in small quantities to help achieve a particular colour, because if used in large volumes it increases the risk of the mortar shrinking as it dries.

For many general applications nowadays, a well-graded aggregate, containing a range of particle sizes, will be appropriate. The size of the aggregate particles is usually adjusted to suit the width of the mortar joint; coarse grit may be included in a mortar for rubble stonework whereas for the narrow joints of ashlar stone or some brick, fine-grained sand or crushed limestone may be suitable.

Historically, other materials such as crushed chalk, wood and coal ash, crushed shells and crushed brick were also used for making mortar. These materials are available from specialist suppliers and may be needed to create new repair mortars to match the character of existing historic mortars. More detailed information can be found in *Practical Building Conservation, Mortars, Renders & Plasters*.

1.4 Does repointing need consent?

For listed buildings or buildings that are scheduled monuments, consent will usually be needed before any repointing is carried out. A sample of the pointing proposed may need to be agreed before works commence. Work to buildings in conservation areas could require consent depending on the degree of planning controls in place.

In all these cases the local planning authority should be contacted well before the planned start date of work to establish what is required.

2 Repointing

As well as deciding on the extent of work and proposed joint finish before works start, it is also important to consider the likely weather conditions. Work with lime mortars should be avoided during extremes of temperature, such as very cold or very hot days or during very windy weather. If possible, work should be carried out in the spring, summer or early autumn. Provision should be made for suitable protection from sunshine, rain and wind, both during the work and at completion, to prevent rapid drying which would damage the mortar before it has set properly. If work has to be done during the winter, protection against frost will also be needed.

2.1 Preparing the joints

Once areas of defective pointing have been identified they can be carefully raked out manually using hooked tools or masonry chisels to a depth of at least twice the height of the joint, although on rubble stonework it will often be much deeper than this. On stonework with variable joint widths it will be necessary to decide what the average joint width is.

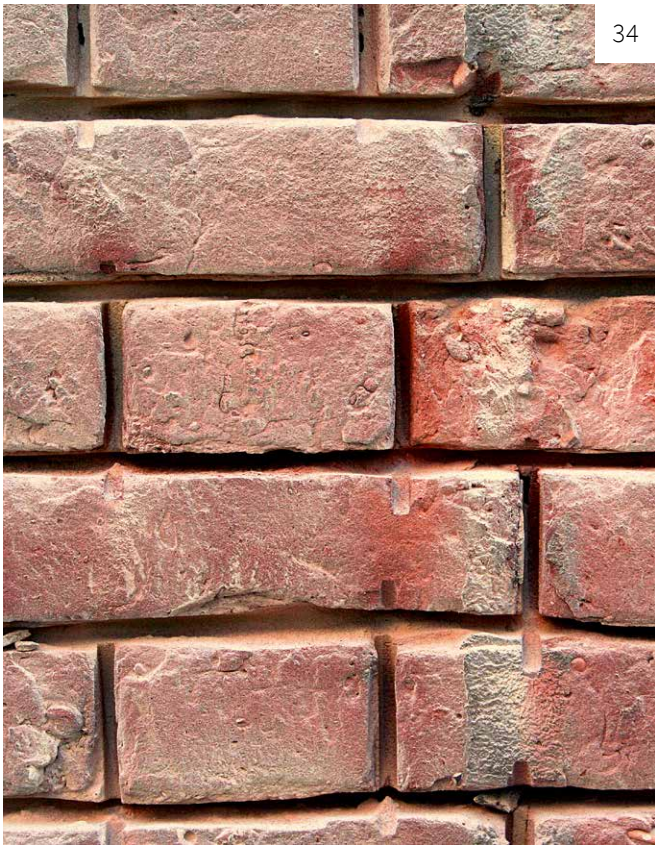
For the repointing of finely jointed work, which is rarely necessary, a hand-held saw blade is a suitable tool for cleaning out the joint.

Whatever method is used, it is important that mortar is removed from the top and bottom of the joints leaving a square-cut joint. Dust and debris must be removed from the joints using brushes or even a vacuum cleaner and thoroughly rinsed with water so that no loose dry material is left. The masonry must be thoroughly dampened with a hosepipe with a spray nozzle or a pump-action water sprayer, before placing the mortar. This is to reduce suction, improve adhesion of the mortar and prevent the mortar from drying too quickly.

Use of power tools

The use of power tools, such as angle grinders to remove pointing is not recommended because these do not completely remove old mortar from the joints and can easily damage the face of the masonry. They create a lot of dust so it is very difficult to keep track of where the blade is. However, where there is hard cement rich mortar it may be necessary to use a thin diamond-disc cutter to *very carefully* make an initial breach along the centre of wide joints, so that the loose mortar can then be removed with a hammer and sharp chisel to avoid damage to the corners of the masonry. Alternatively, a masonry drill can be used to drill a line of holes along the centre of the joint which will make it easier to break up the mortar with a hammer and chisel.

33



34

35

36

37

Removing cement mortar

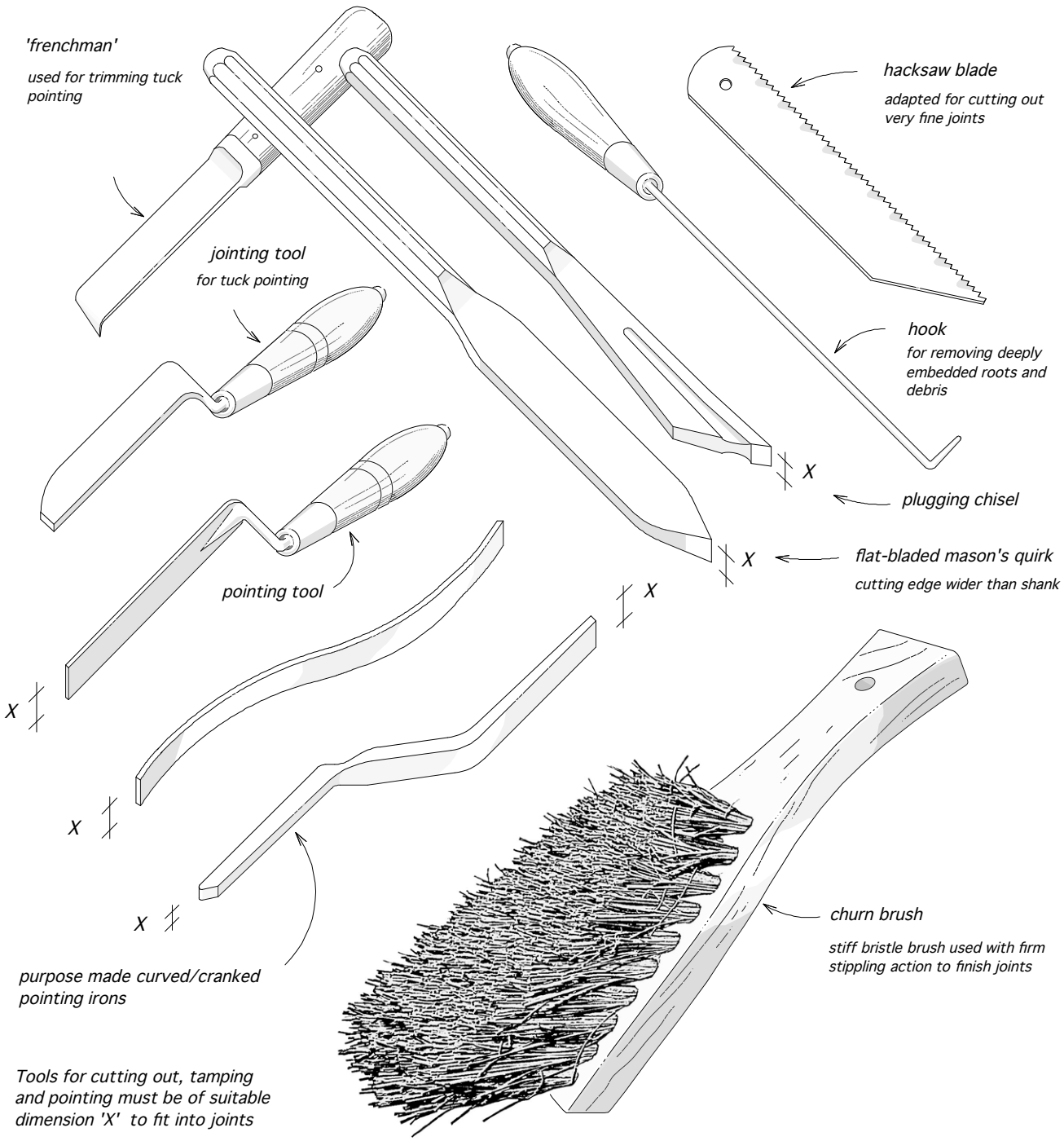
33 Shallow hard cement mortars tend to crack and loosen as they have no flexibility. They can often be removed with a tungsten-carbide tipped chisel as shown here.

34 These bricks have been damaged by the use of an angle grinder for cutting out mortar.

35 A pneumatic chisel being used to break up hard cement mortar along the centre of the joint.

36 Mortar being raked out with a hammer and chisel.

37 Mortar dust being removed from the joints with a brush.



Tools for repointing

Pointing trowels and jointing tools which are wider than the joints to be filled are best avoided as they cannot achieve complete packing of open joints at depth and risk smearing mortar on the surface of the masonry.

2.2 Filling the joints

Once preparation work has been completed then filling the joints can start.

Repointing with lime mortars should generally be carried out by an experienced contractor but the skills can be mastered by inexperienced contractors and practically minded homeowners. However, the use of lime mortar is very different to that of cement. It is important therefore to obtain sufficient training before undertaking repointing work using lime mortars. A number of organisations provide practical training work using lime mortars on historic buildings.

Contact with any form of lime can cause severe irritation to skin and eyes. Powdered lime can also cause respiratory irritation. Protection such as face masks, eye protection and gloves should be used when handling lime.

2.3 Protection during the works

Once the repointing is underway it is important to protect it from wind, rain and strong sunlight, to avoid damage or rapid drying. Particular care is required to avoid damage from frost when pointing has to be carried out in cold weather.

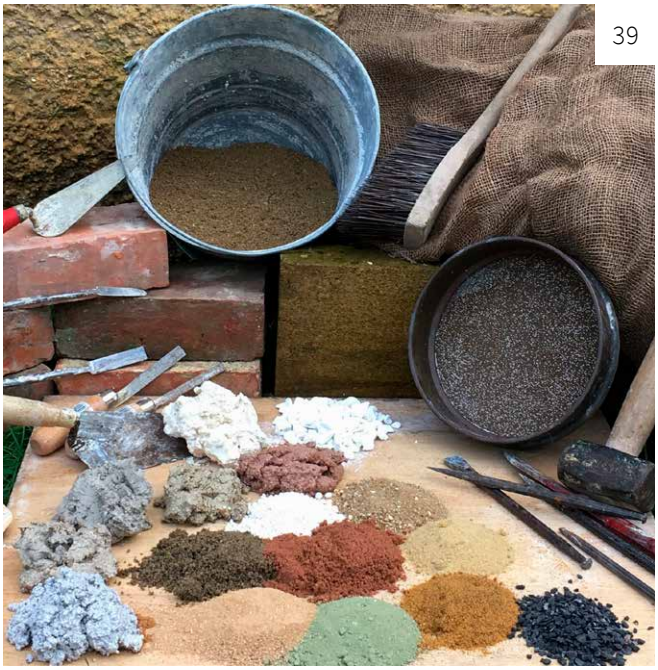
Surfaces should be protected with ventilated covers (multiple layers of hessian, thick blankets or carpet underlay are often used) and regular mist spraying may be needed to maintain damp conditions as the mortar starts to set. Additional plastic sheeting or tarpaulins draped in front of the hessian covers may also be needed if it is very windy or there is driving rain.

2.4 Finishing the joints

The mortar is ready for finishing when it is still damp but has a semi-hard leathery consistency so that it can be marked with a thumbnail, but a thumb pressed into the surface leaves barely any impression.

For joints that are not specially treated a flush finish is usually suitable.

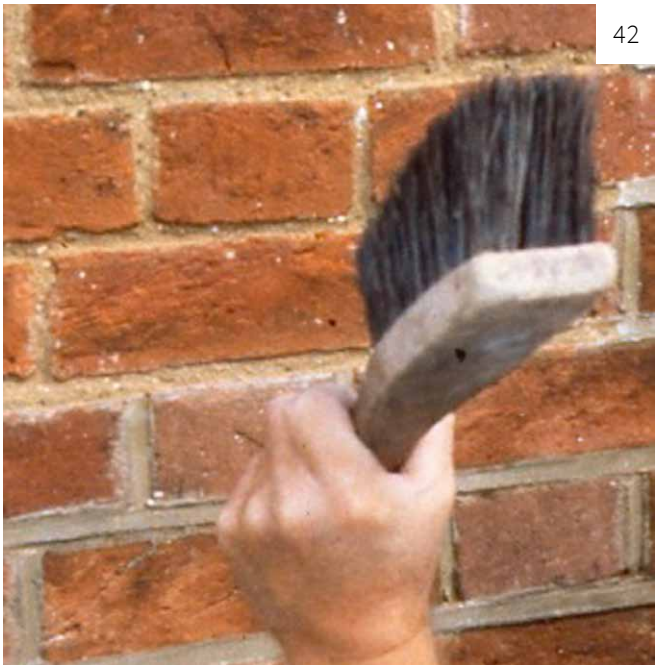
Where edges of the masonry are decayed the mortar may be set back to be within the original joint width so as to avoid visually widening the joint. However, this may provide less protection to the stonework so should only be done following an assessment of the condition of the masonry.



39

40

41



42

Brick joint filling

39 This shows a selection of the tools, lime mixes, sands and aggregates used for repointing works.

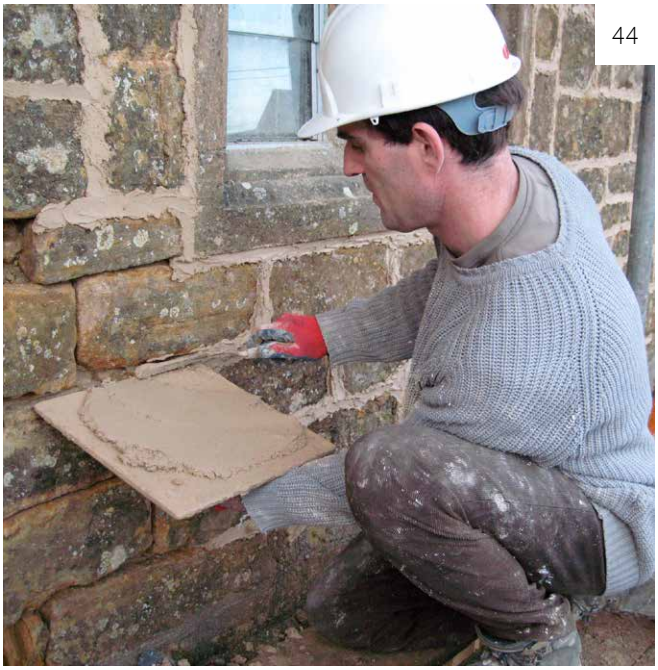
40 The mortar should be packed firmly into the joint using a pointing iron after all the loose material has been flushed out and the joint wetted first to reduce suction. The inside surfaces of the joint need to be damp but not wet.

Joints need to be thoroughly filled from the back and compacted to avoid voids, and be built up in layers of around 25mm deep.

41 The joint should be filled slightly proud of the intended finished level to allow for slight shrinkage and compaction of the mortar as it firms up. Any mortar that is smeared on the masonry should be sponged off with clean water before it has dried.

42 In masonry which is not finely finished, such as this wide-jointed brickwork, the joint can be finished by hitting the mortar with a bristle churn brush with a firm pushing action. This gives a natural weathered appearance by exposing some of the aggregate in the mortar. The use of the brush also helps to compact the joints and increases the surface area which aids drying. However, it is important the mortar is sufficiently set for this otherwise the brush will leave a series of pin-holes in the mortar.

43



44

45

46

Flush pointing rubble stonework

43 Mortar being placed into raked out and wetted joints.

44 The mortar is being placed over the edges of the stones to bring it flush.

45 This shows the mortar in place which is starting to 'firm up'.

46 Here the mortar is being pushed back to close up any shrinkage.

47

48

49

50

Flush pointing rubble stonework (continued)

47 This shows the mortar after being pushed back.

48 Once firm excess mortar can be scraped away with a small trowel.

49 The mortar is being hit with a churn brush to leave an open grained texture.

50 The completed repointing drying out.

51

52

53

54

Repointing regular stone masonry joints

51 A wedge of mortar being inserted into the joint with a pointing iron.

52 Using tools that match the width of the joint allows the mortar to be compacted ensuring a fully filled joint.

53 The mortar being hit with a stiff bristled churn brush to compact the mortar, remove laitance and expose the aggregate.

54 The completed work.

55

56

57

58

59

60

Repointing narrow ashlar joints

55 Removal of mortar with a hacksaw blade.

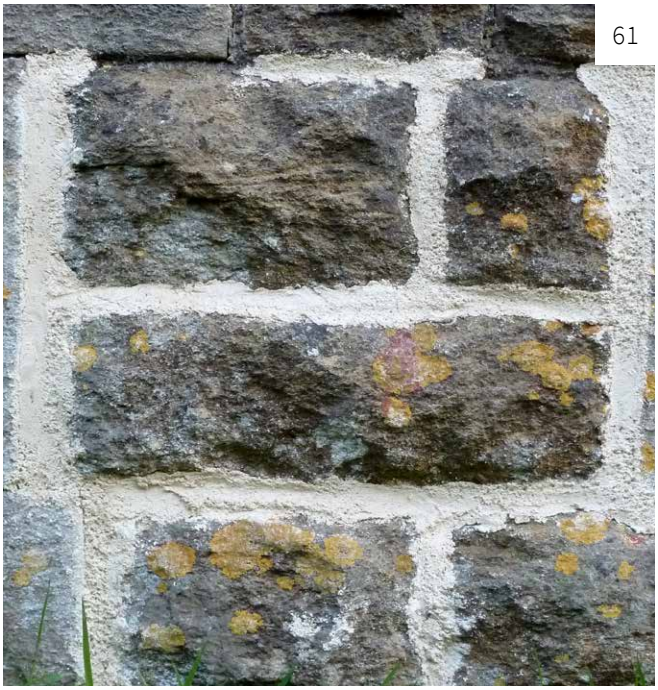
56 Insertion of neoprene backing rod into the joint.

57 Application of plastic faced adhesive tape over the joint to prevent smearing mortar during pointing.

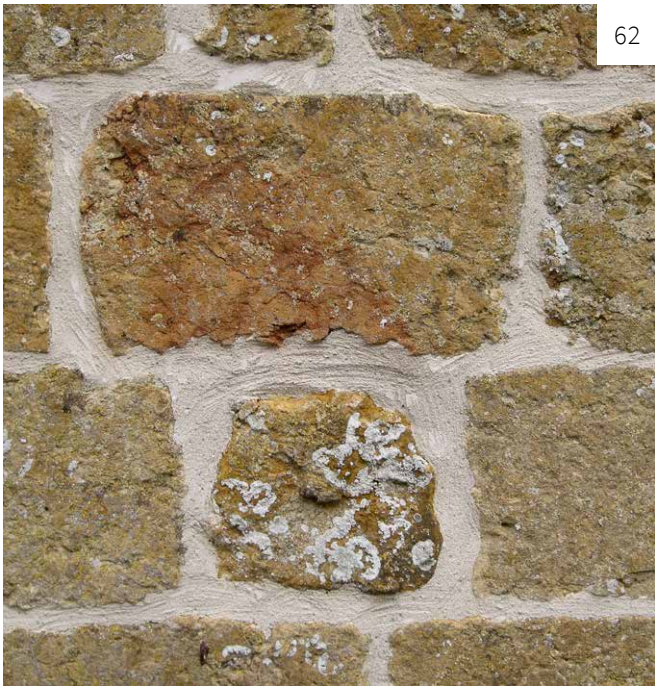
58 Incision of the tape through the joint.

59 Pressing mortar into the joint using a pointing iron.

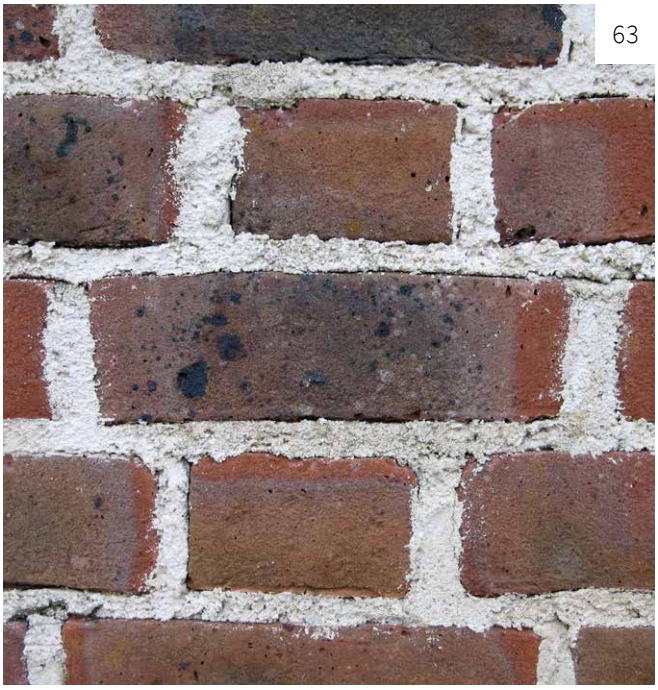
60 The filled joint after removal of adhesive tape.



61



62



63

64

Problems with repointing

61 This repointing was finished too early- the brush has left pin-holes. The mortar has also dried too quickly bringing lime to the surface of the wet mortar resulting in a light bloom.

62 This repointing was left too long before finishing. It required a wire brush to expose the aggregate, resulting in marks in the mortar which detracts from its appearance.

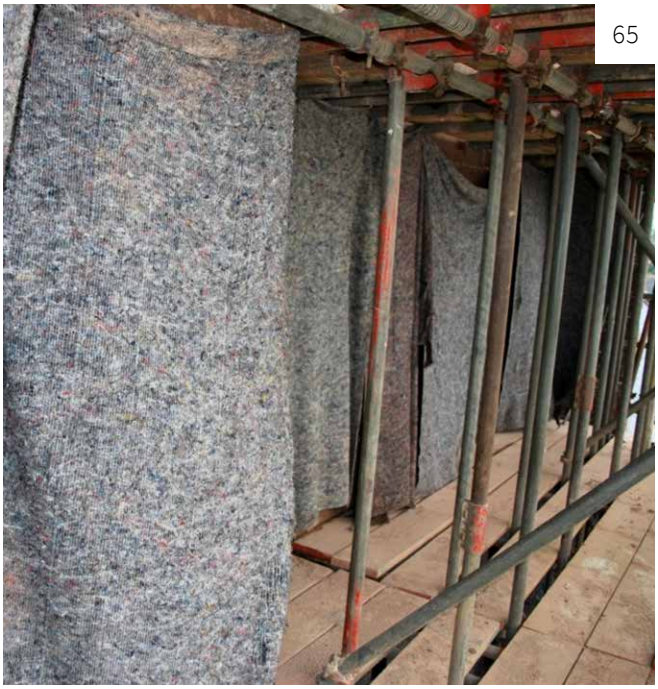
63 This shows a lime mortar which has been applied too wet. It has not been compacted and there is much shrinkage.

64 The mortar here has been smeared over the adjacent stone and is showing signs of shrinkage.

2.5 Protection at completion

Once the repointing is finished it is important to maintain protection as described in 2.3 until the mortar has cured sufficiently to resist damage by rainfall or frost.

The length of time protection is needed depends to a large extent on the weather conditions and type of mortar used. A minimum of a week is recommended but the longer the better particularly in extremes of weather, and for work carried out in the autumn. While all types of mortars will benefit from good aftercare, mortars based on non-hydraulic lime binders need the greatest amount of attention.



65

66

New pointing being protected

65 Thick blankets or carpet underlay are very effective for maintaining a humid environment as the mortar cures. They absorb more water than hessian and stay damp for longer.

66 Hessian being used to protect some completed repointing to a stone wall.

3 Where to Get Advice

3.1 Historic England website

The Historic England website provides a wide range of advice for owners of older homes including maintenance and repair, how to get professional help as well as links to various amenity societies who can offer advice on buildings of specific periods:
www.HistoricEngland.org.uk/your-home

More information can be found at:
https://www.historicengland.org.uk/advice/technical-advice/buildings/practical-building-conservation

Building Conservation Directory

A range of articles are available on many aspects of the care and repair of older buildings:
www.buildingconservation.com

3.2 Further reading

Practical Building Conservation series

This series of fully illustrated books provide detailed guidance on understanding deterioration, assessment and care and repair:

- *Basics* (2013)
- *Earth, Brick & Terracotta* (2015)
- *Mortars, Renders & Plasters* (2012)
- *Stone* (2012)

3.3 Contact Historic England

East Midlands
2nd Floor, Windsor House
Cliftonville
Northampton NN1 5BE
Tel: 01604 735460
Email: eastmidlands@HistoricEngland.org.uk

East of England
Brooklands
24 Brooklands Avenue
Cambridge CB2 8BU
Tel: 01223 582749
Email: eastofengland@HistoricEngland.org.uk

Fort Cumberland
Fort Cumberland Road
Eastney
Portsmouth PO4 9LD
Tel: 023 9285 6704
Email: fort.cumberland@HistoricEngland.org.uk

London
1 Waterhouse Square
138-142 Holborn
London EC1N 2ST
Tel: 020 7973 3700
Email: london@HistoricEngland.org.uk

North East
Bessie Surtees House
41-44 Sandhill
Newcastle Upon Tyne
NE1 3JF
Tel: 0191 269 1255
Email: northeast@HistoricEngland.org.uk

North West
3rd Floor, Canada House
3 Chepstow Street
Manchester M1 5FW
Tel: 0161 242 1416
Email: northwest@HistoricEngland.org.uk

South East
Eastgate Court
195-205 High Street
Guildford GU1 3EH
Tel: 01483 252020
Email: southeast@HistoricEngland.org.uk

South West
29 Queen Square
Bristol BS1 4ND
Tel: 0117 975 1308
Email: southwest@HistoricEngland.org.uk

Swindon
The Engine House
Fire Fly Avenue
Swindon SN2 2EH
Tel: 01793 445050
Email: swindon@HistoricEngland.org.uk

West Midlands
The Axis
10 Holliday Street
Birmingham B1 1TG
Tel: 0121 625 6870
Email: westmidlands@HistoricEngland.org.uk

Yorkshire
37 Tanner Row
York YO1 6WP
Tel: 01904 601948
Email: yorkshire@HistoricEngland.org.uk

Acknowledgements

Images

© Historic England

All images, unless stated below

© Other

31: Graham Abrey

34: SPAB

51-54: Tom Beattie

55-60: John Ashurst Estate

36-37: South Somerset District Council

65: Sally Strachey

Every effort has been made to trace the copyright holders and we apologise in advance for any unintentional omissions, which we would be pleased to correct in any subsequent editions.

Historic England

We are the public body that looks after England's historic environment. We champion historic places, helping people understand, value and care for them.

Please contact
guidance@HistoricEngland.org.uk
with any questions about this document.

HistoricEngland.org.uk

If you would like this document in a different format, please contact our customer services department on:

Tel: 0370 333 0607
Fax: 01793 414926
Textphone: 0800 015 0174
Email: customers@HistoricEngland.org.uk

All information and weblinks accurate at the time of publication.

Please consider the environment before printing this document

HEAG144
Publication date: January 2017 © Historic England
Design: Historic England

TECHNICAL DATA SHEET

SAINT-ASTIER

LIME, LIFELONG EXCELLENCE

Saint-Astier® NHL 2

THE CHALK LIME

PURE NATURAL HYDRAULIC LIME

THE + BENEFITS

- IDEAL FOR SOFT SUBSTRATES
- ALLOWS VERY FINE FINISHES
- ADAPTED FOR TRADITIONAL MASONRY
- RESISTANT TO SULPHATES AND SALTS

SUITABLE FOR

> Masonry, consolidation
> Plastering, rendering, pointing
> Hemp plasters
> Decorative finishes, shelter coats
> Adobe, cob

PACKAGING

25 kg bag
40 bags per pallet (1T pallet)

PRODUCT COMPOSITION

100% pure Natural Hydraulic Lime NHL 2 by Saint-Astier®.

SHELF LIFE & GUARANTEE

One year from production date, if protected in the original packaging and stored in dry conditions. Close open bags as soon as possible. Manufacturer Civil Responsibility.

25 KG | NHL 2 | BS-EN 459

stastier.co.uk

Saint-Astier® NHL 2

RENDERING / PLASTERING

	PREPARATION OF THE SUPPORT	STIPPLE COAT	BASE COAT	TOP COAT	
		3 to 5 mm	10 to 20 mm	Scratched 5 to 7 mm	Smooth or floated 5 mm max
CLAY, STRAW-CLAY, RAMMED CLAY, ADOBE, CLAY CONSTRUCTION	Moisten with lime water 1 NHL2 + 1,5 Water	1 NHL2 + 2 Sand 0/4 mm	1 NHL2 + 2 Sand 0/3 mm	1 NHL2 + 2 Sand 0/2 mm	1 NHL2 + 3 Sand 0/1 mm
LIGHTWEIGHT BLOCKS		1 NHL2 + 1 Cement + 4 Sand 0/3 mm			
ESTIMATED CONSUMPTION		1.7 kg/m² for 5 mm	3 kg/m² for 10 mm	1.5 kg/m² for 5 to 7 mm	1 kg/m² for 5 mm
WAITING TIME BETWEEN COATS		At least 2 Days		At least 15 Days	
MASONRY MADE OF SOFT STONE (CHALK, TUFF...) AND/OR WITH COARSE PLASTER		1 NHL2 + 2 Sand 0/3 mm	1 NHL2 + 2.5 Sand 0/3 mm	1 NHL2 + 2.5 Sand 0/2 mm	1 NHL2 + 3 Sand 0/1 mm
ESTIMATED CONSUMPTION		2.5 kg/m² for 5 mm	3.5 kg/m² for 10 mm	1.5 kg/m² for 5 to 7 mm	1 kg/m² for 5 mm
WAITING TIME BETWEEN COATS	Fresh on fresh	At least 4 Days		At least 7 days	

BEDDING, POINTING, TILING & OTHER APPLICATIONS

SOFT MASONRY AND POINTING	*Hollow, solid and/or traditional bricks*	1 NHL2 + 2 Sand 0/4 mm
	Pointing: medium to soft natural stone, brick	1 NHL2 + 2,5 Sand 0/4 mm
CONSOLIDATION OF THE OLD MASONRY	*Injection*	1 NHL2 + 1 Water
	Grouting	1 NHL2 + 1 Sand

Bucket of **NHL 2**

Bucket of sand

Bucket of cement

ADDITIONAL INFORMATION

> Smooth finish with a maximum thickness of 5 mm (only from Saint-Astier® NHL 2). Do not use plastic trowels for the finish.

> Traditional renders tend to show shading after a rain shower. This phenomenon shows that the lime mortar has a moisture-regulating function.

> Quantity of mixing water depends on the moisture of the sand and the dosage. **Generally 15 litres per 25 kg bag.**

> Technical documentation for the implementation is available at: www.stastier.co.uk

SAINT-ASTIER
LIME, LIFELONG EXCELLENCE

Chaux de Saint-Astier
28 bis route de Montanceix - La Jarthe - 24110 Saint-Astier - France
stastier.co.uk | contact_uk@saint-astier.com | technical_support@saint-astier.com

Saint-Astier® NHL 2

PERFORMANCE

ESSENTIAL SPECIFICATION	BS-EN 459 PERFORMANCE STANDARD	SAINT-ASTIER® NHL 2 TYPICAL VALUES
Bulk density	0.4 to 0.7 kg/l	0.5 kg/l
Compressive strength 28 days	From 2 to 7 MPa	3.5 MPa
SO_3	≤ 2 %	≤ 2 %
Free lime	≥ 35 %	> 55 %
Stability	≤ 2 mm	≤ 2 mm
Initial setting time	More than 1 hours	5 to 6 hours
Particle size 90µm	≤ 15 %	≤ 15 %
Particle size 200µm	≤ 2 %	≤ 2 %
Whiteness index	No requirements	76
Quicklime residue after slaking	n/a	< 1 %
Surface cover (cm^2 per gram)	n/a	11.000
Expansion	n/a	< 1 mm

MORTARS	COMPRESSIVE STRENGTH – N/mm^2				ELASTICITY MODULI (MPa)		
Mix ratio	BS-EN 459*	1 : 2	1 : 2.5	1 : 3	1 : 2	1 : 2.5	1 : 3
7 days		0.62	0.53	0.47	n/a	n/a	n/a
28 days	2	1.48	1.36	1.25	9.025	9.800	9.000
6 months		3.84	3.00	2.88	12.600	12.030	11.900
12 months		4.00	2.90	2.90	12.515	12.030	11.900
24 months		4.25	3.00	2.75	13.375	12.000	11.750
**BS- EN 459 (mortar ratio 1: 1 by volume with ISO 679 sand)*							

APPLICATION

Application with spray gun possible. Do not hesitate to contact our Technical Support.

WORKING TEMPERATURE

Not below 8°C or above 30°C. Dampen the substrates the day before and prior to application, allow the surface water to be reabsorbed. Avoid rapid drying due to high temperatures and/or strong winds by covering and curing with a light water mist as necessary. Protect wet mortars from frost for at least 10 days after application.

REWORKING

Possible within 24 hours.

HEALTH AND SAFETY

Follow the instructions on the safety data sheet and wear the appropriate equipment (gloves, mask, safety shoes....).

FURTHER INFORMATION

Available on our website stastier.co.uk

SAINT-ASTIER
LIME, LIFELONG EXCELLENCE

Chaux de Saint-Astier
28 bis route de Montanceix - La Jarthe - 24110 Saint-Astier - France
stastier.co.uk | contact_uk@saint-astier.com | technical_support@saint-astier.com

© Saint-Astier édition Janvier 2024 - 24023
mcomm