

Donald Insall Associates

The John Rylands Library - Cloister Roof Works

The John Rylands Research Institute and
Library - Cloister Roofs

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H71 DIA

Lead sheet fully supported roof and wall coverings/ flashings

Clauses

95A To be read with preliminaries/ general conditions

Types of leadwork

100D Lead sheet and strip

1. As clause 520, as follows unless otherwise stated or shown on drawings: 2401, 2402
2. Flashings and aprons
3. Lead chute gutter

To be read with preliminaries/ general conditions

410A Apron flashings

1. Refer to drawings 2401,2402
2. Lead: Code 6 in lengths not exceeding 1500 mm.
3. End to end joints: Laps of not less than 150 mm.
4. Dimensions:
5. Upstand: Not less than 100 mm.
6. Cover to abutment: Not less than 150mm
7. Fixing: Lead wedges into bed joint, clips to bottom edge at laps and 300mm centres back pointed in sealant as clause 715, 770 and 790.

430A Cover flashings

1. Drawing reference(s): 2401, 2402
2. Lead: Code 5 or 6 in lengths not exceeding 1500 mm.
3. End to end joints: Laps of not less than 150 mm.
4. Overlap to upstand: Not less than 75 mm.
5. Cover to roof: Not less than 75 mm.
6. Fixing: Welt top edge 12mm, turn 25mm into bed joint in masonry surfaces and fix with lead wedges, clips to bottom edge at laps and 300mm centres and back pointed in sealant as clause 715, 770 and 790. Dress over ventilator units where shown and secure at edge with single welt.

450A Step and cover flashings

1. Drawing reference(s): 2401, 2402
2. Lead: Code 5 or 6 in lengths not exceeding 1500 mm.
3. End to end joints: Laps of not less than 150 mm.
4. Dimensions:
5. Upstand: Not less than 100 mm.
6. Cover to roof: Not less than 150 mm.
7. Fixing: Lead wedges at every course and clips as clause 721D and 726D at not more than 500 mm centres along free edge.

450D Lead chute gutter

1. Drawing reference(s): 2401, 2402
2. Lead: Code 6 in lengths not exceeding 1500 mm.
3. End to end joints: Laps of not less than 150 mm.
4. Dimensions: Refer to drawings.
5. Upstand: Not less than 100 mm.
6. Cover to roof: Not less than 150 mm.
7. Fixing: Contractor to confirm methodology for CA approval.

General requirements/ preparatory work

510 Workmanship generally

1. Standard: To BS 6915 and latest edition of 'Rolled lead sheet. The complete manual' published by the Lead Sheet Training Academy.
2. Fabrication and fixing: To provide a secure, free draining and completely weathertight installation.
3. Operatives: Trained in the application of lead coverings/ flashings. Submit records of experience on request.
4. Preforming: Measure, mark, cut and form lead prior to assembly wherever possible.
5. Marking out: With pencil, chalk or crayon. Do not use scribes or other sharp instruments without approval.
6. Bossing and forming: Straight and regular bends, leaving sheets free from ripples, kinks, buckling and cracks.
7. Solder: Use only where specified.
8. Sharp metal edges: Fold under or remove as work proceeds.
9. Finished work: Fully supported, adequately fixed to resist wind uplift but also able to accommodate thermal movement without distortion or stress.
 - 9.1. Protection: Prevent staining, discolouration and damage by subsequent works.

511A Approved firm

1. The lead sheet covering work is to be carried out by a firm with prior approval of the Architect, and must be a member of the Lead Contractors Association.

516D In situ welding

1. Is not permitted unless agreed daily in advance in writing with the CA and subject to completion and signing of a 'hot work permit' form and subject to compliance with its requirements.

520A Lead sheet

1. Rolled to BS EN 12588: 2006 Rolled Lead Sheet for Building Purposes.
2. Identification: Labelled to show thickness/code, weight and type.

521D Store

1. Lead sheets and lead strip clear of ground in a dry place on level surface. Protect surfaces and edges from distortion and damage, including impact, dust or moisture.

555D Layout

1. Agree setting out of joints, drips, and laps with the CA before beginning work.

2. Form welts and laps to provide cover in direction of flow and away from adjacent sloping roofs and rain water pipe outlets.

581D Replacement of existing lead

1. Must always be carried out in small sections at a time to reduce the risk of weather damage to a minimum. Provide and maintain temporary waterproof coverings to ensure that there is no damage to the existing base and building.

587D Existing lead removed

1. The Contractor is to allow in their tender for collecting all lead that is not to be reinstated, for taking scrap lead to an authorised dealer and for obtaining a credit note for the lead which is to remain the property of the Employer.

610D Suitability of bases

1. Laying of lead will be taken as joint acceptance by the Main Contractor and Sub-Contractor of the suitability of bases.
2. Before covering, inform CA if either the Main Contractor or Sub-Contractor find bases in anyway unsuitable.

647D Underlay - paper

1. Waterproof building paper to BS 1521: 1972, Class A, Grade 1 F.

648A Underlay - non woven crimped filament polyester needle punched

1. BLM Standard Underlay.

650D Laying underlay

1. **Handling:** prevent tears and punctures.
2. Lay paper with 100mm lap across falls. Lay felt with butt joints.
3. Lay felt or paper loose on concrete or screed. Nail or staple underlay (felt or paper) to boarded surfaces sufficient to hold it in place until overlying materials secure it in place. To vertical, and steeply sloping surfaces, where rolls are not to be used, fix head of underlay at 150mm centres with copper clout nails. Continue around gutters and up abutments to flashing line.

651A Preparation of lead sheet

1. A single coat of ready mixed chalk enhanced emulsion is to be applied to the underside of all lead sheets, and allowed to dry prior to laying. Ready mixed chalk emulsion is available from Rowan Technologies, Urmston Road, Manchester (0161) 748 3644.

Fixing lead

705 Head fixing lead sheet

1. **Top edge:** Secured with two rows of fixings, 25 mm and 50 mm from top edge of sheet, at 75 mm centres in each row, evenly spaced and staggered.
2. **Sheets less than 500 mm deep:** May be secured with one row of fixings, 25 mm from top edge of sheet and evenly spaced at 50 mm centres.

713A Clips

1. Retain free edges of coverings and flashings with clips at laps and at maximum 750mm centres. Ensure there is a 3mm gap between the edge of the retained sheet and the internal radius of the clip to allow for expansion.
2. To lead pitched roofs allow for a minimum 6mm expansion gap between the edge of the lead roof sheet and the clip.

715A Clips

1. **Manufacturer:** Contractor's choice.
2. **Material:**
 - 2.1. **Lead clips:** Cut from sheets of same thickness/ code as sheet being secured.
 - 2.2. **Copper clips:**
 - 2.2.1. **Thickness:** 0.70 mm.
 - 2.2.2. **Temper:** BS EN 1172, designation R220 in welts, seams and rolls, R240 elsewhere; dipped in solder if exposed to view.
 - 2.3. **Stainless steel clips:**
 - 2.3.1. **Thickness:** 0.71 mm.
 - 2.3.2. **Grade:** BS EN 10088-1, 1.4301(304)terne coated if exposed to view.
3. **Dimensions:**
 - 3.1. **Width:** 50 mm where not continuous.
 - 3.2. **Length:** To suit detail.
4. **Fixing clips:** Secure each to substrate with either two screw or three nail fixings not more than 50 mm from edge of lead sheet. Use additional fixings where lead downstands exceed 75 mm.
5. **Fixing lead sheet:** Welt clips around edges and turn over 25 mm.
6. **Centres:** max 350mm.

726D Clip fixings

1. Fix copper/lead clips to timber with copper clout nails to BS 1202 Part 2: 1974, table 2, with annular ring, helical ring or serrated shank, length not less than 20 mm, shank diameter not less than 3.35 mm and head diameter not less than 8 mm.
2. Fix copper/lead clips to concrete, brickwork and stonework with brass or stainless steel screws to (superseded) BS 1210: 1963, table 3, length not less than 19 mm and diameter not less than 3.35 mm, with washers of the same material and plastics plugs of length and diameter to suit screws.
3. Fix stainless steel clips to timber with stainless steel (austenitic) clout nails with annular ring, helical ring or serrated shank, length not less than 19 mm, shank diameter not less than 2.65 mm and head diameter not less than 8 mm.
4. Fix stainless steel clips to concrete, brickwork and stonework with stainless steel screws to (superseded) BS 1210: 1963, table 3, length not less than 19 mm and diameter not less than 3.35 mm, with washers of the same material and plastics plugs of length and diameter to suit screws.

770 Wedge fixing into joints/ chases

1. **Joint/ chase:** Rake out to a depth of not less than 25 mm.
2. **Lead:** Dress into joint/ chase.
 - 2.1. **Fixing:** Lead wedges at not more than 450 mm centres, at every change of direction and with at least two for each piece of lead.
3. **Sealant:** One part neutral cure high performance silicon based product specifically formulated for use with lead sheet and flashings, such as Calder Lead Sheet Sealant or Leadmate.

3.1. Application: As section Z22.

790 Screw fixing into joints/ chases

1. Joint/ chase: Rake out to a depth of not less than 25 mm.
2. Lead: Dress into joint/ chase and up back face.
 - 2.1. Fixing: Into back face with stainless steel screws and washers and plastics plugs at not more than 450 mm centres, at every change of direction, and with at least two fixings for each piece of lead.
3. Sealant: one -part, neutral cure, high performance, silicon based product specifically formulated for use with lead sheet and flashings, such as Clader Lead Sheet Sealant or Leadmate.
 - 3.1. Application: As section Z22.

Jointing lead

810 Forming details

1. Method: Bossing or leadwelding except where bossing is specifically required.
2. Leadwelded seams: Neatly and consistently formed.
 - 2.1. Seams: Do not undercut or reduce sheet thickness.
 - 2.2. Filler strips: Of the same composition as the sheets being joined.
 - 2.3. Butt joints: Formed to a thickness one third more than the sheets being joined.
 - 2.4. Lap joints: Formed with 25 mm laps and two loadings to the edge of the overlap.
3. Bossing: Carried out without thinning, cutting or otherwise splitting the lead sheet.
 - 3.1. Details where bossing must be used: To be confirmed on site - allow for bossing of decorative lead finials.

850A Lead T pren expansion joints

1. To be used only where absolutely necessary. Instances where T pren joints are indicated on drawings to be reviewed following strip out prior to commencement.
2. Product description: T pren plus expansion joint.
3. Supplier: British Lead Mills.
4. Fixing: at 2m centres for codes 5 and 6 and 1m each side of fixed points such as outlets and changes in direction. Fitting as per LSTA manual and British Lead Mills recommendations. Normal lead to lead welding techniques for a flat lapped seam to be used to join the lead strips to the adjacent lead guttering, with single loading along the seam for code 5, and double loading for code 6. Keep flame back from the neoprene at all times and cover strip protected by application of damp cloth.
5. Hot work methodology must be in place and fully adhered to.
6. After installation the cover strip should be dressed flat to prevent debris becoming lodged beneath it.
7. A 10 year guarantee is given with Lead T Pren products when fitted in accordance with LTSA Rolled Lead Sheet Manual.

880 Weltd joints

1. Joint allowance: 50 mm overlap and 25 mm underlap.
2. Copper or stainless steel clips: Fix to substrate at not more than 450 mm centres.
3. Overlap: Welt around underlap and clips and lightly dress down.

957D Historic plumbers marks, graffiti etc

1. Prior to stripping, agree with the CA any historic marks and graffiti to be retained. Cut out any identified areas, allowing a margin of at least 50mm around mark. Burn retained sheet on to new lead in original location in accordance with the terms of the relevant hot works permit.

970 Patination oil

1. **Manufacturer:** British Lead.
 - 1.1. **Product reference:** Patination Oil.
2. **Location:** Apron flashings, flat roofs etc where water run off will discharge over slating of masonry.
3. **Application:** As soon as practical, apply a smear coating to lead, evenly in one direction and in dry conditions.

Ω End of Section

J21

Mastic asphalt roofing/ insulation/ finishes

Types of coating/ paving

10 Roof coating

1. Description: Mastic asphalt waterproofing to flat and sloping concrete roof areas.
2. Substrate: Existing concrete deck, repaired and made good where required, with two layer of building (TBC) and 40mm screed.
 - 2.1. Preparation: Clean, dry, free from debris and repair any cracks.
3. Separating layer (loose-laid): IKO Black Sheathing Felt laid over the screed.
 - 3.1. Laps (minimum): 50 mm side and end laps.
4. Coating: Mastic asphalt as [clause 26](#)
5. Surface protection: Sand-rubbed finish on horizontal surfaces, followed by white solar reflective coating.
6. Accessories: Angle fillets at junctions and upstands.
7. Verification: Check continuity, adhesion, and correct thickness of asphalt and fillets.
 - 7.1. Timing: Lay mastic asphalt only once screed and separating layers are fully dry and ready.
8. Refer to drawing 2500.

20 Skirtings/ Vertical work

1. Description: Upstands, parapets, abutments, and penetrations.
2. Substrate: Primed masonry
 - 2.1. Preparation: Clean, dry, and prime per manufacturer's instructions.
3. Separating layer: IKO Black Sheathing Felt where required.
4. Keying: Expanded metal lathing to [BS 8204-5](#), clause 5.4
5. Coating: Mastic asphalt, as [clause 26](#)
 - 5.1. Height above finished roof level (minimum): 150 mm
 - 5.2. Fillet profile: Two-coat solid asphalt fillets, 45° angle, 40 mm minimum width on face.
6. Surface protection: Solar reflective paint, as clause 95
7. Accessories: Angle fillets at junctions and upstands.
8. Verification: Check continuity, adhesion, and correct thickness of asphalt and fillets.
 - 8.1. Timing: Lay mastic asphalt only once screed and separating layers are fully dry and ready.

26 Mastic asphalt

1. Manufacturer: IKO PLC
 - 1.1. Product reference: Permaphalt
2. Type: Mastic asphalt roofing

30 Removing existing mastic asphalt

1. Areas to be removed: Entire roof covering.
2. Existing roof: Concrete substrate with previous mastic asphalt.

50 Applying metal lathing to vertical/ sloping

1. Description: For mastic asphalt on slopes >10° or vertical work.
2. Material:: Galvanised expanded metal lathing, minimum 0.46 mm thick
3. Fixing: Mechanically at 150 mm centres in both directions.
4. Method of fixing:
 - 4.1. Perimeter edges:
 - 4.2. General areas (maximum):

75 Laying mastic asphalt

1. Suitability of substrate: Clean, dry, screed over concrete.
2. Application
 - 2.1. Thickness: 20 mm nominal thickness in three coats
3. Fillets at internal angles: Two-coat solid asphalt at internal junctions.
4. Stagger joints:: Minimum 75 mm between joints in consecutive coats.
5. Completion: During final floating operation, whilst asphalt is still warm, apply sand to horizontal surfaces and rub in well using wooden float. Remove surplus material.
6. Surface condition at completion: Smooth and free from imperfections. Firmly adhered, weatherproof and free-draining.

95 Solar reflective paint

1. Manufacturer: IKO PLC
 - 1.1. Product reference: IKO Solar Reflective Coating (white)
2. Colour: White
3. Application: Apply to cooled asphalt per manufacturer instructions, ensuring complete coverage of all exposed surfaces.
4. Surface coverage: Ensure complete coverage of exposed asphalt.
5. Verification: Manufacturer's confirmation of suitability.
 - 5.1. Timing:

Performance - Not Used

Products - Not Used

Execution generally - Not Used

Substrates/ air and vapour control layers/ warm deck roof insulation - Not Used

Asphalting - Not Used

Surfacing - Not Used

Completion - Not Used

Ω End of Section

Z21 DIA Mortars

Cement gauged mortars

50D PROPORTIONS FOR LIME BASED MORTARS

1. Proportions and additional requirements for mortar materials to be based on trials as specified elsewhere.
2. For purposes of tender assume an NHL 3.5 hydraulic lime:sand mortar
Mature lime putty: TYPE A1 - 1.0. TYPE A2 - 1.0
NHL 3.5 hydraulic lime: sand mortar (1:3 mix) to match the colour of the existing mortar exactly.
Assume source of sand to be 1 part Leighton Buzzard and 1.5 parts Nosterfield sieved so that the particle size equates to one third of the particular joint into which the material is to be placed.

107D ADMIXTURES GENERALLY

1. Do not use in mortar unless specified or approved. Do not use calcium chloride or any admixtures containing calcium chloride. Admixtures, if specified, to be to BS EN 934-3:2003

Lime:sand mortars

323D SAND FOR SITE MADE LIME MORTAR

1. Standard: to BS EN 13139: 2002
2. Grading:
 - adjust according to thickness of joint
3. Sand for facework mortar:
 - obtain from one source.
 - Mix different loads if necessary to ensure consistency of colour and texture.
 - Sand to be sharp, angular and well-graded, with a good range of grain size from 2.36mm to 150µm.
 - Store different sands in different piles on clean hard bases that allow free drainage.
 - Avoid intermixing and contamination.

324D SITE PREPARED LIME:SAND FOR CEMENT GAUGED MORTARS

1. When pigment is not required, lime:sand may be prepared on site in lieu of ready-mixed material, using sand as specified in the type of coating clause(s), by:
Thoroughly mixing lime putty, ready prepared to BS EN 459-1:2001, with sand, or
Thoroughly mixing hydrated lime powder to BS EN 459-1:2001 with sand, first in the dry state and then with water. Keep for at least 16 hours before use and prevent from drying out.

325D SAND FOR CONSERVATION WORK

1. Clean, to BS EN 13139: 2002
2. Aggregate to match existing in colour, texture, grain size and grading. If necessary source from variety of suppliers. Architect to confirm sand type prior to samples.
3. Soft building sand may be added to achieve required colour or to improve workability up to 50% of total volume of sand.

330 Hydraulic limes

1. Manufacturer: [Saint-Astier®](#)
2. Contact details

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Mortars**
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NOTE: All proposals are to be reviewed and commented on by the specialist contractor prior to any works commencing on site.

- 2.1. Address: 75 Cowcross Street
LONDON
United Kingdom
EC1M 6EL
- 2.2. Telephone: +44 7534 806947
- 2.3. Web: www.stastier.co.uk
- 2.4. Email: contact_uk@saint-astier.com
3. Product reference: Saint-Astier® NHL 3.5
4. Type of hydraulic lime: Natural hydraulic lime.
5. Standard: To BS EN 459-1.
6. Designation: NHL 3.5.
7. Constituents: Manufacturer's standard.
8. Density: 0.65 kg/L.
9. Compressive strength - 7 days: 3 MPa.
10. Compressive strength - 28 days: 7 MPa.
11. Technical characteristics, other: Manufacturer's standard.

335D READY PREPARED LIME PUTTY

1. Manufacturer: Mason to submit proposals
- Product reference: Mason to submit proposals
2. Type:
- Slaked directly from CL 90 quicklime to BS EN 459-1:2015, using an excess of water.
3. Maturation:
- In pits/ containers that allow excess water to drain away.
- Maturation period before use (minimum): 4.
4. Density of matured lime putty:
- 1.3 - 1.4 kg/litre.

340D POZZOLANIC MATERIAL

1. Using respiratory protection, incorporate as dry powder with damp sand:lime mix, just before mix to be used, one of the following to approval of CA:
2. - Pozzolan: Polestar obtained from Rose of Jericho Ltd, Horchester Farm, Holywell, Dorchester, Dorset DT2 0LL. Tel: 01935 83676.
3. - Trass: Tubag trass lime obtained from Nimbus Conservation Ltd, Eastgate, Christchurch St East, Frome, Somerset BA11 1QD. Tel: 01373 474646
4. - Brick dust: 150 µm.
Colour _____ to CA approval.

410D POINTING SAMPLES TO MATCH EXISTING WORK

1. Prepare up to six sample tablets of varying mortar mixes to match colour, texture and profile of existing for approval.
2. Prepare samples in advance of site visit so that they can be inspected when dry.
3. Execute up to three sample areas of pointing in approved location(s) using approved mix.
4. Retain approved pointing sample for reference during the contract.

411D LIME:SAND MORTARS AND WINTER WORKING

1. During the period mid-October to April, refer to the CA for confirmation of mix type if high calcium (putty lime) mixes are specified.

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NOTE: All proposals are to be reviewed and commented on by the specialist contractor prior to any works commencing on site.

2. Hydraulic lime mixes require greater care in winter than in summer. To achieve a satisfactory set, 96 hours of constant temperatures above 8-10°C are required. For mortar depths greater than 15 mm, this period is extended.
3. Application should not be undertaken when temperatures are below 5°C or are rising from this temperature unless a means of creating constant warm air behind sheeted protection is provided.
4. Precautions:
 - 4.1. Ensure bulk materials and mixing water temperature are above 5°C at the time of mixing.
 - 4.2. Provide three layers of protection whenever frost is likely. The following should be considered minimum recommendations:
 - 4.2.1. Hessian sacking; 12oz bleached, starch free hessian in contact with the working surface.
 - 4.2.2. Insulation: Either loose hessian sacks of hay or straw in 6 layers or minimum 4 layers of plastic bubble wrap laid or wrapped so that it may be removed when the temperature rises to 6°C to permit necessary air movement to the mortar.
 - 4.2.3. Adjust the number of layers according to severity of frost anticipated.
 - 4.2.4. Polythene sheeting or tarpaulin to shed water clear of the protective under layers.
 - 4.3. Adequate protection from frost, including provision of warm air heating, remains the responsibility of the contractor.
 - 4.4. Protect during frosty weather for a minimum of 5 days removing layers to allow air movement when temperatures are above 6°C and re-instating as the temperature drops.
5. Frost attack of hydraulic lime mortars will produce a powder with little or no strength. This should be removed for the depth of the damage and replaced with a fresh application.

Ω End of Section

Z22 Sealants

Products

310 Joints

1. **Description:** a high-quality, neutral-cure silicone sealant designed specifically for sealing around lead, metal, and masonry.
2. **Drawing reference(s):** 2401, 2402
3. **Manufacturer:** Everbuild
 - 3.1. **Product reference:** Lead Mate
4. **Primer, backing strip, bond breaker:** Types recommended by sealant manufacturer.
5. **Fire performance**
 - 5.1. **Fire resistance:**
 - 5.2. **Reaction to fire (for rateable products):**

Execution

610 Suitability of joints

1. **Presealing checks**
 - 1.1. **Joint dimensions:** Within limits specified for the sealant.
 - 1.2. **Substrate quality:** Surfaces regular, undamaged and stable.
2. **Joints not fit to receive sealant:**

620 Preparing joints

1. **Surfaces to which sealant must adhere**
 - 1.1. **Remove temporary coatings, tapes, loosely adhering material, dust, oil, grease, surface water and contaminants that may affect bond.**
 - 1.2. **Clean using materials and methods recommended by sealant manufacturer.**
2. **Vulnerable surfaces adjacent to joints:** Mask to prevent staining or smearing with primer or sealant.
3. **Backing strip and/ or bond breaker installation:** Insert into joint to correct depth, without stretching or twisting, leaving no gaps.
4. **Protection:** Keep joints clean and protect from damage until sealant is applied.

630 Applying sealants

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

Ω End of Section



Specification created using NBS Chorus