

Manchester City Council

Aids and Adaptations

Ramps and Handrails

29-06-2022

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General notes for ramps and handrails:

- Surface materials to be smooth, easy to maintain and slip resistant.
- The colour and luminance of the ramp surface to contrast with that of the landings.
- A kerbed upstand, at least 100mm high and differentiated by colour and luminance contrast, to be provided on the open side.
- Handrails to be provided on both sides of all ramp.
- Handrails to be fixed 1000mm above the landings and 900mm above the ramp and not more than 100mm beyond the surface width of the ramp.
- Handrails to be of a circular profile, 40mm - 45mm in diameter.
- Handrails to be fixed 60mm - 75mm from any adjacent wall or surface.

D20

Excavating and filling

Generally/the site

110 Site investigation

1. **Report:** The report should give details and locations of trial pits or boreholes, including soils and strata details and groundwater levels.

145 Variations in ground water level

1. **Give notice:** If levels encountered are significantly different from levels in the site investigation report or previously measured.

150 Existing services, features and structures

1. **Services:** See section A12 for locations.
2. **Site features to be retained:** See section A12 for details.
3. **Structures:** See section A34 for details of protection.

Clearance/excavating

168 Site clearance

1. **Timing:** Before topsoil stripping, if any.
2. **General:** Clear site of rubbish, debris and vegetation. Do not compact topsoil.
3. **Treatment:** Apply a suitable non-residual herbicide to areas to receive planting

170 Removing small trees, shrubs, hedges and roots

1. **Identification:** Clearly mark trees to be removed.
2. **Small trees, shrubs and hedges:** Cut down.
3. **Roots:** Grub up and dispose of without undue disturbance of soil and adjacent areas.
4. **Safety:** Comply with Forest Industry Safety Accord safety leaflets.

220 Stripping topsoil

1. **General:** Before beginning general excavation or filling, strip topsoil from areas where there will be regrading, buildings, pavings/ roads and other areas shown on drawings.
2. **Depth**
 - 2.1. Remove to an average depth of 150 mm.
 - 2.2. Give notice where the depth of topsoil is difficult to determine.
3. **Handling:** Handle topsoil for reuse or sale in accordance with clause 225.
4. **Around trees:** Do not remove topsoil from below the spread of trees to be retained.
5. **Site storage:** Not required

221 Treating topsoil

1. **Treatment:** Apply a suitable translocated nonresidual herbicide.
2. **Timing:** Not less than two weeks before excavating topsoil.

225 Handling topsoil

1. **Standard:** To BS 3882.

2. **Aggressive weeds**
 - 2.1. **Species:** Notify the presence of species included in the Weeds Act, section 2, or the appropriate Wildlife and Countryside Act for the relevant jurisdiction.
 - 2.2. **Give notice:** Obtain instructions before moving topsoil.
3. **Contamination:** Do not mix topsoil with:
 - 3.1. Subsoil, stone, hardcore, rubbish or material from demolition work.
 - 3.2. Other soil or material containing aggressive weeds, sharps, plastics and non soil forming materials and notifiable animal or plant diseases.
 - 3.3. Oil, fuel, cement or other substances harmful to plant growth.
 - 3.4. Other classifications of topsoil.
4. **Multiple handling:** Keep to a minimum. Use topsoil immediately after stripping.

244 Excavations adjacent to existing foundations

1. **Prior to commencing excavation**
 - 1.1. Excavate trial pits adjacent to existing foundations to determine extent and formation levels.
 - 1.2. Allow for inspection of trial pits.
 - 1.3. Allow time for amendment of details if required.
 - 1.3.1. **Time period:** 10 working days
2. **Backfill material to new excavation:** to be confirmed by Contract Administrator

246 Excavations adjacent to pile supported structures

1. **Proximity:** When the formation level of an excavation will be lower than the pile cut off level and the distance between the near faces of the pile cap/ ground beam and the excavation is less than the difference in depth between the pile cap and the excavation formations.
 - 1.1. Delay the adjacent excavation until three days after casting the pile cap/ ground beam.

250 Permissible deviations from formation levels

1. **Beneath mass concrete foundations:** ± 25 mm.
2. **Beneath ground bearing slabs and r.c. foundations:** ± 15 mm.
3. **Embankments and cuttings:** ± 50 mm.
4. **Ground abutting external walls:** ± 50 mm, but such as to ensure that finished level is not less than 150 mm below dpc.

270 Foundations generally

1. **Give notice if**
 - 1.1. A natural bearing formation of undisturbed subsoil is not obtained at the depth shown on the drawings.
 - 1.2. The formation contains soft or hard spots or highly variable material.

290 Foundations in made up ground

1. **Depth:** Excavate down to a natural formation of undisturbed subsoil.
2. **Discrepancy:** Give notice if this is greater or less than depth given.

310 Unstable ground

1. **Generally:** Ensure that the excavation remains stable at all times.
2. **Give notice:** Without delay if any newly excavated faces are too unstable to allow earthwork support to be inserted.

3. **Take action:** If instability is likely to affect adjacent structures or roadways, take appropriate emergency action.

330 Unrecorded features

1. **Give notice:** If unrecorded foundations, beds, voids, basements, filling, tanks, pipes, cables, drains, manholes, watercourses, ditches, etc. not shown on the drawings are encountered.

350 Existing watercourses

1. **Diverted watercourses which are to be filled:** Before filling, remove vegetable growths and soft deposits.

Disposal of materials

415 Excavated topsoil removal

1. **General:** Remove from site.

450 Water

1. **Generally:** Keep all excavations free from water until:
 - 1.1. Formations are covered.
 - 1.2. Below ground constructions are completed.
2. **Drainage:** Form surfaces of excavations and fill to provide adequate falls.
3. **Removal of water:** Provide temporary drains, sumps and pumping as necessary. Do not pollute watercourses with silt laden water.

454 Ground water level, springs or running water

1. **Give notice:** If it is considered that the excavations are below the water table.
2. **Springs/ Running water:** Give notice immediately if encountered.

Filling

500 Proposed fill materials

1. **Details:** Submit full details of proposed fill materials to demonstrate compliance with specification, including:
 - 1.1. Type and source of imported fill.
 - 1.2. Proposals for processing and reuse of material excavated on site.
 - 1.3. Test reports as required elsewhere.

510 Hazardous, aggressive or unstable materials

1. **General:** Do not use fill materials which would, either in themselves or in combination with other materials or ground water, give rise to a health hazard, damage to building structures or instability in the filling, including material that is:
 - 1.1. Frozen or containing ice.
 - 1.2. Organic.
 - 1.3. Contaminated or noxious.
 - 1.4. Susceptible to spontaneous combustion.
 - 1.5. Likely to erode or decay and cause voids.
 - 1.6. With excessive moisture content, slurry, mud or from marshes or bogs.
 - 1.7. Clay of liquid limit exceeding 80 and/or plasticity index exceeding 55.
 - 1.8. Unacceptable, class U2 as defined in the 'Specification for highway works', clause 601.

520 Frost susceptibility

1. **General:** Except as allowed below, fill must be non frost-susceptible as defined in the 'Specification for highway works', clause 801.8.
2. **Test reports:** If the following fill materials are proposed, submit a laboratory report confirming they are non frost- susceptible:
 - 2.1. Fine grained soil with a plasticity index less than 20%.
 - 2.2. Coarse grained soil or crushed granite with more than 10% retained on a 0.063 mm sieve.
 - 2.3. Crushed chalk.
 - 2.4. Crushed limestone fill with average saturation moisture content in excess of 3%.
 - 2.5. Burnt colliery shale.
3. **Frost-susceptible fill:** May only be used:
 - 3.1. Within the external walls of buildings below spaces that will be heated. Protect from frost during construction.
 - 3.2. Where frost heave will not affect structural elements.

530 Placing fill

1. **Surfaces of excavations and areas to be filled:** Free from loose soil, topsoil, organic material, rubbish and standing water.
2. **Freezing conditions:** Do not place fill on frozen surfaces. Remove material affected by frost. Replace and recompact if not damaged after thawing.
3. **Adjacent structures, membranes and buried services**
 - 3.1. Do not overload, destabilise or damage.
 - 3.2. Submit proposals for temporary support necessary to ensure stability during filling.
 - 3.3. Allow 14 days (minimum) before backfilling against in situ concrete structures.
4. **Layers:** Place so that only one type of material occurs in each layer.
5. **Earthmoving equipment:** Vary route to avoid rutting.

535 Compaction generally

1. **General:** Compact fill not specified to be left loose as soon as possible after placing.
2. **After compaction:** Surface of each layer must be well closed, showing no movement under compaction plant, and without cracks, holes, ridges, loose material and the like.
3. **Defective areas:** Remove and recompact to full thickness of layer using new material.

710 Hardcore filling

1. **Fill:** Granular material, free from harmful matter and excessive dust, well graded, all pieces less than 75 mm in any direction:
2. **Material**
 - 2.1. **Permitted materials in any one layer**
 - 2.1.1. Crushed rock (other than argillaceous rock) or quarry waste with not more binding material than is required to help hold the stone together.
 - 2.1.2. Crushed concrete, crushed brick or tile, free from plaster, timber and metal.
 - 2.1.3. Crushed non-expansive slag.
 - 2.1.4. Gravel or hoggins with not more clay content than is required to bind the material together, and with no large lumps of clay.
 - 2.1.5. Well-burned non-plastic colliery shale.
 - 2.1.6. Natural gravel.
 - 2.1.7. Natural sand.

3. **Filling:** Spread and level in 150 mm maximum layers. Thoroughly compact each layer.

715 Venting hardcore layer

1. **Fill:** Clean granular material, well graded, passing a 75 mm BS sieve but retained on a 20 mm BS sieve. In each layer only one of the following:
 - 1.1. Crushed hard rock.
 - 1.2. Crushed concrete, crushed brick or tile, free from plaster, timber and metal.
 - 1.3. Gravel.
2. **Filling:** Spread and level in 150 mm maximum layers. Thoroughly compact each layer whilst maintaining enough voids to allow efficient venting.

730 Blinding

1. Surfaces to receive sheet overlays or concrete:
2. Blind with
 - 2.1. Concrete where shown on drawings; or
3. Sand, fine gravel, or other approved fine material applied to fill interstices. Moisten as necessary before final rolling to provide a flat, closed, smooth surface.
4. Sand for blinding: To BS EN 12620, grade 0/4 or 0/2 (MP).
5. Permissible deviations on surface level: +0/-25mm

Bioremediation - Not Used

'specification for highway works: earthworks specification' appendices - Not Used

Ω End of Section

F10

Brick/ block walling

Types of walling

385 Engineering brickwork

1. Description: TO RETAINING WALLS
2. Bricks: To BS EN 771-1.
 - 2.1. Manufacturer: Contractor's choice
 - 2.1.1. Product reference: Contractor's choice
 - 2.2. Mean compressive strength: Greater than or equal to 75 N/mm²
 - 2.2.1. Category: II
 - 2.3. Water absorption: Equal to or less than. 7.5%
 - 2.4. Freeze/ thaw category: F2.
 - 2.5. Active soluble salts content category: S2.
 - 2.6. Additional requirements: None
3. Mortar: As section Z21.
 - 3.1. Standard: To BS EN 998-2
 - 3.2. Mix: Submit proposals
 - 3.3. Additional requirements: None
4. Bond: To match existing / English
5. Joints: Flush.

Testing - Not Used

Workmanship generally

460 Mortar designations

1. Mix proportions: For a specified designation select a mix from the following:
 - 1.1. Designation (i) (BS EN 998-2 M12 equivalent)
 - 1.1.1. 1:0-1/4:3 (Portland cement:lime:sand with or without air entraining additive).
 - 1.1.2. 1:1:3 (Portland cement:sand and air entraining additive).
 - 1.2. Designation (ii) (BS EN 998-2 class M6 equivalent)
 - 1.2.1. 1:1/2:4-5 (Portland cement:lime:sand with or without air entraining additive).
 - 1.2.2. 1:3 (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).
 - 1.2.3. 1:2 1/2-3 1/2 (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
 - 1.2.4. 1:3-4 (Portland cement:sand and air entraining additive).
 - 1.3. Designation (iii) (BS EN 998-2 class M4 equivalent)
 - 1.3.1. 1:1:5-6 (Portland cement:lime:sand with or without air entraining additive).
 - 1.3.2. 1:3 1/2-4 (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).
 - 1.3.3. 1:4-5 (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
 - 1.3.4. 1:5-6 (Portland cement:sand and air entraining additive).

- 1.4. Designation (iv) (BS EN 998-2 class M2 equivalent)
 - 1.4.1.1:2:8-9 (Portland cement:lime:sand with or without air entraining additive).
 - 1.4.2.1:4½ (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).
 - 1.4.3.1:5½-6½ (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
 - 1.4.4.1:7-8 (Portland cement:sand and air entraining additive).
2. Batching: Mix proportions by volume.
3. Mortar type: Continuous throughout any one type of masonry work.

500 Laying generally

1. Mortar joints: Fill vertical joints. Lay bricks, solid and cellular blocks on a full bed.
2. AAC block thin mortar adhesive and gypsum block adhesive joints: Fill vertical joints. Lay blocks on a full bed.
3. Clay block joints
 - 3.1. Thin-layer mortar: Lay blocks on a full bed.
 - 3.2. Interlocking perpend: Butted.
4. Bond where not specified: Half-lap stretcher.
5. Vertical joints in brick and concrete block facework: Even widths. Plumb at every fifth cross joint.

520 Accuracy

1. Courses: Level and true to line.
2. Faces, angles and features: Plumb.
3. Permissible deviations
 - 3.1. Position in plan of any point in relation to the specified building reference line and/ or point at the same level: ± 10 mm.
 - 3.2. Straightness in any 5 m length: ± 5 mm.
 - 3.3. Verticality up to 3 m height: ± 10 mm.
 - 3.4. Verticality up to 7 m height: ± 14 mm.
 - 3.5. Overall thickness of walls: ± 10 mm.
 - 3.6. Level of bed joints up to 5 m (brick masonry): ± 11 mm.
 - 3.7. Level of bed joints up to 5 m (block masonry): ± 13 mm.

535 Height of lifts in walling using cement-gauged or hydraulic lime mortar

1. Quoins and advance work: Rack back.
2. Lift height (maximum): 1.2 m above any other part of work at any time.
3. Daily lift height (maximum): 1.5 m for any one leaf.

540 Height of lifts in walling using thin-layer mortar

1. Quoins and advance work: Rack back.
2. Lift height (maximum): 1.3 m above any other part of work at any time.

545 Levelling of separate leaves

1. Locations for equal levelling of cavity wall leaves: As follows:
 - 1.1. Every course containing vertical twist type ties or other rigid ties.
 - 1.2. Every third tie course for double triangle/ butterfly ties.

- 1.3. Courses in which lintels are to be bedded.

560 Coursing brickwork

1. Gauge: Four brick courses including bed joints to 300 mm.

561 Coursing brickwork with existing

1. Gauge: Line up with existing brick courses.

580 Laying frogged bricks

1. Single frogged bricks: Frog uppermost.
2. Double frogged bricks: Larger frog uppermost.
3. Frog cavity: Fill with mortar.

595 Lintels

1. Bearing: Ensure full length masonry units occur immediately under lintel ends.

610 Support of existing work

1. Joint above inserted lintel or masonry: Fully consolidated with semidry mortar to support existing structure.

620 Block bonding new walls to existing

1. Pocket requirements: Formed as follows:
 - 1.1. Width: Full thickness of new wall.
 - 1.2. Depth (minimum): 100 mm.
 - 1.3. Vertical spacing
 - 1.3.1. Brick to brick: 4 courses high at 8 course centres.
 - 1.3.2. Block to block: Every other course.
2. Pocket joints: Fully filled with mortar.

635 Jointing

1. Profile: Consistent in appearance.

645 Accessible joints not exposed to view

1. Jointing: Struck flush as work proceeds.

690 Adverse weather

1. General: Do not use frozen materials or lay on frozen surfaces.
2. Air temperature requirements: Do not lay bricks/ blocks:
 - 2.1. In cement-gauged mortars when at or below 3°C and falling or unless it is at least 1°C and rising.
 - 2.2. In hydraulic lime:sand mortars when at or below 5°C and falling or below 3°C and rising, or as manufacturer's/ supplier's recommendations.
 - 2.3. In thin-layer mortars when outside the limits set by the mortar manufacturer.
3. Temperature of walling during curing: Above freezing until hardened.
4. Newly erected walling: Protect at all times from:
 - 4.1. Rain and snow.
 - 4.2. Drying out too rapidly in hot conditions and in drying winds.

Additional requirements for facework

710 The term facework

1. **Definition:** Applicable in this specification to brick/ block walling finished fair.
 - 1.1. **Painted facework:** The only requirement to be waived is that relating to colour.

730 Brick/ Concrete block samples

1. **Selection of samples:** Representative of the range in variation of appearance.

750 Colour consistency of masonry units

1. **Colour range:** Submit proposals of methods taken to ensure that units are of consistent and even appearance within deliveries.
2. **Conformity:** Check each delivery for consistency of appearance with previous deliveries and with approved reference panels; do not use if variation is excessive.
3. Facing bricks should be blended on site from a minimum of three packs to ensure an even distribution of colour and texture variation.
4. **Finished work:** Free from patches, horizontal stripes and racking back marks.

760 Appearance

1. **Brick/ block selection:** Do not use units with damaged faces or arrises.
2. **Cut masonry units:** Where cut faces or edges are exposed cut with table masonry saw.
3. **Quality control:** Lay masonry units to match relevant reference panels.
 - 3.1. **Setting out:** To produce satisfactory junctions and joints with built-in features and components.
 - 3.2. **Coursing:** Evenly spaced using gauge rods. To produce satisfactory junctions and joints with built-in elements and components.
4. **Lifts:** Complete in one operation.
5. **Methods of protecting facework:** Submit proposals.

780 Ground level

1. **Commencement of facework:** Not less than 150 mm below finished level of adjoining ground or external works level.

790 Putlog scaffolding

1. **Use:** Not permitted in facework.

800 Toothed bond

1. **New and existing facework in same plane:** Bond together at every course to achieve continuity.

830 Cleanliness

1. **Facework:** Keep clean.
2. **Mortar on facework:** Allow to dry before removing with stiff bristled brush.
3. **Removal of marks and stains:** Rubbing not permitted.

Ω End of Section

F30

Accessories/ sundry items for brick/ block/ stone walling

Cavities

110 Concrete fill to base of cavity

1. Concrete generally: To BS EN 206 and BS 8500-2.
2. Extent: Maintain 75 mm between top of fill and external ground level and a minimum of 225 mm between top of fill and ground level dpc.
3. Placement: Compact to eliminate voids.

120 Cleanliness

1. Cavity base and faces, ties, insulation and exposed dpcs: Free from mortar and debris.

130 Perpend joint weep holes

1. Form: Open perpend joint.
2. Locations: Through outer leaf immediately above base of cavity, at cavity trays, stepped dpcs and external openings. 75 mm above top of cavity fill at base of cavity.
3. Provision: At not greater than 1000 mm centres and not less than two over each opening.

131 Bed joint weep holes

1. Form: Open 10 mm diameter hole.
2. Locations: Through outer leaf immediately above base of cavity at cavity trays, stepped dpcs and external openings. 75 mm above top of cavity fill at base of cavity.
3. Provision: At not greater than 1000 mm centres and not less than two over each opening.

132 Perpend joint plastics weep holes

1. Manufacturer: Submit proposals
 - 1.1. Product reference: Submit proposals
2. Locations: Through outer leaf immediately above base of cavity, at cavity trays, stepped dpcs and external openings. 75 mm above top of cavity fill at base of cavity.
3. Provision: At not greater than 1000 mm centres and not less than two over each opening.

160 Air bricks in external walling

1. Standard: To BS 493, class 1.
2. Manufacturer: Submit proposals
 - 2.1. Product reference: Submit proposals
3. Apertures: Rectangular hole
4. Work sizes: to match existing. DO NOT COVER AIR BRICK TO EXISTING STRUCTURE
5. Material/ Colour: To match adjoining masonry.
6. Placement: Built in with no gaps at joints.

Reinforcing/ fixing accessories - Not Used

Flexible damp proof courses/ cavity trays

320 Damp proof courses – plastics

1. Standard: To BS EN 14909

2. Manufacturer: Submit proposals
 - 2.1. Product reference: Submit proposals
3. Material: Submit proposals

Installation of dpcs/ cavity trays

415 Installation of horizontal dpcs

1. **Placement:** In continuous lengths on full even bed of fresh mortar, with 100 mm laps at joints and full laps at angles.
2. **Width:** At least full width of leaf unless otherwise specified. Edges of dpc not covered with mortar or projecting into cavity.
3. **Overlying construction:** Immediately cover with full even bed of mortar to receive next masonry course.
4. **Overall finished joint thickness:** As close to normal as practicable.

425 Installation of ground level dpcs

1. **Joint with damp proof membrane:** Continuous and effectively sealed.

435 Installation of stepped dpcs in external walls

1. **External walls on sloping ground:** Install dpcs not less than 150 mm above adjoining finished ground level.

445 Installation of sill dpcs

1. **Form and placement:** In one piece and turned up at back when sill is in contact with inner leaf.

455 Installation of coping/ capping dpcs

1. **Placement:** Bed in one operation to ensure maximum bond between masonry units, mortar and dpc.
2. **Dpcs crossing cavity:** Provide rigid support to prevent sagging.

495 Installation of gas resistant dpcs/ cavity trays

1. **Joint treatment:** Use continuous length wherever possible, otherwise lap at least 150 mm and seal to form a gas and watertight installation.
2. **Joint with damp proof membrane:** Overlap dpc/ cavity tray not less than 150 mm.

560 Installation of vertical dpcs

1. **Form:** In one piece wherever possible.
 - 1.1. **Joints:** Upper part overlapping lower not less than 100 mm.

570 Installation of jamb dpcs at openings

1. **Joint with cavity tray/ lintel at head:** Full underlap.
2. **Joint with sill/ horizontal dpc at base:** Full overlap.
3. **Projection into cavity:** Not less than 25 mm.
4. **Relationship with frame:** In full contact.

580 Installation of jamb dpcs to built-in timber frames

1. **Fixing:** Securely fastened to back of frame.
 - 1.1. **Fasteners:** Galvanized clout nails or staples.

Joins

610 Movement joints with sealant

1. Description: TO EXTERNAL FACING BRICKWORK
2. Joint preparation and sealant application: As section Z22.
3. Filler: Submit proposals
 - 3.1. Thickness: To match design width of joint.
 - 3.2. Manufacturer: Submit proposals
 - 3.2.1.Product reference: Submit proposals
 - 3.3. Placement: Build in as work proceeds with no projections into cavities and to correct depth to receive sealant system.
4. Sealant
 - 4.1. Designation: Submit proposals
 - 4.2. Manufacturer: Submit proposals
 - 4.2.1.Product reference: Submit proposals
 - 4.3. Colour: To match adjoining brickwork

630 Unexposed contraction joints

1. Formation: Close butt as work proceeds.

650 Pointing in flashings

1. Joint preparation: Free of debris and lightly wetted.
2. Pointing mortar: As for adjacent walling.
3. Placement: Fill joint and finish flush.

Proprietary sills/ lintels/ copings/ dressings - Not Used

Miscellaneous items - Not Used

Ω End of Section

Q10

Kerbs/ edgings/ channels/ paving accessories

Types of kerbs/edgings and channels

110 Proprietary precast concrete

1. Description: KERBS
2. Standard: To BS EN 1340.
3. Manufacturer: Contractor's Choice
 - 3.1. Product reference: Contractor's choice
4. Recycled content: Contractor's choice
5. Designations: EF Edging, flat top
6. Size (width x height x length): as per Schedule
7. Finish: As cast
8. Colour: Natural
9. Bedding: as per Schedule
10. Joints generally: Dry, 2-3 mm gap
11. Sealant movement joints: Not required
12. Accessories: as required

180 Drainage channel systems with gratings

1. Manufacturer: ACO Technologies plc or equally approved subject to written approval from Contractor's Administrator
 - 1.1. Product reference: Submit proposals
2. Size: Nominal bore 150 mm
3. Finish: As cast
4. Colour: Natural
5. Bedding: Cement mortar
6. Joints generally: Drain unions as required
7. Cover gratings: Galvanized steel, slotted
 - 7.1. Fixings: Hexagon head bolts with black moulded polypropylene protective cover caps
 - 7.2. Finish/ Colour: Galvanized

Roads/paving accessories/ marking/ demarcation - Not Used

Laying

510 Laying kerbs, edgings and channels

1. Cutting: Neat, accurate and without spalling. Form neat junctions.
 - 1.1. Long units (450 mm and over) minimum length after cutting: 300 mm.
 - 1.2. Short units minimum length after cutting: The lower of one third of their original length or 50 mm.
2. Bedding of units: Positioned true to line and levelled along top and front faces, in a mortar bed on accurately cast foundations or on a race of fresh concrete.
3. Securing of units: After bedding has set, secured with a continuous haunching of concrete or on a race of fresh concrete with backing concrete cast monolithically.

520 Adverse weather

1. **Conditions:** Do not construct if the temperature is below 3°C on a falling thermometer or 1°C on a rising thermometer. Adequately protect foundations, bedding and haunching against frost and rapid drying by sun and wind.

530 Concrete for foundations, races and haunching

1. **Standard:** To BS 8500-2.
2. **Designated mix:** Not less than GEN0 or Standard mix ST1.
3. **Workability:** Very low.

540 Cement mortar bedding

1. **General:** To section Z21.
2. **Mix (Portland cement:sand):** 1:3.
 - 2.1. **Portland cement:** Class CEM I 42.5 to BS EN 197-1.
 - 2.2. **Sand:** to BS EN 12620, grade 0/4 or 0/2 (MP).
3. **Bed thickness:** 12-40 mm.

543 Lime mortar bedding

1. **General:** To section Z21.
2. **Mix:** Submit proposals
3. **Bed thickness:** 12-40 mm.

547 Bedding/ Backing of units on fresh concrete races

1. **Standard:** To BS 7533-6.

550 Kerb dowels

1. **Dowels:** Steel bar to BS 4482.
 - 1.1. **Size:** 12 mm diameter, 150 mm long.
2. **Installation of dowels:** Vertically into foundation while concrete is plastic.
 - 2.1. **Centres:** To suit holes in kerbs.
 - 2.2. **Projection:** 75 mm.
3. **Grouting of holes in kerbs:** Filled with 1:3 cement:sand mortar finished flush.

560 Haunching dowels

1. **Dowels:** Steel bar to BS 4482.
 - 1.1. **Size:** 12 mm diameter, 150 mm long.
2. **Installation of dowels:** Vertically into foundation while concrete is plastic.
 - 2.1. **Centres:** 450 mm.
 - 2.2. **Distance from back face of kerb:** 50 mm.
 - 2.3. **Projection:** 75 mm.
3. **Haunching:** Rectangular cross section, cast against formwork, fully enclosing and protecting dowels.

570 Channels

1. **Installation:** To an even gradient, without ponding or backfall.
2. **Lowest points of channels:** 6 mm above drainage outlets.

580 Drainage channel systems

1. **Installation:** To an even gradient, without ponding or backfall. Commence laying from outlets.
2. **Silt and debris:** Removed from entire system immediately before handover.
3. **Washing and detritus:** Safely disposed without discharging into sewers or watercourses.

590 Drainage channel systems with built in fall

1. **Installation:** Top of channels level, installed in correct sequence to form an even gradient without ponding or backfall. Commence laying from outlets.
2. **Silt and debris:** Removed from entire system immediately before handover.
3. **Washings and detritus:** Safely disposed without discharging into sewers or watercourses.

600 Radius kerbs/ channels

1. **Usage:** Radii of 15 m or less.

610 Angle kerbs

1. **Usage:** Internal and external 90° changes of direction.
2. **Cutting of mitres:** Not permitted.

620 Accuracy

1. **Deviations (maximum)**
 - 1.1. **Level:** ± 6 mm.
 - 1.2. **Horizontal and vertical alignment:** 3 mm in 3 m.

625 Regularity of paved surfaces

1. **Maximum undulation of (non-tactile) paving surface:** 3 mm.
 - 1.1. **Method of measurement:** Under a 1 m straight edge placed anywhere on the surface (where appropriate in relation to the geometry of the surface).
2. **Difference in level between adjacent units (maximum)**
 - 2.1. **Joints flush with the surface:** Twice the joint width (with 5 mm max difference in level).
 - 2.2. **Recessed, filled joints:** 2 mm.
 - 2.2.1. **Recess depth (maximum):** 5 mm.
 - 2.3. **Unfilled joints:** 2 mm.
3. **Sudden irregularities:** Not permitted.

630 Narrow mortar joints

1. **Jointing:** Ends of units buttered with bedding mortar as laying proceeds. Joints completely filled, tightly butted and surplus mortar removed immediately.
 - 1.1. **Joint width:** 3 mm.

640 Tooled mortar joints

1. **Jointing:** Ends of units buttered with bedding mortar as laying proceeds. Joints completely filled and tooled to a neat flush profile.
 - 1.1. **Joint width:** 6 mm.

650 Sealant movement joints

1. **Joint filler:** Compressible cellular rubber or plastics compatible with specified sealant.

2. **Filler installation:** Built in as work proceeds, extending through haunching and foundation. Filler positioned accurately to fully support sealant at the recommended depth below exposed faces of units.
3. **Joint width:** 10 mm
4. **Sealant:** Contractor's choice
 - 4.1. **Colour:** Colour match to kerbs
5. **Sealant application:** As section Z22.

Ω End of Section

Q20

Granular sub-bases to roads/ pavings

To be read with preliminaries/ general conditions.

110 Thicknesses of sub-base/ subgrade improvement layers

1. Thicknesses: See sections: Q25 Slab/brick/sett/cobble pavings.

140 Excavation of subgrades

1. Final excavation to formation or subformation level: Carry out immediately before compaction of subgrade.
2. Soft spots and voids: Give notice.
3. Old drainage and service trenches: Give notice to Contract Administrator
4. Wet conditions: Do not excavate or compact when the subgrade may be damaged or destabilized.

145 Preparation and compaction of subgrades

1. Timing: Immediately before placing sub-base.
2. Soft or damaged areas: Obtain instructions
3. Compaction: Thoroughly, by roller or other suitable means, adequate to resist subsidence or deformation of the subgrade during construction and of the completed roads/ pavings when in use. Take particular care to compact fully at intrusions, perimeters and where local excavation and backfilling has taken place.

150 Subgrades for vehicular areas

1. Preparation and treatment: To Highways Agency 'Specification for highway works', clauses 616 and 617.

211 Granular material

1. Quality: Of a known suitability for use in sub-bases, free from excessive dust, well graded, all pieces less than 75 mm in any direction, minimum 10% fines value of 50 kN when tested in a soaked condition to BS 812-111 or a resistance to fragmentation of LA50 for the Los Angeles test to BS EN 1097-2, and in any one layer only one of the following:
 - 1.1. Crushed rock (other than argillaceous rock) or quarry waste with not more binding material than is required to help hold the stone together.
 - 1.2. Crushed concrete, crushed brick or tile, free from plaster, timber and metal.
 - 1.3. Gravel or hoggin with not more clay content than is required to bind the material together, and with no large lumps of clay.
 - 1.4. Natural gravel.
 - 1.5. Natural sand.
2. Filling: Spread and levelled in 150 mm maximum layers, each layer thoroughly compacted.

220 Frost susceptible granular material

1. Definition (non frost susceptible material): To Highways Agency 'Specification for highway works' clause 801.8.
2. Testing: Test materials used if required and supply certificates.

230 Placing granular material generally

1. Preparation: Loose soil, rubbish and standing water removed.

2. **Structures, membranes and buried services:** Ensure stability and avoid damage.

240 Laying granular sub-bases for vehicular areas

1. **General:** Spread and levelled in layers. As soon as possible thereafter compact each layer.
2. **Standard:** To Highways Agency 'Specification for highway works' clause 802.
3. **At drainage fittings, inspection covers, perimeters and where local excavation and backfilling has taken place:** Take particular care to compact fully.

241 Laying granular sub-bases for vehicular areas

1. **Proposals:** Well in advance of starting work submit details of:
 - 1.1. Maximum depth of each compacted layer.
 - 1.2. Type of plant.
 - 1.3. Minimum number of passes per layer.
2. **General:** Spread and levelled in layers. As soon as possible thereafter compact each layer.
3. **At drainage fittings, inspection covers, perimeters and where local excavation and backfilling has taken place:** Take particular care to compact fully.
4. **Defective areas:** Remove loose, segregated or otherwise defective areas to the full thickness of the layer and lay and compact new material.
5. **Sub-base surface after compaction and immediately before overlaying:** Uniformly well closed and free from loose material, cracks, ruts or hollows.

250 Laying granular sub-bases

1. **General:** Spread and levelled.
2. **Compaction**
 - 2.1. **Timing:** As soon as possible after laying.
 - 2.2. **Method:** By roller or other suitable means, adequate to resist subsidence or deformation of the sub-base during construction and of the completed paving when in use. Take particular care to compact fully at intrusions, perimeters and where local excavation and backfilling has taken place.

320 Surfaces to receive sand bedding for paving

1. **Blind surface:** As necessary before compaction to ensure that surface is tight and dense enough to prevent laying course sand being lost into it during construction or use.
2. **Material:** Sand or PFA

330 Cold weather working

1. **Frozen materials:** Do not use.
2. **Freezing conditions:** Do not place fill on frozen surfaces. Remove material affected by frost. Replace and recompact if not damaged after thawing.

340 Protection

1. **Sub-bases:** As soon as practicable, cover with subsequent layers, specified elsewhere.
2. **Subgrades and sub-bases:** Prevent degradation by construction traffic, construction operations and inclement weather.

Ω End of Section

Q25

Slab/ brick/ sett/ cobble pavings

General

120 Concrete flag paving system

1. Description: TO RAMP
2. Subgrade improvement layer: As section Q20
 - 2.1. Compacted thickness: as per Schedule 300 mm
3. Granular sub-base: As section Q20
 - 3.1. Compacted thickness: 300 mm
4. Base: as per Schedule
 - 4.1. Thickness: Submit proposals
5. Laying course: Full mortar bed, nominal thickness after compaction: 15-25 mm.
 - 5.1. Accessories: Submit proposals
6. Paving units: Concrete flags
7. Jointing: Site mixed mortar
 - 7.1. Bond: As indicated on Schedule

System performance

220 Design – concrete flag paving system

1. Design: Complete the design of the concrete slab paving system in accordance with BS 7533-4.
 - 1.1. Site category: IV, to BS 7533-4
2. Ground conditions: as per excavation
3. Performance criteria: To BS EN 1339
4. Proposals: Submit drawings, technical information, calculations and manufacturers' literature.

Products

315 Concrete flags

1. Standard: To BS EN 1339.
 - 1.1. Manufacturer: Submit proposals
 - 1.1.1. Product reference: Submit proposals
2. Recycled content: Contractor's choice
3. Colour: Natural
 - 3.1. Finish: Standard / Natural
 - 3.2. Nominal sizes: 600 x 600 x 50 mm
4. Arrises: Square

380 Lime for site mixed mortar

1. Standard: Nonhydraulic to BS EN 459-1, -2 and -3, type CL 90 or, if ready-mixed lime:sand, to BS EN 998-2.

390 Sand/ fine aggregate for unbound laying course and jointing of concrete flag paving

1. Standard: To BS 7533-4, unbound construction laying course and jointing material.

2. Purity: Free from deleterious salts, contaminants, lime and cement.
3. Procurement: Obtain from one source and ensure consistent grading.

Execution

620 Adverse weather

1. General
 - 1.1. Temperature: Do not lay or joint paving if the temperature is below 3°C on a falling thermometer or below 1°C on a rising thermometer.
 - 1.2. Frozen materials: Do not use. Do not lay bedding on frozen or frost covered bases.
2. Paving with mortar joints and/ or bedding
 - 2.1. Protect from frost damage, rapid drying out and saturation until mortar has hardened.
3. Paving laid and jointed in sand/ fine aggregate
 - 3.1. Stockpiled laying course sand/ fine aggregate: Protect from saturation.
 - 3.2. Exposed areas of unbound laying course and uncompacted areas of unbound paving: Protect from heavy rainfall.
 - 3.3. Saturated unbound laying course: Remove and replace, or allow to dry before proceeding.
 - 3.4. Laying dry sand/ fine aggregate jointed paving in damp conditions: Brush in as much jointing sand as possible. Minimize site traffic over paving. As soon as paving is dry, top up joints and complete compaction.

625 Laying pavings – general

1. Appearance: Smooth and even with regular joints and accurate to line, level and profile.
2. Falls: To prevent ponding.
3. Bedding of paving units: Firm so that rocking or subsidence does not occur or develop.
 - 3.1. Bedding/ Laying course: Consistently and accurately graded, spread and compacted to produce uniform thickness and support for paving units.
4. Slopes: Lay paving units upwards from the bottom of slopes.
5. Paving units: Free of mortar and sand stains.
6. Cutting: Cut units cleanly and accurately, without spalling, to give neat junctions with edgings and adjoining finishes.

630 Levels of paving

1. Permissible deviation from specified levels
 - 1.1. Generally: ± 6 mm.
2. Height of finished paving above features
 - 2.1. At gullies: +6 to +10 mm.
 - 2.2. At drainage channels and kerbs: +3 to +6 mm.

637 Regularity of paved surfaces

1. Maximum undulations in the surface of pavings (except tactile paving surfaces) under a 1 m straight edge placed anywhere on the surface (where appropriate in relation to the geometry of the surface): 3 mm.
2. Joints between paving units or utility access covers
 - 2.1. Joints flush with the surface: difference in level between adjacent units to be no more than twice the joint width (with a 5 mm max difference in level).
 - 2.2. Recessed, filled joints: difference in level between adjacent units to be no greater than 2 mm; the recess to be no deeper than 5 mm.

2.3. Unfilled joints: difference in level between adjacent units to be no greater than 2 mm.

3. Sudden irregularities: Not permitted.

645 Protection

1. **Cleanliness:** Keep paving clean and free from mortar droppings, oil and other materials likely to cause staining.
2. **Materials storage:** Do not overload pavings with stacks of materials.
3. **Handling:** Do not damage paving unit corners, arrises, or previously laid paving.
4. **Mortar bedded pavings:** Keep free from traffic after laying:
 - 4.1. Pedestrian traffic (minimum): 4 days
 - 4.2. Vehicular traffic (minimum): 10 days
5. **Access:** Restrict access to paved areas to prevent damage from site traffic and plant.

650 Cementitious bases and sub-bases

1. **General:** Protect from moisture loss, if not covered by another pavement course within 2 hours of completion.

655 Condition of sub-bases/ bases before spreading laying course

1. **Trenches and excavation of soft or loose spots in subgrade:** Fill and thoroughly compact.
2. **Granular surfaces:** Lay and compact so as to be sound, clean, smooth and close-textured enough to prevent migration of bedding/ laying course materials into the sub-base during compaction and use, free from movement under compaction plant and free from compaction ridges, cracks and loose material.
3. **Prepared existing and new bound bases (roadbases):** Sound, clean, free from rutting or major cracking. Remove sharp stones, projections and debris.
4. **Sub-base/ Roadbase level tolerances:** To BS 7533-7, Annex A.
5. **Levels and falls:** Accurate and within the specified tolerances.
6. **Drainage outlets:** Within 0-10 mm of the required finished level.
7. **Features in unbound paving (including mortar bedded restraints and drainage ironwork):** Complete to required levels; adequately bed and haunch in mortar.
8. **Sub-bases containing cement/ hydraulic binder:** Cure for minimum times specified in BS 7533-4.

685 Laying geotextile sheet overlays

1. **Location:** Immediately below the laying course.
2. **Laying:** Fit neatly at edge restraints and other features that interrupt the laying course, e.g. drainage fittings, channels, manholes and kerbs.
3. **Edge detail:** Turn sheet up to form an upstand against features, height not less than thickness of the laying course.

710 Laying flag and slab paving – sand/ fine aggregate laying course and jointing

1. **Standard:** In accordance with BS 7533-4.
2. **Flag installation and cutting:** To Interpave 'Concrete flag paving'.
3. **Joint width:** 2-5 mm.

715 Laying flag and slab paving – mortar laying course and jointing

1. **Standard generally:** In accordance with BS 7533-4.
2. **Flag installation and cutting:** To Interpave 'Concrete flag paving'.

3. Laying course

760 Laying precast concrete and gravel paving

1. Laying: Tamp down into lightly compacted laying course.
 - 1.1. Nominal thickness of laying course after compaction: 15-25mm
2. Filling: Allow to settle and refill level with surface.

Completion

915 Completion of paving with dry sand or fine aggregate filled joints

1. Sand dressing: as per Schedule
2. Final compaction of the surface course: In accordance with BS 7533-3.
3. Vacuum cleaning machines: Not allowed.

Ω End of Section

Z11

Purpose made metalwork

To be read with preliminaries/ general conditions.

310 Materials generally

1. Grades of metals, section dimensions and properties: To appropriate British Standards. When not specified, select grades and sections appropriate for the purpose.
2. Prefinished metal: May be used if methods of fabrication do not damage or alter appearance of finish, and finish is adequately protected.
3. Fasteners: To appropriate British Standards and, unless specified otherwise, of same metal as component being fastened, with matching coating or finish.

320 Steel long and flat products

1. Hot rolled structural steels (excluding structural hollow sections and tubes): To BS EN 10025-1.
2. Fine grain steels, including special steels: To BS EN 10025-3 and -4.
3. Steels with improved atmospheric corrosion resistance: To BS EN 10025-5.

330 Steel plate, sheet and strip

1. Plates and wide flats, high yield strength steel: To BS EN 10025-6.

340 Hot rolled steel plate, sheet and strip

1. Flat products, high yield strength for cold forming: To BS EN 10149-1, -2 and -3.
2. Carbon steel sheet and strip for cold forming: To BS EN 10111.
3. Narrow strip, formable steel and steel for general engineering purposes: To BS 1449-1.8 and BS 1449-1.14.

350 Cold rolled steel plate, sheet and strip

1. Steel sections: To BS EN 10162.
2. Flat products, high yield strength micro-alloyed steels for cold forming: To BS EN 10268.
3. Carbon steel flat products for cold forming: To BS EN 10130 and BS EN 10131.
4. Uncoated carbon steel narrow strip for cold forming: To BS EN 10139 and BS EN 10140.
5. Narrow strip steel for general engineering purposes: To BS EN 10132-1, -2, and -3.
6. Carbon steel flat products for vitreous enamelling: To BS EN 10209.

360 Coated steel flat products

1. Hot dip zinc coated carbon steel sheet and strip for cold forming: To BS EN 10346 and BS EN 10143.
2. Hot dip zinc coated structural steel sheet and strip: To BS EN 10143 and BS EN 10346.
3. Hot dip zinc-aluminium (za) coated sheet and strip: To BS EN 10346.
4. Hot dip aluminium-zinc (az) coated sheet and strip: To BS EN 10346.
5. Organic coated flat products: To BS EN 10169.

370 Steel structural hollow sections (SHS)

1. Non alloy and fine grain steels, hot finished: To BS EN 10210-1 and -2.
2. Non-alloy and fine grain steels, cold formed welded: To BS EN 10219-2.
3. Weather resistant steels, hot finished: To BS 7668.

380 Other steel sections

1. Equal flange tees: To BS EN 10055.
2. Equal and unequal angles: To BS EN 10056-1 and -2.
3. Wire, carbon steel for general engineering purposes: To BS 1052.
4. Wire and wire products, general: To BS EN 10218-2.
5. Tubes
 - 5.1. Seamless circular: To BS EN 10297-1.
 - 5.2. Seamless cold drawn: To BS EN 10305-1.
 - 5.3. Welded and cold sized square and rectangular: To BS EN 10305-5.
 - 5.4. Welded circular: To BS EN 10296-1.
 - 5.5. Welded cold drawn: To BS EN 10305-2.
 - 5.6. Welded cold sized: To BS EN 10305-3.

400 Stainless steel products

1. Chemical composition and physical properties: To BS EN 10088-1.
2. Sheet, strip and plate: To BS EN 10088-2.
3. Semi-finished products bars, rods and sections: To BS EN 10088-3.
4. Wire: To BS EN 1088-3.
5. Tubes
 - 5.1. Welded circular: To BS EN 10296-2.
 - 5.2. Seamless circular: To BS EN 10297-2.

410 Aluminium alloy products

1. Designations
 - 1.1. Designation system, chemical composition and forms: To BS EN 573-1, -2, -3 and -5.
 - 1.2. Temper designations: To BS EN 515.
2. Sheet, strip and plate: To BS EN 485-1 to -4.
3. Cold drawn rods, bars and tubes: To BS EN 754-1 and -2.
4. Extruded rods, bars, tubes and profiles: To BS EN 755-1 and -2.
5. Drawn wire: To BS EN 1301-1, -2 and -3.
6. Rivet, bolt and screw stock: To BS 1473.
7. Structural sections: To BS 1161.

420 Copper alloy products

1. Sheet, strip, plate and circles for general purposes: To BS EN 1652.
2. Sheet and strip for building purposes: To BS EN 1172.
3. Rods: To BS EN 12163.
4. Profiles and rectangular bars: To BS EN 12167.
5. Wire: To BS EN 12166.
6. Tubes: To BS EN 12449.

Fabrication

515 Fabrication generally

1. Contact between dissimilar metals in components: Avoid.

2. Finished components: Rigid and free from distortion, cracks, burrs and sharp arrises.
 - 2.1. Moving parts: Free moving without binding.
3. Corner junctions of identical sections: Mitre.

520 Cold formed work

1. Profiles: Accurate, with straight arrises.

525 Adhesive bonding

1. Preparation of surfaces of metals to receive adhesives
 - 1.1. Degrease.
 - 1.2. Abrade mechanically or chemically etch.
 - 1.3. Prime: To suit adhesive.
2. Adhesive bond: Form under pressure.

527 Welding

1. Welding procedures
 - 1.1. Method and standard: Metal arc welding to BS EN 1011-1 and -2.
 - 1.2. Welding Procedure Specification (WPS): Submit 2 copies before commencement of welding
2. Preparation
 - 2.1. Joint preparation: Clean thoroughly.
 - 2.2. Surfaces of materials that will be self-finished and visible in the completed work: protect from weld splatter.
3. Jointing
 - 3.1. Joints: Fully bond parent and filler metal throughout with no inclusions, holes, porosity or cracks.
 - 3.2. Dissimilar metals: Filler metal grade to be approved by a qualified metallurgist
 - 3.3. Strength requirements: Welds to achieve design loads.
 - 3.4. Heat straightening: Submit proposals
 - 3.5. Complex assemblies: Agree priority for welding members to minimize distortion caused by subsequent welds.
 - 3.6. Tack welds: Use only for temporary attachment.
 - 3.7. Jigs: Provide to support and restrain members during welding.
 - 3.8. Filler plates: Submit proposals
 - 3.9. Lap joints: Minimum 5 x metal thickness or 25 mm, whichever is greater.
 - 3.10. Weld terminations: Clean and sound.

530 Stainless steel fabrication

1. Guillotining or punching: Do not use for metal thicknesses greater than 10 mm.
2. Thermal cutting
 - 2.1. Carbonation in the heat affected zone: Remove, after cutting.
3. Bending
 - 3.1. Plates or bars: Cold bending radius not less than material thickness.
 - 3.2. Tubes: Cold bending radius not less than 2 x tube diameter.
4. Welding: In addition to general welding requirements:
 - 4.1. Protect adjacent surfaces from weld spatter.
 - 4.2. Pickle all welds before post fabrication treatments.

5. **Protection:** Provide protection to fabricated components during transit and on site.

555 Brazing

1. **Standard:** To BS EN 14324.
2. **Testing**
 - 2.1. **Destructive testing:** To BS EN 12797.
 - 2.2. **Nondestructive testing:** To BS EN 12799.

Finishing

710 Finishing welded and brazed joints visible in complete work

1. **Standard:** To BS EN ISO 8501-3.
2. **Butt joints:** Smooth, and flush with adjacent surfaces.
3. **Fillet joints:** Neat.
4. **Grinding:** Grind smooth where indicated on drawings.

745 Preparation for application of coatings

1. **General:** Complete fabrication, and drill fixing holes before applying coatings.
2. **Paint, grease, flux, rust, burrs and sharp arrises:** Remove.

780 Galvanizing

1. **Standard:** To BS EN ISO 1461.
2. **Preparation**
 - 2.1. **Vent and drain holes:** Provide in accordance with BS EN ISO 14713-1 and -2. Seal after sections have been drained and cooled.
 - 2.2. **Components subjected to cold working stresses:** Heat treat to relieve stresses before galvanizing.
 - 2.3. **Welding slag:** Remove.
 - 2.4. **Component cleaning:** To BS EN ISO 8501-3.

Completion

910 Documentation

1. **Submit**
 - 1.1. **Manufacturer's maintenance instructions.**
 - 1.2. **Guarantees, warranties, test certificates, record schedules and log books.**

920 Completion

1. **Protection:** Remove.
2. **Cleaning and maintenance:** Carry out in accordance with procedures detailed in fabricators' guarantees.

Ω End of Section

Z21 Mortars

Cement gauged mortars

110 Cement gauged mortar mixes

1. **Specification:** Proportions and additional requirements for mortar materials are specified elsewhere.

120 Sand for site made cement gauged masonry mortars

1. **Standard:** To BS EN 13139.
2. **Grading:** 0/2 (FP or MP).
 - 2.1. **Fines content** where the proportion of sand in a mortar mix is specified as a range (e.g. 1:1: 5-6):
 - 2.1.1. **Lower proportion of sand:** Use category 3 fines.
 - 2.1.2. **Higher proportion of sand:** Use category 2 fines.
3. **Sand for facework mortar:** Maintain consistent colour and texture. Obtain from one source.

131 Ready-Mixed lime:sand for cement gauged masonry mortars

1. **Standard:** To BS EN 998-2.
2. **Lime:** Nonhydraulic to BS EN 459-1.
 - 2.1. **Type:** CL 90S.
3. **Pigments for coloured mortars:** To BS EN 12878.

135 Site made lime:sand for cement gauged masonry mortars

1. **Permitted use:** Where a special colour is not required and in lieu of factory made ready-mixed material.
2. **Lime:** Nonhydraulic to BS EN 459-1.
 - 2.1. **Type:** CL 90S.
3. **Mixing:** Thoroughly mix lime with sand, in the dry state. Add water and mix again. Allow to stand, without drying out, for at least 16 hours before using.

160 Cements for mortars

1. **Cement:** To BS EN 197-1 and CE marked.
 - 1.1. **Types:** Portland cement, CEM I.
 - 1.1.1. **Portland limestone cement,** CEM II/A-L or CEM II/A-LL.
2. **Portland slag cement,** CEM II/B-S.
3. **Portland fly ash cement,** CEM II/B-V.
 - 3.1. **Strength class:** 32.5, 42.5 or 52.5.
4. **White cement:** To BS EN 197-1 and CE marked.
 - 4.1. **Type:** Portland cement, CEM I.
 - 4.2. **Strength class:** 52.5.
5. **Sulfate resisting Portland cement**
 - 5.1. **Type:** To BS EN 197-1 Sulfate resisting Portland cement, CEM I/SR and CE marked.
6. **To BS EN 197-1 fly ash cement,** CEM II/B-V and CE marked.
 - 6.1. **Strength class:** 32.5, 42.5 or 52.5.

7. **Masonry cement:** To BS EN 413-1 and CE marked.
 - 7.1. **Class:** MC 12.5.

180 Admixtures for site made cement gauged mortars

1. **Air entraining (plasticizing) admixtures:** To BS EN 934-3 and compatible with other mortar constituents.
2. **Other admixtures:** Submit proposals.
3. **Prohibited admixtures:** Calcium chloride, ethylene glycol and any admixture containing calcium chloride.

190 Retarded ready to use cement gauged mortar

1. **Standard:** To BS EN 998-2.
2. **Lime for cement:lime:sand mortars:** Nonhydraulic to BS EN 459-1.
 - 2.1. **Type:** CL 90S.
3. **Pigments for coloured mortars:** To BS EN 12878.
4. **Time and temperature limitations:** Use within limits prescribed by mortar manufacturer.
 - 4.1. **Retempering:** Restore workability with water only within prescribed time limits.

200 Storage of cement gauged mortar materials

1. **Sands and aggregates:** Keep different types/ grades in separate stockpiles on hard, clean, free-draining bases.
2. **Factory made ready-mixed lime:sand/ ready to use retarded mortars:** Keep in covered containers to prevent drying out or wetting.
3. **Bagged cement/ hydrated lime:** Store off the ground in dry conditions.

210 Making cement gauged mortars

1. **Batching:** By volume. Use clean and accurate gauge boxes or buckets.
 - 1.1. **Mix proportions:** Based on dry sand. Allow for bulking of damp sand.
2. **Mixing:** Mix materials thoroughly to uniform consistency, free from lumps.
 - 2.1. **Mortars containing air entraining admixtures:** Mix mechanically. Do not overmix.
3. **Working time (maximum):** Two hours at normal temperatures.
4. **Contamination:** Prevent intermixing with other materials.

Lime:sand mortars

310 Lime:sand mortar mixes

1. **Specification:** Proportions and additional requirements for mortar materials are specified elsewhere.

320 Sand for lime:sand masonry mortars

1. **Type:** Sharp, well graded.
 - 1.1. **Quality, sampling and testing:** To BS EN 13139.
 - 1.2. **Grading/ Source:** As specified elsewhere in relevant mortar mix items.

330 Ready prepared lime putty

1. **Type:** Slaked directly from CL 90 quicklime to BS 890, using an excess of water.
 - 1.1. **Maturation:** In pits/ containers that allow excess water to drain away.
 - 1.2. **Density of matured lime putty:** 1.3 - 1.4 kg/litre.

345 Admixtures for hydraulic lime:sand mortars

1. **Air entraining (plasticizing) admixtures:** To BS EN 934-3 and compatible with other mortar constituents.
2. **Prohibited admixtures:** Calcium chloride, ethylene glycol and any admixture containing calcium chloride.

350 Storage of lime:sand mortar materials

1. **Sands and aggregates:** Keep different types/ grades in separate stockpiles on hard, clean, free-draining bases.
2. **Ready prepared nonhydraulic lime putty:** Prevent drying out and protect from frost.
3. **Nonhydraulic lime:sand mortar:** Store on clean bases or in clean containers that allow free drainage. Prevent drying out or wetting and protect from frost.
4. **Bagged hydrated hydraulic lime:** Store off the ground in dry conditions.

360 Making lime:sand mortars generally

1. **Batching:** By volume. Use clean and accurate gauge boxes or buckets.
2. **Mixing:** Mix materials thoroughly to uniform consistency, free from lumps.
3. **Contamination:** Prevent intermixing with other materials, including cement.

370 Site prepared nonhydraulic lime:sand mortars

1. **Mixing:** Mix materials thoroughly by compressing, beating and chopping. Do not add water.
 - 1.1. **Equipment:** Roller pan mixer or submit proposals.
2. **Maturation period before use (maximum):** Seek instructions

390 Knocking up nonhydraulic lime:sand mortars

1. **Knocking up before and during use:** Achieve and maintain a workable consistency by compressing, beating and chopping. Do not add water.
 - 1.1. **Equipment:** Roller pan mixer or submit proposals.

400 Making hydraulic lime:sand mortars

1. **Mixing hydrated hydraulic lime:sand:** Follow the lime manufacturer's recommendations for each stage of the mix.
 - 1.1. **Water quantity:** Only sufficient to produce a workable mix.
2. **Working time:** Within limits recommended by the hydraulic lime manufacturer.

Ω End of Section



Specification created using NBS Chorus